

SOIL, AIR AND GROUNDWATER SAMPLING
SPRING 2004

FORT TOTTEN COAST GUARD STATION
QUEENS, NEW YORK

WORK PLAN
ADDENDUMS

MAY 2004



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US Army Corps
of Engineers

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May 2004

WORK MANAGEMENT PLAN ADDENDUM 2

**SOIL, AIR AND GROUNDWATER SAMPLING SPRING 2004
FORT TOTTEN COAST GUARD STATION
QUEENS, NEW YORK**

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**WORK MANAGEMENT PLAN ADDENDUM 2
SOIL, AIR AND GROUNDWATER SAMPLING SPRING 2004
FORT TOTTEN COAST GUARD STATION
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1.0 PROJECT INTRODUCTION

This addendum modifies the original Work Management Plan (WMP), dated June 2000, by specifically addressing work procedures and personnel changes for the Spring 2004 soil, air, and groundwater sampling activities and monitoring well installation at the Fort Totten Coast Guard Station, located in Queens, NY. Unless specifically modified herein, all other sections in the June 2000 WMP are still applicable.

The investigation is being executed by the US Army Corps of Engineers (USACE) with oversight from the New York Department of Environmental Conservation (NYDEC) and New York Department of Health (NYDOH). This project is being implemented by USACE in accordance with the Formerly Used Defense Sites (FUDS) program.

1.1 Background (Unchanged)

1.2 Project Objectives for the Spring 2004 Soil, Air and Groundwater Sampling

The chemicals in the soil at the upland areas do not pose a significant cancer or non-cancer health risk, based on the RI Phase 2 sampling data. However, the concentrations of polycyclic aromatic hydrocarbons (PAHs) in some surface soil samples are greater than the screening concentrations listed in NYDEC Technical and Administrative Guidance Memorandum #4046 on Determination of Soil Cleanup Objectives and Cleanup Levels (NYDEC, 1994). Also, there are fewer data points from 2" – 24" below ground surface (bgs) than in deeper soil horizons. The project objective for soils is to characterize this shallow interval because routine activities in the future use of the site may bring facility workers and visitors into contact with soils from that depth.

Thus 22 additional soil samples will be collected from 11 locations, and analyzed for semivolatile organic chemicals (SVOC) and metals. The soil locations selected for additional characterization showed higher than average SVOC concentrations in the Phase 2 sampling. The sample locations are shown in Field Sampling Plan Figure FSPAd2-1. The proposed additional soil data will be used to determine if the property is suitable for recreational or even unrestricted/unlimited use.

Wipe samples were taken from the walls of Building 615 during the Remedial Investigation. Air monitoring for mercury will be conducted during the present sampling effort. Samples will be taken with a real-time monitor, throughout Building 615 at 3 feet and 6 feet above the floor. The environmental technician will record the readings. A project objective for the air monitoring is to assess the concentration of mercury in the breathing zone for the workers in Building 615.

The human health risk assessment showed elevated levels of risk/hazard to future residential adults and children if the groundwater was used to supply drinking water. (This is hypothetical because groundwater is not presently used at Ft. Totten FUDS.) The groundwater from monitoring well 4 (MW-4) had elevated concentrations of PAHs as compared to state screening criteria. Due to the location of MW-4, surface run-off from the parking lot (which may contain

PAHs) may drain into the well as shown in Figure WMPAd2-1. The effects of runoff are difficult to confirm, therefore, one new monitoring well will be excavated to replace MW-4. The existing and new monitoring well locations are shown in Figure FSPAd2-2. The new well will be developed and groundwater samples taken and analyzed for SVOCs. A project objective is to determine whether the groundwater at Ft. Totten is contaminated with SVOCs, when samples are collected from a properly situated, installed, developed, and sampled monitoring well in the vicinity of the existing MW-4.

1.3 Soil, Air and Groundwater Sampling Spring 2004, Statement of Work

An itemized summary of program activities for Soil, Air and Groundwater Sampling Spring 2004 is as follows:

- a) Prepare the Work Management Plan (WMP), Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HSP) addendums for the Soil, Air and Groundwater Sampling.
- b) Install and develop a replacement Monitoring Well 4 (called MW-4R).
- c) Collect 11 soil samples at 2" – 12" bgs and 12" – 24" bgs. Collect air samples, analyzing for mercury, from Building 615. Collect groundwater samples from MW-4R.
- d) Perform chemical analysis of the 22 soil samples for SVOCs and metals by EPA SW-846 methods as follows:
 - (1) Target Compound List Semivolatiles by EPA Method 8270C in GC Ion-Trap Mode
 - (2) Target Analyte List Metals by EPA methods in the 6000 and 7000 series
- e) Conduct real-time and fixed-based air monitoring for mercury at Building 615. The realtime monitoring will use an OhioLumex Zeeman Portable Mercury Vapor Analyzer, model RA-915+. Samples will be taken throughout Building 615 at 3 feet and 6 feet above the floor to determine a location for fixed-based samplers. An additional sample will be collected outside of the building. The fixed-based samplers will be placed at the locations determined by the real-time monitoring.
- f) Perform chemical analysis of the 1 groundwater sample for SVOC by EPA SW-846 Method 8270C in GC Ion-Trap Mode.
- g) Request 4-week turn-around for soil and groundwater sample analyses.
- h) Review and check laboratory results.
- i) Produce a draft and final report of the results, and respond to comments.

1.4 Project Deliverable Documents

The Soil, Air and Groundwater Sampling Spring 2004 Work Plan, which consists of the Work Management Plan, Field Sampling Plan, Quality Assurance Project Plan, and Health and Safety Plan addendums, has been developed to govern work performed during this sampling event. The four sampling Work Plans together define the scope of the Ft. Totten, Spring 2004, Soil, Air and Groundwater Sampling. The Work Plans establish site-specific field sampling activities, laboratory analyses, and health and safety protocols.

A draft and final data report will be produced that discuss the results obtained from chemical analysis of the 22 soil, Building 615 mercury air sampling, and one monitoring well sample.

2.0 ENVIRONMENTAL SETTING (Unchanged)

3.0 PREVIOUS INVESTIGATIONS

A complete history of site and a discussion of the previous investigations at the Ft. Totten FUDS property are in Section 1.2.3 of the draft Remedial Investigation report (USACE, 2002).

The most recent sampling at the Ft. Totten FUDS, Remedial Investigation Phase II Sampling, was conducted July and August 2000. During the RI, USACE collected and analyzed numerous soil, sediment, surface water, groundwater, and biota samples. They also tested Little Bay sediment to determine whether it was toxic to benthic organisms. The data were used to complete human health and ecological risk assessments for Little Bay and the upland areas at Fort Totten. The conclusion of the draft Remedial Investigation Report showed there is no adverse hazard/risk impact to human health or the ecological receptors.

4.0 SCOPE OF WORK

4.1 Metals Soils Background Levels (Not Applicable)

4.2 Soil Samples B-1 through B-9

Nine soil borings will be installed and soil samples will be collected, 2" – 12" below ground surface (BGS) and 12 – 24" BGS, at the locations specified in the NYDEC letter dated February 6, 2004. The nine soil samples will be numbered Ad2004-SS-1-SH through Ad2004-SS-9-SH, for the shallow samples and Ad2004-SS-1-DP through Ad2004-SS-9-DP for the deep samples. The number of the soil samples correspond to their boring numbers (B-1 through B-9) in the Field Sampling Plan's Figure FSPAd2-1. The soil samples will be analyzed for SVOCs and metals.

4.3 *Fill Area Soil Samples 10 and 11*

Two soil borings will be installed and soil samples will be collected, 2" – 12" BGS and 12 – 24" BGS, at the fill area locations specified in the NYDEC letter dated February 6, 2004. The two soil samples will be numbered Ad2004-SS-10-SH and Ad2004-SS-11-SH for the shallow samples and, Ad2004-SS-10-DP and Ad2004-SS-11-DP, for the deep samples. The number of the soil sample corresponds to its boring number (B-10 and B-11) in the Field Sampling Plan's Figure FSPAd2-1. The soil samples will be analyzed for SVOCs and metals.

4.4 through 4.7 (Not Applicable)

4.8 *Monitoring Well 4R*

One new monitoring well shall be installed in the vicinity of the existing monitoring well MW-4, as shown in the Field Sampling Plan Figure FSPAd2-1. This existing well previously exhibited PAH groundwater contamination; however, since the well is flush-mounted in the parking lot and has sustained damage to its casing and seal, it will be abandoned and replaced by a properly installed and developed well to show the true composition of the groundwater at this facility. Groundwater is located at a depth of approximately six feet BGS at this location and is down gradient from the upland portion of the site. The groundwater gradient is shown in the Figure FSPAd2-2 of the Field Sampling Plan.

The new shallow monitoring well, to be designated MW-04R, will be screened to straddle the water table with 2.5 feet of screen extending above the water table, and 2.5 feet below, for a total of five feet of screen. The well shall have a nominal diameter of at least 4 inches and be constructed of polyvinyl chloride (PVC) with a continuously wrapped screen. A full description of the monitoring well installation and development process is provided in the Field Sampling Plan Section 4.5.

After the new monitoring well, MW-4R has been installed and developed, it will be purged and sampled to determine if soil semivolatile contaminants have entered the groundwater. Monitoring Well 4R will be analyzed for SVOCs. Monitoring well sampling protocol is provided in the Field Sampling Plan Section 4.6.

4.9 *Toxicity and Biota Sampling (Not Applicable)*

4.10 *Air Monitoring for Mercury in Building 615*

Real-time air monitoring for mercury at Building 615 will use an OhioLumex's Zeeman Portable Mercury Vapor Analyzer, model RA-915+. Samples will be taken throughout Building 615 to locate potential source areas. At least 24 locations will be sampled and concentrations recorded. In addition, a background sample will be collected outside of the building in an upwind location. The environmental technician will record the readings.

Based on the results of the real-time monitoring, fixed-based monitoring equipment will be located inside of the building at 6 locations. A fixed-based sample will be collected at 3 feet and 6 feet above the floor at each selected location (12 total samples). The samples will be submitted to an off-site laboratory for analysis. In addition, a fixed-based sample will be collected outside and upwind of the Building 615.

5.0 PROJECT ORGANIZATION AND MANAGEMENT

5.1 *Project Team*

The environmental investigation tasks associated with Fort Totten will be performed by USACE personnel in concert with contract support staff for sampling analysis.

- | | | |
|----|---|------------------------|
| a. | Project Manager | Gregory J. Goepfert |
| | <ul style="list-style-type: none"> • The primary point of contact for the project. • Coordinates between NYDEC and the present owner, the US Coast Guard. • Presents concerns/requirements for environmental cleanup to the community, working in close coordination with the RAB. | |
| b. | Design Team Leader | Debra Ford |
| | <ul style="list-style-type: none"> • Coordinates aspects of the project between Project Manager and technical staff. | |
| c. | HTRW Branch, Project Engineer | Mona Datta Ponnappalli |
| | <ul style="list-style-type: none"> • Writes WMP and HTRW aspects of the FSP. • Coordinates the Work Plan components (i.e., Work Management Plan, Field Sampling Plan, Quality Assurance Project Plan (QAPP), and Site Health and Safety Plan. | |
| d. | Project Chemist | Scott Chang, Ph.D. |
| | <ul style="list-style-type: none"> • Writes QAPP. • Coordinates with analytical chemistry laboratories and reviews chemistry results. | |
| e. | Health & Safety Officer | James Bynum |
| | <ul style="list-style-type: none"> • Prepares and coordinates Site Health and Safety Plan. • Supplies input for specific health and safety issues, which may arise during operations. | |
| f. | Environmental Health Technician | Vernon Griffin |
| | <ul style="list-style-type: none"> • Samples air in Building 615 with real-time and fixed-based equipment | |

- Samples soil and groundwater, packs samples and ships them.
- Supervises decontamination of equipment.
- Supervises disposal of investigation-derived wastes.
- Maintains field log.
- Enforces Site Health and Safety Plan.

g. Project Geologist Valerie Thurmond

- Writes the geotechnical aspects of the FSP.
- Coordinates with the Field Exploration unit (drillers).

h. Geotechnical drilling and sampling will be performed by the Field Exploration Unit (FEU), Baltimore District, U.S. Army Corps of Engineers. POC is William Kriner, 410-962-4044.

- Field Geologist – (To be determined) Responsible for drill hole layout and site utility clearances; responsible for collecting representative field data and record keeping of field activities, describing, packing and shipping geotechnical samples
- Field Supervisor - William Kriner Responsible for overall coordination of field drilling activities and completion of drilling needs to meet project requirements; selects field personnel
- Geotechnical soil testing will be performed by the Baltimore District's Materials and Instrumentation Laboratory. POC is Frank Kuhn, 410-962-4045.

i. Chemical analysis for soil and water will be performed by TriMatrix Laboratories, Inc., 5560 Corporate Exchange Court, Grand Rapids, MI 49512 P.O.C. is Gary Wood 616-975-4500. Quality Assurance will be provided by STL-Seattle, 5755 8th Street East, Tacoma, WA 98424. P.O.C. is Dawn Werner, 253-922-2310.

j. The analytical laboratory for chemical analysis of indoor air samples will be determined. The selected laboratory will be certified by NYDEC and USACE.

5.1.1 Qualifications of Personnel (unchanged)

5.2 Ft. Totten Soil, Air and Groundwater Sampling, Spring 2004 Schedule

Table WMP-Ad2-1 shows the schedule for the soil, air, and groundwater sampling activities.

Table WMP-Ad2-1 Soil, Air, and Groundwater Sampling Spring 2004 Schedule

TASK	START DATE	COMPLETION DATE
Work Management Plan, Field Sampling Plan, Quality Assurance Project Plan, and Health and Safety Plan Addendums	10 Feb 2004	7 May 2004
Comment period on Spring 2004 Soil, Air and Groundwater Sampling Work Plans	9 May 2004	4 Jun 2004
Monitoring well installation (MW-4R). Soil sampling and Building 615 air sampling.	23 Jun 2004	27-Jun 2004
Groundwater sample collection	19 Jul 2004	23 Jul 2004
Chemical Analysis of soil samples	27 Jun 2004	19 Jul 2004
Chemical Analysis of groundwater sample	26 Jul 2004	16 Aug 2004
Draft Data Report	19 Aug 2004	3 Sep 2004
Comment period on Draft Report	6 Sep 2004	30 Sep 2004
Final Data Report	4-Oct 2004	15 Oct 2004

6.0 DATA QUALITY OBJECTIVES

There are 7 steps to the EPA's DQO process. Application of the DQO Process assists site managers plan to collect data of the right type, quality, and quantity to support defensible site decisions. *Data Quality Objectives Process for Hazardous Waste Site Investigations (QA/G-4HW)* provides general, nonmandatory guidance on developing Data Quality Objectives (DQOs) for environmental data collection operations in support of hazardous waste site investigations. The DQOs for this project were developed using this guidance.

The DQO Process is a seven-step iterative planning approach used to prepare plans for environmental data collection activities (see Figure WMPAd2-2). It provides a systematic approach for defining the criteria that a data collection design should satisfy, including: when, where, and how to collect samples or measurements; determination of tolerable decision error rates; and the number of samples or measurements that should be collected. DQOs, outputs of the DQO Process, are qualitative and quantitative statements that are developed in the first six steps of the DQO Process. DQOs define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose, and specify the performance requirements for

the quality of information to be obtained from the data. These outputs are then used in the seventh and final step of the DQO Process to develop a data collection design that meets all performance criteria and other design requirements and constraints.

6.1 Step 1 The Problem

The planning team for this project includes the USACE, NYDEC, and NYDOH. The local Restoration Advisory Board also provides input into the decisions regarding environmental investigations. USACE and its contractors carry out technical execution of the project plan. Oversight is provided by both NYDEC and NYDOH. The remedial actions are governed by the FUDS program, which is executed by USACE on behalf of the Department of the Army at the direction of the US Congress.

The conceptual site model (CSM) for the FUDS area of Ft. Totten (i.e., the Coast Guard enclave) was initially developed by the USACE in the draft Remedial Investigation Report (USACE, 2002). In general terms, the CSM is focused on three potential exposure source areas 1) a release of mercury into Little Bay that occurred in the early 1930 during the use of Building 615 to service torpedoes; 2) residential development of the upland portion of the FUDS area; and consumption of the groundwater. The CSM assumes that the future land use would include recreational development along the waterside and residential development of the upland areas. Residential development in the upland areas is unlikely because the property is slated to become a park after transfer to the New York City Department of Parks and Recreation. Residential re-development of the upland areas was evaluated at the request of the NYDOH. The primary chemicals of potential concern (COPCs) were mercury in Little Bay, lead and the class of chemicals known as semivolatile organic compounds (SVOCs) (although other chemicals [e.g., metals] are present at the site at low concentrations that do not present a concern) in the upland areas and in groundwater. The NYDEC has expressed concern regarding the potential for mercury vapor in the indoor air in Building 615, the potability of the groundwater from MW-4, and number of samples in the upland area.

The RI for the upland sites examined human health risk/hazard under three exposure scenarios (residential, commercial, and construction) using the total soil results (i.e., surface and subsurface soil samples) from each of three exposure units. The upland exposure units are the Fill Area, PCB Area, Pesticide Area, and Other Area. Given that there were no measurable concentrations of PCBs in the PCB Area, a risk assessment for that area was not completed.

The reasonably anticipated receptors, based on current and anticipated future land uses, are adult and child recreational users. Other reasonable receptors include gardeners and utility/construction workers. Groundwater at these two properties and in the immediate area is not used for drinking water purposes. However, use of the groundwater is being evaluated to meet state requirements.

6.2 *Step 2 Identify the Decision*

There are three principal questions for the investigation depending on the exposure area. The principal questions that are driven by state comments on the Draft 2002 RI report are:

- Is there mercury in the indoor air at a concentration greater than 0.001 mg/m³?
- What is the nature and extent of the SVOC contamination in the upper soil horizon of the upland area?
- What is the concentration of SVOCs in the groundwater near MW-4?

After completion of the sampling, the data will be evaluated to determine the follow-up actions, if any, which are warranted. Any remedial action that may result from this investigation would be examined as part of a Feasibility Study and documented in a Proposed Plan in accordance with 40 CFR 300.400

6.3 *Step 3 Identify the Inputs to the Decision*

The information needed to establish the action level includes the potential chemicals of concern (SVOCs and mercury) and existing state and federal requirements or recommendations for clean-up levels. The existing state and federal requirements applicable to this investigation are the same as those outlined in the draft Remedial Investigation and those provided by the state in Comments on the RI. There are no criteria for the COPCs at the federal level.

The benchmark proposed by NYDOH for screening in the indoor air samples is 0.001 mg/m³. Additional benchmarks for indoor air include:

- OSHA PEL – The current Occupational Safety and Health Administration (OSHA) permissible exposure limit for mercury vapor is 0.1 mg/m³ of air as a ceiling limit. A worker's exposure to mercury vapor shall at no time exceed this ceiling level.
- NIOSH REL – The National Institute for Occupational Safety and Health (NIOSH) has established a recommended exposure limit for mercury vapor of 0.05 mg/m³ as a TWA for up to a 10-hour workday and a 40-hour workweek. NIOSH also assigns a "Skin" notation, which indicates that the cutaneous route of exposure, including mucous membranes and eyes, contributes to overall exposure.
- ACGIH TLV – The American Conference of Governmental Industrial Hygienists (ACGIH) has assigned mercury vapor a threshold limit value of 0.025 mg/m³ as a TWA for a normal 8-hour workday and a 40-hour workweek and considers mercury vapor an A4 substance (not classifiable as a human carcinogen).

The relevant information and criteria for the SVOCs in soil are provided in the NYDEC's Determination of Soil Cleanup Objectives and Cleanup Levels, Technical Assistance Guidance Memorandum (TAGM) #4046.

The relevant information and criteria for the SVOCs in groundwater are provided in the State regulations, 6 NYCRR Part 703.5.

Additional inputs to the decisions identified in Step 2 are the concentrations of SVOC in the surface and subsurface soil, the concentration of mercury in the indoor air, and the concentrations of SVOCs in groundwater proximate MW-4. This data will be available after sample collection and analysis. The location of the samples is shown in Figure FSPAd2-1, in the Field Sampling Plan.

The analytical methods necessary for decision-making are available and listed in Table 2 of the QAPP. The available detection limits for the selected methods will enable the project team to identify areas in excess of background and screening concentrations.

6.4 *Step 4 Define the Boundaries of the Study*

The spatial boundaries of the study are the limits of the FUDS portion of Ft. Totten. There is no reason to suspect that there would temporal changes in the concentration of contaminants at the site because the release of any chemicals at the site during the DOD's management of the property occurred many years ago and contaminants are assumed to have reach equilibrium with the surrounding environment. Changes in the concentration of SVOCs in the upland soil with depth are anticipated, but the degree of change is unknown. Based on previous soil boring at the upland area, the concentration of metals and SVOCs in the subsurface soil and surface soil are generally indistinguishable.

6.5 *Steps 5 and 6 Develop Decision Rule/Limits on Decision Error*

The action/no action rules for the project are based on the criteria provided by the state.

There are two possible decision errors that they could made based on the environmental data: 1) deciding that an area is not contaminated when, in fact, the area is contaminated; or 2) deciding that an area is contaminated, when in fact, it is not. In the first case, unacceptable contamination would be left on-site, and in the second case, unneeded remediation would be carried out. The following null hypothesis and the alternate hypothesis were defined:

Ho = the media of interest (soil, groundwater, indoor air) is contaminated at or above X ppm

Ha = the media of interest (soil, groundwater, indoor air) is not contaminated above X ppm

where X is the decision criterion is from Step 3.

The data collected under this plan is not designed to support statistical determination regarding the difference between the measured concentrations and the decision criteria. Decisions will be made based on the absolute values reported by the laboratory as compared to the decision criterion.

6.6 *Step 7 Optimize the Design*

The design of the sampling and analysis plan is being optimized through review by State Department of Environmental Conservation and Department of Health.

7.0 REFERENCES

Two references are added.

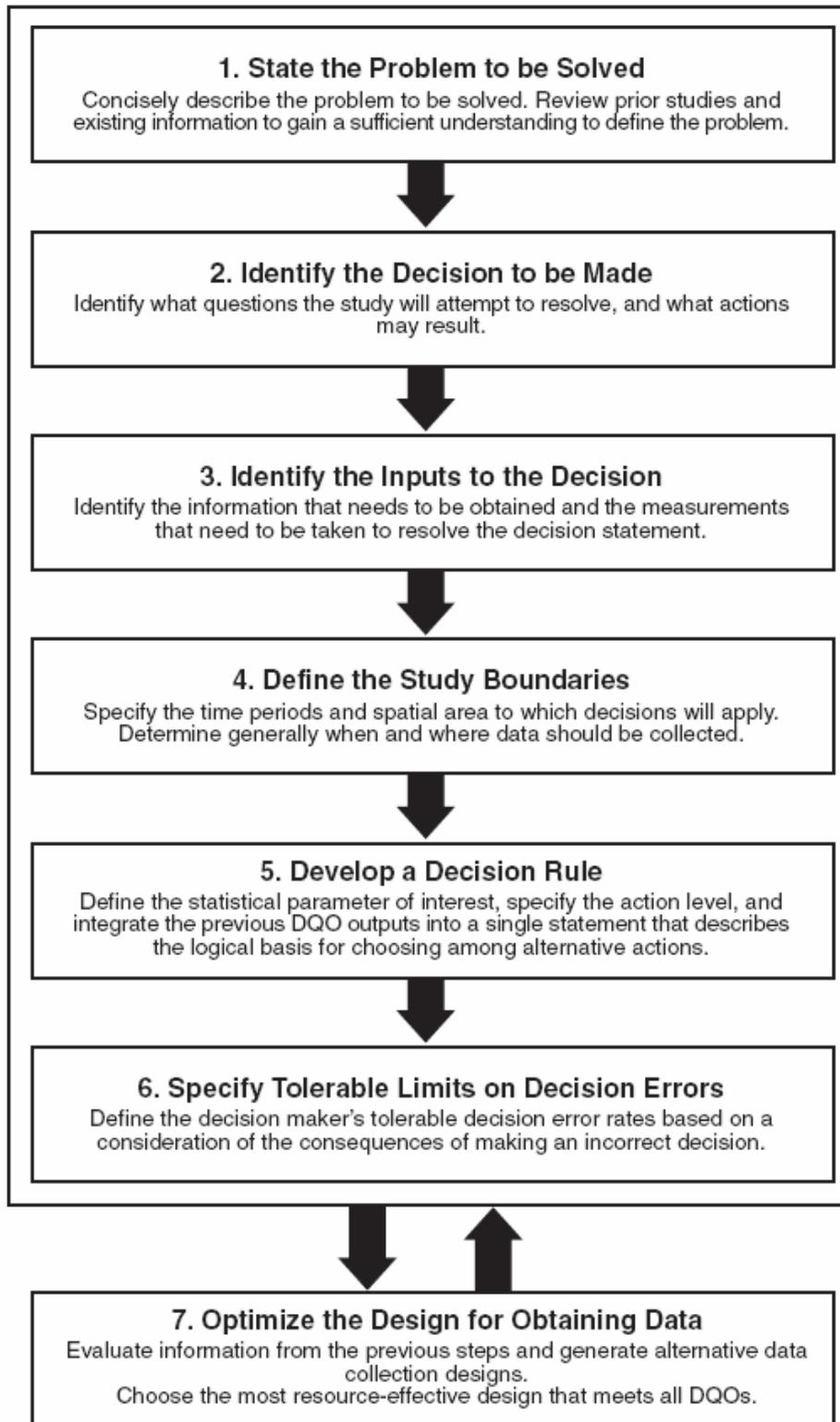
1. Remedial Investigation Draft Report, Fort Totten Coast Guard Station, Queens, NY, by EA Engineering & USACE, (July 2002)
2. Spring 2002 Monitoring Well Sampling Summary Report, Fort Totten Coast Guard Station, Queens, NY, by EA Engineering & USACE, (August 2002)
3. Technical and Administrative Guidance Memorandum #4046: Determination of Soil Cleanup Objectives and Cleanup Levels <http://www.dec.state.ny.us/website/der/tagms/prtg4046.html> by New York Department of Conservation (NYDEC), (January 1994)

Figure WMPAd2-2 Location of MW-4



Figure WMPAd2-2 Data Quality Objectives Flow Chart

DQO Process Flowchart



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May 2004

FIELD SAMPLING PLAN ADDENDUM 2

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1.0 PROJECT INTRODUCTION

This addendum modifies the original Field Sampling Plan (FSP), dated June 2000, by specifically addressing work procedures and personnel changes for the Spring 2004 soil, air and groundwater sampling activities and monitoring well installation Fort Totten Coast Guard Station, located in Queens, NY. Unless specifically modified herein, all other sections in the June 2000 FSP are still applicable.

1.1 Background (Unchanged)

1.2 Previous Investigations

A complete history of site and a discussion of the previous investigations at the Ft. Totten FUDS property are in Section 1.2.3 of the draft Remedial Investigation report (USACE, 2002).

The most recent sampling at the Ft. Totten FUDS, Remedial Investigation Phase II Sampling, was conducted July and August 2000. During the RI, USACE collected and analyzed numerous soil, sediment, surface water, groundwater, and biota samples. They also tested Little Bay sediment to determine whether it was toxic to benthic organisms. The data were used to complete human health and ecological risk assessments for Little Bay and the upland areas at Fort Totten. The conclusion of the draft Remedial Investigation Report showed there is no adverse hazard/risk impact to human health or the ecological receptors.

During Phase II investigations of the groundwater one of the monitoring wells, MW-4 had detectable concentrations of semivolatile organic compounds (SVOC) at low levels (ppm). However, groundwater may not be appropriate for use as a potable water source.

1.3 Project Objectives for the Spring 2004 Soil, Air and Groundwater Sampling

The project objectives for the Spring 2004 sampling effort are provided in the Work management Plan, Addendum 2. A summary of the effort is provided in Table FSPAd2-1.

1.4 Soil, Air and Groundwater Sampling Spring 2004, Statement of Work

An itemized summary of program activities for Soil, Air and Groundwater Sampling Spring 2004 is contained in the Work Management Plan, Addendum 2. A summary of the effort is provided in Table FSPAd2-2.

1.5 Project Deliverable Documents

The project deliverable documents are described in the Work Management Plan, Addendum 2.

2.0 GROUND RULES

2.1 *Site Access*

Access to the facility will be coordinated with Mr. Gregory Goepfert, at least 7 days prior to mobilization to the site.

Gregory J. Goepfert, U. S. Army Corps of Engineers, Project Manager, Attn: CENAN-PP-E, 26 Federal Plaza, Room 1811, New York, NY 10278-00090 (212) 264-5581.

2.2 *Field Equipment and Supplies (unchanged)*

2.3 *Field Instrumentation*

In addition to the information in the Field Sampling Plan (FSP), dated June 2000, Section 2.3, the following is added. Air monitoring for mercury at Building 615 will use OhioLumex's Zeeman Portable Mercury Vapor Analyzer, model RA-915+, a real time monitor. Appendix A contains the Users's Manual.

2.4 *Work Area Restoration*

All work areas around the drill holes shall be restored to a physical condition equivalent to that prior to the investigation. Pavement areas will be patched with in-kind materials. Borings shall be backfilled by alternately placing soil cuttings in the hole and tamping. Borings in the roadway will be allowed to settle for a day, tamped again and patched with in-kind material.

2.5 *Contractor Chemical Quality Control (unchanged)*

2.6 *Correct Actions (unchanged)*

2.7 *Ft. Totten Soil, Air and Groundwater Sampling, Spring 2004 Schedule*

Table WPM-Ad2-1 in the Work Management Plan shows the schedule for the soil, air and groundwater sampling activities.

3.0 SCOPE OF WORK FOR FIELD ACTIVITIES

3.1 *Metals Soil Background Levels (not applicable)*

3.2 *Soil Samples B-1 through B-9*

Nine soil borings will be installed and soil samples will be collected, 2'' – 12'' BGS and 12 – 24'' BGS, at the locations specified in the NYDEC letter dated February 6, 2004. The nine soil samples will be numbered Ad2004-SS-1-SH through Ad2004-SS-9-SH, for the shallow samples and Ad2004-SS-1-DP through Ad2004-SS-9-DP for the deep samples. The number of the soil

samples correspond to their boring numbers (B-1 through B-9) in Figure FSPAd2-1. The soil samples will be analyzed for Target Compound List (TCL) semi-volatile organic compounds, and Target Analyte List metals, as shown in Table FSPAd2-3. The relationship between the soil sample numbers and the descriptions specified in the NYDEC letter is given in Table FSPAd2-6.

3.3 *Fill Area Soil Samples 10 and 11*

Two soil borings will be installed and soil samples will be collected, 2" – 12" BGS and 12 – 24" BGS, at the fill area locations specified in the NYDEC letter dated February 6, 2004. The two soil samples will be numbered Ad2004-SS-10-SH and Ad2004-SS-11-SH for the shallow samples and, Ad2004-SS-10-DP and Ad2004-SS-11-DP, for the deep samples. The number of the soil samples correspond to their boring numbers (B-10 and B-11) in Figure FSPAd2-1. The soil samples will be analyzed for Target Compound List (TCL) semi-volatile organic compounds, and Target Analyte List metals, as shown in Table FSPAd2-3.

3.4 through 3.7 (not applicable)

3.8 *Monitoring Well 4R (MW-4R)*

One new monitoring well shall be installed in the vicinity of the existing monitoring well MW-4, as shown in Figure FSPAd2-1. This existing well previously exhibited PAH groundwater contamination; however, since the well is flush-mounted in the parking lot and has sustained damage to its casing and seal, it will be abandoned and replaced by a properly installed and developed well to show the true composition of the groundwater at this facility. Groundwater is located at a depth of approximately six feet BGS at this location and is down gradient from the upland portion of the site. The groundwater gradient is shown in Figure FSPAd2-2.

The new shallow monitoring well, to be designated MW-04R, will be screened to straddle the water table with 2.5 feet of screen extending above the water table, and 2.5 feet below, for a total of five feet of screen. The well shall have a nominal diameter of at least 4 inches and be constructed of polyvinyl chloride (PVC) with a continuously wrapped screen. A full description of the monitoring well installation and development process is provided in Section 4.5.

After the new monitoring well, MW-4R has been installed and developed, it will be purged and sampled to determine if soil semivolatile contaminants have entered the groundwater. Monitoring Well 4R will be analyzed for SVOCs, as shown in Table FSPAd2-4. Monitoring well sampling protocol is provided in Section 4.6.

3.9 *Toxicity and Biota Sampling (not applicable)*

3.10 *Air Monitoring for Mercury in Building 615*

Air monitoring for mercury at Building 615 will use an OhioLumex Zeeman Portable Mercury Vapor Analyzer (model RA-915+), as shown in Table FSPAd2-5. Samples will be taken throughout Building 615 to locate potential source areas. At least 12 locations will be sampled.

An additional sample will be collected at an up-wind background location outside the building. The Zeeman Portable Mercury Vapor Analyzer (model RA-915+) has a response time of one second for air. A pair of samples (high and low) will be taken at each location and the readings will be recorded by the environmental technician. The Zeeman monitor analyzes using the differential atomic absorption spectrophotometer technique.

Based on the results of the real-time monitoring, fixed-based monitoring equipment will be located inside the building at 6 locations. A fixed-based sample will be collected at 3 feet and 6 feet above the floor at each selected location (12 samples). There will also be a duplicate sample location inside the building and a background sample location outside and upwind of Building 615. In these cases also, samples will be taken at 3 and 6 feet above the floor or ground (4 more samples). The samples will be submitted to an off-site laboratory for analysis. The laboratory will be certified by the New York State Department of Health's Environmental Laboratory Approval Program (ELAP). The samples will be analyzed by National Institute for Occupational Health and Safety (NIOSH) method 6009/ELAP method 4503. This method uses sorbent tubes to collect the sample.

4.0 FIELDWORK

All fieldwork will be performed in compliance with the Site Safety and Health Plan developed specifically for this investigation. Monitoring well installation will be the first element of the investigation and will precede soil-boring sampling. Utility clearances will be performed by the field geologist prior to intrusive work being performed at the site.

4.1 Sediment Samples (not applicable)

4.2 Soil Samples

Eleven borings shall be drilled, logged, and sampled from the upland portion of the Fort Totten Coast Guard site to assess surface soils for all potential future uses. Samples will be collected and analyzed from soils immediately below the ground surface to a depth of two feet. Individual samples will be collected from the 2 to 12-inch depth and from the 12 to 24-inch depth from each of the eleven sample locations, as shown in Figure FSP-AD2-1. Each of the 22 samples will be analyzed for TCL SVOCs and TAL metals.

All soil borings shall be sampled continuously from the surface to a depth of 24 inches for lithological descriptions and laboratory analysis. The first analytical sample retained shall be the sample collected from the 2-inch to 12-inch interval. The second sample retained shall be the sample collected from the 12-inch to 24-inch interval of each boring. The soil sampling plan is summarized in Table FSPAd2-3. NYDEC may collect QA split samples.

4.2.1 Soil Boring Sample Collection

Collection of soil samples at boring locations shall be conducted as follows:

- a) Soil borings will be drilled using a mobile, truck-mounted rig equipped with 4.25-inch inner diameter (ID) hollow stem augers. Split-spoon samples will be collected at the designated intervals using a three-inch ID split-spoon and a 300-pound hammer (18" drop, blows recorded per 0.5'). All drilling equipment, to include the drill rig, water tanks (inside and out), augers, drill casings, rods, samplers, downhole tools, etc., shall be steam cleaned prior to commencing work and prior to beginning work on each new boring. Petroleum based lubricants will not be used on any downhole tools or sampling equipment. Soil samples will be classified according to the Unified Soil Classification System (USCS) and boring logs completed for each boring.
- b) Soil shall be scooped from the center of both halves of the soil core, and placed in a stainless steel mixing bowl. The scoop or trowel for sample homogenization should not be chrome-plated, because metals are contaminants of concern. The portion of the soil in the split-spoon which represents slough shall not be included as part of the sample, and no soil in contact with the split-spoon shall be included as part of the sample. The soil in the stainless steel mixing bowl will be homogenized by thoroughly mixing the soil using the quartering technique. This procedure should be followed two or three times until the sample is adequately mixed (i.e. a consistent physical appearance is obtained). Once mixing is complete, the sample should be divided in half and the sample containers filled by scooping sample material alternately from each half. Immediately transfer sample into an appropriate sample bottle with a stainless steel spoon or equivalent. Check that a PTFE liner is present in cap. Secure the cap tightly.
- c) Each sample jar will be labeled in waterproof ink to indicate the sample number, analytical parameters/method, preservation (if any), location, date and time of collection, and sampler. Each sample number and associated information will be entered on the lab provided chain of custody form.
- d) The sample containers should be tightly sealed, clearly labeled, wrapped in bubble wrap, put in a "ZipLoc" bag and placed on ice immediately.
- e) Upon completion of sampling, soil cuttings will be returned to the boring and tamped into place. Excess cuttings will be spread around the borehole.
- f) A survey-grade global positioning system (GPS) unit will be used to accurately measure horizontal survey position (X, Y coordinates) of each boring drilled in the Upland areas. Survey measurements should be accurate to within 5.0 ft. and will reference the New York State Plane Coordinate System. A sketch of the boring location with the GPS coordinates will be included on each boring log.

4.3 *Sampling for Physical/Geotechnical Parameters*

Geotechnical samples shall be collected to determine the physical/geotechnical properties of the soils for evaluation of remedial/removal alternatives should cleanup to an unrestricted/unlimited

level be found practicable. Environmental samples have precedence over geotechnical samples. Two geotechnical samples per boring shall be collected from each of the eleven boring locations; one from each of the two depth intervals, for a total of 22 samples. The objective is to obtain geotechnical parameters from the shallow subsurface soils in the upland area of site. The samples shall be submitted for Atterberg Limits, grain-size distribution, and moisture content testing. Testing will be performed by the USACE Soils Laboratory Unit at Fort McHenry Yard in Baltimore, MD.

4.4 *Surface Water (not applicable)*

4.5 *Monitoring Well Installation & Development*

4.5.1 *Monitoring Well Materials*

Well Screen and Casing. The well screen and casing will consist of four-inch diameter, Schedule 40 polyvinyl chloride (PVC). The casing and screen will have ASTM-type threaded joints. No grease, lubricant, gaskets, glue, or tape will be used. Well screen and casing that have been pre-cleaned and factory-sealed will be utilized. If the factory plastic seal is not intact, the PVC should be cleaned with a phosphate-free detergent and rinsed thoroughly with potable water and allowed to air dry prior to installation in the borehole.

Screens will be 5 feet in length with a slot width of 0.010 inches. Well screen will be constructed of continuously wound four-inch diameter Schedule 40 PVC pipe. All well screens will be fitted with a threaded PVC plug that will be within six inches of the open portion of the screen. Solid casing will extend from the screen to just below the ground surface. The top of the casing will be equipped with an easily removable cap.

Filter Pack. Filter material will be a Morie composite #00 well gravel or equivalent.

Seal. Three-eighths-inch diameter bentonite pellets will be used as a well sealant material and will be a commercially available product designed specifically for well sealing purposes. Potable water will be used to hydrate the pellets. Approximately one gallon of water will be added after each foot of bentonite placed in the annulus.

Grout. The cement/bentonite grout used for the well construction will consist of Type I Portland cement combined with a granular bentonite additive to reduce shrinkage. The grout mixture will be composed of six to eight gallons of potable water per 94-pound bag of cement and four to five pounds of dry, unaltered granular bentonite.

Flush Mount. The well will be placed in a waterproof vault, the rim of which extends two inches above the ground surface. A sloping cement pad shall be placed 18 inches around and two feet below the base of the vault, between the casing and the wall of the borehole to prevent surface contaminants from entering the monitoring well. The well will be fitted with a bolted lid.

Well Tag. The well tag will be permanently affixed to the rim of the vault.

4.5.2 Drilling Procedures

Monitoring wells are to be installed in boreholes advanced by the hollow stem auger method. The minimum diameter of the borehole prior to well installation will be six inches.

4.5.3 Boring Logs

A lithologic boring log will be developed for each boring. Boring logs will, at a minimum, include the following information:

- Depth interval for each sample,
- Soil/Rock description,
- Moisture content,
- Depth to first encountered groundwater,
- Water level at completion of drilling,
- 24-hour water level,
- Drilling method & equipment specifications, and significant observations regarding drilling rate, water loss, etc.

4.5.4 Well Construction

- All monitoring wells shall be constructed in accordance with USACE Engineering Manual (EM) 1110-1-4000, "Monitor Well Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites.
- Wells will be constructed as shown in Attachment 1.
- Filter pack material will be tremied into the annulus. The filter pack will be placed from the bottom of the boring to one foot above the top of the well screen.
- A three-foot bentonite seal will be placed on top of the filter material and hydrated in one-foot lifts. After the bentonite pellets have been placed, the seal will be allowed to hydrate for a minimum period of one hour before grout emplacement. Fine sand (e.g., Morie FJ 100 or equivalent) will be placed immediately on top of the bentonite seal to prevent downward grout migration.
- A cement-bentonite grout mixture will be placed from the top of the fine sand and bentonite seal to the ground surface. The grout material should be combined in an above-ground rigid container and mechanically blended to produce a thick, lump-free mixture. The grout will be pumped into the annular space under pressure to ensure that there is a continuous grout seal. The bottom of the grout tube should be constructed so as to direct discharge to the sides, not downward towards the well seal,

and should extend to within three feet of the well seal. It shall be slowly raised as the grout is placed, maintaining the discharge end of the pipe submerged at all times.

- The well will be placed in a waterproof vault, the rim of which extends two inches above the ground surface. A sloping cement pad shall be placed 18 inches around and two feet below the base of the vault, between the casing and the wall of the borehole to prevent surface contaminants from entering the monitoring well. The well will be fitted with a bolted lid.
- An as-built diagram of the well installation will be completed for the well installation and attached to the drilling log. Blank as-built diagrams are provided in Attachment 1.
- A weather resistant tag with the well designation, elevation, screen depth, well depth, well diameter, and completion date will be affixed to the outside of the waterproof vault.

4.5.5 Well Development

- Well development will occur between 48 hours and seven days after well installation.
- Development will be accomplished by pumping and surging. During the development procedure, flow will be induced along the entire length of the screen by alternately raising and lowering the pump intake or swabbing with a surge block tool along the length of the well screen.
- The surge block, pump, and related equipment and tools will be steam cleaned on site before use in the wells, and between wells. When not in the well, these items will be stored on clean, disposable polyethylene plastic sheeting to prevent contact with the ground surface.
- Development shall proceed until all of the following requirements are met:
 - 1) The well water is clear to the unaided eye,
 - 2) The sediment thickness remaining in the well is less than one percent of the screen length,
 - 3) A volume of water equal to a minimum of five times the standing water in the well (to include the volume of the filter pack assuming 30 percent porosity) has been removed,
 - 4) Five times the volume of added water (if used) is removed, and
 - 5) Turbidity is less than 50 nephelometric turbidity units (NTUs).
- A well development record will be completed for the well. An example well development form is contained in Attachment 1.

Note: If the development requirements are not met after four hours of development, the field supervisor/geologist should contact the project geologist for further guidance.

4.6 Purging and Sampling of Monitoring Wells

Groundwater purging and sampling shall be performed using low-flow (minimal drawdown) groundwater sampling procedures. Low-flow sampling procedures allow for sampling of the formation water with minimal mixing of the casing water or disturbance to the sampling zone. Low flow sampling techniques have been demonstrated to provide samples that are in general more representative of the “mobile” contaminant load. NYDEC may collect QA split samples.

A Grundfos Redi-Flo submersible pump (or equivalent) shall be used for purging and sampling. The pump intake shall be placed at the approximate midpoint of the saturated screened interval, and the rates of discharge kept low enough to minimize stress (drawdown) in the well. The goal is minimal drawdown (<0.1 m) during purging. Pumping rates and drawdown shall be measured and recorded on the purging sheets. Purging shall be performed until stabilization of water quality indicator parameters (pH, temperature, specific conductance, dissolved oxygen, oxidation-reduction potential, and turbidity) is established. Stabilization will be established by three consecutive readings in which: pH variation is less than 0.2 units, temperature variation is less than 0.5 degrees Celsius, and all other parameters are less than 10 percent variation. A minimum of 5 sets of water quality indicator parameters should be recorded.

Turbidity and DO usually require the longest time for stabilization. Thirty minutes to 1.5 hours of purging at a rate of 0.2 to 0.3 liter/minute may be required to reach stabilization. Stabilized purge indicator trends are generally obvious and follow either an exponential or asymptotic change to stable parameter values during purging.

The above stabilization guidelines are provided as estimates and will not be appropriate for use in all circumstances. Purging will cease if the indicator parameters do not stabilize within 2 hours of elapsed purging time. If the parameters do not stabilize, a notation will be made in the sampling log to that effect.

Purging of wells should be conducted as follows:

- a) Prior to purging a well, the static water level will be recorded.
- b) Testing of well parameters will be performed using a flow-through cell (i.e. Purge-Saver). Instruments will be calibrated and operated in accordance with manufacturer's instructions. The sampling chamber will be decontaminated between wells. The pH meter will be calibrated with buffer solution before sampling the well.
- c) An initial reading of parameters will be recorded at the start of purging, and again at regular intervals during purging. Results will be recorded on the well sampling record. Pump rates and drawdowns shall also be recorded on the purging records. The six water quality parameters will be tested and recorded constantly during purging until they have stabilized.

- d) Every effort should be made to avoid purging the well to dryness. The well should be purged at or below their recovery rates. If the well has been pumped to near dryness, the well should be allowed to recover to a volume sufficient for sampling and then sampled.
- e) Record the total amount of water purged before groundwater sampling. The sample jars will be filled immediately after purging has been completed.
- f) The groundwater sample shall be collected from the pump discharge tube prior to the flow-through cell. The use of a T-valve is recommended. The sample should flow gently into the vial, rolling down the inside wall. The sampling flow rate should be established to minimize aeration, bubble formation, turbulent filling of sample bottle and residence time in tubing. Typically, flow rates less than 0.5 L/min are appropriate. The vial will be filled so a meniscus is formed and no headspace remains. Upon collection of the sample, the vial will be checked to ensure no bubbles are present. If bubbles are present, re-sampling will occur.

5.0 SAMPLE IDENTIFICATION

5.1 *Sample Identification*

The Fort Totten Spring 2004 soil sample numbering scheme will be in the format **Ad2004-SS-# -SH** for the shallow samples (2" – 12" BGS) and **Ad2004-SS-# -DP** for the deeper (12" – 24" BGS) samples. In this sampling scheme the # refers to the borehole number, ranging from one to eleven (shown in Figure FSPAd2-1). Higher, masking, sample numbers can be assigned for quality assurance/quality control (QA/QC) samples.

The real-time and laboratory air samples from Building 615 will be numbered **Ad2004-AIR-Hg-#-L**, or **Ad2004-AIR-Hg-#-H**, where # is the sample number, consecutively taken and recorded. The L is for samples taken at 3 feet above the floor and the H is for samples taken 6 feet above the floor. The real-time samples will have the first numbers, expected to be one through 13. (Number 13 is expected to be the background real-time air sample.) It will be noted which real-time location corresponds to which laboratory sample. Quality control samples are not taken during real time air sampling for mercury. The laboratory air samples for mercury will have one duplicate quality control sample taken from inside building 615. There will also be a trip blank with the laboratory air sample cooler. Higher, masking, sample numbers can be assigned for the quality control samples.

The groundwater sample numbering scheme for the Spring 2004 sampling will be in the format **Ad2004-MW4R-GW-#**, where # is the sample number. The sample number is "1" except when higher, masking, numbers are used for QA/QC samples.

5.2 *Sample Labeling*

Section 5.2 (d) is amended below:

- a. Project number and site name
- b. Unique sample identification number
- c. Sample location
- d. Sample description (soil, or groundwater sample)
- e. Sample status (grab or composite)
- f. Chemical analysis parameters (analytes and EPA SW-846 method number).
- g. Sampling date and time
- h. Initials of Environmental Health Technician
- i. Method of sample preservation
- j. Remarks (such as PID readings) are useful

6.0 CHAIN OF CUSTODY (Unchanged)

7.0 SAMPLE PACKING AND SHIPPING

7.1 Packing and Transportation (unchanged)

7.2 Sample Packing Instruction (unchanged)

7.3 Sample Shipping

Samples will either be shipped overnight express or be hand delivered to the laboratory every day. A copy of the chain of custody form showing proper turnover to the lab will be returned to the Project Chemist at the completion of the project. The primary laboratory for the soil and groundwater samples analysis is TriMatrix Laboratories, Inc. and the QA samples analysis laboratory is STL-Seattle (STL). The laboratory for the air samples is to be determined in the near future.

Samples collected on Friday and going to the contract laboratory will be marked on the shipping label "For Saturday Delivery" and sent by overnight express. The Environmental Health Technician will contact the laboratory to expect a Saturday delivery.

It is preferred that chemical analytical samples be shipped to the lab within 24 hours. The laboratory has a 4-week turn around time on samples. Therefore, the Environmental Health

Technician must obtain specific prior approval from the USACE Project Chemist for samples collected on Saturday, which will be shipped to the laboratory on Monday. In that case the temperature of 4° C must be maintained inside the cooler throughout the weekend and until the samples have been turned over to the laboratory.

Shipping Addresses:

<p>Primary Laboratory:</p> <p>TriMatrix Laboratories, Inc. 5560 Corporate Exchange Court Grand Rapids, MI 49512 Phone: (616) 975-4500 POC: Gary Wood</p>	<p>QA/QC Laboratory:</p> <p>STL-Seattle 5755 8th Street East Tacoma, WA 98424 Phone: 253-922-2310 POC: Dawn Werner</p>
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8.0 DOCUMENTATION (Unchanged)

9.0 DECONTAMINATION

9.1 Decontamination Supplies (unchanged)

9.2 Equipment Decontamination

9.2.1 Drill Rig

The drill rig shall be decontaminated prior to entering the site, between boreholes, any time the rig leaves the drill site, and at the conclusion of the drilling program, by steam cleaning with potable tap water. All rust, soil, and other materials that may pose a risk of contamination shall be cleaned off. The drill rig must be inspected to ensure that all oil, grease, and hydraulic fluid has been removed from exposed surfaces and that all seals and gaskets are intact, with no fluid leaking.

9.2.2 Downhole Tools

Downhole tools are equipment such as augers, drill casings, rods, bits, tremie pipe, etc., that are unlikely to come in direct contact with the sample. Decontamination procedures shall be followed prior to the beginning of work, between boreholes, any time the rig leaves the drill site, and at the conclusion of the drilling program. Lubricants, with the exception of Well Guard, shall not be used on any downhole tools and sampling equipment. The equipment shall be kept off the ground during and after the decontamination process. Such equipment shall be decontaminated thus:

- 1) Dislodge gross contamination.

- 2) Steam clean the equipment thoroughly, using a brush to remove any particulate matter or surface film. If the equipment is still not clean, proceed to steps 3) and 4). Otherwise, allow the equipment to air dry.
- 3) Scrub the equipment thoroughly with phosphate-free detergent and tap water. Use a brush to remove any clinging soil or surface film.
- 4) Rinse the equipment thoroughly with potable water and allow it to air dry.

9.2.3 Sampling Equipment

All sampling and drilling equipment that has the potential to come in direct contact with the sample (i.e. split spoon samplers, sampling spatulas, bowls and spoons), will be decontaminated at the start of work and between sampling increments and bore/well holes. The decontamination procedure that follows is ASTM D 5088-90.

The following field cleaning procedure is outlined for routine decontamination of such equipment:

- 1) Dislodge gross contamination with sampling utensils.
- 2) Wash the equipment thoroughly with phosphate-free detergent and tap water. Use a brush to remove any particulate matter or surface film.
- 3) Rinse the equipment thoroughly with potable water.
- 4) Equipment used to collect metal analysis samples should be rinsed with a dilute nitric acid solution (1% solution), then rinsed thoroughly with potable water. Otherwise proceed to next step.
- 5) Equipment used to collect samples, to be analyzed for organics, will be rinsed with pesticide-grade isopropanol and air dried.
- 6) Thoroughly rinse equipment with distilled/deionized water and allow to air dry.
- 7) Wrap sampling equipment completely with aluminum foil or plastic wrap to prevent contamination during storage and/or transport.
- 8) Equipment that cannot be washed and rinsed (PID, for example) should be covered with a plastic bag while sampling, with only the probe tip exposed.

10.0 MANAGEMENT OF INVESTIGATIVE DERIVED WASTE (Unchanged)

11.0 REFERENCES

Two references are added.

1. Remedial Investigation Draft Report, Fort Totten Coast Guard Station, Queens, NY, by EA Engineering & USACE, (July 2002)
2. Spring 2002 Monitoring Well Sampling Summary Report, Fort Totten Coast Guard Station, Queens, NY, by EA Engineering & USACE, (August 2002)

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Table FSPAd2-1

HTRW Sampling Plan Outline
 Ft. Totten Spring 2004 Sampling

AREA	SAMPLE TYPE	ANALYSIS	QA/QC SAMPLES
Soil Samples (11 locations)	11 Soil Samples (2" -- 12" BGS) and 11 samples (12" - 24" BGS)	TCL SVOC = 22	2D + 2R + 2F + 2QA = 8
Soil Samples (11 locations)	11 Soil Samples (2" -- 12" BGS) and 11 samples (12" - 24" BGS)	TAL Metals = 22	2D + 2R + 2F + 3QA = 9
Building 615	Air at 3' and 6' above the floor/ground. At least 13 real-time and 7 laboratory analysis sample pairs will be taken. One sample each, of real-time and laboratory analysis, will be an outside, background sample.	Mercury	2D + 1TB = 3
Monitoring Well 4R	1 MW = 1 GW Samples	TCL SVOC = 5	1D + 1QA = 2

Table FSPAd2-2

**Chemical Data Collection, Analytical Methods and QA/QC Table
Ft. Totten Spring 2004 Sampling**

Medium	Sampling			Analysis		Number of Samples							
	Method	Location	Depth	Parameter	Method	Matrix	Duplicate		Blanks			MS/MSD	Total
							QA	QC	Rinsate	Trip	Field		
Surface Soil	Split Spoon	Upland Area	2" - 12" BGS	TCL SVOC	EPA 8270	9	1	1	1	-	1	-	13
Surface Soil	Split Spoon	Upland Area	2" - 12" BGS	TAL Metals	EPA6000 /7000 Ser.	9	2	1	1	-	1	-	14
Surface Soil	Split Spoon	Fill Area	12" - 24" BGS	TCL SVOC	EPA 8270	2	1	1	1	-	1	-	6
Surface Soil	Split Spoon	Fill Area	12" - 24" BGS	TAL Metals	EPA6000 /7000 Ser.	2	1	1	1	-	1	-	6
Ambient Air	Zeeman RA-915+	Building 615	3 feet above floor	Mercury	Difrntrl AA Spectropho	13	-	-	-	-	-	-	13
Ambient Air	Zeeman RA-915+	Building 615	6 feet above floor	Mercury	Difrntrl AA Spectropho	13	-	-	-	-	-	-	13
Ambient Air	Sorbent Tube	Building 615	3 feet above floor	Mercury	NIOSH 6009	6	-	1	-	1	-	-	8
Ambient Air	Sorbent Tube	Building 615	6 feet above floor	Mercury	NIOSH 6009	6	-	1	-	-	-	-	7
Ground-Water	Low-Flow Pump	Well 4R	Mid-saturated Level	TCL SVOC	EPA 8270	1	1	1	-	-	-	-	3

Table FSPAd2-3

**Soil Sampling, Chemical Matrix Table
Ft. Totten Spring 2004 Sampling**

Sample I.D.	Depth BGS	TCL SVOC	TAL Metals	Container	Laboratory
Ad2004-SS-1-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-2-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-3-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-4-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-5-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-6-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-7-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-8-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-9-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-10-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-11-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-12-SH	2" - 12"	X	X	(1) 8 oz Glass	TriMatrix Duplicate (QC)
Ad2004-SS-13-SH	2" - 12"	X	X	(1) 8 oz Glass	STL Duplicate (QA)
Ad2004-SS-14-SH	2" - 12"		X	(1) 8 oz Glass	The extra metal STL Duplicate (QA)
Ad2004-SS-15-SH	2" - 12"	X	X	(1) 1 l Plastic & (2) 1 L Amber	TriMatrix Rinse Blank
Ad2004-SS-16-SH	2" - 12"	X	X	(1) 1 l Plastic & (2) 1 L Amber	TriMatrix Field Blank
Ad2004-SS-1-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-2-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-3-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-4-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-5-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-6-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-7-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-8-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-9-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-10-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-11-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix
Ad2004-SS-12-DP	12" - 24"	X	X	(1) 8 oz Glass	TriMatrix Duplicate (QC)
Ad2004-SS-13-DP	12" - 24"	X	X	(1) 8 oz Glass	STL Duplicate (QA)
Ad2004-SS-14-DP	12" - 24"	X	X	(1) 1 l Plastic & (2) 1 L Amber	TriMatrix Rinse Blank
Ad2004-SS-15-DP	12" - 24"	X	X	(1) 1 l Plastic & (2) 1 L Amber	TriMatrix Field Blank

Each pair of samples with the same number before the suffix ("SH" or "DP"), shall be taken from the same borehole.

Table FSPAd2-4**Groundwater Sampling, Chemical Matrix Table
Ft. Totten Spring 2004 Sampling**

Sample I.D.	Depth BGS	TCL SVOC	Container	Laboratory
Ad2004-MW4R-GW-1	Water Table	X	(2) 1L Amber Glass	TriMatrix
Ad2004-MW4R-GW-2	Water Table	X	(2) 1L Amber Glass	TriMatrix Duplicate (QC)
Ad2004-MW4R-GW-3	Water Table	X	(2) 1L Amber Glass	STL-Seattle Duplicate (QA)

**Mercury Air Sampling Matrix Table
Ft. Totten Spring 2004 Sampling**

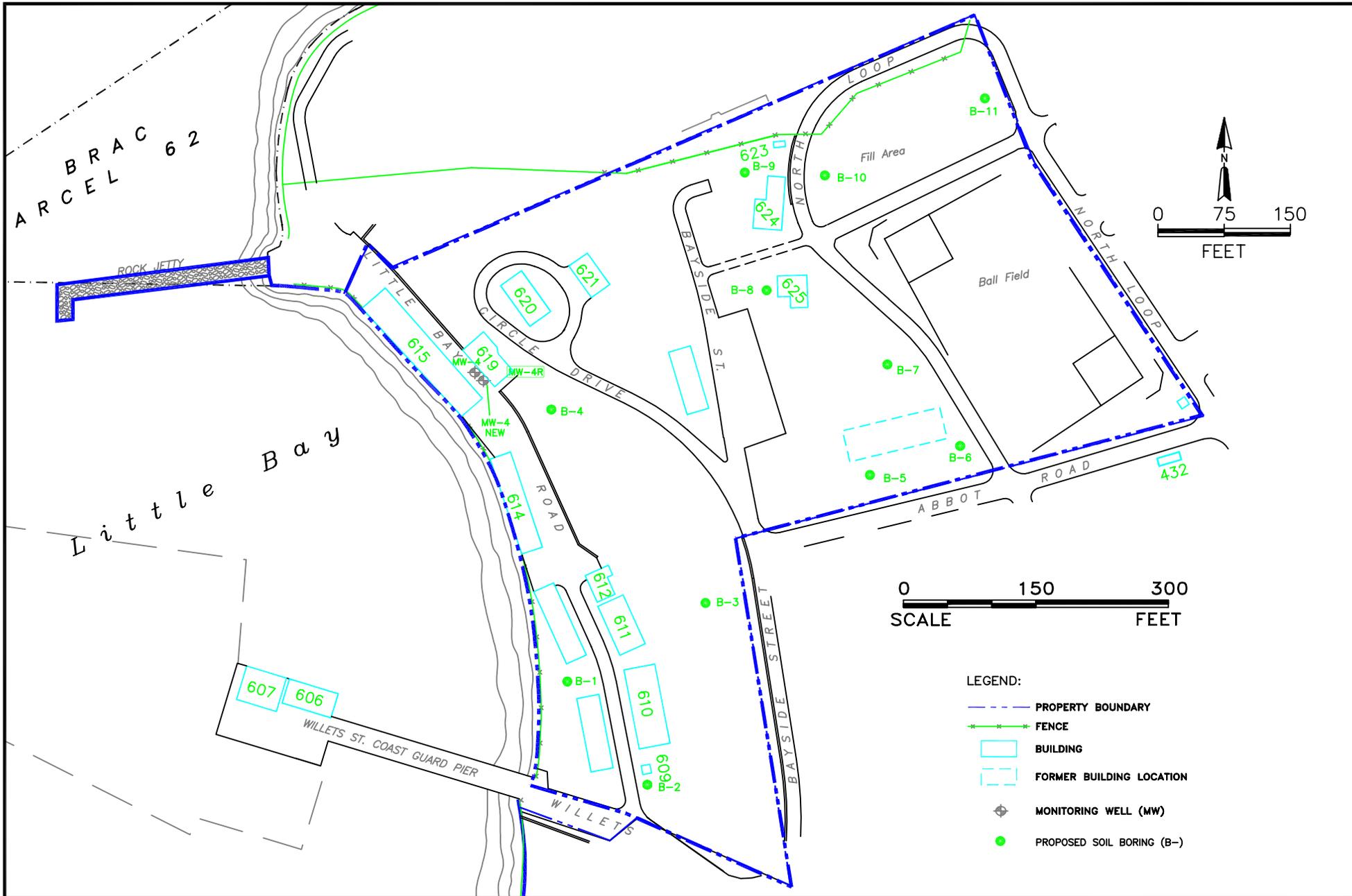
Sample I.D.	Height from Floor (feet)	Mercury (Hg)	Sampling Matrix	Analyzer
Ad2004-AIR-Hg-14L	3	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-14H	6	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-15L	3	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-15H	6	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-16L	3	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-16H	6	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-17L	3	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-17H	6	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-18L	3	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-18H	6	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-19L	3	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-19H	6	X	Ambient air from inside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-20L	3	X	Background air from outside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-20H	6	X	Background air from outside Bldg. 615	ELAP Certified Laboratory
Ad2004-AIR-Hg-21L	3	X	Ambient air from inside Bldg. 615	ELAP Laboratory QC Duplicate
Ad2004-AIR-Hg-21H	6	X	Ambient air from inside Bldg. 615	ELAP Laboratory QC Duplicate

Each pair of samples with the same number, with "L" and "H" suffixes, should be taken from the same location.

Table FSPAd2-6

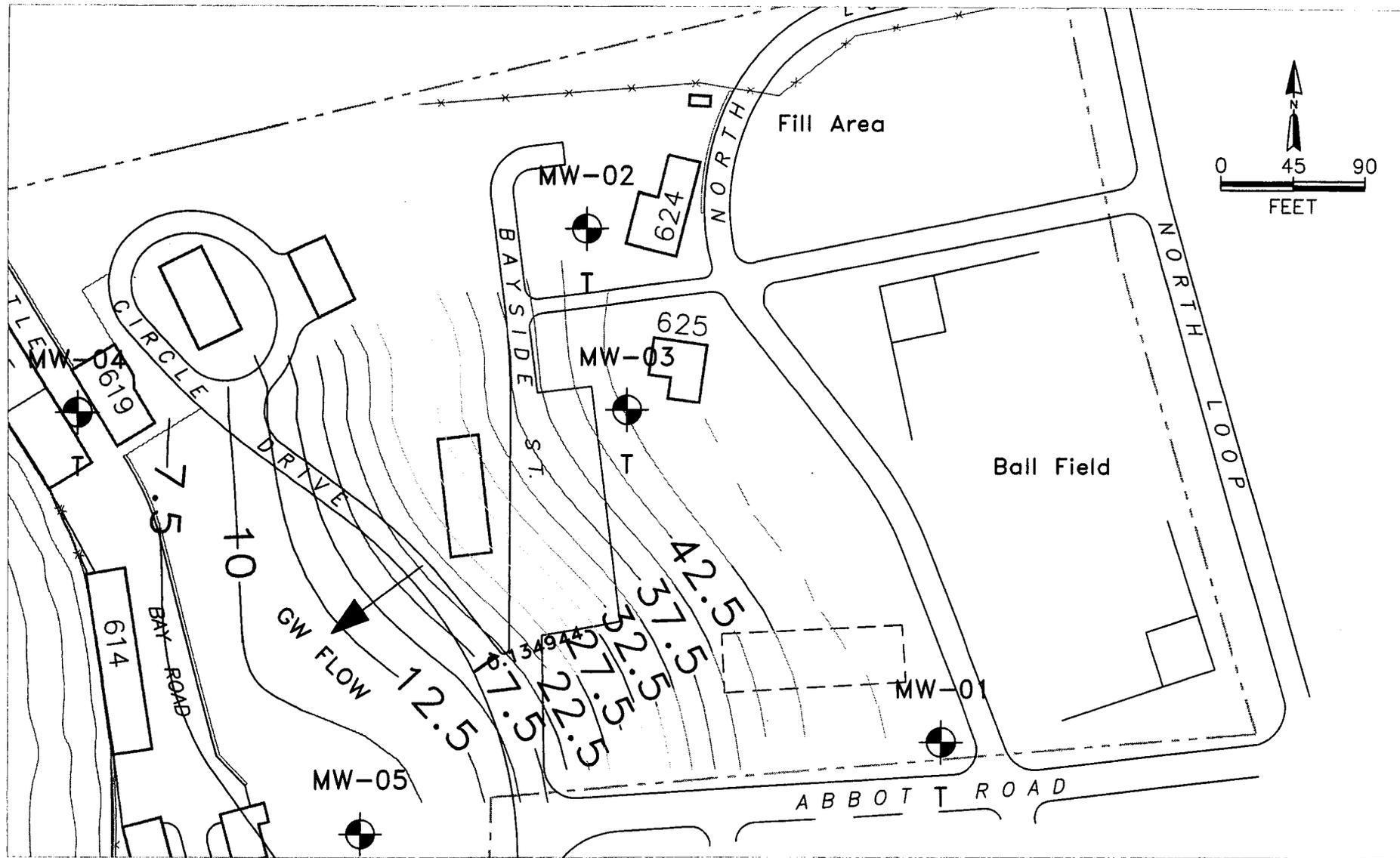
Correlation Between Proposed Sample Location and Soil Samples Requested by NYDEC

Soil Sample Location in Figure FSPAd2-1	NYSDEC Description
B-1	In grassy area between the bay and the buildings to the west of Buildings 610 and 611.
B-2	South of Building 609
B-3	Near former soil boring SB-7
B-4	Near former surface soil sample FSS-45
B-5	Near former surface soil sample FSS-5
B-6	Near former surface soil sample FSS-3
B-7	Near former surface soil sample FSS-15
B-8	Near former surface soil sample FSS-10
B-9	Near former surface soil sample FSS-28
B-10	Near former surface soil sample FLA-51
B-11	Near former surface soil sample FLA-45



TITLE:
Ft. Totten Formerly Used Defense Site

DWN:	DES.:	PROJECT NO.:
CHKD:	APPD.:	
DATE:	REV.:	FIGURE NO.:
		FSP-AD2-1



TITLE:

Ft. Totten Formerly Used Defense Site

DWN:

DES.:

PROJECT NO.:

CHKD:

APPD:

FIGURE NO.:

DATE:

REV.:

FSP-Ad2-2

ATTACHMENT 1

Drilling Log

Well Construction Diagram (Typical)

Blank As-Built Well Diagram

Well Development Record

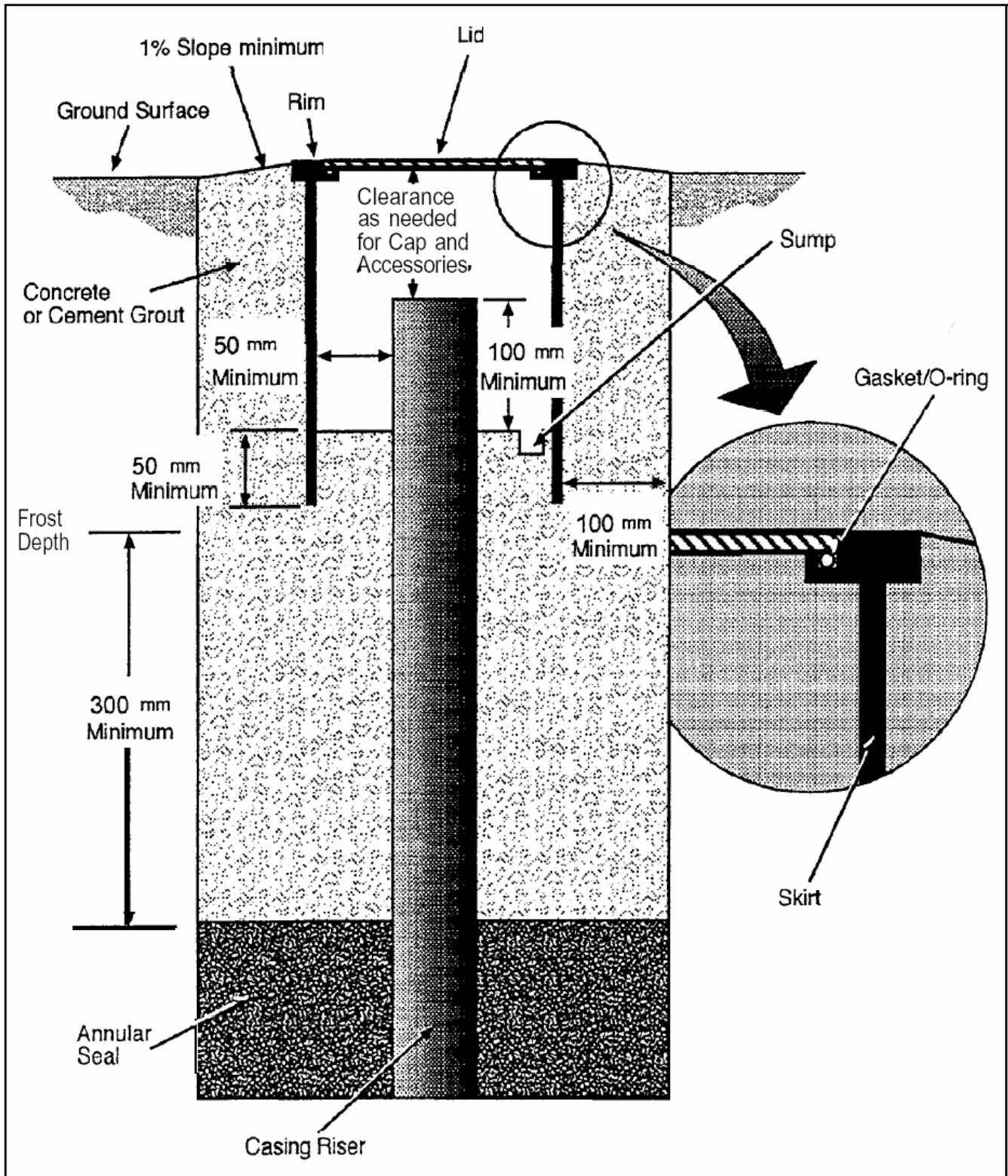
Well Purging Record

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Drilling Log

HTRW DRILLING LOG			DISTRICT			HOLE NUMBER		
1. COMPANY NAME			2. DRILLING SUBCONTRACTOR			SHEET		SHEETS
						OF		
3. PROJECT				4. LOCATION				
5. NAME OF DRILLER				6. MANUFACTURER'S DESIGNATION OF DRILL				
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT				8. HOLE LOCATION				
				9. SURFACE ELEVATION				
				10. DATE STARTED		11. DATE COMPLETED		
12. OVERBURDEN THICKNESS				15. DEPTH GROUNDWATER ENCOUNTERED				
13. DEPTH DRILLED INTO ROCK				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED				
14. TOTAL DEPTH OF HOLE				17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)				
18. GEOTECHNICAL SAMPLES		DISTURBED		UNDISTURBED		19. TOTAL NUMBER OF CORE BOXES		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %	
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR			
LOCATION SKETCH/COMMENTS						SCALE:		
PROJECT						HOLE NO.		

Schematic Well Design



As-Built Well Record

Facility/Project Name _____	Local Grid Location of Well _____ m. <input type="checkbox"/> N. _____ m. <input type="checkbox"/> E. _____ m. <input type="checkbox"/> S. _____ m. <input type="checkbox"/> W.	Well Number _____
Facility License, Permit or Monitoring Number _____	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ m. N. _____ m. E. Section Location of Waste/Source _____	Date Well Installed (Start) _____
Type of Protective Cover: Above-Ground <input type="checkbox"/> Flush-To-Ground <input type="checkbox"/>	Well Distance From Waste/Source Boundary _____	Date Well installed (Completed) _____
Maximum Depth of Frost Penetration (estimated) _____	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name & Firm) _____

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation _____ m. MSL

B. Well casing, top elevation _____ m. MSL

C. Land surface elevation _____ m. MSL

D. Surface seal, bottom _____ m. TOC or _____ m. MSL

16. USCS classification of soil near screen:
 GP GM GC GW SW SP
 SM SC ML MH CL CH
 Bedrock

17. Sieve analysis attached? Yes No

18. Drilling method used: Rotary
 Hollow Stem Auger
 _____ Other

19. Drilling fluid used: Water Air
 Drilling Mud None

20. Drilling additives used? Yes No
 Describe _____

21. Source of water (attach analysis):

E. Secondary filter, top _____ m. TOC or _____ m. MSL

F. Bentonite seal, top _____ m. TOC or _____ m. MSL

G. Secondary filter, top _____ m. TOC or _____ m. MSL

H. Primary filter, top _____ m. TOC or _____ m. MSL

I. Screen joint, top _____ m. TOC or _____ m. MSL

J. Well bottom _____ m. TOC or _____ m. MSL

K. Filter pack, bottom _____ m. TOC or _____ m. MSL

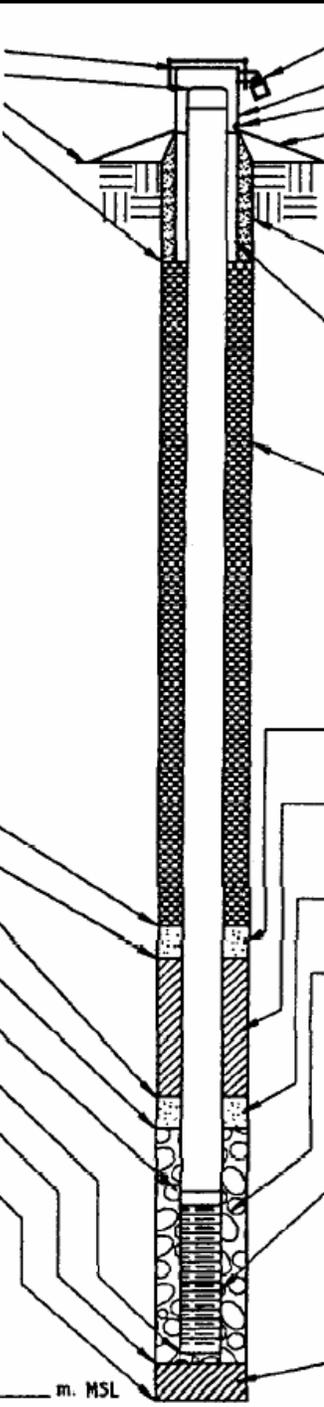
L. Borehole, bottom _____ m. TOC or _____ m. MSL

M. Borehole, diameter _____ mm.

N. O.D. well casing _____ mm.

O. I.D. well casing _____ mm.

P. 24-hr water level after completion _____ m. TOC or _____ m. MSL



1. Cap and lock? Yes No

2. Protective posts? Yes No

3. Protective casing:
 a. Inside diameter: _____ mm.
 b. Length: _____ m.

4. Drainage port(s) Yes No

5. Surface seal:
 a. Cap: Gravel blanket
 Bentonite
 Concrete
 _____ Other
 b. Annular space seal: Bentonite
 Cement
 _____ Other

6. Material between well casing and protective casing:
 Bentonite
 Cement
 _____ Other

7. Annular space seal:
 a. Granular Bentonite
 b. _____ Lbs/gal mud weight .. Bentonite-sand slurry
 c. _____ Lbs/gal mud weight Bentonite slurry
 d. _____ x Bentonite Bentonite-cement grout
 e. _____ m³ volume added for any of the above
 f. How installed: Tremie
 Tremie pumped
 Gravity

8. Centralizers Yes No

9. Secondary Filter Yes No
 a. Volume added _____ m³ _____ Bags/Size

10. Bentonite seal:
 a. Bentonite granules
 b. 1/4 in. 3/8 in. 1/2 in. Bentonite pellets
 c. _____ Other

11. Secondary Filter Yes No
 a. Volume added _____ m³ _____ Bags/Size

12. Filter pack material: Manufacturer, product name & mesh size
 a. _____
 b. Volume added _____ m³ _____ Bags/Size

13. Well casing: Flush threaded PVC schedule 40
 Flush threaded PVC schedule 80
 _____ Other

14. Screen material:
 a. Screen type: Factory cut
 Continuous slot
 _____ Other
 b. Manufacturer: _____
 c. Slot size: 0. _____ in.
 d. Slotted length: _____ m.

15. Backfill material (below filter pack): None
 _____ Other

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APPENDIX A

**RA-915+ Mercury Analyzer
User's Manual**

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RA-915+ MERCURY ANALYZER

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About this manual

This manual is designed to familiarize you with the principle of operation and structure of the RA-915+ analyzer (hereinafter referred to as the «analyzer»), its design, performance characteristics and operating conditions. It contains information that will provide proper operation and comprehensive utilization of the analyzer's capabilities. Please take time to read the manual in order to attain the best results in operation and to gain the greatest benefit from your analyzer.

This manual contains:

- List of important safety measures, warnings and precautions, which you should follow when operating with the analyzer.
- The purpose of the analyzer, its basic performance and analytical characteristics, and operating conditions.
- Brief description of the physical foundations and the principle of operation of the analyzer, and of its design.
- Functional controls of the analyzer, their purpose and operation.
- Procedures for preparation of the analyzer for operation in different configurations using appropriate operation modes.
- Procedures for handling the analyzer in all of the operation modes using the display and control unit.
- Brief description of procedures for analyzer operation using a PC.
- Procedures for analyzer maintenance.
- Reference data for correction of results obtained during operation in different modes, as well as instructions for troubleshooting.

Safety guidelines

Important safety precautions

Read these rules completely before starting operation with analyzer.

- Carefully study all the sections of this operation manual, analyzer design and control functions.
- To avoid electrical shock, never work with the analyzer covers taken off.
- Charge the battery on a timely basis. Store the unit with the battery fully charged.
- Do not put extraneous objects inside the analyzer through its ports.
- Do not allow the ingress of liquids on the case or inside the analyzer.
- Use only the power supply which is provided.
- Never use a defective power supply cable, do not put any objects on the power supply cable, and locate it in a manner to avoid a trip hazard.
- Do not try to repair the analyzer or adjust its optical units and electronic boards by yourself, except for cases stipulated in troubleshooting section (Appendix 1).
- Call an authorized agent or certified service engineer in the following cases:
 - If the analyzer does not operate properly or its parameters have noticeably deteriorated.
 - If the analyzer has fallen down or if its case is damaged.
 - If a liquid has gotten inside the analyzer.
 - If you hear unusual sounds or sense unusual smell coming from the analyzer.
- Keep the analyzer at a minimum distance of 1 meter from heating devices and heat sources. Do not transport analyzer in the trunk of your car.
- Do not forget to switch the analyzer off when the working day is over and to disconnect the power supply unit from the mains if the analyzer is not used for more than 6 hours.
- Never work without absorption and dust filters.
- The analyzer should be switched off before any maintenance operations.
- When measuring mercury concentration, it is necessary to follow instructions and documents stating safety regulations for operation in chemical laboratories and safety rules for operation with electric appliances.

- Observe the following rules during any transportation of the device, as well as when performing measurements from a moving vehicle (car, helicopter, etc.):
 - To avoid strong vibration effects, do not place the device on a hard surface (baggage compartment, floor of a vehicle, etc.).
 - Place the device on shock-insulated surfaces (a seat, damping support, etc.).
 - Secure the device on a working surface to prevent its fall or incidental contact with other objects.
- Observe the following safety precautions during outdoor operation:
 - Do not work in rainy or foggy weather and avoid precipitation ingress inside the analyzer.
 - Do not work in dusty ambient air.

Operating personnel should participate in training at OhioLumex Co., Inc. premises or at a regional service center.

Note symbols



Cautions. Pay attention to these in order to avoid damage of equipment.



Notes. They contain useful information, which will make the operation with the device easier.

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Introduction

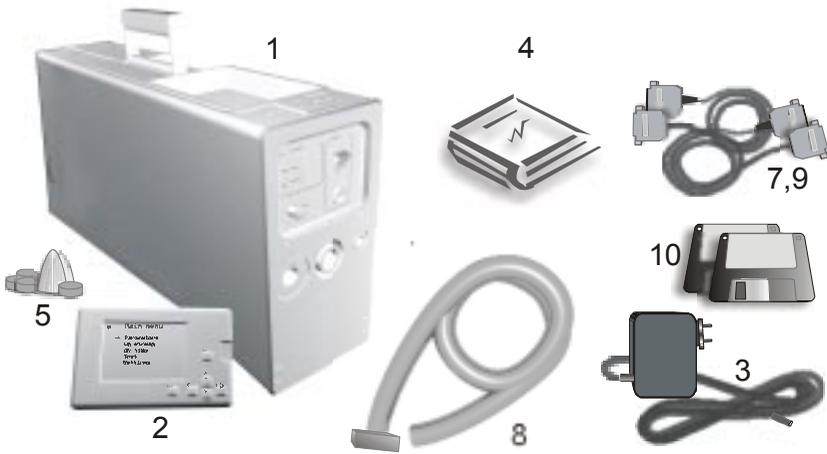
Our compliments on the acquisition of the RA-915+ mercury analyzer. The advanced technologies implemented in the analyzer's production ensure their extraordinary reliability. The RA-915+ mercury analyzer provides high selectivity of analysis, wide dynamic measurement range, ultra-low mercury detection limits for water and air and, in most cases, enables determination of mercury content in samples with a complex composition without preliminary sample preparation. It can be used in the field and in a laboratory as a stand-alone unit and as part of a computerized analytical system.

The RA-915+ mercury analyzer is a sophisticated high-precision device, therefore, it should be handled in compliance with operation conditions at all times to ensure its reliable operation.

User's manual RA-915+

After taking the device out of the package, make sure that you have everything necessary for its operation. The complete delivery set includes the following items:

1 Base unit	1 pc.
2 Display and control unit	1 pc.
3 Power supply unit (for operation from an a.c. mains)	1 pc.
4 Operation manual	1 pc.
5 Kit of spare parts and accessories (absorption and dust filters)	1 pc. each
6 Canvas shoulder bag (not pictured)	1 pc.
7 Display-unit-connection cable	1 pc.
8 Air intake hose with pre-filter	1 pc.
9 Analyzer-PC interface cable (RS-232 standard)	1 pc.
10 Software for RA-915+ (4 disks)	1 pc.



Options:

- RP-91C attachment for determination of mercury content in solid samples.
- RP-91 attachment for determination of mercury content in liquid samples.
- Cable for connection with an external d.c. power supply .
- Cable for analog signal input from a peripheral device.

Application

The RA-915+ analyzer (base unit) is intended for measuring mercury vapor concentration in ambient air and in the air of residential quarters and production areas, as well as in natural gas and in factory smokestack emissions.

The analyzer can be used for on stream measuring of mercury vapor concentration in the air both in a stationary mode and in continuous mode from vehicles (car, helicopter, boat).

The analyzer is used for tackling environmental problems, oil and ore deposit prospecting, technological processes monitoring, and for industrial sanitary and scientific research.

The RA-915+ analyzer is a part of a mercury analytical system, which enables determination of mercury content in gas, liquid, and solid samples. The analytical system consists of the RA-915+ analyzer itself, the RP-91 attachment for determination of mercury content in aqueous solutions using the "cold vapor" technique, and the RP-91C attachment for measuring mercury concentration in liquid and solid samples with a complex composition using the pyrolysis technique. Basic analytical characteristics of the system are given in the table below:

Subject	Detection limit	Sample parameters (flow rate, volume, weight)	Detection technique	Complete set
Ambient air	2 ng/m ³	20 l/min	Direct	RA-915+
Natural and industrial gases	2 - 500 ng/m ³	1 - 20 l/min		
Water	0.5 ng/l	20 ml	"Cold vapor" technique	RA-915+ RP-91
Urine	5 ng/l	1 ml		
Solid samples (soils, rocks)	0.5 µg/kg	0.2 g	Pyrolysis technique	RP-91C RA-915+
Biological samples (tissues, liver, etc.)	5 µg/kg	0.02 g		
Hair	20 µg/kg	0.01 g		
Oil and oil products	50 µg/kg	0.01 g		
Plants	2 µg/kg	0.05g		
Foodstuff	2 - 10 µg/kg	0.005 - 0.05 g		

Detection limit for mercury vapor concentration in air (ng/m³), with the use of:

Multi-path cell	2
Single-path cell *	500

Maximum mercury vapor concentration under analysis (ng/m³), with the use of:

Multi-path cell	20 000
Single-path cell *	200 000

(*) in the “High concentration” mode

Accuracy, %	± 20
-------------	------

Main technical data and specifications

Built-it battery	6.3 V
External direct current source	10 – 14 V
A.C. power source, through external unit	220/110 V, 50/60 Hz
Power consumption	20 W
Dimensions (mm)	460 * 210 * 110
Weight (kg)	7.5

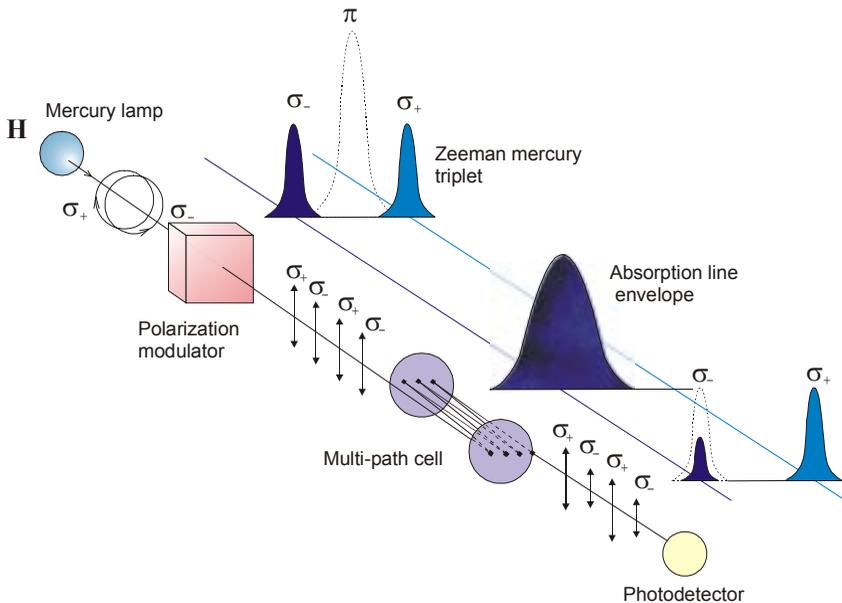
Operating conditions

Ambient air temperature	from +1 to 40 °C
Atmospheric pressure	84.0 – 106.7 kPa
Relative humidity	under 95 %, at 35 °C

Design and operation of the analyzer

Physical foundation and principle of operation

The RA-915+ analyzer operation is based on differential Zeeman atomic absorption spectrometry using high frequency modulation of light polarization (ZAAS-HFM).



A radiation source (mercury lamp) is placed in permanent magnetic field H. The mercury resonance line $\lambda=254$ nm is split into three polarized Zeeman components (π , σ_- and σ_+ , respectively). When radiation propagates along the direction of the magnetic field, a photodetector detects only the radiation of the σ_- components, one of those falling within the absorption line profile and another one lying outside. When mercury vapor is absent in the analytical cell, the radiation intensities of both σ_- components are equal. When absorbing atoms appear in the cell, the difference between the intensities of the σ_- components increase as the mercury vapor concentration grows.

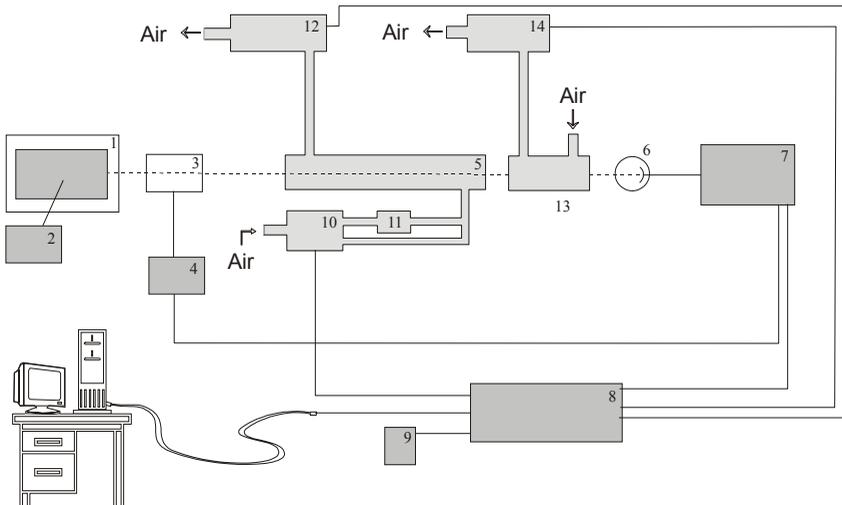
The σ_- components are separated by the polarization modulator. The spectral shift of the σ_- components is significantly smaller than the widths of molecular absorption bands and scattering spectra, hence the background ab-

sorption by interfering components does not affect analyzer's readings. A multi-path cell with an effective length about 10 m is used to enhance the sensitivity of analysis.

Design of analyzer

Block diagram of the analyzer:

- 1) mercury EDL lamp
- 2) high-frequency generator
- 3) polarization modulator
- 4) modulator control unit
- 5) multi-path cell
- 6) photodetector
- 7) electronic signal-processing unit
- 8) built-in microprocessor
- 9) display and control unit
- 10) gas flow commutation unit
- 11) absorption filter
- 12) air pump of the multi-path cell
- 13) single-path cell or external cell (is part of the RP-91C attachment)
- 14) air pump of the single-path cell



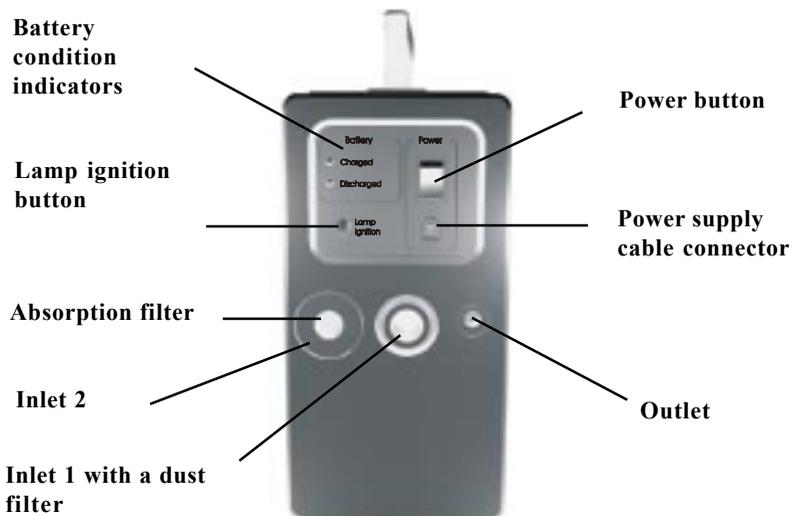
Mercury EDL lamp (1), which is placed in the gap between the poles of a magnet, is excited by high frequency generator (2). The light successively passes through polarization modulator (3), which is controlled by unit (4), multi-path cell (5), single-path cell (13) and is detected by photodetector (6). A signal from the photodetector then arrives at electronic signal-processing unit (7), where the signal is separated at the modulation frequency and the analytical signal is formed. After analog-to-digital conversion the signals come to a built-in micro-processor (8) for the final data processing.

The analyzer can be alternatively controlled as follows:

- From the display and control unit mounted in the base unit of the analyzer.
- From the display and control unit connected with the base unit via a signal cable.
- By means of an IBM-compatible computer connected with the base unit via an interface cable.

Appearance and functional controls

Front panel view



Inlet 1

The analyzer takes air into a multi-path cell with a built-in dust filter.



Inlet 1 (with the dust filter) is used for determination of the mercury vapor content in the air (or gas)

Inlet 2

This inlet is intended for the air intake into the multi-path cell through the built-in absorption filter.



Inlet 2 (with the absorption filter) is used only for baseline measurement.

Absorption filter

The absorption filter excludes mercury from the air/gas being analyzed.

Lamp ignition button

The button ignites the spectral lamp.

Battery condition indicators

CHARGED (green) - the battery charge indicator (does not glow during operation with the built-in battery). When the battery is being charged, the indicator flashes at a constant frequency. Duration of flashing indicates level of charge.

DISCHARGED (red) - the battery discharge indicator (does not glow during operation with an external power supply source). Duration of flashing indicates level of discharge.

Power button

The button switches on the analyzer.

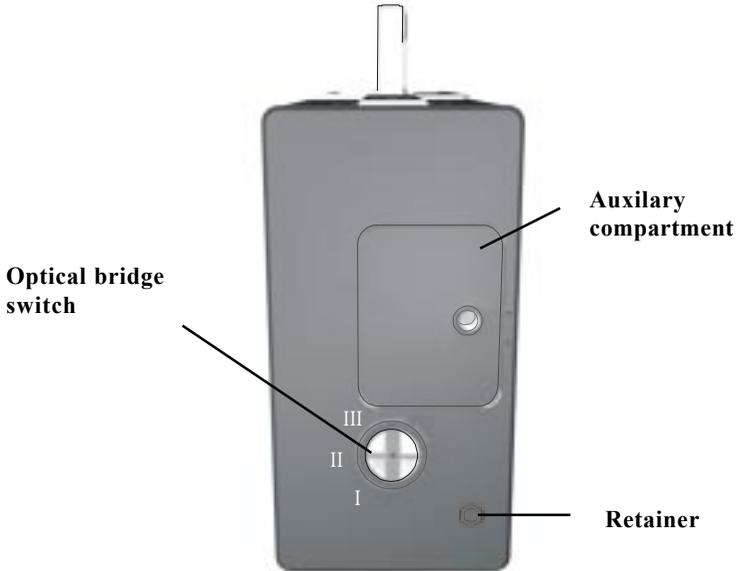
Power supply cable connector

It is intended for connection of the power supply cable for operation with an a.c. transformer.

Outlet

The air duct outlet of the multi-path cell.

Back panel view



Optical bridge switch

It is used for changing the position of the optical bridge. Light passes through different analytical cells when the switch is set in different positions:

Position I - through an external cell (pyrolysis).

Position II - through an accessory single-path cell (auxiliary compartment).

Position III - through a built-in multi-path cell.



Position I is used only with the mounted optical unit of the RP-91C attachment.

Auxiliary compartment

This is intended for the single-path analytical cell during operation with the RP-91 attachment, as well as for analyses of air, natural, or technological gases in the *HIGH CONCENTRATION* mode.

Retainer

The retention screw is intended for mounting the optical unit of the RP-91C pyrolytic attachment.

Right panel view

Opening for a pyrolytic attachment



Opening for a pyrolytic attachment

It is used for mounting an optical unit during operation with the RP-91C attachment.

Left panel view

TEST handle



TEST handle

The TEST handle is intended for placing a test cell in the optical path to check the serviceability of the device:

ON position - the test cell is placed into the light beam.

OFF position - the test cell is removed from the light beam.

Upper panel view



Connector

It is intended for connection of the display unit or a PC.

Pre-operational procedures

- 1 Prior to starting operation, make an external examination of the analyzer to be sure that there is no physical damage. Do not switch on the analyzer on your own if your analyzer has a physical damage. Call your regional dealer for replacement or repair of the analyzer.
- 2 Place the analyzer on a working surface so that the display unit is on top.
- 3 Select the operating mode (self-contained operation with the display unit or operation with a stand-alone PC). If the self-contained operation is chosen, install the display and control unit directly in the base unit (Fig. A) or connect it to the base unit with a cable, which is supplied with the analyzer (Fig .B).



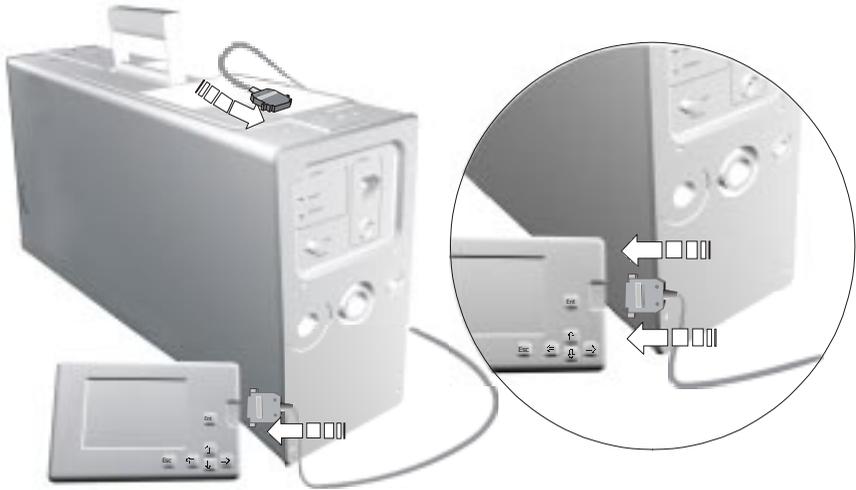


Fig. B

To operate with a stand-alone PC, it is necessary to connect the analyzer to the PC by the RS-232 cable, which is included into the basic package*. To connect the analyzer, do the following:

- Disconnect the analyzer from the a.c. power supply
- Switch off the PC.
- Insert the plug of the connecting cable into the socket of the interface connector on the upper panel of the analyzer.
- Insert the other end of the cable into a socket of the free COM-port of the PC and secure it.
- If your PC is not equipped with a 9-pin port, it is necessary to use a special adapter (not included).



* When operating the analyzer as part of a computer system and when using additional devices (an autosampler, pressure transducers, etc.), which are connected to a PC, it is necessary to use a double cable, which is supplied upon request.

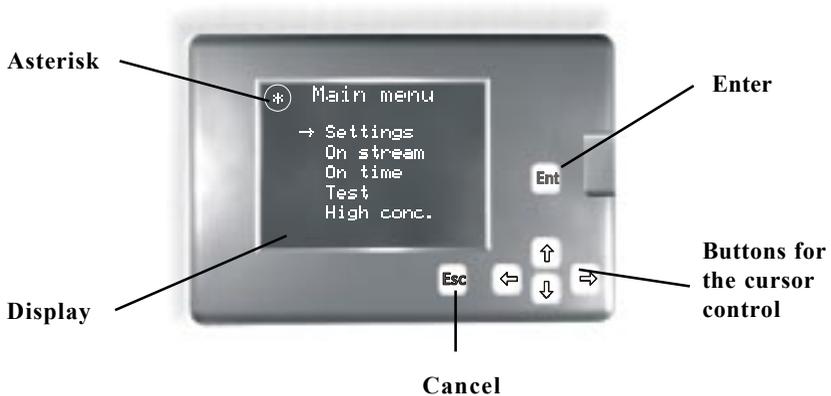


Fig. C

- 4 Select power supply mode of the analyzer. If the built-in battery is chosen as a power supply, you can directly proceed to the preparation for measurements, because the analyzer is supplied with a fully charged battery. If you intend to operate using the transformer, do the following:
 - Plug the low-voltage power adapter into the power supply cable connector on the front panel of the analyzer.
 - Use a grounded connection with the appropriate voltage.
- 5 Prepare your analyzer for measurements. Set the handle of the test cell on the left panel into the OFF position and the optical bridge handle on the back panel to position III.
- 6 Switch the analyzer on with the power button located on the front panel.

Operation with the display unit

- 1 Upon switching on the analyzer, the manufacturer's trademark will appear on the screen of the display and control unit.
- 2 Press the Ent button on the display and control unit. The MAIN MENU will be displayed and the sign * (asterisk) will appear in the upper left corner.



- 3 Press and hold for several seconds the **LAMP IGNITION** button on the front panel of the device. When the spectral lamp turns on, the sign * (asterisk) will go out.
- 4 Let the analyzer warm up for at least 20 minutes. Then the device is ready for measurement.



*The presence of the sign * (asterisk) indicates that the spectral lamp is not glowing or that the lamp radiation intensity is low for measurements.*

Description of the MAIN MENU

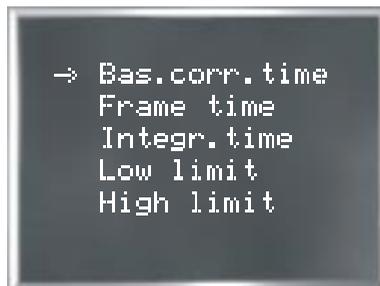
SETTINGS

The **SETTINGS** command is intended for setting the operation parameters.

- 1 Using the cursor control buttons select the **SETTINGS** command on the display unit and press the **Ent** button. The **Settings** window will appear.



- 2 If you want to change the language, select the **SELECT LANGUAGE** command and press the **Ent** button. The **Select language** window will appear.
- 3 Select the language and press the **Ent** button. The language is installed. The **Setup** window will appear on the display.
- 4 Select the **PARAMETERS** command if you want to change the measurement parameters. The **Parameters** window will appear.



Bas. corr. time (sec). The baseline correction time is a period of time during which the level corresponding to the zero mercury vapor concentration in the analytical cell is measured over a range of 10 to 255 sec. The default value is 20 sec.

Frame time (sec). The frame time is a period of time during which an analytical signal is averaged over a range of 1 - 255 sec. The default value is 10 sec.

Integr. time (sec). The integration time is a period of time during which an analytical signal is integrated (summed up) in the *ON TIME* mode over a range of 1 to 255 sec. The default value is 150 sec.

Low limit (ng/m³). The low limit is the value of the mercury vapor concentration in an analytical cell below which the deviation for three successive values of the mercury vapor concentration is not computed in the

PROTOCOL mode; in the *ON TIME* mode the device is ready for integration (the *READY* message appears). Range: 1 - 255 ng/m³. The default value is 20 ng/m³.

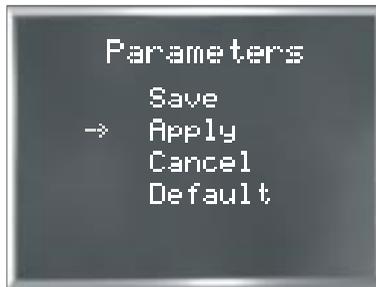
High limit (ng/m³). The high limit is the value of the mercury vapor concentration in an analytical cell above which the *ALARM* warning appears in the *ON STREAM* mode; in the *ON TIME* mode it is the value below which the device is ready for integration (the *READY* message appears). Range: 1 - 10 000 ng/m³. The default value is 100 ng/m³.



To change parameters by 1 unit, press the up or down arrows on the control panel.

To change parameters by 10 units, press the right or left arrows on the control panel.

- 5 Set the necessary parameters according to the task or to the measurement method desired.
- 6 Press the **Esc** button. The **Parameters saving** window will appear.
- 7 Select the necessary command.



Save – saves all the changes made.

Apply – temporarily saves the changes made.

Cancel – does not save changes in the parameters menu.

Default – set the parameters by default for the current session.

- 8 Press the **Ent** button.

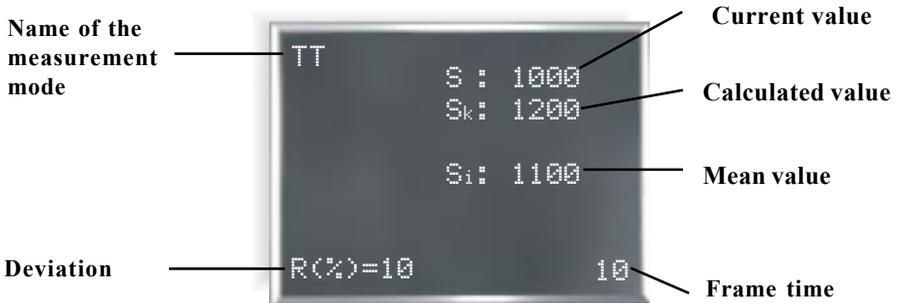
TEST

The *TEST* command is intended for checking the analyzer serviceability.

- 1 Set the *TEST* handle to the *OFF* position!
- 2 Select the *TEST* command on the display unit and press the **Ent** button.
- 3 The *SET OPTICAL BRIDGE TO POSITION III* message will be displayed.
- 4 Set the optical bridge to position *III* and press the **Ent** button.

The zero signal will be measured with the compressor on during the time you have preset (**bas. corr. time** in the **Parameters** window).

- 5 The ENTER THE TEST CELL message will be displayed.
- 6 Set the TEST handle of the test cell on the left panel of the unit into the ON position (after rotating it back and forth several times) and press the **Ent** button. The window for the device serviceability check will appear.



Current value (S). It is the mercury vapor concentration in the test cell at the current moment (it is displayed at a rate of 1 Hz).

Calculated value (S_k). It is the calculated mercury vapor concentration in the test cell, which depends on the temperature of the test cell. The temperature dependence of the calculated value is given in Appendix 2.

Mean value (S_i). It is the mean mercury vapor concentration determined during the accumulation time.

Frame time. It is the countdown of the accumulation time in seconds (**frame time**, the **Parameters** command).

Name of the measurement mode. TT - the serviceability check-up.

Deviation (R, %). It is the relative deviation of the measured value of the mercury vapor concentration in the test cell from the tabulated value. It is consecutively displayed and retained during the frame time.



*The **Temperature** message may appear during the analyzer serviceability check. This indicates that the temperature of the test cell falls out of the allowable temperature range.*

- 7 If relative deviation **R equals less than 25 %**, the device is ready for operation and you may proceed.
- 8 Press the **ESC** button. The REMOVE THE TEST CELL message will appear.
- 9 Set the TEST handle of the test cell to the OFF position and press the **Ent** button. The MAIN MENU will be displayed.

ON STREAM

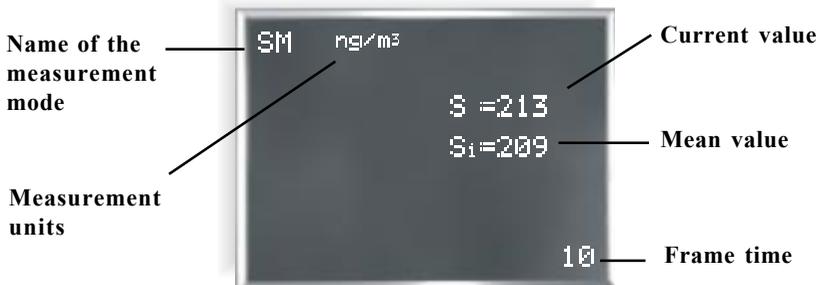
The *ON STREAM* command is used for measuring the mercury vapor concentration in the air.

- 1 Set the TEST handle to the OFF position.
- 2 Set suitable parameters using the PARAMETERS command in accordance with the type of analysis.
- 3 Select the ON STREAM mode from the MAIN MENU and press the **Ent** button. The compressor will switch on and the zero-signal measurement will be performed during the preset time (**bas. corr. time**, the **Parameters** command).



To determine the mercury vapor concentration in the ambient air in the ON STREAM mode, default parameters are sufficient.

- 4 The SET OPTICAL BRIDGE TO POSITION III message will be displayed.
- 5 Set the optical bridge handle to position III and press the **Ent** button.
- 6 On completion of the zero-signal measurement, the window for operation in the *ON STREAM* mode will appear.



Current value (S). It is the mercury vapor concentration in the pumped air at the current moment. (It is displayed at a repetition rate of 1 Hz and is measured in ng/m³).

Mean value (S₁). It is the mean mercury vapor concentration determined during the accumulation time. (It is displayed once per the accumulation time and is measured in ng/m³).

Frame time. It is the countdown of the accumulation time in seconds (**frame time**, the **Parameters** command).

Name of the measurement mode. SM – the ON STREAM mode.



The compressor is switched on when the up arrow button is pressed at the display unit. The compressor is switched off when the down arrow button is pressed at the display unit. Switching off the compressor during pauses in operation extends battery life.

Measurement units. Mercury vapor concentration is measured in terms of ng/m^3 .

$$1 \text{ ng}/\text{m}^3 = 0.001 \text{ }\mu\text{g}/\text{m}^3 = 0.000001 \text{ mg}/\text{m}^3$$

$$1 \text{ mg}/\text{m}^3 = 1000 \text{ }\mu\text{g}/\text{m}^3 = 1\,000\,000 \text{ ng}/\text{m}^3$$

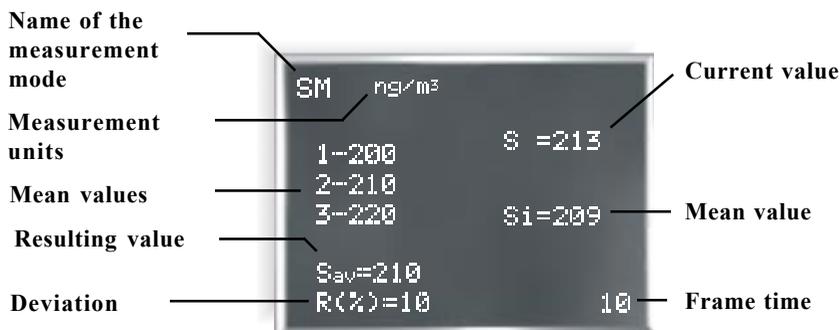


The **ALARM** warning may appear during operation in the **SM** mode. This means that the mercury vapor concentration in the air exceeds the preset **higt limit**.



The **LOW RADIATION** warning is highlighted if the value of the background absorption of the resonance radiation in the analytical cell exceeds the allowable level. In this case, the measurement is assumed to be invalid and it should be repeated.

- When the **Ent** button is pressed during the ON STREAM operation, the device switches over to the **PROTOCOL** mode. This mode is intended for establishing three mean values of the mercury vapor concentration. We recommend the use of this mode for determination of the mercury vapor concentration in indoor air.



Current value (S). It is the mercury vapor concentration in the pumped air (it's displayed at a repetition rate of 1 Hz and is measured in ng/m^3).

Mean value (S₁). It is the mean mercury vapor concentration determined during the accumulation time. It is measured in ng/m^3 .

Frame time. It is the countdown of the accumulation time in seconds (**frame time**, the *PARAMETERS* command).

Name of the measurement mode. SM – On stream mode.

Measurement units. The mercury vapor concentration is measured in terms of ng/m³.

Mean values. There are three consecutive mean values of the mercury vapor concentrations.

Resulting value (S_{av}). It is the resulting averaged value over three mercury vapor concentrations.

Deviation (R, %). It is the deviation of the three measured mercury vapor concentrations from the averaged value (in percent).

$$R = \frac{|S_{i \max} - S_{i \min}|}{S_{av}} \times 100\%$$



*The R % (deviation) value disappears if the resulting value (S_{av}) is smaller than the preset detection limit (**low limit**, the *PARAMETERS* command).*



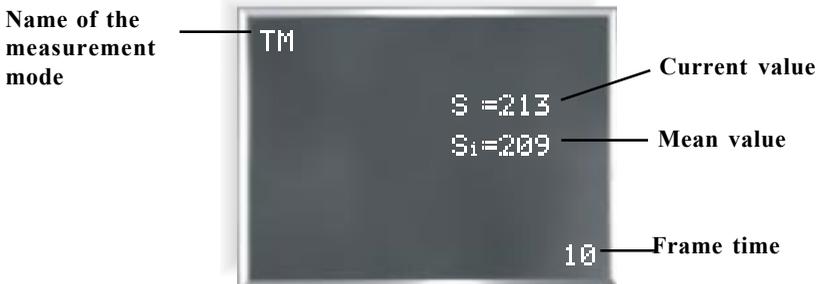
*When the back arrow button is pressed at the display unit, the analyzer switches over to the baseline check mode for the time that was preset in the **bas. corr. time** of the **Parameters** command.*

- 8 Press the **ESC** button to exit the *PROTOCOL* or *ON STREAM* mode. The MAIN MENU will be displayed.

ON TIME

The *ON TIME* command is intended for determination of the mercury vapor concentration in liquid and solid samples using the RP-91 and RP-91C attachments. This section describes basic instructions for operation with the *ON TIME* command. For more detailed instructions refer to the “Analyzer RA-915+ User`s manual. Operations with RP-91attachment” or “Analyzer RA-915+ User`s manual. Operations with RP-91C attachment”.

- 1 Prepare the RP-91 (RP-91C) attachment for operation according to the appropriate operation manual.
- 2 Set the optical bridge handle to position I for operation with an RP-91C attachment. If an RP-91 attachment is used, set the switch to position II or III for operation with the single-path or multi-pass cell, respectively.
- 3 If necessary, set the required measurement parameters in the **Settings window** according to the type of analysis.
- 4 Select the *ON TIME* command in the MAIN MENU and press the **Ent** button. This will initiate the baseline check during the preset time (**bas. corr. time** of the **Parameters** command).
- 5 **Integration waiting window** will be displayed.



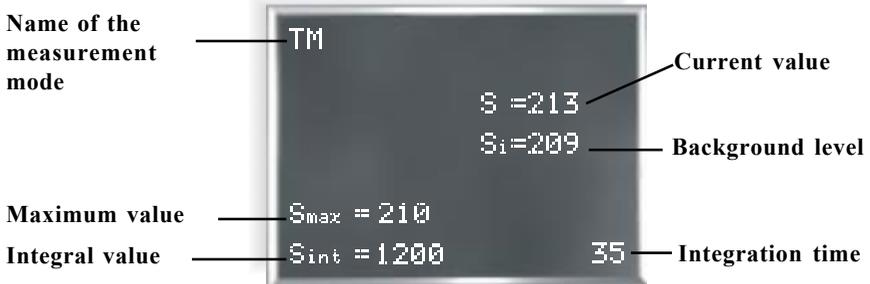
Current value (S). It is the mercury vapor concentration in the analytical cell at the current moment. (It is displayed at a repetition rate of 1 Hz.

Mean value (S_i). It is the mean mercury vapor concentration determined during the accumulation time.

Frame time. It is the countdown of the accumulation time in seconds (**frame time** of the **Parameters** command).

Name of the measurement mode. TM – on time mode.

- 6 Measuring can be started after the READY message appears.
- 7 Press the forward arrow button at the display unit and introduce a sample into the reaction vessel. The INTEGRATION PHASE window will appear on the display.



Current value (S). It is the mercury vapor concentration in the analytical cell at the current moment (it is displayed at a repetition rate of 1 Hz).

Background level (S_i). It is equal to the last mean value of the mercury vapor concentration obtained before the forward arrow button was pressed.

Integration time. It is the direct count of the integration time in seconds (**integration time**, the **Parameters** command).

Name of the measurement mode. TM – on-time mode.

Maximum value (S_{max}). It is the maximum value of the mercury vapor concentration obtained during the integration time with respect to the background level.

Integral value (S_{int}). It is the integrated signal, which is proportional to the mercury amount in a sample (displayed after the measurement is finished).



The LOW RADIATION warning is highlighted if the value of the background absorption of the resonance radiation in the analytical cell exceeds the allowable level. In this case, the measurement is assumed to be invalid and it should be repeated after, for example, diluting the sample or reducing its weight.

- The integration is completed automatically when the preset integration time elapses (**integration time**, the **Parameters** command).



*The integral values of the signal, S, exceeding 9999 are displayed as XXXE2, which corresponds to a decimal number equal to XXX*10² (for example, 231E2 means 23100).*



To enhance the measurement accuracy, we recommend stopping the integration process by pressing the back arrow button when the READY message recurs.

9. Press the **Ent** button. The analyzer will switch over to the INTEGRATION STANDBY PHASE mode.
10. Press the **ESC** button to stop measuring. The MAIN MENU will be displayed.

HIGH CONCENTRATIONS

High concentrations measurement mode (HC). This command is intended for determination of the mercury content in atmospheric air if its concentration exceeds the 500 ng/m³ level. In this case, the mercury vapor concentration is measured in the single-path cell compartment with the air pump idling. In this mode, the air is exchanged by convection only. When this mode is selected, a window similar to that for the ON STREAM mode appears with the same designations, except for the name of the operation mode. In this case, the zero-control is carried out by placing a closed small cell into the compartment at the back panel of the analyzer. The small cell should be filled with air, in which the mercury vapor concentration is lower than 500 ng/m³. If such a cell is unavailable, the zero-signal can be measured outdoors, in the open air.

Operation with a PC

This section contains basic instructions for operating the analyzer with a PC. For more detailed instructions refer to the "Analyzer RA-915+ User's manual. Operation with a PC".

1. Make sure that the device is on and is connected to the PC. Start running the RA-915+ program.
2. Select the AIR mode in the Main menu. The Air analysis window will appear.
3. Press the LAMP IGNITION button on the front panel of the analyzer. Now the analyzer is ready for operation.



The LOW INTENSITY warning, which appears in the upper right corner of the window, means that the lamp radiation intensity is insufficient for measuring. After pressing the LAMP IGNITION button, this warning will disappear.

Serviceability check-up

- 1 Set the TEST handle of the test cell to the OFF position.
- 2 Select the Test mode button in the Air analysis window.
- 3 Two black lines will appear on the graph and the current readings will be displayed.
- 4 Set the TEST handle of the test cell to the ON position.
- 5 The signal, which is obtained when the test cell is installed, will appear on the graph.



If the signal, which was obtained when the test cell was installed, falls within the area between the two black lines, the device is ready for measurements.

Measuring procedure

Select the Graph command. Click the Start button. Follow the instructions on the display.

Maintenance

Maintenance of the analyzer includes:

- Daily visual inspection
- Battery charging
- Changing of the dust filters (inlet port, pre-filter)
- Changing the zero mercury absorption filter
- Preventive maintenance

During daily visual inspection make sure that there is no physical damage of the analyzer housing and of its parts. Ensure that all the cables are undamaged and securely fastened. Check the analyzer serviceability each time before starting measurements using the TEST mode.



Charge the battery. Do not store the unit with a discharged battery for more than three days to avoid permanent damage.

Charging the battery

The battery is charged when the analyzer is connected with the transformer. If it is only necessary to charge the battery without making measurements, we recommend not switching on the power button of the analyzer.

It takes 5 hours to charge a dead battery. Longer charging time does not cause damage to the battery. The fully charged battery provides continuous operation of the analyzer for approximately 3.5 hours.

Changing of the dust filter



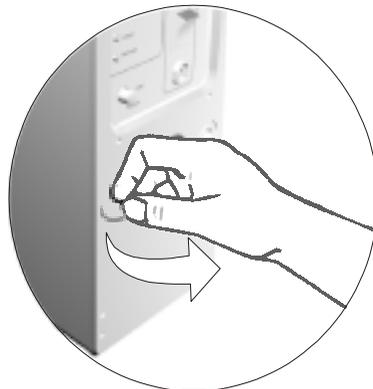
Change the dust and absorption filters on a regular basis, especially when operating under dusty conditions.

When changing the dust filter, the device should be switched off.

The dust filter is located in the Inlet 1 at the front panel of the analyzer. To remove the filter from the analyzer, grip it with tweezers and pull it out. Insert a new filter into Inlet 1, exercising caution not to push through the screen on the valve.

Changing of the absorption filter

The absorption filter is located in the Inlet 2 at the front panel of the analyzer. To remove the filter from the analyzer, pull it straight out. Insert a new filter into Inlet 2 and push it flush with the front panel.



Changing the Pre-filter

See separate instruction manual provided with the unit.

Preventive maintenance

During preventive maintenance check the housing covers and, if necessary, change the dust and absorption filters.

Handle the multi-path cell carefully! Prevent ingress of foreign substances into the cell, metal mercury in particular. Avoid long operation with the multi-path cell in rooms with high mercury vapor concentration (higher than 10 000 ng/m³). In this case, it is preferable to use the HIGH CONCENTRATIONS measuring mode. If the multi-path cell has been contaminated, do the following:

- Remove the dust filter using tweezers.
- Blow hot air through the cell for several hours using, for example, a hair-drier.
- Install a new dust filter.

It is recommended to carry out annual pre-verification preventive maintenance of the analyzer at a regional service center, followed by a calibration of the device.

On completion of operation with the analyzer, take it indoors with the ambient air temperature of 5 - 40 °C and relative humidity not higher than 98 % at 30 °C. The ambient air should not contain corrosive impurities.

If you will not operate the analyzer for a long time, store it in the following manner:

- Charge the battery fully.
- Put the RA-915+ analyzer into a polyethylene cover with 0.8 kg of the silica-gel dryer and hermetically seal the case. Store the analyzer indoors at the ambient temperature of - 50 °C + 50 °C and relative humidity below 98 % at +35 °C.

Appendix 1

Troubleshooting

The RA-915+ analyzer should be repaired only at an authorized service center or by the manufacturer.

Prior to returning the unit for repair, check the troubleshooting table given below.

Fault symptom	Possible cause	Remedial measure
Segments of the indicator table on the display and control unit are not highlighted when the analyzer is switched on	<ul style="list-style-type: none"> - Power cable is out of order - Display unit cable is out of order - Battery is discharged 	<ul style="list-style-type: none"> - Repair the power cable - Repair the display unit cable - Charge the battery
<p>The (*) symbol at the display and control panel is not dimmed out when the "Lamp ignition" button is pressed:</p> <ul style="list-style-type: none"> - if the optical switch is in position I - if the optical switch is in position II - if the optical switch is in position III 	<ul style="list-style-type: none"> - Battery is discharged - Operation is possible only with attachments - The single-pass cell is contaminated, compartment windows are contaminated or foreign objects are found in the compartment - Multi-path cell is contaminated 	<ul style="list-style-type: none"> - Charge the battery - Set the optical switch into positions II or III - Remove the single-path cell, check if the compartment windows are clean, make sure that there are no foreign objects inside the compartment - Clean the multi-path cell (see appropriate section)
The battery discharge indicator (red) glows for some time and then goes out when the analyzer is switched on.	The battery is fully discharged	Charge the battery
In the TEST mode, relative deviation R of the measured test number differs from the tabulated value by more than 25 %.	<ul style="list-style-type: none"> - Spectral lamp is not switched on - The test cell switch is in idle position - The test cell is out of order - The absorption filter has failed 	<ul style="list-style-type: none"> - Press the "Lamp ignition" button - Set the switch of the test cell to the working position - Shake the test cell 2 - 3 times by the TEST (ON/OFF) switch - Replace the filter

Appendix 2

Values of the test number Sk as a function of the temperature of the test cell (step 1°C)

T , °C	Sk	T , °C	Sk
1	320	21	1650
2	347	22	1791
3	377	23	1943
4	409	24	2109
5	445	25	2291
6	482	26	2485
7	524	27	2698
8	568	28	2929
9	616	29	3180
10	669	30	3451
11	727	31	3750
12	788	32	4060
13	856	33	4410
14	929	34	4790
15	1008	35	5200
16	1095	36	5640
17	1188	37	6130
18	1290	38	6650
19	1400	39	7220
20	1519	40	7835

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US Army Corps
of Engineers

DRAFT

May 2004

**QUALITY ASSURANCE PROJECT PLAN
ADDENDUM 2**

**SOIL, AIR AND GROUNDWATER SAMPLING SPRING 2004
FORT TOTTEN COAST GUARD STATION
QUEENS, NEW YORK**

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**QUALITY ASSURANCE PROJECT PLAN ADDENDUM 2
SOIL, AIR AND GROUNDWATER SAMPLING SPRING 2004
FORT TOTTEN COAST GUARD STATION
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**QUALITY ASSURANCE PROJECT PLAN
SOIL, AIR AND GROUNDWATER SAMPLING SPRING 2004
FORT TOTTEN COAST GUARD STATION
QUEENS, NEW YORK**

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(Continued)**

QUALITY ASSURANCE PROJECT PLAN FIGURES

Number	Title
QAPP-1	Chain of Custody Record

QUALITY ASSURANCE PROJECT PLAN TABLES

Number	Title
QAPP-1	Sample Summary, Actual, Blanks, Duplicates (QA/QC Samples)
QAPP-2	Data Quality Objectives for Precision, Accuracy and Method Detection Limits
QAPP-3	Sample Container Requirements
QAPP-4	Sample Preservation and Maximum Holding Time Requirements

1.0 INTRODUCTION

This addendum modifies the original Quality Assurance Project Plan (QAPP), dated June 2000, by specifically addressing work procedures and personnel changes for the Spring 2004 soil, air and groundwater sampling activities and monitoring well installation Fort Totten Coast Guard Station, located in Queens, NY. Unless specifically modified herein, all other sections in the June 2000 QAPP are still applicable.

The purpose of the QAPP Addendum 2 is to describe the air, soil and groundwater sampling event for completing the following items:

- Quality Assurance (QA) Objectives
- Quality Assurance Objectives for Measurement (PARCC Parameters)
- Field Sampling Quality Assurance/Quality Control Checks
- Sampling Strategy
- Sample Preservation and Custody
- Laboratory Analytical Procedures
- Data Assessment Procedures
- Chemical Data Reports

2.0 PROJECT DESCRIPTION

2.1 *Background Information (Unchanged)*

2.2 *Sampling Strategy*

Phase II Sampling was conducted July-August 2000 and April 2002. Comments provided by the State of NY Department of Environmental Conservation (NYDEC) and Department of Health (NYDOH) provided comments that requested additional information on indoor air in Building 615, groundwater at MW-4, and upland soils. Specifically, the concerns expressed by the state relate to mercury in indoor air at Building 615, Target Compound List (TCL) semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs), and 23 Target Analyte List (TAL) metals in the upland area, and SVOCs / PAHs in the groundwater. This Addendum-2 will be used to address these issues.

The indoor air in Building 615 will be monitored with real-time sampling and fixed-based samplers at 3 feet and 6 feet above the ground floor. NYDEC has a proposed action level of 1 ug/m³, therefore the potential sources of mercury in Building 615 will be screened with an OhioLumex Zeeman Portable Mercury Vapor Analyzer, model RA-915+. The fixed-based sampling will use NYDOH Environmental Laboratory Approval Program (ELAP) Method #4503 and the sorbent tubes will be analyzed by National Institute of Occupational Safety and Health (NIOSH) Method 6009. Eleven (11) locations of the subsurface soils at two depths (2-12" and 12-24' depth intervals) in the upland area will be sampled for analysis of SVOCs/PAHs and 23 TAL metals and one newly-constructed monitoring well will be sampled for analysis of SVOCs/PAHs. Soil and groundwater samples will be analyzed by U. S. EPA 8270C Method in

the highly sensitive Ion-Trap GC/MS mode. Details of the soil, groundwater, and air monitoring are described in the Addendum of Field Sampling Plan. Table QAPP-1 summarizes the required field and QA/QC samples for this sampling event.

Table QAPP-1 Sample Summary, Actual, Blanks, Duplicates (QA/QC Samples)

Locations	Chemical Parameter	Field Samples	QA/QC Samples
Upland Area	TCL Semi-Volatile Organic Compounds (PAHs, etc.)	22 Soil Samples	2D+2R+2F+2QA
Upland Area	23 TAL Metals	22 Soil Samples	2D+2R+2F+3QA
New MW	TCL Semi-Volatile Organic Compounds (PAHs, etc.)	1 Groundwater Sample	1D+1QA
Building 615	Mercury in indoor air*	12 Sampled Sorbent Tubes - See * (2)	2D (1D for each air sampling height) +1T

Notes:

23 TAL metals include aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium and zinc.

D = Duplicate Sample F = Field Blank R = Rinsate Blank T = Trip Blank
QA = Split QA Sample

- * = (1) Zeeman RA-915+ Mercury Analyzer manufactured by OhioLumex will be used to screen the potential sources of mercury in Building 615 - See HSP for details.
- (2) The indoor air of Building 615 will be sampled via ELAP Method #4503 at two heights (3 feet and 6 feet above the floor - 6 samples used for each height) and the sampled sorbent tubes will be analyzed by NIOSH Method 6009.

3.0 QUALITY ASSURANCE OBJECTIVES

3.1 Data Requirements

The object of the sampling program is to produce representative, defensible data to identify if chemical contamination exists, and to determine if any health hazards will be harmful to human life and the site environment. Chemical analysis of the samples will enable contaminated materials removal, conforming to all federal and state regulations.

3.2 Data Quality Objectives

The data quality objectives (DQOs) presented in the Project Work Management Plan need to be supported by a certain level of quality which is based on the intended use of the data. The level of

analytical quality control for the project laboratory work is Definitive Data Level as defined by U.S. Environmental Protection Agency (EPA).

The soil samples collected will be analyzed by methods defined in the EPA 8270C Method in the Ion-Trap mode for analysis of SVOCs including PAHs and the EPA 6000/7000 Series/Cold Mercury Vapor Methods for analysis of 23 TAL metals. The GW samples collected will be analyzed by methods defined in the EPA 8270C Method in the Ion-Trap mode for analysis of SVOCs, including PAHs. In addition to the collection of the field samples, field Quality Assurance (QA) and Quality Control (QC) samples will be analyzed by the Quality Assurance Laboratory and the contract laboratory respectively. Internal laboratory QC samples, as specified by the method, will be used and analyzed. TriMatrix Laboratories, Inc. in Grand Rapid, MI is the contract laboratory to perform the sample analyses of the Primary and QC samples for this project. The Quality Assurance Laboratory is STL-Seattle, WA.

3.3 *Quality Assurance Objectives for Measurement*

The primary goal of this QAPP is to define procedures that will ensure the quality and integrity of samples, accuracy and precision of analyses, and representativeness, comparability and completeness of results for the field work. The Quality Assurance Objectives for the measurement of project field work and samples are presented in Table QAPP-2.

Table QAPP-2 Data Quality Objectives for Precision, Accuracy and Method Detection Limits

Analyte	Matrix	Anal. Method	Precision (RPD)	Accuracy(%Rec)	Meth. Det. Limits
TCL SVOC	Soil	EPA 8270C (Ion-Trap)	45%	55% - 145%	< TAGM Stds/Values?
23 TAL Metals	Soil	EPA 6000/7000 Series/7471 Methods	40%	50% - 140%	< TAGM Stds/Values?
TCL SVOC	GW	EPA 8270C (Ion-Trap)	45%	55% - 145%	< TOGS Stds/Values♣
Hg	Air	NIOSH 6009	45%	55% - 145%	< 1 ug/cubic meters

Notes: * = Standards/Guidance values of NYDEC Technical Administrative Guidance Memorandum (TAGM) HWR-94-4046, Determination of Soil Cleanup Levels, Revised January 24, 1994.
 ♣ = Standards/Guidance values of NYDEC Technical & Operational Guidance Series (TOGS) 1.1.1, Oct. 22, 1993 applied if possible.

The precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters are indicators of data quality. The following procedures and criteria will be used to evaluate data precision, accuracy, and analytical completeness for the analyses conducted.

3.3.1 Precision (unchanged)

3.3.2 Accuracy (unchanged)

3.3.3 Representativeness (unchanged)

3.3.4 Completeness (unchanged)

3.3.5 Comparability (unchanged)

3.4 Field Sampling Quality Assurance/Quality Control Checks

Field duplicates, field splits, field blanks, rinsate blanks, and trip blanks will be collected and submitted to the analytical laboratory to provide a means to assess the quality of the data resulting from the field sampling program. Types of samples collected and used for the assessment of chemical quality assurance are defined in the sub-sections that follow.

The field personnel for the project shall collect all field, QC, and QA samples and send them to the appropriate laboratories. Some attempt should be made to select contaminated samples for QA/QC, as based on physical evidence such as appearance, odor, or field screening tests.

3.4.1 Quality Assurance/Quality Control Samples

The QA and QC samples are duplicate or split samples which are analyzed at the Quality Assurance laboratory and the contractor's laboratory respectively. QA and QC samples will be collected at a minimal rate of 10% of the total samples. The duplicate or split aliquots are processed separately and the results compared to evaluate the effects of the matrix on the precision of the analysis. Results are expressed as relative percent difference between the duplicate aliquots analyzed.

A comparison between the QA and QC sample results by the Quality Assurance Laboratory is used to assess the quality and validity of the data along with the contract laboratory's internal quality control measures. A report of the findings shall be presented in the Chemical Quality Assurance Report (CQAR).

3.4.2 Field Blanks

A field blank is prepared from the equipment decontamination water source. The field blank measures contamination during sample collection and is obtained at a frequency of one per water source. The water source is recorded, and the sample is analyzed for the same parameters as the collected field samples. If more than one water source is used for equipment decontamination, a sample is collected and analyzed from each source. It is expected that only one water source will be used for decontamination in this Site Inspection, thus leading to one Field Blank.

3.4.3 Rinsate Blanks

Rinsate blanks are defined as samples which are obtained by pouring analyte-free deionized water through the sample collection equipment (bailer, pump, auger, etc.) after decontamination, and placing it in appropriate sample containers for analysis. A rinsate blank, sometimes referred to as an equipment blank or wash blank, is used to determine if decontamination procedures are effective. Rinsate blanks will be collected during the field investigation from all major sampling devices. These samples will be analyzed for the target parameters.

3.4.4 Duplicates

Multiple grab samples, collected separately, that equally represent a medium at a given time and location. This is the type of co-located sample required for volatile organic analyses. Duplicate samples collected in the field provide precision information for the entire measurement system including sampling, homogeneity, handling, shipping, storage, preparation, and analysis. Samples for duplicate analyses will be selected at locations with suspected contamination. Duplicates shall be **submitted blind to the laboratory** for analyses.

3.4.5 Split Sample

Split samples are those collected as a single sample, mixed, divided into two or more equal parts, and placed in separate containers. Samples to be analyzed for volatiles are never split samples because the VOCs can volatilize. The samples shall be split in the field prior to delivery to one or more laboratories for analysis. Split samples are subjected to the same environmental conditions and steps in the measurement process. This serves as an oversight function in assessing the analytical portion of the measurement system.

3.5 Method Detection Limits

The detection limits needed for this project are stated in Table QAPP-2. Contract Required Quantitation Limits (CRQLs) set forth by the State of New York will be used as guidance on detection limits for chemical parameters investigated in this project. The following documents contain the necessary regulatory criteria and contaminant levels needed for imposing the detection limits required for this sampling event:

- NYDEC Technical Administrative Guidance Memorandum (TAGM) HWR-94-4046, Determination of Soil Cleanup Levels, revised January 24, 1994
- Technical and Operational Guidance Series (TOGS), 1.1.1, Oct. 22, 1993

4.0 FIELD SAMPLING

Sampling locations and procedures for the fieldwork are described in detail in the Field Sampling Plan Addendum.

A sufficient amount of clean equipment and sample containers should be taken to the project site whenever possible, to minimize the need for equipment cleaning in the field. Table QAPP-3 lists requirements of the groundwater sample containers.

Table QAPP-3 Sample Container Requirements

Parameter	Sample Media	Container
SVOCs/PAHs	Soil	8 oz. CWM
23 TAL Metals	Soil	8 oz. Clear Wide Mouth
SVOCs/PAHs	Groundwater	2 -1 L Amber Jug
Mercury	Air	Sorbent Tube

4.1 Sample Preservation

After collection, soil and groundwater samples will be placed in a cooler with ice and cooled to approximately 4°C. Soil and air samples require no chemical preservatives, but water samples do. The sample preservation method and holding times for various matrixes and analytes is shown in Table QAPP-4. The laboratory will pre-add the preservatives to the necessary samples containers.

4.2 Holding Times

All the soil and groundwater samples will be delivered to the contract laboratory at the end of each day. The laboratory will perform the required analyses within the maximum holding times as shown in Table QAPP-4. QA samples, representing approximately 10% of each batch delivered to the contract lab, shall be packaged and sent to STL-Seattle [5755 8th Street East, Tacoma, WA 98424, ATTN: Dawn Werner, Phone: (253) 922-2310] at the end of each day.

Table QAPP-4 Sample Preservation and Maximum Holding Time Requirements

Parameter	Matrix	Preservation	Maximum Hold Time
TCL SVOCs	Soil	Cool to 4°C	Ext:/Anal: 14/28 days
23 TAL Metals*	Soil	Cool to 4°C	Ext:----/Anal: 6 months
TCL SVOCs	Groundwater	Cool to 4°C	Ext:/Anal: 14/28 days
Mercury	Air	Kept at Room Temperature	Ext:/Anal: 30 days

Notes: * = Except mercury Ext = Extraction Anal = Analysis

5.0 SAMPLE DOCUMENTATION, CUSTODY AND TRANSPORTATION

5.1 Field Documentation

5.1.1 Field Notebook (unchanged)

5.1.2 Daily Quality Control Report (unchanged)**5.1.3 Photographic Documentation (unchanged)****5.1.4 Departure From Approved Plans (unchanged)****5.1.5 Unusual Incidents and Accidents (unchanged)****5.1.6 Sample Identification**

All field samples, including QA and QC duplicates/splits, rinsates, and field blanks, shall be identified using a unique sample identification scheme suitable to the project and sampling protocol. This unique sample number shall be recorded in indelible ink on the sample label and chain of custody form. The QA/QC sample I.D. and labels will be written so that they can be submitted “blind” to the laboratory; that is their labels and I.D. numbers must be indistinguishable from that of any regular sample.

The Fort Totten Spring 2004 soil sample numbering scheme will be in the format **Ad2004-SS-# -SH** for the shallow samples (2” – 12” BGS) and **Ad2004-SS-# -DP** for the deeper (12” – 24” BGS) samples. In this sampling scheme the # refers to the borehole number, ranging from one to eleven (shown in Figure FSPAd2-1). Higher, masking, sample numbers can be assigned for quality assurance/quality control (QA/QC) numbers.

The results from air samples from Building 615 will be numbered **Ad2004-AIR-Hg-#-L**, or **Ad2004-AIR-Hg-#-H**, where # is the sample number, consecutively taken and recorded. The L is for samples taken at 3 feet above the floor and the H is for samples taken 6 feet above the floor. Quality control samples are not taken during real time air sampling for mercury.

The groundwater sample numbering scheme for the Spring 2004 sampling will be in the format **Ad2004-MW4R-GW-#**, where # is the sample number. The sample number is “1” except when higher, masking, numbers are used for QA/QC samples.

5.1.7 Sample Labeling (unchanged)**5.2 Chain of Custody****5.2.1 Chain of Custody Procedures**

The purpose of sample custody procedures is to document the history of sample containers and samples from the time of preparation of sample containers through sample collection, shipment, and analysis.

An essential consideration for the validation of environmental data is demonstrating that samples have been obtained from the locations stated and that they have reached the laboratory without alteration. Evidence of sample traceability from collection to shipment, to laboratory receipt and

custody while in the laboratory, until proper disposal, must be documented. A sample is considered to be in a person's custody if the sample is:

- a. In a person's actual possession
- b. In view after being in a person's possession
- c. Locked up so that no one can tamper with it after having been in physical custody.
- d. In a secured area, restricted to authorized personnel.

Chain-of-custody procedures are initiated in the field following sample collection. The procedures consist of:

- a. Preparing and attaching a unique sample label to each sample collected.
- b. Completing the chain of custody form.
- c. Preparing and packaging the samples for shipment.

5.2.2 Chain of Custody Form

Documentation will be accomplished through a Chain of Custody form that records each sample and the individuals responsible for sample collection, transfer, shipment and receipt by the laboratory. This form must also contain pertinent information about sampling location, date, and times, signature of sampling technician, types and numbers of samples collected and shipped for analysis in each lot, parameters to be analyzed per sample, sample identification number and the project name.

Primary and QC samples will be shipped to the laboratory of TrixMatrix Laboratories, Inc., 5560 Corporate Exchange Court, Grand Rapids, MI 49512, ATTN: Gary Wood, Phone: (616) 975-4500.

Split QA samples will be sent to the laboratory of STL-Seattle, 5755 8th Street East, Tacoma, WA 98424, ATTN: Dawn Werner, Phone: (253) 922-2310.

An approved and completed chain of custody form shall accompany samples during each step of custody, transfer, and shipment. When physical possession of samples is transferred, both the individual relinquishing the samples and the individual receiving them shall sign, date, and record the time on the chain of custody form. Figure QAPP-1 is a sample Chain of Custody record.

5.3 Sample Transportation

5.3.1 Packing and Transportation (unchanged)

Figure QAPP-1 Chain of Custody Record

U.S. Army Corps of Engineers Chain of Custody Record (ER 1110-1-263)

Proj. No.		Project Name				Number of Containers	VOCs (EPA 8260)	TPH-GRO (8015M)	Herbicides (8151)	Pesticides (8081)	PCBs (EPA8082)	8 RCRA Metals	Remarks
Sampler : (Signature)													
Date/Time	Grab or Composite	Preservative	Matrix	Site Code / Sample Number									
Sample Relinquished by: (Sig.)				Date/Time Received by: (Sig.)			Date/Time		Hazards Associated with Sample				
Sample Relinquished by: (Sig.)				Date/Time Received by: (Sig.)			Date/Time						
Sample Relinquished by: (Sig.)				Date/Time Received by Lab: (Sig.)			Date/Time		Remarks at time of receipt:				
Custody Seal No:				Lab Case No.:									

ENG Form 5021-R, Oct 90

5.3.2 Sample Packing Instructions (unchanged)

6.0 LABORATORY QUALITY ASSURANCE

The primary field and QC samples of soil and groundwater collected for analysis will be sent to TriMatrix Laboratories, Inc. in Grand Rapid, MI that has been validated by USACE HTRW Center of Expertise (CEMRO-HX), Omaha, Nebraska and certified by the State of New York. The Split QA samples of soil and groundwater will be sent to STL in Seattle, WA. Samples will be inspected and logged in to the laboratory's data system and then prepared for analysis by using EPA 8270C Method in Ion-Trap mode. The primary and duplicate mercury samples will be collected in sorbent tubes and will be analyzed by a chemical laboratory that is certified by the State of New York - bid winning firm/laboratory will be determined in the near future. No QA samples for the mercury in the indoor air will be collected and analyzed in this project.

6.1 Incoming Samples/Cooler Receipt Form

Upon sample receipt, the laboratory representative responsible for accepting incoming sample shipments must compare the samples received against the list on the chain of custody form. All samples will be examined and information will be recorded on a "Cooler Receipt Form" or equivalent to verify the condition of the samples upon receipt, and verify that sample holding times have not been exceeded.

Laboratory personnel shall measure the surface temperature of the samples to determine if the proper temperature was maintained during shipment. Any water samples (i.e. field blanks or rinsate blanks) that were preserved (acidic or alkaline) shall be checked with pH paper upon receipt. If any samples are observed as improperly preserved or damaged during transit, the USACE Design Team Leader and Project Chemist shall be notified immediately to decide if re-sampling will be required:

- Design Team Leader: Debra Ford, Phone (410) 962 6736.
- Project Chemist: Scott Chang, Phone (410) 962 6739.

6.2 Instrument Preventive Maintenance, Calibration and Frequency (unchanged)

6.3 Laboratory Analytical Methods

The laboratory analytical methods needed for this project are stated in the Table QAPP-2. The semi-volatiles in soil will be extracted, purged and trapped by EPA Method 5030. The purged volatiles will be analyzed by EPA Method 8270C. Method 8270C in Ion-Trap mode is a highly sensitive gas chromatographic/ mass spectroscopy (GC/MS) method that detects a wide range of SVOCs. The SVOCs in groundwater will be extracted by the micro-wave EPA Method 3540 and analyzed by the GC/MS EPA Method 8270C.

EPA Method 6010, using Inductively Coupled Plasma (ICP) instrumentation will be used to determine contents of barium, chromium and selenium in the extract. Cold vapor atomic absorption

methods EPA Methods 7471 will be used to determine the mercury concentrations in soil. EPA Methods 7061, 7131, and 7421 for arsenic, cadmium, and lead respectively are various furnace atomic absorption methods used in determination of the TAL metals. The mercury in air will be analyzed by the Zeeman Mercury Analyzer RA-915+ that has an ultra low detection limit of 2 ng/m^3 in the air. The mercury samples collected in sorbent tube will be analyzed by NIOSH Method 6009 which employs the cold vapor atomic absorption spectroscopic technique to determine the mercury content in the tube and converted it to the concentration of mercury in the air if the sampling time and flow rate are known/recorded. The detection limit of NIOSH Method 6009 is less than 1 ug/m^3 .

6.4 Quality Control Procedures (unchanged)

6.5 Internal Quality Control Checks (unchanged)

6.6 Corrective Action (unchanged)

6.7 Data Reduction, Evaluation and Documentation

Data evaluation shall be performed in accordance with the procedures of the USACE approved laboratory's QA manual and shall adhere to the protocols described in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, Third Edition, U.S. EPA, including UPDATE III, September 1994 and EPA 600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983.

Data evaluation serves 3 main purposes:

- a. It qualifies data for further use to ensure data are not inappropriately used;
- b. It serves as a check on a laboratory to ensure they are meeting contractual deliverables and regulatory requirements;
- c. It establishes due diligence and allows errors to be addressed sooner in a program, so that the impact will be less than if the errors were detected later.

For purposes of this investigation, the contractor shall perform a Definitive Level type data evaluation of all generated analytical data. The Definitive Level type data evaluation will be performed consistent with EPA QA/G-4, Guidance for the Data Quality Objectives Process, September 1994.

TriMatrix will present the chemical data of the primary and QC samples and STL-Seattle will present the chemical data of the Split QA samples to the Project Chemist for data assessments, compilation and reporting. The details of this package are explicated in Section 7.2.

7.0 CHEMICAL DATA DELIVERABLES

During the project, the chemical data deliverables to be submitted are listed in Sections 7.1 to 7.6.

7.1 *Analytical Results*

Chemical analysis results of soil and groundwater (no air samples included) will be formatted in GISKey .dbf or .csv files and e-mailed to the USACE Baltimore District Project Chemist within one month of sample receipt. The hard copy of the analytical results with laboratory quality control/internal check data will be delivered after the electronic package as soon as possible.

7.2 *Laboratory Analytical Data Report Package*

The laboratory's data shall be submitted as a pre-draft final report to the QA laboratory for comparison between the data generated from the contractor's field samples, the QC samples, and the USACE QA laboratory data. This review also encompasses an assessment of the internal quality control and method requirements, enabling a evaluation of the data generated during the project to be performed by the QA laboratory. This package of data shall be submitted within 30 days of receiving the last sample. A complete data set shall also be submitted to the USACE Baltimore District Project Chemist simultaneously, for him to review the submittal for completeness and verification that the DQOs were met.

This deliverable shall contain at a minimum all of the items listed below to allow the Project Chemist to perform an adequate data evaluation (Data shall be presented in tabular format whenever possible):

- a. Sample Identification - Prepare a tabular presentation which matches the contract laboratory sample identifications to the field identification numbers assigned to each sample. This list shall identify all field splits/duplicates.
- b. Cooler Receipt Forms - Provide copies from all sample shipments received at the contract laboratory.
- c. Chain of Custody Record Forms - Provide copies from all sample shipments received by the contract laboratory.
- d. General Organic and Inorganic Reports - For each analytical method run, report results of all analytes for each sample (concentration detected or less than the specific quantitation limit). On the sample's data sheets, clearly identify the specific analytical batch the sample belongs to and the corresponding QC data reported. Report any dilution factors, as well as date of extraction (if applicable) and date of analysis for each sample. Soil samples shall be reported on a dry-weight basis.

- e. Internal Quality Control (QC) Reports - For each analytical batch, report a complete set of QC results. At a minimum, Internal QC samples shall be analyzed at rates specified in the methods. The following Internal QC results shall be submitted:
- (1) Laboratory Blanks (Method and Instrument Blanks) - Report all analytes for each laboratory blank analyzed per sample batch.
 - (2) Surrogate Spike Samples - Report recoveries with all organic method reports, where applicable (i.e. when the method requires surrogate spikes). Also specify the control limits for surrogate spike results, and the concentration used for the spike.
 - (3) Matrix Spike Samples - Report recoveries for all organic and inorganic analyses. Also specify the control limits for matrix spike results, each method, and matrix. General sample results shall be designated as corresponding to a particular matrix spike sample.
 - (4) Laboratory Duplicates and/or Matrix Spike Duplicate Pairs - Report the Relative Percent Difference (RPD) for each duplicate pair and the analyte/matrix-specific control limits.
 - (5) Laboratory Control Samples - When run for a method's internal QC, report the results of the laboratory control sample (LCS) with the corresponding project sample data. Also specify the control limits for the LCSs.
 - (6) Field Duplicates and Field Blanks - Field duplicates shall be identified by the USACE Baltimore District Project Chemist, after analysis but just before completion of the Data Report Package. Report the Relative Percent Difference for all field duplicate pairs.

7.3 *Quality Control Summary Report (unchanged)*

7.4 *Data Reports to the Project Chemist*

The Laboratory Analytical Data Report Package, described in Section 7.2 and the Quality Control Summary Report (QCSR), described in Section 7.3, will comprise TriMatrix Laboratories and STL-Seattle Laboratory reports to the USACE Baltimore District Chemist.

7.5 *Chemical Quality Assurance Report*

The Project Chemist will write a Chemical Quality Assurance Report (CQAR). This will compare QA versus primary and QC sample results, and thus assess the quality and validity of the data along with the contract laboratory's internal quality control measures.

7.6 Investigation Results and Reporting

The analytical results of the Spring 2004 sampling event of monitoring wells will be incorporated into the Remedial Investigation Report, Fort Totten, New York. The Baltimore District will finalize Remedial Investigation Report for the Fill Area/Upland that include a summary of findings, a tabulation of chemical analysis performed, an assessment of the environmental conditions at the site, a discussion of potential risks to human health and recommendations for any further action.

8.0 REFERENCES

1. USACE Engineering Regulation 1110-1-263, Chemical Data Quality Management for Hazardous Waste Remedial Activities, updated March 1996.
2. USACE Engineering Manual 200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, 1 September 1994.
4. U.S. Environmental Protection Agency, Methods for Determination of Organic Compounds in Drinking Water, issued in 1988 – 1995.
5. U.S. Environmental Protection Agency, Methods for Determination of Metals in Drinking Water, issued in 1991 and 1994.
6. EPA QA/G-4, Guidance for the Data Quality Objectives Process, September 1994.
7. 40 CFR 136: Definition and Procedures for the Determination of the Method Detection
8. 40 CFR 136.3e: Required Containers, Preservation Techniques, and Holding Times
9. New York State Department of Environmental Conservation (NYDEC) Technical Administrative Guidance Memorandum (TAGM) HWR-94-4046, Determination of Soil Cleanup Levels, Revised January 24, 1994.
10. New York State Department of Environmental Conservation (NYDEC) Ambient Water Quality Standards and Guidance Values, Technical and Operational Guidance Series (1.1.1) (TOGS), Oct. 22, 1993.



**US Army Corps
of Engineers**

DRAFT

May 2004

**SITE SAFETY AND HEALTH PLAN
ADDENDUM 2**

**SOIL, AIR, AND GROUNDWATER SAMPLING SPRING 2004
FORT TOTTEN COAST GUARD STATION
QUEENS, NEW YORK**

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APPROVAL PAGE

**SITE SAFETY AND HEALTH PLAN ADDENDUM 2
SOIL, AIR AND GROUNDWATER SAMPLING SPRING 2004
FORT TOTTEN COAST GUARD STATION
QUEENS, NEW YORK**

This Site Safety and Health Plan was prepared by the Baltimore District, for the Field Exploration Unit, who will be performing the soil, and groundwater sampling. And well installation.

This Site Safety and Health Plan addendum was prepared by the following:

Date: _____

**James O. Bynum
Industrial Hygiene & Chemistry Section
Hazardous, Toxic, and Radioactive Waste Branch**

This Site Safety and Health Plan addendum was approved by the following:

Date: _____

**Nancy R. Hammond, CIH
Chief, Industrial Hygiene & Chemistry Section
Hazardous, Toxic, and Radioactive Waste Branch**

**SITE SAFETY AND HEALTH PLAN ADDENDUM 2
FORT TOTTEN GROUNDWATER INVESTIGATION
FORT TOTTEN COAST GUARD STATION
QUEENS, NEW YORK**

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1.0 INTRODUCTION

This addendum modifies the original Site Safety and Health Plan (SSHP), dated June 2000 by specifically addressing work procedures and personnel changes for the soil, air and groundwater sampling and well installation activities at the Fort Totten Coast Guard Station, located in Queens, NY. Unless specifically modified herein, all other sections in the June 2000 SSHP are still applicable.

2.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION (UNCHANGED)

3.0 PROJECT OBJECTIVE

The project objectives are described in Section 1.2 of the Work Management Plan Addendum 2.

4.0 HAZARD/RISK ANALYSIS

4.1 *Task Analysis*

Site Mobilization/Demobilization: The hazards of this phase of activity are those associated with equipment movement, manual materials handling, and manual site preparation. Manual materials handling and manual site preparation may cause blisters, sore muscles, joint and skeletal injuries and may present the potential for eye hazards, contusions and lacerations. The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitoes, wasps, spiders and snakes. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

Well Installation: One monitoring well will be installed, developed and sampled from boreholes drilled by the hollow stem auger method. This process involves the physical installation of the well casing, filling the boreholes with a grout mixture, and constructing the concrete pad. This activity exposes workers to standard construction/demolition safety hazards along with potential health hazards of noise, dust, Portland cement and bentonite exposures. Care will be taken to help minimize exposure to these hazards.

Soil Borings: Two soil borings will be drilled using the hand auger method. This process involves manual auguring and the hazards associated this method includes potential lower back and muscle strains, exposure to noise, grout mixture, IDW, slips and falls. Extreme care should be taken when engaging in this activity.

Sample Collection: Field sampling will focus on groundwater and soil samples. The primary hazards of these tasks could be the potential for direct contact with the contaminants of concern discharged during intrusive activities. Dermal contact with contaminated water on the site will be minimized through use of chemical resistant garments as described in Appendix A of the original SSHP and avoidance of media that is suspected of being contaminated. Air monitoring for hazardous atmospheres will be conducted as described in section 9.0 of the original SSHP.

Decontamination Activities: Personnel involved in decontamination activities may be exposed to contaminated soil and liquids from contaminated sampling equipment.

4.2 *Mercury Vapor Analyzer Field Screening*

Modified D level of personal protection equipment should provide adequate coverage during the screening process for mercury vapor or mercury contaminated materials.

4.3 *Chemical Exposure*

Data relating to the presence of chemical contamination of concern in the subsurface at the site indicate that the potential for personnel exposure during the sampling activity is low. The maximum exposure potential to field personnel will occur during mercury vapor screening and handling samples. Exposure routes include direct skin contact and inhalation of particulates and vapors. Protective measures are taken to mitigate exposure will also provide adequate and appropriate protection against known chemical contamination detected on site. If the recommended PPE is used properly, according to this plan, and Standard Operating Procedures (SOP) and decontamination procedures followed, unhealthful exposures should not occur.

5.0 PROJECT MANAGEMENT

5.1 *Activities*

The project team is consists of the USACE personnel and contract team members for sampling analysis.

5.2 *Personnel*

The roles and responsibilities of each project team member are described in Section 5.1 of the Work Management Plan Addendum 2.

Additional sampling personnel may be identified before the start of site activities. At a minimum, all on-site personnel will have the initial 40 hour OSHA HAZWOPER training with a current 8-hour refresher.

STATEMENT OF UNDERSTANDING

SITE SAFETY AND HEALTH PLAN ADDENDUM

Soil, Air, and Groundwater Sampling Spring 2004
Fort Totten Coast Guard Station
Queens, New York

All site personnel have read the above plan and are familiar with its provisions. My signature certifies that I have read, understand and will comply with the guidelines set forth.

Name	Signature	Date
-------------	------------------	-------------

Site Safety Officer (SSO):

_____	_____	_____
_____	_____	_____
_____	_____	_____

Other Site Personnel:

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____