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NAVAL STATION TREASURE ISLAND
HUNTERS POINT ANNEX
SAN FRANCISCO, CALIFORNIA

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
FIELD WORK AND ANALYSIS
PARCELS B, C, D, AND E

WORK PLAN

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1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC) received Contract Task Order (CTO) No. 0276 under CLEAN Contract N62474-88-D-5086 from the Department of the Navy, Western Division, Naval Facilities Engineering Command (WESTDIV) to provide consulting services for the remedial investigation/feasibility study (RI/FS) at Naval Station Treasure Island, Hunters Point Annex (HPA), in San Francisco, California. PRC has contracted Harding Lawson Associates (HLA) to provide assistance in the implementation of this CTO. The tasks will include: (1) implement RI sampling at Parcels B, C, D, and E, (2) provide sampling analysis, (3) perform waste management, (4) implement database management, (5) develop a data collection system proposal, and (6) provide project management for CTO No. 0276 tasks. This work will be performed jointly by PRC and HLA, as described in the text of this work plan.

This work plan presents the approach and assumptions used to implement this CTO. A cost estimate for the proposed activities is provided under separate cover.

1.1 BACKGROUND

The Navy is currently conducting a comprehensive RI/FS at HPA in accordance with state and federal regulations. Currently, RI/FS activities are being conducted at 20 installation restoration (IR) sites, which have been assembled into Operable Units (OUs) I, II, III, IV, Group 5, and Group 6. Group 5 and Group 6 are part of OU V. Site inspection (SI) activities were conducted at PA-16 and at 37 additional sites at HPA, including the underground utilities. This work was covered under CTO 0142. The original work plan for CTO 0142 was comprised in 3 volumes (volumes I, II, and III) (see Table I). Of these SI sites, 29 are scheduled for further work under this CTO with 8 sites recommended for no further action. The underground storage tank (UST) program (CTO 0153) has been proceeding concurrently with the extensive CTO 0142 field work. Under the UST program, 45 tanks have been removed or closed-in-place. 42 USTs will require additional RI field work, which is included in this CTO. The scale of work for this CTO is similar to all of our previous combined efforts at HPA.

The massive field work proposed for implementation in this CTO is necessary to accelerate the schedules at HPA, in order to produce the parcel-wide reports to aid in property transfer to the community. In addition, as a result of the previous field work, 4 large scale removal actions have been proposed, along with 20 small to medium removals or interim actions which will be proposed for 1994 implementation and that will require separate funding. Because of the undetermined nature of the final report format for this work, this CTO does not include report preparation.

The Navy has entered into a Federal Facilities Agreement (FFA) with the U.S. Environmental Protection Agency (EPA), the State of California Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB). The FFA contains restrictive deadlines for the completion of Summary of Findings Memoranda, RI reports, Public Health and Environment Evaluations (PHEE) reports, Draft Initial Screening of Alternatives (DISA) reports, FS reports, proposed plans, and Records of Decision. The schedules within this FFA are currently under negotiation to accommodate the proposed Base Realignment and Closure (BRAC) for HPA which calls for acceleration of the RI/FS process.

Negotiations are currently underway between the Navy, the City and County of San Francisco, and the regulatory agencies to reorganize HPA into parcels. The FA sites are currently within Parcels B, C, D, and E, as listed in Table 2.

1.2 PURPOSE

The purpose of the RI is to delineate the distribution of contaminants in soils and groundwater and evaluate site-specific hydrogeologic conditions to the extent needed for evaluating the need for remedial action and to select and design remedial actions. The results of this RI will be used to prepare parcel-specific RI/FS reports and also to evaluate the need for time-critical removal actions.

The scope of this CTO does not include air sampling and analysis, radiation investigation, and sampling and analysis of biota, which are covered by different CTOs.

2.0 TECHNICAL APPROACH

The technical approach presented herein is based on the scope required by CTO 0276 and an analysis of the results of the Parcels B and C SI investigations performed under CTO 0142. Since the SI results for Parcels D and E are still being evaluated, the scope for Parcels D and E are estimated to be similar in quantity to those for Parcels C and B, respectively. The tasks associated with this CTO are:

Task 1.0 Remedial Investigation of Parcel B

- 1.1 Implement Sampling
  - 1.1.1 Geophysical Survey
  - 1.1.2 Drilling, Boring, Sampling
  - 1.1.3 Exploratory Excavation
  - 1.1.4 Hydropunch/Geoprobe
  - 1.1.5 Mobile Field Lab/Immunoassay
  - 1.1.6 Aquifer Testing
- 1.2 Implement Sampling Analysis
  - 1.2.1 Sample Analysis
  - 1.2.2 Sample Tracking
  - 1.2.3 Data Validation
- 1.3 Implement Waste Management
- 1.4 Implement Database Management
  - 1.4.1 Data Collection/Input
  - 1.4.2 Data Analysis

Task 2.0 Remedial Investigation of Parcel C

- 2.1 Implement Sampling
  - 2.1.1 Geophysical Survey
  - 2.1.2 Drilling, Boring Sampling
  - 2.1.3 Exploratory Excavation
  - 2.1.4 Hydropunch/Geoprobe

2.1.5 Mobile Field Lab/Immunoassay

2.1.6 Aquifer Testing

2.2 Implement Sampling Analysis

2.2.1 Sample Analysis

2.2.2 Sample Tracking

2.2.3 Data Validation

2.3 Implement Waste Management

2.4 Implement Database Management

2.4.1 Data Collection/Input

2.4.2 Data Analysis

Task 3.0 Remedial Investigation of Parcel D

3.1 Implement Sampling

3.1.1 Geophysical Survey

3.1.2 Drilling, Boring Sampling

3.1.3 Exploratory Excavation

3.1.4 Hydropunch/Geoprobe

3.1.5 Mobile Field Lab/Immunoassay

3.1.6 Aquifer Testing

3.2 Implement Sampling Analysis

3.2.1 Sample Analysis

3.2.2 Sample Tracking

3.2.3 Data Validation

3.3 Implement Waste Management

3.4 Implement Database Management

3.4.1 Data Collection/Input

3 4.2 Data Analysis

Task 4.0 Remedial Investigation of Parcel E

4.1 Implement Sampling

4.1.1 Geophysical Survey

4.1.2 Drilling, Boring Sampling

4.1.3 Exploratory Excavation

4.1.4 Hydropunch, Geoprobe

4.1.5 Mobile Field Lab, Immunoassay

4.1.6 Aquifer Testing

4.2 Implement Sampling Analysis

4.2.1 Sample Analysis

4.2.2 Sample Tracking

4.2.3 Data Validation

4.3 Implement Waste Management

4.4 Implement Database Management

4.4.1 Data Collection/Input

4.4.2 Data Analysis

Task 5.0 Project Management for CTO 0276

Task 6.0 Negotiation Preparation (HLA)

Task 7.0 Data Collection System Proposal

2.1 TASK DESCRIPTIONS

This section describes the scope of services to be provided by PRC and HLA for each task.

2.1.1 Task 1.0 - Remedial Investigation of Parcel B

2.1.1.1 Task 1.1 - Implement Sampling

This task includes proposed RI work at three types of sites; 1) those PA sites investigated under CTO 0142 with further investigation proposed; 2) those UST sites previously investigated under Phases I and II which have been proposed for RI work; 3) any sites requiring additional field work to complete previous data gaps necessary to prepare a parcel-wide RI report. This proposed work has been presented to the regulatory agencies in a series of presentations with the field work documented in the

meeting summaries without a formal work plan review or approval. These recommendations were presented for Parcel B on July 27, 1993 and on October 12, 1993. Specific field activities include:

Task 1.1.1 - Geophysical Survey

The geophysical surveying subtask activities comprise the following:

- Geophysical surveying to clear borehole, well, piezometer, hydropunch boring, test pit, and exploratory excavation locations.

Task 1.1.2 - Drilling, Boring, Sampling Activities

The drilling, boring, and sampling activities under this subtask comprise the following:

- Preparation of quality assurance plan for activities specific to this phase of work and updating sampling and analysis plans for specific sites.
- Mobilization and preparation for drilling, well development, well sampling, test pit excavation, sanitary sewer sediment sampling, water level monitoring, and hydropunch/geoprobe, and exploratory boring.
- Concrete coring at drilling locations.
- Drilling of borings for soil sampling.
- Drilling and installation of groundwater monitoring wells.
- Development and three rounds of sampling of groundwater monitoring wells, installed in this phase or in CTO 0142.
- Excavation of test pits, excavation at storm drain catch basins, and sampling of soil.
- Sampling of sanitary sewer water.
- Surveying boring, well, and test pit locations.
- Two rounds of water level elevation monitoring on all monitoring wells installed in this phase or in the SI work in CTO 0142.

Task 1.1.3 - Exploratory Excavation

Exploratory excavation and clearance sampling were planned for the investigation of near-surface soil contamination, contingent upon regulatory approval. Because several issues, such as definition of exploratory excavation, plans to handle excavated soil, and the need for public notification, are yet to be resolved, this proposal includes "Plan 2" for characterizing near-surface soil contamination. The scope of this task includes drilling soil borings to a depth of 5 feet and sampling at depths of 6 inches and 5 feet to characterize the horizontal and vertical extent of near-surface soil contamination.

Task 1.1.4 - Hydropunch/Geoprobe

A hydropunch/geoprobe investigation will be performed to assess the distribution of chemicals in groundwater for the purpose of optimal placement of groundwater monitoring wells. The hydropunch/geoprobe locations will utilize two types of sampling strategies. The first strategy will be a series of linear transections, usually parallel to a building edge to intercept the edges of a suspect contaminant plume. The second will be a series of locations around a UST site to delineate the migration of suspected contamination. This activity will include drilling to the target depth using air rotary technique and pushing a hydropunch through the bottom of the boring to collect a representative groundwater sample from the underlying aquifer. Three soil samples per boring will also be collected to assess chemical distribution in the soil. One grab water sample per hydropunch boring will be collected.

Task 1.1.5 - Mobile Field Lab/Immunoassay

The original scope of this task included the performance of immunoassay analysis during exploratory excavation and field laboratory analysis of groundwater samples collected through hydropunch.

Because regulatory approval to excavate has not been obtained to date, exploratory borings and laboratory analysis of soil samples have been proposed as a substitute for excavation in Task 1.1.3. Therefore, the scope for immunoassay analysis is not included in this task. The scope of this task

now includes only the analysis of groundwater samples from hydropunch borings using a selected laboratory. Results will be obtained on a 48-hour expedited turn-around-time.

Task 1.1.6 - Aquifer Testing

Aquifer tests will be performed to estimate the hydraulic properties, primarily aquifer transmissivity and hydraulic conductivity, of the aquifer. Two different types of aquifer tests are proposed; slug tests of short duration on all wells installed under CTO 0276 and constant-rate discharge tests on selected wells. Whereas the slug tests yield the hydraulic properties of the aquifer only in a zone within a short distance from the well screen, constant-rate discharge tests yield the properties of a larger aquifer domain. The results of constant-rate discharge tests better represent the true properties of the aquifer. The scope of this task includes:

- Mobilization and preparation for slug tests and constant-rate discharge tests.
- Performance of slug tests on all groundwater monitoring wells installed under this CTO and the wells installed under the SI program under CTO 0142.
- Installation, development, and surveying of two piezometers, to be used as observation wells, for each of the constant-rate discharge tests. The steps of a constant-rate discharge tests are: (1) background fluctuation test; (2) step drawdown test; and (3) constant-rate test.
- Analysis of slug test and constant-rate discharge test data.

The purpose of background fluctuation testing is to quantify the fluctuation in water-level elevations in the test well and intended observation wells to accurately determine the changes in water-level elevation that result from pumping. Background fluctuation testing will be performed within 48 hours of step drawdown testing.

Step drawdown testing will be performed to estimate the sustainable yield from each test well. This information will be used to determine the pumping rate for the constant-rate tests.

Constant-rate tests will be performed on selected wells. Data from these tests will be analyzed using appropriate methods to estimate transmissivity, storage coefficient, leakage factor, and to assess the presence of hydraulic boundaries in the aquifer. The results of aquifer testing will be incorporated in respective RI reports.

2.1.1.2 Task 1.2 - Implement Sampling Analysis

All samples will be analyzed in accordance with the RI Field Sampling and Analysis Plan (FSAP), the surrogate RI work plan and the QAPjP (HLA, 1988 and 1993). The number of environmental samples and QC samples for each analytical method has been summarized in Table 4 and 6. The number of samples may vary depending on field conditions encountered. PRC is responsible for laboratory analyses and data validation. The selected laboratory will have California state certification.

All field activities will be documented by the use of daily field logs, well completion forms, chain-of-custody forms, and sampling forms as detailed in the RI FSAP and the QAPjP.

Sample management and tracking will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database.

2.1.1.3 Task 1.3 - Implement Waste Management

The waste management subcontractor will visit the site two times per week to containerize and transport wastes to the central waste storage area as necessary, and maintain the decontamination pad and surrounding area. All wastes will be logged and tracked during these visits.

All liquid wastes will be collected in storage tanks located at the decontamination area. When full, or after completion of a phase of the project, the tank contents will be sampled and profiled for disposal.

Soil cuttings will be collected, containerized, and segregated according to site visual contamination, and volume. Where practical and cost efficient analytical results from sampling will be used to characterize the waste for disposal. If necessary, composite samples will be collected for profiling.

Sump sludge from the decontamination pad and used personal protective equipment (PPE) will be placed in drums when generated and stored in the central waste storage area. Sampling for profiling will be performed for disposal.

Sampling of the liquid wastes and sum solids to evaluate disposal/treatment options will be performed by the waste management contractor. The anticipated total volume of wastes that will be produced are summarized in Table 7. Non-hazardous solid wastes will be placed at the derived soil placement area and non-hazardous liquid wastes will be discharged to the sanitary sewer. Hazardous wastes will be disposed of at permitted waste disposal facilities. Weekly waste inspections will be performed of central waste storage areas and the decontamination area.

2.1.1.4 Task 1.4 - Implement Database Management

This task is divided into two subtasks, data collection/input and data analysis. Data Collection/Input includes management of field and laboratory data associated with soil and groundwater sampling and laboratory and data analysis entails interpretation of geologic and chemical data to provide information on the nature and extent of contamination in the investigated parcels.

Task 1.4.1 - Data Collection/Input

Data management will be conducted by HLA for the activities under HLA's supervision. Data can be divided into two primary categories: field activities, and laboratory and survey results.

All field activities will be documented through the use of daily field logs, well completion forms, chain of custody forms, and sampling forms as detailed in the Quality Assurance Project Plan (QAPjP).

Management and tracking of laboratory results will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database. HLA will also maintain survey and groundwater elevation data.

Task 1.4.2 - Data Analysis

Data collected during the RI will be interpreted under this task to develop information on geology and hydrogeology of the parcels and also to develop information on the nature and extent of contamination in Parcel B. The data will be tabulated and graphical representation of data, such as water level contour maps, geologic cross-sections, and chemical distribution maps, will be prepared, as appropriate.

2.1.2 Task 2.0 - Remedial Investigation of Parcel C

2.1.2.1 Task 2.1 - Implement Sampling

This task includes proposed RI work at three types of sites; 1) those PA sites investigated under CTO 0142 with further investigation proposed; 2) those UST sites previously investigated under Phases I and II which have been proposed for RI work; 3) any sites requiring additional field work to complete previous data gaps necessary to prepare a parcel-wide RI report. This proposed work has been presented to the regulatory agencies in a series of presentations with the field work documented in the meeting summaries without a formal work plan review or approval. These recommendations were

presented for Parcel C on August 31, 1993 and on October 12, 1993. Specific field activities include:

Task 2.1.1 - Geophysical Survey

The geophysical surveying subtask activities comprise the following:

- Geophysical surveying to clear borehole, well, piezometer, hydropunch boring, test pit, and exploratory excavation locations.

Task 2.1.2 - Drilling, Boring, Sampling Activities

The drilling, boring, and sampling activities under this subtask comprise the following:

- Preparation of quality assurance plan for activities specific to this phase of work and updating sampling and analysis plans for specific sites.
- Mobilization and preparation for drilling, well development, well sampling, test pit excavation, sanitary sewer sediment sampling, water level monitoring, and hydropunch/geoprobe, and exploratory boring.
- Concrete coring at drilling locations.
- Drilling of borings for soil sampling.
- Drilling and installation of groundwater monitoring wells.
- Development and three rounds sampling of groundwater monitoring wells installed in this phase or under CTO 0142.
- Excavation of test pit excavation at storm drain catch basins and sampling of soil.
- Sampling of sanitary sewer water.
- Surveying boring, well, and test pit locations.
- Two rounds of water level elevation monitoring on all monitoring wells installed in this phase or in the SI work in CTO 0142.

Task 2.1.3 - Exploratory Excavation

Exploratory excavation and clearance sampling were planned for the investigation of near-surface soil contamination, contingent upon regulatory approval. Because several issues, such as definition of exploratory excavation, plans to handle excavated soil, and the need for public notification, are yet unresolved, this proposal includes "Plan 2" for characterizing near-surface soil contamination. The scope of this task includes drilling soil borings to a depth of 5 feet and sampling at depths of 6 inches and 5 feet to characterize the horizontal and vertical extent of near-surface soil contamination.

Task 2.1.4 - Hydropunch/Geoprobe

A hydropunch/geoprobe investigation will be performed to assess the distribution of chemicals in groundwater for the purpose of optimal placement of groundwater monitoring wells. The hydropunch/geoprobe locations will utilize two types of sampling strategies. The first strategy will be a series of linear transections, usually parallel to a building edge to intercept the edges of a suspect contaminant plume. The second will be a series of locations around a UST site to delineate the migration of suspected contamination. This activity will include drilling to the target depth using air rotary technique and pushing a hydropunch through the bottom of the boring to collect a representative groundwater sample from the underlying aquifer. Three soil samples per boring will also be collected to assess chemical distribution in the soil. One grab water sample per hydropunch boring will be collected.

Task 2.1.5 - Mobile Field Lab/Immunoassay

The original scope of this task included the performance of immunoassay analysis during exploratory excavation and field laboratory analysis of groundwater samples collected through hydropunch.

Because regulatory approval to excavate has not been obtained to date, exploratory borings and laboratory analysis of soil samples have been proposed as a substitute for excavation in Task 1.1.3. Therefore, the scope for immunoassay analysis is not included in this task. The scope of this task now includes only the analysis of groundwater samples from hydropunch borings using a selected laboratory. Results will be obtained on a 48-hour expedited turn-around-time.

Task 2.1.6 - Aquifer Testing

Aquifer tests will be performed to estimate the hydraulic properties, primarily aquifer transmissivity and hydraulic conductivity, of the aquifer. Two different types of aquifer tests are proposed; slug tests of short duration on all wells installed under CTO 0276 and constant-rate discharge tests on selected wells. Whereas the slug tests yield the hydraulic properties of the aquifer only in a zone within a short distance from the well screen, constant-rate discharge tests yield the properties of a larger aquifer domain. The results of constant-rate discharge tests better represent the true properties of the aquifer. The scope of this task includes:

- Mobilization and preparation for slug tests and constant-rate discharge tests.
- Performance of slug tests on all groundwater monitoring wells installed under this CTO and the wells installed under the SI program under CTO 0142.
- Installation, development, and surveying of two piezometers, to be used as observation wells, for each of the constant-rate discharge tests. The steps of a constant-rate discharge tests are: (1) background fluctuation test; (2) step drawdown test; and (3) constant-rate test.
- Analysis of slug test and constant-rate discharge test data.

The purpose of background fluctuation testing is to quantify the fluctuation in water-level elevations in the test well and intended observation wells to accurately determine the changes in water-level elevation that result from pumping. Background fluctuation testing will be performed within 48 hours of step drawdown testing.

Step drawdown testing will be performed to estimate the sustainable yield from each test well. This information will be used to determine the pumping rate for the constant-rate tests.

Constant-rate tests will be performed on selected wells. Data from these tests will be analyzed using appropriate methods to estimate transmissivity, storage coefficient, leakage factor, and to assess the presence of hydraulic boundaries in the aquifer. The results of aquifer testing will be incorporated in respective RI reports.

2.1.2.2 Task 2.2 - Implement Sampling Analysis

All samples will be analyzed in accordance with the RI Field Sampling and Analysis Plan (FSAP), the surrogate RI work plan and the QAPjP (HLA, 1988 and 1993). The number of environmental samples and QC samples for each analytical method has been summarized in Table 4 and 6. The number of samples may vary depending on field conditions encountered. PRC is responsible for laboratory analyses and data validation.

All field activities will be documented by the use of daily field logs, well completion forms, chain-of-custody forms, and sampling forms as detailed in the RI FSAP and the QAPjP.

Sample management and tracking will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database.

2.1.2.3 Task 2.3 - Implement Waste Management

The waste management subcontractor will visit the site two times per week to containerize and transport wastes to the central waste storage area as necessary, and maintain the decontamination pad and surrounding area. All wastes will be logged and tracked during these visits.

All liquid wastes will be collected in storage tanks located at the decontamination area. When full, or after completion of a phase of the project, the tank contents will be sampled and profiled for disposal.

Soil cuttings will be collected, containerized, and segregated according to site visual contamination, and volume. Where practical and cost efficient analytical results from sampling will be used to characterize the waste for disposal. If necessary, composite samples will be collected for profiling.

Sump sludge from the decontamination pad and used personal protective equipment (PPE) will be placed in drums when generated and stored in the central waste storage area. Sampling for profiling will be performed for disposal.

Sampling of the liquid wastes and sum solids to evaluate disposal/treatment options will be performed by the waste management contractor. The anticipated total volume of wastes that will be produced are summarized in Table 7. Non-hazardous solid wastes will be placed at the derived soil placement area and non-hazardous liquid wastes will be discharged to the sanitary sewer. Hazardous wastes will be disposed of at permitted waste disposal facilities. Weekly waste inspections will be performed of central waste storage areas and the decontamination area.

2.1.2.4 Task 2.4 - Implement Database Management

This task is divided into two subtasks, data collection/input and data analysis. Data Collection/ Input includes management of field and laboratory data associated with soil and groundwater sampling and laboratory analysis and data analysis entails interpretation of geologic and chemical data to provide information on the nature and extent of contamination in the investigated parcels.

Task 2.4.1 - Data Collection/Input

Data management will be conducted by HLA for the activities under HLA's supervision. Data can be divided into two primary categories: field activities, and laboratory and survey results.

All field activities will be documented through the use of daily field logs, well completion forms, chain of custody forms, and sampling forms as detailed in the Quality Assurance Project Plan (QAPjP).

Management and tracking of laboratory results will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database. HLA will also maintain survey and groundwater elevation data.

Task 2.4.2 - Data Analyses

Data collected during the RI will be interpreted under this task to develop information on geology and hydrogeology of the parcels and also to develop information on the nature and extent of contamination in Parcel C. The data will be tabulated and graphical representation of data, such as water level contour maps, geologic cross-sections, and chemical distribution maps, will be prepared, as appropriate.

2.1.3 Task 3.0 - Remedial Investigation of Parcel D

2.1.3.1 Task 3.1 - Implement Sampling

This task includes proposed RI work at three types of sites; 1) those PA sites investigated under CTO 0142 with further investigation proposed; 2) those UST sites previously investigated under Phases I and II which have been proposed for RI work; 3) any sites requiring additional field work to complete previous data gaps necessary to prepare a parcel-wide RI report. This proposed work has been presented to the regulatory agencies in a series of presentations with the field work documented in the meeting summaries without a formal work plan review or approval. These recommendations were presented for Parcel D on November 2, 1993 and on November 19, 1993. Specific field activities include:

Task 3.1.1 - Geophysical Survey

The geophysical surveying subtask activities comprise the following:

- Geophysical surveying to clear borehole, well, piezometer, hydropunch boring, test pit, and exploratory excavation locations.

Task 3.1.2 - Drilling, Boring, Sampling Activities

The drilling, boring, and sampling activities under this subtask comprise the following:

- Preparation of quality assurance plan for activities specific to this phase of work and updating sampling and analysis plans for specific sites.
- Mobilization and preparation for drilling, well development, well sampling, test pit excavation, sanitary sewer sediment sampling, water level monitoring, and hydropunch/geoprobe and exploratory boring.
- Concrete coring at drilling locations.
- Drilling of borings for soil sampling.

- Drilling and installation of groundwater monitoring wells.
- Development and three rounds sampling of groundwater monitoring wells, installed in this phase or in CTO 0142.
- Excavation of test pits, excavation at storm drain catch basins, and sampling of soil.
- Sampling of sanitary sewer sediments water.
- Surveying boring, well, and test pit locations.
- Two rounds of water level elevation monitoring, on all monitoring wells installed in this phase or in the SI work in CTO 0142.

Task 3.1.3 - Exploratory Excavation

Exploratory excavation and clearance sampling were planned for the investigation of near-surface soil contamination, contingent upon regulatory approval. Because several issues, such as definition of exploratory excavation, plans to handle excavated soil, and the need for public notification, are yet to be resolved, this proposal includes "Plan 2" for characterizing near-surface soil contamination. The scope of this task includes drilling soil borings to a depth of 5 feet and sampling at depths of 6 inches and 5 feet to characterize the horizontal and vertical extent of near-surface soil contamination.

Task 3.1.4 - Hydropunch/Geoprobe

A hydropunch/geoprobe investigation will be performed to assess the distribution of chemicals in groundwater for the purpose of locating groundwater monitoring wells. The hydropunch/geoprobe locations will utilize two types of sampling strategies. The first will be a series of linear transects, usually parallel to a building edge to intercept the edges of a suspect contaminant plume. The second will be a series of locations around a UST site to delineate the migration of suspected contamination. This activity will include drilling to the target depth using air rotary technique and pushing a hydropunch through the bottom of the boring to collect representative groundwater sample from the underlying aquifer. Three soil samples per boring will also be collected to assess chemical distribution in the soil.

Task 3.1.5 - Mobile Field Lab/Immunoassay

The original scope of this task included the performance of immunoassay analysis during exploratory excavation and field laboratory analysis of groundwater samples collected through hydropunch.

Because regulatory approval to excavate has not been obtained to date, exploratory borings and laboratory analysis of soil samples have been proposed as a substitute for excavation in Task 1.1.3. Therefore, the scope for immunoassay analysis is not included in this task. The scope of this task now includes only the analysis of groundwater samples from hydropunch borings using a selected laboratory. Results will be obtained on a 48-hour expedited turn-around-time.

Task 3.1.6 - Aquifer Testing

Aquifer tests will be performed to estimate the hydraulic properties, primarily aquifer transmissivity and hydraulic conductivity, of the aquifer. Two different types of aquifer tests are proposed; slug tests of short duration on all wells installed under CTO 0276 and constant-rate discharge tests on selected wells. Whereas the slug tests yield the hydraulic properties of the aquifer only in a zone within a short distance from the well screen, constant-rate discharge tests yield the properties of a larger aquifer domain. The results of constant-rate discharge tests better represent the true properties of the aquifer. The scope of this task includes:

- Mobilization and preparation for slug tests and constant-rate discharge tests.
- Performance of slug tests on all groundwater monitoring wells installed under this CTO and the wells installed under the SI program under CTO 0142.
- Installation, development, and surveying of two piezometers, to be used as observation wells, for each of the constant-rate discharge tests. The steps of a constant-rate discharge tests are: (1) background fluctuation test; (2) step drawdown test; and (3) constant-rate test.
- Analysis of slug test and constant-rate discharge test data.

The purpose of background fluctuation testing is to quantify the fluctuation in water-level elevations in the test well and intended observation wells to accurately determine the changes in water-level elevation that result from pumping. Background fluctuation testing will be performed within 48 hours of step drawdown testing.

Step drawdown testing will be performed to estimate the sustainable yield from each test well. This information will be used to determine the pumping rate for the constant-rate tests.

Constant-rate tests will be performed on selected wells. Data from these tests will be analyzed using appropriate methods to estimate transmissivity, storage coefficient, leakage factor, and to assess the presence of hydraulic boundaries in the aquifer. The results of aquifer testing will be incorporated in respective RI reports.

2.1.3.2 Task 3.2 - Implement Sampling Analysis

All samples will be analyzed in accordance with the RI Work Plan and the QAPjP (HLA, 1988). The number of environmental samples and QC samples for each analytical method has been summarized in Table 3. The number of samples may vary depending on field conditions encountered. PRC is responsible for laboratory analyses and data validation. Data Management will be conducted by HLA for the activities under HLA's supervision. Data management can be divided into two primary categories: field activities and sample management and tracking.

All field activities will be documented by the use of daily field logs, well completion forms, chain-of-custody forms, and sampling forms as detailed in the RI Work Plan and the QAPjP.

Sample management and tracking will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC

samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database.

2.1.3.3 Task 3.3 - Implement Waste Management

The waste management subcontractor will visit the site two times per week to containerize and transport wastes to the central waste storage area as necessary, and maintain the decontamination pad and surrounding area. All wastes will be logged and tracked during these visits.

All liquid wastes will be collected in storage tanks located at the decontamination area. When full, or after completion of a phase of the project, the tank contents will be sampled and profiled for disposal.

Soil cuttings will be collected, containerized, and segregated according to site visual contamination, and volume. Where practical and cost efficient analytical results from sampling will be used to characterize the waste for disposal. If necessary, composite samples will be collected for profiling.

Sump sludge from the decontamination pad and used PPE will be placed in drums when generated and stored in the central waste storage area. Sampling for profiling will be performed for disposal.

Sampling of the liquid wastes and sum solids to evaluate disposal/treatment options will be performed by the waste management contractor. The anticipated total volume of wastes that will be produced are summarized in Table 7. Non-hazardous solid wastes will be placed at the derived soil placement area and non-hazardous liquid wastes will be discharged to the sanitary sewer. Hazardous wastes will be disposed of at permitted waste disposal facilities. Weekly waste inspections will be performed of central waste storage areas and the decontamination area.

2.1.3.4 Task 3.4 - Implement Database Management

This task is divided into two subtasks, data collection/input and data analysis. Data Collection/ Input includes management of field and laboratory data associated with soil and groundwater sampling and

laboratory analysis and data analysis entails interpretation of geologic and chemical data to provide information on the nature and extent of contamination in the investigated parcels.

Task 3.4.1 - Data Collection/Input

Data management will be conducted by HLA for the activities under HLA's supervision. Data can be divided into two primary categories: field activities, and laboratory and survey results.

All field activities will be documented through the use of daily field logs, well completion forms, chain of custody forms, and sampling forms as detailed in the Quality Assurance Project Plan (QAPjP).

Management and tracking of laboratory results will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database. HLA will also maintain survey and groundwater elevation data.

Task 3.4.2 - Data Analyses

Data collected during the RI will be interpreted under this task to develop information on geology and hydrogeology of the parcels and also to develop information on the nature and extent of contamination in Parcel D. The data will be tabulated and graphical representation of data, such as water level contour maps, geologic cross-sections, and chemical distribution maps, will be prepared, as appropriate.

2.1.4 Task 4.0 - Remedial Investigation of Parcel E

2.1.4.1 Task 4.1 - Implement Sampling

This task includes proposed RI work at three types of sites; 1) those PA sites investigated under CTO 0142 with further investigation proposed; 2) those UST sites previously investigated under Phases I and II which have been proposed for RI work; 3) any sites requiring additional field work to complete previous data gaps necessary to prepare a parcel-wide RI report. This proposed work has been presented to the regulatory agencies in a series of presentations with the field work documented in the meeting summaries without a formal work plan review or approval. These recommendations were presented for Parcel E on November 3, 1993. Another presentation is scheduled on December 16, 1993. Specific field activities include:

Task 4.1.1 - Geophysical Survey

The geophysical surveying subtask activities comprise the following:

- Geophysical surveying to clear borehole, well, piezometer, hydropunch boring, test pit, and exploratory excavation locations.

Task 4.1.2 - Drilling, Boring, Sampling Activities

The drilling, boring, and sampling activities under this subtask comprise the following:

- Preparation of quality assurance plan for activities specific to this phase of work and updating sampling and analysis plans for specific sites.
- Mobilization and preparation for drilling, well development, well sampling, test pit excavation, sanitary sewer sediment sampling, water level monitoring, and hydropunch/geoprobe, and exploratory boring.
- Concrete coring at drilling locations.
- Drilling of borings for soil sampling.

- Drilling and installation of groundwater monitoring wells.
- Development and three rounds sampling of groundwater monitoring wells, installed in this phase or in CTO 0142.
- Excavation of test pit, excavation at storm drain catch basins and sampling of soil.
- Sampling of sanitary sewer water.
- Surveying boring, well, and test pit locations.
- Two rounds of water level elevation monitoring on all monitoring wells installed in this phase or in the SI work in CTO 0142.

Task 4.1.3 - Exploratory Excavation

Exploratory excavation and clearance sampling were planned for the investigation of near-surface soil contamination, contingent upon regulatory approval. Because several issues, such as definition of exploratory excavation, plans to handle excavated soil, and the need for public notification, are yet to be resolved, this proposal includes "Plan 2" for characterizing near-surface soil contamination. The scope of this task includes drilling soil borings to a depth of 5 feet and sampling at depths of 6 inches and 5 feet to characterize the horizontal and vertical extent of near-surface soil contamination.

Task 4.1.4 - Hydropunch/Geoprobe

A hydropunch/geoprobe investigation will be performed to assess the distribution of chemicals in groundwater for the purpose of locating groundwater monitoring wells. The hydropunch/geoprobe locations will utilize two types of sampling strategies. The first will be a series of linear transects, usually parallel to a building edge to intercept the edges of a suspect contaminant plume. The second will be a series of locations around a UST site to delineate the migration of suspected contamination. This activity will include drilling to the target depth using air rotary technique and pushing a hydropunch through the bottom of the boring to collect representative groundwater samples from the underlying aquifer. Three soil samples per boring will also be collected to assess chemical distribution in the soil. One grab water sample per hydropunch boring will be collected.

Task 4.1.5 - Mobile Field Lab/Immunoassay

The original scope of this task included the performance of immunoassay analysis during exploratory excavation and field laboratory analysis of groundwater samples collected through hydropunch.

Because regulatory approval to excavate has not been obtained to date, exploratory borings and laboratory analysis of soil samples have been proposed as a substitute for excavation in Task 1.1.3. Therefore, the scope for immunoassay analysis is not included in this task. The scope of this task now includes only the analysis of groundwater samples from hydropunch borings using a selected laboratory. Results will be obtained on a 48-hour expedited turn-around-time.

Task 4.1.6 - Aquifer Testing

Aquifer tests will be performed to estimate the hydraulic properties, primarily aquifer transmissivity and hydraulic conductivity, of the aquifer. Two different types of aquifer tests are proposed; slug tests of short duration on all wells installed under CTO 0276 and constant-rate discharge tests on selected wells. Whereas the slug tests yield the hydraulic properties of the aquifer only in a zone within a short distance from the well screen, constant-rate discharge tests yield the properties of a larger aquifer domain. The results of constant-rate discharge tests better represent the true properties of the aquifer. The scope of this task includes:

- Mobilization and preparation for slug tests and constant-rate discharge tests.
- Performance of slug tests on all groundwater monitoring wells installed under this CTO and the wells installed under the SI program under CTO 0142.
- Installation, development, and surveying of two piezometers, to be used as observation wells, for each of the constant-rate discharge tests. The steps of a constant-rate discharge tests are: (1) background fluctuation test; (2) step drawdown test; and (3) constant-rate test.
- Analysis of slug test and constant-rate discharge test data.

The purpose of background fluctuation testing is to quantify the fluctuation in water-level elevations in the test well and intended observation wells to accurately determine the changes in water-level elevation that result from pumping. Background fluctuation testing will be performed within 48 hours of step drawdown testing.

Step drawdown testing will be performed to estimate the sustainable yield from each test well. This information will be used to determine the pumping rate for the constant-rate tests.

Constant-rate tests will be performed on selected wells. Data from these tests will be analyzed using appropriate methods to estimate transmissivity, storage coefficient, leakage factor, and to assess the presence of hydraulic boundaries in the aquifer. The results of aquifer testing will be incorporated in respective RI reports.

2.1.4.2 Task 4.2 - Implement Sampling Analysis

All samples will be analyzed in accordance with the RI Field Sampling and Analysis Plan (FSAP), the surrogate RI work plan and the QAPjP (HLA, 1988 and 1993). The number of environmental samples and QC samples for each analytical method has been summarized in Table 4 and 6. The number of samples may vary depending on field conditions encountered. PRC is responsible for laboratory analyses and data validation.

All field activities will be documented by the use of daily field logs, well completion forms, chain-of-custody forms, and sampling forms as detailed in the RI FSAP and the QAPjP.

Sample management and tracking will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database.

2.1.4.3 Task 4.3 - Implement Waste Management

The waste management subcontractor will visit the site two times per week to containerize and transport wastes to the central waste storage area as necessary, and maintain the decontamination pad and surrounding area. All wastes will be logged and tracked during these visits.

All liquid wastes will be collected in storage tanks located at the decontamination area. When full, or after completion of a phase of the project, the tank contents will be sampled and profiled for disposal.

Soil cuttings will be collected, containerized, and segregated according to site visual contamination, and volume. Where practical and cost efficient analytical results from sampling will be used to characterize the waste for disposal. If necessary, composite samples will be collected for profiling.

Sump sludge from the decontamination pad and used PPE will be placed in drums when generated and stored in the central waste storage area. Sampling for profiling will be performed for disposal.

Sampling of the liquid wastes and sum solids to evaluate disposal/treatment options will be performed by the waste management contractor. The anticipated total volume of wastes that will be produced are summarized in Table 7. Non-hazardous solid wastes will be placed at the derived soil placement area and non-hazardous liquid wastes will be discharged to the sanitary sewer. Hazardous wastes will be disposed of at permitted waste disposal facilities. Weekly waste inspections will be performed of central waste storage areas and the decontamination area.

2.1.4.4 Task 4.4 - Implement Database Management

This task is divided into two subtasks, data collection/input and data analysis. Data Collection/ Input includes management of field and laboratory data associated with soil and groundwater sampling and laboratory analysis and data analysis entails interpretation of geologic and chemical data to provide information on the nature and extent of contamination in the investigated parcels.

Task 4.4.1 - Data Collection/Input

Data management will be conducted by HLA for the activities under HLA's supervision. Data can be divided into two primary categories: field activities, and laboratory and survey results.

All field activities will be documented though the use of daily field logs, well completion forms, chain of custody forms, and sampling forms as detailed in the Quality Assurance project Plan (QAPjP).

Management and tracking of laboratory results will be performed jointly by HLA and PRC. HLA will prepare the sample identification and initial chain of custody documentation and will be responsible for the samples until receipt by PRC's courier or selected laboratory representative. PRC will perform all data validation activities including cursory and full validation, review of laboratory and field QC samples, qualifier assignment, and qualifier spreadsheet creation. Upon receipt, HLA will load the data and associated qualifiers into the database. HLA will also maintain survey and groundwater elevation data.

Task 4.4.2 - Data Analyses

Data collected during the RI will be interpreted under this task to develop information on geology and hydrogeology of the parcels and also to develop information on the nature and extent of contamination in Parcel E. The data will be tabulated and graphical representation of data, such as water level contour maps, geologic cross-sections, and chemical distribution maps, will be prepared, as appropriate.

2.1.5 Task 5.0 - Project Management for CTO 0276

Project management will consist of (1) technical duties such as coordination and oversight of the technical staff, (2) administrative duties such as document management, preparing monthly reports, budget tracking, scheduling, and general coordination and technical consultation among WESTDIV,

PRC, and HLA, (3) contracting tasks such as bid package preparation and contractor selection, and (4) attending project and regulatory agency meetings.

2.1.6 Task 6.0 - Negotiation Preparation

This work plan and cost estimate were prepared under this task. Pre-negotiations between PRC and HLA regarding the work scoped under this CTO, along with negotiations with the Navy and revisions to the work plan and cost estimate that include the results of the negotiations, will also be performed under this task.

2.1.7 Task 7.0 - Data Collection System Proposal

PRC will develop a proposal/technical memorandum that will outline the cost and level of effort needed to establish a Relational Database Management System (RDBMS) and Geographic Information System (GIS). The proposal will include an evaluation and comparison of available software to meet the Navy's requirements. It will also include the results of a cursory review and evaluation of HLA's database management systems to determine its integration potential with systems under consideration for HPA. As a subtask to this effort, PRC will determine if there is a sufficient amount of data available in a usable format to develop a state-of-the art presentation package for the Navy.

2.2 ASSUMPTIONS

This section discusses the assumptions used in preparing the cost proposal (attached) associated with this work plan. Modifications in scope may be required in response to site-specific conditions and regulatory agency direction. The specific assumptions used for each task are identified in the sections below. The general assumptions used in the preparation of this cost estimate and work plan are as follows:

- Geophysical methods used for clearing boring and trenching locations may not be able to locate terra cotta or clay pipes.

- Radiation sampling, if necessary, will be conducted by PRC, under CTO 0155.

- HLA will have full access to all locations.

- The general scope of work presented in Table 3 will meet the objectives of this CTO, which are to perform RI work at 29 IR and 42 UST sites. This field work is necessary to adequately characterize the sites to prepare parcel-wide RI reports.

- The scope in Table 3 does not address CTO 0268 potential sites.

- Elevation and coordinate locations will be surveyed by a California state licensed company, and the survey results will be received no later than 1 month following the completion of field activities.

- Coordinate locations will be surveyed and referenced to the California State Plane Coordinate System to an accuracy of plus or minus 1 foot. Boring and monitoring well ground surface elevations will be surveyed to an accuracy of 0.1 foot and referenced to the 1929 Mean Sea Level, National Geologic Vertical Datum (1958 adjustment). Monitoring well top-of-casing elevations will be surveyed to an accuracy of 0.01 foot.

- Two soil samples will be collected from each exploratory boring, one at 6 inches and the other at 4.50 feet.

- Three soil samples will be collected from hydropunch borings (0.50', 5.0', and at the water table) in Parcels B, D, and E.

- Four soil samples will be collected from each hydropunch boring (0.5', 5.0', 10.0', and 20.0') in Parcel C.

- Laboratory analysis of soil, groundwater, and sediment samples will be analyzed by methods identified in Table 4. Table 4 also identifies the number of samples, by matrix, by parcel. A typical analytical suite will consist of analysis for volatiles, semivolatiles, pesticide/PCBs, metals, total petroleum hydrocarbon (TPH) as gasoline, TPH as diesel, total recoverable petroleum hydrocarbon (TRPH), and pH.

- The turn-around-time for the laboratory data deliverables (hard-copy and electronic) will be 35 days after closing of a sample delivery group (SDG). A SDG is defined as a group of 20 or fewer samples received by the laboratory over a period of 14 days or less. For cost estimated purposes, the number of samples per SDG was calculated to be 15 samples.

- The selected laboratory will follow the technical provisions prescribed in the following documents: Contract Laboratory Program for Organics and Inorganic Analysis (EPA 1991), Test Methods for Evaluating Solid Wastes, 3rd Edition -SW-846 (EPA 1992), Leaking Underground Tank Field Manual (CA LUFT 1989), Methods for Chemical

Analysis of Water and Wastes (EPA 1983), and PRC Statement of Work (PRC 1993), as appropriate.

- Data validation will be performed according to the guidelines prescribed in the following documents: National Functional Guidelines for Organic Data Review (EPA 1991), Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (EPA 1988), and the HPA Quality Assurance Project Plan and Amendment (HLA 1988, 1993).

- Ten soil samples will be collected from each parcel and analyzed for leachability of contaminants (TCLP).

- Twenty samples from each parcel will be tested for physical parameters listed in Table 5. Dry bulk density testing will not be performed on samples from Parcel D and E.

- Implementation of the RI field work will commence within 15 working days after authorization to proceed is received. The schedule will be adjusted to reflect the date of authorization to proceed.

- PA sites in each parcel are listed in Table 2.

- PRC will provide 100 percent oversight of field activities and coordinate sample pick-up by the laboratory. For cost estimating purposes, this task will require two P2A for 10 hours per day for 9 months.

The estimated number of field quality assurance/quality water control samples included in Table 6 is based on the following assumptions:

- One trip blank for analysis of volatile organic compounds per day.

- Two equipment blanks per week of sampling for each test method.

- One field blank per 20 samples for each test method per sample event. Field blanks will be collected from each water source used for equipment decontamination.

- One duplicate groundwater sample per day of groundwater sampling per test method.

The subcontractors required for the implementation of the RI include a driller, surveyor, concrete corer, excavator, analytical laboratory, data validator, and physical testing laboratory. The cost estimates for the driller, surveyor, concrete corer, and excavator are based on costs provided by subcontractors under other CTOs. The analytical laboratory and data validation unit prices are based

on PRC's basic ordering agreement (BOA) weighted averages for option years 2 and 1, respectively. The cost for physical testing is based on the standard rate schedule from Solea Laboratory (Solea is a minority business enterprise [MBE]).

2.2.1 Task 1.0 - Remedial Investigation of Parcel B

2.2.1.1 Task 1.1 - Implement Sampling

The number of samples and analytical methods for Task 2 are summarized in Tables 3, 4, 5, and 6. The estimated waste volumes are summarized in Table 7.

Task 1.1.1 - Geophysical Survey

- All drilling and excavation locations will be cleared for underground utilities and buried objects by a HLA geophysical crew prior to intrusive activities. It may not be possible to locate all underground utilities.

Task 1.1.2 - Drilling, Boring, Sampling

- The QAPjP will be revised to include site-specific activities not already covered in the existing plan.
- Site-specific sampling and analysis plans will be prepared for each site, showing sample locations and required analytical program, prior to start of field work to coordinate the activities between HLA and PRC.
- All investigatively-derived waste will be contained by HLA for handling, inspection, and waste management by PRC, with the ultimate disposal by the Navy's representative.

Soil Borings

- Two shallow borings will be completed per day using a 10-inch-diameter ARCH or equivalent.
- This task will require only one mobilization by the drilling contractor.

- All borings inside buildings or under concrete pavement are assumed to require concrete coring up to a maximum of 2 feet deep at each location.

- All soil borings will be sealed with bentonite-cement grout or concrete.

- All soil cuttings will be contained and labeled by HLA; disposal will be the responsibility of PRC.

Monitoring Wells

- One and one-half monitoring wells will be installed per day using a 10-inch-diameter ARCH.

- All monitoring wells inside buildings and under concrete pads are assumed to require concrete coring.

- All soil cuttings from the installation of monitoring wells will be contained and labeled by HLA; disposal will be the responsibility of PRC.

- HLA will develop, purge, and sample all monitoring wells three times; water generated from the well development and purging will be pumped into the sump at the decontamination area; disposal will be the responsibility of PRC.

- The monitoring wells will be developed until 10 casing volumes are removed, the well runs dry, or the water becomes relatively clear, whichever occurs first.

Task 1.1.3 - Exploratory Excavation

- Exploratory excavation will be replaced by exploratory boring. Each boring will be 5 feet deep; two soil samples will be collected from each boring.

Task 1.1.4 - Hydropunch/Geoprobe

- Soil borings will be drilled to target depths and a hydropunch will be pushed through the bottom of the borehole to collect groundwater samples.

Task 1.1.5 - Mobile Field Lab/Immunoassay

- A California state certified laboratory will analyze groundwater samples collected through hydropunch by SW-486 methods 8010, 8020, 8270, and for TPH/Diesel (see Table 4).

- The analytical laboratory will analyze up to three water samples per day. Results will be obtained on a 48-hour turn-around-time. The hydropunch results will be used for optimal placement of monitoring wells.

Task 1.1.6 - Aquifer Testing

- Slug tests will be attempted in all wells installed under this CTO and the wells installed under the CTO 0142 SI program.

- It is assumed that all of the wells will recover to 85 percent of their original water level within 30 minutes of the beginning of the test and that five wells can be tested per day.

- Upon completion of the tests, the recovery data will be analyzed and the hydraulic conductivities of the aquifer materials will be estimated. Results of the slug testing will be used to prepare recommendations for aquifer testing.

- Background fluctuation testing will be performed for a period of 24 hours in four wells for each site.

- Step drawdown tests will include three steps of 2 hours each.

- The average flow rate for the constant-rate tests will not exceed 7.5 gallons per minute (gpm).

- The duration of the constant-rate tests will be 36 hours: 24 hours for pumpout and 12 hours for recovery.

- Aquifer testing data will be analyzed to refine the estimate of hydraulic properties of the aquifer at referenced sites. No report on aquifer testing will be produced under this CTO.

- For security reasons, two field personnel will be assigned to each measurement station of the pumping test.

2.2.1.2 Task 1.2 - Implement Sampling Analysis

The cost estimate for the sampling analysis task was based on the following:

- Laboratory cost was calculated using option year 2 weighted average unit prices.
- Laboratory analytical data will be provided in hard-copy and digital formats. The data will be reported and checked for accuracy against hard copies of the same data. It is assumed that the laboratory analytical data laboratories and the submittals will be 99 percent error free.
- Data evaluation includes evaluation of the analytical and hydrogeologic data for the RI sites. Storm drain/sanitary sewer/fuel distribution line/maps, water level contour maps, and graphical representations of analytical data will be prepared, as appropriate.
- Data validation cost was calculated using option year 1 weighted average unit price.
- A cursory validation will be performed on all of the laboratory analytic data following Level C QC guidelines. This cursory validation includes review of relative percent differences, percent recovery, holding times, and other sample documentation. Conventional Contract Laboratory Program (CLP) validation following Level D QC guidelines will be performed on a 10 percent of soil and ground water samples. This conventional CLP validation includes review of all laboratory documentation and analysis records, in particular calibrations, chromatograms, and mass spectra.

2.2.1.3 Task 1.3 - Implement Waste Management

The cost estimate for the waste management task was based on the following:

- Investigatively-derived waste produced during RI activities will be transported and disposed of at a permitted disposal facility. Waste types that will be produced include drill cuttings, groundwater produced during well development and sampling, decontamination liquids, sludges from the decontamination facility sump, and personal protective equipment. The estimated total quantities of each waste type that will be produced at each site are presented in Table 7.
- The actual disposal method will be required for each waste type cannot be determined until the wastes have been adequately characterized. The following assumptions have been made for the purpose of this cost estimate.

1. None of the groundwater and decontamination fluids will require disposal as hazardous waste. Except for sump sludge and drilling mud volumes, 50 percent of the remaining waste types will require disposal as hazardous. Sump sludge is assumed to be 100 percent hazardous.

2. Hazardous solid wastes will be transported by and disposed of at a Chemical Waste Management, Inc. (CWMI) Kettleman Hills facility.

3. All hazardous solids and liquids will be treated in bulk by chemical stabilization prior to disposal, except drummed PPE, which will be disposed as-is.

4. Density of solids is 1.3 tons/cy.

5. Waste streams from individual OUs will be transported together where feasible. Drummed PPE will be transported in one load (50 drums).

6. No state taxes will be paid.

7. Liquids will be transported by vacuum truck (5,000/gal per load). Solids will be transported by end dump (18 cy per load). Drums will be transported by flatbed.

2.2.1.4 Task 1.4 - Implement Database Management

Task 1.4.1 - Data Collection/Input

Laboratory analytical data will be provided to HLA in hard-copy and digital formats. Database management will include the labor and computer time to manually load boring log data, well completion details, chain of custody information, water-level data, and analytical data supplied by the laboratories, and the results of data validation in a digital format, into the database systems. The data will be randomly checked for accuracy against hard copies of the input data. It is assumed that the laboratory analytical data will be supplied in the appropriate digital format by the analytical laboratories and the submittals will be 99 percent error free.

Task 1.4.2 - Data Analysis

Data analysis includes interpretation of the analytical and hydrogeologic data for Parcel B. Water level contour maps and graphical representations of analytical data will be prepared, as appropriate.

There will be no data submittals or agency meeting requiring presentation of data or its interpretation. All drawings and tables required for the RI/FS reports will be prepared under separate authorization.

2.2.2 Task 2.0 - Remedial Investigation of Parcel C

2.2.2.1 Task 2.1 - Implement Sampling

The number of samples and analytical methods for Task 2 are summarized in Tables 3, 4, 5 and 6. The estimated waste volumes are summarized in Table 7.

Task 2.1.1 - Geophysical Survey

- All drilling and excavation locations will be cleared for underground utilities and buried objects by a geophysical crew prior to intrusive activities. It may not be possible to locate all underground utilities.

Task 2.1.2 - Drilling, Boring, Sampling

- The QAPjP will be revised to include site-specific activities not already covered in the existing QAPjP plan.
- Site-specific sampling and analysis plans will be prepared for each site, showing sample locations and required analytical program, prior to start of field work to coordinate the activities between HLA and PRC.
- All investigatively-derived waste will be contained by HLA for handling, inspection, and disposal by PRC.

Soil Borings

- Two shallow borings will be completed per day using a 10-inch-diameter ARCH or equivalent.
- This task will require only one mobilization by the drilling contractor.
- 11 borings inside buildings or under concrete pavement are assumed to require concrete coring, up to a maximum of 2 feet deep.
- All soil borings will be sealed with bentonite-cement grout or concrete.

Monitoring Wells

- One and one-half monitoring wells will be installed per day using a 10-inch-diameter ARCH.
- All monitoring wells inside buildings and under concrete pads are assumed to require concrete coring.
- All soil cuttings from the installation of monitoring wells will be contained and labeled by HLA; disposal will be the responsibility of PRC.
- HLA will develop, purge, and sample all monitoring wells three times each; water generated from the well development and purging will be pumped into the sump at the decontamination area; disposal will be the responsibility of PRC.
- The monitoring wells will be developed until 10 casing volumes are removed, the well runs dry, or the water becomes relatively clear, whichever occurs first.

Task 2.1.3 - Exploratory Excavation

- Exploratory excavation will be replaced by exploratory boring. Each boring will be 5 feet deep; two soil samples will be collected from each boring.

Task 2.1.4 - Hydropunch/Geoprobe

- Soil borings will be drilled to target depths and a hydropunch will be pushed through the bottom of the borehole to collect groundwater samples.

Task 2.1.5 - Mobile Field Lab/Immunoassay

- A California state certified laboratory will analyze groundwater samples collected through hydropunch by SW-486 methods 8010, 8020, 8270, and for TPH/Diesel (see Table 4).

- The analytical laboratory will analyze up to three water samples per day. Results will be obtained on a 48-hour turn-around-time. The hydropunch results will be used for optimal placement of monitoring wells.

Task 2.1.6 - Aquifer Testing

- Slug tests will be attempted in all wells installed under this CTO and the wells installed under the CTO 0142 SI program.

- It is assumed that all of the wells will recover to 85 percent of their original water level within 30 minutes of the beginning of the test and that five wells can be tested per day.

- Upon completion of the tests, the recovery data will be analyzed and the hydraulic conductivities of the aquifer materials will be estimated. Results of the slug testing will be used to prepare recommendations for aquifer testing.

- Background fluctuation testing will be performed for a period of 24 hours in four wells for each site.

- Step drawdown tests will include three steps of 2 hours each.

  The average flow rate for the constant-rate tests will not exceed 7.5 gallons per minute (gpm).

- The duration of the constant-rate test will be 36 hours: 24 hours for pumpout and 12 hours for recovery.

- Aquifer testing data will be analyzed to refine the estimate of hydraulic properties of the aquifer at referenced sites. No report on aquifer testing will be produced under this CTO.

- For security reasons, two field personnel will be assigned to each measurement station of the pumping test.

2.2.2.2 Task 2.2 - Implement Sampling Analysis

The cost estimate for the sampling analysis task was based on the following:

- Laboratory cost was calculated using option year 2 weighted average unit prices.

- Laboratory analytical data will be provided in hard-copy and digital formats. The data will be reported and checked for accuracy against hard copies of the same data. It is assumed that the laboratory analytical data laboratories and the submittals will be 99 percent error free.

- Data evaluation includes evaluation of the analytical and hydrogeologic data for the RI sites. Storm drain/sanitary sewer/fuel distribution line/maps, water level contour maps, and graphical representations of analytical data will be prepared, as appropriate.

- Data validation cost was calculated using option year 1 weighted average unit price.

- A cursory validation will be performed on all of the laboratory analytic data following Level C QC guidelines. This cursory validation includes review of relative percent differences, percent recovery, holding times, and other sample documentation. Conventional Contract Laboratory Program (CLP) validation following Level D QC guidelines will be performed on a 10 percent of soil and ground water samples. This conventional CLP validation includes review of all laboratory documentation and analysis records, in particular calibrations, chromatograms, and mass spectra.

2.2.2.3 Task 2.3 - Implement Waste Management

The cost estimate for the waste management task was based on the following:

- Hazardous waste produced during RI activities will be transported and disposed of at a permitted disposal facility. Waste types that will be produced include drill cuttings, groundwater produced during well development and sampling, decontamination liquids,

sludges from the decontamination facility sump, and personal protective equipment. The estimated total quantities of each waste type that will be produced at each site are presented in Table 4.

- The actual disposal method will be required for each waste type cannot be determined until the wastes have been adequately characterized. The following assumptions have been made for the purpose of this cost estimate.

  1. None of the groundwater and decontamination fluids will require disposal as hazardous waste. Except for sump sludge and drilling mud volumes, 50 percent of the remaining waste types will require disposal as hazardous. Sump sludge is assumed to be 100 percent hazardous.

  2. Hazardous solid wastes will be transported by and disposed of at a Chemical Waste Management, Inc. (CWMI) Kettleman Hills facility.

  3. All hazardous solids and liquids will be treated in bulk by chemical stabilization prior to disposal, except drummed PPE, which will be disposed as-is.

  4. Density of solids is 1.3 tons/cy.

  5. Waste streams from individual OUs will be transported together where feasible. Drummed PPE will be transported in one load (50 drums).

  6. No state taxes will be paid.

  7. Liquids will be transported by vacuum truck (5,000/gal per load). Solids will be transported by end dump (18 cy per load). Drums will be transported by flatbed.

2.2.2.4 Task 2.4 - Implement Database Management

Task 2.4.1 - Data Collection/Input

Laboratory analytical data will be provided to HLA in hard-copy and digital formats. Database management will include the labor and computer time to manually load boring log data, well completion details, chain of custody information, water-level data, and analytical data supplied by the laboratories, and the results of data validation in a digital format, into the database systems. The data will be randomly checked for accuracy against hard copies of the input data. It is assumed that the

laboratory analytical data will be supplied in the appropriate digital format by the analytical laboratories and the submittals will be 99 percent error free.

A cursory validation will be performed by PRC on all of the laboratory analytical data following Level C QC guidelines. This cursory validation includes review of relative percent differences, percent recovery, holding times, and other sample documentation. Conventional Contract Laboratory Program (CLP) validation following Level D QC guidelines will be performed by PRC on 10 percent of the soil and groundwater samples. This conventional CLP validation includes review of all laboratory documentation and analysis records, in particular calibrations, chromatograms and mass spectra.

Task 2.4.2 - Data Analysis

Data analysis includes interpretation of the analytical and hydrogeologic data for Parcel C. Water level contour maps and graphical representations of analytical data will be prepared, as appropriate.

There will be no data submittals or agency meeting requiring presentation of data or its interpretation. All drawings and tables required for the RI/FS reports will be prepared under separate authorization.

2.2.3 Task 3.0 - Remedial Investigation of Parcel D

2.2.3.1 Task 3.1 - Implement Sampling

The number of samples and analytical methods for Task 2 are summarized in Tables 3, 4, 5 and 6. The estimated waste volumes are summarized in Table 7.

Task 3.1.1 - Geophysical Survey

All drilling and excavation locations will be cleared for underground utilities and buried objects by a geophysical crew prior to intrusive activities. It may not be possible to locate all underground utilities.

Task 3.1.2 - Drilling, Boring, Sampling

- The QAPjP will be revised to include site-specific activities not already covered in the existing QAPjP plan.
- Site-specific sampling and analysis plans will be prepared for each site, showing sample locations and required analytical program, prior to start of field work to coordinate the activities between HLA and PRC.
- All investigatively-derived waste will be contained by HLA for handling, inspection, and disposal by PRC.

Soil Borings

- Two shallow borings will be completed per day using a 10-inch-diameter ARCH or equivalent.
- This task will require only one mobilization by the drilling contractor.
- All borings inside buildings or under concrete pavement are assumed to require concrete coring, up to a maximum of 2 feet deep.
- All soil borings will be sealed with bentonite-cement grout or concrete.

Monitoring Wells

- One and one-half monitoring wells will be installed per day using a 10-inch-diameter ARCH.
- All monitoring wells inside buildings and under concrete pads are assumed to require concrete coring.

- All soil cuttings from the installation of monitoring wells will be contained and labeled by HLA; disposal will be the responsibility of PRC.

- HLA will develop, purge, and sample all monitoring wells three times each; water generated from the well development and purging will be pumped into the sump at the decontamination area; disposal will be the responsibility of PRC.

- The monitoring wells will be developed until 10 casing volumes are removed, the well runs dry, or the water becomes relatively clear, whichever occurs first.

Task 3.1.3 - Exploratory Excavation

- Exploratory excavation will be replaced by exploratory boring. Each boring will be 5 feet deep; two soil samples will be collected from each boring.

Task 3.1.4 - Hydropunch/Geoprobe

- Soil borings will be drilled to target depths and a hydropunch will be pushed through the bottom of the borehole to collect groundwater samples.

Task 3.1.5 - Mobile Field Lab/Immunoassay

- A California state certified laboratory will analyze groundwater samples collected through hydropunch by SW-486 methods 8010, 8020, 8270, and for TPH/Diesel (see Table 4).

- The analytical laboratory will analyze up to three water samples per day. Results will be obtained on a 48-hour turn-around-time. The hydropunch results will be used for optimal placement of monitoring wells.

Task 3.1.6 - Aquifer Testing

- Slug tests will be attempted in all wells installed under this CTO and the wells installed under the CTO 0142 SI program.

- It is assumed that all of the wells will recover to 85 percent of their original water level within 30 minutes of the beginning of the test and that five wells can be tested per day.

- Upon completion of the tests, the recovery data will be analyzed and the hydraulic conductivities of the aquifer materials will be estimated. Results of the slug testing will be used to prepare recommendations for aquifer testing.

- Background fluctuation testing will be performed for a period of 24 hours in four wells for each site.

- Step drawdown tests will include three steps of 2 hours each.

- The average flow rate for the constant-rate tests will not exceed 7.5 gallons per minute (gpm).

- The duration of the constant-rate test will be 36 hours: 24 hours for pumpout and 12 hours for recovery.

- Aquifer testing data will be analyzed to refine the estimate of hydraulic properties of the aquifer at referenced sites. No report on aquifer testing will be produced under this CTO.

- For security reasons, two field personnel will be assigned to each measurement station of the pumping test.

2.2.3.2 Task 3.2 - Implement Sampling Analysis

The cost estimate for the sampling analysis task was based on the following:

- Laboratory cost was calculated using option year 2 weighted average unit prices.

- Laboratory analytical data will be provided in hard-copy and digital formats. The data will be reported and checked for accuracy against hard copies of the same data. It is assumed that the laboratory analytical data laboratories and the submittals will be 99 percent error free.

- Data evaluation includes evaluation of the analytical and hydrogeologic data for the RI sites. Storm drain/sanitary sewer/fuel distribution line/maps, water level contour maps, and graphical representations of analytical data will be prepared, as appropriate.

- Data validation cost was calculated using option year 1 weighted average unit price.

- A cursory validation will be performed on all of the laboratory analytic data following Level C QC guidelines. This cursory validation includes review of relative percent differences, percent recovery, holding times, and other sample documentation.

Conventional Contract Laboratory Program (CLP) validation following Level D QC guidelines will be performed on a 10 percent of soil and ground water samples. This conventional CLP validation includes review of all laboratory documentation and analysis records, in particular calibrations, chromatograms, and mass spectra.

2.2.3.3 Task 3.3 - Implement Waste Management

The cost estimate for the waste management task was based on the following:

- Hazardous waste produced during RI activities will be transported and disposed of at a permitted disposal facility. Waste types that will be produced include drill cuttings, groundwater produced during well development and sampling, decontamination liquids, sludges from the decontamination facility sump, and personal protective equipment. The estimated total quantities of each waste type that will be produced at each site are presented in Table 4.

- The actual disposal method will be required for each waste type cannot be determined until the wastes have been adequately characterized. The following assumptions have been made for the purpose of this cost estimate.

    1. None of the groundwater and decontamination fluids will require disposal as hazardous waste. Except for sump sludge and drilling mud volumes, 50 percent of the remaining waste types will require disposal as hazardous. Sump sludge is assumed to be 100 percent hazardous.

    2. Hazardous solid wastes will be transported by and disposed of at a Chemical Waste Management, Inc. (CWMI) Kettleman Hills facility.

    3. All hazardous solids and liquids will be treated in bulk by chemical stabilization prior to disposal, except drummed PPE, which will be disposed as-is.

    4. Density of solids is 1.3 tons/cy.

    5. Waste streams from individual OUs will be transported together where feasible. Drummed PPE will be transported in one load (50 drums).

    6. No state taxes will be paid.

    7. Liquids will be transported by vacuum truck (5,000/gal per load). Solids will be transported by end dump (18 cy per load). Drums will be transported by flatbed.

2.2.3.4 Task 3.4 - Implement Database Management

Task 3.4.1 - Data Collection/Input

Laboratory analytical data will be provided to HLA in hard-copy and digital formats. Database management will include the labor and computer time to manually load boring log data, well completion details, chain of custody information, water-level data, and analytical data supplied by the laboratories, and the results of data validation in a digital format, into the database systems. The data will be randomly checked for accuracy against hard copies of the input data. It is assumed that the laboratory analytical data will be supplied in the appropriate digital format by the analytical laboratories and the submittals will be 99 percent error free.

A cursory validation will be performed by PRC on all of the laboratory analytical data following Level C QC guidelines. This cursory validation includes review of relative percent differences, percent recovery, holding times, and other sample documentation. Conventional Contract Laboratory Program (CLP) validation following Level D QC guidelines will be performed by PRC on 10 percent of the soil and groundwater samples. This conventional CLP validation includes review of all laboratory documentation and analysis records, in particular calibrations, chromatograms and mass spectra.

Task 3.4.2 - Data Analysis

Data analysis includes interpretation of the analytical and hydrogeologic data for Parcel D. Water level contour maps and graphical representations of analytical data will be prepared, as appropriate.

There will be no data submittals or agency meeting requiring presentation of data or its interpretation. All drawings and tables required for the RI/FS reports will be prepared under separate authorization.

2.2.4 Task 4.0 - Remedial Investigation of Parcel E

2.2.4.1 Task 4.1 - Implement Sampling

The number of samples and analytical methods for Task 2 are summarized in Tables 3, 4, 5 and 6. The estimated waste volumes are summarized in Table 7.

Task 4.1.1 - Geophysical Survey

- All drilling and excavation locations will be cleared for underground utilities and buried objects by a geophysical crew prior to intrusive activities. It may not be possible to locate all underground utilities.

Task 4.1.2 - Drilling, Boring, Sampling

- The QAPjP will be revised to include site-specific activities not already covered in the existing QAPjP plan.
- Site-specific sampling and analysis plans will be prepared for each site, showing sample locations and required analytical program, prior to start of field work to coordinate the activities between HLA and PRC.
- All investigatively-derived waste will be contained by HLA for handling, inspection, and disposal by PRC.

Soil Borings

- Two shallow borings will be completed per day using a 10-inch-diameter ARCH or equivalent.
- This task will require only one mobilization by the drilling contractor.
- All borings inside buildings or under concrete pavement are assumed to require concrete coring, up to a maximum of 2 feet deep.
- All soil borings will be sealed with bentonite-cement grout or concrete.

Monitoring Wells

- One and one-half monitoring wells will be installed per day using a 10-inch-diameter ARCH.
- All monitoring wells inside buildings and under concrete pads are assumed to require concrete coring.
- All soil cuttings from the installation of monitoring wells will be contained and labeled by HLA; disposal will be the responsibility of PRC.
- HLA will develop, purge, and sample all monitoring wells three times each once each; water generated from the well development and purging will be pumped into the sump at the decontamination area; disposal will be the responsibility of PRC.
- The monitoring wells will be developed until 10 casing volumes are removed, the well runs dry, or the water becomes relatively clear, whichever occurs first.

Task 4.1.3 - Exploratory Excavation

- Exploratory excavation will be replaced by exploratory boring. Each boring will be 5 feet deep; two soil samples will be collected from each boring.

Task 4.1.4 - Hydropunch/Geoprobe

- Soil borings will be drilled to target depths and a hydropunch will be pushed through the bottom of the borehole to collect groundwater samples.

Task 4.1.5 - Mobile Field Lab/Immunoassay

- A California state certified laboratory will analyze groundwater samples collected through hydropunch by SW-486 methods 8010, 8020, 8270, and for TPH/Diesel (see Table 4).
- The analytical laboratory will analyze up to three water samples per day. Results will be obtained on a 48-hour turn-around-time. The hydropunch results will be used for optimal placement of monitoring wells.

Task 4.1.6 - Aquifer Testing

- Slug tests will be attempted in all wells installed under this CTO and the wells installed under the CTO 0142 SI program.
- It is assumed that all of the wells will recover to 85 percent of their original water level within 30 minutes of the beginning of the test and that five wells can be tested per day.
- Upon completion of the tests, the recovery data will be analyzed and the hydraulic conductivities of the aquifer materials will be estimated. Results of the slug testing will be used to prepare recommendations for aquifer testing.
- Background fluctuation testing will be performed for a period of 24 hours in four wells for each site.
- Step drawdown tests will include three steps of 2 hours each.
- The average flow rate for the constant-rate tests will not exceed 7.5 gallons per minute (gpm).
- The duration of the constant-rate test will be 36 hours: 24 hours for pumpout and 12 hours for recovery.
- Aquifer testing data will be analyzed to refine the estimate of hydraulic properties of the aquifer at referenced sites. No report on aquifer testing will be produced under this CTO.
- For security reasons, two field personnel will be assigned to each measurement station of the pumping test.

2.2.4.2 Task 1.2 - Implement Sampling Analysis

The cost estimate for the sampling analysis task was based on the following:

- Laboratory cost was calculated using option year 2 weighted average unit prices.
- Laboratory analytical data will be provided in hard-copy and digital formats. The data will be reported and checked for accuracy against hard copies of the same data. It is assumed that the laboratory analytical data laboratories and the submittals will be 99 percent error free.

- Data evaluation includes evaluation of the analytical and hydrogeologic data for the RI sites. Storm drain/sanitary sewer/fuel distribution line/maps, water level contour maps, and graphical representations of analytical data will be prepared, as appropriate.

- Data validation cost was calculated using option year 1 weighted average unit price.

- A cursory validation will be performed on all of the laboratory analytic data following Level C QC guidelines. This cursory validation includes review of relative percent differences, percent recovery, holding times, and other sample documentation. Conventional Contract Laboratory Program (CLP) validation following Level D QC guidelines will be performed on a 10 percent of soil and ground water samples. This conventional CLP validation includes review of all laboratory documentation and analysis records, in particular calibrations, chromatograms, and mass spectra.

2.2.4.3 Task 1.3 - Implement Waste Management

The cost estimate for the waste management task was based on the following:

- Hazardous waste produced during RI activities will be transported and disposed of at a permitted disposal facility. Waste types that will be produced include drill cuttings, groundwater produced during well development and sampling, decontamination liquids, sludges from the decontamination facility sump, and personal protective equipment. The estimated total quantities of each waste type that will be produced at each site are presented in Table 4.

- The actual disposal method will be required for each waste type cannot be determined until the wastes have been adequately characterized. The following assumptions have been made for the purpose of this cost estimate.

    1. None of the groundwater and decontamination fluids will require disposal as hazardous waste. Except for sump sludge and drilling mud volumes, 50 percent of the remaining waste types will require disposal as hazardous. Sump sludge is assumed to be 100 percent hazardous.

    2. Hazardous solid wastes will be transported by and disposed of at a Chemical Waste Management, Inc. (CWMI) Kettleman Hills facility.

    3. All hazardous solids and liquids will be treated in bulk by chemical stabilization prior to disposal, except drummed PPE, which will be disposed as-is.

    4. Density of solids is 1.3 tons/cy.

5. Waste streams from individual OUs will be transported together where feasible. Drummed PPE will be transported in one load (50 drums).

6. No state taxes will be paid.

7. Liquids will be transported by vacuum truck (5,000/gal per load). Solids will be transported by end dump (18 cy per load). Drums will be transported by flatbed.

2.2.4.4 Task 1.4 - Implement Database Management

Task 4.4.1 - Data Collection/Input

Laboratory analytical data will be provided to HLA in hard-copy and digital formats. Database management will include the labor and computer time to manually load boring log data, well completion details, chain of custody information, water-level data, and analytical data supplied by the laboratories, and the results of data validation in a digital format, into the database systems. The data will be randomly checked for accuracy against hard copies of the input data. It is assumed that the laboratory analytical data will be supplied in the appropriate digital format by the analytical laboratories and the submittals will be 99 percent error free.

A cursory validation will be performed by PRC on all of the laboratory analytical data following Level C QC guidelines. This cursory validation includes review of relative percent differences, percent recovery, holding times, and other sample documentation. Conventional Contract Laboratory Program (CLP) validation following Level D QC guidelines will be performed by PRC on 10 percent of the soil and groundwater samples. This conventional CLP validation includes review of all laboratory documentation and analysis records, in particular calibrations, chromatograms and mass spectra.

Task 4.4.2 - Data Analysis

Data analysis includes interpretation of the analytical and hydrogeologic data for Parcel E. Water level contour maps and graphical representations of analytical data will be prepared, as appropriate.

There will be no data submittals or agency meeting requiring presentation of data or its interpretation. All drawings and tables required for the RI/FS reports will be prepared under separate authorization.

2.2.5 Task 5.0 - Project Management of CTO 0276

Project management costs for HLA are estimated at 14 percent of the total labor budget. The actual hours will vary depending on the level of project activities. Project management LOE's for PRC assume two half time senior personnel and one half time clerical staff and one half time technical staff for 24 months. The period of performance of this CTO will be 2 years. PRC and HLA will attend five technical meetings for each parcel.

2.2.6 Task 6.0 - Negotiation Preparation

This proposal will be revised after negotiations with the Navy. PRC and HLA will attend both negotiations.

2.2.7 Task 7.0 - Data Collection System Proposal

The cost estimate for the task of evaluating a data collection system is based on the following:

- PRC will use the CADD II contract "Buyer's Guideline" costs as a basis for comparison of hardware and software capabilities.
- The Navy requirements for a GIS and presentation system will be determined by questionnaire and through meetings and discussions and through meetings and discussions with managers, end users (EICS) and computer system personnel.
- PRC staff will evaluate the level of development of the Harding Lawson Chemical, Geological and Hydrological databases through discussions with key data management personnel regarding structure, grouping and availability of the data. The intent or outcome of these discussions should not jeopardize the proprietary structures of Harding Lawson's databases but rather determine whether the data is available in as format that will allow PRC to evaluate the integration potential with systems under consideration for HPA.

- If possible, a system will be established between PRC and HLA to allow transfer of chemical, geologic, hydrologic and geographical data.

- PRC will give HLA at least 24 hours notice before a visit to their office.

- PRC will prepare a technical memorandum which will: 1) report on the content and availability of the existing data at HLA; 2) summarize the needs of the Navy based on the outcome of meetings and questionnaire; 3) provide a cost comparison of the available software/hardware needed to implement an effective RDBMS and presentation package for the Navy.

2.3 DELIVERABLES

The deliverables identified for this project are presented below by task.

Deliverable	Copies Required	Delivery Date
Task 1 - Parcel B Investigation No Deliverables	N/A	N/A
Task 2 - Parcel C Investigation No Deliverables	N/A	N/A
Task 3 - Parcel D Investigation No Deliverables	N/A	N/A
Task 4 - Parcel E Investigation No Deliverables	N/A	N/A
Task 5 - Project Management Monthly Status Reports	1	Tenth calendar day of each month in which work is performed.
Task 6 - Work Plan and Cost Estimate Work Plan and Cost Estimate	1	November 17, 1993
Task 7 - Data Collection System Proposal Technical Memorandum to Ray Ramos	N/A	February 15, 1994

3.0 SCHEDULE

The implementation schedule for the activities included in this CTO is still being developed and negotiated with the regulatory agencies. The proposed schedule for implementation has been included although the actual dates may change. (See Figure 1). This schedule was compiled with an initial authorization date of October 26, 1993 based on the receipt of the undefinitized CTO.

4.0 PROJECT MANAGEMENT

PRC will provide project management and oversight to ensure that activities defined in this work plan are accomplished in a timely and efficient manner. The HLA project manager will communicate with PRC's project manager on an as-needed basis to discuss the technical, financial, schedule, and administrative status of the project. The project managers will also be responsible for coordinating with the subcontractors and technical managers associated with the project.

5.0 STAFFING

PRC and HLA has available a qualified professional and technical staff to meet the needs of the project. Some of the team members have been involved in the preparation of the work plans and design of the tasks described in this CTO. Team members are familiar with the details required for the efficient implementation of the RI activities at HPA.

6.0 HEALTH AND SAFETY

Work on this project will be performed in accordance with the PRC Navy CLEAN Health and Safety Program dated June 25, 1993 and the PRC Navy CLEAN Draft Ionizing Radiation Program (PRC, 1993). Site-specific health and safety plans will also be prepared for each site.

7.0 SAMPLING AND ANALYSIS

Sampling and analysis conducted during the RIs will be in accordance with the Surrogate RI work plan presented to the regulatory agencies and the QAPjP. Tables 3, 4, 5, and 6 outline the sampling and analysis scope.

8.0 QUALITY ASSURANCE

Work on this contract will be conducted in accordance with PRC's Navy CLEAN Quality Control Management Plan dated January 17, 1990 and HLA's QAPjP (HLA, 1988, 1993). Activities defined in this work plan may be subject to a system audit conducted by the QA staff to check on adherence to the QC Management Plan. Audit results will be included in the appropriate monthly progress reports.

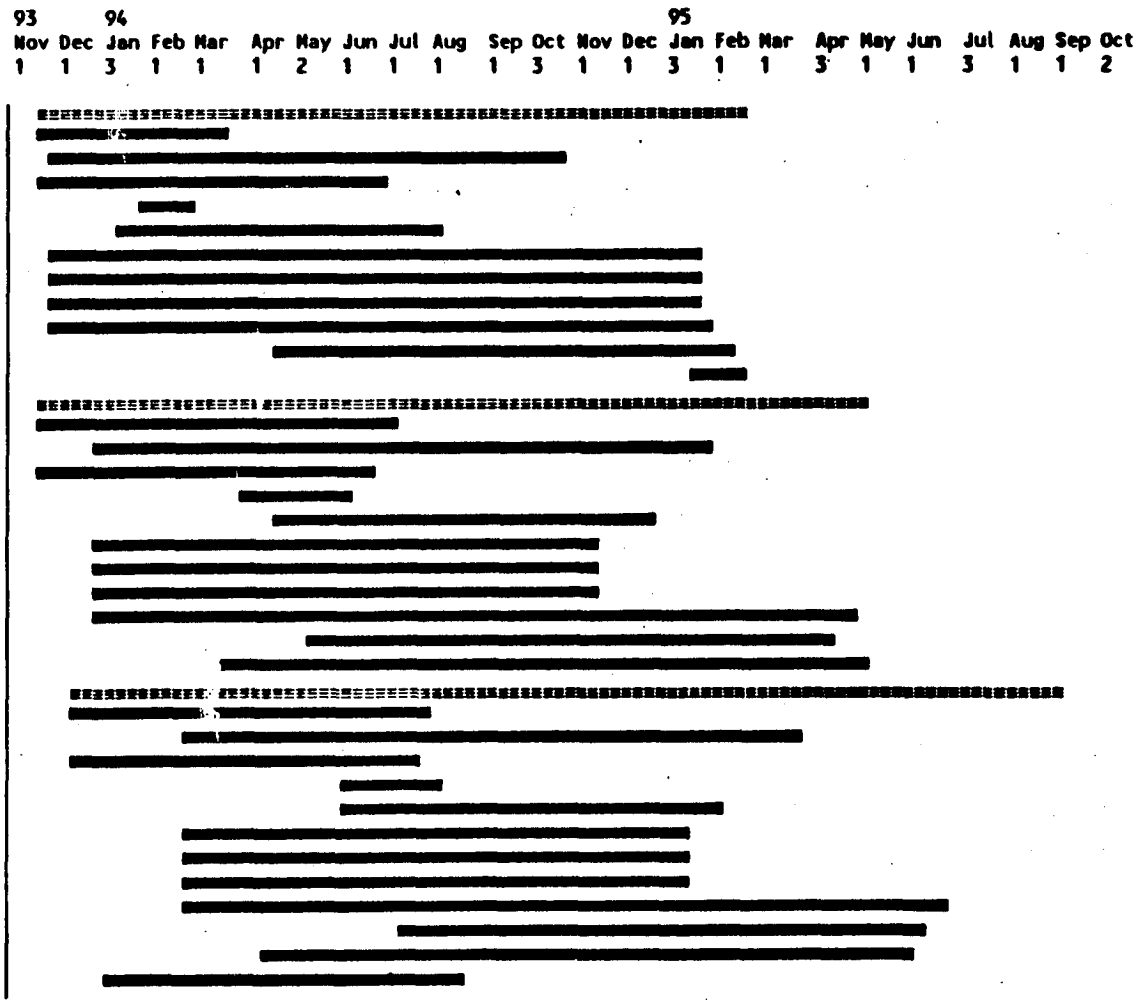
FIGURE 1

SCHEDULE

(Page 1 of 2)

Schedule Name : Hunters Point Annex
Responsible : Gary Weishans, Emir Utush
As-of Date : 26-Oct-93 Schedule File : CTO-0276

Keyword	Task Name	Start Date	End Date
Task I	Parcel B RI Investigation	15-Nov-93	14-Feb-95
Task IA1	Geophysical Survey	15-Nov-93	14-Mar-94
Task IA2	Drill/Bore/Sampling/Well Instl	22-Nov-93	20-Oct-94
Task IA3	Exploratory Excavation	15-Nov-93	27-Jun-94
Task IA4	Hydropunch/Geoprobe	24-Jan-94	18-Feb-94
Task IA5	Aquifer Testing	5-Jan-94	2-Aug-94
Task IB1	Sample Analysis	22-Nov-93	18-Jan-95
Task IB2	Sample Tracking	22-Nov-93	18-Jan-95
Task IB3	Data Validation	22-Nov-93	18-Jan-95
Task IC1	IDW Removal and Disposal	22-Nov-93	20-Jan-95
Task ID1	Data Collect/Input	18-Apr-94	8-Feb-95
Task ID2	Data Analysis	13-Jan-95	14-Feb-95
Task II	Parcel C RI Investigation	15-Nov-93	3-May-95
Task IIA1	Geophysical Survey	15-Nov-93	28-Jun-94
Task IIA2	Drill/Bore/Sampling/Well Instl	22-Dec-93	25-Jan-95
Task IIA3	Exploratory Excavation	15-Nov-93	20-Jun-94
Task IIA4	Hydropunch/Geoprobe	29-Mar-94	31-May-94
Task IIA5	Aquifer Testing	19-Apr-94	19-Dec-94
Task IIB1	Sample Analysis	22-Dec-93	9-Nov-94
Task IIB2	Sample Tracking	22-Dec-93	9-Nov-94
Task IIB3	Data Validation	22-Dec-93	9-Nov-94
Task IIC1	IDW Removal and Disposal	22-Dec-93	24-Apr-95
Task IID1	Data Collection/Input	9-May-94	13-Apr-95
Task IID2	Data Analysis	16-Mar-94	3-May-95
Task III	Parcel D RI Investigation	7-Dec-93	30-Aug-95
Task IIIA	Geophysical Survey	7-Dec-93	21-Jul-94
Task IIIA	Drill/Bore/Sampling/Well Instl	17-Feb-94	21-Mar-95
Task IIIA	Exploratory Excavation	7-Dec-93	13-Jul-94
Task IIIA	Hydropunch/Geoprobe	1-Jun-94	29-Jul-94
Task IIIA	Aquifer Testing	31-May-94	1-Feb-95
Task IIIB	Sample Analysis	17-Feb-94	6-Jan-95
Task IIIB	Sample Tracking	17-Feb-94	6-Jan-95
Task IIIB	Data Validation	17-Feb-94	6-Jan-95
Task IIIC	IDW Removal and Disposal	17-Feb-94	21-Jun-95
Task IIID	Data Collection/Input	6-Jul-94	9-Jun-95
Task IIID	Data Analysis	11-Apr-94	30-May-95
Task IVA1	Geophysical Survey	3-Jan-94	15-Aug-94



Detail Task — Summary Task — Baseline
(Progress) — (Progress) — Conflict
(Slack) — (Slack) — Resource delay
Progress shows Percent Achieved on Actual — Milestone
Scale: 5 days per character

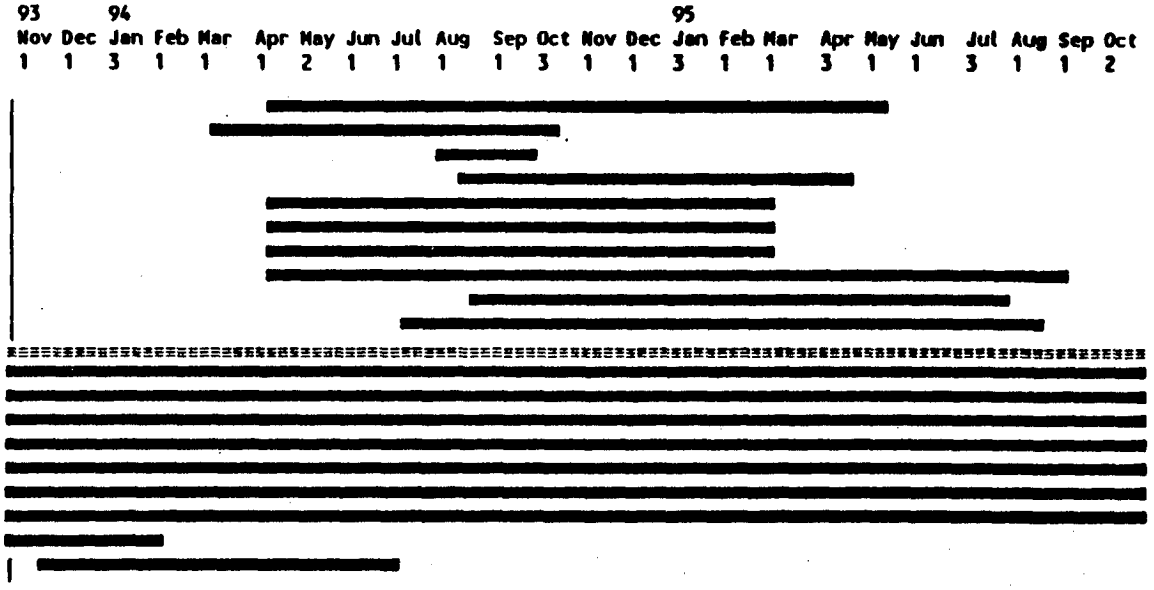
TIME LINE Gantt Chart Report, Strip 1, Page 1

FIGURE 1
SCHEDULE

(Page 2 of 2)

Schedule Name : Hunters Point Annex
Responsible : Gary Welshans, Emir Utush
As-of Date : 26-Oct-93 Schedule File : CTO-0276

Keyword	Task Name	Start Date	End Date
Task IVA2	Drill Bore/Sampling/Well Instl	11-Apr-94	10-May-95
Task IVA3	Exploratory Excavation	7-Mar-94	6-Oct-94
Task IVA4	Hydropunch/Geoprobe	1-Aug-94	28-Sep-94
Task IVA5	Aquifer Testing	15-Aug-94	18-Apr-95
Task IVB1	Sample Analysis	11-Apr-94	1-Mar-95
Task IVB2	Sample Tracking	11-Apr-94	1-Mar-95
Task IVB3	Data Validation	11-Apr-94	1-Mar-95
Task IVC1	IDW Removal and Disposal	11-Apr-94	30-Aug-95
Task IVD1	Data Collection/Input	22-Aug-94	27-Jul-95
Task IVD2	Data Analysis	5-Jul-94	22-Aug-95
Task V	Project Management	26-Oct-93	26-Oct-95
Task VA	Cost/Budget Tracking	26-Oct-93	26-Oct-95
Task VB	Meetings	26-Oct-93	26-Oct-95
Task VC	Contract Management	26-Oct-93	26-Oct-95
Task VD	Negotiations	26-Oct-93	26-Oct-95
Task VE	Subcontractor Coordination	26-Oct-93	26-Oct-95
Task VF	Technical Oversight	26-Oct-93	26-Oct-95
Task VG	MSR Reports	26-Oct-93	26-Oct-95
Task VI	HLA Workplan & Cost Estimate	26-Oct-93	31-Jan-94
Task VII	Implement Database/GIS System	15-Nov-93	30-Jun-94



Detail Task ..... (Progress) ..... (Slack)
Summary Task ..... (Progress) ..... (Slack)
Baseline
Conflict
Resource delay
Milestone
Progress shows Percent Achieved on Actual
Scale: 5 days per character

TIME LINE Gantt Chart Report, Strip 1, Page 2

REFERENCES

Environmental Protection Agency (EPA), 1983. Methods for Chemical Analysis of Water and Wastes. March.

EPA, 1988. Laboratory Data Validation Functional Guidelines Evaluating Inorganic Analysis. July.

EPA, 1991. National Functional Guidelines for Evaluating Organic Data Review. June.

EPA, 1991. Contract Laboratory Program Statement of Work for Organic Analysis. Revisions through OLM01.8. August.

EPA, 1991. Contract Laboratory Program Statement of Work for Inorganic Analysis. Revisions through ILM02.1. September.

EPA, 1992. Test Methods for Evaluating Solid Wastes, 3rd Edition. SW-846. Promulgated revisions through 1992.

Federal Facility Agreement (FFA), January 1992.

Harding Lawson Associates (HLA), 1988. Quality Assurance Project Plan, Remedial Investigation/Feasibility Study, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California. May 27.

HLA, 1993. Parcel B Site Inspection Data Presentation Meeting, Volumes II and III. July 27

HLA, 1993. Parcel C Site Inspection Data Presentation Meeting, Volumes II and III. August 31.

HLA, 1993. Parcels B/C Site Inspection Data Presentation Meeting, Volume I. October 12.

HLA, 1993. Parcel D Site Inspection Data Presentation Meeting, Volumes II and III. November 2.

HLA, 1993. Parcel E Site Inspection Data Presentation Meeting, Volumes II and III. November 3.

HLA, 1993. Parcels D Site Inspection Data Presentation Meeting, Volume I. November 19.

HLA, 1993. Quality Assurance Project Plan Amendment, Remedial Investigation/Feasibility Study, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California. November.

PRC, Environmental Management, Inc. (PRC), 1993. Statement of Work for Analytical Laboratory Services. November.

State of California Leaking Underground Fuel Tank (LUFT) Task Force (CA), 1989. LUFT Field Manual. October.

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REMEDIAL INVESTIGATION/FEASIBILITY STUDY
FIELD WORK AND ANALYSIS
PARCELS B, C. D. AND E WORK PLAN

THE ABOVE IDENTIFIED PAGE IS NOT AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY SOUTHWEST DIVISION TO LOCATE THIS PAGE. THIS PAGE HAS BEEN INSERTED AS A PLACEHOLDER AND WILL BE REPLACED SHOULD THE MISSING ITEM BE LOCATED.

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
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TELEPHONE: (619) 532-3676

TABLE 1

IR/PA SITES BY OPERABLE UNIT
(Sheet 1 of 3)

Operable Unit	Site	Description
OU I	IR-1/21	Industrial Landfill and Triple A Sites* 1 and 16
	IR-2	Bay Fill Area and Triple A Sites 2, 13, 14, 17, 18, 19; excluding IR-3
	IR-3	Oil Reclamation Ponds and part of Triple A Site 17
OU II	IR-6	Tank Farm
	IR-8	Building 503 PCB Spill Area
	IR-9	Pickling and Plate Yard
	IR-10	Battery and Electroplating Shop (Building 123)
OU III	IR-4	Scrap Yard and Triple A Site 3 (north of Spear Avenue)
	IR-5	Old Transformer Storage Yard
OU IV	IR-7	Sub-base Area
OU V		
Group 5	IR-11**	Building 521, Power Plant
	IR-12	Disposal Trench, Triple A Sites 3 (partial) and 4
	IR-13	Old Commissary Site, Triple A Sites 5 and 15
	IR-14	Oily Liquid Waste Disposal Site, Triple A Sites 6 and 7
	IR-15	Oily Waste Ponds and Incineration Tank, Triple A Sites 12 and 13 (partial)
	IR-17	Drum Storage and Disposal Site, Triple A Sites 10 and 1
Group 6	IR-20	Building 156
	IR-22	Buildings 368 and 369
Unassigned	IR-18	Waste Oil Disposal Site behind Dago Mary's and Unnumbered Triple A Site
SIWP-Other Areas/Utilities Volume I	PA-45	Steamlines
	PA-46	Fuel Distribution Lines, Tank Farm
	PA-47	Fuel Distribution Lines, Tank S-505
	PA-48	Suspected Steamlines, Former Building 503

TABLE 1

IR/PA SITES BY OPERABLE UNIT
(Sheet 2 of 3)

Operable Unit	Site	Description
	PA-49	Fuel Distribution Lines at Buildings 205 and 203
	PA-50	Storm Drain and Sanitary Sewer Lines
SIWP-Other Areas/Utilities Volume II	PA-19	Building 901
	PA-24	Buildings 124, 125, 128, and 130
	PA-32	Building 383 and Regunning Pier
	PA-36	Buildings 371, 400, 404A, 405, 406, 413, 414, 704, and 710 and Parts of Area IV
	PA-39	Buildings 505 and 707
SIWP-Other Areas/Utilities Volume III	PA-23	Buildings 146, 161, and 162
	PA-25	Building 134
	PA-26	Building 157 and Area XIV
	PA-27	Building 205
	PA-28	Buildings 211/253, 219, 230, 231, 258, 270, 271, and 281
	PA-29	Buildings 203, 217, 275, 279, 280 and 282 and area bounded by Nimitz, Blandy, and C Streets
	PA-30	Building 241
	PA-31	Building 114
	PA-33	Buildings 302, 302A, 304, 364, 411, and 418
	PA-34	Buildings 351 and 366
	PA-35	Buildings 274 and 306 and area bounded by Manseau, Morell, and E Streets
	PA-37	Buildings 401, 423, 435, and 436
	PA-38	Buildings 500, 506, 507, 509, and 510
	PA-40	Building 527 and Pier 2
	PA-41	Buildings 816 and 818
	PA-42	Buildings 109 and 113
	PA-43	Building 906
	PA-44	Building 438, area near Buildings 408, 409, and 410
	PA-51	Former Transformer Sites
	PA-52	Railroad Right-of-Way
	PA-53	Buildings 525 and 530
	PA-54	Building 511A

TABLE 1

IR/PA SITES BY OPERABLE UNIT
(Sheet 3 of 3)

Operable Unit	Site	Description
	PA-55	Building 307
	PA-56	Area VII, Railroad Tracks
	PA-57	Drydock 4 Area
	PA-58	Scrap Yard across from Building 258
PA/Other Area	PA-16	Container Storage Area and Triple A Site 9

* The numbering system for Triple A sites was previously used by the San Francisco District Attorney's office and the U.S. Navy. These areas/sites have been included within IR and PA sites.

** Site IR-11 was originally included with the OU II sites, but is now in Group 5 because it is contiguous with Sites IR-14 and IR-15.

TABLE 2

CURRENTLY DEFINED IR AND PA SITES BY PARCEL

Parcel	IR Sites	PA Sites
B	6, 7, 10, 18, 20	23, 24, 25, 26, 31, 42, 45p, 46, 49p, 50p, 51p*
C	–	27, 28, 29, 30, 45p, 49p, 50p, 51p, 57, 58
D	8, 9, 22	32, 33, 34, 35, 36, 37, 38p, 39p, 44, 45p, 47p, 48p, 50p, 51p, 53, 55
E	1/21, 2, 3, 4, 5, 11 12, 13, 14, 15, 17	38p, 39p, 40, 45p, 47p, 48p, 50p, 51p, 52, 54, 56

Notes:

p = Site partially in this parcel. Parcel boundaries as shown in Technical Memorandum, Operable Unit V Redefinition (HLA, 1992b).

TABLE 3.
PLANNED DRILLING AND SAMPLING PROGRAM

	Parcel B	Parcel C	Parcel D	Parcel E
Number of Borings:	20	116	19	20
Average Depth (Feet):	20	20	20	20
Total Drilling Footage:	400	2320	380	400
Average Soil Samples Per Boring:	5	5	5	5
Grab Water Samples Per Boring:	1	1	1	1
Number of Monitoring Wells:	14	10	6	14
Average Depth (Feet):	45	25	25	25
Total Drilling Footage:	630	250	150	350
Average Soil Samples Per Boring:	5	5	5	5
Number of Hydropunch Borings:	37	88	167	37
Average Depth (Feet):	20	20	20	20
Total Drilling Footage:	740	1760	3340	740
Average Soil Samples Per Boring:	3	3	4	3
Number of Wells after Hydropunch:	12	39	40	12
Average Depth (Feet):	25	25	25	25
Total Drilling Footage:	300	975	1000	300
Average Soil Samples Per Well:	0	0	0	0
Number of Piezometers:	8	10	10	8
Average Depth (Feet):	25	25	25	25
Total Drilling Footage:	200	250	250	200
Average Soil Samples Per Boring:	0	0	0	0
Number of Test Pits:	1	11	29	1
Average Soil Samples Per Pit:	3	3	3	3
No. of Plan 2 Exploratory Borings:	40	91	52	40
Average Depth (Feet):	10	10	10	10
Total Drilling Footage:	400	910	520	400
Average Soil Samples Per Boring:	2	2	2	2
Concrete Corings (24" deep):	25	47	30	25
Sanitary Sewer Water Samples:	12	12	12	12
Survey Points:	132	365	323	132
Locations for Geophysical Clearance:	132	365	323	132
Feet of Other Geophys. Investigation:	0	700	0	0
Slug Tests:	31	55	58	29
Aquifer Tests:	4	5	5	4
Existing SI Wells:	5	6	12	3
Dye Test:	0	0	2	0
Surface Samples:	0	0	4	0

TABLE 4.
PROPOSED ANALYTICAL PROGRAM

	Soil				Groundwater				Hydropunch Groundwater				Sanitary Sewer Water Samples				TCLP Analyses			
Proposed Analysis	B	C	D	E	B	C	D	E	B	C	D	E	B	C	D	E	B	C	D	E
CLP VOCs	364	1,109	984	364	108	275	181	104	37	88	167	37	12	12	12	12	10	10	10	10
CLP SOCs	364	1,109	984	364	108	275	181	104	0	0	0	0	12	12	12	12	10	10	10	10
CLP PCB/Pesticides	364	1,109	984	364	108	275	181	104	8	0	0	8	12	12	12	12	10	10	10	10
CLP Metals, including molybdenum	364	1,109	984	364	108	275	181	104	0	0	0	0	12	12	12	12	10	10	10	10
pH	364	1,109	984	364	108	275	181	104	0	0	0	0	12	12	12	12	10	10	10	10
TPH/Diesel	364	1,109	984	364	108	275	181	104	8	0	0	8	12	12	12	12	10	10	10	10
TPH Gasoline: LUFT & SW-846 EPA Method 5030	364	1,109	984	364	108	275	181	104	0	0	0	0	12	12	12	12	10	10	10	10
TRPH	364	1,109	984	364	108	275	181	104	0	0	0	0	12	12	12	12	10	10	10	10

TABLE 5

UNSATURATED ZONE SOIL SAMPLES

	Parcel B	Parcel C	Parcel D	Parcel E
Grain Size	20	20	20	20
Porosity (Total)	20	20	20	20
Moisture Content	20	20	20	20
Dry Bulk Density	20	20	0	0
Wet Bulk Density	20	20	20	20
Total Organic Carbon (TOC)	20	20	20	20

TABLE 6.
FIELD QA/QC SAMPLES (WATER)

	Equipment Blanks				Duplicates				Field Blanks				Trip Blanks			
	Parcel				Parcel				Parcel				Parcel			
Proposed Analysis	B	C	D	E	B	C	D	E	B	C	D	E	B	C	D	E
CLP VOCs	13	32	30	13	10	21	20	10	30	77	72	30	50	116	110	50
CLP SOCs	13	32	30	13	10	21	20	10	30	77	72	30	0	0	0	0
CLP PCB/Pesticides	13	32	30	13	10	21	20	10	30	77	72	30	0	0	0	0
CLP Metals, including molybdenum	13	32	30	13	10	21	20	10	30	77	72	30	0	0	0	0
TPH/Diesel	13	32	30	13	10	21	20	10	30	77	72	30	0	0	0	0
TPH Gasoline: LUFT & SW-846 EPA Method 5030	13	32	30	13	10	21	20	10	30	77	72	30	50	116	110	50
TRPH	13	32	30	13	10	21	20	10	30	77	72	30	0	0	0	0

Equipment Blanks are based on five percent of all samples taken (from Table 4), plus two.
Duplicates are based on two percent of all water samples taken (from Table 4), plus two.
Field Blanks are based on two percent of all samples taken (from Table 4), plus two.
Trip Blanks are based on thirty percent of all water samples taken (from Table 4), plus two.

TABLE 7

ESTIMATED WASTE VOLUMES

	Parcel B	Parcel C	Parcel D	Parcel E
Cuttings (Cubic Yards)	50	100	100	50
Groundwater, Wells (Gallons)	16,000	28,000	16,000	28,000
Groundwater, Aq. Tests (Gallons)	40,000	136,000	136,000	40,000
Decontamination Water (Gallons)	10,000	18,000	18,000	10,000
Sump Sludge (Cubic Yards)	0	0	0	0
Personal Protective Equipment (Drum Volume)	8	15	15	8