PERIMETER AIR MONITORING REPORT
AUGUST 31, 2000 THROUGH MARCH 13, 2001
HUNTERS POINT SHIPYARD, PARCEL E
SAN FRANCISCO, CALIFORNIA

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Prepared for:

Southwest Division
Department of the Navy
Naval Facilities Engineering Command
Environmental Division
1220 Pacific Highway
San Diego, California 92132-5190

Prepared by:

IT Corporation
4005 Port Chicago Highway
Concord, California 94520-1120

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Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
AAMP	Ambient Air Monitoring Plan
ARB	Air Resources Board
AVOCS	automated volatile organic canister sampler
BAAQMD	Bay Area Air Quality Management District
Cal-EPA	State of California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain-of-Custody
DOD	Department of Defense
EPA	U.S. Environmental Protection Agency
HPS	Hunters Point Shipyard
IRP	Installation Restoration Program
IT	IT Corporation
metals	metals in suspended particulate matter
NPL	National Priority List
PAH	polynuclear aromatic hydrocarbons
PAMP	Perimeter Air Monitoring Plan
PCB	polychlorinated biphenyl
pg/m^3	picograms per cubic meter
PRG	preliminary remediation goals
PUF	polyurethane foam
PVC	polyvinyl chloride
SVOC	semivolatile organic compound
SWDiv	Southwest Division
TIC	tentatively identified compounds
Triple A	Triple A Machine Shop, Inc.
TSP	total suspended particulates
VOC	volatile organic compound

Executive Summary

A grass fire burned on Parcel E of the facility on August 16, 2000. After the surface fire was extinguished, subsurface smoldering was discovered. An initial 24-hour ambient air sample was collected downwind of the fire area on August 31, 2000, and an air-monitoring network was established around the perimeter of Parcel E on September 8, 2000. Air samples were collected at seven stations to determine if contaminants were migrating toward residential and commercial receptors. Additionally, work commenced to smother the subsurface smoldering by constructing a cap on top of the old landfill. The perimeter air-monitoring program continued from September 8, 2000 until the cap was structurally completed on March 13, 2001.

The objective of the perimeter ambient air monitoring at Parcel E was to identify any conditions requiring corrective measures necessary to assure that public health and the environment of the nearby community were not compromised by air emissions from the subsurface smoldering and landfill capping activities.

Integrated air sampling was conducted for volatile organic compounds, semivolatile organic compounds, pesticides and polychlorinated biphenyls (PCBs), metals in suspended particulate matter (metals), low resolution and high resolution dioxins/furans, chlorine compounds, and phosgene. A radioactivity sample was taken during a single sample period. Action levels for target analytes were based on a combination of existing Action Levels in the Parcel B Perimeter Air Monitoring Plan (PAMP) and EPA Preliminary Remediation Goals (PRGs).

The initial 24-hour sample collected August 31, 2000 through September 1, 2000 indicated that all compounds except benzene (detected at 4.63 micrograms per cubic meter [$\mu g/m^3$]) were below action levels. There were no detections of pesticides, PCBs, low-resolution dioxin/furan, or metals except for copper. PAHs of several types were detected at levels at least one order of magnitude below action levels. There were no detections of benzo(a)pyrene or related compounds. No compounds inconsistent with those expected from smoldering vegetative matter were detected.

The reported benzene concentration is above the PAMP and EPA PRG action level on a daily basis. The results for this initial sample are consistent with those observed during the Parcel E monitoring program. The highest concentration observed during that monitoring program was 5.91 $\mu g/m^3$.

During the Parcel E perimeter ambient air monitoring program, over 2,400 different analyses were conducted on the more than 1,700 samples collected from the seven station monitoring network from September 8, 2000 through March 13, 2001. Of the more than 150 target compounds or classes of compounds, 98 were not detected at any time during the program. Monitoring Stations A, B, and C, located along the western and northern parcel boundaries, tended to have fewer detections and lower observed concentrations than Stations D, E, F, and G, because they are usually upwind of Parcel E.

The following compounds and classes of compounds were not detected:

- Pesticides, except for one detection of endrin below action levels (231 samples)
- Chlorine or hydrogen chloride (104 samples)
- Phosgene (216 samples)
- Low resolution dioxins/furans (231 samples)
- Benzo(a)pyrene (231 samples)
- Cadmium (374 samples)
- Vinyl chloride (388 samples)

The following key compounds were detected, but did not exceed PAMP and PRG action levels:

- Lead
- Nickel
- High resolution dioxins/furans

Beryllium, chloroform, and chromium were detected in one, two, and five samples, respectively. The project average concentration for these compounds exceeded the PRG action level because one-half the reporting limit was used to calculate the average for each sample with a nondetected result. In the case of these three compounds, the reporting limits are substantially higher than the PRG action level. A single detection results in a project average that exceeds the PRG action level.

Benzene and carbon tetrachloride were frequently detected, and concentrations exceeded project duration PAMP or PRG action levels. These levels can be attributed to ambient air background levels. The project average benzene and carbon tetrachloride concentrations were less than the background benzene and carbon tetrachloride concentration reported for the Bay Area Air Quality Management District ambient air monitoring station on Arkansas Street in San Francisco. It is unlikely that the landfill fire or capping activities contributed to the observed concentration of these two compounds.

Arsenic and manganese were frequently detected, and observed concentrations exceeded project duration PAMP or PRG action levels or 24-hour PAMP action levels. These metals are naturally occurring in soil, and observed concentrations of these metals can be correlated with earth moving activities during cap construction and wind direction. Manganese was frequently observed above action levels during the Parcel B perimeter air monitoring program in 1998, 1999, 2000, and 2001. The manganese appears to be coming from the local soil at Hunters Point. Average arsenic concentrations did not exceed the project duration PAMP action level. The PRG action level for arsenic is five times lower than the reporting limit; thus, the project average concentration calculations, which are based on using one-half the detection limit for nondetects, result in an exceedance. Arsenic was detected at the detection limit numerous times and appears to also be coming from soil.

Bis(2-ethylhexyl)phthalate was frequently detected and observed concentrations exceeded project duration PAMP action levels. However, PRG action levels were not exceeded. This compound is ubiquitous in nature and is associated with polyvinyl chloride plastic, including gloves. This compound was frequently observed above action levels during the Parcel B perimeter air monitoring program in 1998, 1999, 2000, and 2001. The landfill fire does not appear to be the source of this compound.

A review of the detected compounds and their results indicate that combustion products, such as PAHs and dioxins/furans, directly attributable to the fire were not prevalent and were below project duration PAMP and annual PRG action levels.

Aroclor 1260 (PCB) was detected in 34 of 596 samples. The project duration PAMP action level of 0.01 $\mu g/m^3$ was not exceeded at any station. The annual average PRG action level of 0.0034 $\mu g/m^3$ was exceeded at sample Station F with a project average concentration of 0.00429 $\mu g/m^3$. Aroclor 1260 was above the PAMP action level of 0.01 $\mu g/m^3$ on a daily basis in nine samples at Station F. Aroclor 1260 was above the PRG action level of 0.0034 $\mu g/m^3$ on a daily basis in 27 samples (2 at Station E and 25 at Station F).

Almost all of the Aroclor 1260 detections were at monitoring Station F, which is in the southeast corner of the landfill area near the bay, near an area of Parcel E that has Aroclor 1260 contaminated surface soil. Detections of Aroclor 1260 began when landfill capping activities disturbed surface soil along the southern edge of Parcel E. As soon as the Aroclor 1260 results were received from the laboratory, steps were taken to minimize the heavy activity that generated dust in the Aroclor 1260 contamination area. These measures had a noticeable but minimal effect in reducing Aroclor 1260 concentrations. An area contaminated with

Aroclor 1260 was unknowingly chosen as the landfill liner laydown area because there was no other usable space near the cap. Concentrations of Aroclor 1260 ranging to 0.0432 $\mu g/m^3$ were observed at Station F during delivery and retrieval of the landfill liner. Additional mitigation measures were immediately undertaken to place gravel in the contaminated area to reduce airborne concentrations.

Review of the test results for all samples collected during the Parcel E perimeter ambient air monitoring program indicates the major concern is Aroclor 1260. The detected compounds and their results indicate that combustion products such as PAHs and dioxin/furans directly attributable to the fire were not prevalent and were below project duration PAMP and annual PRG levels. All of the other compounds were either not detected above the laboratory reporting limits, below action limits, above action limits and attributable to background, or naturally occurring in soil.

The Aroclor 1260 results are associated with soil at Parcel E and not outside sources or background levels normally associated with soil. Previous remediation/mitigation activities were not specifically designed to address the Aroclor 1260 surface soil contamination. Additional investigations and measures should be taken to prevent the Aroclor 1260 from becoming airborne and to mitigate risks posed to potential receptors.

1.0 Introduction

IT Corporation (IT) was contracted by the United States Navy, Southwest Division (SWDiv) to perform environmental remediation and air monitoring activities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), at the Parcel E industrial landfill at Hunters Point Shipyard (HPS) San Francisco, California (Figure 1, "Hunters Point Site Location and Parcel Location Map.") The remedial activities ongoing in nearby Parcel B of the shipyard include a perimeter air monitoring program. On August 16, 2000, a brushfire burned on Parcel E (the former industrial landfill), shown in Figure 1. After the surface fire was extinguished, subsurface smoldering was discovered. An initial 24-hour ambient air sample was collected downwind of the fire area on August 31, 2000, and the air-monitoring network from Parcel B was relocated to the perimeter of Parcel E on September 8, 2000. IT was contracted by the Navy to smother and eliminate the subsurface smoldering by constructing a cap on top of the old landfill. The perimeter air monitoring program continued from September 8, 2000, until the cap was structurally complete on March 13, 2001.

The objective of the perimeter ambient air monitoring at Parcel E was to assist in protecting the public health of the nearby community and environment by documenting concentrations of specific air contaminants and comparing them to specified levels. Perimeter air monitoring was performed at Parcel E to identify any conditions requiring corrective measures necessary to assure that public health and the environment were not compromised by air emissions from the subsurface fire and landfill capping activities. The results from all air monitoring conducted at Parcel E are summarized in this report.

1.1 Report Format

This report provides a description of the air-monitoring network and summarizes monitoring results for the project. The report contains the following sections:

- Section 2.0 Background
- Section 3.0 Air Monitoring Program
- Section 4.0 Results Discussion
- Section 5.0 Quality Assurance
- Section 6.0 Conclusions
- Section 7.0 References

2.0 Background

A summary of background information is presented below, including a description and historical account of land use at the site. The majority of the information presented in this section was taken from a Public Health Assessment Report (U.S. Public Health Service, 1994).

2.1 Site Description

The HPS site is located in the southeastern portion of San Francisco, California, as shown in Figure 1. It is bounded by an off-site residential and industrial community, the Hunters Point/ Bayview Area, on the west. The site occupies a total of 965 acres (500 acres on land and 465 acres in the San Francisco Bay). Originally, the landmass of the HPS was less than 100 acres. The Navy increased the land mass of HPS primarily by using earth from the surrounding hills as fill.

Parcel E consists of approximately 168 acres and is located in the southwest and southern portions of the HPS site. It is bordered by the bay to the south and east, Parcels A and D to the north and east, and the community to the west. The industrial landfill comprises approximately 46 acres in the northwest portion of Parcel E.

The Hunters Point/Bayview community is composed of residential, commercial, and industrial properties. A natural gas-fueled steam generating power plant is located about 1 mile north of HPS. The Southeast Sewage Treatment Plant for the City and County of San Francisco is located approximately 1 mile west of HPS. The Candlestick Point State Recreation Area and 3Com Park Professional Sports Stadium are located approximately 1 mile southwest of the site. Other industrial operations, such as concrete recycling, take place in the general vicinity.

2.2 Site History

The site has been used for over 100 years as a ship repair facility. The northern and eastern shores of HPS were used for ship repair with dry-dock and berthing facilities; however, the southern shore was not used for shipping activities.

Currently, the Navy is conducting investigations and remediation of the shipyard under CERCLA.

The Parcel E industrial landfill is located in an area that was created when the bay margin was filled with quarried and artificial materials and was used until 1974 to dispose of industrial wastes. These wastes may have included materials such as spent petroleum products, solvents, acids, caustics, detergent, paint sludge, sandblast grit, radioactive materials, and various other waste chemicals and liquids (Tetra Tech EM, Inc., 1998).

3.0 Air Monitoring Program

This air monitoring program was performed to assess the potential migration of air contaminants resulting from the subsurface landfill smoldering as well as from work activities at the site. The air sample collection and monitoring activities followed the procedures established in the Ambient Air Monitoring Plan (AAMP) for monitoring activities at Parcel E (IT, 2000) and the Perimeter Air Monitoring Plan (PAMP) for monitoring activities at Parcel B (IT, 1998a). This program consists of stationary-integrated air sample collection, meteorological data collection, and assessment of the data against established guidelines.

Integrated air sampling was conducted for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides and polychlorinated biphenyls (PCBs), metals in suspended particulate matter (metals), low resolution and high resolution dioxins/furans, chlorine compounds, phosgene, and radioactivity. Action levels for target analytes were established in the AAMP and are based on a combination of existing Action Levels in the Parcel B PAMP and EPA Preliminary Remediation Goals (PRGs) (EPA, 2000a) for all compounds that do not have an Action Level in the Parcel B PAMP. In addition to the PAMP Action Levels, all of the air monitoring data was also compared to the PRGs. The PRG data is presented for comparison purposes only.

All target compounds and associated PAMP Action Levels and PRGs are listed in Table 1, "Air Quality Target Compounds and Action Level Criteria for Integrated Sampling." The PAMP averaging period identifies the length of time the monitoring data were be averaged for comparisons with the PAMP Action Level. The EPA cancer and chronic PRG values are based on annual average concentrations.

Action levels are used to determine if the ambient air monitoring results constitute a potential health risk. Even though most of the action levels are based on project average concentrations, results were compared against the action levels on a daily basis. If the results exceeded the action levels, steps were taken to reduce the concentration of the contaminant.

Meteorological monitoring was conducted using the existing Parcel B meteorological station to collect data including wind speed, horizontal wind direction, ambient temperature, barometric pressure, and precipitation. Meteorological data were used in sampler flow calculations and to evaluate the air monitoring analytical results based on predominant wind direction.

The AAMP, which incorporated the Parcel B PAMP, was reviewed and approved by the Base Realignment and Closure Cleanup which is composed of the Navy, the EPA, the California Regional Water Quality Control Board, and the Department of Toxic Substances Control. The PAMP provides guidelines for the performance of perimeter air monitoring during the environmental restoration activities conducted at Parcel B and is the basis for perimeter monitoring activities at Parcel E.

3.1 Air Sampling Program

Parcel E air samples were collected at seven air sampling stations (Sample Stations A through G) at six perimeter locations as shown in Figure 2, "Air Monitoring Facility Locations." The locations were sited to assist in determining whether air contaminants were migrating from Parcel E toward residential and commercial receptors. Stations were not established along the southern edge of Parcel E near the bay because there are no nearby receptors in this direction. Station D was placed as near to the smoldering area of the landfill as possible to maximize potential detections of fire-related contaminants. Station G, collocated with Station D, was used to collect duplicate integrated samples to confirm the precision of sample collection. Sampling stations were located in areas clear of obstacles (e.g., trees, structures, etc.) at least two meters above the ground, on a flat base that allowed free flow of weather elements (precipitation and wind). The high-volume air sampling instruments were protected from the elements by stainless steel housings with air inlets that permitted air flow to sample collection media. Exhaust flow for the polyurethane foam (PUF) samplers was directed away from the inlet to prevent recycling of air.

Because of the unknown nature of the emissions, each sample was analyzed for all possible compounds for each analytical category. The analytical method used for each compound category is presented in the following table:

Compound Group	Analytical Method
Pesticides	EPA Method TO4A
PCBs	EPA Method TO4A
SVOCs	EPA Method TO13A
VOCs	EPA Method TO14A
Metals	EPA Methods IO2.1, 3.1, and 3.5
Dioxin/Furan (low resolution)	EPA Method TO-09A (modified)
Dioxin/Furan (high resolution)	EPA Method TO-09A
Chlorine Compounds	EPA SW-846 Method 0051 (modified)
Phosgene	EPA Method TO-06 (modified)
Radioactivity	Gamma-ray spectrometry, gross alpha/gross beta

As a quality control measure, duplicate samples and field blanks were collected at a rate of at least 10 percent of the total number of integrated air samples collected at the site. Duplicates of samples collected at Station D were collected at adjacent Station G and submitted for laboratory analyses. Blanks were carried into the field during sample collection, again at a minimum rate of 10 percent, and submitted for laboratory analyses with the samples collected from the stations.

Air samples were submitted to K Prime, Inc., (State of California, Environmental Laboratory Accreditation/Certification Process No. 1532), located in Santa Rosa, California, under chain-of-custody (COC) protocol. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, dioxins/furans, chlorine compounds, and phosgene in accordance with the AAMP. Samples collected for radioactive analysis were submitted to Barringer Laboratories, Inc., located in Golden, Colorado, under COC protocol.

The COC forms for all project samples are provided in Appendix A, "Chain-of Custody Forms." The sample volumes shown on the COCs were calculated on spreadsheets using data collected in the field and the on-site meteorological station. The volume calculation sheets are provided in Appendix B, "Volume Calculation Sheets."

3.1.1 Project Schedule

A project timeline is presented in Table 2, "Project Timeline." Initial monitoring for VOCs, SVOCs, metals, pesticides, PCBs, and low-resolution dioxins/furans was conducted at a single station downwind of the fire area on August 31, 2000. A six-station (Stations A-F) monitoring network began daily sampling on September 8, 2000. Initial pesticide, PCB, and low resolution dioxin/furan samples were taken during the September 8 through 9 sampling period, and initial VOC and metal samples were taken during the September 9 through 10 sampling period. The total suspended particulates (TSP) samplers used for sampling metal from September 17 through 18 were used to sample for radioactivity instead of metals. High-resolution dioxin/furan sampling began September 16 through 17 and continued every 8 days for five sampling periods through October 18 through 19. Chlorine compound and phosgene daily sampling began September 19 through 20.

The monitoring program was scaled back after results from the first month of daily monitoring were reviewed. The only SVOC detected above the PAMP Action Level was bis-2-ethylhexyl phthalate. This compound has been routinely detected in 1998, 1999, and 2000 was in the Parcel B ambient air monitoring program. Because this compound is ubiquitous and has been detected in the Hunters Point ambient air before the fire, it is unlikely to be a by-product of the fire. Therefore, SVOC monitoring was discontinued after the October 17 through 18 sampling period.

Pesticide and low resolution dioxin/furan monitoring was discontinued after the October 17 through 18 sampling period. No pesticides were detected with the exception of a single detection of endrin (Station F) during the September 9 through 10 sampling period. There were no detections of low-resolution dioxins/furans.

High resolution dioxin/furan monitoring was discontinued after the October 18 through 19 sampling period. Of 29 sampling events, only one 24-hour sample resulted in an exceedence of the PRG, which is based on an annual average concentration. The average dioxin/furan concentration at each sample station was less than 30 percent of the PRG.

Chlorine compound and phosgene monitoring continued daily until October 6 through 7. Except for particulate chlorides, attributed to sea salt spray from the bay, there were no detections. Following procedures established in the Parcel B PAMP for nondetected compounds, the sampling frequency was reduced to every second or third day. After continued nondetections in each sample, chlorine compounds and phosgene sampling was discontinued after the October 19 through 20 sampling period.

After the October 20 through 21 sampling period, VOC and metal monitoring frequency was reduced to approximately every 3 to 5 days. Up to that time, the only metal compound detected in excess of the PAMP action level was manganese, and the only VOC compound detected in excess of the PAMP action level was benzene. Benzene, a byproduct of gasoline combustion, was detected at concentrations that are similar to background levels observed at the Bay Area Air Quality Management District (BAAQMD) Arkansas Street Monitoring Station in San Francisco and that were relatively consistent between monitoring stations. Therefore, it is unlikely that the fire was a source of benzene emissions.

No monitoring occurred from November 22 through 27 as field activities were suspended so that monitoring equipment could be serviced and maintained after prolonged daily sampling. Due to inclement weather, reduced field work, and the Christmas and New Years holidays, monitoring occurred only during a single sampling period (January 5 through 6) between December 15 and January 29. From January 29 through March 13, PCB, VOC, and metal samples were taken approximately every 4 days.

The daily air monitoring activities are detailed in the Field Activity Daily Logs presented in Appendix C, "Field Activity Daily Logs."

3.1.2 PUF Samplers

PUF samplers were used to collect SVOC, pesticide, PCB, and low-resolution dioxin/furan data on PUF filters. A second set of PUF samplers was used to collect high-resolution dioxin/furan data on PUF filters. Each sample was taken over a 24-hour period. The filters were analyzed for SVOCs following EPA Method TO-13A (EPA, 1999a), for pesticides and PCBs following EPA Method TO-4A (EPA, 1999a), for low-resolution dioxins/furans following a modified EPA Method TO-09A (EPA, 1999a), and for high-resolution dioxins/furans following EPA Method TO-09A (EPA, 1999a).

3.1.3 TSP Samplers

TSP samplers were used to collect total suspended particulate on glass or quartz fiber filters. Each sample was taken over a 24-hour period. The filters were analyzed for metals according to EPA Methods IO 2.1, 3.1, and 3.5 (EPA, 1999b). The filters collected September 17 through 18 were analyzed for radioactivity using gamma-ray spectrometry and gross alpha/beta.

3.1.4 Volatile Organic Compound Samplers

VOC samplers utilized Summa canisters equipped with integrated mass flow controllers to collect ambient air samples. Each sample was taken over a 24-hour period. The air in each canister was analyzed for VOCs following EPA Method TO-14A (EPA, 1999a).

3.1.5 Chlorine Compound and Phosgene Samplers

Midget impingers and sampling pumps were used to collect particulate chloride, hydrogen chloride gas, chlorine gas, and phosgene samples. Chlorine compound samples were taken over a 24-hour period and phosgene samples were taken over a 1-hour period. During most 24-hour sampling periods, two phosgene samples were taken. The chlorine compound samples were analyzed using a modified EPA SW-846 Method 0051 (EPA, 1996). Phosgene samples were analyzed using a modified version of EPA Method TO-06 (EPA, 1999a).

The phosgene and chlorine samples are less quantitative in nature than the PUF and TSP samples because the large difference in volumes collected. The typical chlorine sample volume was 1.3 to 1.5 m^3 and the typical phosgene sample volume was 0.05 m^3. These volumes are substantially lower than the typical 35 m^3 PUF sample volume and 1,800 m^3 TSP sample volume.

3.2 Meteorological Data

The Meteorological Monitoring Station consists of a 10-meter tower with mounted instruments and a rain gauge. The tower was constructed at the site to obtain continuously recorded (on a 5-second basis) local climatic data. The station is located in Parcel B as shown in Figure 1. Wind speed, horizontal wind direction, ambient temperature, barometric pressure, and rainfall data were collected and were used to evaluate ambient air monitoring results, to determine upwind and downwind sampling locations, and to calculate actual air volume of samples.

The meteorological data is summarized for each day that samples were collected and is presented in Appendix D, "Meteorological Data." Wind rose plots are presented for each day that samples were collected and provide graphic representations of the frequency of wind direction and speed. From the wind roses, the predominant wind direction (i.e., the direction from which the wind was blowing) for the period can be used to determine the upwind and downwind stations for the sample period.

Wind roses for each day (that samples were collected), each month, and project duration are presented in Appendix E, "Wind Rose Plots." In general, during September, October, and March, the predominant wind was from the west. During these periods, Sampling Station A was upwind and Sampling Stations D, E, and G were downwind. During the months of November, December, January, and February, the wind was more variable with the most predominant directions being the west, north, and southeast. During these periods, each of the sampling stations could be upwind, downwind, or sidewind.

The potential differences between the wind direction data at Parcel B (where the meteorological tower is sited) and Parcel E (where the ambient air monitoring occurred) were examined. The approximate wind direction was recorded by field sampling crews on an hourly basis from September 16, 2000 through October 22, 2000. The field data were collected by observing a ribbon attached to the top of a 4-foot (1.3 meters) tall stake in the ground. Depending on the crew, the data was recorded in either 45-degree or 90-degree increments. A total of 466 instantaneous hourly observations was recorded. Discounting the 83 observations of calm conditions, 383 hourly observations were compared on an hour-by-hour basis to the data collected at the meteorological tower. The averaged-observed wind direction (direction from which the wind is blowing) was 250 degrees, and the average wind direction recorded at the tower was 235 degrees, with an average difference of 14 degrees. These data indicate that a qualitative correlation exists between the two data sets. A quantitative or absolute correlation cannot be made because the hourly Parcel B data are based on an average of 720 readings (one every 5 seconds), whereas the Parcel E data are based on a single observation. Further, the

Parcel B data were obtained from 10 meters above ground level compared to the Parcel E data that were obtained at 1.3 meters above ground level. The wind direction data for both parcels during this period is presented in Appendix F, Wind Correlation Data."

4.0 Results Discussion

The results of the air-sampling program are discussed in the following sections. Data from the single station sampling conducted downwind of the fire area on August 31, 2000, are presented separately from the seven-station daily sampling that began September 9, 2000.

All laboratory analytical reports are included in Appendix G, "Laboratory and Radioactivity Reports/Results": Appendix G-1, "Laboratory Analytical Reports, – VOC/TSP/PUF," contains the VOC/PUF/TSP reports; Appendix G-2, "Laboratory Analytical Reports – High Resolution Dioxin/Furan," contains the high-resolution dioxin/furan reports; Appendix G-3, "Laboratory Analytical Reports – Chlorine/Phosgene," contains the chlorine compound and phosgene reports; and Appendix G-4, "Radioactivity Report/Results," contains the radiological compound report.

4.1 Initial Sampling

An initial 24-hour sample was collected directly downwind of the fire area on August 31, 2000, through September 1, 2000. This station was located approximately where Station D was later located. Three ambient air samplers were located at this station. A PUF ambient air sampler for pesticides; PCBs; SVOCs, including polynuclear aromatic hydrocarbons (PAH); and low-resolution dioxins/furans was operated for approximately 24 hours at the station. In addition, a TSP ambient air sampler for metals, and an automated volatile organic canister sampler (AVOCS) for VOCs was operated simultaneously with the PUF sampler. A summary of the sampling results from the initial sampling conducted between August 31 and September 1, 2000, is presented in Table 3, "Initial Sampling Results." The laboratory report is included in Appendix G-1.

All compounds were below action levels except for benzene. There were no detections of pesticides, PCBs, low-resolution dioxin/furan, or metals, except for copper. PAHs of several types were detected at levels at least one order of magnitude below action levels. There were no detections of benzo(a)pyrene or related compounds such as benzo(a)anthracene.

Benzene was detected at 4.63 micrograms per cubic meter ($\mu g/m^3$), which is above the PAMP and EPA PRG action level on a daily basis. The highest level observed during the Parcel E monitoring program was 5.91 $\mu g/m^3$ at Station F during the February 1 and 2 sampling period.

The average level observed during the program was 1.3 $\mu g/m^3$. The 1999 mean benzene concentration observed at the BAAQMD Monitoring Station on Arkansas Street in San

Francisco was 2.07 µg/m^3. The results for this sample are consistent with what was observed during the Parcel E monitoring program.

This initial sample did not reveal detections of compounds other than those expected from smoldering brush and vegetation.

4.2 Monitoring Program Results

The daily sampling program data is summarized by sampling station for all detected compounds in Appendix H, "Results Summary by Compound." The project average concentration for each detected compound by sampling station is presented in Table 4, "Project Average Air Concentrations of Detected Compounds." When calculating averages, one-half the reporting limit was assumed for all undetected compounds (EPA, 2000b). All target compounds that were not detected in any sample at any monitoring station during the entire sampling program are listed in Table 5, "Non-Detected Target Compounds."

Daily summary tables, shown in Appendix I-1, "Daily Detection Summaries – VOC/TSP/PUF," and Appendix I-2, "Daily Detection Summaries – High Resolution Dioxins/Furans," present sampling data for each detected compound during the sampling period. The high-resolution dioxin/furan data in Appendix I-2 is presented as 2,3,7,8-TCDD equivalents. This is calculated by summing the products of each dioxin/furan cogener by its cogener-specific 2,3,7,8-TCDD equivalent using international toxic equivalent factors (Cal EPA, 1999).

During the project, the daily laboratory results, which are presented as 24-hour average concentrations, were compared to the PAMP Action Levels and the PRGs even though most of the PAMP Action Levels and all of the PRGs are based on long-term averages (quarter, project duration, or annual). Table 6, "Concentrations above PAMP/PRG – Daily Basis," lists, by sample date, each time results were above a PAMP Action Level or a PRG on a daily basis. These data are presented by compound group in Table 7, "Results Summary," showing whether any target compound group were detected, and, if detected, whether it was detected above or below the PAMP Action Level or PRG.

4.2.1 Compounds Exceeding Applicable PAMP or PRG Action Levels

Table 8, "PAMP Action Level Exceedances," identifies compounds that exceeded the applicable 24-hour or project duration averaging period PAMP Action Level. Table 9, "PRG Exceedances," identifies compounds that exceeded the annual average PRGs. The potential emission sources of each compound listed in these tables and the likelihood that observed concentrations are influenced for site emissions are discussed below.

Benzene

Benzene was detected in 306 samples of 388 samples (47 at Station A, 49 at Station B, 45 at Station C, 51 at Station D, 49 at Station E, 46 at Station F, and 19 at Station G) during 60 sampling periods. The minimum detection was 0.32 $\mu g/m^3$ and the maximum detection was 5.91 $\mu g/m^3$.

The project duration PAMP and annual average PRG action level of 0.32 and 0.25 $\mu g/m^3$, respectively, were exceeded at all seven sampling stations. The average observed concentration at each station ranged from 0.94 $\mu g/m^3$ to 1.21 $\mu g/m^3$.

Benzene was above the PAMP and PRG action level on a daily basis in 306 samples (47 at Station A, 49 at Station B, 45 at Station C, 51 at Station D, 49 at Station E, 46 at Station F, and 19 at Station G) of the 306 detected samples. The action levels for benzene are at or below the laboratory reporting limits, thus any detection is above the action level.

Benzene is a by-product of gasoline combustion and is common in urban areas. The BAAQMD monitors the benzene concentration at a site on Arkansas Street in San Francisco. In 1999, the mean benzene concentration was 2.07 $\mu g/m^3$ (Air Resources Board [ARB], 1999). Because the project duration average benzene concentrations at each sampling station were less than the background concentrations as measured by the air district, it is unlikely that emissions from Parcel E contributed significantly to the observed data. Additionally, on a daily basis, benzene concentrations did not vary much between sampling stations, further indicating that the site was not a significant source of benzene emissions.

Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate was detected in 160 of 231 samples (28 at Station A, 26 at Station B, 22 at Station C, 30 at Station D, 21 at Station E, 23 at Station F, and 10 at Station G) during 36 sampling periods. The minimum detection was 0.0006 $\mu g/m^3$ and the maximum detection was 0.7440 $\mu g/m^3$.

The project average PAMP of 0.018 $\mu g/m^3$ was exceeded at Sampling Stations A, B, D, and E. None of the station averages exceeded the PRG action level of 0.48 $\mu g/m^3$. The average observed concentration at each station ranged from 0.0074 $\mu g/m^3$ to 0.038 $\mu g/m^3$.

Bis(2-ethylhexyl)phthalate was above the PAMP action level of 0.018 $\mu g/m^3$ on a daily basis in 19 samples (2 at Station A, 2 at Station B, 2 at Station C, 3 at Station D, 4 at Station E, 4 at Station F, and 2 at Station G) of the 160 detected samples. Bis(2-ethylhexyl)phthalate was above the PRG action level of 0.48 μg/m^3 on a daily basis in three samples (1 at Station A, 1 at Station B, and 1 at Station F) of the 160 detected samples.

Bis(2-ethylhexyl)phthalate is found in many materials from polyvinyl chloride (PVC) pipe to rubber gloves. The concentrations shown in the sampling results could easily be influenced by the presence of these materials nearby the sampling stations. In addition, the concentrations at each station for each sampling period are relatively constant. Bis(2-ethylhexyl)phthalate as well as other phthalates were detected several times in the field blank ranging in concentrations from 0.0036 to .006 μg/m$^{3.}$ The site was not likely a significant emitter of bis(2-ethylhexyl)phthalate.

Manganese

Manganese was detected in 321 of 376 samples (43 at Station A, 48 at Station B, 47 at Station C, 57 at Station D, 53 at Station E, 54 at Station F, and 19 at Station G) over 59 sampling periods. The minimum detection was 0.012 μg/m^3 and the maximum detection was 0.294 μg/m^3.

Manganese exceeded the 24-hour PAMP action level of 0.05 μg/m^3 in 120 samples (9 at Station A, 8 at Station B, 16 at Station C, 43 at Station D, 16 at Station E, 19 at Station F, and 9 at Station G) of the 321 detected samples. The annual average PRG of 0.051 μg/m^3 was exceeded at Sampling Stations D and G. The average observed concentration at each station ranged from 0.026 μg/m^3 to 0.088 μg/m^3.

Manganese was above the PRG action level of 0.051 μg/m^3 on a daily basis in 119 samples (9 at Station A, 8 at Station B, 16 at Station C, 43 at Station D, 15 at Station E, 19 at Station F, and 9 at Station G) of the 321 detected samples.

Most of the exceedences of the 24-hour PAMP action level were observed in Station D, which is predominately a downwind station. A majority of the exceedences occurred during September and early October when substantial earth moving activities were occurring. Manganese is a common constituent of the local soil and is often observed in the Parcel B air monitoring. The source of manganese emissions is most likely fugitive dust from the surrounding area. It is unlikely that the fire was a source of manganese emission.

Arsenic

Arsenic was detected in 41 of 376 samples (4 at Station A, 3 at Station B, 9 at Station C, 14 at Station D, 3 at Station E, 6 at Station F, and 2 at Station G) over 27 sampling periods. The minimum detection was 0.002 μg/m^3 and the maximum detection was 0.005 μg/m^3.

The project duration PAMP action level of 0.014 $\mu g/m^3$ was not exceeded at any monitoring station. The annual average PRG action level of 0.00045 $\mu g/m^3$ was exceeded at all seven sampling stations. The average observed concentration at each station ranged from 0.00105 $\mu g/m^3$ to 0.00142 $\mu g/m^3$. In most cases, arsenic was detected at the reporting limit (0.002 $\mu g/m^3$). In addition, one-half the detection limit is 2½ times greater than the PRG, which makes the average concentration calculations automatically exceed the PRG action level.

Arsenic was not above the PAMP action level of 0.014 $\mu g/m^3$ on a daily basis in any of the 41 detected samples. Arsenic was above the PRG action level of 0.00045 $\mu g/m^3$ on a daily basis in 41 samples (4 at Station A, 3 at Station B, 9 at Station C, 14 at Station D, 3 at Station E, 6 at Station F, and 2 at Station G) of the 41 detected samples. The PRG action level for arsenic is a factor of 5 below the laboratory reporting limits; thus, any detection is above the action level.

Most of the detections of arsenic were observed in Station D, which is predominately a down-wind station. A majority of the detections occurred during mid September and early October when substantial earth moving activities were occurring. Arsenic is a component of the local soil. The arsenic concentrations did not vary much over time or between sampling stations. The source of arsenic emissions is most likely fugitive dust from activities involving local and imported soil. It is unlikely that the fire was a source of arsenic emissions.

Beryllium

Beryllium was detected in one of 376 samples (at Station C) over one sampling period. The air concentration detected was 0.013 $\mu g/m^3$. The project duration PAMP action level of 0.03 $\mu g/m^3$ was not exceeded at any monitoring station. The annual average PRG action level of 0.0008 $\mu g/m^3$ was exceeded at sampling Station C. The calculated average concentration of 0.00627 $\mu g/m^3$ resulted from the fact that average concentration calculations were performed using one-half the reporting limit of 0.012 $\mu g/m^3$ (0.006 $\mu g/m^3$) for all of the other non-detect sampling periods. This automatically causes the average concentration to exceed the PRG action level because the reporting limit is a factor of 15 times the PRG.

Beryllium was not above the PAMP action level of 0.03 $\mu g/m^3$ on a daily basis for the one detected sample. Beryllium was above the PRG action level of 0.0008 $\mu g/m^3$ on a daily basis in the one detected sample at Station C. The PRG action level for beryllium is a factor of 15 below the laboratory reporting limits; thus, any detection is above the action level.

Total Chromium

Chromium was detected in five of 376 samples (1 at Station C, 1 at Station D, 1 at Station E, 1 at Station F, and 1 at Station G) over three sampling periods. The minimum detection was 0.083 $\mu g/m^3$ and the maximum detection was 0.503 $\mu g/m^3$.

The project duration PAMP action level of 0.042 $\mu g/m^3$ was not exceeded at any station. The annual average PRG of 0.00016 $\mu g/m^3$ was exceeded at sampling Stations C, D, E, F, and G. The average observed concentration at each station ranged from 0.0260 $\mu g/m^3$ to 0.0344 $\mu g/m^3$. There was only one detection at each of the stations. In addition, the reporting limit (0.0250 $\mu g/m^3$) is 150 times greater than the PRG, which makes the average concentration calculations using one-half the reporting limit exceed the PRG action level.

Chromium was above the PAMP action level of 0.042 $\mu g/m^3$ on a daily basis in five samples (1 at Station C, 1 at Station D, 1 at Station E, 1 at Station F, and 1 at Station G) of the 5 detected samples. Chromium was above the PRG action level of 0.00016 $\mu g/m^3$ on a daily basis in five samples (1 at Station C, 1 at Station D, 1 at Station E, 1 at Station F, and 1 at Station G) of the 5 detected samples. The PRG action level for chromium is a factor of 150 below the laboratory reporting limits; thus, any detection is above the action level.

The chromium detections occurred in late February and early March 2001 during three of the last four sampling events. The chromium appears to be unrelated to the fire because the detections occurred when the landfill cap was almost complete.

The PRG for total chromium is based on an assumed chromium VI to chromium III ratio of 1:6. Because chromium VI is much more toxic than chromium III, the PRG may not be applicable to the observed total chromium concentrations. Further, the sampling method used only reports total chromium. Information as to the site-specific chromium VI to chromium III ratio is not available to accurately determine whether the PRG was actually exceeded. To be conservative, because this information is not available, we have reported the results assuming the chromium VI to chromium III ratio is 1:6.

Carbon Tetrachloride

Carbon tetrachloride was detected in 69 of 388 samples (8 at Station A, 13 at Station B, 9 at Station C, 9 at Station D, 13 at Station E, 11 at Station F, and 6 at Station G) over 27 sampling periods. The minimum detection was 0.629 $\mu g/m^3$ and the maximum detection was 1.636 $\mu g/m^3$. There is no established PAMP action level for carbon tetrachloride. The annual average PRG of

0.13 μg/m^3 was exceeded at all seven sampling stations. The average observed concentration at each station ranged from 0.396 μg/m^3 to 0.466 μg/m^3.

Carbon tetrachloride was above the PRG action level of 0.13 μg/m^3 on a daily basis in 69 samples (8 at Station A, 13 at Station B, 9 at Station C, 9 at Station D, 13 at Station E, 11 at Station F, and 6 at Station G) of the 69 detected samples. The PRG action level for carbon tetrachloride is almost a factor of 5 below the laboratory reporting limits; thus, any detection is above the action level.

The BAAQMD monitors the carbon tetrachloride concentration at a site on Arkansas Street in San Francisco. In 1996, the last year for which a mean concentration of carbon tetrachloride was available, the mean concentration was 0.49 μg/m^3 (ARB, 1996). The median carbon tetrachloride concentration observed in 1997 and 1998 was 0.69 μg/m^3 (ARB, 1996). Because the project duration average carbon tetrachloride concentrations at each sampling station were less than the background concentrations as measured by the air district, it is unlikely that emissions from Parcel E contributed significantly to the observed data.

Chloroform

Chloroform was detected in two of 388 samples (1 at Station C, and 1 at Station D) over 2 sampling periods. The minimum detection was 1.170 μg/m^3 and the maximum detection was 1.220 μg/m^3. There is no established PAMP action level for chloroform. The annual average PRG action level of 0.084 μg/m^3 for chloroform was exceeded at sampling Stations C and D. The average observed concentration at each station ranged from 0.551 μg/m^3 to 0.601 μg/m^3. There was only 1 detection at each station. In addition, the reporting limit (1.0 μg/m^3) is 12 times greater than the PRG, which makes the average concentration calculations using one-half the reporting limit exceed the PRG action level.

Chloroform was above the PRG action level of 0.084 μg/m^3 on a daily basis in 2 samples (1 at Station C and 1 at Station D) of the 2 detected samples. The PRG action level for chloroform is almost a factor of 12 below the laboratory reporting limits; thus, any detection is above the action level.

Aroclor 1260 (PCB)

Aroclor 1260 (PCB) was detected in 34 of 596 samples (1 at Station A, 4 at Station E, and 29 at Station F) over 29 sampling periods. The minimum detection was 0.003 μg/m^3 and the maximum detection was 0.043 μg/m^3. The project duration PAMP action level of 0.01 μg/m^3 was not exceeded at any station. The annual average PRG action level of 0.0034 μg/m^3 was exceeded at sample Station F. The average observed concentrations ranged from 0.00153 $\mu g/m^3$ to 0.00429 $\mu g/m^3$.

Aroclor 1260 was above the PAMP action level of 0.01 $\mu g/m^3$ on a daily basis in nine samples (at Station F) of the 34 detected samples. Aroclor 1260 was above the PRG action level of 0.0034 $\mu g/m^3$ on a daily basis in 27 samples (2 at Station E and 25 at Station F) of the 34 detected samples.

Almost all of the Aroclor 1260 detections were observed at monitoring Station F, which is located in the southeast corner of the landfill area near the bay. This station is near a known area in parcel E that has surface soil contamination of Aroclor 1260. The detections of Aroclor 1260 did not occur until landfill capping activities began. The highest concentrations are associated with periods of heavy activity, which disturbed surface soil along the southern edge of Parcel E near the bay. As soon as the Aroclor 1260 results were received from the laboratory, steps were taken to try to minimize dust generation and activities in the Aroclor 1260 contamination area. These measures were somewhat effective in that concentrations began to drop. An area contaminated with Aroclor 1260 was unknowingly chosen as the landfill liner laydown area because of the lack of other usable space near the cap. Concentrations of Aroclor 1260 ranging to 0.0432 $\mu g/m^3$ were observed at Station F during periods, in which the landfill liner was delivered and retrieved. Additional mitigation measures were immediately undertaken to place gravel in the contaminated area, and this reduced airborne concentrations.

The last sampling period that Aroclor 1260 concentrations were above the PAMP action level was October 4 and 5. Concentrations of Aroclor 1260 above the PRG action level on a daily basis continued until sampling period December 14 and 15. Because of detections of Aroclor 1260, sampling for PCBs was continued throughout the monitoring program.

The Aroclor 1260 results are directly associated with Parcel E and are not coming from outside sources or from background levels normally associated with soil. The results for all of the other compounds that exceeded action levels can be attributed in whole or part to ambient air background concentrations or naturally occurring metals in soil. The landfill cap did not address the Aroclor 1260 surface soil contamination issue. Therefore, it is likely that wind and activities in this area will continue to allow Aroclor 1260 to become airborne. This continues to pose a risk to receptors.

4.2.2 Compounds Not Exceeding Applicable PAMP or PRG Action Levels

The following sections discuss results for compounds that did not exceed a project average PAMP or PRG action level or a 24-hour PAMP action level. The discussion is grouped by class of compound: SVOCs, metals, VOCs, pesticides, PCBs, dioxins/furans, chlorine compounds, and phosgene. Compounds that exceeded the project average PAMP or PRG action level or a 24-hour PAMP action level were discussed above.

Occasionally, some results for the compounds discussed below were above a project average PAMP or PRG action level on a daily basis. Results above the project average PAMP action level on a daily basis are shown in Table 10, "Concentrations above PAMP Action Level – Daily Basis." Results above the annual PRG action level on a daily basis are shown in Table 11, "Concentrations above PRG – Daily Basis." These results do not indicate that an action level was exceeded. There are provided as a reference to understand an individual day of sampling results.

4.2.2.1 Semi-Volatile Organic Compounds

Two hundred thirty-one samples were analyzed for SVOCs during 38 sampling periods. Of the 59 target compounds, 45 were not detected in any samples (see Table 5). Key compounds that were not detected include pentachlorophenol as well as benzo(a)pyrene and related compounds. The detection statistics for each of the detected compounds is presented in Table 12, "Detected Compound Statistics," and summarized below.

2-Methylnaphthalene

2-Methylnaphthalene was detected in two of 231 samples (both at Station A) over two sampling periods. The minimum detection was 0.00316 $\mu g/m^3$ and the maximum detection was 0.00342 $\mu g/m^3$. There is no PAMP or PRG action level for this compound.

Acenaphthylene

Acenaphthylene was detected in 36 of 231 samples (4 at Station A, 1 at Station B, 2 at Station C, 18 at Station D, 1 at Station F, and 10 at Station G) over 19 sampling periods. The minimum detection was 0.000687 $\mu g/m^3$ and the maximum detection was 0.01230 $\mu g/m^3$. There is no PAMP or PRG action level for this compound.

Anthracene

Anthracene was detected in 27 of 231 samples (2 at Station A, 12 at Station D, 3 at Station E, 4 at Station F, and 6 at Station G) over 19 sampling periods. The minimum detection was 0.00325 $\mu g/m^3$ and the maximum detection was 0.01370 $\mu g/m^3$. Anthracene was not above the

PRG action level of 1100 μg/m^3 on a daily basis for the 27 detected samples. There is no PAMP action level for this compound.

Butyl Benzyl Phthalate

Butyl benzyl phthalate was detected in 50 of 231 samples (9 at Station A, 8 at Station B, 7 at Station C, 9 at Station D, 11 at Station E, 4 at Station F, and 2 at Station G) over 19 sampling periods. The minimum detection was 0.00098 μg/m^3 and the maximum detection was 0.24600 μg/m^3. Butyl benzyl phthalate was not above the PRG action level of 730 μg/m^3 on a daily basis for the 50 detected samples. There is no PAMP action level for this compound.

Dibenzofuran

Dibenzofuran was detected in 41 of 231 samples (1 at Station A, 1 at Station C, 22 at Station D, 4 at Station E, 4 at Station F, and 9 at Station G) over 24 sampling periods. The minimum detection was 0.00086 μg/m^3 and the maximum detection was 0.0100 μg/m^3. Dibenzofuran was not above the PRG action level of 15 μg/m^3 on a daily basis for the 41 detected samples. There is no PAMP action level for this compound.

Diethylphthalate

Diethylphthalate was detected in 211 of 231 samples (34 at Station A, 34 at Station B, 28 at Station C, 33 at Station D, 35 at Station E, 33 at Station F, and 14 at Station G) over 38 sampling periods. The minimum detection was 0.0006 μg/m^3 and the maximum detection was 0.4440 μg/m^3. Diethylphthalate was not above the PRG action level of 2,900 μg/m^3 on a daily basis for the 211 detected samples. There is no PAMP action level for this compound.

Di-n-butylphthalate

Di-n-butylphthalate was detected in 206 of 231 samples (33 at Station A, 32 at Station B, 34 at Station C, 31 at Station D, 29 at Station E, 36 at Station F, and 11 at Station G) over 38 sampling periods. The minimum detection was 0.0005 μg/m^3 and the maximum detection was 0.0820 μg/m^3. Di-n-butylphthalate was not above the PRG action level of 370 μg/m^3 on a daily basis for the 206 detected samples. There is no PAMP action level for this compound.

Di-n-octylphthalate

Di-n-octylphthalate was detected in one of 231 samples (at Station A) over one sampling period. The air concentration detected was 0.0119 μg/m^3. Di-n-octylphthalate was not above the PRG action level of 73 μg/m^3 on a daily basis for the one detected sample. There is no PAMP action level for this compound.

Fluoranthene

Fluoranthene was detected in 64 of 231 samples (6 at Station A, 4 at Station B, 5 at Station C, 25 at Station D, 7 at Station E, 6 at Station F, and 11 at Station G) over 29 sampling periods. The minimum detection was 0.00065 $\mu g/m^3$ and the maximum detection was 0.02110 $\mu g/m^3$. Fluoranthene was not above the PRG action level of 150 $\mu g/m^3$ on a daily basis for the 64 detected samples. There is no PAMP action level for this compound.

Fluorene

Fluorene was detected in 63 of 231 samples (1 at Station A, 2 at Station B, 7 at Station C, 25 at Station D, 9 at Station E, 6 at Station F, and 13 at Station G) over 29 sampling periods. The minimum detection was 0.00127 $\mu g/m^3$ and the maximum detection was 0.01690 $\mu g/m^3$. Fluorene was not above the PRG action level of 150 $\mu g/m^3$ on a daily basis for the 63 detected samples. There is no PAMP action level for this compound.

Naphthalene

Naphthalene was detected in three of 231 samples (1 at Station A, 1 at Station B, and 1 at Station C) over one sampling period. The minimum detection was 0.00298 $\mu g/m^3$ and the maximum detection was 0.00416 $\mu g/m^3$. Naphthalene was not above the PRG action level of 3.1 $\mu g/m^3$ on a daily basis for the three detected samples. There is no PAMP action level for this compound.

Phenanthrene

Phenanthrene was detected in 201 of 231 samples (30 at Station A, 27 at Station B, 30 at Station C, 35 at Station D, 31 at Station E, 34 at Station F, and 14 at Station G) over 37 sampling periods. The minimum detection was 0.0009 $\mu g/m^3$ and the maximum detection was 0.1000 $\mu g/m^3$. There is no PAMP or PRG action level for this compound.

Pyrene

Pyrene was detected in 44 of 231 samples (5 at Station A, 2 at Station B, 3 at Station C, 15 at Station D, 4 at Station E, 7 at Station F, and 8 at Station G) over 20 sampling periods. The minimum detection was 0.00058 $\mu g/m^3$ and the maximum detection was 0.02080 $\mu g/m^3$. Pyrene was not above the PRG action level of 110 $\mu g/m^3$ on a daily basis for the 44 detected samples. There is no PAMP action level for this compound.

4.2.2.2 Metal Compounds

Three hundred and seventy-four samples were analyzed for metals over 62 sampling periods. Of the 19 target compounds, seven were not detected in any samples (see Table 5). Key compounds that were not detected include antimony, cadmium, and selenium. The detection statistics for each of the detected compounds is presented in Table 12 and summarized below.

Aluminum

Aluminum was detected in 24 of 374 samples (3 at Station A, 5 at Station C, 8 at Station D, 1 at Station E, 5 at Station F, and 2 at Station G) over 15 sampling periods. The minimum detection was 2.314 $\mu g/m^3$ and the maximum detection was 7.139 $\mu g/m^3$. Aluminum was not above the PAMP action level of 150 $\mu g/m^3$ on a daily basis in any of the 24 detected samples. Aluminum was above the PRG action level of 5.1 $\mu g/m^3$ on a daily basis in three samples (two at Station D and one at Station F) of the 24 detected samples.

Barium

Barium was detected in 10 of 374 samples (2 at Station D, 3 at Station E, and 5 at Station F) over seven sampling periods. The minimum detection was 0.122 $\mu g/m^3$ and the maximum detection was 0.199 $\mu g/m^3$. Barium was not above the PRG action level of 0.52 $\mu g/m^3$ on a daily basis for the 10 detected samples. There is no PAMP action level for this compound.

Cobalt

Cobalt was detected in two of 374 samples (both at Station D) over two sampling periods. The minimum detection was 0.012 $\mu g/m^3$ and the maximum detection was 0.013 $\mu g/m^3$. There is no PAMP or PRG action level for this compound.

Copper

Copper was detected in 371 of 374 samples (57 at Station A, 58 at Station B, 55 at Station C, 61 at Station D, 58 at Station E, 60 at Station F, and 22 at Station G) over 62 sampling periods. The minimum detection was 0.013 $\mu g/m^3$ and the maximum detection was 1.016 $\mu g/m^3$. Copper was not above the PAMP action level of 10 $\mu g/m^3$ on a daily basis in any of the 371 detected samples. There is no PRG action level for this compound.

Lead

Lead was detected in 119 of 374 samples (5 at Station A, 7 at Station B, 24 at Station C, 36 at Station D, 20 at Station E, 21 at Station F, and 6 at Station G) over 42 sampling periods. The minimum detection was 0.024 $\mu g/m^3$ and the maximum detection was 0.281 $\mu g/m^3$. Lead was not above the PAMP action level of 1.5 $\mu g/m^3$ on a daily basis in any of the 119 detected samples. There is no PRG action level for this compound.

Molybdenum

Molybdenum was detected in three of 374 samples (1 at Station E, 1 at Station F, and 1 at Station G) over two sampling periods. The minimum detection was 0.028 $\mu g/m^3$ and the maximum detection was 0.124 $\mu g/m^3$. There is no PAMP or PRG action level for this compound.

Nickel

Nickel was detected in three of 374 samples (1 at Station A, 1 at Station E, and 1 at Station F) over three sampling periods. The minimum detection was 0.145 $\mu g/m^3$ and the maximum detection was 0.319 $\mu g/m^3$. Nickel was not above the PAMP action level of 10 $\mu g/m^3$ on a daily basis in any of the three detected samples. There is no PRG action level for this compound.

Zinc

Zinc was detected in four of 374 samples (2 at Station D and 2 at Station F) over four sampling periods. The minimum detection was 0.248 $\mu g/m^3$ and the maximum detection was 0.360 $\mu g/m^3$. Zinc was not above the PAMP action level of 1,050 $\mu g/m^3$ on a daily basis in any of the four detected samples. There is no PRG action level for this compound.

4.2.2.3 Volatile Organic Compounds

Three hundred and eighty-eight samples were analyzed for VOCs over 64 sampling periods. Of the 37 target compounds, 19 were not detected in any samples (see Table 5). Key compounds that were not detected include vinyl chloride. The detection statistics for each of the detected compounds is presented in Table 12 and summarized below.

1,2,4-Trimethylbenzene

1,2,4-Trimethylbenzene was detected in 29 of 388 samples (8 at Station A, 4 at Station B, 6 at Station C, 3 at Station D, 5 at Station E, 2 at Station F, and 1 at Station G) over 15 sampling periods. The minimum detection was 2.56 $\mu g/m^3$ and the maximum detection was 77.20 $\mu g/m^3$. 1,2,4-Trimethylbenzene was above the PRG action level of 6.2 $\mu g/m^3$ on a daily basis in three samples (one at Station A and two at Station C) of the 29 detected samples. There is no PAMP action level for this compound.

1,3,5-Trimethylbenzene

1,3,5-Trimethylbenzene was detected in three of 388 samples (1 at Station A, 1 at Station C, and 1 at Station E) over three sampling periods. The minimum detection was 5.10 $\mu g/m^3$ and the maximum detection was 13.70 $\mu g/m^3$. 1,3,5-Trimethylbenzene was above the PRG action level of 6.2 μg/m^3 on a daily basis in two samples (one at Station A and one at Station C) of the three detected samples. There is no PAMP action level for this compound.

Chlorobenzene

Chlorobenzene was detected in one of 388 samples (at Station C) over one sampling period. The air concentration detected was 0.875 μg/m^3. Chlorobenzene was not above the PRG action level of 62 μg/m^3 on a daily basis for the one detected sample. There is no PAMP action level for this compound.

Chloroethane

Chloroethane was detected in four of 388 samples (1 at Station A, 1 at Station C, 1 at Station D, and 1 at Station E) over four sampling periods. The minimum detection was 0.530 μg/m^3 and the maximum detection was 1.800 μg/m^3. Chloroethane was not above the PRG action level of 2.3 μg/m^3 on a daily basis for the four detected samples. There is no PAMP action level for this compound.

Chloromethane

Chloromethane was detected in 55 of 388 samples (6 at Station A, 11 at Station B, 6 at Station C, 9 at Station D, 10 at Station E, 11 at Station F, and 2 at Station G) over 22 sampling periods. The minimum detection was 0.410 μg/m^3 and the maximum detection was 10.900 μg/m^3. Chloromethane was above the PRG action level of 1.1 μg/m^3 on a daily basis in 19 samples (3 at Station A, 6 at Station B, 2 at Station C, 3 at Station D, 3 at Station E, 1 at Station F, and 1 at Station G) of the 55 detected samples. There is no PAMP action level for this compound. All of the results that were above the PRG action level on a daily basis occurred from November 2000 through March 2001.

Cis-1,2-dichloroethane

Cis-1,2-dichloroethane was detected in two of 388 samples (1 at Station D, and 1 at Station G) over two sampling periods. The minimum detection was 2.100 μg/m^3 and the maximum detection was 6.300 μg/m^3. Cis-1,2-dichloroethane was not above the PRG action level of 37 μg/m^3 on a daily basis for the two detected samples. There is no PAMP action level for this compound.

Dichlorodifluoromethane

Dichlorodifluoromethane was detected in 379 of 388 samples (59 at Station A, 59 at Station B, 56 at Station C, 60 at Station D, 62 at Station E, 60 at Station F, and 23 at Station G) over 64 sampling periods. The minimum detection was 1.00 μg/m^3 and the maximum detection was

6.13 μg/m^3. Dichlorodifluoromethane was not above the PRG action level of 210 μg/m^3 on a daily basis for the 379 detected samples. There is no PAMP action level for this compound.

Ethylbenzene

Ethylbenzene was detected in 141 of 388 samples (26 at Station A, 23 at Station B, 22 at Station C, 22 at Station D, 21 at Station E, 20 at Station F, and 7 at Station G) over 33 sampling periods. The minimum detection was 0.43 μg/m^3 and the maximum detection was 12.30 μg/m^3. Ethylbenzene was not above the PRG action level of 1,100 μg/m^3 on a daily basis for the 141 detected samples. There is no PAMP action level for this compound.

Methylene Chloride

Methylene chloride was detected in 21 of 388 samples (4 at Station A, 4 at Station B, 1 at Station C, 1 at Station D, 3 at Station E, and 8 at Station F) over 12 sampling periods. The minimum detection was 1.700 μg/m^3 and the maximum detection was 4.800 μg/m^3. Methylene chloride was above the PRG action level of 4.1 μg/m^3 on a daily basis in two samples (1 at Station B and 1 at Station F) of the 21 detected samples. There is no PAMP action level for this compound.

Styrene

Styrene was detected in 29 of 388 samples (8 at Station A, 2 at Station B, 2 at Station C, 4 at Station D, 4 at Station E, 8 at Station F, and 1 at Station G) over 15 sampling periods. The minimum detection was 0.426 μg/m^3 and the maximum detection was 5.920 μg/m^3. Styrene was not above the PRG action level of 1,100 μg/m^3 on a daily basis for the 29 detected samples. There is no PAMP action level for this compound.

Tetrachloroethene

Tetrachloroethene was detected in 38 of 388 samples (5 at Station A, 7 at Station B, 5 at Station C, 5 at Station D, 8 at Station E, 5 at Station F, and 3 at Station G) over 16 sampling periods. The minimum detection was 0.680 μg/m^3 and the maximum detection was 3.700 μg/m^3. Tetrachloroethene was not above the PAMP action level of 35 μg/m^3 on a daily basis in any of the 38 detected samples. Tetrachloroethene was above the PRG action level of 3.3 μg/m^3 on a daily basis in four samples (1 at Station A, 1 at Station C, 1 at Station D, and 1 at Station F of the 38 detected samples.

Toluene

Toluene was detected in 355 of 388 samples (58 at Station A, 60 at Station B, 54 at Station C, 54 at Station D, 57 at Station E, 51 at Station F, and 21 at Station G) over 64 sampling periods.

The minimum detection was 0.75 $\mu g/m^3$ and the maximum detection was 25.80 $\mu g/m^3$. Toluene was not above the PRG action level of 400 $\mu g/m^3$ on a daily basis for the 355 detected samples. There is no PAMP action level for this compound.

Trichloroethene

Trichloroethene was detected in four of 388 samples (2 at Station B, 1 at Station F, and 1 at Station G) over four sampling periods. The minimum detection was 0.70 $\mu g/m^3$ and the maximum detection was 6.30 $\mu g/m^3$. Trichloroethene was above the PRG action level of 1.1 $\mu g/m^3$ on a daily basis in two samples (1 at Station F and 1 at Station G) of the four detected samples. There is no PAMP action level for this compound.

Trichlorofluoromethane

Trichlorofluoromethane was detected in 261 of 388 samples (36 at Station A, 47 at Station B, 35 at Station C, 43 at Station D, 51 at Station E, 36 at Station F, and 13 at Station G) over 61 sampling periods. The minimum detection was 1.10 $\mu g/m^3$ and the maximum detection was 3.00 $\mu g/m^3$. Trichlorofluoromethane was not above the PRG action level of 730 $\mu g/m^3$ on a daily basis for the 261 detected samples. There is no PAMP action level for this compound.

Xylenes

Xylenes (m-ylene, o-xylene, and p-xylene) were detected in 277 of 388 samples (46 at Station A, 49 at Station B, 42 at Station C, 42 at Station D, 44 at Station E, 38 at Station F, and 16 at Station G) over 56 sampling periods. The minimum detection was 0.87 $\mu g/m^3$ and the maximum detection was 46.30 $\mu g/m^3$. Xylenes were not above the PAMP action level of 4,350 $\mu g/m^3$ on a daily basis in any of the 277 detected samples. Xylenes were not above the PRG action level of 730 $\mu g/m^3$ on a daily basis for the 277 detected samples.

4.2.2.4 Pesticides and Polychlorinated Biphenyls

Five hundred ninety-six samples were analyzed for PCBs over 101 sampling periods. Two hundred thirty-one samples were analyzed for pesticides over 38 sampling periods. Of the 26 target pesticide and PCB compounds, 24 were not detected in any samples (see Table 5). Other than the one detection of endrin noted below, there were no other detections of pesticides during the entire program. Thus, airborne pesticides do not appear to be an issue at Parcel E. The detection statistics for each of the detected compounds is presented in Table 12 and summarized below.

Endrin

Endrin (pesticide) was detected in one of 231 samples (at Station F) over one sampling period. The air concentration detected was 0.583 $\mu g/m^3$. Endrin was not above the PRG action level of 1.1 $\mu g/m^3$ on a daily basis for the one detected sample. There is no PAMP action level for this compound.

4.2.2.5 Dioxins and Furans

Twenty-nine samples were analyzed for high-resolution dioxin/furan over five sampling periods. Dioxin/furan was detected in every sample and was reported as 2,3,7,8-TCDD Equivalent. The detection statistics are presented in Table 12. The minimum 2,3,7,8-TCDD Equivalent was 0.00024 picograms per cubic meter (pg/m^3) and the maximum was 0.04588 pg/m^3. 2,3,7,8-TCDD Equivalent was just above the PRG action level of 0.045 pg/m^3 on a daily basis in one sample (at Station D on October 19) of the 29 detected samples. There is no PAMP action level for this compound.

The 2,3,7,8-TCDD equivalent results for Station D on October 19 was 0.04588 pg/m^3 which is barely above the PRG action level on a daily basis. Additionally, 2,3,7,8-TCDD was detected once in the 29 samples.

Additionally, 231 samples were analyzed using a low-resolution dioxin/furan method. There were no detections of dioxins/furans in any of these samples.

4.2.2.6 Chlorine Compounds

One hundred and four samples were analyzed for chlorine compounds over 18 sampling periods. Of the three target compounds, chlorine and hydrogen chloride were not detected in any samples (see Table 5). The detection statistics for particulate chloride is presented in Table 12 and summarized below.

Although the reported sample volumes of the chlorine sample are not precise, the laboratory results are valid since chlorine and hydrogen chloride was not detected in any sample. Variations in the collected volumes would only affect the concentration of any reported results; it would not affect whether or not chlorine as compounds are detected.

Particulate Chloride

Particulate chloride was detected in 73 samples (14 at Station A, 13 at Station B, 12 at Station C, 13 at Station D, 11 at Station E, and 10 at Station F) over 16 sampling periods. The minimum detection was 1.90 $\mu g/m^3$ and the maximum detection was 23.50 $\mu g/m^3$. The particulate chloride is most likely due to salt spray from the bay and is not an indication of chlorine or hydrogen chloride presence.

4.2.2.7 Phosgene

Phosgene was not detected in any of the 216 samples collected over 36 sampling periods.

Although the reported sample volumes of the phosgene samples are not precise, the laboratory results are valid since phosgene was not detected in any sample. Variations in the collected volumes would only affect the concentration of any reported results; it would not affect whether or not phosgene is detected.

4.2.2.8 Radiological Compounds

Radioactivity was measured for six samples taken from one sampling period for TSP (metals) on September 17 and 18. Metals analysis was not conducted on the samples as they were used up in the radioactivity analysis. The results are summarized in Appendix G, "Radioactivity Report/Results."

4.2.2.9 Tentatively Identified Compounds

The laboratory's gas chromatography/mass spectrometer analysis identified several compounds that were not in the list of target compounds (Table 1). The data for these compounds, designated as tentatively identified compounds (TIC), is presented in Table 13, "Tentatively Identified Compounds." The TIC data has also been included in all other data summaries. TICs were usually detected below method reporting limits. The data are qualitative in nature and only signify the potential presence of a compound.

5.0 Quality Assurance

To ensure that the air monitoring data was of high quality, quality assurance quality control procedures were established and followed throughout the project. Duplicate and field blank samples were collected to validate field sampling procedures. Samplers were maintained and calibrated according to a rigid schedule so that an accurate sample volume could be calculated.

The volume calculation sheets (Appendix B) filled out in the field have been checked for accuracy. In cases where the volume differed more than 1 percent from the value calculated in the field, the corrected volume was forwarded to the laboratory and the laboratory issued a revised report. All data in this report represent the most recent laboratory data.

5.1 Air Sampling Equipment Quality Assurance/Quality Control

Integrated air sampling equipment was monitored for flow rate during sample periods and calibrated if needed as summarized below. A summary of all monitoring data not meeting standards is presented in Table 14, "Quality Assurance Summary." These data are also flagged in the data summary tables and appendices referenced in Section 4.0. The following samples were designated as "not meeting quality assurance standards": 1) samples taken after a sampler required calibration and before it was calibrated, 2) samples taken, for which no daily or hourly sampler log sheets are available, 3) samples taken, for which the daily flow check did not meet specifications, 4) samples for which the sampler log sheets were annotated with "representative sample only," or 5) TSP samples where the volume collected was out of the acceptable range of 1,600 to 2,400 m^3 and PUF samples where the volume collected was less than the minimum acceptable volume of 300 m^3.

Any potential inaccuracy would affect the calculated sample volume and thus the concentration; however, it would not affect whether or not a compound is present.

5.1.1 PUF Sampler

The PUF samplers underwent a seven-point calibration and set point determination initially as well as periodically during the monitoring period. The records of each calibration and set point determination are presented in Appendix J-1, "Low Resolution PUF 7-Point Calibrations and Set Point Determinations." The PUF 7-point calibrations and set point determinations were performed during initial placement of the sampler and after motor brushes were changed or whenever daily flow checks indicated that the sampler was operating outside the calibration curve. Motor brushes were usually changed after 500 hours of use (approximately every 20 to 60 days depending on the sampling frequency).

A single point PUF flow check using a calibrated orifice standard was conducted prior to each sampling event unless a PUF 7-point calibration had just been performed. This assured that the samplers were operating within their respective calibration curves. A summary of the PUF calibrations and flow checks is presented in Table 15, "Low Resolution PUF 7-Point and Flow Check Quality Assurance." All data collected after a sampler failed a flow check and before it was recalibrated are considered as not meeting quality assurance standards and are noted as such in the data tables. The records of each PUF flow check are presented in Appendix K-1, "Low Resolution PUF Daily Flow Checks." Continual or hourly flow data is presented in Appendix L, "PUF Wheel Charts and Magnehelic® Hourly Readings," as wheel charts (continual) or Magnehelic® pressure gauge readings (hourly). Air sampling log sheets are provided in Appendix M-1, "Air Sampling Logs – VOC/TSP/PUF."

5.1.2 High Resolution PUF Sampler

The PUF samplers underwent an initial seven-point calibration and set point determination. The record of each calibration and set point determination are presented in Appendix J-2, "High Resolution PUF 7-Point Calibrations and Set Point Determinations." The high-resolution units did not require any maintenance due to their infrequent usage, and all daily flow checks met quality assurance criteria, therefore, additional calibrations were not necessary.

A single point PUF flow check using a calibrated orifice standard was conducted prior to each sampling event unless a PUF 7-point calibration had just been performed. This assured that the samplers were operating within their respective calibration curves. A summary of the PUF calibrations and flow checks is summarized in Table 16, "High Resolution PUF Quality Assurance." The PUF flow check records are presented in Appendix K-2, "High Resolution PUF Daily Flow Checks." Data collected during days for which the flow check data is missing are marked as not meeting quality assurance standards. Hourly flow data are presented in Appendix L as Magnehelic® pressure gauge readings. Air sampling log sheets are provided in Appendix M-2, "Air Sampling Logs – High Resolution PUF."

5.1.3 TSP Sampler

The TSP samplers were initially, as well as, periodically calibrated during the monitoring period. Calibrations were performed after samplers were moved or after maintenance. The calibration records are presented in Appendix N, "TSP Calibration Sheets," and are summarized in Table 17, "TSP Quality Assurance." All data collected after a sampler failed a calibration are considered not meeting quality assurance standards and are noted as such in the data tables. Continual flow data are presented in Appendix O, "TSP Wheel Charts," as wheel charts. Air sampling log sheets are provided in Appendix M-1.

5.1.4 Volatile Organic Compounds Sampler

The vacuum/pressure and flow rate was monitored and recorded during each sampling period. The final pressure was recorded on a COC form. The analytical laboratory measured the pressure upon receipt, compared the pressures, and recorded the percentage difference. This provided an additional check for the site equipment and efficiency of sample collection vessels. The mass flow meters were inspected at each sampling event and were returned to the laboratory when necessary. Cleaning was conducted as needed, typically monthly. Air sampling log sheets are provided in Appendix M-1.

5.1.5 Chlorine/Phosgene Samplers

The flow rates on the mini sampling pumps were monitored at the beginning and end of each sampling period, and the average flow from the two readings was used to calculate the total sample volume. The air sampling log sheets are provided in Appendix M-3, "Air Sampling Logs – Chlorine/Phosgene."

5.2 Field Quality Control Data

Quality control of the field sampling procedures was monitored by submitting field blank and field duplicate samples. Field blanks accompanied the actual sample media into the field approximately every second sampling day for all samplers except for the chlorine and phosgene samplers, for which no field blanks were used. The blank samples were left in the field during the monitoring period, then collected, and sent to the laboratory along with the active samples. Field duplicate data was obtained at Station G, which was collocated with Station D. Samples were taken at Station G approximately every second sampling day.

5.2.1 Field Blanks

The field blank results are presented in Table 18, "Field Blank Results." The initial PUF field blanks in September contained detectable quantities of Di-n-butylphlalate, Bis(2-ethylhexyl)phthalate, Diethylphthalate, butylbenzylphthalate, and phenanthrene. These detections were several orders of magnitude below action level except for bis(2-ethylhexyl)phthalate, for which the highest detection in the blank was one-third of the action level. These detections in the initial PUF samples can potentially be attributed to the use of new PUF sampler media.

Benzene was detected in two field blank samples. While toluene was detected once. Copper was detected in one metals field blank while low levels of OCDD was detected in the high resolution dioxin/furan field blank. The number and concentration of these detections in the field blanks do not indicate any contamination problems in the sampling media and handling techniques in the Parcel E perimeter ambient air monitoring program.

5.2.2 Field Duplicate

The field duplicate data are presented in Table 19, "Field Duplicate Summary." Of all the compounds analyzed in each sample, there were 238 instances in which a compound was detected at both Stations D and G during the same sampling period. The relative percent difference (RPD) between the Station D and Station G data was calculated. The absolute value of the relative difference was less than 50 percent in 76 percent of the samples, indicating acceptable field sampling precision. The remaining 24 percent of the RPD values exceeded the 50 percent criteria due to low concentration values in samples and the associated lack of analytical accuracy.

5.3 Laboratory Data Quality Control

Ambient air samples collected at Hunters Point project site under Parcel E were analyzed for toxic organic and nonorganic compounds using EPA Methods TO-4, TO-9, TO-14, and IO-2.1/IO-3.1/IO-3.5 The analytical data was evaluated per testing method requirements of *Compendium of Methods for Determination of Toxic Organic and Inorganic Compounds in Ambient Air* and laboratory internal quality control.

Quality control samples included field and laboratory quality control samples. Field quality control samples included field duplicate and field blank samples. Laboratory control samples included method blank, laboratory control sample (LS), laboratory control sample duplicate (LCSD), matrix spike (MS), and matrix spike duplicate (MSD).

All of the samples were analyzed within the holding time requirements specified for each applicable analytical method.

None of the method blank samples had contaminants of concern at or above the specified detection limit.

The percent recoveries for all analytes of concern in LCS and LCSD, and RPD value between LCS and LCSD recoveries, were within the acceptance criteria, with the exceptions noted below.

- For reports 2001-030809 and 2001-031213, for metals analysis by EPA Method IO-2.1/IO-3.1/IO-3.5, recovery of beryllium in LCSD were 128 percent, which was slightly above the acceptance criteria of 75 to 125 percent.
- For reports 102021 and 102425, for metals analysis by EPA Method IO-2.1/IO-3.1/IO-3.5, RPD value between arsenic recoveries in LCS and LCSD was 21.33, which was marginally above the control limit of 20.

The percent recoveries for all analytes of concern in MS and MSD, and RPD value between MS and MSD recoveries, were within the acceptance criteria, with the exceptions noted below.

- For reports 102728 and 110102, for VOCs analysis by EPA Method TO-14, RPD value between 1,1-Dichloroethene recoveries in MS and MSD was 50.8, which was above the acceptance limit of 25.

All of the internal standard and surrogate standard recoveries were within the acceptance criteria, with the exceptions noted below.

- For report 91617, for dioxins and furans analysis by EPA Method TO-09, surrogate (recovery) standard (13C-1,2,37,8,9-HxCDF) recoveries in method blank and a spike sample were 68.1 and 68.4 percent, respectively, which were slightly below the lower control limit of 70 percent.
- For report 101011HR, for dioxins and furans analysis by EPA Method TO-09, surrogate (recovery) standard (13C-1,2,3,7,8,9-HxCDF) recoveries in spike sample and five field samples (station A, B, C, D, F) were in the range of 56.1 and 69 percent, which were below the lower control limit of 70 percent.

Quality of the data is not affected due to the above listed recoveries and RPD values outside of the acceptance criteria.

Overall, data are of acceptable quality and usable for the purposes of this project.

5.4 Meteorological Instrumentation

Meteorological instruments were disassembled, inspected, lubricated, and reassembled approximately every 4 to 6 weeks. This schedule was adopted as standard operating procedure to prevent corrosion from airborne salt and high humidity. No events were recorded during the monitoring period that affected meteorological data. Meteorological station information and certification records are included in Appendix P, "Meteorological Information and Certification."

6.0 Conclusions

During the Parcel E perimeter ambient air monitoring program, over 2,400 different analyses were conducted on the more than 1,700 samples collected from the seven station monitoring network from September 8, 2000 through March 13, 2001. Of the more than 150 target compounds or classes of compounds, 98 were not detected at any time during the program. Monitoring Stations A, B, and C, located along the western and northern parcel boundaries, tended to have fewer detections and observed concentrations than Stations D, E, F, and G, because they are usually upwind of Parcel E.

Key compounds and classes of compounds not detected include the following:

- No pesticides in 231 samples (except for one detection of endrin below action levels)
- No chlorine or hydrogen chloride in 104 samples
- No phosgene in 216 samples
- No low resolution dioxins/furans in 231 samples
- No benzo(a)pyrene in 231 samples
- No cadmium in 374 samples
- No vinyl chloride in 388 samples

Key compounds that were detected, but all of the detections and averages were below PAMP and PRG action levels were as follows:

- Lead
- Nickel
- High resolution dioxins/furans (one out of 29 results was just above the PRG action level on a daily basis 0.04588 pg/m^3 vs. 0.045 pg/m^3)

The following discussion relates to compounds that exceeded a project average or 24-hour PAMP or PRG action level.

Beryllium, chloroform, and chromium were detected in one, two and five samples, respectively. The project average concentration that was calculated for these compounds exceeded the PRG action level because one-half the reporting limit was used in the average calculation for each sample for compounds that were not detected above the laboratory reporting limit. In the case of these three compounds, the reporting limits are substantially higher than the PRG action level. Therefore, even one detection would cause the project average calculation to be performed and automatically exceed the PRG action level as happened for these compounds.

Benzene and carbon tetrachloride were frequently detected, and their observed average concentrations exceeded project duration PAMP or PRG action levels. The detections of these compounds at the levels observed can be attributed to ambient air background levels. The project average benzene and carbon tetrachloride concentrations were less than the background benzene and carbon tetrachloride concentration reported for the BAAQMD ambient air monitoring station on Arkansas Street in San Francisco. Therefore, it is unlikely that the landfill fire or capping activities contributed to the observed concentration of these two compounds.

Arsenic and manganese were frequently detected, and their observed average and 24-hour concentration exceeded project duration PAMP or PRG action levels or 24-hour PAMP action levels. These metals are naturally occurring in soil, and observed concentrations of these metals can be correlated to the timing of earth moving activities during cap construction as well as wind direction. Manganese was frequently observed above action levels during the Parcel B perimeter air monitoring program in 1998, 1999, 2000, and 2001. Manganese appears to be coming from the local and imported soil at Hunters Point. Average arsenic concentrations did not exceed the project duration PAMP action level. The PRG action level for arsenic is 5 times lower than the reporting limit; thus, average concentration calculations using one-half the reporting limit for samples with undetected data automatically shows an exceedence. Arsenic was detected at the reporting limit numerous times and appears to also be coming from soil.

Bis(2-ethylhexyl)phthalate was frequently detected, and its observed average concentration exceeded project duration PAMP action levels. None of the station averages exceeded the PRG action level. This compound is ubiquitous in nature and is associated with PVC plastic. This compound was frequently observed above action levels during the Parcel B perimeter air monitoring program in 1998, 1999, 2000, and 2001. The landfill fire does not appear to be the source of this compound.

Aroclor 1260 (PCB) was detected in 34 of 596 samples (one at Station A, four at Station E, and 29 at Station F). The project duration PAMP action level of 0.01 $\mu g/m^3$ was not exceeded at any station. The annual average PRG action level of 0.0034 $\mu g/m^3$ was exceeded at sample Station F with an average observed concentration of 0.00429 $\mu g/m^3$. Aroclor 1260 was above the PAMP action level of 0.01 $\mu g/m^3$ on a daily basis in nine samples (nine at Station F). Aroclor 1260 was above the PRG action level of 0.0034 μg/m^3 on a daily basis in 27 samples (two at Station E and 25 at Station F).

Almost all of the Aroclor 1260 detections were observed at monitoring Station F, which is located in the southeast corner of the landfill area near the bay. This station is near a known area of Parcel E that has surface soil contamination of Aroclor 1260. The detections of Aroclor 1260 did not occur until landfill capping activities began. The highest concentrations are associated with periods of heavy activity, which disturbed surface soil along the southern edge of Parcel E near the bay. As soon as the Aroclor 1260 results were received from the laboratory, steps were taken to minimize dust generation and activities in the Aroclor 1260 contamination area.

Review of the test results for all samples collected during the Parcel E perimeter ambient air monitoring program indicates the major concern is Aroclor 1260. The detected compounds and their results indicate that combustion products, such as PAHs and dioxins/furans, directly attributable to the fire were not prevalent and were below project duration PAMP and annual PRG levels. All of the other compounds were either not detected above the laboratory reporting limits or were below action limits, or above action limits and were attributable to background, or naturally occurring in soil.

The Aroclor 1260 results are associated with soil at Parcel E and not outside sources or background levels normally associated with soil. Previous remediation/mitigation activities were not specifically designed to address the Aroclor 1260 surface soil contamination. Additional investigations and measures should be taken to prevent the Aroclor 1260 from becoming airborne and to mitigate risks posed to potential receptors by Aroclor 1260.

7.0 References

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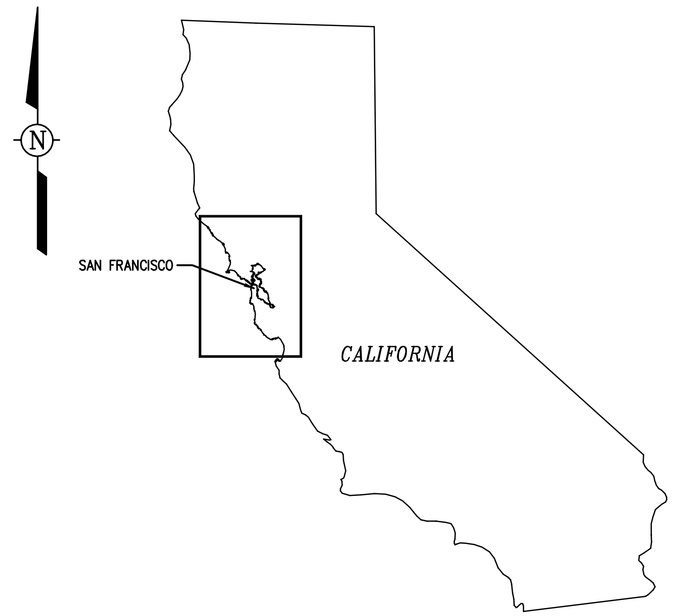
FIGURES



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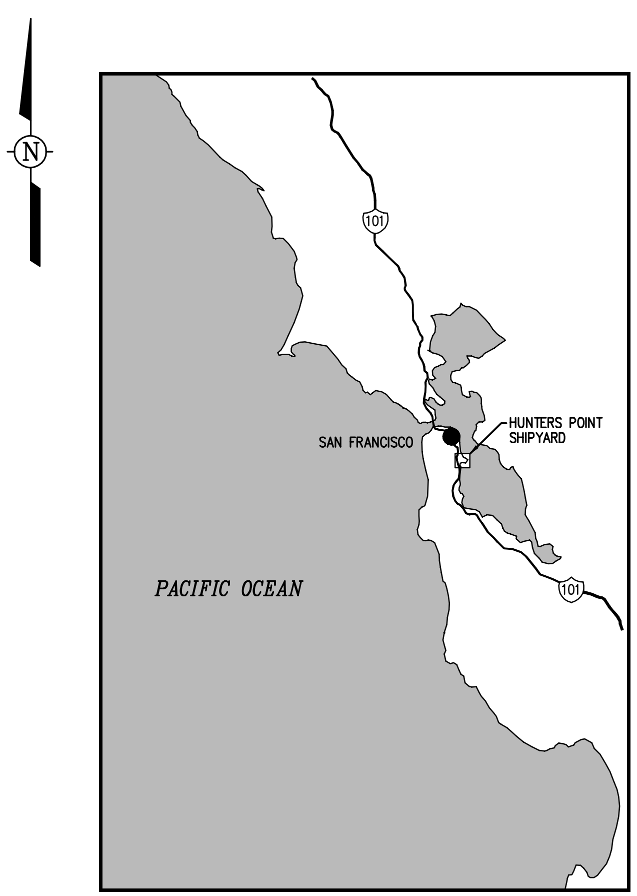

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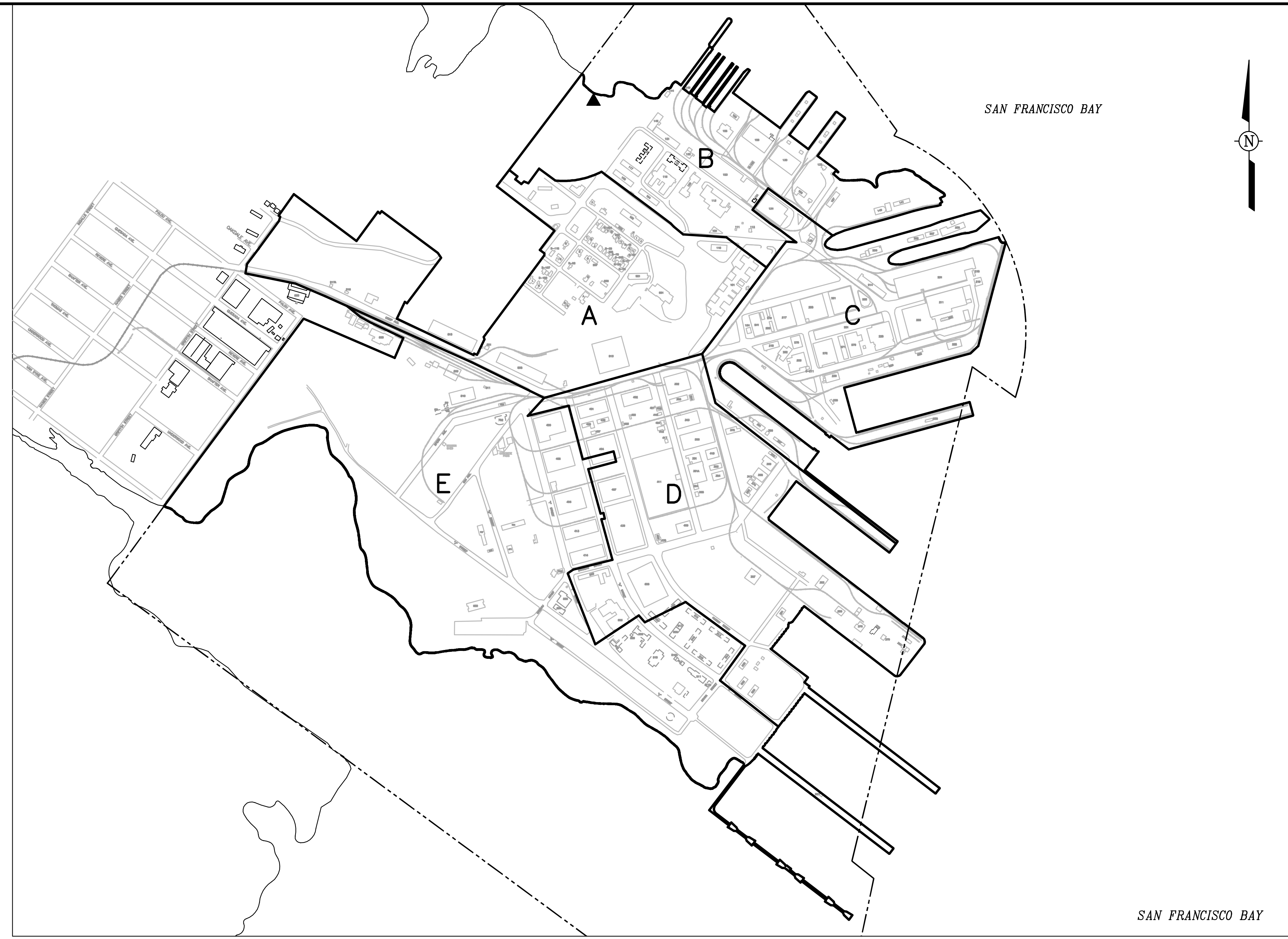


SCALE

0 1000 2000 FEET

LEGEND

▲ METEOROLOGICAL STATION

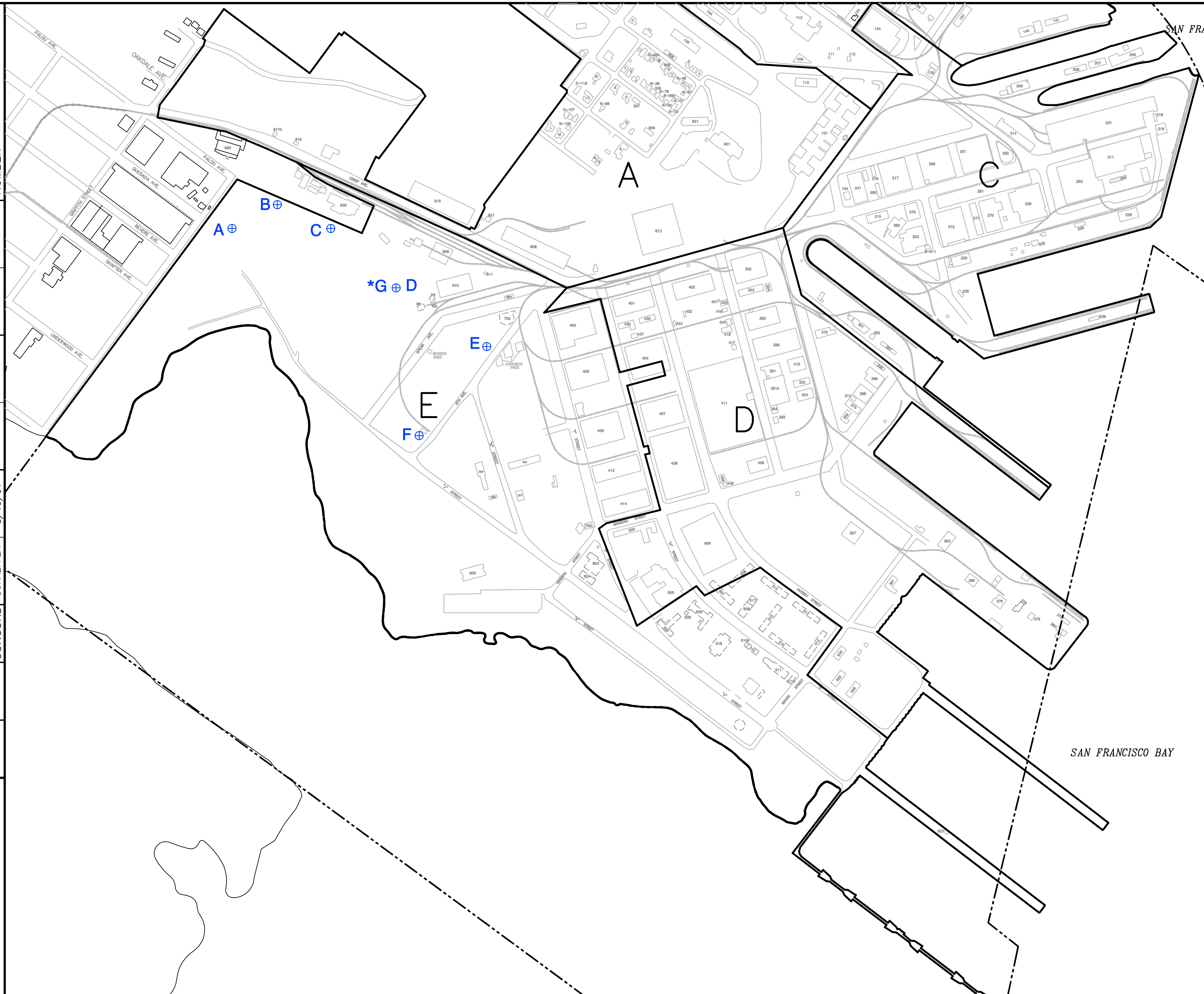
IT CORPORATION

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

FIGURE 1

HUNTERS POINT SITE LOCATION
AND PARCEL LOCATION MAP

DRAWING NUMBER	773247-B118
APPROVED BY	
CHECKED BY	
DRAWN BY	5/10/01
	SCHAEFFER
OFFICE	CONCORD
X-REF	---
IMAGE	---



LEGEND

⊕ AIR QUALITY STATION AND I.D. NUMBER

* STATION G IS CO-LOCATED WITH STATION D

SCALE

0 600 1200 FEET

IT CORPORATION

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

FIGURE 2

AIR MONITORING FACILITY LOCATIONS

DRAWING NUMBER	773247-B119
APPROVED BY	
CHECKED BY	
DRAWN BY	SCHAEFFER 5/10/01
OFFICE	CONCORD
X-REF	---
IMAGE	---

TABLES

Table 1
Hunters Point Shipyard, Parcel E
Air Quality Target Compounds and Action Level Criteria for Integrated Sampling

Contaminant	PAMP Action Level (µg/m3)	PAMP Averaging Period	EPA [(k)] Cancer PRG (µg/m^3)	EPA [(k)] Chronic PRG (µg/m^3)
Metals (particulate)				
Aluminum	150[c]	24-hour TWA	na	5.1
Antimony	5[a]	24-hour TWA	na	na
Arsenic	0.014	project duration	0.00045	na
Barium	na		na	0.52
Beryllium	0.03	project duration	0.0008	0.021
Cadmium	0.04	project duration	0.0011	na
Chromium (Total) **	0.042	project duration	0.00016	na
Cobalt	na		na	na
Copper	10[c]	24-hour TWA	na	na
Lead	1.5[e]	quarterly average	na	na
Manganese	0.05[b]	24-hour TWA	na	0.051
Mercury	0.3[b]	24-hour TWA	na	0.31
Molybdenum	na		na	na
Nickel	10[c]	24-hour TWA	na	na
Selenium	na		na	na
Silver	na		na	na
Thallium	na		na	na
Vanadium	0.5[b]	24-hour TWA	na	na
Zinc	1050[d]	24-hour TWA	na	na
VOCs				
1,1,1-Trichloroethane	na		na	1000
1,1,2-Trichloroethane	na		0.12	15
1,1-Dichloroethane	na		na	520
1,1-Dichloroethene	1.4	project duration	0.038	33
1,1,2,2-Tetrachloroethane	na		0.033	220
1,2,4-Trimethylbenzene	na		na	6.2
1,2-Dibromoethane	na		0.0087	0.21
1,2-Dichlorobenzene	na		na	210
1,2-Dichloroethane	3	project duration	0.074	5.1
1,2-Dichlorpropane	na		0.099	4.2
1,2,4-Trichlorobenzene	na		na	210
1,3,5-Trimethylbenzene	na		na	6.2
1,3-Dichlorobenzene	na		na	3.3
1,4-Dichlorobenzene	na		0.31	110
Benzene	0.32[j]	project duration	0.25	6.2
Bromomethane	na		na	5.2
Carbon Tetrachloride	na		0.13	2.6
Chlorobenzene	na		na	62
Chloroethane	na		2.3	10000
Chloroform	na		0.084	0.31
Chloromethane	na		1.1	1900000000
Cis-1,2-Dichloroethene	na		na	37
Cis-1,3-Dichloropropene	na		0.052	21
Dichlorodifluoromethane	na		na	210
Dichlorotetrafluoroethane	na		na	na
Ethylbenzene	na		na	1100
Hexachlorobutadiene	na		0.086	0.73
Methylene Chloride	na		4.1	3100
Styrene	na		na	1100
Tetrachloroethene	35[d]	24-hour TWA	3.3	420
Toluene	na		na	400
Trans-1,3-Dichloropropene	na		na	na
Trichloroethene	na		1.1	220
Trichlorofluoromethane	na		na	730
Trichlorotrifluoroethane	na		0.022	na
Vinyl Chloride	na		0.22	104
Xylenes (Total)	4350[c]	24-hour TWA	na	730

Table 1
Hunters Point Shipyard, Parcel E
Air Quality Target Compounds and Action Level Criteria for Integrated Sampling

Contaminant	PAMP Action Level (µg/m3)	PAMP Averaging Period	EPA [(k)] Cancer PRG ($\mu g/m^3$)	EPA [(k)] Chronic PRG ($\mu g/m^3$)
Pesticides/PCBs				
Aldrin	0.014	project duration	0.00039	0.11
4,4'-DDD	0.012[g]	project duration	0.028	na
4,4'-DDE	0.009[g]	project duration	0.02	na
4,4'-DDT	0.7	project duration	0.02	1.8
A-BHC	na		na	na
B-BHC	na		na	na
Chlordane	na		0.019	0.73
D-BHC	na		na	na
Dieldrin	na		0.00042	0.18
Endosulfan I	na		na	22
Endosulfan II	na		na	na
Enosulfan Sulfate	na		na	na
Endrin	na		na	1.1
Endrin Aldehyde	na		na	na
Heptachlor	na		0.0015	1.8
Heptachlor Epoxide	na		0.00074	0.047
Lindane	na		na	na
Methoxychlor	na		na	18
Toxaphene	na		0.006	na
PCBs (Aroclor 1016)	na		0.096	0.26
PCBs (Aroclor 1221, 1232, 1248)	na		0.0034	na
PCBs (Aroclor 1260, 1254, 1242)	0.01	project duration	0.0034	.073 (1254)
SVOCs				
2,4,5-Trichlorophenol	na		na	370
2,4,6-Trichlorophenol	na		0.62	na
2,4-Dichlorophenol	na		na	11
2,4-Dimethylphenol	na		na	73
2,4-Dinitrophenol	na		na	7.3
2,4-Dinitrotoluene	na		na	7.3
2-Chloronaphthalene	na		na	na
2-Chlorophenol	na		na	18
2-Methylnaphthalene	na		na	na
2-Methylphenol	na		na	180
2-Nitroaniline	na		na	0.21
2-Nitrophenol	na		na	na
3,3'-Dichlorobenzidine	na		0.015	na
3-Nitroaniline	na		na	na
4,6-Dinitro-2-Methylphenol	na		na	na
4-Bromophenyl Phenyl Ether	na		na	na
4-Chloro-3-Methylphenol	na		na	na
4-Chloroaniline	na		na	15
4-Chlorophenyl Phenyl Ether	na		na	na
4-Methylphenol	na		na	18
4-Nitroaniline	na		na	0.21
4-Nitrophenol	na		na	29
Acenaphthene	na		na	220
Acenaphthylene	na		na	na
Anthracene	na		na	1100
Benzo(a)anthracene	0.3[h]	project duration	0.022	na
Benzo(a)pyrene	0.04[h]	project duration	0.0022	na
Benzo(b)fluoranthene	0.3[h]	project duration	0.022	na
Benzo(k)fluoranthene	0.8[h]	project duration	0.22	na
Benzo(g,h,i)perylene	na		na	na
Benzyl Alcohol	na		na	1100
Bis(2-Chloroethyl)ether	na		0.0058	na
Bis(2-Chloroethoxy)methane	na		na	na
Bis(2-Chloroisopropyl)ether	na		0.19	150

Table 1
Hunters Point Shipyard, Parcel E
Air Quality Target Compounds and Action Level Criteria for Integrated Sampling

Contaminant	PAMP Action Level (µg/m3)	PAMP Averaging Period	EPA [(k)] Cancer PRG ($\mu g/m^3$)	EPA [(k)] Chronic PRG ($\mu g/m^3$)
SVOCs - continued				
Bis(2-ethylheyxl)phthalate	0.018[g]	project duration	0.48	80
Butyl Benzyl Phthalate	na		na	730
Chrysene	0.14	project duration	2.2	na
Dibenzo(a,h)anthracene	0.04[h]	project duration	0.0022	na
Dibenzofuran	na		na	15
Diethylphthalate	na		na	2900
Dimethyl Phthalate	na		na	37000
Di-n-butylphthalate	na		na	370
Di-n-octyl phthalate	na		na	73
Fluoranthene	na		na	150
Fluorene	na		na	150
Hexachlorobenzene	na		0.0042	2.9
Hexachlorobutadiene	na		0.086	1.1
Hexachlorocyclopentadiene	na		na	0.073
Hexachloroethane	na		0.48	3.7
Indeno(1,2,3-cd)pyrene	0.14[h]	project duration	0.022	na
Isophorone	na		7.1	730
Naphthalene	na		na	3.1
Nitrobenzene	na		na	2.1
N-Nitroso-di-n-propylamine	na		0.00096	na
N-Nitrosodipropylamine	0.04[g]	project duration	na	na
Pentachlorophenol	na		0.056	110
Phenanthrene	na		na	na
Phenol	na		na	2200
Pyrene	na		na	110
High Resolution Dioxin/Furans				
1,2,3,7,8-Pentachlorodobenzo-p-dioxin	na		na	na
2,3,7,8-Tetrachlorodibenzofuran	na		na	na
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	na		0.000000045	na
Heptachlorodibenzofuran (Total)	na		na	na
Heptachlorodibenzo-p-dioxins (Total)	na		na	na
Hexachlorodibenzofuran (Total)	na		na	na
Hexachlorodibenzo-p-dioxins (Total)	na		0.0000015	na
Octachlorodibenzofuran	na		na	na
Octachlorodibenzo-p-dioxin	na		na	na
Pentachlorodibenzofuran (Total)	na		na	na
Chlorine Compounds				
Particulate Chloride	na		na	na
Hydrogen Chloride Gas	na		na	na
Chloring Gas	na		na	na
OTHER				
Phosgene	na		na	na

Notes:
Source: IT, 1998a.
USEPA, Region 9, Residential Preliminary Remediation Goal (PRG) for air is presented to evaluate the sensitivity of the analytical results, it is not used for risk assessment or risk characterization.

a) No inhalation RfD, RfD, or carcinogenic slope factor. Also, no OSHA PEL. Based on NIOSH REL/100.
b) Based on RfC.
c) No inhalation RfD or RfC. Based on OSHA PEL/100 for criteria.
d) No inhalation RfD or RfC. Criteria based on oral RfC, assuming 20 m^3/day inhalation rate and 100% absorption.
e) National Ambient Air Quality Standard.
f) No current RfC or slope factor. Based on slope factor value withdrawn from HEAST tables in Ref. 1.
g) Calculated by using the oral carcinogenic slope factor and assuming 20 m^3/day inhalation rate and 100% absorption.
h) Calculated from inhalation slope factor listed in EPA 1993, assuming 20 m^3/day inhalation rate and 100% absorption.
I) No inhalation RfD or OSHA PEL. Used OSHA PEL for coke oven emissions divided by a factor of 100.
j) This is the minimum detection limit for benzene using the specified T0-14 method which is higher than the action level criteria in Specification 01420 of 0.1 ug/m^3.
k) PRG values based on annual average concentration.
* PRG for thallium sulfate used since this is the thallium compound used for pesticidal use.
** PAMP Action Level and Cancer PRG are based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III. PAMP Action Level for Chromium VI = 0.006, for Chromium III = 5. Cancer PRG for Chromium VI = 2.3 E -5. PAMP Action Level and PRGs shown in table = 7 x Chromium VI value.

Table 2
Hunters Point Shipyard, Parcel E
Project Timeline
2000/2001

Date	Activity
08/16/00	Grass fire at Parcel E.
08/31/00	A single air sample (pesticides, PCBs, SVOCs, VOCs, metals, low resolution dioxins/furans) was taken downwind of the fire area.
09/08/00	At the request of the Department of the Navy, air monitoring equipment was moved from Parcel B to Parcel E. Daily Pesticide, PCB, SVOC, and Low Resolution Dioxin/Furan sampling began at Stations A-F.
09/09/00	Daily Metals and VOC sampling began at Stations A-F.
09/13/00	Clearing and grubbing begins at fire area.
09/16/00	Began cap construction. Began testing for High Resolution Dioxins/Furans - samples taken every 8 days.
09/17/00	TSP samples tested for radioactive properties (gross alpha, beta, and gamma). Metals analysis were not conducted. Station G (duplicate of Station D) is added to sampling network. Station G samples collected approximately every other sampling day.
09/19/00	Began daily testing for Chlorine and Phosgene.
09/24/00	Increased use of water for dust control.
09/28/00	Began receiving cap liner material.
09/29/00	Increased use of water for dust control. Discontinued use of transfer trailers.
10/03/00	To control dust, rock was placed on roads and near air stations. Soil was placed and compacted at liner lay down area.
10/07/00	Chlorine and Phosgene testing scaled back to approximately every other day.
10/15/00	PUF samplers moved back to Parcel B. New PUF samplers installed at Parcel E. New samplers do not have Dixon chart recorders, therefore, hourly Magnehelic® readings recorded.
10/18/00	Ceased sampling for Pesticides, SVOCs and Low Resolution Dioxin/Furan.
10/19/00	Sampling for High Resolution Dioxin/Furan stopped.

Table 2
Hunters Point Shipyard, Parcel E
Project Timeline
2000/2001

Date	Activity
10/20/00	Ceased sampling for Chorine and Phosgene.
10/21/00	Metals and VOC sampling scaled back to approximately every third day.
10/23/00	Grading and smooth rolling activities completed on western portion of site.
10/24/00	Began placing geosynthetics.
11/21/00	Geosynthetic placement activities completed.
11/22/00 - 11/27/00	Sampler maintenance - no sampling conducted. Field activities suspended.
11/30/00	Began placement of vegetative cover. Began transporting landfill fire debris offsite.
12/06/00	Transport of landfill fire debris offsite completed.
12/15/00 - 1/04/01	No sampling due to inclement weather and reduced Parcel E field work.
01/05/01	Sampled for PCBs, VOCs, and Metals.
1/06/01 - 1/29/01	No sampling due to inclement weather and reduced Parcel E field work.
01/29/01	Restarted PCB, VOC, and metal sampling approximately every three days.
03/13/01	Department of Navy suspended air sampling and monitoring activities.
03/27/01	Vegetative cover placement activities completed.
03/29/01	Began hydroseeding.

Table 3
Hunters Point Shipyard, Parcel E
Initial Sampling Results - 8/31/00

Compound	8/31/00 to 9/01/00 Results (µg/m^3)	DO109 PAMP Action Level (µg/m^3)	% of PAMP Action Level	Ambient Air Cancer PRG (µg/m^3)	% of Ambient Air Cancer PRG	Ambient Air Chronic PRG (µg/m^3)	% of Ambient Air Chronic PRG
Phenol	0.0493	-	-	-	-	2200	0.002%
2-Methylphenol	0.0262	-	-	-	-	180	0.015%
4-Methylphenol	0.0465	-	-	-	-	18	0.26%
Dibenzofuran	0.00775	-	-	-	-	15	0.052%
Diethylphthalate	0.022	-	-	-	-	2,900	0.0008%
Fluorene	0.00526	-	-	-	-	150	0.0035%
Phenanthrene	0.0889	1.5	5.93%	-	-	-	-
Anthracene	0.0113	-	-	-	-	1,100	0.00103%
Di-N-Butylphthalate	0.045	-	-	-	-	370	0.012%
Fluoranthene	0.0232	-	-	-	-	150	0.0155%
Pyrene	0.00979	-	-	-	-	110	0.01%
Bis(2-ethylhexyl)phthalate	0.00631	0.018	35%	0.48	1%	80	0.01%
Dichlorodifluoromethane	2.1	-	-	-	-	210	1.0%
Copper	0.052	10	1%	-	-	-	-
Styrene	0.767	-	-	-	-	1,100	0.07%
Benzene	4.63	0.32	1447%	0.25	1852%	6.2	75%
Toluene	1.92	-	-	-	-	400	0.48%
Xylene, Total [(a)]	0.825	4,350	0.019%	-	-	730	0.11%
Heptadecane, 9-octyl-[(c)]	0.200	-	-	-	-	-	-
Naphthalene, decahydro-4a-methyl-[(c)]	0.169	-	-	-	-	-	-
Vanillin[(c)]	0.0955	-	-	-	-	-	-
Phenol,2,6-dimethoxy-[(c)]	0.0811	-	-	-	-	-	-
Lup-20(20)-en-3-one[(c)]	0.0577	-	-	-	-	-	-

(a) Xylene (M+P) = 1.0; Xylene (O) = ND

(b) PAMP Action Level and Cancer PRG are based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III. PAMP Action Level for Chromium VI = 0.006, for Chromium III = 5. Cancer PRG for Chromium VI = 2.3 E-5. PAMP Action Level and PRGs shown in table = 7 x Chromium VI value.

(c) Tentatively Identified Compound

Table 4
Hunters Point Shipyard, Parcel E
Project Average* Air Concentrations of Detected Compounds
(µg/m^3)

Compound	PAMP Action Level	Cancer PRG Action Level	Chronic PRG Action Level	Station A	Station B	Station C	Station D	Station E	Station F	Station G
Metals (particulate)										
Aluminum	150	5.1	NA	1.317	ND	1.457	1.622	1.287	1.437	1.421
Arsenic	0.014	0.00045	NA	0.00110	0.00105	0.00120	0.00142	0.00107	0.00114	0.00118
Barium	NA	NA	0.52	ND	ND	ND	0.0637	0.0629	0.0684	ND
Beryllium	0.03	0.0008	0.021	ND	ND	0.00627	ND	ND	ND	ND
Chromium (Total) **	0.042	0.00016	NA	ND	ND	0.0260	0.0260	0.0278	0.0330	0.0344
Cobalt	NA	NA	NA	ND	ND	ND	0.00636	ND	ND	ND
Copper	10	NA	NA	0.0893	0.1474	0.1521	0.0800	0.0586	0.1202	0.0535
Lead***	1.5	NA	NA	0.0144	0.0156	0.0266	0.0498	0.0262	0.0251	0.0240
Manganese	0.05	NA	0.051	0.0263	0.0288	0.0412	0.0884	0.0425	0.0506	0.0520
Molybdenum	NA	NA	NA	ND	ND	ND	ND	0.0124	0.0139	0.0127
Nickel	10	NA	NA	0.0655	0.0633	0.0638	0.0638	0.0653	0.0683	0.0613
Zinc	1050	NA	NA	0.123	ND	ND	0.127	ND	0.130	ND
VOCs										
1,2,4-Trimethylbenzene	NA	NA	6.2	2.90	1.46	2.74	1.45	1.52	1.61	1.36
1,3,5-Trimethylbenzene	NA	NA	6.2	1.58	ND	1.57	ND	1.33	ND	ND
Benzene	0.32	0.25	6.2	1.21	1.08	1.13	1.07	1.02	1.15	0.94
Carbon Tetrachloride	NA	0.13	2.6	0.403	0.434	0.454	0.404	0.396	0.466	0.429
Chlorobenzene	NA	NA	62	ND	ND	0.284	ND	ND	ND	ND
Chloroethane	NA	2.3	10000	0.318	ND	0.322	0.292	0.274	ND	ND
Chloroform	NA	0.084	0.31	ND	ND	0.601	0.551	ND	ND	ND
Chloromethane	NA	1.1	1900000000	0.539	0.517	0.399	0.410	0.472	0.437	0.568
Cis-1,2-Dichloroethene	NA	37	NA	ND	ND	ND	0.247	ND	ND	0.452
Dichlorodifluoromethane	NA	NA	210	2.57	2.65	2.58	2.66	2.63	2.74	2.48
Ethylbenzene	NA	NA	1100	0.677	0.567	0.562	0.751	0.526	0.606	0.450
Methylene Chloride	NA	4.1	3100	1.112	1.043	1.050	0.948	0.935	1.299	ND
Styrene	NA	NA	1100	0.371	0.243	0.267	0.251	0.234	0.318	0.232
Tetrachloroethene	35	3.3	420	0.461	0.476	0.493	0.454	0.450	0.489	0.462
Toluene	NA	NA	400	4.88	4.28	3.99	4.08	3.86	4.47	3.80
Trichloroethene	NA	1.1	NA	ND	0.321	ND	ND	ND	0.350	0.522
Trichlorofluoromethane	NA	NA	730	1.14	1.42	1.19	1.34	1.32	1.24	1.05
Xylenes (Total)	4350	NA	730	4.17	3.14	3.50	3.60	2.95	3.35	2.58
Pesticides/PCBs										
Endrin	NA	NA	1.1	ND	ND	ND	ND	ND	0.015130	ND
Aroclor 1260	0.01	0.0034	NA	0.00153	ND	ND	ND	0.00160	0.00429	ND
SVOCs										
2-Methylnaphthalene	NA	NA	NA	0.00157	ND	ND	ND	ND	ND	ND
Acenaphthylene	NA	NA	NA	0.00192	0.00156	0.00162	0.00285	ND	0.00157	0.00389
Anthracene	NA	NA	1100	0.00163	ND	ND	0.00289	0.00204	0.00189	0.00321
Bis(2-ethylheyxl)phthalate	0.018	0.48	80	0.02490	0.03765	0.00743	0.02830	0.02968	0.01521	0.01036
Butyl Benzyl Phthalate	NA	NA	730	0.00242	0.00225	0.00928	0.00900	0.00259	0.00189	0.00193
Dibenzofuran	NA	NA	15	0.00153	ND	0.00156	0.00390	0.00174	0.00182	0.00442
Diethylphthalate	NA	NA	2900	0.0233	0.0231	0.0060	0.0166	0.0272	0.0175	0.1420
Di-n-butylphthalate	NA	NA	370	0.0081	0.0155	0.0331	0.0171	0.0196	0.0241	0.0065
Di-n-octyl phthalate	NA	NA	73	0.00175	ND	ND	ND	ND	ND	ND
Fluoranthene	NA	NA	150	0.00199	0.00169	0.00186	0.00562	0.00228	0.00206	0.00611
Fluorene	NA	NA	150	0.00159	0.00168	0.00198	0.00612	0.00229	0.00232	0.00807
Naphthalene	NA	NA	3.1	0.00154	0.00151	0.00155	ND	ND	ND	ND
Phenanthrene	NA	NA	NA	0.00716	0.00642	0.01009	0.03252	0.01421	0.01165	0.03543
Pyrene	NA	NA	110	0.00207	0.00158	0.00173	0.00317	0.00186	0.00233	0.00342
High Resolution Dioxin/Furans										
2,3,7,8-Tetrachlorodibenzo-p-dioxin, Equivalency (TCDD)	NA	0.000000045	NA	0.0000000095	0.0000000069	0.0000000094	0.0000000130	0.0000000102	0.0000000047	0.0000000035
Chlorine Compounds										
Particulate Chloride	NA	NA	NA	6.20	4.69	6.22	5.68	5.72	5.78	NS

* Averages are calculated assuming 1/2 the Laboratory Reporting Limit for Not Detected Results.

** PAMP Action Level and Cancer PRG are based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III. PAMP Action Level for Chromium VI = 0.006, for Chromium III = 5. Cancer PRG for Chromium VI = 2.3 E^{-5}. PAMP Action Level and PRGs shown in table = 7 x Chromium VI value.

Table 5
Hunters Point Shipyard, Parcel E
Non-Detected Target Compounds

Contaminant		
Metals (particulate)	***VOCs***	***SVOCs***
Antimony	1,1,1-Trichloroethane	2,4,5-Trichlorophenol
Cadmium	1,1,2-Trichloroethane	2,4,6-Trichlorophenol
Mercury	1,1-Dichloroethane	2,4-Dichlorophenol
Selenium	1,1-Dichloroethene	2,4-Dimethylphenol
Silver	1,1,2,2-Tetrachloroethane	2,4-Dinitrophenol
Thallium	1,2-Dibromoethane	2,4-Dinitrotoluene
Vanadium	1,2-Dichlorobenzene	2,4-Dinitrotoluene
	1,2-Dichloroethane	2-Chloronaphthalene
High Resolution Dioxin/Furans	1,2-Dichloropropane	2-Chlorophenol
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,4-Trichlorobenzene	2-Methylphenol
2,3,7,8-Tetrachlorodibenzofuran	1,3-Dichlorobenzene	2-Nitroaniline
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1,4-Dichlorobenzene	2-Nitrophenol
Heptachlorodibenzofuran (Total)	Bromomethane	3,3'-Dichlorobenzidine
Heptachlorodibenzo-p-dioxins (Total)	Cis-1,3-Dichloropropene	3-Nitroaniline
Hexachlorodibenzofuran (Total)	Dichlorotetrafluoroethane	4,6-Dinitro-2-Methylphenol
Hexachlorodibenzo-p-dioxins (Total)	Hexachlorobutadiene	4-Bromophenol Phenyl Ether
Octachlorodibenzofuran	Trans-1,3-Dichloropropene	4-Chloro-3-Methylphenol
Octachlorodibenzo-p-dioxin	Trichlorotrifluoroethane	4-Chloroaniline
Pentachlorodibenzofuran (Total)	Vinyl Chloride	4-Chlorophenyl Phenyl Ether
		4-Methylphenol
CHLORINE COMPOUNDS	***Pesticides/PCBs***	4-Nitroaniline
Hydrogen Chloride Gas	Aldrin	4-Nitrophenol
Chlorine Gas	4,4'-DDD	Acenaphthylene
	4,4'-DDE	Benzo(a)anthracene
OTHER	4,4'-DDT	Benzo(a)pyrene
Phosgene	A-BHC	Benzo(b)fluoranthene
	B-BHC	Benzo(k)fluoranthene
	Chlordane	Benzo(g,h,i)perylene
	D-BHC	Benzyl Alcohol
	Dieldrin	Bis(2-Chlorethyl)ether
	Endosulfan I	Bis(2-Chlorethoxy)methane
	Endosulfan II	Bis(2-Chlorisopropyl)ether
	Endosulfan Sulfate	Chrysene
	Endrin Aldehyde	Dibenzo(a,h)anthracene
	Heptachlor	Dimethyl Phthalate
	Heptachlor Epoxide	Hexachlorobenzene
	Lindane	Hexachlorobutadiene
	Methoxychlor	Hexachlorocyclopentadiene
	Toxaphene	Hexachloroethane
	PCBs (Aroclor 1016)	Indeno(1,2,3-cd)pyrene
	PCBs (Aroclor 1221)	Isophorone
	PCBs (Aroclor 1232)	Nitrobenzene
	PCBs (Aroclor 1242)	N-Nirtoso-di-n-propylamine
	PCBs (Aroclor 1248)	N-Nitrosodipropylamine
	PCBs (Aroclor 1254)	Pentachlorophenol

Table 6
Concentrations Above PAMP/PRG - Daily Basis [a]

Date	Compound Name	Air Concentration (µg/m3) [a]									
		PAMP Action Level	Cancer PRG	Chronic PRG	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
8/31 to 9/1	Benzene	0.32	0.25	6.2				4.63			
9/1 to 9/8	No Samples taken										
9/8 to 9/9	Bis(2-ethylhexyl)phthalate	0.018	0.48	80		0.744		0.365 [b]	0.133 [b,e]	0.0621 [b,e]	
9/9 to 9/10	Benzene	0.32	0.25	6.2	0.479	0.543	0.511	0.926	0.799	0.351	
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80					0.0797 [b]		
	Carbon Tetrachloride	5	0.13	2.6		0.629 [c]				0.629 [c]	
	Manganese	0.05	NA	0.051				0.0612			
9/10 to 9/11	Benzene	0.32	0.25	6.2	0.479	0.447	0.575	0.607	0.639	0.735	
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80					0.647	0.0279 [b]	
	Carbon Tetrachloride	5	0.13	2.6					0.629 [c]		
	Manganese	0.05	NA	0.051				0.0744		0.0561	
9/11 to 9/12	Benzene	0.32	0.25	6.2	1.09	1.15	1.15	1.09	0.99	0.958	
	Carbon Tetrachloride	5	0.13	2.6						0.629 [c]	
	Manganese	0.05	NA	0.051		0.0586 [e]		0.0669		0.0729	
9/12 to 9/13	Benzene	0.32	0.25	6.2	3.45	2.88	3.45	2.84	2.78	2.04	
	Manganese	0.05	NA	0.051	0.0699		0.0619	0.0921	0.0788	0.173	
9/13 to 9/14	Benzene	0.32	0.25	6.2	0.799			0.511	0.671	0.671	
	Manganese	0.05	NA	0.051		0.0525		0.108		0.0848	
9/14 to 9/15	Benzene	0.32	0.25	6.2		0.415				1.50	
	Carbon Tetrachloride	5	0.13	2.6					0.629 [c]		
	Manganese	0.05	NA	0.051				0.104			
9/15 to 9/16	1,2,4-Trimethylbenzene	NA	NA	6.2	77.2 [c]						
	1,3,5-Trimethylbenzene	NA	NA	6.2	13.7 [c]						
	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0121	
	Benzene	0.32	0.25	6.2	0.383			0.319			
	Manganese	0.05	NA	0.051		0.0521 [e]		0.227	0.0901		
9/16 to 9/17	Benzene	0.32	0.25	6.2	2.72	2.20	1.50	2.08	2.33	1.88	
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80	0.683					0.328 [b]	
	Carbon Tetrachloride	5	0.13	2.6		0.629 [c]				0.692 [c]	
	Manganese	0.05	NA	0.051	0.0606	0.116 [e]		0.122	0.107	0.0589	
9/17 to 9/18	Benzene	0.32	0.25	6.2	2.97	2.43	2.65	2.20	2.43	2.88	
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80							0.187 [b]
	Chloroform	NA	0.084	0.31				1.22 [c]			
9/18 to 9/19	Aluminum	150	NA	5.1				6.626 [c]		7.094 [c]	
	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0381	
	Arsenic	0.014	0.00045	NA				0.0038 [c]		0.0220	
	Benzene	0.32	0.25	6.2	1.50	1.28	1.92	1.15	1.53	1.12	
	Carbon Tetrachloride	5	0.13	2.6			1.636 [c]				
	Chloroform	NA	0.084	0.31			1.17 [c]				
	Manganese	0.05	NA	0.051	0.0752	0.0775 [e]	0.0868	0.294	0.156	0.195	
9/19 to 9/20	1,2,4-Trimethylbenzene	NA	NA	6.2			41 [c]				
	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0152	
	Arsenic	0.014	0.00045					0.002 [c]			
	Benzene	0.32	0.25	6.2	1.3	1.4	1.7	1.2	1.2	1.1	
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80		0.445 [b]					
	Manganese	0.05	NA	0.051				0.192	0.117	0.136	
9/20 to 9/21	Arsenic	0.014	0.00045	NA				0.003 [c]			
	Manganese	0.05	NA	0.051	0.0575			0.134			
9/21 to 9/22	Benzene	0.32	0.25	6.2				0.4			
	Carbon Tetrachloride	5	0.13	2.6	0.63 [c]						
	Manganese	0.05	NA	0.051	0.0738			0.1282			
9/22 to 9/23	Benzene	0.32	0.25	6.2	1.2	1.0		1.0	0.9	0.7	
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80					0.0196 [b,e]		
	Manganese	0.05	NA	0.051			0.081	0.078			
9/23 to 9/24	No Samples taken										
9/24 to 9/25	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00861 [c]	
	Benzene	0.32	0.25	6.2	1.0	0.9	1.0	0.7	0.7	1.3	0.7
	Manganese	0.05	NA	0.051		0.0612	0.0540	0.122	0.0740		
9/25 to 9/26	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0127	
	Arsenic	0.014	0.00045	NA	0.004 [c]			0.003 [c]			
	Beryllium	0.03	0.0008	0.021			0.013 [c]				
	Benzene	0.32	0.25	6.2	0.42	0.51	0.64	0.51		0.83	
	Carbon Tetrachloride	5	0.13	2.6						1.32 [c]	
	Manganese	0.05	NA	0.051			0.0725	0.259	0.0559	0.0819	
9/26 to 9/27	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00448 [c]	
	Arsenic	0.014	0.00045	NA			0.002 [c]	0.004 [c]			
	Benzene	0.32	0.25	6.2		0.42					
	Manganese	0.05	NA	0.051			0.0716	0.226	0.0613	0.069	
9/27 to 9/28	Aroclor 1260 (PCB)	0.01	0.0034	NA					0.00382 [c,e]	0.00520 [c]	
	Arsenic	0.014	0.00045	NA		0.002 [c]					
	Manganese	0.05	NA	0.051				0.162			

Table 6
Concentrations Above PAMP/PRG - Daily Basis [a]

Date	Compound Name	Air Concentration (µg/m3) [a]									
		PAMP Action Level	Cancer PRG	Chronic PRG	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
9/28 to 9/29	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0338	
	Arsenic	0.014	0.00045	NA				0.004 [c]		0.003 [c]	0.004 [c]
	Benzene	0.32	0.25	6.2	0.89	0.67	0.58	0.61	0.61	0.67	0.61
	Manganese	0.05	NA	0.051				0.166	0.0637	0.119	0.197
	Trichloroethene	NA	1.1	22						1.4 [c]	
9/29 to 9/30	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0432	
	Arsenic	0.014	0.00045	NA	0.002 [c]						
	Benzene	0.32	0.25	6.2		1.5	1.4	1.3	1.5	1.1	
	Manganese	0.05	NA	0.051				0.185		0.173	
9/30 to 10/1	No Samples taken										
10/1 to 10/2	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0247 [e]	
	Arsenic	0.014	0.00045	NA			0.002 [c]				
	Benzene	0.32	0.25	6.2	0.45		0.42	0.32	0.73		
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80			0.0471 [b]				
	Manganese	0.05	NA	0.051	0.107		0.085	0.127		0.146	0.084
10/2 to 10/3	Aroclor 1260 (PCB)	0.01	0.0034	NA					0.00408 [c,e]	0.00645 [c,e]	
	Arsenic	0.014	0.00045	NA	0.002 [c]		0.002 [c]	0.002 [c]			
	Manganese	0.05	NA	0.051	0.063		0.104	0.117	0.079	0.070	
10/3 to 10/4	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0208 [e]	
	Arsenic	0.014	0.00045	NA			0.003 [c]	0.002 [c]			
	Manganese	0.05	NA	0.051			0.093	0.119		0.052	0.083
	Benzene	0.32	0.25	6.2		0.45	0.32		0.35		
	Trichloroethene	NA	1.1	22							0.63 [c]
10/4 to 10/5	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0156	
	Arsenic	0.014	0.00045	NA			0.002 [c]	0.002 [c]			
	Benzene	0.32	0.25	6.2	0.32	0.35					
	Carbon Tetrachloride	5	0.13	2.6	0.82 [c]				0.63 [c]		
	Manganese	0.05	NA	0.051			0.052	0.237	0.050 [b]	0.079	
10/5 to 10/6	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.0138	
	Benzene	0.32	0.25	6.2							0.42
	Carbon Tetrachloride	5	0.13	2.6						0.63 [c]	0.76 [c]
	Manganese	0.05	NA	0.051				0.100		0.069	0.092
10/6 to 10/7	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00566 [c]	
	Benzene	0.32	0.25	6.2				0.32			
	Manganese	0.05	NA	0.051				0.063			
10/7 to 10/8	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00482 [c]	
	Benzene	0.32	0.25	6.2					0.32		
10/8 to 10/9	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00434 [c]	
	Carbon Tetrachloride	5	0.13	2.6	0.69 [c]						
	Manganese	0.05	NA	0.051				0.053			
10/9 to 10/10	Benzene	0.32	0.25	6.2				0.32			
10/10 to 10/11	Benzene	0.32	0.25	6.2	1.25			1.05			
	Manganese	0.05	NA	0.051				0.137			
10/11 to 10/12	Benzene	0.32	0.25	6.2	1.21	1.12		0.89	0.80		1.2
	Carbon Tetrachloride	5	0.13	2.6		0.63 [c]			0.63 [c]		
	Manganese	0.05	NA	0.051				0.074			0.052
10/12 to 10/13	Benzene	0.32	0.25	6.2	1.8 [e]	1.1 [e]	1.2 [e]	1.5 [e]	1.3 [e]	1.4 [e]	
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80				0.187 [b,e]		0.0283 [b,e]	
	Carbon Tetrachloride	5	0.13	2.6		0.76 [ce]					
	Manganese	0.05	NA	0.051				0.061			
10/13 to 10/14	Aluminum	150	NA	5.1			5.711 [c]				
	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00381 [ce]	
	Arsenic	0.014	0.00045	NA			0.002 [c]				
	Benzene	0.32	0.25	6.2	1.6	1.2	1.3	1.1	1.3	1.0	1.2
	Carbon Tetrachloride	5	0.13	2.6	0.69 [c]		0.76 [c]				
	Manganese	0.05	NA	0.051			0.103	0.077			
10/14 to 10/15	Benzene	0.32	0.25	6.2	0.38		0.38	0.38			1.2
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80			0.0251 [b,e]	0.301 [b,e]			
	Manganese	0.05	NA	0.051	0.070		0.075	0.086			
10/15 to 10/16	Arsenic	0.014	0.00045	NA					0.002 [c]		
	Benzene	0.32	0.25	6.2	3.1	2.1	1.8	2.2	1.9	2.4	1.7
	Manganese	0.05	NA	0.051				0.070			
10/16 to 10/17	Benzene	0.32	0.25	6.2	3.6	2.9	2.7	2.7	2.8	2.9	
	Manganese	0.05	NA	0.051				0.054	0.051	0.057	
10/17 to 10/18	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00403 [c]	
	Benzene	0.32	0.25	6.2	0.80	0.80	0.86	0.96	0.70	0.58	1.1
	Bis(2-ethylhexyl)phthalate	0.018	0.48	80	0.0306 [b]						0.0996 [b,e]
	Chloromethane	NA	1.1	1900000000							6.3 [c]
	Manganese	0.05	NA	0.051			0.053 [e]	0.065			0.072
10/18 to 10/19	Benzene	0.32	0.25	6.2	0.61	0.61	0.32	0.45	0.54	0.48	
	TCDD Equivalency	NA	0.000000045	NA				0.0000000459 [c,e]	0.54	0.48	

Table 6
Concentrations Above PAMP/PRG - Daily Basis [a]

Date	Compound Name	Air Concentration (µg/m3) [a]									
		PAMP Action Level	Cancer PRG	Chronic PRG	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
10/19 to 10/20	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00368 [c]	
	Benzene	0.32	0.25	6.2	0.61	0.89	0.80	0.77	0.54	0.64	
	Manganese	0.05	NA	0.051			0.059	0.051		0.053	
10/20 to 10/21	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.00452 [c]	
	Benzene	0.32	0.25	6.2	0.67	0.73	0.83	0.61	0.61	0.67	1.0
	Manganese	0.05	NA	0.051		0.063	0.114	0.052			
10/21 to 10/22	No Exceedances										
10/22 to 10/23	No Exceedances										
10/23 to 10/24	No Exceedances										
10/24 to 10/25	Benzene	0.32	0.25	6.2	0.32	0.38		0.38	0.45	0.45	
	Manganese	0.05	NA	0.051	0.055	0.080	0.216	0.074			
10/25 to 10/26	No Exceedances										
10/26 to 10/27	No Exceedances										
10/27 to 10/28	Benzene	0.32	0.25	6.2					0.32	0.54	
10/28 to 10/29	No Exceedances										
10/29 to 10/30	No Exceedances										
10/30 to 10/31	No Exceedances										
10/31 to 11/1	No Exceedances										
11/1 to 11/2	Arsenic	0.014	0.00	NA		0.002 [c]					
	Benzene	0.32	0.25	6.2	2.2	0.7 [e]	1.8	1.8	1.9	1.7	1.8
11/2 to 11/3	No Exceedances										
11/3 to 11/4	No Exceedances										
11/4 to 11/5	Benzene	0.32	0.25	6.2	0.48	0.64	0.54	0.61	0.35	0.64	
11/5 to 11/6	No Exceedances										
11/6 to 11/7	No Exceedances										
11/7 to 11/8	1,2,4-Trimethylbenzene	NA	NA	6.2			27 [c]				
	1,3,5-Trimethylbenzene	NA	NA	6.2			7.2 [c]				
	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.004 [c]	
	Benzene	0.32	0.25	6.2	1.6	2.0	3.1	0.38	1.3	1.8	1.3
	Carbon Tetrachloride	5	0.13	2.6		0.69 [c]			0.82 [c]	0.69 [c]	0.63 [c]
	Manganese	0.05	NA	0.051				0.066			0.062
11/8 to 11/9	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.006 [c]	
11/9 to 11/10	No Exceedances										
11/10 to 11/11	Benzene	0.32	0.25	6.2	1.7	1.6	1.6	1.8	1.7	1.6	
	Carbon Tetrachloride	5	0.13	2.6	0.76 [c]	0.76 [c]	0.76 [c]		0.82 [c]		
	Chloromethane	NA	1.1	1.90E+09		2.2 [c]		3.1 [c]	7.4 [c]		
	Manganese	0.05	NA	0.051				0.058			
11/11 to 11/12	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.004 [c]	
11/12 to 11/13	No Exceedances										
11/13 to 11/14	Benzene	0.32	0.25	6.2	1.5	1.4	1.4	1.4	1.5	1.6	0.48
	Carbon Tetrachloride	5	0.13	2.6		0.69 [c]	0.76 [c]	0.69 [c]	0.88 [c]	0.69 [c]	
	Chloromethane	NA	1.1	1900000000					1.1 [c]		
11/14 to 11/15	No Exceedances										
11/15 to 11/16	No Exceedances										
11/16 to 11/17	Arsenic	0.014	0.00045	NA			0.002 [c]				
	Benzene	0.32	0.25	6.2	2.0	1.7	1.8	1.8	2.3	2.1	
	Carbon Tetrachloride	5	0.13	2.6		0.88 [c]	0.82 [c]	0.82 [c]	0.69 [c]	0.69 [c]	
	Chloromethane	NA	1.1	1900000000					1.1 [c]		
11/17 to 11/18	No Exceedances										
11/18 to 11/19	No Exceedances										
11/19 to 11/20	Arsenic	0.014	0.00045	NA				0.003 [c]		0.002 [c]	
	Benzene	0.32	0.25	6.2	2.7	2.2	2.0	2.4	1.7	2.9	2.5
	Carbon Tetrachloride	5	0.13	2.6	0.82 [c]			0.63 [c]			0.82 [c]
	Chloromethane	NA	1.1	1900000000	1.1 [c]						
	Manganese	0.05	NA	0.051				0.093	0.065	0.153	0.077
11/20 to 11/21	No Exceedances										
11/21 to 11/22	No Exceedances										
11/22 to 11/27	No Samples taken										
11/27 to 11/28	No Exceedances										
11/28 to 11/29	No Exceedances										
11/29 to 11/30	No Exceedances										
11/30 to 12/1	Arsenic	0.014	0.00045	NA			0.002 [c]		0.002 [c]		
	Benzene	0.32	0.25	6.2	3.0	2.7	2.7	2.5	2.4	2.8	
	Carbon Tetrachloride	5	0.13	2.6	0.76 [c]		0.69 [c]	0.76 [c]	0.63 [c]		
	Chloromethane	NA	1.1	1900000000	1.1 [c]						
12/1 to 12/2	No Exceedances										
12/2 to12/3	No Exceedances										
12/3 to12/4	Arsenic	0.014	0.00045	NA						0.002 [c]	0.002 [c]
	Benzene	0.32	0.25	6.2	2.1	1.9	1.8	1.8	2.0	2.0	1.9
	Carbon Tetrachloride	5	0.13	2.6		0.88 [c]		0.63 [c]			0.76 [c]
	Manganese	0.05	NA	0.051					0.086		
12/4 to 12/5	No Exceedances										

Table 6
Concentrations Above PAMP/PRG - Daily Basis [a]

Date	Compound Name	Air Concentration (µg/m3) [a]									
		PAMP Action Level	Cancer PRG	Chronic PRG	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
12/5 to 12/6	No Exceedances										
12/6 to 12/7	No Exceedances										
12/7 to 12/8	Arsenic	0.014	0.00045	NA			0.003 [c]	0.002 [c]			
	Benzene	0.32	0.25	6.2	2.5	2.5	2.4	2.3	2.1	2.2	
	Carbon Tetrachloride	5	0.13	2.6	0.63 [c]	0.69 [c]	0.69 [c]	0.69 [c]			
	Chloromethane	NA	1.1	1900000000		1.1 [c]					
	Manganese	0.05	NA	0.051				0.115			
12/8 to 12/9	No Exceedances										
12/9 to 12/10	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.004 [c,e]	
12/10 to 12/11	No Exceedances										
12/11 to 12/12	Arsenic	0.014	0.00045	NA						0.003 [c]	
	Benzene	0.32	0.25	6.2		0.8	0.67	0.70	0.70	0.54	0.73
	Carbon Tetrachloride	5	0.13	2.6		0.82 [c]					0.82 [c]
12/12 to 12/13	No Exceedances										
12/13 to 12/14	No Exceedances										
12/14 to 12/15	Aroclor 1260 (PCB)	0.01	0.0034	NA						0.004 [c]	
12/15 to 1/5	No Samples taken										
1/5 to 1/6	Arsenic	0.014	0.00045	NA				0.002 [c]		0.002 [c]	
	Benzene	0.32	0.25	6.2	3.35	3.51	3.39	3.48	3.39	3.90	
	Carbon Tetrachloride	5	0.13	2.6		1.0 [c]	0.63 [c]	0.94 [c]	0.69 [c]	0.63 [c]	
	Chloromethane	NA	1.1	1900000000				1.7 [c]			
	Manganese	0.05	NA	0.051				0.061			
	Methylene Chloride	NA	4.1	3,100		4.24 [c]					
	Tetrachloroethene	35	3.3	420	3.5 [c]		3.5 [c]	3.4 [c]		3.7 [c]	
1/6 to 1/29	No Samples taken										
1/29 to 1/30	Benzene	0.32	0.25	6.2	1.4	0.4	1.0	1.0	1.0	0.9	1.0
	Carbon Tetrachloride	5	0.13	2.6			0.82 [c]	0.88 [c]	0.63 [c]	0.69 [c]	0.63 [c]
1/30 to 2/1	No Samples taken										
2/1 to 2/2	Arsenic	0.014	0.00045	NA	0.002 [c]			0.002 [c]			
	Benzene	0.32	0.25	6.2	2.7	2.6	2.91	2.7	2.7	5.91	
	Chloromethane	NA	1.1	1900000000			1.57 [c]				
	Methylene Chloride	NA	4.1	3100						4.48 [c]	
2/2 to 2/4	No Samples taken										
2/4 to 2/5	Benzene	0.32	0.25	6.2	3.42	2.7	2.49	2.8	1.21	2.08	2.20
	Carbon Tetrachloride	5	0.13	2.6				0.63 [c]			
	Chloromethane	NA	1.1	1900000000	10.9 [c]	1.4 [c]	1.4 [c]	1.1 [c]			
2/5 to 2/7	No Samples taken										
2/7 to 2/8	Benzene	0.32	0.25	6.2		0.86	1.05	1.02	0.93	1.2	
	Chloromethane	NA	1.1	1900000000						1.5 [c]	
2/8 to 2/13	No Samples taken										
2/13 to 2/14	Benzene	0.32	0.25	6.2		1.3	1.3	1.2	1.6	1.8	1.6
	Carbon Tetrachloride	5	0.13	2.6		0.69 [c]					
	Chloromethane	NA	1.1	1900000000		1.7 [c]					
	Manganese	0.05	NA	0.051					0.053		
2/14 to 2/16	No Samples taken										
2/16 to 2/17	Arsenic	0.014	0.00045	NA		0.002 [c]					
	Benzene	0.32	0.25	6.2	0.6	0.7	0.8	0.6	0.7	0.5	
2/17 to 2/23	No Samples taken										
2/23 to 2/24	Arsenic	0.014	0.00045	NA					0.003 [c]		
	Benzene	0.32	0.25	6.2	0.67	0.51	0.48		0.58	0.42	0.58
	Carbon Tetrachloride	5	0.13	2.6					0.76 [c]		
	Chloromethane	NA	1.1	1900000000		1.4 [c]					
	Chromium [d]	0.042	0.000164	NA				0.085			
	Tetrahydrofuran	NA	0.99	310					28.2 [c]		
2/24 to 3/5	No Samples taken										
3/5 to 3/6	Benzene	0.32	0.25	6.2	0.96	0.73	0.80	0.83	0.54		
3/6 to 3/8	No Samples taken										
3/8 to 3/9	Aluminum	150	NA	5.1				7.139 [c]			
	Benzene	0.32	0.25	6.2	0.64	0.45	0.61	0.61	0.48	0.61	0.64
	Chromium [d]	0.042	0.000164	NA						0.503	0.231
	Manganese	0.05	NA	0.051				0.204	0.072		0.154
3/9 to 3/12	No Samples taken										
3/12 to 3/13	Benzene	0.32	0.25	6.2	0.77	1.0	0.67		0.64	0.67	
	Carbon Tetrachloride	5	0.13	2.6					0.69 [c]		
	Chloromethane	NA	1.1	1900000000		6.2 [c]					
	Chromium [d]	0.042	0.000164	NA			0.083		0.188		

* Station G is a duplicate of Station D

(a) Unless otherwise noted, concentration exceeds PAMP and PRG levels

(b) Only exceeds PAMP level

(c) Only exceeds PRG level

(d) PAMP Action Level and Cancer PRG are based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III. PAMP Action Level for Chromium VI = 0.006, for Chromium III = 5. Cancer PRG for Chromium VI = 2.3 E-5. PAMP Action Level and PRG's shown in table = 7 x Chromium VI value.

(e) Data does not meet Quality Assurance Specifications

Table 7
Hunters Point Shipyard, Parcel E
Results Summary

Sample Date 2000/2001	Pesticides	PCBs	Chlorine / HCl Gas	Phosgene	SVOCs Other Than Bis-2-Ethylhexyl Phthalate	Bis-2-Ethylhexyl Phthalate	Low Resolution Dioxins/Furans	High Resolution Dioxins/Furans	VOCs	Metals other than Manganese	Manganese
9/8/-9/9	ND	ND	NS	NS	B	A [(a)]	ND	NS	NS	NS	NS
9/9-9/10	B	ND	NS	NS	B	A	ND	NS	A	B [(a)]	A [(a)]
9/10-9/11	ND	ND	NS	NS	B	A	ND	NS	A	B	A
9/11-9/12	ND	ND	NS	NS	B	B	ND	NS	A	B [(a)]	A [(a)]
9/12-9/13	ND	ND	NS	NS	B	B	ND	NS	A	B	A
9/13-9/14	ND	ND	NS	NS	B	B	ND	NS	A	B [(a)]	A [(a)]
9/14-9/15	ND	ND	NS	NS	B	B	ND	NS	A	B [(a)]	A [(a)]
9/15/-9/16	ND	A	NS	NS	B [(a)]	B	ND	NS	A	B [(a)]	A [(a)]
9/16/-9/17	ND	ND	NS	NS	B	A	ND	B [(a)]	A	B [(a)]	A [(a)]
9/17-9/18	ND	ND	NS	NS	B	A	ND	NS	A	NS*	NS*
9/18-9/19	ND	A	NS	NS	B	B	ND	NS	A	A [(a)]	A [(a)]
9/19-9/20	ND	A	ND	NS	B [(a)]	A [(a)]	ND	NS	A	A [(a)]	A [(a)]
9/20-9/21	ND	ND	ND	ND	B [(a)]	B [(a)]	ND	NS	B	A [(a)]	A [(a)]
9/21-9/22	ND	ND	ND	NS	B [(a)]	B [(a)]	ND	NS	A	B [(a)]	A [(a)]
9/22-9/23	ND	ND	NS	NS	B [(a)]	A [(a)]	ND	NS	A	B [(a)]	A [(a)]
9/23-9/24	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
9/24-9/25	ND	A	NS	ND	B [(a)]	B [(a)]	ND	B [(a)]	A	B	A
9/25-9/26	ND	A	NS	ND	B [(a)]	B [(a)]	ND	NS	A	A	A
9/26-9/27	ND	A	ND	ND	B [(a)]	B [(a)]	ND	NS	A	A	A
9/27-9/28	ND	A [(a)]	ND	ND	B [(a)]	B	ND	NS	B	A	A
9/28-9/29	ND	A	ND	ND	B [(a)]	B [(a)]	ND	NS	A	A	A
9/29-9/30	ND	A	ND	ND	B [(a)]	B [(a)]	ND	NS	A	A	A
9/30-10/01	NS	NS	ND	ND	NS	NS	NS	NS	NS	NS	NS
10/01-10/02	ND	A [(a)]	ND	ND	B [(a)]	A [(a)]	ND	NS	A	A	A
10/02-10/03	ND	A [(a)]	ND	ND	B [(a)]	B [(a)]	ND	B [(a)]	B	A	A
10/03-10/04	ND	A [(a)]	ND	ND	B [(a)]	B [(a)]	ND	NS	A	A	A
10/04-10/05	ND	A	ND	ND	B [(a)]	B [(a)]	ND	NS	A	A	A
10/05-10/06	ND	A	ND	ND	B [(a)]	B	ND	NS	A	B	A
10/06-10/07	ND	A	NS	ND	B [(a)]	B	ND	NS	A	B	A
10/07-10/08	ND	A	NS	NS	B [(a)]	ND	ND	NS	A	B	B
10/08-10/09	ND	A	ND	ND	B [(a)]	ND	ND	NS	A	B	A
10/09-10/10	ND	ND	NS	NS	B [(a)]	B	ND	NS	A	B	B
10/10-10/11	ND	ND	NS	ND	B [(a)]	B [(a)]	ND	B [(a)]	A	B	A
10/11-10/12	ND	ND	ND	NS	B [(a)]	B	ND	NS	A	B	A
10/12-10/13	ND	ND	NS	ND	B [(a)]	A [(a)]	ND	NS	A [(a)]	B	A
10/13-10/14	ND	A [(a)]	ND	NS	B [(a)]	B [(a)]	ND	NS	A	A	A
10/14-10/15	ND	ND	NS	NS	B [(a)]	A [(a)]	ND	NS	A	B	A
10/15-10/16	ND	ND	NS	ND	B [(a)]	B [(a)]	ND	NS	A	A	A
10/16-10/17	ND	ND	ND	NS	B [(a)]	B [(a)]	ND	NS	A	B	A
10/17-10/18	ND	A [(a)]	NS	NS	B [(a)]	A [(a)]	ND	NS	A	B [(a)]	A [(a)]
10/18-10/19	NS	NS	NS	ND	NS	NS	NS	A [(a)]	A	NS	NS
10/19-10/20	NS	A	ND	NS	NS	NS	NS	NS	A	B	A
10/20-10/21	NS	A	NS	NS	NS	NS	NS	NS	A	B	A
10/21-10/22	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/22-10/23	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/23-10/24	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/24-10/25	NS	ND	NS	NS	NS	NS	NS	NS	A	B	A
10/25-10/26	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/26-10/27	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/27-10/28	NS	ND	NS	NS	NS	NS	NS	NS	A	B	ND
10/28-10/29	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/29-10/30	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/30-10/31	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/31-11/1	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/1-11/2	NS	ND	NS	NS	NS	NS	NS	NS	A [(a)]	A [(a)]	B
11/2-11/3	NS	B	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/3-11/4	NS	B	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/4-11/5	NS	ND	NS	NS	NS	NS	NS	NS	A	B [(a)]	B [(a)]
11/5-11/6	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/6-11/7	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/7-11/8	NS	A	NS	NS	NS	NS	NS	NS	A	B	A
11/8-11/9	NS	A	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/9-11/10	NS	B	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/10-11/11	NS	B	NS	NS	NS	NS	NS	NS	A	B	A
11/11-11/12	NS	A	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 7
Hunters Point Shipyard, Parcel E
Results Summary

Sample Date 2000/2001	Pesticides	PCBs	Chlorine / HCl Gas	Phosgene	SVOCs Other Than Bis-2-Ethylhexyl Phthalate	Bis-2-Ethylhexyl Phthalate	Low Resolution Dioxins/Furans	High Resolution Dioxins/Furans	VOCs	Metals other than Manganese	Manganese
11/12-11/13	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/13-11/14	NS	ND	NS	NS	NS	NS	NS	NS	A	B	B
11/14-11/15	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/15-11/16	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/16-11/17	NS	ND	NS	NS	NS	NS	NS	NS	A	A	B
11/17-11/18	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/18-11/19	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/19-11/20	NS	ND	NS	NS	NS	NS	NS	NS	A	A	A
11/20-11/21	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/21-11/22	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/22-11/27	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/27-11/28	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/28-11/29	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/29-11/30	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/30-12/1	NS	ND	NS	NS	NS	NS	NS	NS	A	A	B
12/1-12/2	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/2-12/3	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/3-12/4	NS	ND	NS	NS	NS	NS	NS	NS	A	A	A
12/4-12/5	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/5-12/6	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/6-12/7	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/7-12/8	NS	ND	NS	NS	NS	NS	NS	NS	A	A	A
12/8-12/9	NS	B	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/9-12/10	NS	A [(a)]	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/10-12/11	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/11-12/12	NS	ND	NS	NS	NS	NS	NS	NS	A	A	B
12/12-12/13	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/13-12/14	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/14-12/15	NS	A	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/15-1/5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1/5-1/6	NS	ND	NS	NS	NS	NS	NS	NS	A	A	A
1/6-1/29	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1/29-1/30	NS	ND	NS	NS	NS	NS	NS	NS	A	B	B
1/30-2/1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2/1-2/2	NS	ND	NS	NS	NS	NS	NS	NS	A	A	B
2/2-2/4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2/4-2/5	NS	ND	NS	NS	NS	NS	NS	NS	A	B	B
2/5-2/7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2/7-2/8	NS	ND	NS	NS	NS	NS	NS	NS	A	B	B
2/8-2/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2/13-2/14	NS	ND	NS	NS	NS	NS	NS	NS	A	B	A
2/14-1/16	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2/16-2/17	NS	ND	NS	NS	NS	NS	NS	NS	A	A	B
2/17-2/23	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2/23-2/24	NS	ND	NS	NS	NS	NS	NS	NS	A	A	ND
2/24-3/5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3/5-3/6	NS	ND	NS	NS	NS	NS	NS	NS	A	B	ND
3/6-3/8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3/8-3/9	NS	ND	NS	NS	NS	NS	NS	NS	A	A	A
3/9-3/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3/12-3/13	NS	B	NS	NS	NS	NS	NS	NS	A	A	B

A: Results were above the action level (PAMP or PRG) for at least one compound in the group, for at least one monitoring station.
B: Results were below the action level for each compound at all monitoring stations.
ND: Not detected
NS: Not sampled
NR: Not yet reported
* Particulate filters were analyzed for radioactivity instead of metals.
[(a)] Annotates Detected Data that does not meet Quality Assurance Specifications.

Table 8
Hunters Point Shipyard, Parcel E
PAMP Action Level Exceedances

Compound	PAMP Action Level (µg/m^3)	PAMP Averaging Period	Air Concentration* (a) (µg/m3)						
			Station A	Station B	Station C	Station D	Station E	Station F	Station G
Benzene	0.32	Project Duration	1.21	1.08	1.13	1.13	1.02	1.15	0.94
Bis(2-ethylheyxl)phthalate	0.018	Project Duration	0.02490	0.03765	B	0.0283	0.0297	B	B

Compound	PAMP Action Level (µg/m^3)	PAMP Averaging Period	Number of PAMP Exceedances(a, b) for compounds with 24-hour PAMP Averaging Periods						
			Station A	Station B	Station C	Station D	Station E	Station F	Station G
Manganese	0.05	24-Hour	9	8	16	43	16	19	9

* Averages are calculated assuming 1/2 the Laboratory Reporting Limit for Not Detected Results.

(a) For compounds with project duration PAMP averaging periods, concentrations represent the project average; for compounds with 24-hour PAMP averaging periods, concentrations represent the maximum 24-hour average.

(b) For Detected Air Concentration Results in detail, see Daily PAMP Exceedances (Table 6)

B: Average Air Concentration Below PAMP Action Level

Table 9
Hunters Point Shipyard, Parcel E
PRG Exceedances

Compound	Cancer PRG Action Level	Chronic PRG Action Level	Project Average Air Concentration* (µg/m3)						
			Station A	Station B	Station C	Station D	Station E	Station F	Station G
Aroclor 1260	0.0034	NA	B	ND	ND	ND	B	0.00429	ND
Arsenic	0.00045	NA	0.00110	0.00105	0.0012	0.00142	0.00107	0.00114	0.00118
Benzene	0.25	6.2	1.21	1.08	1.13	1.07	1.02	1.15	0.94
Beryllium	0.0008	0.021	ND	ND	0.00627	ND	ND	ND	ND
Carbon Tetrachloride	0.13	2.6	0.403	0.434	0.454	0.404	0.396	0.466	0.429
Chloroform	0.084	0.31	ND	ND	0.601	0.551	ND	ND	ND
Chromium (Total) **	0.00016	NA	ND	ND	0.0260	0.0260	0.0278	0.0330	0.0344
Manganese	NA	0.051	B	B	B	0.0884	B	B	0.0520

* Averages are calculated assuming 1/2 the Laboratory Reporting Limit for Not Detected Results.

** PRG is based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III.

B: Average Air Concentration Below PRG Action Level

ND: Compound not detected throughout sampling duration

Table 10
Concentrations Above PAMP Action Level - Daily Basis

Date	Compound	PAMP	Air Concentration (µg/m³) Station A	Station B	Station C	Station D	Station E	Station F	Station G*
8/31 to 9/1	Benzene	0.32				4.63			
9/1 to 9/8	No Samples taken								
9/8 to 9/9	Bis(2-ethylhexyl)phthalate	0.018		0.744		0.365	0.133 (e)	0.0621 (e)	
9/9 to 9/10	Benzene	0.32	0.479	0.543	0.511	0.926	0.799	0.351	
	Bis(2-ethylhexyl)phthalate	0.018					0.0797		
	Manganese	0.05				0.0612			
9/10 to 9/11	Benzene	0.32	0.479	0.447	0.575	0.607	0.639	0.735	
	Bis(2-ethylhexyl)phthalate	0.018					0.647	0.0279	
	Manganese	0.05				0.0744		0.0561	
9/11 to 9/12	Benzene	0.32	1.09	1.15	1.15	1.09	0.99	0.958	
	Manganese	0.05		0.0586 (e)		0.0669		0.0729	
9/12 to 9/13	Benzene	0.32	3.45	2.88	3.45	2.84	2.78	2.04	
	Manganese	0.05	0.0699		0.0619	0.0921	0.0788	0.173	
9/13 to 9/14	Benzene	0.32	0.799			0.511	0.671	0.671	
	Manganese	0.05		0.0525 (e)		0.108		0.0848	
9/14 to 9/15	Benzene	0.32		0.415				1.50	
	Manganese	0.05				0.104			
9/15 to 9/16	Aroclor 1260 (PCB)	0.01						0.0121	
	Benzene	0.32	0.383			0.319			
	Manganese	0.05		0.0521 (e)		0.227	0.0901		
9/16 to 9/17	Benzene	0.32	2.72	2.20	1.50	2.08	2.33	1.88	
	Bis(2-ethylhexyl)phthalate	0.018	0.683					0.328	
	Manganese	0.05	0.0606	0.116 (e)		0.122	0.107	0.0589	
9/17 to 9/18	Benzene	0.32	2.97	2.43	2.65	2.20	2.43	2.88	
	Bis(2-ethylhexyl)phthalate	0.018							0.187
9/18 to 9/19	Aroclor 1260 (PCB)	0.01						0.0381	
	Benzene	0.32	1.50	1.28	1.92	1.15	1.53	1.12	
	Manganese	0.05	0.0752	0.0775 (e)	0.0868	0.294	0.156	0.195	
9/19 to 9/20	Aroclor 1260 (PCB)	0.01						0.0152	
	Benzene	0.32	1.3	1.4	1.7	1.2	1.2	1.1	
	Bis(2-ethylhexyl)phthalate	0.018		0.445					
	Manganese	0.05				0.192	0.117	0.136	
9/20 to 9/21	Manganese	0.05	0.0575			0.134			
9/21 to 9/22	Benzene	0.32				0.4			
	Manganese	0.05	0.0738			0.1282			
9/22 to 9/23	Benzene	0.32	1.2	1.0		1.0	0.9	0.7	
	Bis(2-ethylhexyl)phthalate	0.018					0.0196 (e)		
	Manganese	0.05			0.081	0.078			
9/23 to 9/24	No Samples taken								
9/24 to 9/25	Benzene	0.32	1.0	0.9	1.0	0.7	0.7	1.3	0.7
	Manganese	0.05		0.0612	0.0540	0.122	0.0740		
9/25 to 9/26	Aroclor 1260 (PCB)	0.01						0.0127	
	Benzene	0.32	0.42	0.51	0.64	0.51		0.83	
	Manganese	0.05			0.0725	0.259	0.0559	0.0819	
9/26 to 9/27	Benzene	0.32		0.42					
	Manganese	0.05			0.0716	0.226	0.0613	0.069	
9/27 to 9/28	Manganese	0.05				0.162			
9/28 to 9/29	Aroclor 1260 (PCB)	0.01						0.0338	
	Benzene	0.32	0.89	0.67	0.58	0.61	0.61	0.67	0.61
	Manganese	0.05				0.166	0.0637	0.119	0.197
9/29 to 9/30	Aroclor 1260 (PCB)	0.01						0.0432	
	Benzene	0.32		1.5	1.4	1.3	1.5	1.1	
	Manganese	0.05				0.185		0.173	
9/30 to 10/1	No Samples taken								
10/1 to 10/2	Benzene	0.32	0.45		0.42	0.32	0.73		
	Bis(2-ethylhexyl)phthalate	0.018			0.0471				
	Manganese	0.05	0.107		0.085	0.127		0.146	0.084
10/2 to 10/3	Manganese	0.05	0.063		0.104	0.117	0.079	0.070	
10/3 to 10/4	Aroclor 1260 (PCB)	0.01						0.0208 (e)	
	Manganese	0.05			0.093	0.119		0.052	0.083
	Benzene	0.32		0.45	0.32		0.35		

Table 10
Concentrations Above PAMP Action Level - Daily Basis

Date	Compound	Air Concentration (µg/m^3) PAMP	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
10/4 to 10/5	Aroclor 1260 (PCB)	0.01						0.0156	
	Benzene	0.32	0.32	0.35					
	Manganese	0.05			0.052	0.237	0.050	0.079	
10/5 to 10/6	Aroclor 1260 (PCB)	0.01						0.0138	
	Benzene	0.32							0.42
	Manganese	0.05				0.100		0.069	0.092
10/6 to 10/7	Benzene	0.32				0.32			
	Manganese	0.05				0.063			
10/7 to 10/8	Benzene	0.32					0.32		
10/8 to 10/9	Manganese	0.05				0.053			
10/9 to 10/10	Benzene	0.32				0.32			
10/10 to 10/11	Benzene	0.32	1.25			1.05			
	Manganese	0.05				0.137			
10/11 to 10/12	Benzene	0.32	1.21	1.12		0.89	0.80		1.2
	Manganese	0.05				0.074			0.052
10/12 to 10/13	Benzene	0.32	1.8 (e)	1.1 (e)	1.2 (e)	1.5 (e)	1.3 (e)	1.4 (e)	
	Bis(2-ethylhexyl)phthalate	0.018				0.187 (e)		0.0283 (e)	
	Manganese	0.05				0.061			
10/13 to 10/14	Benzene	0.32	1.6	1.2	1.3	1.1	1.3	1.0	1.2
	Manganese	0.05			0.103	0.077			
10/14 to 10/15	Benzene	0.32	0.38		0.38	0.38			1.2
	Bis(2-ethylhexyl)phthalate	0.018			0.0251 (e)	0.301 (e)			
	Manganese	0.05	0.070		0.075	0.086			
10/15 to 10/16	Benzene	0.32	3.1	2.1	1.8	2.2	1.9	2.4	1.7
	Manganese	0.05				0.070			
10/16 to 10/17	Benzene	0.32	3.6	2.9	2.7	2.7	2.8	2.9	
	Manganese	0.05				0.054	0.051	0.057	
10/17 to 10/18	Benzene	0.32	0.80	0.80	0.86	0.96	0.70	0.58	1.1
	Bis(2-ethylhexyl)phthalate	0.018	0.0306						0.0996 (e)
	Manganese	0.05			0.053 (e)	0.065			0.072
10/18 to 10/19	Benzene	0.32	0.61	0.61	0.32	0.45	0.54	0.48	
10/19 to 10/20	Benzene	0.32	0.61	0.89	0.80	0.77	0.54	0.64	
	Manganese	0.05			0.059	0.051		0.053	
10/20 to 10/21	Benzene	0.32	0.67	0.73	0.83	0.61	0.61	0.67	1.0
	Manganese	0.05		0.063	0.114	0.052			
10/21 to 10/22	No Exceedances								
10/22 to 10/23	No Exceedances								
10/23 to 10/24	No Exceedances								
10/24 to 10/25	Benzene	0.32	0.32	0.38		0.38	0.45	0.45	
	Manganese	0.05	0.055	0.080	0.216	0.074			
10/25 to 10/26	No Exceedances								
10/26 to 10/27	No Exceedances								
10/27 to 10/28	Benzene	0.32					0.32	0.54	
10/28 to 10/29	No Exceedances								
10/29 to 10/30	No Exceedances								
10/30 to 10/31	No Exceedances								
10/31 to 11/1	No Exceedances								
11/1 to 11/2	Benzene	0.32	2.2	0.7 (e)	1.8	1.8	1.9	1.7	1.8
11/2 to 11/3	No Exceedances								
11/3 to 11/4	No Exceedances								
11/4 to 11/5	Benzene	0.32	0.48	0.64	0.54	0.61	0.35	0.64	
11/5 to 11/6	No Exceedances								
11/6 to 11/7	No Exceedances								
11/7 to 11/8	Benzene	0.32	1.6	2.0	3.1	0.38	1.3	1.8	1.3
	Manganese	0.05				0.066			0.062
11/8 to 11/9	No Exceedances								
11/9 to 11/10	No Exceedances								
11/10 to 11/11	Benzene	0.32	1.7	1.6	1.6	1.8	1.7	1.6	
	Manganese	0.05				0.058			
11/12 to 11/13	No Exceedances								
11/13 to 11/14	Benzene	0.32	1.5	1.4	1.4	1.4	1.5	1.6	0.48
11/14 to 11/15	No Exceedances								
11/15 to 11/16	No Exceedances								
11/16 to 11/17	Benzene	0.32	2.0	1.7	1.8	1.8	2.3	2.1	
11/17 to 11/18	No Exceedances								
11/18 to 11/19	No Exceedances								
11/19 to 11/20	Benzene	0.32	2.7	2.2	2.0	2.4	1.7	2.9	2.5
	Manganese	0.05				0.093	0.065	0.153	0.077
11/20 to 11/21	No Exceedances								

Table 10
Concentrations Above PAMP Action Level - Daily Basis

Date	Compound	Air Concentration (µg/m^3) PAMP	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
11/21 to 11/22	No Exceedances								
11/22 to 11/27	No Samples taken								
11/27 to 11/28	No Exceedances								
11/28 to 11/29	No Exceedances								
11/29 to 11/30	No Exceedances								
11/30 to 12/1	Benzene	0.32	3.0	2.7	2.7	2.5	2.4	2.8	
12/1 to 12/2	No Exceedances								
12/2 to12/3	No Exceedances								
12/3 to 12/4	Benzene	0.32	2.1	1.9	1.8	1.8	2.0	2.0	1.9
	Manganese	0.05					0.086		
12/4 to 12/5	No Exceedances								
12/5 to 12/6	No Exceedances								
12/6 to 12/7	No Exceedances								
12/7 to 12/8	Benzene	0.32	2.5	2.5	2.4	2.3	2.1	2.2	
	Manganese	0.05				0.115			
12/8 to 12/9	No Exceedances								
12/9 to 12/10	No Exceedances								
12/10 to 12/11	No Exceedances								
12/11 to 12/12	Benzene	0.32		0.8	0.67	0.70	0.70	0.54	0.73
12/12 to 12/13	No Exceedances								
12/13 to 12/14	No Exceedances								
12/14 to 12/15	No Exceedances								
12/15 to 1/5	No Samples taken								
1/5 to 1/6	Benzene	0.32	3.35	3.51	3.39	3.48	3.39	3.90	
	Manganese	0.05				0.061			
1/6 to 1/29	No Samples taken								
1/29 to 1/30	Benzene	0.32	1.4	0.4	1.0	1.0	1.0	0.9	1.0
1/30 to 2/1	No Samples taken								
2/1 to 2/2	Benzene	0.32	2.7	2.6	2.91	2.7	2.7	5.91	
2/2 to 2/4	No Samples taken								
2/4 to 2/5	Benzene	0.32	3.42	2.7	2.49	2.8	1.21	2.08	2.20
2/5 to 2/7	No Samples taken								
2/7 to 2/8	Benzene	0.32		0.86	1.05	1.02	0.93	1.2	
2/8 to 2/13	No Samples taken								
2/13 to 2/14	Benzene	0.32		1.3	1.3	1.2	1.6	1.8	1.6
	Manganese	0.05					0.053		
2/14 to 2/16	No Samples taken								
2/16 to 2/17	Benzene	0.32	0.6	0.7	0.8	0.6	0.7	0.5	
2/17 to 2/23	No Samples taken								
2/23 to 2/24	Benzene	0.32	0.67	0.51	0.48		0.58	0.42	0.58
	Chromium (d)	0.042				0.085			
2/24 to 3/5	No Samples taken								
3/5 to 3/6	Benzene	0.32	0.96	0.73	0.80	0.83	0.54		
3/6 to 3/8	No Samples taken								
3/8 to 3/9	Benzene	0.32	0.64	0.45	0.61	0.61	0.48	0.61	0.64
	Chromium (d)	0.042						0.503	0.231
	Manganese	0.05				0.204	0.072		0.154
3/9 to 3/12	No Samples taken								
3/12 to 3/13	Benzene	0.32	0.77	1.0	0.67		0.64	0.67	
	Chromium (d)	0.042			0.083		0.188		

* Station G is a duplicate of Station D

(d) PAMP Action Level based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III. PAMP Action Level for Chromium VI = 0.006, for Chromium III = 5. PAMP Action Levels shown in table = 7 x Chromium VI value.

(e) Data does not meet Quality Assurance Specifications

Table 11
Concentrations Above PRG-Daily Basis

Date	Compound	Air Concentration (μg/m^3)								
		Cancer PRG	Chronic PRG	**Station A**	**Station B**	**Station C**	**Station D**	**Station E**	**Station F**	**Station G***
8/31 to 9/1	Benzene	0.25	6.2				4.63			
9/1 to 9/8	No Samples taken									
9/8 to 9/9	Bis(2-ethylhexyl)phthalate	0.48	80		0.744					
9/9 to 9/10	Benzene	0.25	6.2	0.479	0.543	0.511	0.926	0.799	0.351	
	Carbon Tetrachloride	0.13	2.6		0.629				0.629	
	Manganese	NA	0.051				0.0612			
9/10 to 9/11	Benzene	0.25	6.2	0.479	0.447	0.575	0.607	0.639	0.735	
	Bis(2-ethylhexyl)phthalate	0.48	80					0.647		
	Carbon Tetrachloride	0.13	2.6					0.629		
	Manganese	NA	0.051				0.0744		0.0561	
9/11 to 9/12	Benzene	0.25	6.2	1.09	1.15	1.15	1.09	0.99	0.958	
	Carbon Tetrachloride	0.13	2.6						0.629	
	Manganese	NA	0.051		0.0586 (e)		0.0669		0.0729	
9/12 to 9/13	Benzene	0.25	6.2	3.45	2.88	3.45	2.84	2.78	2.04	
	Manganese	NA	0.051	0.0699		0.0619	0.0921	0.0788	0.173	
9/13 to 9/14	Benzene	0.25	6.2	0.799			0.511	0.671	0.671	
	Manganese	NA	0.051		0.0525 (e)		0.108		0.0848	
9/14 to 9/15	Benzene	0.25	6.2		0.415				1.50	
	Carbon Tetrachloride	0.13	2.6					0.629		
	Manganese	NA	0.051				0.104			
9/15 to 9/16	1,2,4-Trimethylbenzene	NA	6.2	77.2						
	1,3,5-Trimethylbenzene	NA	6.2	13.7						
	Aroclor 1260 (PCB)	0.0034	NA						0.0121	
	Benzene	0.25	6.2	0.383			0.319			
	Manganese	NA	0.051		0.0521 (e)		0.227	0.0901		
9/16 to 9/17	Benzene	0.25	6.2	2.72	2.20	1.50	2.08	2.33	1.88	
	Bis(2-ethylhexyl)phthalate	0.48	80	0.683						
	Carbon Tetrachloride	0.13	2.6		0.629				0.629	
	Manganese	NA	0.051	0.0606	0.116 (e)		0.122	0.107	0.0589	
9/17 to 9/18	Benzene	0.25	6.2	2.97	2.43	2.65	2.20	2.43	2.88	
	Chloroform	0.084	0.31				1.22			
9/18 to 9/19	Aluminum	NA	5.1				6.626		7.094	
	Aroclor 1260 (PCB)	0.0034	NA						0.0381	
	Arsenic	0.00045	NA				0.0038		0.0022	
	Benzene	0.25	6.2	1.50	1.28	1.92	1.15	1.53	1.12	
	Carbon Tetrachloride	0.13	2.6			1.636				
	Chloroform	0.084	0.31			1.17				
	Manganese	NA	0.051	0.0752	0.0775 (e)	0.0868	0.294	0.156	0.195	
9/19 to 9/20	1,2,4-Trimethylbenzene	NA	6.2			41				
	Aroclor 1260 (PCB)	0.0034	NA						0.0152	
	Arsenic	0.00045					0.002			
	Benzene	0.25	6.2	1.3	1.4	1.7	1.2	1.2	1.1	
	Manganese	NA	0.051				0.192	0.117	0.136	
9/20 to 9/21	Arsenic	0.00045	NA				0.003			
	Manganese	NA	0.051	0.0575			0.134			
9/21 to 9/22	Benzene	0.25	6.2				0.4			
	Carbon Tetrachloride	0.13	2.6	0.63						
	Manganese	NA	0.051	0.0738			0.1282			
9/22 to 9/23	Benzene	0.25	6.2	1.2	1.0		1.0	0.9	0.7	
	Manganese	NA	0.051			0.081	0.078			
9/23 to 9/24	No Samples taken									
9/24 to 9/25	Aroclor 1260 (PCB)	0.0034	NA						0.00861	
	Benzene	0.25	6.2	1.0	0.9	1.0	0.7	0.7	1.3	0.7
	Manganese	NA	0.051		0.0612	0.0540	0.122	0.0740		
9/25 to 9/26	Aroclor 1260 (PCB)	0.0034	NA						0.0127	
	Arsenic	0.00045	NA	0.004			0.003			
	Beryllium	0.0008	0.021			0.013				
	Benzene	0.25	6.2	0.42	0.51	0.64	0.51		0.83	
	Carbon Tetrachloride	0.13	2.6						1.32	
	Manganese	NA	0.051			0.0725	0.259	0.0559	0.0819	
9/26 to 9/27	Aroclor 1260 (PCB)	0.0034	NA						0.00448	
	Arsenic	0.00045	NA			0.002	0.004			
	Benzene	0.25	6.2		0.42					
	Manganese	NA	0.051			0.0716	0.226	0.0613	0.069	
9/27 to 9/28	Aroclor 1260 (PCB)	0.0034	NA					0.00382 (e)	0.00520	
	Arsenic	0.00045	NA		0.002					
	Manganese	NA	0.051				0.162			

Table 11
Concentrations Above PRG-Daily Basis

Date	Compound	Cancer PRG	Chronic PRG	Air Concentration (μg/m^3)						
				Station A	**Station B**	**Station C**	**Station D**	**Station E**	**Station F**	**Station G***
9/28 to 9/29	Aroclor 1260 (PCB)	0.0034	NA						0.0338	
	Arsenic	0.00045	NA				0.004		0.003	0.004
	Benzene	0.25	6.2	0.89	0.67	0.58	0.61	0.61	0.67	0.61
	Manganese	NA	0.051				0.166	0.0637	0.119	0.197
	Trichloroethene	1.1	22						1.4	
9/29 to 9/30	Aroclor 1260 (PCB)	0.0034	NA						0.0432	
	Arsenic	0.00045	NA	0.002						
	Benzene	0.25	6.2		1.5	1.4	1.3	1.5	1.1	
	Manganese	NA	0.051				0.185		0.173	
9/30 to 10/1	No Samples taken									
10/1 to 10/2	Aroclor 1260 (PCB)	0.0034	NA						0.0247[(e)]	
	Arsenic	0.00045	NA			0.002				
	Benzene	0.25	6.2	0.45		0.42	0.32	0.73		
	Manganese	NA	0.051	0.107		0.085	0.127		0.146	0.084
10/2 to 10/3	Aroclor 1260 (PCB)	0.0034	NA					0.00408[(e)]	0.00645[(e)]	
	Arsenic	0.00045	NA	0.002		0.002	0.002			
	Manganese	NA	0.051	0.063		0.104	0.117	0.079	0.070	
10/3 to 10/4	Aroclor 1260 (PCB)	0.0034	NA						0.0208[(e)]	
	Arsenic	0.00045	NA			0.003	0.002			
	Manganese	NA	0.051			0.093	0.119		0.052	0.083
	Benzene	0.25	6.2		0.45	0.32		0.35		
	Trichloroethene	1.1	22							6.3
10/4 to 10/5	Aroclor 1260 (PCB)	0.0034	NA						0.0156	
	Arsenic	0.00045	NA			0.002	0.002			
	Benzene	0.25	6.2	0.32	0.35					
	Carbon Tetrachloride	0.13	2.6	0.82				0.63		
	Manganese	NA	0.051			0.052	0.237		0.079	
10/5 to 10/6	Aroclor 1260 (PCB)	0.0034	NA						0.0138	
	Benzene	0.25	6.2							0.42
	Carbon Tetrachloride	0.13	2.6						0.63	0.76
	Manganese	NA	0.051				0.100		0.069	0.092
10/6 to 10/7	Aroclor 1260 (PCB)	0.0034	NA						0.00566	
	Benzene	0.25	6.2				0.32			
	Manganese	NA	0.051				0.063			
10/7 to 10/8	Aroclor 1260 (PCB)	0.0034	NA						0.00482	
	Benzene	0.25	6.2					0.32		
10/8 to 10/9	Aroclor 1260 (PCB)	0.0034	NA						0.00434	
	Carbon Tetrachloride	0.13	2.6	0.69						
	Manganese	NA	0.051				0.053			
10/9 to 10/10	Benzene	0.25	6.2				0.32			
10/10 to 10/11	Benzene	0.25	6.2	1.25			1.05			
	Manganese	NA	0.051				0.137			
10/11 to 10/12	Benzene	0.25	6.2	1.21	1.12		0.89	0.80		1.2
	Carbon Tetrachloride	0.13	2.6		0.63			0.63		
	Manganese	NA	0.051				0.074			0.052
10/12 to 10/13	Benzene	0.25	6.2	1.8 [(e)]	1.1 [(e)]	1.2 [(e)]	1.5 [(e)]	1.3 [(e)]	1.4 [(e)]	
	Carbon Tetrachloride	0.13	2.6		0.76					
	Manganese	NA	0.051				0.061			
10/13 to 10/14	Aluminum	NA	5.1			5.711				
	Aroclor 1260 (PCB)	0.0034	NA						0.00381[(e)]	
	Arsenic	0.00045	NA			0.002				
	Benzene	0.25	6.2	1.6	1.2	1.3	1.1	1.3	1.0	1.2
	Carbon Tetrachloride	0.13	2.6	0.69		0.76				
	Manganese	NA	0.051			0.103	0.077			
10/14 to 10/15	Benzene	0.25	6.2	0.38		0.38	0.38			1.2
	Manganese	NA	0.051	0.070		0.075	0.086			
10/15 to 10/16	Arsenic	0.00045	NA					0.002		
	Benzene	0.25	6.2	3.1	2.1	1.8	2.2	1.9	2.4	1.7
	Manganese	NA	0.051				0.070			
10/16 to 10/17	Benzene	0.25	6.2	3.6	2.9	2.7	2.7	2.8	2.9	
	Manganese	NA	0.051				0.054	0.051	0.057	
10/17 to 10/18	Aroclor 1260 (PCB)	0.0034	NA						0.00403	
	Benzene	0.25	6.2	0.80	0.80	0.86	0.96	0.70	0.58	1.1
	Chloromethane	1.1	1900000000							6.3
	Manganese	NA	0.051			0.053	0.065			0.072
10/18 to 10/19	Benzene	0.25	6.2	0.61	0.61	0.32	0.45	0.54	0.48	
	TCDD Equivalency	0.000000045	6.2				0.0000000459[(e)]			
10/19 to 10/20	Aroclor 1260 (PCB)	0.0034	NA						0.00368	
	Benzene	0.25	6.2	0.61	0.89	0.80	0.77	0.54	0.64	
	Manganese	NA	0.051			0.059	0.051		0.053	

Table 11
Concentrations Above PRG-Daily Basis

Date	Compound	Cancer PRG	Chronic PRG	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
		Air Concentration (µg/m³)								
10/20 to 10/21	Aroclor 1260 (PCB)	0.0034	NA						0.00452	
	Benzene	0.25	6.2	0.67	0.73	0.83	0.61	0.61	0.67	1.0
	Manganese	NA	0.051		0.063	0.114	0.052			
10/21 to 10/22	No Exceedances									
10/22 to 10/23	No Exceedances									
10/23 to 10/24	No Exceedances									
10/24 to 10/25	Benzene	0.25	6.2	0.32	0.38		0.38	0.45	0.45	
	Manganese	NA	0.051	0.055	0.080	0.216	0.074			
10/25 to 10/26	No Exceedances									
10/26 to 10/27	No Exceedances									
10/27 to 10/28	Benzene	0.25	6.2					0.32	0.54	
10/28 to 10/29	No Exceedances									
10/29 to 10/30	No Exceedances									
10/30 to 10/31	No Exceedances									
10/31 to 11/1	No Exceedances									
11/1 to 11/2	Arsenic	0.00	NA		0.002					
	Benzene	0.25	6.2	2.2	0.7 (e)	1.8	1.8	1.9	1.7	1.8
11/2 to 11/3	No Exceedances									
11/3 to 11/4	No Exceedances									
11/4 to 11/5	Benzene	0.25	6.2	0.48	0.64	0.54	0.61	0.35	0.64	
11/5 to 11/6	No Exceedances									
11/6 to 11/7	No Exceedances									
11/7 to 11/8	1,2,4-Trimethylbenzene	NA	6.2			27				
	1,3,5-Trimethylbenzene	NA	6.2			7.2				
	Aroclor 1260 (PCB)	0.0034	NA						0.004	
	Benzene	0.25	6.2	1.6	2.0	3.1	0.38	1.3	1.8	1.3
	Carbon Tetrachloride	0.13	2.6		0.69			0.82	0.69	0.63
	Manganese	NA	0.051				0.066			0.062
11/8 to 11/9	Aroclor 1260 (PCB)	0.0034	NA						0.006	
11/9 to 11/10	No Exceedances									
11/10 to 11/11	Benzene	0.25	6.2	1.7	1.6	1.6	1.8	1.7	1.6	
	Carbon Tetrachloride	0.13	2.6	0.76	0.76	0.76		0.82		
	Chloromethane	1.1	1900000000		2.2		3.1	7.4		
	Manganese	NA	0.051				0.058			
11/11 to 11/12	Aroclor 1260 (PCB)	0.0034	NA						0.004	
11/12 to 11/13	No Exceedances									
11/13 to 11/14	Benzene	0.25	6.2	1.5	1.4	1.4	1.4	1.5	1.6	0.48
	Carbon Tetrachloride	0.13	2.6		0.69	0.76	0.69	0.88	0.69	
	Chloromethane	1.1	1900000000					1.1		
11/14 to 11/15	No Exceedances									
11/15 to 11/16	No Exceedances									
11/16 to 11/17	Arsenic	0.00045	NA			0.002				
	Benzene	0.25	6.2	2.0	1.7	1.8	1.8	2.3	2.1	
	Carbon Tetrachloride	0.13	2.6		0.88	0.82	0.82	0.69	0.69	
	Chloromethane	1.1	1900000000					1.1		
11/17 to 11/18	No Exceedances									
11/18 to 11/19	No Exceedances									
11/19 to 11/20	Arsenic	0.00045	NA				0.003		0.002	
	Benzene	0.25	6.2	2.7	2.2	2.0	2.4	1.7	2.9	2.5
	Carbon Tetrachloride	0.13	2.6	0.82			0.63			0.82
	Chloromethane	1.1	1900000000	1.1						
	Manganese	NA	0.051				0.093	0.065	0.153	0.077
11/20 to 11/21	No Exceedances									
11/21 to 11/22	No Exceedances									
11/22 to 11/27	No Samples taken									
11/27 to 11/28	No Exceedances									
11/28 to 11/29	No Exceedances									
11/29 to 11/30	No Exceedances									
11/30 to 12/1	Arsenic	0.00045	NA			0.002		0.002		
	Benzene	0.25	6.2	3.0	2.7	2.7	2.5	2.4	2.8	
	Carbon Tetrachloride	0.13	2.6	0.76		0.69	0.76	0.63		
	Chloromethane	1.1	1900000000	1.1						
12/1 to 12/2	No Exceedances									
12/2 to12/3	No Exceedances									
12/3 to12/4	Arsenic	0.00045	NA						0.002	0.002
	Benzene	0.25	6.2	2.1	1.9	1.8	1.8	2.0	2.0	1.9
	Carbon Tetrachloride	0.13	2.6		0.88		0.63			0.76
	Manganese	NA	0.051					0.086		
12/4 to 12/5	No Exceedances									
12/5 to 12/6	No Exceedances									

Table 11
Concentrations Above PRG-Daily Basis

Date	Compound	Air Concentration ($\mu g/m^3$)								
		Cancer PRG	Chronic PRG	Station A	Station B	Station C	Station D	Station E	Station F	Station G*
12/6 to 12/7	No Exceedances									
12/7 to 12/8	Arsenic	0.00045	NA			0.003	0.002			
	Benzene	0.25	6.2	2.5	2.5	2.4	2.3	2.1	2.2	
	Carbon Tetrachloride	0.13	2.6	0.63	0.69	0.69	0.69			
	Chloromethane	1.1	1900000000		1.1					
	Manganese	NA	0.051				0.115			
12/8 to 12/9	No Exceedances									
12/9 to 12/10	Aroclor 1260 (PCB)	0.0034	NA						0.004 [e]	
12/10 to 12/11	No Exceedances									
12/11 to 12/12	Arsenic	0.00045	NA						0.003	
	Benzene	0.25	6.2		0.8	0.67	0.70	0.70	0.54	0.73
	Carbon Tetrachloride	0.13	2.6		0.82					0.82
12/12 to 12/13	No Exceedances									
12/13 to 12/14	No Exceedances									
12/14 to 12/15	Aroclor 1260 (PCB)	0.0034	NA						0.004	
12/15 to 1/5	No Samples taken									
1/5 to 1/6	Arsenic	0.00045	NA				0.002		0.002	
	Benzene	0.25	6.2	3.35	3.51	3.39	3.48	3.39	3.90	
	Carbon Tetrachloride	0.13	2.6		1.0	0.63	0.94	0.69	0.63	
	Chloromethane	1.1	1900000000				1.7			
	Manganese	NA	0.051				0.061			
	Methylene Chloride	4.1	3,100		4.24					
	Tetrachloroethene	3.3	420	3.5		3.5	3.4		3.7	
1/6 to 1/29	No Samples taken									
1/29 to 1/30	Benzene	0.25	6.2	1.4	0.4	1.0	1.0	1.0	0.9	1.0
	Carbon Tetrachloride	0.13	2.6			0.82	0.88	0.63	0.69	0.63
1/30 to 2/1	No Samples taken									
2/1 to 2/2	Arsenic	0.00045	NA	0.002			0.002			
	Benzene	0.25	6.2	2.7	2.6	2.91	2.7	2.7	5.91	
	Chloromethane	1.1	1900000000			1.57				
	Methylene Chloride	4.1	3100						4.48	
2/2 to 2/4	No Samples taken									
2/4 to 2/5	Benzene	0.25	6.2	3.42	2.7	2.49	2.8	1.21	2.08	2.20
	Carbon Tetrachloride	0.13	2.6				0.63			
	Chloromethane	1.1	1900000000	10.9	1.4	1.4	1.1			
2/5 to 2/7	No Samples taken									
2/7 to 2/8	Benzene	0.25	6.2		0.86	1.05	1.02	0.93	1.2	
	Chloromethane	1.1	1900000000						1.5	
2/8 to 2/13	No Samples taken									
2/13 to 2/14	Benzene	0.25	6.2		1.3	1.3	1.2	1.6	1.8	1.6
	Carbon Tetrachloride	0.13	2.6		0.69					
	Chloromethane	1.1	1900000000		1.7					
	Manganese	NA	0.051					0.053		
2/14 to 2/16	No Samples taken									
2/16 to 2/17	Arsenic	0.00045	NA		0.002					
	Benzene	0.25	6.2	0.6	0.7	0.8	0.6	0.7	0.5	
2/17 to 2/23	No Samples taken									
2/23 to 2/24	Arsenic	0.00045	NA					0.003		
	Benzene	0.25	6.2	0.67	0.51	0.48		0.58	0.42	0.58
	Carbon Tetrachloride	0.13	2.6					0.76		
	Chloromethane	1.1	1900000000		1.4					
	Chromium [d]	0.000164	NA				0.085			
	Tetrahydrofuran	0.99	310					28.2		
2/24 to 3/5	No Samples taken									
3/5 to 3/6	Benzene	0.25	6.2	0.96	0.73	0.80	0.83	0.54		
3/6 to 3/8	No Samples taken									
3/8 to 3/9	Aluminum	NA	5.1				7.139			
	Benzene	0.25	6.2	0.64	0.45	0.61	0.61	0.48	0.61	0.64
	Chromium [d]	0.000164	NA						0.503	0.231
	Manganese	NA	0.051				0.204	0.072		0.154
3/9 to 3/12	No Samples taken									
3/12 to 3/13	Benzene	0.25	6.2	0.77	1.0	0.67		0.64	0.67	
	Carbon Tetrachloride	0.13	2.6					0.69		
	Chloromethane	1.1	1900000000		6.2					
	Chromium [d]	0.000164	NA			0.083		0.188		

* Station G is a duplicate of Station D

(d) Cancer PRG based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III.
Cancer PRG for Chromium VI = 2.3 E-5. PRGs shown in table = 7 x Chromium VI value.

(e) Data does not meet Quality Assurance Specifications

Table 12
Detected Compound Statistics

Compound	# Days Sampled	# Days Detected	# Total Samples	# Total Detections	Minimum Detection (µg/m³)	Maximum Detection (µg/m³)	PAMP Action Level (µg/m³)	# Days Exceeding PAMP	Stations Exceeding PAMP	Cancer PRG (µg/m³)	Chronic PRG (µg/m³)	# Days Exceeding PRGs	Stations Exceeding PRGs
Metals (particulate)													
Aluminum	62	15	374	24	2.314	7.139	150	0	0	5.1	-	3	3
Arsenic	62	27	374	41	0.002	0.005	0.014	0	0	0.00045	-	27	7
Barium	62	7	374	10	0.122	0.199	-	NA	NA	-	0.52	0	0
Beryllium	62	1	374	1	0.013	0.013	0.03	0	0	0.0008	0.021	1	1
Chromium (Total) *	62	3	374	5	0.083	0.503	0.042	3	5	0.00016	-	3	5
Cobalt	62	2	374	2	0.012	0.013	-	NA	NA	-	-	NA	NA
Copper	62	62	374	371	0.013	1.016	10	0	0	-	-	NA	NA
Lead	62	42	374	119	0.0239	0.281	1.5	0	0	-	-	NA	NA
Manganese	62	59	374	321	0.012	0.294	0.05	44	7	-	0.051	44	7
Molybdenum	62	2	374	3	0.028	0.124	-	NA	NA	-	-	NA	NA
Nickel	62	3	374	3	0.145	0.319	10	0	0	-	-	NA	NA
Zinc	62	4	374	4	0.248	0.360	1050	0	0	-	-	NA	NA
VOCs													
1,2,4-Trimethylbenzene	64	15	388	29	2.56	77.20	-	NA	NA	-	6.2	4	3
1,3,5-Trimethylbenzene	64	3	388	3	5.10	13.70	-	NA	NA	-	6.2	2	2
Benzene	64	60	388	306	0.319	5.910	0.32	60	7	0.25	6.2	60	7
Carbon Tetrachloride	64	27	388	69	0.629	1.636	-	NA	NA	0.13	2.6	27	7
Chlorobenzene	64	1	388	1	0.875	0.875	-	NA	NA	-	62	0	0
Chloroethane	64	4	388	4	0.530	1.800	-	NA	NA	2.3	10000	0	0
Chloroform	64	2	388	2	1.170	1.220	-	NA	NA	0.084	0.31	2	2
Chloromethane	64	22	388	55	0.410	10.900	-	NA	NA	1.1	1900000000	14	7
Cis-1,2-Dichloroethene	64	2	388	2	2.10	6.30	-	NA	NA	37	-	0	0
Dichlorodifluoromethane	64	64	388	378	1.00	6.13	-	NA	NA	-	210	0	0
Ethylbenzene	64	33	388	141	0.43	12.30	-	NA	NA	-	1100	0	0
Methylene Chloride	64	12	388	21	1.70	4.80	-	NA	NA	4.1	3100	2	2
Styrene	64	15	388	29	0.426	5.92	-	NA	NA	-	1100	0	0
Tetrachloroethene	64	16	388	38	0.68	3.70	35	0	0	3.3	420	1	4
Toluene	64	64	388	355	0.75	25.80	-	NA	NA	-	400	0	0
Trichloroethene	64	4	388	4	0.70	6.30	-	NA	NA	1.1	-	2	2
Trichlorofluoromethane	64	61	388	260	1.10	3.00	-	NA	NA	-	730	0	0
Xylenes (Total)	64	56	388	277	0.87	46.30	4350	0	0	-	730	0	0
Pesticides/PCBs													
Endrin	38	1	231	1	0.583	0.583	-	NA	NA	-	1.1	0	0
Aroclor 1260	101	32	596	34	0.0030	0.0432	0.01	10	1	0.0034	-	27	2
SVOCs													
2-Methylnaphthalene	38	2	231	2	0.00316	0.00342	-	NA	NA	-	-	NA	NA
Acenaphthylene	38	19	231	36	0.000687	0.01230	-	NA	NA	-	-	NA	NA
Anthracene	38	19	231	27	0.00325	0.01370	-	NA	NA	-	1100	0	0
Bis(2-ethylheyxl)phthalate	38	36	231	160	0.000619	0.74400	0.018	11	7	0.48	80	3	3
Butyl Benzyl Phthalate	38	19	231	50	0.000981	0.24600	-	NA	NA	-	730	0	0
Dibenzofuran	38	24	231	41	0.000855	0.01000	-	NA	NA	-	15	0	0
Diethylphthalate	38	38	231	211	0.000645	0.444000	-	NA	NA	-	2900	0	0
Di-n-butylphthalate	38	38	231	206	0.000545	0.082000	-	NA	NA	-	370	0	0
Di-n-octyl phthalate	38	1	231	1	0.0119	0.0119	-	NA	NA	-	73	0	0
Fluoranthene	38	29	231	64	0.000645	0.021100	-	NA	NA	-	150	0	0
Fluorene	38	29	231	63	0.00127	0.01690	-	NA	NA	-	150	0	0
Naphthalene	38	1	231	3	0.00298	0.00416	-	NA	NA	-	3.1	0	0
Phenanthrene	38	37	231	201	0.000944	0.10000	-	NA	NA	-	-	NA	NA
Pyrene	38	20	231	44	0.000577	0.020800	-	NA	NA	-	110	0	0
High Resolution Dioxin/Furans													
2,3,7,8-Tetrachlorodibenzofuran	5	5	29	29	0.0000000002	0.0000000459	-	NA	NA	0.000000045	-	1	1
Chlorine Compounds													
Particulate Chloride	18	16	104	73	1.90	23.50	-	NA	NA	-	-	NA	NA

NA: not applicable

* PAMP Action Level and Cancer PRG are based on assumed total chromium ratio of 1:6 Chromium VI to Chromium III. PAMP Action Level for Chromium VI = 0.006, for Chromium III = 5. Cancer PRG for Chromium VI = 2.3 E^{-5}. PAMP Action Level and PRGs shown in table = 7 x Chromium VI value.

Table 13
Hunters Point Shipyard, Parcel E
Tentatively Identified Compounds (TICs)

Compound	Sample Date	Sample Station	Detected Concentration (µg/m3)	HPS Action Level (µg/m3)	Cancer PRG (µg/m3)	Chronic PRG (µg/m3)
Heptadecane, 9-octyl-	08/31/00	-	0.200	-	-	-
Naphthalene, decahydro-4a-methyl-	08/31/00	-	0.169	-	-	-
Vanillin	08/31/00	-	0.0955	-	-	-
Phenol,2,6-dimethoxy-	08/31/00	-	0.0811	-	-	-
Lup-20(20)-en-3-one	08/31/00	-	0.0577	-	-	-
Acetone	09/15/00	A	6.78	na	na	365
Acetone	10/11/00	E	4.22	na	na	365
Benzene,1-ethyl-2methyl	09/15/00	A	8.93	na	na	na
Benzene,1-ethyl-3methyl	09/15/00	A	5.50	na	na	na
Benzene,1-ethyl-2-(1-methylethyl)	09/15/00	A	5.75	na	na	na
Hexane	09/18/00	B	19.06	na	na	208.57
Hexane	09/18/00	F	24.76	na	na	208.57
Tetrahydrofuran	02/23/01	E	28.20	na	0.98878	312.805

Table 14
Hunters Point Shipyard, Parcel E
Quality Assurance Summary

Date	Sample	Station	PUF 7-Pt Calibration Required	PUF Single-Pt Flow Check Not Available	> 10% PUF Flow Difference	Air Monitoring Sample Logs	Magnehelic® Hourly Readings Not Available	TSP Calibration Required	Sample Volume
09/08/00	PUF	A							X
09/08/00	PUF	E							X
09/08/00	PUF	F							X
09/09/00	TSP	B						X	
09/10/00	TSP	B						X	
09/11/00	TSP	B						X	
09/13/00	TSP	B						X	
09/14/00	TSP	B						X	
09/15/00	PUF	C		X					
09/15/00	TSP	B						X	
09/16/00	TSP	B						X	
09/18/00	TSP	B						X	
09/19/00	PUF	E			X				
09/19/00	PUF	G		X					
09/19/00	TSP	B						X	
09/20/00	PUF	E	X						
09/20/00	TSP	B						X	
09/21/00	PUF	E	X						
09/21/00	PUF	G		X					
09/21/00	TSP	B						X	
09/22/00	PUF	E	X						
09/22/00	TSP	B						X	
09/24/00	PUF	E	X						
09/24/00	PUF	G		X					
09/24/00	Hi Res PUF	A		X					
09/24/00	Hi Res PUF	B		X					
09/24/00	Hi Res PUF	D		X					
09/24/00	Hi Res PUF	E		X					
09/24/00	Hi Res PUF	F		X					
09/25/00	PUF	E	X						

Table 14
Hunters Point Shipyard, Parcel E
Quality Assurance Summary

Date	Sample	Station	PUF 7-Pt Calibration Required	PUF Single-Pt Flow Check Not Available	> 10% PUF Flow Difference	Air Monitoring Sample Logs	Magnehelic® Hourly Readings Not Available	TSP Calibration Required	Sample Volume
09/26/00	PUF	E	X						
09/26/00	PUF	G		X					
09/27/00	PUF	E	X						
09/28/00	PUF	E	X						
09/28/00	PUF	G		X					
09/29/00	PUF	A		X					
09/29/00	PUF	B		X					
10/01/00	PUF	D		X					
10/01/00	PUF	E	X						
10/01/00	PUF	F		X					
10/01/00	PUF	G		X					
10/02/00	PUF	A				X	X		
10/02/00	PUF	B				X	X		
10/02/00	PUF	C				X	X		
10/02/00	PUF	D				X	X		
10/02/00	PUF	E	X			X	X		
10/02/00	PUF	F				X	X		
10/02/00	Hi Res PUF	A		X					
10/02/00	Hi Res PUF	B		X					
10/02/00	Hi Res PUF	C		X					
10/02/00	Hi Res PUF	D		X					
10/02/00	Hi Res PUF	E		X					
10/02/00	Hi Res PUF	F		X					
10/03/00	PUF	E	X						
10/03/00	PUF	F							X
10/03/00	PUF	G		X					
10/04/00	PUF	E	X						
10/05/00	PUF	E	X						
10/05/00	PUF	G		X					
10/06/00	PUF	E	X						

Table 14
Hunters Point Shipyard, Parcel E
Quality Assurance Summary

Date	Sample	Station	PUF 7-Pt Calibration Required	PUF Single-Pt Flow Check Not Available	> 10% PUF Flow Difference	Air Monitoring Sample Logs	Magnehelic® Hourly Readings Not Available	TSP Calibration Required	Sample Volume
10/07/00	PUF	E	X						
10/07/00	PUF	G		X					
10/08/00	PUF	E	X						
10/09/00	PUF	E	X						
10/10/00	PUF	E	X						
10/11/00	PUF	E	X						
10/12/00	PUF	A				X			
10/12/00	PUF	B				X			
10/12/00	PUF	C				X			
10/12/00	PUF	D				X			
10/12/00	PUF	E	X			X			
10/12/00	PUF	F				X			
10/12/00	VOC	A				X			
10/12/00	VOC	B				X			
10/12/00	VOC	C				X			
10/12/00	VOC	D				X			
10/12/00	VOC	E				X			
10/12/00	VOC	F				X			
10/13/00	PUF	A					X		
10/13/00	PUF	B			X		X		
10/13/00	PUF	C					X		
10/13/00	PUF	D					X		
10/13/00	PUF	E	X				X		
10/13/00	PUF	F					X		
10/13/00	PUF	G					X		
10/14/00	PUF	A					X		
10/14/00	PUF	B	X				X		
10/14/00	PUF	C					X		
10/14/00	PUF	D					X		
10/14/00	PUF	E	X				X		
10/14/00	PUF	F				X	X		
10/15/00	PUF	A					X		

Table 14
Hunters Point Shipyard, Parcel E
Quality Assurance Summary

Date	Sample	Station	PUF 7-Pt Calibration Required	PUF Single-Pt Flow Check Not Available	> 10% PUF Flow Difference	Air Monitoring Sample Logs	Magnehelic® Hourly Readings Not Available	TSP Calibration Required	Sample Volume
10/15/00	PUF	B	X				X		
10/15/00	PUF	C					X		
10/15/00	PUF	D					X		
10/15/00	PUF	E	X				X		
10/15/00	PUF	F					X		
10/15/00	PUF	G					X		
10/16/00	PUF	B	X						
10/17/00	PUF	B	X						X
10/17/00	PUF	G			X				
10/17/00	TSP	C							X
10/18/00	Hi Res PUF	D							X
10/21/00	PUF	A			X				
10/21/00	PUF	D			X				
10/22/00	PUF	A	X				X		
10/22/00	PUF	B					X		
10/22/00	PUF	C					X		
10/22/00	PUF	D	X				X		
10/22/00	PUF	E					X		
10/22/00	PUF	F					X		
10/22/00	PUF	G				X	X		
10/23/00	PUF	A	X						
10/23/00	PUF	D	X						
10/24/00	PUF	A	X						
10/24/00	PUF	D	X						
10/31/00	PUF	D	X			X			
11/01/00	PUF	B				X			
11/01/00	PUF	D	X			X			
11/01/00	VOC	B				X			
11/01/00	TSP	C				X			
11/02/00	PUF	D	X			X			
11/03/00	PUF	A	X						
11/03/00	PUF	D	X			X			

Table 14
Hunters Point Shipyard, Parcel E
Quality Assurance Summary

Date	Sample	Station	PUF 7-Pt Calibration Required	PUF Single-Pt Flow Check Not Available	> 10% PUF Flow Difference	Air Monitoring Sample Logs	Magnehelic® Hourly Readings Not Available	TSP Calibration Required	Sample Volume
11/04/00	PUF	A	X						
11/04/00	PUF	D	X			X			
11/04/00	TSP	C				X			
11/04/00	TSP	D				X			
11/05/00	PUF	A	X						
11/05/00	PUF	D	X			X			X
11/07/00	PUF	G				X			
11/15/00	PUF	A				X			X
11/28/00	PUF	B				X			X
12/04/00	PUF	D		X					
12/09/00	PUF	A				X			
12/09/00	PUF	B				X			
12/09/00	PUF	C				X			
12/09/00	PUF	D				X			
12/09/00	PUF	E				X			
12/09/00	PUF	F				X			
12/10/00	PUF	A				X			
12/10/00	PUF	B				X			
12/10/00	PUF	C				X			
12/10/00	PUF	D				X			
12/10/00	PUF	E				X			
12/10/00	PUF	F				X			
12/10/00	PUF	G				X			

Table 15
Hunters Point, Parcel E
Low Resolution PUF 7-Point and Flow Check Quality Assurance

Sample Date	Station A Most Recent PUF 7-Pt Calibration	Station A Calib. & Flowcheck In/Out of Specs.	Station B Most Recent PUF 7-Pt Calibration	Station B Calib. & Flowcheck In/Out of Specs.	Station C Most Recent PUF 7-Pt Calibration	Station C Calib. & Flowcheck In/Out of Specs.	Station D Most Recent PUF 7-Pt Calibration	Station D Calib. & Flowcheck In/Out of Specs.	Station E Most Recent PUF 7-Pt Calibration	Station E Calib. & Flowcheck In/Out of Specs.	Station F Most Recent PUF 7-Pt Calibration	Station F Calib. & Flowcheck In/Out of Specs.	Station G Most Recent PUF 7-Pt Calibration	Station G Calib. & Flowcheck In/Out of Specs.
09/08/00	09/08/00	7-pt; In	09/08/00	7-pt; In	09/08/00	7-pt; In	09/08/00	7-pt; In	09/08/00	7-pt; In	09/08/00	7-pt; In	NA	NS
09/09/00	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	NA	NS
09/10/00	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	NA	NS
09/11/00	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	NA	NS
09/12/00	09/08/00	In	09/08/00	NS; In	09/08/00	In	09/08/00	In	09/08/00	In	09/08/00	In	NA	NS
09/13/00	09/08/00	In	09/13/00	7-pt; In	09/08/00	NS	09/08/00	In	09/08/00	In	09/08/00	In	NA	NS
09/14/00	09/08/00	In	09/13/00	In	09/08/00	NS	09/08/00	NS	09/08/00	In	09/08/00	In	NA	NS
09/15/00	09/08/00	In	09/13/00	In	09/08/00	na	09/08/00	In	09/08/00	NS; In	09/08/00	In	NA	NS
09/16/00	09/08/00	In	09/13/00	In	09/08/00	In	09/08/00	NS; In	09/16/00	7-pt; In	09/08/00	In	NA	NS
09/17/00	09/08/00	In	09/13/00	In	09/08/00	In	09/08/00	In	09/16/00	In	09/08/00	In	09/17/00	7-pt; In
09/18/00	09/08/00	In	09/13/00	In	09/08/00	In	09/08/00	In	09/16/00	In	09/08/00	In	09/17/00	NS
09/19/00	09/08/00	NS; In	09/13/00	In	09/08/00	In	09/08/00	In	09/16/00	Out	09/08/00	In	09/17/00	na
09/20/00	09/08/00	In	09/13/00	In	09/08/00	In	09/08/00	In	09/16/00	Out	09/08/00	In	09/17/00	NS
09/21/00	09/08/00	In	09/13/00	In	09/08/00	In	09/08/00	In	09/16/00	Out	09/08/00	In	09/17/00	na
09/22/00	09/08/00	In	09/13/00	In	09/08/00	In	09/08/00	In	09/16/00	Out	09/08/00	In	09/17/00	NS
09/23/00	09/08/00	NS	09/13/00	NS	09/08/00	NS	09/08/00	NS	09/16/00	NS	09/08/00	NS	09/17/00	NS
09/24/00	09/24/00	7-pt; In	09/24/00	7-pt; In	09/24/00	7-pt; NS	09/24/00	7-pt; In	09/16/00	Out	09/24/00	7-pt; In	09/17/00	In
09/25/00	09/24/00	In	09/24/00	In	09/24/00	In	09/24/00	In	09/16/00	Out	09/24/00	In	09/17/00	NS
09/26/00	09/24/00	In	09/24/00	In	09/24/00	In	09/24/00	In	09/16/00	Out	09/24/00	In	09/17/00	na
09/27/00	09/24/00	In	09/24/00	In	09/24/00	In	09/24/00	In	09/16/00	Out	09/24/00	In	09/17/00	NS
09/28/00	09/24/00	In	09/24/00	In	09/24/00	NS; In	09/24/00	In	09/16/00	Out	09/24/00	In	09/17/00	na
09/29/00	09/24/00	na	09/24/00	na	09/24/00	NS	09/29/00	7-pt; In	09/16/00	NS	09/29/00	7-pt; In	09/17/00	NS
09/30/00	09/30/00	7-pt; NS	09/30/00	7-pt; NS	09/30/00	7-pt; NS	09/29/00	NS	09/16/00	NS	09/29/00	NS	09/17/00	NS
10/01/00	09/30/00	7-pt	09/30/00	7-pt; In	09/30/00	In	09/29/00	na	09/16/00	Out	09/29/00	na	09/17/00	na
10/02/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	NS
10/03/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	na
10/04/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	NS
10/05/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	na
10/06/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	NS
10/07/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	na

na : no flow check available
NS: Not Sampled
NA: Not Applicable
In: within specifications
Out: not within specifications

Table 15
Hunters Point, Parcel E
Low Resolution PUF 7-Point and Flow Check Quality Assurance

Sample Date	Station A Most Recent PUF 7-Pt Calibration	Station A Calib. & Flowcheck In/Out of Specs.	Station B Most Recent PUF 7-Pt Calibration	Station B Calib. & Flowcheck In/Out of Specs.	Station C Most Recent PUF 7-Pt Calibration	Station C Calib. & Flowcheck In/Out of Specs.	Station D Most Recent PUF 7-Pt Calibration	Station D Calib. & Flowcheck In/Out of Specs.	Station E Most Recent PUF 7-Pt Calibration	Station E Calib. & Flowcheck In/Out of Specs.	Station F Most Recent PUF 7-Pt Calibration	Station F Calib. & Flowcheck In/Out of Specs.	Station G Most Recent PUF 7-Pt Calibration	Station G Calib. & Flowcheck In/Out of Specs.
10/08/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	NS
10/09/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	In
10/10/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	NS
10/11/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	In
10/12/00	09/30/00	In	09/30/00	In	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	NS
10/13/00	09/30/00	In	09/30/00	Out (10/18)	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	In
10/14/00	09/30/00	In	09/30/00	Out	09/30/00	In	09/29/00	In	09/16/00	Out	09/29/00	In	09/17/00	NS
10/15/00	09/30/00	In	09/30/00	Out	09/30/00	In	09/29/00	In	09/16/00	Out	10/15/00	7-pt; In	09/17/00	In
10/16/00	09/30/00	In	09/30/00	Out	09/30/00	In	09/29/00	In	10/16/00	NS	10/15/00	In	09/17/00	NS
10/17/00	09/30/00	In	09/30/00	Out	09/30/00	In	09/29/00	In	10/16/00	7-pt; In	10/15/00	In	09/17/00	Out (10/18)
10/18/00	10/18/00	In	10/18/00	NS	10/18/00	NS; In	10/18/00	NS; In	10/16/00	NS; In	10/15/00	NS; In	10/18/00	NS
10/19/00	10/18/00	7-pt; In	10/18/00	7-pt; In	10/18/00	7-pt; In	10/18/00	7-pt; In	10/16/00	In	10/15/00	In	10/18/00	NS
10/20/00	10/18/00	In	10/18/00	In	10/18/00	In	10/18/00	In	10/16/00	NS	10/15/00	In	10/18/00	7-pt; In
10/21/00	10/18/00	Out (11/6)	10/18/00	In	10/18/00	In	10/18/00	Out (11/6)	10/16/00	NS	10/15/00	In	10/18/00	NS
10/22/00	10/18/00	Out	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	In
10/23/00	10/18/00	Out	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	NS
10/24/00	10/18/00	Out	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	In
10/25/00	10/18/00	NS	10/18/00	In	10/18/00	In	10/18/00	NS; In	10/16/00	In	10/15/00	In	10/18/00	NS
10/26/00	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/16/00	In	10/15/00	In	10/18/00	NS
10/27/00	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/16/00	In	10/15/00	In	10/18/00	NS
10/28/00	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/16/00	In	10/15/00	NS; In	10/18/00	NS
10/29/00	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/16/00	In	10/15/00	In	10/18/00	NS
10/30/00	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/18/00	NS	10/16/00	In	10/15/00	In	10/18/00	NS
10/31/00	10/18/00	NS	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	NS
11/01/00	10/18/00	NS	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	In
11/02/00	10/18/00	NS	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	NS
11/03/00	10/18/00	Out	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	In
11/04/00	10/18/00	Out	10/18/00	In	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	NS
11/05/00	10/18/00	Out	10/18/00	Out (11/6)	10/18/00	In	10/18/00	Out	10/16/00	In	10/15/00	In	10/18/00	In
11/06/00	11/06/00	7-pt; In	11/06/00	7-pt; In	10/18/00	In	11/06/00	7-pt; In	10/16/00	In	10/15/00	In	11/06/00	7-pt: NS

na : no flow check available
NS: Not Sampled
NA: Not Applicable
In: within specifications
Out: not within specifications

Table 15
Hunters Point, Parcel E
Low Resolution PUF 7-Point and Flow Check Quality Assurance

Sample Date	Station A		Station B		Station C		Station D		Station E		Station F		Station G	
	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.
11/07/00	11/06/00	In	11/06/00	In	11/07/00	7-pt; NS	11/06/00	In	11/07/00	7-pt; In	11/07/00	7-pt; In	11/06/00	In
11/08/00	11/06/00	In	11/06/00	In	11/08/00	7-pt; NS	11/06/00	In	11/07/00	In	11/07/00	In	11/06/00	NS
11/09/00	11/06/00	In	11/06/00	In	11/08/00	NS; In	11/06/00	In	11/07/00	In	11/07/00	In	11/09/00	7-pt; In
11/10/00	11/06/00	In	11/06/00	In	11/10/00	7-pt; In	11/06/00	In	11/07/00	In	11/07/00	NS; In	11/09/00	NS
11/11/00	11/06/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	7-pt; In	11/09/00	In
11/12/00	11/06/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	NS
11/13/00	11/06/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	In
11/14/00	11/06/00	NS; In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	NS
11/15/00	11/15/00	7-pt; In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	In
11/16/00	11/15/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	NS
11/17/00	11/15/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	In
11/18/00	11/15/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	NS
11/19/00	11/15/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	In
11/20/00	11/15/00	In	11/06/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	NS
11/21/00	11/15/00	In	11/06/00	NS	11/10/00	NS; In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	In
11/22/00	11/15/00	NS	11/06/00	NS	11/10/00	NS	11/06/00	NS	11/07/00	NS	11/11/00	NS	11/09/00	NS
11/23/00	11/15/00	NS	11/06/00	NS	11/10/00	NS	11/06/00	NS	11/07/00	NS	11/11/00	NS	11/09/00	NS
11/24/00	11/15/00	NS	11/06/00	NS	11/10/00	NS	11/06/00	NS	11/07/00	NS	11/11/00	NS	11/09/00	NS
11/25/00	11/15/00	NS	11/06/00	NS	11/10/00	NS	11/06/00	NS	11/07/00	NS	11/11/00	NS	11/09/00	NS
11/26/00	11/15/00	NS	11/06/00	NS	11/10/00	NS	11/06/00	NS	11/07/00	NS	11/11/00	NS	11/09/00	NS
11/27/00	11/15/00	In	11/27/00	7-pt; In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	NS
11/28/00	11/15/00	In	11/27/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/09/00	NS; In
11/29/00	11/15/00	In	11/27/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/29/00	NS
11/30/00	11/15/00	In	11/27/00	In	11/10/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/29/00	7-pt; In
12/01/00	11/15/00	In	11/27/00	In	11/10/00	NS; In	11/06/00	In	11/07/00	In	11/11/00	In	11/29/00	NS
12/02/00	11/15/00	In	11/27/00	In	12/02/00	7-pt; In	11/06/00	In	11/07/00	In	11/11/00	In	11/29/00	In
12/03/00	11/15/00	In	11/27/00	In	12/02/00	In	11/06/00	In	11/07/00	In	11/11/00	In	11/29/00	NS
12/04/00	12/04/00	7-pt; In	11/27/00	In	12/02/00	In	12/04/00	7-pt; In	12/04/00	7-pt; In	12/04/00	7-pt; In	12/04/00	7-pt; In
12/05/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	NS
12/06/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	In

na : no flow check available
NS: Not Sampled
NA: Not Applicable
In: within specifications
Out: not within specifications

Table 15
Hunters Point, Parcel E
Low Resolution PUF 7-Point and Flow Check Quality Assurance

	Station A		Station B		Station C		Station D		Station E		Station F		Station G	
Sample Date	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.
12/07/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	NS
12/08/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	In
12/09/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	NS
12/10/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	In
12/11/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	NS
12/12/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	In
12/13/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	NS
12/14/00	12/04/00	In	11/27/00	In	12/02/00	In	12/04/00	In	12/04/00	In	12/04/00	In	12/04/00	In
01/05/01	01/04/01	7-pt; In	01/04/01	7-pt; In	01/04/01	7-pt; In	01/04/01	7-pt; In	01/04/01	7-pt; In	01/05/01	7-pt; In	01/04/01	7-pt; In
01/29/01	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/05/01	NS	01/04/01	In
02/01/01	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/05/01	In	01/04/01	NS
02/04/01	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/05/01	In	01/04/01	In
02/07/01	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/05/01	In	02/07/01	7-pt; NS
02/13/01	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/05/01	In	02/07/01	In
02/16/01	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/04/01	In	01/05/01	In	02/07/01	NS
02/23/01	02/21/01	7-pt; In	02/21/01	7-pt; In	02/21/01	7-pt; In	02/21/01	7-pt; In	02/21/01	7-pt; In	02/21/01	7-pt; In	02/21/01	7-pt; In
03/05/01	02/21/01	In	02/21/01	In	02/21/01	In	02/21/01	In	02/21/01	In	02/21/01	NS; In	02/21/01	NS
03/08/01	02/21/01	In	02/21/01	In	02/21/01	In	02/21/01	In	02/21/01	In	02/21/01	NS	02/21/01	In
03/12/01	02/21/01	NS; In	02/21/01	NS; In	02/21/01	NS; In	02/21/01	In	02/21/01	In	03/12/01	7-pt; In	02/21/01	NS

Shaded information denotes stations that do **not meet** Quality Assurance Specifications.

Note: PUF Singlepoint Flow Check not required for first sampling event after 7-point calibration.

na : no flow check available
NS: Not Sampled
NA: Not Applicable
In: within specifications
Out: not within specifications

Table 16
Hunters Point Shipyard, Parcel E
High Resolution PUF Quality Assurance

	Station A		Station B		Station C		Station D		Station E		Station F		Station G	
Sample Date	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.	Most Recent PUF 7-Pt Calibration	Calib. & Flowcheck In/Out of Specs.
09/16/00	09/16/00	7-pt; In	09/16/00	7-pt; In	NS	NA	NS	7-pt; In	09/16/00	7-pt; In	09/16/00	7-pt; In	NS	NA
09/24/00	09/16/00	-	09/16/00	-	09/17/00	7-pt; In	09/16/00	-	09/16/00	-	09/16/00	-	09/24/00	7-pt; In
10/02/00	09/16/00	-	09/16/00	-	09/17/00	-	09/16/00	-	09/16/00	-	09/16/00	-	NS	NA
10/10/00	09/16/00	Flow: In	09/16/00	Flow: In	09/17/00	Flow: In	09/16/00	Flow: In	09/16/00	Flow: In	09/16/00	Flow: In	09/24/00	Flow: In
10/18/00	09/16/00	Flow: In	09/16/00	Flow: In	09/17/00	Flow: In	09/16/00	Flow: In	09/16/00	Flow: In	09/16/00	Flow: In	NS	NA

Shaded information denotes stations that do **not meet** Quality Assurance Specifications.
Note: PUF Singlepoint Flow Check not required for first sampling event after 7-point calibration.

- : no flow check available
NS: Not Sampled
NA: Not Applicable
In: within specifications
Out: not within specifications

Table 17
Hunters Point Shipyard, Parcel E
TSP Quality Assurance

Calibration Date	Stations						
	A	**B**	**C**	**D**	**E**	**F**	**G**
	09/08/00 - Installation of samplers A, B, C, D, E, and F						
09/09/00	In	Out	In	In	In	In	NA
	09/023/00 - Conditioning motor changeout on all samplers						
09/24/00	In	In	In	In	In	In	NA
	09/28/00 - Installation of sampler G						
09/28/00	In	In	In	In	In	In	In
	10/18/00 - Conditioning motor changeout on all samplers						
10/18/00	In	In	In	In	In	In	In
	12/04/00 - Conditioning motor changeout on all samplers						
12/05/00	In	In	In	In	In	In	In
	01/05/01 - Conditioning motor changeout on samplers A, B, C, D, F, and G						
01/05/01	In	In	In	In	NA	In	In
	01/16/01 - Conditioning motor changeout on sampler E						
01/16/01	NA	NA	NA	NA	In	NA	NA
	01/29/01 - Recalibrate sampler E						
01/29/01	NA	NA	NA	NA	In	NA	NA
	03/15/01 - Conditioning motor changeout on all samplers						
03/15/01	In	In	In	In	In	In	In

Shaded information denotes stations that do **not meet** Quality Assurance Specifications.

In: calibration within specifications
Out: calibration not within specifications
NA: not applicable

Table 18
Hunters Point Shipyard, Parcel E
Field Blank Results

Sample Date	mg/m3									
	PUF		VOC		TSP		Hi Res PUF		Chlor / Phos	
9/8 to 9/9	NS		NS		NS		NS		NS	
9/9 to 9/10	NS		NS		NS		NS		NS	
9/10 to 9/11	Phenanthrene	0.00805	Benzene	0.511	ND		NS		NS	
	Di-n-butylphthalate	0.0278								
9/11 to 9/12	NS		NS		NS		NS		NS	
9/12 to 9/13	Di-n-butylphthalate	0.0214	ND		ND		NS		NS	
9/13 to 9/14	NS		NS		NS		NS		NS	
9/14 to 9/15	Di-n-butylphthalate	0.00702	ND		ND		NS		NS	
	Bis(2-ethylhexyl)phthalate	0.0060								
9/15 to 9/16	NS		NS		NS		NS		NS	
9/16 to 9/17	Diethylphthalate	0.00382	ND		ND		OCDD	0.0507	NS	
	Di-n-butylphthalate	0.0117								
9/17 to 9/18	NS		NS		NS		NS		NS	
9/18 to 9/19	Diethylphthalate	0.00608	ND		ND		NS		NS	
	Di-n-butylphthalate	0.00868								
	Butyl Benzyl Phthalate	0.00423								
	Bis(2-ethylhexyl)phthalate	0.00365								
9/19 to 9/20	NS		NS		NS		NS		NS	
9/20 to 9/21	Butyl Benzyl Phthalate	0.00369	ND		ND		NS		NS	
	Bis(2-ethylhexyl)phthalate	0.00483								
9/21 to 9/22	NS		NS		NS		NS		NS	
9/22 to 9/23	Di-n-butylphthalate	0.00322	ND		ND		NS		NS	
9/23 to 9/24	NS		NS		NS		NS		NS	
9/24 to 9/25	NS		NS		NS		NS		NS	
9/25 to 9/26	ND		ND		ND		NS		NS	
9/26 to 9/27	NS		NS		NS		NS		NS	
9/27 to 9/28	ND		ND		ND		NS		NS	
9/28 to 9/29	NS		NS		NS		NS		NS	
9/29 to 9/30	Di-n-butylphthalate	0.00840	ND		ND		NS		NS	
9/30 to 10/1	NS		NS		NS		NS		NS	
10/1 to 10/2	NS		NS		NS		NS		NS	
10/2 to 10/3	ND		ND		ND		ND		NS	
10/3 to 10/4	NS		NS		NS		NS		NS	
10/4 to 10/5	ND		ND		ND		NS		NS	
10/5 to 10/6	NS		NS		NS		NS		NS	
10/6 to 10/7	ND		ND		ND		NS		NS	
10/7 to 10/8	NS		NS		NS		NS		NS	
10/8 to 10/9	ND		ND		ND		NS		NS	
10/9 to 10/10	NS		NS		NS		NS		NS	
10/10 to 10/11	ND		ND		ND		NS		NS	
10/11 to 10/12	NS		NS		NS		NS		NS	
10/12 to 10/13	Di-n-butylphthalate	0.00661	ND		ND		NS		NS	
10/13 to 10/14	NS		NS		NS		NS		NS	
10/14 to 10/15	ND		Benzene	0.38	ND		NS		NS	
			Toluene	0.75						
10/15 to 10/16	NS		NS		NS		NS		NS	
10/16 to 10/17	ND		ND		ND		NS		NS	
10/17 to 10/18	NS		NS		NS		NS		NS	
10/18 to 10/19	NS		ND		NS		ND		NS	
10/19 to 10/20	ND		NS		ND		NS		NS	
10/20 to 10/21	NS		NS		NS		NS		NS	
10/21 to 10/22	NS		NS		NS		NS		NS	
10/22 to 10/23	NS		NS		NS		NS		NS	
10/23 to 10/24	ND		NS		NS		NS		NS	
10/24 to 10/25	NS		ND		ND		NS		NS	
10/25 to 10/26	ND		NS		NS		NS		NS	
10/26 to 10/27	NS		NS		NS		NS		NS	

ND: not detected
NS: not sampled

Table 18
Hunters Point Shipyard, Parcel E
Field Blank Results

	mg/m3									
Sample Date	**PUF**		**VOC**		**TSP**		**Hi Res PUF**		**Chlor / Phos**	
10/27 to 10/28	NS		NS		NS		NS		NS	
10/28 to 10/29	NS		NS		NS		NS		NS	
10/29 to 10/30	ND		NS		NS		NS		NS	
10/30 to 10/31	NS		NS		NS		NS		NS	
10/31 to 11/1	ND		NS		NS		NS		NS	
11/1 to 11/2	NS		NS		NS		NS		NS	
11/2 to 11/3	ND		NS		NS		NS		NS	
11/3 to 11/4	NS		NS		NS		NS		NS	
11/4 to 11/5	ND		ND		ND		NS		NS	
11/5 to 11/6	NS		NS		NS		NS		NS	
11/6 to 11/7	ND		NS		NS		NS		NS	
11/7 to 11/8	NS		NS		NS		NS		NS	
11/8 to 11/9	ND		NS		NS		NS		NS	
11/9 to 11/10	NS		NS		NS		NS		NS	
11/10 to 11/11	ND		ND		ND		NS		NS	
11/11 to 11/12	NS		NS		NS		NS		NS	
11/12 to 11/13	ND		NS		NS		NS		NS	
11/13 to 11/14	NS		NS		NS		NS		NS	
11/14 to 11/15	ND		NS		NS		NS		NS	
11/15 to 11/16	NS		NS		NS		NS		NS	
11/16 to 11/17	ND		ND		ND		NS		NS	
11/17 to 11/18	NS		NS		NS		NS		NS	
11/18 to 11/19	ND		NS		NS		NS		NS	
11/19 to 11/20	NS		NS		NS		NS		NS	
11/20 to 11/21	ND		NS		NS		NS		NS	
11/21 to 11/22	NS		NS		NS		NS		NS	
11/22 to 11/27	NS		NS		NS		NS		NS	
11/27 to 11/28	ND		NS		NS		NS		NS	
11/28 to 11/29	NS		NS		NS		NS		NS	
11/29 to 11/30	ND		NS		NS		NS		NS	
11/30 to 12/1	NS		ND		ND		NS		NS	
12/1 to 12/2	ND		NS		NS		NS		NS	
12/2 to 12/3	NS		NS		NS		NS		NS	
12/3 to 12/4	ND		NS		NS		NS		NS	
12/4 to 12/5	NS		NS		NS		NS		NS	
12/5 to 12/6	ND		NS		NS		NS		NS	
12/6 to 12/7	NS		NS		NS		NS		NS	
12/7 to 12/8	ND		ND		ND		NS		NS	
12/8 to 12/9	NS		NS		NS		NS		NS	
12/9 to 12/10	ND		NS		NS		NS		NS	
12/10 to 12/11	NS		NS		NS		NS		NS	
12/11 to 12/12	ND		NS		NS		NS		NS	
12/12 to 12/13	NS		NS		NS		NS		NS	
12/13 to 12/14	ND		NS		NS		NS		NS	
12/14 to 12/15	NS		NS		NS		NS		NS	
12/15 to 1/5	NS		NS		NS		NS		NS	
1/5 to 1/6	ND		ND		ND		NS		NS	
1/6 to 1/29	NS		NS		NS		NS		NS	
1/29 to 1/30	NS		NS		NS		NS		NS	
1/30 to 2/1	NS		NS		NS		NS		NS	
2/1 to 2/2	ND		ND		Copper	0.275	NS		NS	
2/2 to 2/4	NS		NS		NS		NS		NS	
2/4 to 2/5	NS		NS		NS		NS		NS	
2/5 to 2/7	NS		NS		NS		NS		NS	
2/7 to 2/8	ND		ND		ND		NS		NS	
2/8 to 2/13	NS		NS		NS		NS		NS	
2/13 to 2/14	NS		NS		NS		NS		NS	

ND: not detected
NS: not sampled

Table 18
Hunters Point Shipyard, Parcel E
Field Blank Results

Sample Date	mg/m3				
	PUF	VOC	TSP	Hi Res PUF	Chlor / Phos
2/14 to 2/16	NS	NS	NS	NS	NS
2/16 to 2/17	ND	ND	ND	NS	NS
2/17 to 2/23	NS	NS	NS	NS	NS
2/23 to 2/24	NS	NS	NS	NS	NS
2/24 to 3/5	NS	NS	NS	NS	NS
3/5 to 3/6	ND	ND	ND	NS	NS
3/6 to 3/8	NS	NS	NS	NS	NS
3/8 to 3/9	NS	NS	NS	NS	NS
3/9 to 3/12	NS	NS	NS	NS	NS
3/12 to 3/13	ND	ND	ND	NS	NS

ND: not detected
NS: not sampled

Table 19
Hunters Point Shipyard, Parcel E
Field Duplicate Summary

When Stations D and G Both Had Detections Relative Percent Difference:		
Both Stations D and G Detected	238	
Relative % Difference 0 - 50 %	181	76%
Relative % Difference > 50 %	57	24%
0 - 10 %	70	29%
11 - 20 %	43	18%
21 - 30 %	33	14%
31 - 40 %	18	8%
41 - 50 %	17	7%
51 - 60 %	6	3%
61 - 70 %	8	3%
71 - 80 %	3	1%
81 - 90 %	3	1%
91 - 100 %	5	2%
101 - 120 %	8	3%
121 - 140 %	10	4%
141 - 160 %	6	3%
161 - 180 %	4	2%
181 - 200 %	4	2%
> 200 %	0	0%
Total	238	

Total Comparisons (# of times both Stations D and G were sampled and analyzed for Detected Compounds)	966	
# of times both Stations D and G were Detected	238	25%
# of times both Station D and G were not detected	638	66%
# of times one and only of either D or G was detected	90	9%

APPENDIX A
CHAIN-OF-CUSTODY FORMS

Complete Appendix A is provided on CD-ROM #2 of this submittal

APPENDIX B
VOLUME CALCULATION SHEETS

Complete Appendix B is provided on CD-ROM #2 of this submittal

APPENDIX C
FIELD ACTIVITY DAILY LOGS

Complete Appendix C is provided on CD-ROM #2 of this submittal

APPENDIX D
METEOROLOGICAL DATA

Complete Appendix D is provided on CD-ROM #2 of this submittal

APPENDIX E
WIND ROSE PLOTS

Complete Appendix E is provided on CD-ROM #2 of this submittal

APPENDIX F
WIND CORRELATION DATA

Complete Appendix F is provided on CD-ROM #2 of this submittal

APPENDIX G
LABORATORY AND RADIOACTIVE REPORTS/RESULTS

Complete Appendix G is provided on CD-ROM #2 of this submittal

APPENDIX G-1
LABORATORY ANALYTICAL REPORTS – VOC/TSP/PUF

APPENDIX G-2
LABORATORY ANALYTICAL REPORTS - HIGH RESOLUTION DIOXIN/FURAN

APPENDIX G-3
LABORATORY ANALYTICAL REPORTS – CHLORINE/PHOSGENE

APPENDIX G-4
RADIOACTIVITY REPORT/RESULTS

APPENDIX H
RESULTS SUMMARY BY COMPOUND

Complete Appendix H is provided on CD-ROM #2 of this submittal

APPENDIX I
DAILY DETECTION SUMMARIES

Complete Appendix I is provided on CD-ROM #2 of this submittal

APPENDIX I-1
DAILY DETECTION SUMMARIES – VOC/TSP/PUF

APPENDIX I-2
DAILY DETECTION SUMMARIES – HIGH RESOLUTION DIOXINS/FURANS

APPENDIX J
7-POINT CALIBRATION

Complete Appendix J is provided on CD-ROM #2 of this submittal

APPENDIX J-1
LOW RESOLUTION PUF 7-POINT CALIBRATIONS AND SET POINT DETERMINATIONS

APPENDIX J-2
HIGH RESOLUTION PUF 7-POINT CALIBRATIONS AND SET POINT DETERMINATIONS

APPENDIX K
PUF DAILY FLOW CHECKS

Complete Appendix K is provided on CD-ROM #2 of this submittal

APPENDIX K-1
LOW RESOLUTION PUF DAILY FLOW CHECKS

APPENDIX K-2
HIGH RESOLUTION PUF DAILY FLOW CHECKS

APPENDIX L
PUF WHEEL CHARTS & MAGNEHELICâ HOURLY READINGS

Complete Appendix L is provided on CD-ROM #2 of this submittal

APPENDIX M
AIR SAMPLING LOGS

Complete Appendix M is provided on CD-ROM #2 of this submittal

APPENDIX M-1
AIR SAMPLING LOGS – VOC/TSP/PUF

APPENDIX M-2
AIR SAMPLING LOGS – HIGH RESOLUTION PUF

APPENDIX M-3
AIR SAMPLING LOGS – CHLORINE/PHOSGENE

APPENDIX N
TSP CALIBRATION SHEETS

Complete Appendix N is provided on CD-ROM #2 of this submittal

APPENDIX O
TSP WHEEL CHARTS

Complete Appendix O is provided on CD-ROM #2 of this submittal

APPENDIX P
METEOROLOGICAL INFORMATION AND CERTIFICATION

Complete Appendix P is provided on CD-ROM #2 of this submittal

ATTACHMENT B

FINAL 2000-2001 CLOSURE CONSTRUCTION AS-BUILT REPORT
HUNTERS POINT SHIPYARD PARCEL E
IR 1/21 INTERIM LANDFILL CAP
SAN FRANCISCO, CALIFORNIA

Complete Appendices for this Attachment are provided on CD-ROM #2

FINAL
2000-2001 CLOSURE CONSTRUCTION AS-BUILT REPORT
HUNTERS POINT NAVAL SHIPYARD PARCEL E
IR 1/21 INTERIM LANDFILL CAP
SAN FRANCISCO, CALIFORNIA

Environmental Remediation
Contract Number N62474-98-D-2076
Contract Task Order 0025

Document Control Number 1697
Revision 0

July 6, 2001

Submitted to:

U.S. Department of the Navy
Southwest Division
Naval Facilities Engineering Command
Environmental Division
1220 Pacific Highway
San Diego, CA 92123-5187

Submitted by:

IT Corporation
4005 Port Chicago Highway
Concord, CA 94520-1120

FINAL
2000-2001 CLOSURE CONSTRUCTION AS-BUILT REPORT
HUNTERS POINT NAVAL SHIPYARD PARCEL E,
IR 1/21 INTERIM LANDFILL CAP
SAN FRANCISCO, CALIFORNIA

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July 6, 2001

Approved by:

__________________________________ ________________________

Sunil Kishnani, Ph.D., P.E. — Date
Engineer of Record, IT Hunters Point Shipyard Parcel E
California Registered Civil Engineer No. C054276
(Expires 12/31/03)

Approved by:

__________________________________ ________________________

Rich Purdue, P.E. — Date
Independent Engineer, IT Hunters Point Shipyard Parcel E
Purdue Engineering and Construction
California Registered Civil Engineer No. C042809
(Expires 3/31/04)

Approved by:

__________________________________ ________________________

Beth L. Yurek, E.I.T. — Date
Resident Engineer, IT Hunters Point Shipyard Parcel E
Vector Engineering, Inc.

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Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
CCR	California Code of Regulations
CETCO	Colloidal Technologies Company
CFR	Code of Federal Regulations
cm/sec	centimeters per second
CQA/QC	construction quality assurance/quality control
cy	cubic yard(s)
GCL	geosynthetic clay liner
GSE	GSE Lining Technology, Inc.
HDPE	high-density polyethylene
HPS	Hunters Point Shipyard
IT	IT Corporation
ITSI	Innovative Technical Solutions, Inc.
lbs/acre	pounds per acre
mil	millimeter
oz.	ounce(s)
PI	plasticity index
psi	pound(s) per square inch
QA	quality assurance
QC	quality control
tsf	tons per square foot
UCS	unconfined compression strength
VSC	vegetative soil cover

1.0 Introduction

The Hunters Point Shipyard (HPS) Parcel E is a 135-acre facility located at Hunters Point Naval Shipyard in San Francisco, California. Figure 1, “Site Location Map,” shows the location of the site. The facility has been inactive as a U.S. Naval Shipyard since 1974, but an interim closure cover system was mandated after a brush fire occurred in Parcel E in August of 2000. As a result, a 13.8-acre interim closure cover system was designed for the landfill.

This report summarizes the construction and performance documentation collected during the 2000 to 2001 construction season, including the installation of the interim cover system at the HPS Parcel E Landfill. The 2000 to 2001 closure construction activities represent a 7-month construction schedule, including weather delays. This work was performed under the provisions of Environmental Remediation Contract Number N62474-98-D-2076 and Contract Task Order 0025. All work has been implemented per project specifications and other approved modifications, as appropriate. The major construction activities of the 2000 to 2001 construction season included within this report are as follows:

- Site preparation, clearing and removal of grub material
- Installation of one well point (probe) and monitoring for subsurface activities
- Extension of existing wells for monitoring of subsurface activities
- Testing and approval of a minimum 2-foot-thick foundation layer
- Installation of a multilayer geosynthetic cover system
- Placement of a minimum 1½-foot-thick vegetative soil cover (VSC)
- Winterization of the site, including construction of a surface water collection and drainage system and erosion control for disturbed areas
- Hydroseeding of the final cap areas

1.1 Project Summary

Closure construction activities for the HPS Parcel E Landfill began in September of 2000. This report documents the construction activities completed for the interim closure cover installation at the HPS Parcel E Landfill.

Throughout this report, reference will be made to the IT Corporation (IT) Resident Engineering group. This group refers to the Engineer of Record, Resident Engineer, field engineers, and all field quality control (QC) technicians and inspectors. The IT Resident Engineer was represented by Vector Engineering, Inc., of Grass Valley, California. The purpose of the IT Resident Engineering group was to ensure that the landfill was closed in accordance with the project technical specifications and other approved modifications, as appropriate. The construction quality assurance/quality control (CQA/QC) activities of the IT Resident Engineering group were also monitored, reviewed, and certified by Purdue Engineering and Construction, Rich Purdue, P.E., of Concord, California, an Independent Certifying Engineer. The controlling document for this project, except where noted, was the IT Project Technical Specifications (see Appendix A, "Technical Specifications, Hunters Point Shipyard Parcel E Landfill Cap Construction," of this report).

In addition to the previously mentioned activities, several other independent activities occurred throughout the 2000 to 2001 construction season, one of which being clearing and grubbing of the site. Resulting trash and debris was stockpiled on-site to be disposed of at an appropriate off-site disposal facility.

Other non-construction-related activities included the extension of existing groundwater monitoring wells above final grade of the VSC prior to completing the foundation layer. A total of 12 monitoring wells were extended within the landfill cap boundary. Additionally, one well point was installed to monitor subsurface activity in an area that was still smoldering at the time of liner installation. Subsurface monitoring of the above-mentioned wells was initiated on December 18, 2000 to determine if combustion existed within the landfill.

In addition, air monitoring stations were installed to detect health-related particulate matter as a result of the fire. Perimeter air monitoring was initiated on September 9, 2000, and terminated on March 14, 2001. Subsurface air monitoring commenced on December 18, 2000, and is on-going. Perimeter monitoring was conducted on-site by Mendelian Construction and subsurface air monitoring was conducted by Innovative Technical Solutions, Inc. (ITSI).

Finally, two settlement markers were installed prior to the completion of construction of the foundation layer. The settlement markers were placed at the approximate center of the two high points, where the thickness of the foundation layer was the greatest. The settlement marker comprised of a 10-foot steel pole welded to a 3-foot-by-3-foot steel base plate and was placed at the top of the original grade during placement of the foundation layer.

This report documents the 2000 to 2001 HPS Parcel E Landfill cap construction and the associated CQA/QC activities as follows:

- Section 2.0 – Site Preparation
- Section 3.0 – Final Cover System Design
- Section 4.0 – Foundation Layer
- Section 5.0 – Geosynthetic Layers
- Section 6.0 – Vegetative Soil Cover
- Section 7.0 – Summary and Certifications
- Section 8.0 – References

2.0 Site Preparation

This section summarizes the activities conducted for the protection of monitoring wells, removal of debris, and subgrade preparation. Existing site topography of the HPS Parcel E Landfill area prior to construction is shown on Figure 2, "Preconstruction Topography."

2.1 General

The site preparation activities for the HPS Parcel E landfill areas included protection of existing monitoring wells throughout construction. Further site preparation involved removal of objectionable materials and vegetation prior to placement of soil for the foundation layer. Objectionable materials included burned debris such as vegetation, soil, railroad ties, and concrete rubble. Materials were segregated and stored on-site in separate stockpiles. The subgrade was scarified, moisture conditioned, and compacted to incorporate remaining vegetative roots into the existing subgrade soil prior to placement of the foundation layer.

2.2 Protection of Monitoring Wells

Monitoring wells were protected by painting the wells with fluorescent orange paint and placing delineators, such as traffic cones, around the wells. Within the construction area of the 13.8-acre closure cover, 50-gallon drums were placed around the 12 existing wells and painted fluorescent orange so they were easily visible to the equipment operators. These existing wells are shown in Figure 7, "Final Topography." The drums were left in place until the closure cover system was completed. Once the VSC was placed, a concrete pad and bollards were installed around each well. Table 1, "Monitoring Well Location Data," lists the 12 wells and their locations.

2.3 Preparation of Subgrade

Prior to placement of the foundation layer, the subgrade was prepared by stripping objectionable materials and vegetation. This was accomplished using a CAT D6H dozer to push debris into a pile from which it was loaded into a dump truck with a Volvo L90 C loader and a Komatsu WA 450 loader. The debris was transferred and stockpiled on-site at Parcel E in segregated piles for disposal.

Following the stripping of objectionable materials and vegetation, the subgrade was scarified and moisture conditioned using a Hutch Master disk pulled by a CAT D6C tractor (No. 2633) to blend and incorporate remaining vegetative roots into the existing subgrade soil. Some areas were compacted prior to the fill placement.

2.4 Debris Disposal

During the preparation of the subgrade, segregated piles of debris were transferred and stockpiled on-site for disposal. The debris consisted of vegetation, soil, railroad ties, and concrete rubble. Burned debris was also removed from the site. Quantities of debris are shown in Table 2, "Debris Removal—Summary of Removed Debris Quantities." All debris has been removed from the site.

2.5 Construction Quality Control

A QC program was conducted to verify and document that the site preparation specifications were met (see Appendix A). The QC program required supervision of the above-mentioned stripping and disposal of objectionable materials. Documentation consisted of debris removal quantities, which are presented in Table 2.

3.0 Final Cover System Design

3.1 Introduction

The remainder of this report summarizes the construction and performance documentation collected during the 2000 to 2001 construction of the interim cover system at the HPS Parcel E Landfill. Construction was completed in accordance with the project technical specifications requirements and other approved modifications as appropriate (see Appendix A). The major activities included the following:

- Subgrade preparation and approval for foundation layer placement
- Installation of a minimum 2-foot-thick compacted foundation layer
- Extension of existing monitoring wells over the approved foundation
- Installation of a geosynthetic clay liner (GCL), where required
- Installation of the 80-millimeter (mil) high-density polyethylene (HDPE) geomembrane layer
- Installation of a geocomposite drainage layer
- Placement of a 1½-foot-thick VSC
- Hydroseeding the finished cap

3.1.1 General

The design of the final cover system is described in the *Technical Specifications, Hunters Point Shipyard Parcel E, IR 1/21 Interim Landfill Cap Construction* technical specifications (IT, 2000).

Requirements for quality-related activities, such as inspections and testing specific to the final cover construction, are contained in Appendix A. Steps were taken to ensure that all field engineering and/or QC personnel who were part of the daily working staff at the facility were familiarized with the CQA/QC Program, as well as the specifications, drawings, and ongoing site activities. Daily logs of the Resident Engineer and the Field Quality Control Inspectors, documenting the CQA/QC activities, may be found in Appendices B, "Field Activity Daily Logs: Resident Engineer," and C, "Field Activity Daily Logs: Field Quality Control Inspector," respectively.

3.2 Cover System Design

A multi-layer closure cover system was used to cover the site. The closure covers were constructed to meet the applicable requirements of the technical specifications (IT, 2000). Soil used for the foundation layer and the VSC in the closure covers was obtained from clean, off-site borrow sources. Documents and analytical data supporting the cleanliness of the off-site borrow material are provided in Appendix D. Two types of closure covers, referred to as Covers A and B, were used to cover the site. The two types of closure covers were implemented for varying slopes on the designed cover. The final closure cover systems are described below in Section 3.2.1.

3.2.1 Final Design for Closure Covers

Cover A

Cover A was placed in areas where the final ground surface slope was flat, (i.e., typical 3 to 8 percent), as shown on Figure 3, "Plan and Locations of Final Closure Covers." Cover A includes the following layers from bottom to top:

<u>Cover A for slopes of 3 to 8 percent</u>

- Compacted foundation layer, 2 feet thick
- GCL, non-reinforced
- Smooth 80-mil HDPE geomembrane layer
- Single-sided geocomposite drainage layer (HDPE drainage net with a geotextile fused to one side)
- VSC, 1½ feet thick

Cover B

Cover B was placed where the final slopes were greater than 8 percent, as shown on Figure 3. Cover B includes the following layers from bottom to top:

<u>Cover B for slopes greater than 8 percent</u>

- Compacted foundation layer, 2 feet thick
- Textured 80-mil HDPE geomembrane layer
- Double-sided geocomposite drainage layer (HDPE drainage net with a geotextile fused to both sides)

- VSC, 1½ feet thick

Both cover systems A and B required a double-sided gecomposite drainage layer on the perimeter of the cover system extending beyond the anchor trench to enhance drainage and limit erosion. This was accomplished by placing a layer of geotextile beneath the single-sided geocomposite layer in the area beyond the anchor trench. This additional layer of geotextile also serves as a separation layer and prevents the geonet component of the single-sided geocomposite from getting clogged by soil at the ground surface.

4.0 Foundation Layer

The following section describes the work conducted during the construction of the foundation layer and the QC procedures related to this task. The observations and verification testing required for the foundation layer were conducted in accordance with the technical specifications, (IT, 2000).

4.1 General

The foundation layer for the cover system is designed to:

- Prevent failure of the cover system due to settlement
- Provide adequate strength to:
  1. Support the loads associated with the cover system
  2. Maintain the integrity of the closure cover during and after an earthquake
  3. Provide appropriate grades for drainage control

The foundation layer, common to all cover systems, was constructed to be a minimum thickness of 2 feet to meet the design topography of the foundation layer. This layer was constructed from clean off-site borrow materials. Compaction of the newly constructed foundation layer was performed as part of the layer installation. The compaction provided adequate bearing capacity to support heavy construction equipment and to support the closure cover system. Letters of certification for the clean borrow material used for the foundation layer are found in Appendix D, “Material Certifications.” If letters of certification were not provided, analytical testing was performed on the borrow material. The results of the analytical tests are also presented in Appendix D.

Prior to placement of the compacted foundation layer, the existing subgrade was prepared as follows:

- Stripped objectionable materials and vegetation that interfered with work, including, but not limited to, boulders, concrete blocks, trees, stumps, and debris

- Stripped and removed existing vegetation. Stripped vegetative material was re-utilized where feasible and incorporated into the foundation layer

- Scarified to blend and incorporate the remaining vegetative roots into the existing foundation soil

- Placed lifts of clean borrow soil and compacted with heavy equipment for preparation of the foundation layer; the layer was constructed in controlled lifts not exceeding 8 inches in loose thickness to obtain a nominal 6-inch compacted thickness.

- Smooth drum rolled the top lift (minimum 4-passes) prior to GCL placement.

Preparation of the foundation layer began on September 19, 2000. Once the placing of the foundation material began, two CAT 825 B compactors were used to condition and compact the foundation layer in lifts not exceeding 8 inches. Compaction of the foundation was done under the continuous observation of the IT Resident Engineering group to ensure that complete and uniform coverage was achieved. In all, approximately 14 acres of foundation were approved for final cover placement.

4.2 Construction Quality Control

A QC program was conducted to verify and document that the foundation design specifications were met (Appendix A). The QC program required the 2-foot-thick foundation layer to be tested at a minimum frequency of one test every 3 acres for each 6-inch lift in order to demonstrate a minimum strength. IT personnel conducted testing for the foundation approval. The results of these tests as well as field daily logs are presented in Appendices E, "Conformance Test Data," and B, respectively.

4.2.1 Foundation Approval

Samples of the compacted foundation were collected from random locations for strength testing at the specified frequencies during the placement of the foundation material. Samples were collected using Shelby tubes that were hydraulically pushed by a CAT D6H dozer blade to a depth of 6 inches. The Shelby tubes were removed from the soil by carefully excavating around the perimeter of the tube with hand tools until it could be lifted by hand. Each sample was given a unique sample number and the location was surveyed by Foresite Engineering. In addition to collecting samples for strength testing, samples were collected to determine the permeability of the compacted foundation layer. The method used for collecting the samples was identical to the method used for strength testing. The collected samples were then tested for the following:

- Unconfined Compressive Strength (American Society for Testing and Materials [ASTM] D 2166)

- Moisture Content (ASTM D 2216)

- Hydraulic Conductivity (ASTM D 5084)

The unconfined compressive strength testing was performed at Smith-Emery Geoservices directed under Pat Morrison. The laboratory is located at HPS, Building 114, San Francisco, California. The hydraulic conductivity tests were performed under Raf B. Hutalla of Smith-Emery Geoservices in Los Angeles, California. The sample collection logs and the laboratory chain-of-custody records may be found in Appendices F, "Sample Collection Logs," and G, "Chain-of-Custody Forms," respectively.

4.2.1.1 Unconfined Compression Strength Tests

Unconfined compression strength (UCS) tests were conducted in accordance with ASTM D 2166 at a frequency of test every 3 acres for each 6-inch lift. The acceptance criterion for the unconfined compression test was a minimum value of 1.0 tons per square foot (tsf). The results of these tests are presented in Table 3, "Foundation Approval—Summary of Unconfined Compressive Strength Tests." As shown, the final unconfined compressive strength of the approved foundation layer ranges from 1.0 to 6.2 tsf. A total of 39 samples were taken, with 35 tests conducted.

The location of each passing test was surveyed by Foresite Engineering. The surveyed foundation tests are shown in Figure 4, "Foundation Layer Topography with Passing Test Locations."

4.2.1.2 Moisture Content Tests

Moisture content tests (ASTM D 2216) were conducted routinely as part of the UCS tests, the results of which are listed in Table 3. No criterion for moisture content tests was detailed in the design specifications.

4.2.1.3 Hydraulic Conductivity

Hydraulic conductivity tests were conducted in accordance with ASTM D 5084, at a frequency of one test every 3 acres from the final grade of the foundation layer. The hydraulic conductivity tests were not required for foundation approval; therefore, the results are for informational purposes only. The results of these tests are presented in Table 4, "Foundation Approval—Summary of Hydraulic Conductivity Tests." As shown, the final permeability of the approved foundation layer ranges from 2.70 E-05 to 9.84 E-08 centimeters per second (cm/sec). The average permeability is 5.54 E-06 cm/sec. A total of five tests were conducted. The results indicate that the foundation layer has low permeability and thus provides an added barrier to infiltration, in conjunction with the other cover components.

The locations of these tests were surveyed by Foresite Engineering. The surveyed locations of the hydraulic conductivity tests are shown in Figure 4.

4.2.1.4 Verification Survey

After final approval of the foundation layer and prior to placement of the geosynthetic layers, a survey was conducted on a minimum 100-x-100-foot grid. This survey was conducted to verify that the foundation layer was constructed according to the design and was later used to verify the thickness of the VSC. Figure 4 shows the resulting foundation topography and the surveyed location of each of the passing UCS and hydraulic conductivity tests.

5.0 Geosynthetic Layers

The following sections describe the work conducted during the installation of the geosynthetic layers including the GCL, HDPE geomembrane layer, and the geosynthetic drainage layer. The sections also describe the materials used and the QC activities related to this task.

5.1 General

Approximately 1,954,985 square feet of geosynthetic material was installed during the 2000 construction of the final cover system. The various layers of geosynthetics as constructed in the cover system consist of the following components from bottom to top:

- GCL (non-reinforced), on slopes 3 to 8%
- 80-mil HDPE geomembrane layer (smooth), on slopes 3 to 8%
- 80-mil HDPE geomembrane layer (textured), on slopes greater than 8%
- Single-sided Geocomposite drainage layer, on slopes 3 to 8%
- Double-sided Geocomposite drainage layer, on slopes greater than 8%
- 8-ounce (oz.) Geotextile extending beyond the anchor trench

Installation of the geosynthetic layers began on October 24, 2000, at the northwestern corner of the Parcel E Landfill, and was completed on November 21, 2000. During that time, approximately 14 acres were covered under the continuous observation of the IT Resident Engineering group. The as-built surveyed quantities of these materials, not including overlap or anchor trench work, are listed in Table 5, "Material Quantity Summary."

5.2 Materials

From September 27, 2000 to November 18, 2000, geosynthetic materials were delivered to the site from various manufacturers via flat bed trucks. Upon delivery, each truckload of material was inspected by a member of the IT Resident Engineering group for damage during shipment. To document any damage, receiving inspection forms were completed for each truckload of material received. Slight damage, if any, was identified during the receiving inspections and was repaired at the time of deployment. Roll numbers and quantities received were also checked against the truck tags. The material receiving inspection logs for each truckload of material have been included in Appendix H, "Material Receiving Inspection Logs."

After the receiving inspections were completed, each roll number was cross-checked against the manufacturer's certification provided by the supplier. This documentation provided certified test results for the physical and chemical properties of each material received on site.

Manufacturer's certifications were reviewed, maintained, and completed on site by members of the IT Resident Engineering group. The manufacturer's certifications are located in Appendix D. The test results for each of the properties of the received materials met or exceeded the specified requirements.

The geosynthetic materials were stored on site at the Parcel E Landfill on railroad ties and railroad tracks and covered with plastic tarps to minimize any damages that may occur due to weather. This is standard acceptable practice and prevents damage of the materials from protrusions in the ground surface and standing water during the rainy season. Storage of geosynthetic material was done in accordance with the technical specifications (see Appendix A).

5.3 Installation

The geosynthetic installation Contractor for this project was GSE Lining Technology, Inc. (GSE), of Houston, Texas. The required seamer and supervisor resumes, and panel layout drawings were provided to IT prior to commencement of installation activities. In addition, a preconstruction meeting was held with GSE's superintendent and IT Corporation's Resident Engineering group. The purpose of this meeting was to discuss sequencing of the liner deployment.

Installation of the geosynthetic layers followed the procedures outlined in the technical specifications (Appendix A). This was accomplished by the continuous inspection of the geosynthetic system materials and workmanship throughout the period of the installation. The IT Resident Engineering group provided the field QC with periodic oversight by the Independent Certifying Engineer. The inspections and tests conducted during installation of the geosynthetic layers are described in the following sections.

5.4 Geosynthetic Clay Liner

Non-reinforced GCL was used in the original design of the geosynthetic layer system. Due to a shortage of non-reinforced GCL near the end of deployment, a rush shipment of reinforced GCL was shipped from the IT Panoche Facility located in Benicia, California. This material was GSE-owned, but at the time it was being stored at the Panoche Facility. The non-reinforced rolls of GCL were manufactured by the GSE Clay Lining Technology Company in Spearfish, North Dakota. The reinforced rolls of GCL were manufactured by the Colloid Technologies Company (CETCO), a subsidiary of the American Colloid Company. The reinforced product, Bentomat® ST, was supplied in rolls measuring 15 feet wide and approximately 150 feet in length The reinforced product is superior when compared to the non-reinforced product and meet or exceeds the required technical specifications of the project. This sustitution provides an overall superior product and enhances the performance of the cover system as designed. The non-reinforced product, GundSeal®, was supplied in rolls 17½ feet wide and approximately 200 feet in length. The installed panels were sized and seamed in the field by GSE. Certified physical properties of the GCL and the powdered bentonite were collected, along with the manufacturer's QA test results.

The foundation layer beneath the GCL was kept moist until the areas were ready for deployment. The soil surfaces were also proof rolled with a Hamm smooth drum vibratory compactor prior to installation of the GCL. This was done to ensure that the GCL was being deployed over a smooth, firm, and unyielding surface free of abrupt elevation changes. The final foundation surface was approved in writing by the IT Resident Engineering group and the geosynthetics installation Contractor. Documentation supporting the subgrade acceptance is found in Appendix I, "Foundation Subgrade Approval Forms." An anchor trench measuring a minimum of 1 foot wide by 2 feet deep was excavated using a modified trenching machine. A total of 2,866 linear feet were excavated for the anchor trench at the perimeter of the designed landfill cap and the trench is shown in Figure 5, "80-Mil HDPE Panel Layout with Destructive Sample Locations." After the installation of geosynthetics, the anchor trenches were backfilled with the excavated soil and wheel compacted using the front wheel of a CAT 140G motor grader.

All GCL panels were installed in accordance with the plans and specifications as described herein. A technical paper prepared by GSE detailing the installation of GSE GundSeal® was referenced for deployment (GSE, 1997). The GundSeal® was deployed with the 15-mil HDPE backing facing the prepared foundation layer. Both GundSeal® and Bentomat® ST were deployed by means of a Volvo L120C wheel loader, which could maneuver the roll into position and then, with the assistance of several laborers and a WA 450 Komatsu wheel loader, unroll the required length of material. All GCL seams were constructed by overlapping their adjacent edges. The minimum dimension of all overlap was 6 inches with the exception of the end-of-roll overlap, which was a minimum of 24 inches. Supplemental bentonite was used only for the seaming of the Bentomat® ST. The minimum application rate at which the bentonite was applied was one quarter pound per lineal foot.

All cover penetrations were lined by cutting an "X" in the GCL blanket and wrapping the penetration in a GCL skirt. Granular sodium bentonite was added at the base of each penetration as additional protection. Only as much GCL as could be covered by the following layer of HDPE was placed in a single day. During the course of construction, no GCL panels were left uncovered overnight. Members of the IT Resident Engineering group maintained panel deployment logs throughout the deployment process to ensure that the project specifications were met. All panel deployment logs are included in Appendix J, "Geosynthetic Deployment Logs."

5.4.1 Construction Quality Control Program

A QC program was conducted to document the installation of the GCL and to verify that the design specifications were met. This was accomplished by the continuous inspection of the GCL and workmanship throughout the period of the installation. The IT Resident Engineering group provided the field QC. Throughout the installation of GCL, QC inspectors maintained all panel deployment logs. These logs were compiled each day and were used to complete the construction inspection forms, in accordance with the CQA/QC Plan (IT, 2000). The material certifications, inspections, and tests that were performed for the GCL are described in the following sections.

5.4.1.1 Manufacturer's Material Certification

Certified test results for the physical and chemical properties of the GCL were obtained from the manufacturer. The test results for each of the properties were checked by the IT Resident Engineering group and all roll values met or exceeded the technical specification. The manufacturer's material certifications are included in Appendix D.

5.4.1.2 Inspection of Material Received

The GCL rolls were inspected upon delivery for damage during shipment. The manufacturer's identification numbers were obtained to ascertain that the proper materials were received and that the lot numbers matched those listed on the quality assurance (QA) certificates. Every roll of GCL met the specifications. The IT Resident Engineering group conducted inspections of every deployed panel during installation activities. No significant damage was noted during these inspections. The material receiving inspection records are included in Appendix H.

5.4.1.3 Conformance Testing

In addition to the manufacturer's QC documentation, samples were cut from random rolls of each material received and delivered to Geotechnics Geosynthetic Laboratories of Pittsburgh, Pennsylvania for third party conformance testing. In accordance with the specifications, a minimum of one sample for every 100,000 square feet of material was collected for testing. At a minimum, each sample was tested for Bentonite Swell Index (ASTM D 5890), Bentonite Mass/Area (ASTM D 5993), Bentonite Hydraulic Conductivity (ASTM D 5887), HDPE Thickness (ASTM D 5199), HDPE Puncture Resistance (ASTM D 4833), and HDPE Tensile Strength and Elongation (ASTM D 638, Method IV) as outlined in technical specifications

(Appendix A). Subsequent modifications were made to the conformance testing specifications (see Appendix K, "Memorandums" for details).

Members of the IT Resident Engineering group reviewed the results of the conformance tests. All of the conformance test results met the design specifications.

Tables 6, "Material Receiving Summary—GundSeal® GCL," and 7, "Material Receiving Summary—Bentomat ST® GCL," include summaries of the CQA/QC activities involved with the materials inspection for the GundSeal® GCL and the Bentomat® GCL, including a summary of the conformance samples collected. A copy of the laboratory testing results has also been included in Appendix E.

5.4.1.4 Inspection of the Subgrade

The finished foundation layers received smooth steel drum rolling to produce soil surfaces that were relatively smooth and free of any sharp discontinuities and desiccation cracks. Prior to installation of the GCL, an inspection of the completed foundation layer was made by a member of the IT Resident Engineering group and the geosynthetic subcontractor's superintendent. Subgrade acceptance forms were completed during these inspections, and any corrective actions were noted and implemented prior to deployment of the GCL.

5.4.1.5 Inspection of the Anchor Trench

As the anchor trenches were excavated, the dimensions of the excavation and the conditions of the trench bottom and side walls were inspected for conformance with the technical specifications. The constructed anchor trench dimensions conformed with the specifications. The trenches were excavated, backfilled, and compacted in accordance with the specifications.

5.4.1.6 Inspection of Panels

Each GCL panel was inspected for damage during deployment. All areas of damage were marked and repaired.

5.4.1.7 Inspection of Panel Overlap

The overlap of the panels was inspected to verify a minimum overlap of 6 inches at the sides and 24 inches on the ends of the rolls, in accordance with the manufacturer's recommendation. All panels had sufficient overlap and conformed to the specifications. Patches were also overlapped a minimum of 12 inches over the defective area to be patched. Supplemental bentonite was used only for the seaming of the Bentomat® ST product. The minimum application rate at which the bentonite was applied was one quarter pound per lineal foot.

5.4.1.8 Walk-Through Inspection of Completed Installation

After the completion of each GCL panel, and prior to the HDPE deployment, the surface was given a final walk-through inspection by members of the IT Resident Engineering group and GSE's superintendent. Any damaged or defective areas were marked and repaired. Any protrusions observed in the subgrade were also repaired. No HDPE was allowed to be deployed over the GCL until this walk-through was completed and all required repairs made.

5.5 High-Density Polyethylene Geomembrane

The textured and smooth 80-mil HDPE geomembrane was supplied in 22½-foot-wide and 34½-foot-wide rolls, respectively. The length of the rolls was approximately 320 feet. The installed panels were sized and seamed in the field. Certified physical properties of the HDPE geomembrane and the resins used to manufacture the geomembrane were collected, along with the manufacturer's QA test results. The HDPE geomembrane was installed in accordance with the plans and specifications and as described herein.

The HDPE panels were deployed by several laborers who, with the assistance of a Volvo L120C loader, held the rolls in an elevated position just outside of the anchor trench, and unrolled the geomembrane onto the soil surface. A Komatsu WA 450 loader assisted the laborers in deploying the HDPE geomembrane.

Two types of field seams were used to join the geomembrane panels: extrusion welding and hot-wedge fusion welding. Both methods were performed per the manufacturer's recommendations. Field Seaming Logs may be found in Appendix L, "HDPE Geomembrane Seaming Logs." Panels were overlapped a minimum of 4 inches and sandbags were placed along the edges of unseamed panels to minimize the risk of uplift during strong winds. Destructive samples were cut from the installed HDPE geomembrane at a minimum rate of one per 500 linear feet of field seam (Appendix A). The destructive samples were tested in the field by GSE laborers under the supervision of a member of the IT Resident Engineering group. The destructive samples were also delivered to Geotechnics Laboratories of Pittsburgh, Pennsylvania for third party conformance testing. Field test results are provided in Appendix M, "Field Destructive Sample Test Results," and the laboratory test results are provided in Appendix E.

The as-built HDPE panel layout for the cover system is shown on Figure 5. These figures show the surveyed locations of all field seams, destructive samples taken for laboratory testing, and pipe penetrations. HDPE boots were attached to all pipes that penetrated the liner. The boots over each pipe were constructed according to the manufacturer's recommendations. As-built details of the boot configurations are shown on Figure 6. Details and sections of the interim cover system are also shown on Figure 6.

5.5.1 Construction Quality Control Program

A QC program was conducted to document the installation of the geomembrane layers and to verify that the design specifications were met. This was accomplished by the continuous inspection of the geomembrane materials and workmanship throughout the period of the installation. The IT Resident Engineering group provided the field QC. Throughout the installation of HDPE geomembrane, QC inspectors maintained logs of deployment, seaming, and testing of welded seams. These logs were compiled each day and were used to complete the construction inspection forms, in accordance with the CQA/QC Plan (IT, 2000). The material certifications, inspections, and tests that were performed for the HDPE are described in the following sections.

5.5.1.1 Manufacturer's Material Certification

Certified test results for the physical and chemical properties of the HDPE geomembrane were obtained from the manufacturer. The test results for each of the properties were checked by the IT Resident Engineering group and all roll values met or exceeded the specification. The manufacturer's material certifications are included in Appendix D.

5.5.1.2 Inspection of Material Received

The HDPE geomembrane was inspected upon delivery for damage during shipment. The manufacturer's identification numbers were obtained to ascertain that the proper materials were received and that the lot numbers matched those listed on the QA certificates. Every roll of HDPE geomembrane met the specifications. The IT Resident Engineering group conducted inspections of every deployed panel during installation activities. No significant damage was noted during these inspections. Material receiving inspection records are included in Appendix H.

5.5.1.3 Conformance Testing

In addition to the manufacturer's QC documentation, samples were cut from random rolls of each material received and delivered to Geotechnics Laboratories of Pittsburgh, Pennsylvania for third party conformance testing. In accordance with the specifications, a minimum of one sample for every 100,000 square feet of material was collected for testing. At a minimum each sample was tested for Thickness (ASTM D 5199), Tensile Strength and Elongation (ASTM D 638), Puncture Resistance (ASTM D 4833), and Tear Resistance (ASTM D 1004) as outlined in the specifications.

Members of the IT Resident Engineering group reviewed results of the conformance tests. All of the conformance test results met the technical specifications.

Table 8, “Material Receiving Summary—80-Mil HDPE Liner,” includes a summary of the CQA/QC activities involved with the materials inspection including a summary of the conformance samples collected. A copy of the laboratory testing results has also been included in Appendix E.

5.5.1.4 Inspection of the Subgrade

Prior to installation of the HDPE geomembrane, a member of the IT Resident Engineering group inspected the completed GCL panel. Any shifting of the GCL panel or other damage was marked and repaired prior to HDPE deployment.

5.5.1.5 Inspection of the Anchor Trench

As the anchor trenches were excavated, the dimensions of the excavation and the conditions of the trench bottom and sidewalls were inspected for any nonconformance with the specifications. The constructed anchor trench dimensions conformed to the specifications. The trenches were excavated, backfilled, and compacted in accordance with the specifications.

5.5.1.6 Inspection of Panels

Each HDPE panel was inspected for damage during deployment. All areas of damage were marked, repaired, and tested.

5.5.1.7 Inspection of Panel Overlap

The overlap of the panels was inspected to verify a minimum overlap of 4 inches, in accordance with the manufacturer’s recommendation. All-field welded seams had sufficient overlap. Seam patches were also overlapped a minimum of 4 inches over the defective area to be patched.

5.5.1.8 Visual Inspection of Seams

All field seams were visually inspected for noticeable defects such as burn-through, fishmouths, drifting of the welding unit, and any other abnormalities. All defects were marked, repaired, and tested in accordance with the specifications.

5.5.1.9 Field Testing of Seams

Field testing of seams was performed by the subcontractor under the continuous observation of members of the IT Resident Engineering group. A “start-up” weld was performed and tested at the beginning of each work shift on days when seaming was performed to ensure the quality of the seaming process. GSE tested each start-up weld in both shear and peel in accordance with

ASTM D 4437. All start-up testing was observed, documented, and maintained in the project files by members of the IT Resident Engineering group. No field seam testing was allowed unless a member of the IT Resident Engineering group was present to monitor the test and to observe that defects were detected and marked for repair. Two primary field test methods were employed for seam testing: air pressure testing and vacuum testing. An electrical spark test was employed when the extrusion weld to be tested was located on the side of a boot, or at a location that prohibited the use of a vacuum box. One hundred percent of field seams were tested. Throughout the installation of HDPE geomembrane, QC inspectors maintained logs of deployment, seaming, and testing of welds and seams. These logs were compiled each day and used to complete the construction inspection forms. All QC documentation on the start-up welds was compiled at the end of each day and is provided in Appendix N, "Daily Start-Up Welds."

The air pressure test was performed on all wedge welds, in accordance with the methods described in the technical specifications (Appendix A). The wedge weld channel was fusion sealed on both ends and pressurized to 25 to 30 pounds per square inch (psi) for a minimum of 5 minutes. Any seam channels exhibiting pressure drops greater than 5 psi were repaired and retested.

The vacuum test was performed on extrusion welds, which primarily consisted of patches, minor repairs of defects, and repairs of air test punctures. The vacuum test was conducted in accordance with the methods described in the specifications. The vacuum box induced a negative pressure of 3 to 6 psi (or greater). This pressure was held as long as necessary for the QC inspector to note the presence of any opening or puncture in the seam, as evidenced by the creation of bubbles in the applied soapy solution. Any failures were noted, rewelded, and retested to the satisfaction of the QC inspector.

The electrical spark test was performed on extrusion welds located on the sides of boots and on any seams where a vacuum test could not be utilized. The seams were constructed with copper wires embedded under the extrusion weld. After grounding the wires, a high-voltage (15 to 30 kilovolts) electrical current was applied to the seam area using a high voltage detector and any leakage to the ground was detected by the creation of an arc that sounded an alarm. No leaks were found during these spark tests.

Documentation supporting inspections on air pressure tests, vacuum tests, and spark tests are included in Appendix O, "Field Testing Logs."

5.5.1.10 Destructive (Laboratory) Testing of Seams

Seam samples for laboratory testing were collected at a minimum rate of one per 500 linear feet of field seam. The destructive samples were randomly cut from the installed geomembrane, but in such a manner that a sample was obtained from as many different areas as possible. Each sample measured no less than 12 inches wide by 36 inches long. All cut-out areas of geomembrane were patched using HDPE material of the same thickness as the parent material. The patches were extrusion welded and vacuum tested.

Analyses were performed on destructive samples collected from the HDPE geomembrane to determine their as-built engineering properties. The tests performed, with reference to the applicable standards, are as follows:

- Bonded Seam Strength in Shear (ASTM D 4437)
- Bonded Seam Strength in Peel (ASTM D 4437)
- Thickness (ASTM D 5199)

Each destructive sample was identified with a sample number (date-seam number) at the time of sampling and the location was noted on a working drawing in the field. The locations of the samples were surveyed and are shown on Figure 5. A total of 47 destructive samples were taken from approximately 21,228 linear feet of seam produced in the 80-mil HDPE layer of the final cover system. All destructive samples were tested in the field by GSE laborers under the supervision of the IT Resident Engineering group. The destructive samples were also delivered to Geotechnics Laboratories in Pittsburgh, Pennsylvania for third party conformance testing. Field test results are provided in Appendix M, and the laboratory test results are provided in Appendix E.

Destructive samples were collected from fusion and extrusion welds. A total of 47 destructive samples were taken from approximately 21,228 linear feet of seam produced by fusion welds. Of these 47 destructs, a total of 3 destructive samples were taken from seams produced by extrusion welds.

If a destructive test failed to meet the specification, then retests were performed on both sides of the original destructive test location. This process was continued, if necessary, until two passing destructive tests were achieved. The seam was then patched and extrusion welded between the two passing tests. This remediation process was necessary in one seam area where there was a failed test. A failure occurred in the extrusion weld destructive sample number 15 as determined by Geotechnics conformance test results. Destructive sample numbers 15A and 15B were collected to meet the specifications.

Shear and Peel Testing

The minimum acceptable shear strength value is 90 percent of the parent material tensile strength at yield. This value is 156 pounds per inch for both the 80-mil smooth and textured HDPE. All test result values of bonded seam strength in shear for 80-mil textured and 80-mil smooth HDPE exceeded the minimum criteria. Test results for bonded seam strength in shear are included in Appendix O of this report. The minimum acceptance criteria for bonded seam strength in peel is a tear in the parent material, rather than a parting at the seam interface. This condition is often referred to as a film tearing bond. This is a pass/fail test. All destructive samples taken passed the bonded seam peel strength test. Test results for bonded seam strength in peel are provided in Appendix G of this report.

Thickness Testing

The specified thickness for HDPE geomembrane is the base thickness of 80-mil minus 10 percent. In addition to the manufacturer's QC documentation, samples were cut from random rolls of each material received and delivered to Geotechnics Laboratories of Pittsburgh, Pennsylvania for third party conformance testing. All values of thickness for the installed geomembrane met the minimum criterion. Results of laboratory thickness testing are provided in Appendix E of this report.

5.5.1.11 Walk-Through Inspection of Completed Installation

After the completion of each HDPE geomembrane layer, the IT Resident Engineering group and GSE's superintendent performed a walk-through inspection of the installation. Any damaged or defective areas were marked, repaired, and tested during the inspection. No geosynthetics (geocomposite) were allowed to be deployed over the HDPE geomembrane until this walk-through was completed and all required repairs were made.

5.6 Geocomposite Layer

The geocomposite used for the final cover system was the GSE FabriNet and FabriCap product, which is a single or double-sided geocomposite comprising of an HDPE geonet. The double-sided geocomposite is comprised of a geonet sandwiched in between two 6-oz. geotextile layers. The single-sided product was installed with the HDPE geonet in contact with the HDPE geomembrane. The geocomposite layer was installed above the 80-mil HDPE layer as outlined in the specifications. The geocomposite was supplied in rolls measuring approximately 14 feet wide by 250 feet long.

Wherever possible, the geocomposite was installed with its long dimension oriented down slope. Sides and ends were butted (or overlapped slightly) and secured with plastic ties. The ties were installed approximately 4 feet apart on the long seam, 6 inches apart on the cross seam, and as necessary to produce flat and uniform layers. The geotextile fused to the bottom of the geocomposite was overlapped. The geotextile fused to the top of the geocomposite panels was either heat bonded or sewn together. In both cases, all seams were continuously seamed. The seam was located approximately 12 inches from the sides of the panels.

5.6.1 Construction Quality Control Program

A QC program was conducted to document the installation of the geocomposite layer and to verify that the design specifications were met. Construction inspection documentation was completed for the geocomposite layer. These forms may be found in Appendix P, "Construction Inspection for the Geocomposite Layer." This was accomplished by the continuous inspection of the geocomposite and workmanship throughout the period of the installation. The IT Resident Engineering group provided the field QC. Throughout the installation of geocomposite layer, QC inspectors maintained logs of deployment. These logs were compiled each day and were used to complete the construction inspection forms, in accordance with the CQA/QC Plan (IT, 2000). The material certifications, inspections, and tests that were performed for the geocomposite layer are described in the following sections.

5.6.1.1 Manufacturer's Material Certification

Certifications, specifications, and laboratory test results regarding the physical properties of the geocomposite were obtained from the manufacturer prior to installation. The properties and test values were checked by members of the IT Resident Engineering group and all roll values met or exceeded the specifications. The manufacturer's material certifications are included in Appendix D.

5.6.1.2 Inspection of Material Received

The geocomposite material was inspected upon receipt for damage during shipment. In addition, the manufacturer's identification numbers were obtained to ascertain that the proper materials were received. All geocomposite material received was the proper material with no noticeable damage found during the material receiving inspections. Detailed inspections of the entire rolls occurred during installation. Material receiving inspection records can be found in Appendix H.

5.6.1.3 Conformance Testing

In addition to the manufacturer's QC documentation, samples were cut from random rolls of each material received and delivered to Geotechnics Laboratories of Pittsburgh, Pennsylvania for third party conformance testing. In accordance with the specifications, a minimum of one sample for every 100,000 square feet of material was collected for testing. At a minimum the HDPE drainage net portion of each sample was tested for Thickness (ASTM D 5199), Density (ASTM D 1505), and Transmissivity (ASTM D 4716) as outlined in the specifications. Due to the difficulty in separating an intact sample of geotextile, testing was conducted only for the HDPE drainage net portion.

Members of the IT Resident Engineering group reviewed the results of the conformance tests. All of the conformance test results met the design specifications.

Table 9, "Material Receiving Summary—Geocomposite," includes a summary of the CQA/QC activities involved with the materials inspection and a list of the conformance samples collected. A copy of the laboratory testing results has also been included in Appendix E.

5.6.1.4 Inspection of the Underlying HDPE Geomembrane for Cleanliness

The underlying HDPE geomembrane was inspected for dirt and debris prior to installation of the geocomposite. The surface of the HDPE geomembrane was swept before the geocomposite was installed. Any debris was removed.

5.6.1.5 Inspection of Panels

The geocomposite panels were inspected for cleanliness, defects, and appearances of nonuniformity, both before and after deployment. Any defective geocomposite was removed and replaced. Sandbags were placed along the edges of unseamed panels to minimize the risk of uplift during strong winds.

5.6.1.6 Inspection of Joints

The joints of adjacent sheets were inspected to ensure that the panels were properly butted and tied together. The ties were installed approximately 4 feet apart on the long seam, 6 inches apart on the cross seam, and as necessary to produce flat and uniform layers. The geotextile fused to the bottom of the geocomposite was inspected to ensure sufficient overlap, and to ensure a relatively unwrinkled layer. The geotextile fused to the top of the geocomposite panels was inspected to ensure a completely bonded seam without areas of burn-through. Sewn seams were inspected to ensure the stitching was complete and that there were no inconsistencies. Open stitches in sewn geotextiles were secured by additional sewing.

5.7 Geotextile

The geotextile used for the final cover system was the nonwoven 8-oz TC Mirafi 180N product. The geotextile product was installed in conjunction with the single-sided geocomposite as outlined in the technical specifications (Appendix A), as an alternative to double-sided geocomposite. The geotextile layer was installed under the single-sided geocomposite layer where the geocomposite extended beyond the anchor trench. The combination of the two geosynthetics acted as erosion control for runoff exiting the geosynthetic cover system where the 80-mil HDPE did not exist. A schematic representing the use of this system is shown in Figure 6. The geotextile was supplied in rolls measuring approximately 15 feet wide by 300 feet long.

The geotextile was installed with 10 feet extending beyond the anchor trench outside the landfill cap and the remaining 5 feet on top of the HDPE. The single-sided geocomposite was installed with and extra 10 feet extending beyond the anchor trench to simulate a double-sided geocomposite with the long dimension oriented down the slopes. The ends of the geotextile were overlapped approximately 3 feet.

5.7.1 Construction Quality Control Program

A QC program was conducted to document the installation of the geotextile layer and to verify that the design specifications were met. This was accomplished by the continuous inspection of the geotextile and workmanship throughout the period of the installation. The IT Resident Engineering group provided the field QC. Throughout the installation of geotextile layer, QC inspectors maintained logs of deployment. These logs were compiled each day and were used to complete the construction inspection forms, in accordance with the CQA/QC Plan (IT, 2000). The material certifications, inspections, and tests that were performed for the geotextile layer are described in the following sections.

5.7.1.1 Manufacturer's Material Certification

Certifications, specifications, and laboratory test results regarding the physical properties of the geotextile were obtained from the manufacturer prior to installation. The properties and test values were checked by members of the IT Resident Engineering group and all roll values met or exceeded the specifications. The manufacturer's material certifications are included in Appendix D.

5.7.1.2 Inspection of Material Received

The geotextile material was inspected upon receipt for damage during shipment. In addition, the manufacturer's identification numbers were obtained to ascertain that the proper materials were received. All geotextile material received was the proper material with no noticeable damage found during the material receiving inspections. Detailed inspections of the entire rolls occurred during installation. Material receiving inspection records are included in Appendix H.

5.7.1.3 Conformance Testing

In addition to the manufacturer's QC documentation, samples were cut from random rolls of each material received and delivered to Geotechnics Laboratories of Pittsburgh, Pennsylvania for third party conformance testing. In accordance with the specifications, a minimum of one sample for every 100,000 square feet of material was collected for testing. At a minimum, the geotextile of each sample was tested for Thickness (ASTM D 5199), Mass/Unit Area (ASTM D 5261), Grab Tensile Strength (ASTM D 4632), Elongation at Break (ASTM D 4632), Trapezoidal Tear (ASTM D 4533), Mullen Burst Strength (ASTM D 3786), and Equivalent Opening Size (ASTM D 4751) as outlined in the specifications. Subsequent modifications were made to the conformance testing specifications. Please refer to Appendix K for details.

Members of the IT Resident Engineering group reviewed the results of the conformance tests. All of the conformance test results met the technical specifications.

Table 10, "Material Receiving Summary—Geotextile Liner," includes a summary of the CQA/QC activities involved with the materials inspection and a list of the conformance samples collected. A copy of the laboratory testing results has also been included in Appendix E.

5.7.1.4 Inspection of the Underlying HDPE Geomembrane for Cleanliness

The underlying HDPE geomembrane was inspected for dirt and debris prior to installation of the geocomposite. The surface of the HDPE geomembrane was swept before the geocomposite was installed. Any debris was removed.

5.7.1.5 Inspection of Panels

The geotextile panels were inspected for cleanliness, defects, and appearances of nonuniformity both before and after deployment. Any defective geotextile was removed and replaced. Sandbags were placed along the edges of unseamed panels to minimize the risk of uplift during strong winds.

5.7.1.6 Inspection of Joints

The joints of adjacent sheets of geotextile were inspected to ensure that the panels were properly butted and tied together. The ties were installed approximately 4 feet apart on the long seam, 6 inches apart on the cross seam, and as necessary to produce flat and uniform layers. The geotextile fused to the bottom of the geocomposite was inspected to ensure sufficient overlap, as well as a relatively unwrinkled layer. The geotextile fused to the top of the geocomposite panels was inspected to ensure a completely bonded seam without areas of burn-through. Sewn seams were inspected to ensure the stitching was complete and that there were no inconsistencies. Open stitches in sewn geotextiles were secured by additional sewing.

6.0 Vegetative Soil Cover

6.1 General

The following sections describe the earthwork and related activities completed during the construction of the VSC and the QC procedures related to the tasks. The specifications call for a minimum 1½ feet of clean soil as the vegetative soil layer.

6.2 Placement

Prior to placement of the VSC, documents certifying the cleanliness of the off-site borrow source and tests verifying the soil properties in accordance with the technical specifications were obtained.

Placement of the vegetative soil layer began on November 30, 2000, along the southeast corner of the Parcel E Landfill cap and was completed on March 24, 2001, along the west and northwest slope. The final topography for the top of the vegetative soil layer is shown on Figure 7. The material used for the VSC was obtained from several clean off-site borrow sources that are listed below:

- Alameda Creek, Fremont
- 3rd and Oak Street, Oakland
- BART Excavation, San Bruno
- Moscone Center Stockpile, Specialty Crushing
- Leona Quarry – Gallagher & Burk, Oakland
- 16th Street, San Francisco
- Airway and North Canyon, Livermore
- Oak Grove and El Camino, Menlo Park

The VSC materials were continuously inspected to ensure that they were clean and conformed to the specifications.

A 1½-foot-thick layer of clean soil has been placed over the approved geosynthetic cover system at Parcel E. The VSC was constructed in a minimum of two lifts: the first lift at a thickness of 12 inches and compacted by an Ingersoll Rand Pro Pac 100 compactor at a minimum of four passes; the second lift at a thickness of 6 inches was track-walked using a John Deere 750C and 850C bulldozer.

During placement of the first lift, the soil was transported to the fill area by end-dump trucks. The piles of soil were pushed out over the existing drainage layer by means of a CAT D6H bulldozer, a Komatsu D58E bulldozer, and a John Deere 750 C and 850 C bulldozer while a member of the IT Resident Engineering group and IT laborers closely inspected the drainage layer and other geosynthetics for damage during placement. Any roots or rocks larger than 2 inches in any dimension that did arrive in the soil were removed by "rock pickers" prior to the soil being pushed over the geocomposite layer. A John Deere 200 LC excavator was used to place bucket loads of soil at the perimeter of the VSC to minimize wrinkles in the geocomposite produced from the dozers pushing soil. Prior to forecasts of rain, the first lift was graded using a CAT 140G grader and compacted with HAMM smooth drum roller. This allowed runoff to drain properly without erosion of the VSC. Erosion control was also performed by placing hay bales where necessary.

6.2.1 Construction Quality Control Program

A QC program for the VSC was conducted in accordance with the construction QA/QC Plan (IT, 2000). The program was incorporated to verify and document that the placement and compaction of materials met the project technical specifications. The IT Resident Engineering group provided the field QC. In addition, the results of the QC program verified that the VSC was from clean, existing borrow sources, inorganic, resisted erosion, and promoted vegetative growth. Verification was determined by obtaining documents that supported the cleanliness of the off-site borrow material, and soil testing was conducted at a minimum frequency of one test per every 5,000 cubic yards (cy) of borrow material. The field inspections and tests that were performed are described in the following sections.

6.2.1.1 Soil Certification and Testing

Prior to placement of the VSC, documents and analytical data certifying the cleanliness of the off-site borrow source were obtained from the subcontractor. Samples were collected and tests conducted to verify that the soil properties met the specifications. The soil chosen was inorganic, free of debris and other deleterious materials, resisted erosion, and promoted vegetative growth. The collected samples were then tested for the following:

- Plasticity Index (PI) (ASTM D 4318)
- Sieve Analysis (ASTM D 422)

The PI tests were conducted in accordance with ASTM D 4318 at a frequency of one test per every 5,000 cy for each off-site borrow source. Due to the logistics of soil delivery and borrow source locations, PI tests were conducted as necessary by the Resident Engineer. A total of

22 tests were conducted. The acceptance criterion for the PI test was a value of 15 percent or less. Test results for the PI and respective sieve analysis of the off-site borrow materials are included in Appendix E. Table 11, "Vegetative Soil Cover—Summary of Plasticity Index Tests," provides a summary of the PI results. Soil samples HP010401-SS01 and HP-011801-MP2 had plasticity indices of 16 percent and 17 percent, respectively, higher than the specification. This small variance in the specification is not expected to adversely affect the performance of the cover system. The soil was allowed to be used in the field in the interest of maintaining production because a suitable source of competent vegetative soil cover material was difficult to find on a consistent basis. Documents and analytical data supporting the cleanliness of the off-site borrow material are provided in Appendix D.

The PI and sieve analysis testing was performed by Smith-Emery Geoservices under the direction of Pat Morrison. The laboratory is located at HPS, Building 114, San Francisco, California.

6.2.1.2 Field Inspection

The VSC field inspection included the following general tasks:

- Inspection of lift thickness for conformance
- Inspection of soil for rocks, roots, and other deleterious materials
- Surveying the lines and grade of the finished cover

The IT Resident Engineering group inspected the VSC placement and logged the daily activities. The construction logs for the VSC placement are provided in Appendix Q, "Construction Inspection for Vegetative Soil Cover."

6.2.1.3 Surveying

After final grading had been completed, the top of the VSC was surveyed for thickness verification. Survey points from the previous foundation layer as-built survey were resurveyed over the VSC on a minimum grid of 100 feet x 100 feet and the elevations were compared to determine the thickness of the soil cover. In any areas where the thickness was deficient, additional soil was placed and the top of the VSC was resurveyed. This procedure was conducted until the VSC was at the specified thickness of 1½ feet. A tabulation of survey and thickness verification data is presented in Table 12, "Vegetative Soil Cover—Thickness Verification." The final VSC topography is shown in Figure 7. Figure 7 also shows the locations of the existing wells and the installed settlement markers. A portion of the final cap on the western edge at the central drainage termination was not surveyed at publication time due to wet conditions in that area. This area will be surveyed once the area dries and access is available.

6.3 Seeding

For mitigating erosion-related impacts, the VSC was seeded with a special erosion control mix of seed. Hydroseeding was conducted on March 29 through 31, 2001. The temperature- and drought-resistant vegetation is indigenous; has a root system that does not extend into the geosynthetic drainage layer; needs little maintenance; is able to survive in low-nutrient soil; and has sufficient density to control the rate of erosion to less than 2.0 tons per acre per year (standard of practice of minimal long term maintanence). Seeding of the completed closure cover was conducted by means of the spray method. The erosion control seed mix was purchased from Carefree Greens of Newcastle, California. The hydroseeding mix was as follows and certifications for the seed mix are included in Appendix D:

- Zorrow Annual Fescue — 15 pounds per acre (lbs/acre)
- Blando Brome — 20 lbs/acre
- Rose Clover — 20 lbs/acre
- Wimmera Rye — 20 lbs/acre
- Mixed California wildflowers — 3 lbs/acre

A minimum seeding rate of 78 lbs/acre was used. The following ingredients were mixed with clean potable water for application with the seed:

- 16-20-0 fertilizer — 500 lbs/acre
- Wood fiber mulch — 2000 lbs/acre
- Stabilizer (either type) — R Type – 100 lbs/acre
M Type – 80 lbs/acre

6.4 Winterization

Starting in early October, work began to prepare the site for the upcoming rainy season. To prevent runoff of silt into the San Francisco Bay waters, a silt fence was constructed between the bay and the Parcel E Landfill. The foundation layer was graded and compacted with a smooth drum roller to promote drainage. VSC was also smooth drum rolled to prevent ponding.

6.5 Erosion Control

Riprap, hay bales, and silt fencing have been placed along the ditches and at the inlets/outlets of all pipes. These items were placed as erosion and sedimentation controls to reduce the velocity of the runoff and protect the integrity of the cover system. Riprap placed at the outlet of the central drainage ditch is shown in Figure 6.

Water within the VSC is collected in the central drainage collection ditch. The drainage ditch was constructed on top of the foundation layer with a trenching machine and has a depth and width of 12 inches. Both GCL and HDPE lined the ditch. A "burrito" wrap was constructed within the ditch using 8-oz. geotextile containing pea gravel and a 4-inch flexible perforated drainage pipe. The pea gravel surrounded the drainage pipe and was flush to the final grade of the foundation layer. Geocomposite was placed over the top of the ditch. This drainage feature of a perforated pipe encased in gravel and geotextile works efficiently in collecting and diverting concentrated flow and percolation away from the landfill. This system also reduces head on the HDPE geomembrane liner further precluding infiltration into the landfill. A cross-section of the drainage ditch is shown in Figure 6. Material certifications for the pipe and gravel are provided in Appendix D.

Surface water runoff throughout the landfill cap is diverted and managed through a central drainage system. On March 26, 2001, a central drainage ditch was installed on the VSC. Riprap protection is required in the central area over the VSC to mitigate erosion impacts during the winter season. This component of the cover system was not included in the original design when construction work began. It is critical to protect the underlying geosynthetics and control erosion during winter rains.

The VSC was excavated to a minimum of 6 inches and TC Mirafi 160N nonwoven geotextile was placed on the soil cover. Approximately 300 tons of mattress gabion rock (3 x 6 inches) was placed on the geotextile. The plan width of rock is approximately 10 feet and the nominal thickness is approximately 9 inches. A cross section of this ditch is shown in Figure 6. Material certifications for the drainage gravel and the geotextile can be found in Appendix D.

A photo log showing the construction activities, from foundation placement to hydroseeding, may be found in Appendix R, "Photo Log."

7.0 Summary

The 2000 to 2001 closure construction activities at the HPS Parcel E Landfill included:

- Site preparation
- Installation, testing, and approval of a 2-foot-thick foundation layer
- Installation/Extension of monitoring wells and well points
- Installation of a GCL over the approved foundation
- Installation of the 80-mil HDPE geomembrane layer
- Installation of a geocomposite drainage layer
- Placement of a 1½-foot-thick VSC with winter seeding
- Construction of a temporary surface water collection/drainage system
- Hydroseeding

Interim closure of the HPS Parcel E Landfill was performed in accordance with the approved specifications, as described in this report.

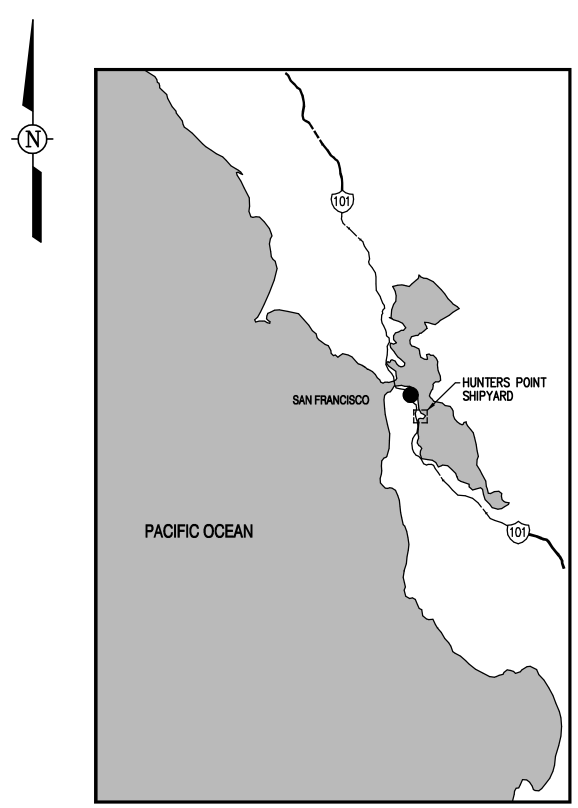
The extensive QA and QC procedures performed, as specified in the CQA/QC program, are documented by the test results and inspections summarized in this report. These procedures substantiate that the interim closure of the HPS Parcel E Landfill was performed satisfactorily as designed and constructed.

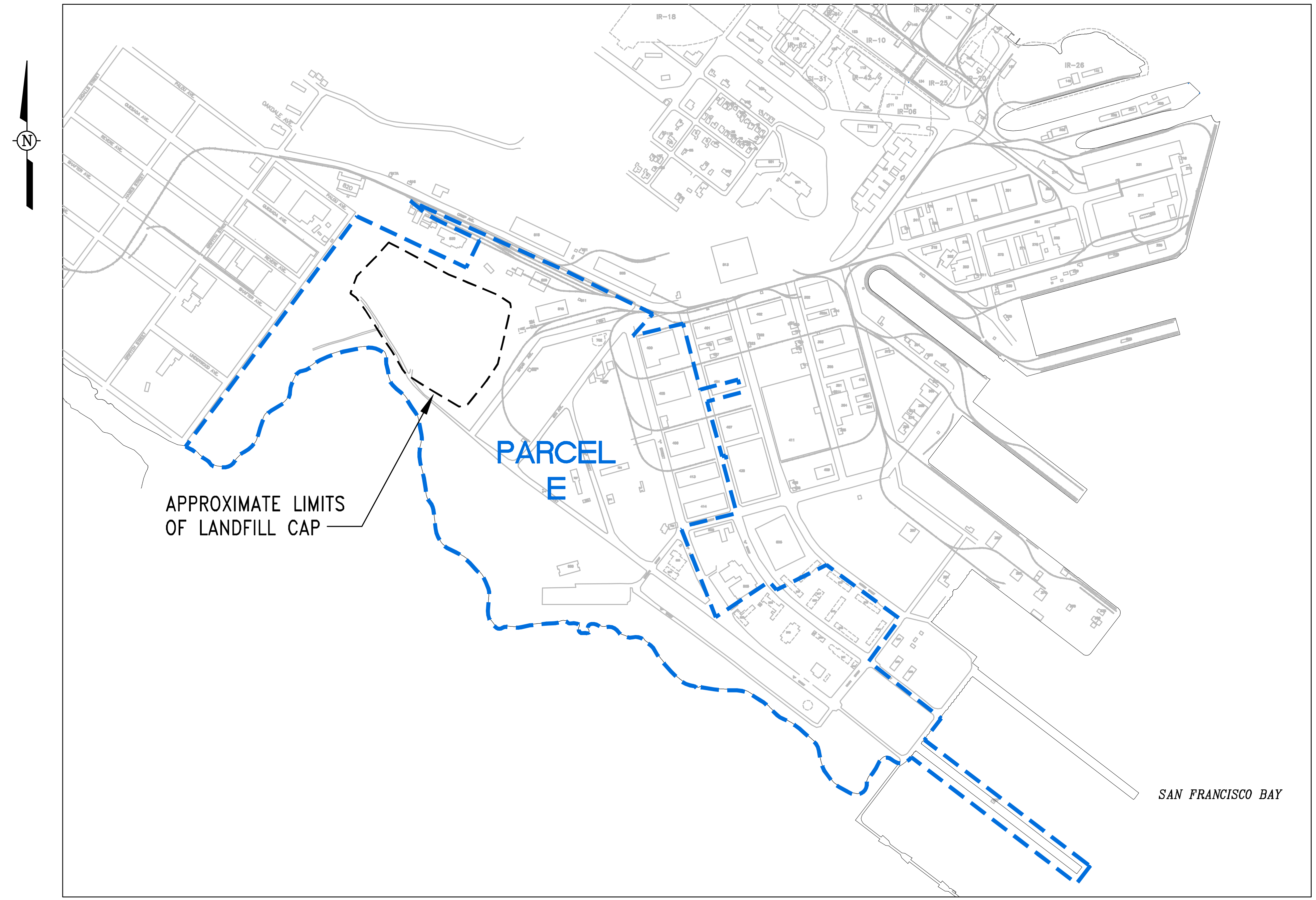
8.0 References

IT Corporation, 2000, *Technical Specifications, Hunters Point Shipyard Parcel E Landfill Cap Construction, September 20*.

FIGURES

IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	CONCORD	812575-D9





REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IT CORPORATION

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITIES WEST
SAN BRUNO, CALIFORNIA
CTO 025

SITE LOCATION MAP

HUNTERS POINT SHIPYARD, PARCEL E
SAN FRANCISCO, CALIFORNIA

DESIGNED BY	B. YUREK	4/11/01	CHECKED BY	
DRAWN BY	T. SCHAEFFER	4/24/01	APPROVED BY	
SCALE: AS SHOWN	DRAWING NO. 812575-D9	FIGURE NO. 1	REVISION NO. 0	

FORMAT REVISION 2/26/99

IMAGE	X-REF	OFFICE	DRAWING NUMBER
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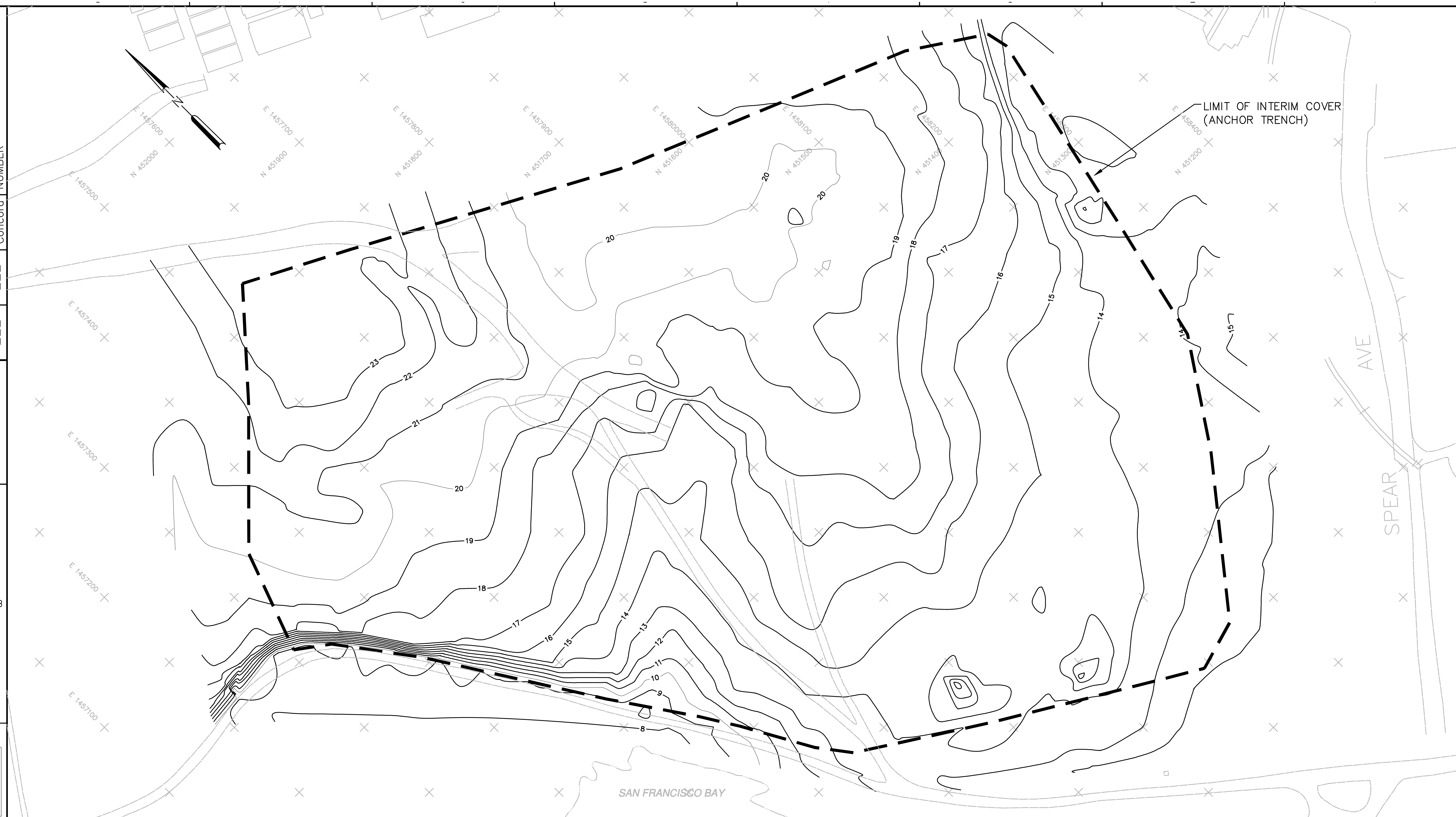


LEGEND

PRE-CONSTRUCTION TOPOGRAPHY

LIMIT OF INTERIM COVER
(ANCHOR TRENCH)

SCALE IN FEET
0 50 100

REFERENCE:

PRE-CONSTRUCTION TOPOGRAPHY SURVEYED BY FORESITE ENGINEERING, 2000

VERIFY SCALE

FORMAT REVISION 2/26/99

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IT CORPORATION

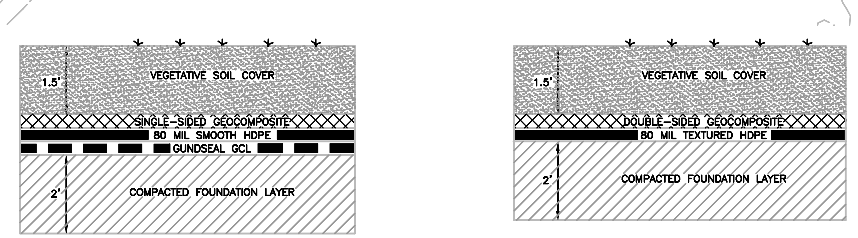
DEPARTMENT OF THE NAVY
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

PRE CONSTRUCTION TOPOGRAPHY

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DESIGNED BY	D. Hullings	10/1/00	CHECKED BY	
DRAWN BY	R. Bricker	4/23/01	APPROVED BY	

SCALE:	DRAWING NO.	FIGURE NO.	REVISION NO.
AS SHOWN	812575-D5	2	0



COVER A
NOT TO SCALE

COVER B
NOT TO SCALE

TYPICAL CLOSURE COVER SECTIONS

LEGEND

COVER A

COVER B

NOTE:
TOPOGRAPHY SHOWN IS AS-BUILT OF TOP OF THE FOUNDATION LAYER.

SCALE IN FEET
0 50 100

REFERENCE:
FOUNDATION LAYER CONTOURS SURVEYED BY FORESITE ENGINEERING, 2000.

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IT CORPORATION

DEPARTMENT OF THE NAVY
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

PLAN AND LOCATIONS OF FINAL CLOSURE COVERS
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DESIGNED BY	D. Hullings	10/1/00	CHECKED BY	
DRAWN BY	R. Bricker	4/24/01	APPROVED BY	

SCALE:	DRAWING NO.	FIGURE NO.	REVISION NO.
AS SHOWN	812575-D6	3	0

IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	Concord	812575-D6

VERIFY SCALE 0 1"

FORMAT REVISION 2/26/99

IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	Concord	812575-D7

LEGEND

2' FOUNDATION LAYER CONTOURS

UCS SAMPLE LOCATIONS • HP092800-UC02

HYDRAULIC CONDUCTIVITY SAMPLE LOCATIONS ⊕ HP110600-UC02

REFERENCE:

FOUNDATION LAYER CONTOURS, LINER LIMITS, AND SAMPLE LOCATIONS SURVEYED BY FORESITE ENGINEERING, 2000.

SCALE IN FEET

0 50 100

VERIFY SCALE 0 1"

FORMAT REVISION 2/26/99

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

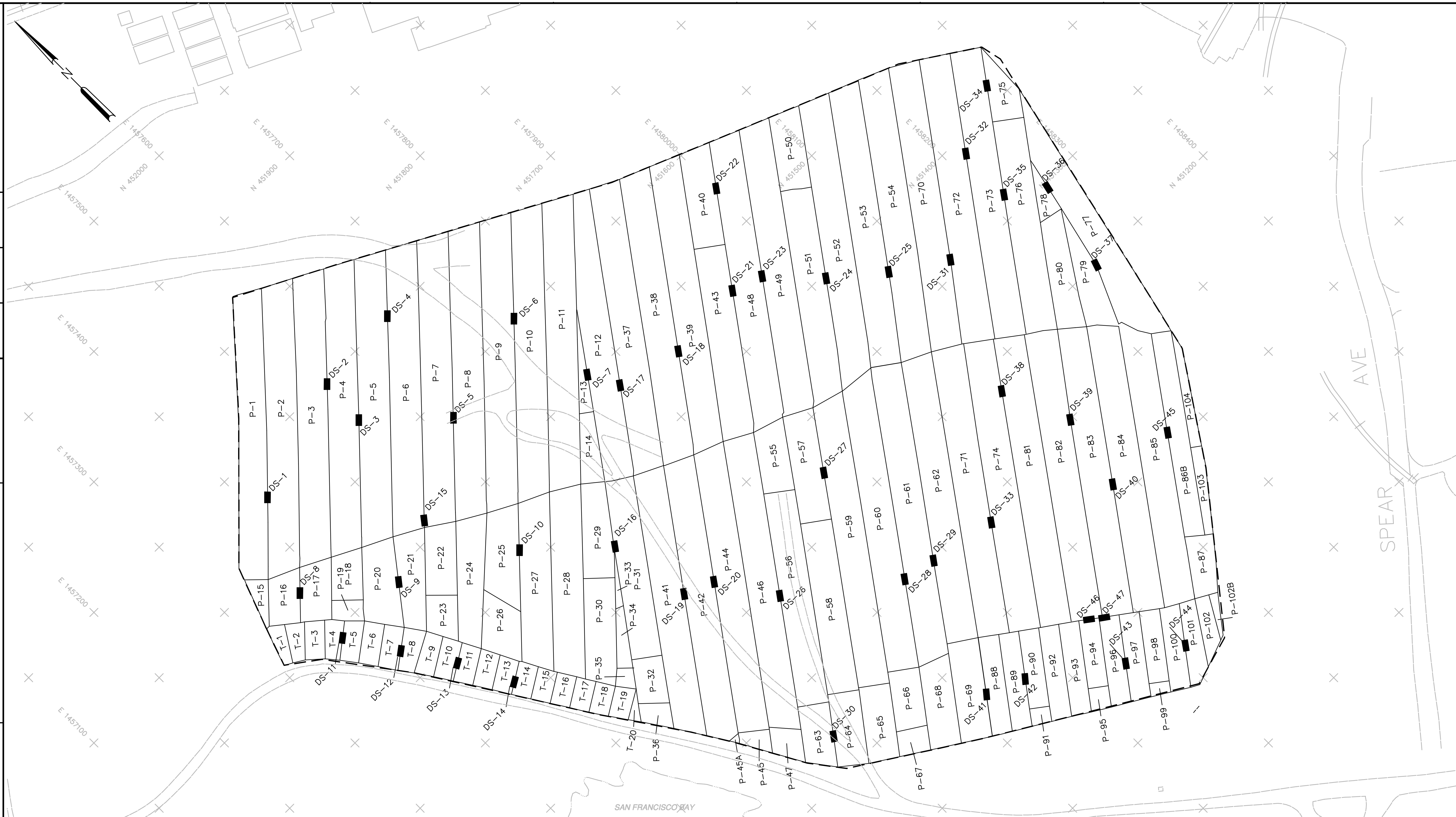
IT CORPORATION

DEPARTMENT OF THE NAVY
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

FOUNDATION LAYER TOPOGRAPHY
WITH PASSING TEST LOCATIONS
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DESIGNED BY	D. Hullings	10/1/00	CHECKED BY	
DRAWN BY	R. Bricker	4/24/01	APPROVED BY	

SCALE:	DRAWING NO.	FIGURE NO.	REVISION NO.
AS SHOWN	812575-D7	4	0



DRAWING NUMBER 812575–D8 | OFFICE Concord | X–REF --- | IMAGE ---

NOTES:

T–# INDICATES TEXTURED HDPE GEOMEMBRANE.

P–# INDICATES SMOOTH HDPE GEOMEMBRANE.

LEGEND

LINER LIMITS (ANCHOR TRENCH)

DESTRUCT SAMPLE LOCATIONS DS–38

SCALE IN FEET 0 50 100

REFERENCE:
PANELS AND DESTRUCT SAMPLES SURVEYED BY FORESITE ENGINEERING, 2000.

FORMAT REVISION 2/26/99

VERIFY SCALE 0 1"

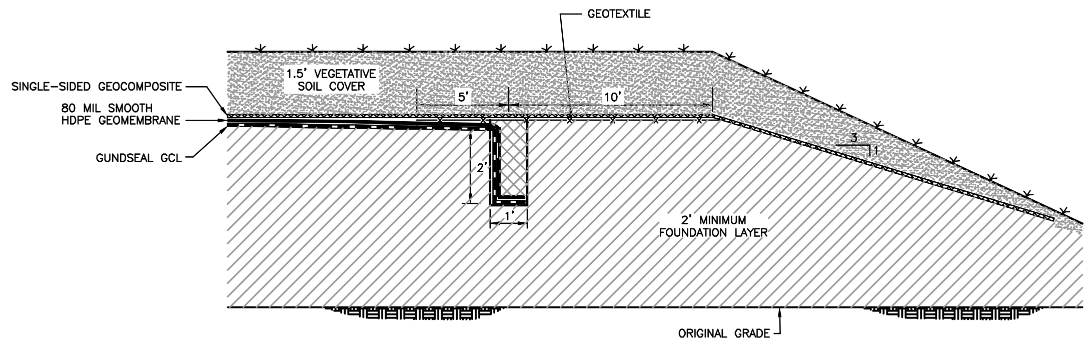
REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IT CORPORATION

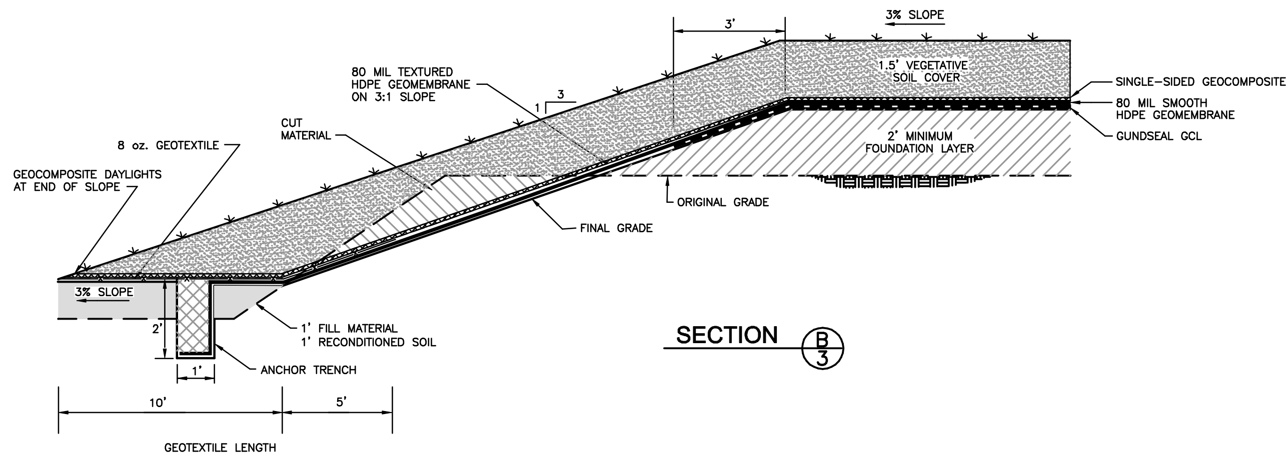
DEPARTMENT OF THE NAVY
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

80–MIL HDPE PANEL LAYOUT WITH DESTRUCTIVE SAMPLE LOCATIONS
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DESIGNED BY	D. Hullings	10/1/00	CHECKED BY	
DRAWN BY	R. Bricker	4/24/01	APPROVED BY	
SCALE: AS SHOWN	DRAWING NO. 812575–D8		FIGURE NO. 5	REVISION NO. 0



SECTION A/3



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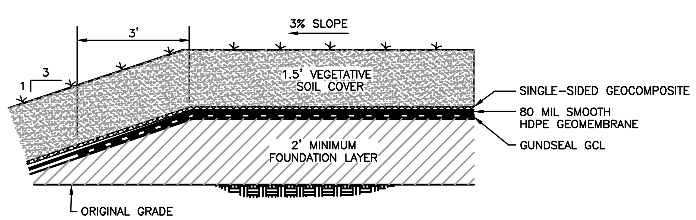

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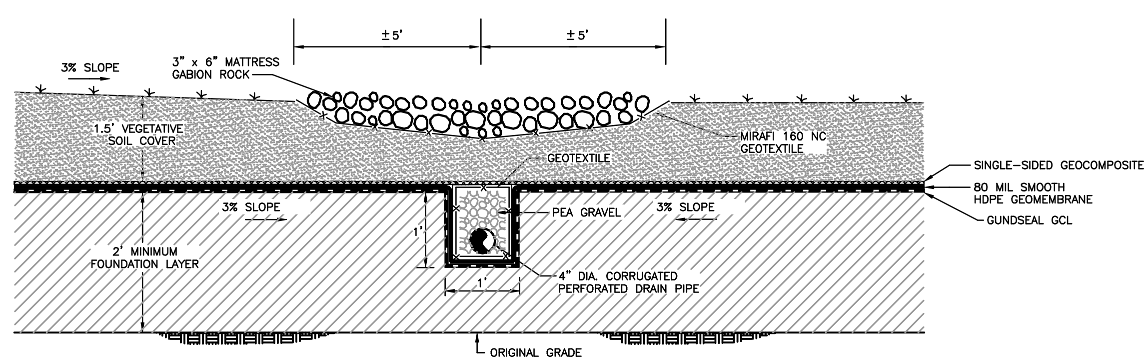
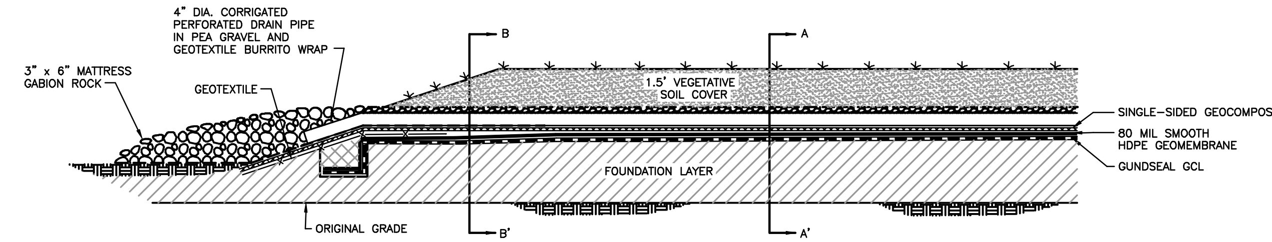
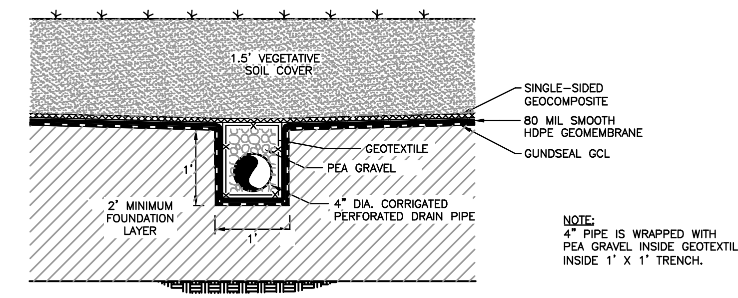


SECTION D/3
CENTRAL DRAINAGE

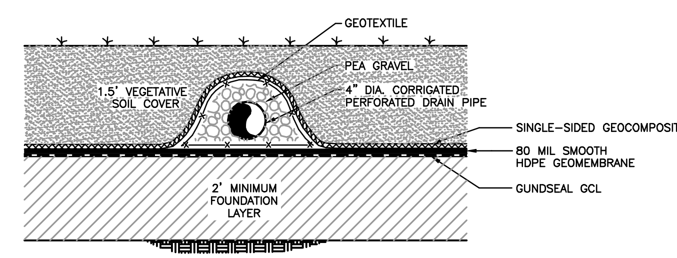


SECTION E/3



NOTE:
4" PIPE IS WRAPPED WITH PEA GRAVEL INSIDE GEOTEXTILE, INSIDE 1' X 1' TRENCH.

SECTION A–A'



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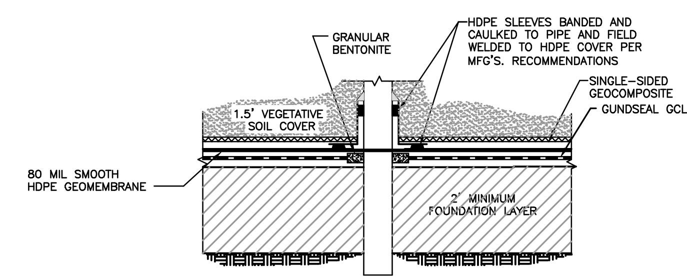


SECTION F/3
HDPE PIPE BOOT

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IT CORPORATION

DEPARTMENT OF THE NAVY
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

CLOSURE COVER SECTIONS AND DETAILS
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

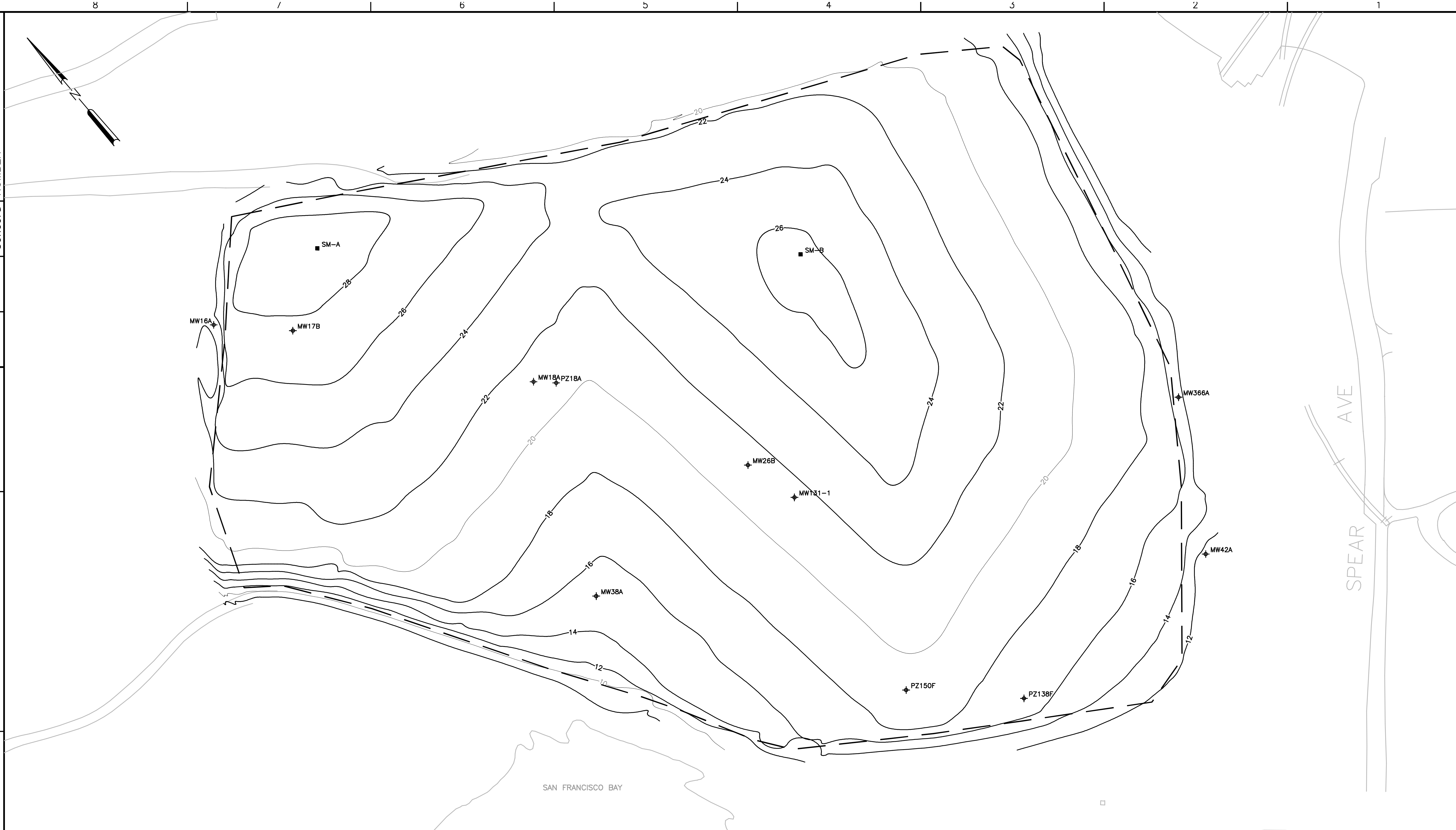
DESIGNED BY	D. Hullings	12/18/00	CHECKED BY	
DRAWN BY	R. Bricker	4/25/01	APPROVED BY	
SCALE: NOT TO SCALE	DRAWING NO. 812575–D4	FIGURE NO. 6	REVISION NO. 0	

DRAWING NUMBER 812575–D4 | OFFICE Concord | X–REF --- | IMAGE ---

VERIFY SCALE 0 1"

FORMAT REVISION 2/26/99

IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	Concord	812575-D11



VERIFY SCALE 0 1"

LEGEND

FINAL TOPOGRAPHY

ANCHOR TRENCH

MONITORING WELL MW38A

SETTLEMENT MARKER SM-A

SCALE IN FEET 0 50 100

REFERENCE:

FINAL TOPOGRAPHY SURVEYED BY FORESITE ENGINEERING, 2001

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IT CORPORATION

DEPARTMENT OF THE NAVY
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

FINAL TOPOGRAPHY

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DESIGNED BY	D. Hullings	12/18/00	CHECKED BY	
DRAWN BY	R. Bricker	5/3/01	APPROVED BY	

SCALE:	DRAWING NO.	FIGURE NO.	REVISION NO.
AS SHOWN	812575-D11	7	0

FORMAT REVISION 2/26/99

TABLES

Table 1
Hunters Point Parcel E Landfill Cap Monitoring Well Location Data

Well ID	Northing (feet)	Easting (feet)	Elevation (feet)
MW60-1	450982.5	1457653	14.69
MW17B	451697	1457522	29.95
MW16A	451755	1457458	23.85
MW18A	451490	1457688	22.94
PZ18A	451474	1457707	22.34
MW38A	451297	1457594	17.30
MW26B	451274	1457813	23.39
MW131-1	451215	1457828	23.78
PZ150F	450976	1457792	21.27
PZ138F	450889	1457887	18.76
MW42A	450888	1458138	14.03
MW366A	451038	1458221	16.74

[NOTE: Shaded numbers will change with the final survey—that's why they are shaded]

Table 2
Hunters Point Parcel E Landfill Cap Debris Removal
Summary of Removed Debris Quantities

Date	Truck Loads of Debris Removed			
	Burn Debris Vegetation	Burn Debris Soil	Burn Debris RxR Ties	Concrete Rubble
11/30/00	6	—	—	14
12/01/00	—	16	5	9
12/04/00	—	28	—	—
12/05/00	—	9	—	—
12/06/00	—	1	—	—
Total Loads Removed	**6**	**54**	**5**	**23**

TABLE 3
Hunters Point Parcel E Landfill Cap
Foundation Approval
Summary of Unconfined Compressive Strength Tests

Sample Number	Test Location			Test Location	Unconfined Compressive Strength (tsf)			Moisture Content	Wet Density	Retest Information
	Northing (ft)	Easting (ft)	Elevation (ft)		Actual	Criteria	P/F	(%)	(pcf)	
HP 092100-UC01	451065.7	1457972.9	14.3	S'ly End	0.7	1.0	F	8.8	110.6	NA
HP 092100-UC02	451190.6	1457859.2	16.8	S'ly End	1.2	1.0	P	14.8	123.4	NA
HP 092100-UC03	451449.8	1457601.5	16.6	S'ly End	NA	1.0	NA	NA	NA	Untestable
HP 092100-UC04	451605.9	1457336.3	18.1	S'ly End	NA	1.0	NA	NA	NA	Untestable
HP 092100-UC05	451781.6	1457540.7	22.0	S'ly End	NA	1.0	NA	NA	NA	Untestable
HP 092300-UC01	451065.7	1457972.9	14.3	S'ly End	1.7	1.0	P	24.3	129.3	Re-test of Sample No. HP 092100-UC01
HP 092300-UC02	451395.3	1457820.5	16.8	S'ly End	NA	1.0	NA	NA	NA	Untestable
HP 092800-UC01	451713.5	1457573.5	23.3	N'ly End	1.5	1.0	P	17.2	129.6	NA
HP 092800-UC02	451540.7	1457421.5	19.2	N'ly End	3.1	1.0	P	12.0	143.0	NA
HP 092800-UC03	451426.2	1457721.4	15.7	S'ly End	1.4	1.0	P	16.7	135.3	NA
HP 092900-UC01	451106.5	1457728.3	14.2	S'ly End	0.4	1.0	F	13.7	133.0	NA
HP 092900-UC02	451537.3	1457917.9	14.7	S'ly End	2.7	1.0	P	10.3	136.2	NA
HP 092900-UC03	450944.5	1457928.6	19.4	S'ly End	4.6	1.0	P	10.4	121.1	NA
HP 100200-UC01	451089.8	1457792.0	15.6	S'ly End	1.3	1.0	P	14.5	134.1	NA
HP 100200-UC02	450984.0	1458037.7	14.9	S'ly End	3.7	1.0	P	9.2	138.9	NA
HP 100200-UC03	451360.3	1458121.0	19.8	S'ly End	1.5	1.0	P	13.8	137.7	NA
HP 100200-UC04	451344.8	1457628.7	14.6	N'ly End	1.5	1.0	P	12.4	135.9	NA
HP 100200-UC05	451501.2	1457466.7	19.9	N'ly End	2.2	1.0	P	12.1	135.5	NA
HP 100200-UC06	451723.3	1457568.4	24.9	N'ly End	2.5	1.0	P	13.7	137.3	NA
HP 100300-UC01	451168.1	1457780.3	16.6	N'ly End	1.9	1.0	P	12.3	138.1	NA
HP 100300-UC02	451358.8	1457592.0	15.4	S'ly End	2.6	1.0	P	13.5	126.2	NA
HP 100400-UC01	451401.5	1457769.2	18.5	S'ly End	1.4	1.0	P	13.1	136.9	NA
HP 100400-UC02	451534.9	1457720.5	20.3	N'ly End	0.7	1.0	F	14.8	127.7	NA
HP 100600-UC01	451476.9	1457555.0	19.3	N'ly End	4.8	1.0	P	13.3	135.7	NA
HP 100600-UC02	451615.2	1457545.0	23.3	N'ly End	2.7	1.0	P	13.5	134.5	NA
HP 100600-UC03	451639.6	1457660.8	21.0	N'ly End	NA	1.0	NA	NA	NA	Untestable due to bent Shelby tube
HP 100600-UC04	451438.6	1457795.1	19.4	S'ly End	1.6	1.0	P	12.0	134.7	NA
HP 100600-UC05	451266.4	1457844.5	18.8	S'ly End	2.7	1.0	P	8.7	134.2	NA
HP 101000-UC01	451639.6	1457660.8	21.0	N'ly End	5.0	1.0	P	7.4	133.9	Re-test of Sample No. HP 100600-UC03
HP 101200-UC01	450992.0	1457927.2	16.1	S'ly End	1.6	1.0	P	13.6	129.6	NA
HP 101200-UC02	451013.1	1458047.4	15.9	S'ly End	1.5	1.0	P	14.7	137.3	NA
HP 101200-UC03	451358.5	1457760.2	17.8	S'ly End	0.9	1.0	F	14.6	137.4	NA
HP 101700-UC01	451170.4	1458159.0	18.2	S'ly End	1.8	1.0	P	14.2	140.6	NA
HP 101700-UC02	451362.4	1458182.1	18.5	S'ly End	3.5	1.0	P	9.2	126.3	NA
HP 101700-UC03	451682.1	1457751.5	23.5	N'ly End	1.6	1.0	P	9.6	119.5	NA
HP 101700-UC04	451534.9	1457720.5	20.3	N'ly End	1.8	1.0	P	14.2	140.6	Re-test of Sample No. HP 100400-UC02
HP 101700-UC05	451358.5	1457760.2	17.8	S'ly End	1.0	1.0	P	12.9	135.0	Re-test of Sample No. HP 101200-UC03
HP 101900-UC01	451106.5	1457728.3	14.2	N'ly End	1.5	1.0	P	8.7	124.9	Re-test of Sample No. HP 092900-UC01
HP 111300-UC01	451139.0	1458173.0	17.9	S'ly End	1.7	1.0	P	9.6	124.9	NA
HP 111300-UC02	450980.6	1458023.0	16.3	S'ly End	6.2	1.0	P	13.4	132.9	NA

Table 4
Hunters Point Parcel E Landfill Cap Foundation Approval
Summary of Hydraulic Conductivity Tests

Sample Date	Sample Number	Test Location			Test Location	Hydraulic Conductivity* k (cm/sec) ASTM 5084
		Northing (feet)	Easting (feet)	Elevation (feet)		
10/23/00	HP-102300-UC01	451681.7	1457717.2	24.7	N'ly End	2.19E-07
11/06/00	HP-110600-UC02	451410.3	1457464.0	17.7	N'ly End	2.70E-05
11/09/00	HP-110900-UC03	450994.7	1457779.0	17.2	S'ly End	2.53E-07
11/09/00	HP-110900-UC04	451046.7	1458118.0	17.4	S'ly End	1.49E-07
11/09/00	HP-110900-UC05	451423.3	1458063.0	22.8	S'ly End	9.84E-08

**Samples were taken at final grade of foundation layer*

Table 5
Material Quantity Summary**

		Geosynthetic Clay Liner		80-Mil HDPE		Geocomposite		Geotextile
Landfill Areas	**Required Cover**	**Non-reinforced**	**Reinforced**	**Smooth**	**Textured**	**Single-sided**	**Double-sided**	**8 oz.**
3-8%	A	611,388	29,250	608,895	0	592,340	0	0
>8%	B	0	0	0	19,802	0	31,050	0
All*	A/B	0	0	0	0	28,660	0	33,600
Totals		**611,388**	**29,250**	**608,895**	**19,802**	**621,000**	**31,050**	**33,600**

***Areas of application included perimeter at anchor trench and central drainage*

****All quantities are in square feet.*

Table 6
Hunters Point Parcel E Landfill Cap Material Receiving Summary
GundSeal® GCL

Date of Delivery	Delivery Slip No.	Certifications Received	GundSeal® (HDPE used as backing) Quantity (ft²)	Conformance Sample	GCL Roll No.	HDPE Roll No.	HDPE Lot No.	Bentonite Mass/Area	Bentonite Swell Index	Thickness	Tensile Strength & Elongation	Puncture Resistance	Tear Resistance	Comments
								P / F						
09/28/00	3248	Y	34,895	21035323	21035323	104102704	7131265	P	P	P	P	P	P	
09/28/00	3255	Y	34,615	—	—	—	—	—	—	—	—	—	—	
09/29/00	3254	Y	34,930	—	—	—	—	—	—	—	—	—	—	
09/29/00	3247	Y	35,000	—	—	—	—	—	—	—	—	—	—	
09/29/00	3256	Y	35,000	21035411	21035411	104106859	7101043	P	P	P	P	P	P	
10/02/00	3259	Y	34,930	21035400	21035400	104106869	7101043	P	P	P	P	P	P	
10/02/00	3258	Y	36,750	—	—	—	—	—	—	—	—	—	—	
10/02/00	3257	Y	35,875	—	—	—	—	—	—	—	—	—	—	
10/02/00	3260	Y	34,685	—	—	—	—	—	—	—	—	—	—	
10/03/00	3262	Y	35,000	—	—	—	—	—	—	—	—	—	—	
10/04/00	3264	Y	34,475	—	—	—	—	—	—	—	—	—	—	
10/05/00	3267	Y	34,335	21035426	21035426	104106868	7101043	P	P	P	P	P	P	
10/05/00	3263	Y	34,580	—	—	—	—	—	—	—	—	—	—	
10/05/00	3265	Y	34,930	21035274*	21035274	104105984	7100711	P	P	P	F/P	P	P	Retested, Passed 10/25/00
10/05/00	3266	Y	34,580	21035443	21035443	104106856	7101043	P	P	P	P	P	P	
10/06/00	3507	Y	35,735	—	—	—	—	—	—	—	—	—	—	
10/09/00	3506	Y	35,000	21035431	21035431	104106867	7101043	P	P	P	P	P	P	
10/09/00	3508	Y	33,915	21035423*	21035423	104106868	7101043	P	P	P	F/P	P	P	Retested, Passed 10/31/00
		Totals	**629,230**	**8**										

** Sample failed while testing the HDPE for the elongation at break in the machine direction (MD).*

Table 7
Hunters Point Parcel E Landfill Cap Material Receiving Summary
Bentomat ST® GCL

Date of Delivery	Delivery Slip No.	Certifications Received	Bentomat ST® GC				Mentonite Mass/Area	Bentonite Swell Index	Comments
			Quantity (ft2)	Conformance Sample	Roll No.	Lot No.	P / F		
11/16/00	3542	Y	18,000	7279-081500-11	7279	200031LO	P	P	Lot numbers of the conformance samples represent those that were used at the Hunters Point Parcel E Landfill cap. Samples were previously taken at IT Panoche Landfill site.
11/17/00	3558	Y	33,750	6692-072800-2	6292	200030LO	P	P	
		Totals	**51,750**	**2**					

Table 8
Hunters Point Parcel E Landfill Cap Material Receiving Summary
80-Mil HDPE Liner

Date of Delivery	Delivery Slip No.	Certifications Received	30-Mil HDPE (Smooth / Textured)				Thickness	Tensile Strength & Elongation	Puncture Resistance	Tear Resistance
			Quantity (ft²)	Conformance Sample	Roll No.	Lot No.	P / F			
09/27/00	4079	Y	99,539	—	*106104659	7101070	—	—	—	—
09/27/00	4414	Y	110,400	106104658	*106104658	7101070	P	P	P	P
09/27/00	3755	Y	110,400	106104635	*106104635	7101070	P	P	P	P
09/28/00	5155	Y	93,669	HP-092800-HDPET02	t105104416	7100283	P	P	P	P
09/28/00	5155	Y	—	HP-092800-HDPES01	*106104676	7101061	P	P	P	P
09/28/00	7669	Y	110,400	106104680	*106104680	7101061	P	P	P	P
09/28/00	7669	Y	—	106104687	*106104687	7101061	P	P	P	P
09/29/00	4223	Y	110,400	106104699	*106104699	7101061	P	P	P	P
10/06/00	4860 A	Y	11,040	—	*106104701	7101061	—	—	—	—
11/18/00	3427	Y	48,357	105105637	**105105637	7100714	P	P	P	P
		Totals	**694,205**	**8**						

** Smooth Black HDPE*
*** Smooth Black / White HDPE*
t Textured Black / White HDPE

Table 9
Hunters Point Parcel E Landfill Cap Material Receiving Summary
Geocomposite

Date of Delivery	Delivery Slip No.	Certifications Received	Geocomposite				Thickness	Density	Transmissivity
			Quantity (ft²)	Conformance Sample	Roll No.	Lot No.	P / F		
09/29/00	1121	Y	84,000	111123990	111123990	B50935	P	P	P
09/29/00	1136	Y	84,000	111124051	111124051	B50935	—	—	—
09/29/00	1136	Y		111124050	111124050	B50935	P	P	P
09/29/00	7001B	Y	84,000	111124040	111124040	B50935	—	—	—
09/29/00	7001B	Y		111124108	111124108	B50935	P	P	P
10/02/00	TP-7006B	Y	81,424	111124119	111124119	B50935	—	—	—
10/02/00	TP-7006B	Y		111124329	111124329	B50933	P	P	P
10/05/00	2382	Y	80,220	111124317	111124317	B50933	—	—	—
10/05/00	2382	Y		111124339	111124339	B50933	—	—	—
10/05/00	2382	Y		111124335	111124335	B50933	P	P	P
10/05/00	2382	Y		111124328	111124328	B50933	P	P	P
10/06/00	1150	Y	84,000	111124286	111124286	B50933	—	—	—
10/06/00	1150	Y		111124349	111124349	B50933	—	—	—
10/06/00	1143	Y	64,120	111124332	111124332	B50933	—	—	—
10/06/00	1143	Y		111124086	111124086	B50935	—	—	—
10/06/00	7013	Y	84,000	111124079	111124079	B50935	P	P	P
10/06/00	7013	Y		111125386**	111125386	B50939	—	—	—
11/18/00	3427	Y	51,800	111124444	111124444	B50933	P	P	P
		Totals	**697,564**	**8**					

**Number refers to quantity of all rolls listed on that delivery slip*
***Fabrinet, all others listed are Fabricap w/SI 651 - 6 oz.*

Table 10
Hunters Point Parcel E Landfill Cap Material Receiving Summary
Geotextile

Date of Delivery	Delivery Slip No.	Certifications Received	Geotextile (Mirafi 180N - 8 oz.)				Mass/Unit Area	Thickness	Grab Tensile Strength	Elongation at Break	Trapezoidal Tear	Mullen Burst Strength	Equivalent Opening Size
			Quantity (ft2)	Conformance Sample	Roll No.	Lot No.	P / F						
10/21/00	39163	Y	9000	10092076	10092076	11096E	P	P	P	P	P	P	P
10/25/00	39320	Y	40500	—	—	—	—	—	—	—	—	—	—
		Totals	**49,500**	**1**									

Table 11
Hunters Point Parcel E Landfill Cap Vegetative Soil Cover Approval
Summary of Plasticity Index Tests Results

Sample Date	Sample Number	Sample Information		Plasticity Index	Soil Description
		Soil Source	Sample Location		
10/02/00	HP-DD Fremont-SA01	Alameda Creek, Fremont	At Source	9.2	Brown Clayey Sandy Silt
10/02/00	HP-100200-Fremont	Alameda Creek, Fremont	NW Stockpile, Parcel E	6.9	Gray Brown Clayey Sand (Silt)
11/30/00	HP-113000-OAK01	3rd & Oak St., Oakland	SE Stockpile, Parcel E	NP	Gray Brown Clayey Silty Sand
12/01/00	HP-120100-FR01	Alameda Creek, Fremont	SE Stockpile, Parcel E	4	Gray Brown Clayey Silty Sand
12/04/00	HP-120400-SB01	Bart, San Bruno	San Bruno Excavation	NP	Olive Brown Silty Sand
12/04/00	HP-120400-SB02	Bart, San Bruno	San Bruno Excavation	3	Light Brown Silty Sand
12/13/00	HP-121300-Moscone01	Moscone Ctr. Excavation	Stockpile at Specialty Crushing	NP	Light Brown Silty Sand
12/14/00	HP-121400-MC01	Moscone Ctr. Excavation	End Dump Pile, Parcel E	NP	Yellow Brown Sandy Silty
12/18/00	HP-121800-LQ01	Leona Quarry, Oakland	Stockpile at Leona Quarry	NP	Orange Brown Silty Sand
12/21/00	HP-122100-SB01	Bart, San Bruno	End Dump Pile, Parcel E	10	Olive Brown Clayey Sand
01/03/01	HP-010301-LQ01	Leona Quarry, Oakland	End Dump Pile, Parcel E	NP	Yellow Brown Silty Sand w/ trace Gravel
01/04/01	HP-010401-SS01	16th Street	End Dump Pile, Parcel E	16	Brown Clayey Sand
01/18/01	HP-011801-MP1	Menlo Park	At Source	14	Dark Brown Sandy Clay w/ trace Gravel
01/18/01	HP-011801-MP2	Menlo Park	End Dump Pile, Parcel E	17	Light Brown Sandy Clay/Clayey Sand w/ Silt
01/19/01	HP-0119-SF1	16th Street	End Dump Pile, Parcel E	NP	Brown Sand w/ Silt
02/01/01	HP-020101-SF1	16th Street	End Dump Pile, Parcel E	NP	Brown Sand w/ Clay
02/05/01	HP-020501-MP1	Menlo Park	End Dump Pile, Parcel E	NP	Silty Sand
03/10/01	HP-031001-FR01	Alameda Creek, Fremont	SE Stockpile, Parcel E	8.5	Gray Brown Silty Sand with Organics
03/10/01	HP-031001-FR02	Alameda Creek, Fremont	End Dump Pile, Parcel E	8	Gray Clayey Sand with Silt
03/14/01	HP-031401-FR01	Alameda Creek, Fremont	End Dump Pile, Parcel E	7.4	Brown Silty Sand
03/29/01	HP-032901-FR01	Alameda Creek, Fremont	SE Veg. Cover Excavation	7	Light Brown Silty Sand

NP = Non-plastic

Table 12
Hunters Point Parcel E Landfill Cap Vegetative Soil Cover Thickness Verification

Initial Survey				Final Survey				Cover Thickness (feet)
Point ID	Northing (feet)	Easting (feet)	Elevation (feet MSL)	Point ID	Northing (feet)	Easting (feet)	Elevation (feet MSL)	

APPENDIX A
TECHNICAL SPECIFICATIONS
HUNTERS POINT SHIPYARD PARCEL E LANDFILL CAP CONSTRUCTION

Complete Appendix A is provided on CD-ROM #2 of this submittal

APPENDIX B
FIELD ACTIVITY DAILY LOGS: RESIDENT ENGINEER

Complete Appendix B is provided on CD-ROM #2 of this submittal

APPENDIX C
FIELD ACTIVITY DAILY LOGS: FIELD QUALITY CONTROL INSPECTOR

Complete Appendix C is provided on CD-ROM #2 of this submittal

APPENDIX D
MATERIAL CERTIFICATIONS

Complete Appendix D is provided on CD-ROM #2 of this submittal

APPENDIX E
CONFORMANCE TEST DATA

Complete Appendix E is provided on CD-ROM #2 of this submittal

APPENDIX F
SAMPLE COLLECTION LOGS

Complete Appendix F is provided on CD-ROM #2 of this submittal

APPENDIX G
CHAIN-OF-CUSTODY FORMS

Complete Appendix G is provided on CD-ROM #2 of this submittal

APPENDIX H
MATERIAL RECEIVING INSPECTION LOGS

Complete Appendix H is provided on CD-ROM #2 of this submittal

APPENDIX I
FOUNDATION SUBGRADE APPROVAL FORMS

Complete Appendix I is provided on CD-ROM #2 of this submittal

APPENDIX J
GEOSYNTHETIC DEPLOYMENT LOGS

Complete Appendix J is provided on CD-ROM #2 of this submittal

APPENDIX K
MEMORANDUMS

Complete Appendix K is provided on CD-ROM #2 of this submittal

APPENDIX L
HDPE GEOMEMBRANE SEAMING LOGS

Complete Appendix L is provided on CD-ROM #2 of this submittal

APPENDIX M
FIELD DESTRUCTIVE SAMPLE TEST RESULTS

Complete Appendix M is provided on CD-ROM #2 of this submittal

APPENDIX N
DAILY START-UP WELDS

Complete Appendix N is provided on CD-ROM #2 of this submittal

APPENDIX O
FIELD TESTING LOGS

Complete Appendix O is provided on CD-ROM #2 of this submittal

APPENDIX P
CONSTRUCTION INSPECTION FOR THE GEOCOMPOSITE LAYER

Complete Appendix P is provided on CD-ROM #2 of this submittal

APPENDIX Q
CONSTRUCTION INSPECTION FOR THE VEGETATIVE SOIL COVER

Complete Appendix Q is provided on CD-ROM #2 of this submittal

APPENDIX R
PHOTO LOG

Complete Appendix R is provided on CD-ROM #2 of this submittal