SECTION 2.0 – SITE CHARACTERIZATION

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2.0 SITE CHARACTERIZATION

The RFI program was based on known or suspected potential sources or releases to various site media, which required further characterization to support closure of the Maine Yankee site in accordance with RCRA requirements. Based on this understanding, analytes of interest, analytical protocol and sampling approaches were developed in the QAPP to support a determination of the nature and extent of contamination and to assess impact to human health and the environment for the Bailey Point area of the site (Stratex, 2001d). This section presents an overview of the site characterization activities required to make project decisions leading to site closure, and summarizes the quality assurance assessments performed during the RFI to ensure that quality data were collected.

2.1 Program Overview

This section provides an overview of the RFI program performed for the Bailey Point portion of the Maine Yankee site. Included is a summary of potentially affected media, pathways and receptors, the sampling and analytical approach used, and the requirements that would trigger a project action.

2.1.1 Environmental Contamination Overview

Minor spills and releases (primarily petroleum) have occurred since the beginning of plant construction. A few significant releases occurred during operation. These spills and releases, detailed in the QAPP, are summarized below and are shown on **Figure 2-1**.

As part of the MDEP RFA study, two solid waste management units (SWMUs) and four areas of concern (AOCs) were identified. The SWMUs included:

- SWMU-1 PCC and SCC Pipelines and
- SWMU-2 Hazardous material and waste storage area (Lube Oil Storage Area).

The four AOCs were identified as:

- AOC-1 Satellite storage area outside Service Building,
- AOC-2 Floor drains in water treatment area,
- AOC-3 Hazardous waste storage buildings, and
- AOC-4 Cooling water discharge to Forebay and diffuser pipe in Montsweag Bay.

Review of these SWMUs and AOCs as part of the Building Assessment Plan and visual site inspection has led to focused studies in SWMUs 1 and 2 and AOCs 2 and 4 (Stratex, 2000a and 2001c and MY 2002m). No specific studies were focused on AOCs 1 and 3 as no historic or visual evidence of spill/releases was observed. As part of decommissioning activities, the hazardous waste storage buildings will be closed in accordance with

Chapter 851 of the MDEP hazardous waste management rules. Additionally, groundwater samples were taken from monitoring wells located downgradient of AOCs 1 and 3.

Three notable features relating to construction of the plant were identified in the QAPP and investigated as part of the RFI: a chemical cleaning basin; a garage used for the maintenance of concrete trucks; and a marine sediment/construction debris disposal area.

The pre-operational chemical cleaning basin was located south of Old Ferry Road and east of the railroad tracks (**Figure 2-1**). The unlined basin, approximately 250 feet by 350 feet with a depth of approximately 10 feet, was used for the disposal of chemical solutions and rinse water from pre-operational cleaning associated with the main steam, condensate and steam generator feed piping. Pipe cleaning was necessary to remove corrosion-inhibiting protective coatings, and reportedly involved the following chemicals: monosodium, disodium and trisodium phosphate; formic acid; hydroxyacetic acid; a high temperature chloride free inhibitor; a nonionic wetting agent; citric acid; and sodium nitrate. After completing the pre-operational cleaning activities, the wastewater in the basin was reportedly released to a drainage area (west of the railroad tracks) that flowed to Bailey Cove. The pre-operational cleaning activity occurred over a limited time period during construction (July 1971) and was terminated prior to start of facility operation (December 1972).

A second pre-operational feature identified was a maintenance garage that was used to service concrete trucks during construction. The garage was located on the east side of the plant access road in the vicinity of the former meteorological tower (**Figure 2-1**). The location of the garage was confirmed by both aerial and project photographs taken during plant construction. The location or presence of floor drains or other specific features was researched; however no detailed drawings of the garage could be located. Based on the use as a vehicle maintenance garage, potential chemicals used at the facility include oils, fuel and degreasing solvents. The garage was removed prior to operation of the Maine Yankee facility.

The final pre-operational feature investigated was located in an approximate 20-acre area west of the railroad tracks and north of the 345 kV switchyard to Old Ferry Road (**Figure 2-1**). Prior to plant construction, this portion of the site included a large tidal drainage that connected a channel extending from Bailey Cove eastward to the area of the pre-operational cleaning basin described above. The tidal drainage was bordered by a significant expanse of saltwater marsh terrain. The initial fill material utilized in this portion of the site included glaciomarine clay-silt soils and blasted bedrock removed from the southern portion of Bailey Point where the main plant buildings were constructed. Various construction debris and wastes including wire rope, wood, and steel were also mixed with this material that was used to fill the central and southern portion of the area including the large tidal drainage. A construction debris area was located in the southwestern portion of the site and was used to sort through the construction debris, most of which was recycled. The construction debris that was not recycled was most likely buried in this area. Based on this understanding, the central and southern portion of the area, west of the railroad tracks, is believed to have had a combination of soil/blast rock fill and construction debris placed within the large drainage and above the natural soils. Most of the construction debris is believed to have been placed in the area west of the 345 kV lines and south of the "ball field". In addition to the fill included in this area, the area west of the railroad and contractor access road, and under the more easterly 345 kV set of lines has occasionally served as a parking area for subcontractors and a laydown area for equipment.

During 1968 and 1969, an estimated 50,000 cubic yards (cy) of marine sediments were removed from the intake channel associated with the construction of the Circulating Water Pump House and material removed from under the original east forebay dike, barge slip and accompanying barge slip channel. These materials were pumped via overland pipes and deposited north of the pre-construction drainage to what is now called the "ball field" area and the area east of the railroad tracks where the pre-operational cleaning basin was constructed in 1971.

During the construction of the Maine Yankee forebay structure and diffuser pipe in 1974, a berm was built along the western edge of the 345 kV transmission line area to retain soft marine sediments that had been excavated for the foundations of the west dike of the forebay and the marine portion of the diffuser pipe. The material for the berm included an estimated 35,000 cy of glaciomarine clay-silt soils and 34,000 cy of blasted rock excavated from the Foxbird Island trench for the diffuser pipe. Following construction of the berm, approximately 90,000 cy of the marine sediments were placed within the berm and to the north into the "ball field" area.

Additionally, a total of approximately 60 cy of marine sediments and silt periodically removed from the intake structure of the Circulating Water Pump House was spread on five separate occasions between September 1992 and September 1997. This material was spread in an approximate one-acre portion of the site that was located adjacent to the contractor parking area, in accordance with a dredge spoils utilization license (MDEP, 1992b). The dredge spoils area was sampled annually as required by the license, and the license was surrendered to MDEP, with its approval, in 1998.

Four notable releases occurred during operation of the facility:

- a release of an unknown amount of chromated water from the Primary Component Cooling (PCC) system to a storm drain in October 1985 (SWMU-1);
- a release of approximately 12,000 gallons of de-mineralized Secondary Component Cooling (SCC) water containing sodium chromate in December 1988 through an underground pipe leak (SWMU-1);
- an accidental release of approximately 200 gallons of low viscosity non-PCB containing transformer oil to the Back River in May 1991 from a fire in the main transformer; and
- a release of kerosene through a slow leak in a fuel line to subsurface soils in the former Spare Generator Storage Building adjacent to the west side of the current ISFSI area in June 1994.

These four releases were addressed in a timely manner to the satisfaction of the MDEP; however additional characterization within these former release areas were conducted as part of the RFI to support an assessment of risk and final site closure.

Several areas of contamination were identified and remediated both prior to and during construction of ISFSI. The release of kerosene to subsurface soils near the former Spare Generator Storage Building was remediated prior to the RFI to MDEP Baseline-2 standards (MDEP, 2000a). Approximately 1,700 tons of petroleum-contaminated soil were removed, and the remediation was completed in accordance with MDEP-approved remediation plan and clean-up criteria (Stratex, 2000c).

Two areas of subsurface historical petroleum contamination were discovered during construction of the ISFSI and were subsequently remediated to MDEP Baseline-2 standards (MDEP, 2000a). The initial discovery was during utility trenching along the west side of the ISFSI Operations Building. Approximately 300 cubic yards of petroleum-contaminated soil was removed, which was completed in accordance with an MDEP-approved remediation plan and clean-up criteria (S&W, 2000f). The second area was in the central portion of the ISFSI area and resulted in the removal of about 30 cubic yards of petroleum-impacted soil. A report summarizing that remedial activities were performed in accordance with the MDEP-approved plan and clean-up criteria was submitted to MDEP (JWC, 2000).

One minor spill of "form oil" was reported during construction of the ISFSI that was remediated in a timely manner to MDEP Baseline-2 standards (MDEP, 2000a). A small amount of impacted surface soil was removed in accordance with MDEP-approved plan and clean-up criteria (JWC, 2001).

Within the RA, several minor surface spills (i.e., hydraulic fluid) and a historic subsurface petroleum-contaminated area were discovered and addressed during the RFI. Two hydraulic oil leaks to surface soils in the RA were cleaned to MDEP-Baseline standards (MDEP, 2000a). The two spills were timely addressed and a small volume of impacted surface soils were removed to MDEP clean-up standards (JWC, 2002). An area of subsurface historical petroleum soil contamination discovered in the alleyway adjacent to the Primary Auxiliary Building (PAB) was remediated to MDEP Baseline-2 standards (MDEP, 2000a). Approximately eight cubic yards of soil was removed from this area down to bedrock and MDEP clean-up standards were achieved (JWC, 2003).

Additional activities having contamination potential during operation of the facility were identified and investigated. In the 1970's and early 1980's, used drums containing residual solvents were staged in front of the loading dock at Warehouse 2/3 prior to shipment back to the vendor to recycle the containers. It was reported that a used drum of degreasing solvent that contained 1,1,1- trichloroethane was likely released to the ground on the east of the loading dock as a result of this practice. It was also believed that paint, painting solvents, and paint removal blasting grit was disposed west of

Warehouse 2/3 and along the boundary of Warehouse 2 and Warehouse 3 prior to joining the two structures.

The forebay, the licensed discharge pathway, was connected to a large, underground pipe system beneath Foxbird Island that lead to diffuser pipes in Montsweag Bay (AOC-4) (**Figure 2-1**). Several sumps located in the industrialized portion of the facility were treated and discharged through the forebay along with stormwater runoff. The forebay was also the discharge point for the non-contact cooling water systems. When the plant was operating, approximately 420,000 gallons per minute of circulating and service water were discharged through the forebay.

In addition to the known spills and releases and documented historical activity, the QAPP outlined additional understanding concerning the distribution of impacted areas at the Maine Yankee facility based on previous investigations and remediations (Stratex, 2001d). The previous studies included investigations of soil, groundwater, sediment, and surface water from areas of potential concern. These investigations showed low concentrations of Volatile Organic Compounds (VOCs), Polynuclear Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), and Diesel Range Organics (DRO) in soils, and low concentrations of VOCs, Semivolatile Organic Compounds (SVOCs) and metals in groundwater. Sediments were impacted primarily by PAHs and DRO, and surface water, collected primarily from catch basins, contained elevated concentrations of DRO.

Air discharges did not appear to be a significant issue at the Maine Yankee facility as no significant or historic releases of airborne material occurred at the facility.

2.1.2 Potentially Affected Media, Pathways and Receptors

Previous studies described in the QAPP and summarized in **Table 1-1** indicate low levels of soil and groundwater contamination in industrial portions of Bailey Point where spills and releases occurred. Detected concentrations of chemicals, primarily PAHs and petroleum hydrocarbons, were also observed in sediments associated with stormwater outfalls. The Bailey Point area includes a near-shore environment that consists of populations of benthic organisms (clams, mussels, and worms) that are commercially harvested and are a source of food for fish and wildlife. Based on these studies, the following is a summary of potentially affected media within the Bailey Point area:

- surface waters and sediment of Montsweag Bay;
- sediments along drainage ways leading from the Maine Yankee property into Back River, Bailey Cove, and Montsweag Bay;
- soils on the site upon which spills occurred or wastes were placed or intermixed with soil;
- concrete left in place below grade upon which spills occurred;
- groundwater in the soil of the site; and
- groundwater in the bedrock of the site.

The potential migration pathways and receptors of these contaminants within the Bailey Point area include:

- contaminants entering the groundwater system traveling the pathways identified by the groundwater modeling discussed in Section 3 of this RFI;
- contaminants being extracted from the groundwater system by plants;
- contaminants entering shallow drainage ditches or wetlands and being returned to the fresh water surface system;
- contaminants potentially extracted through subsurface drains or from groundwater from wells or springs used as human water supplies;
- contaminants discharging to Montsweag Bay, up through or onto the bay sediments;
- surface runoff carrying contaminated sediments or bringing contaminants in contact with sediments that adsorb or precipitate contaminants carried in surface water;
- contaminants being taken out of sediments or soil by plants or by soil-ingesting or water-filtering organisms;
- bioaccumulation of contaminants by soil ingesting or water filtering organisms, followed by food chain transfer to higher trophic level organisms, such as fish, birds, or mammals;
- human contact with contaminated sediment;
- human contact with contaminated soil;
- human contact with the waters of Montsweag Bay;
- human ingestion of benthic organisms like clams or mussels; and
- human ingestion of fish and lobster.

A schematic site conceptual model relating the primary and secondary sources at the site to potential pathways and receptors was developed in the QAPP. Previous studies indicated that the stormwater discharge to sediments in the industrial area outfall areas represents the most significant potential risk at the site. Due to the presence of the near-shore environment, other receptors potentially include commercial and recreational shellfish harvesters, worm diggers, and other recreational receptors. Specific ecological and human health receptors will be evaluated in the risk assessments outlined in Sections 5 and 6 of this RFI Report.

2.1.3 Analytes of Interest

Analytes of Interest (AOI) represent specific compounds that were believed to be present at the site based on previous investigations, scoping meetings with regulators, historic use of materials at the site and pre-operational and operational releases. Initial AOIs were developed in the QAPP, which formed the program outlined in this RFI. Additional AOIs and target analytes were added to the program based on preliminary RFI findings to support assessment of risk to human health and the environment.

Due to the diverse activities across the site, the AOIs include several classes of organic and inorganic compounds that generally resulted in "full suite" analysis at each soil and groundwater sample location. A full suite of organic analytes was considered to be VOCs, SVOCs, pesticides, and PCBs identified on the Target Compound List (TCL) in Appendix D of 06-096 CMR 405. Petroleum hydrocarbons were evaluated by Extractable Petroleum Hydrocarbons (EPH) and Volatile Organic Hydrocarbons (VPH) using Massachusetts DEP methods. Following the initial round of groundwater sampling results, at the request of MDEP, analysis of petroleum hydrocarbons in groundwater was performed using the MDEP Diesel Range Organics (DRO) method (MDEP, 2002d and MY, 2002q). In addition to RCRA metals, inorganic compounds included a full suite analysis of compounds identified in CMR 405 as total inorganic target compounds, and referred to in this report as the Target Analyte List (TAL). Boron, a commonly used element at this site was included in the TAL list. Because of groundwater analytical results from previous sampling on site, nitrate analysis was included with the majority of groundwater samples collected in this program.

Concrete sampling was conducted on potentially impacted foundations, floors and slabs that will remain onsite following demolition. Concrete sample locations and selection of the analytical suite were based on observations and assessments made during the RFA phase and included analysis for PCBs and EPH.

To support an assessment of ecological risk, sediment samples were analyzed for TCL, TAL metals, PAHs using Selected Ion Monitoring (SIM), grain size, PCB homologues and congeners identified on NOAA and World Health Organization lists, and total organic carbon (TOC). Additional testing of sediment occurred in a phased approach based on the results of the bulk-chemistry analysis. The additional testing included bulk sediment toxicity to amphipods (BSTA) and sand worms (BSTS). Following an assessment of the chemical and toxicity analysis, benthic community structure analysis (BCSA) was conducted at selected sites.

Biota samples collected for analysis included the soft-shell clam, blue mussel, mummichog, and lobster. The tissue from these organisms was analyzed for TCL (minus VOCs), TAL, SIM PAHs, and lipids.

2.1.4 Project Action Limits

Project Action Limits (PALs) were developed in the QAPP to support DQOs for the project. The PALs are risk-based and are used to make project decisions. Further investigation and remedial actions will be based on risk-based screening concentrations, the findings of the risk assessments and whether the limits of potential contamination are bounded.

The QAPP defines the basis of the PALs developed for the RFI, which are summarized as follows:

- Soil - USEPA Region 9 Preliminary Remediation Goals (PRGs) for residential soil;
- Concrete - USEPA Region 9 PRGs for industrial soil;

- Groundwater - Maine Maximum Exposure Guideline (MEG) or USEPA Region 9 PRGs for tap water when MEGs are not available;
- Surface Water - Ambient Water Quality Criteria (AWQC), using chronic values when available;
- Sediment - National Oceanographic and Atmospheric Administration (NOAA) Effects Range-Low (ER-L); and
- Tissue - Maine Bureau of Health (MEBOH) Fish Tissue Action Levels (FTALs) or USEPA Region III Risk Based Concentrations (RBCs) for fish tissue when MEBOH FTALs are not available.

The risk-based values utilized for the PALs were not always available for the complete TCL and TAL suite of analytes. Likewise, for a few of the TCL and TAL compounds the PALs were less than laboratory achievable quantitation limits (QLs).

2.1.5 Sampling Approach

The primary purpose of the RFI program was to obtain an understanding of current site conditions to support potential remedial decision-making in order to close the site in a manner appropriate for the protection of human health and the environment. To support this understanding, three separate sampling and analysis strategies were developed in the QAPP:

- a backlands sampling program in non-industrial areas north of Old Ferry Road and west of Bailey Cove;
- an exterior sampling program in the industrial area of Bailey Point south of Old Ferry Road; and
- an interior sampling program within and beneath on-site buildings and structures.

The QAPP also divided the site into study areas to provide additional focus and grouping of similar areas or features of the site. The six study areas and approximate size are defined below and are shown on **Figure 2-2**:

- *Study Area 1 and 2*: 670-acre backland areas north of Old Ferry Road and west of Back River, including the Eaton Farm area;

- *Study Area 3*: 12-acre peninsula (Foxbird Island) within Montsweag Bay south of the plant forebay in the Bailey Point area;

- *Study Area 4*: 8-acre area within the Bailey Point area consisting of the Independent Spent Fuel Storage Installation (ISFSI);

- *Study Area 5*: 130-acre area within Bailey Point containing the majority of the plant structures, two electrical switchyards, a ball field, and the Bailey Farmhouse and barn, but excluding the ISFSI; and

- *Study Area 6*: Shoreline outfall locations and tidal areas around Bailey Point in Back River, Montsweag Bay and Bailey Cove.

A draft Backlands RFI Report, based on the investigation outlined in the QAPP for the non-industrial backland portions of the Maine Yankee site (Study Areas 1 and 2) was submitted to MDEP February 27, 2002 (MY, 2002c). Following additional investigation of several relic dump areas and in response to MDEP comments, a second draft Backlands RFI Report was submitted to MDEP on March 11, 2003 and a final report was submitted on January 14, 2004 (MY, 2004).

The investigation of the industrial area south of Old Ferry Road (Study Areas 3 through 6) within the Bailey Point area is the focus of this RFI Report. This investigation took into account the potential migration pathways discussed above, and focused primarily on the major surface water discharge areas located on the edge of the Back River, Bailey Cove, and Montsweag Bay; soils from within the industrial area; and migration of contaminants from soils to site groundwater.

To support construction of the ISFSI, an investigation of Study Area 4 was conducted in Spring 2000, based on discussion with the MDEP and USEPA at the QAPP planning meetings on February 9 and 10, 2000. The results of the soil and groundwater investigation were communicated to MDEP prior to construction to demonstrate that there was no significant residual environmental contamination in the ISFSI area that would preclude construction (MY, 2000d). The results of this investigation are included in this RFI Report.

The interior sampling program focused on potential migration pathways associated with floor cracks, sumps and trenches located within the on-site buildings, and/or specific historic spills, AOCs, SWMUs, or releases within the buildings that had the potential to migrate into the environment (Stratex, 2000a). The majority of the interior investigations were performed prior to building demolition.

The Lube Oil Storage Room, Maine Yankee's former Interim Hazardous Waste Storage Facility, was closed in accordance with a MDEP-approved closure plan (Stratex, 2001a). The findings are included in this RFI Report (MY, 2002j).

In addition to the six study areas described above, sediment was also collected in and around the submerged portion of the plant's diffuser pipes in the Back River to support decommissioning. The samples were collected using divers in summer 2001 using methods consistent with procedures and protocol outlined in the QAPP. The results of this sampling effort are included in this RFI Report.

2.2 Data Acquisition Methods

Data acquisition activities included surface and subsurface soil sampling, installation of test pits, soil borings, geoprobes, and monitoring wells, bedrock coring, concrete sampling, sediment sampling, biota collection for tissue analysis, surface water sampling, groundwater sampling, QA/QC sampling, and laboratory analysis. Following collection of samples and installation of monitoring wells, locations were surveyed. Following analytical data collection, the results were validated and managed using a web-based database system that geo-referenced the sample results with their surveyed locations.

2.2.1 Soil Sampling and Bedrock Coring

Soil samples were collected using several methods depending on the location to be sampled or the objective of the investigation as dictated by the QAPP. Soil samples were obtained via surface grabs, soil boring, geoprobes, hand auger, test pit, and through core holes from beneath building slabs. Bedrock was cored as specified in the QAPP and was used to support geologic interpretation and selection of monitoring well screen intervals.

Surface Soil Sampling

Surface soil samples were collected in accordance with methods identified in the QAPP, which involved collection from soil boring locations and at discrete locations identified specifically for surface soil sampling. In limited instances, a composite surface soil was collected which consisted of a mixture of equal portions of soil from more than one discrete location. The sampling interval for surface soils was 0 to 6 inches. The surface soil samples (except VOCs) were collected using a stainless-steel spatula and mixing bowl. The soil was placed in a stainless-steel bowl and screened using a photoionization detector (PID). The soil was mixed with a spoon to homogenize the sample and placed in pre-cleaned, glass soil jars for analysis. Discrete VOC surface soil samples were taken using an EnCore™ sampler. All sampling equipment was decontaminated between sampling locations in accordance with protocols specified in the QAPP.

Hand Auger Sampling

A hand auger was used to obtain soil samples up to approximately 5 feet below the ground surface as soil conditions permitted. The hand auger consisted of an auger bucket attached to a drill rod extension and a "T" handle. In accordance with the QAPP, a hand auger soil sample was collected by advancing the auger into the soil by applying downward pressure on the handle while manually rotating it. The soils were logged in the field and observations were recorded in field logbooks. After collecting a sample from the desired sampling depth, the soil was screened using a PID. VOC soil samples were collected first from the auger using an EnCore™ sampler. The remaining soil from the auger was placed in a stainless-steel bowl, mixed with a spoon to homogenize the sample, and placed in pre-cleaned, glass soil jars for analysis. All hand auger sampling equipment was decontaminated between sampling locations in accordance with protocols specified in the QAPP.

Test Pit Sampling

Test pits were installed using a backhoe consistent with QAPP protocols. The soil stratigraphy observed within the test pit was logged in the field. Soil samples from the test pits were screened using a PID at two-foot intervals from the ground surface to the base of the test pit. The completed test pit was photographed to document the excavation. Test pit soil samples required for PID screening and laboratory analysis were taken directly from the backhoe bucket. VOC soil samples were collected first from the bucket using an EnCore™ sampler. Then an appropriate amount of soil was taken from the backhoe bucket and placed in a stainless-steel bowl, mixed with a stainless-steel spoon to homogenize the sample, and placed in pre-cleaned, glass soil jars for other required analysis. All sampling equipment, including the backhoe bucket, was decontaminated between sampling locations in accordance with protocols specified in the QAPP.

Sub-Slab Soil Sampling

Soil samples were collected from potentially impacted areas below concrete foundations and slabs in accordance with QAPP protocols. Sub-slab soil samples were either obtained following foundation or slab removal, in which they were collected as a surface soil sample as described above, or following the installation of a core hole through the concrete slab. Concrete coring was performed using an air-powered drill equipped with a 4 or 6-inch carbide bit. The bit removed a cylinder of concrete that created a void through which to retrieve a sub-slab soil sample for analysis using hand auger or surface soil sampling methods as described above.

Geoprobe Sampling

Geoprobes were installed in accordance with methods outlined in the QAPP. A 1½ -inch open tube sampler was installed to the desired sampling interval and then withdrawn. The soils were logged in the field and all observations were recorded in field logbooks. Upon retrieving and opening the sampler, the soil was screened using a PID. VOC soil samples were collected first from the open split-spoon using an EnCore™ sampler. The remaining soil from the sampler was placed in a stainless-steel bowl, mixed with a spoon to homogenize the sample and placed in pre-cleaned, glass soil jars for analysis. All geoprobe equipment was steam cleaned prior to use and all sampling equipment was decontaminated between sampling locations in accordance with protocols specified in the QAPP.

Soil Boring Sampling

Soil borings were typically installed at the site using a 4.25-inch inside diameter (ID) Hollow Stem Auger (HSA) in accordance with the QAPP. In summary, the HSAs were advanced into the subsurface soils using five-foot auger flights. For borings that were planned to core bedrock, a 4-inch casing was driven in 5-foot sections through the overburden soils. Subsurface soils were continuously sampled using a 3-inch outside diameter (OD) split-spoon sampler. The soils were logged in the field and all observations were recorded in field logbooks. Upon retrieving and opening the split-spoon sampler, the soil was screened using a PID. VOC soil samples were collected first from the open split-spoon using an EnCore™ sampler. The remaining soil from the split-spoon sampler was placed in a stainless-steel bowl, mixed with a spoon to homogenize the sample and placed in pre-cleaned, glass soil jars for analysis. All down-hole drilling equipment was steam cleaned prior to use and all sampling equipment was decontaminated between sampling locations in accordance with protocols specified in the QAPP.

Bedrock Coring

In proposed bedrock monitoring well locations, cores were removed from the bedrock. Once the bedrock was encountered, the casing was driven or spun into the rock to securely seat it, and the borehole was advanced further by coring. A core barrel with a diamond-impregnated bit was advanced through the casing and into the rock. The OD of the bit was usually 4 inches, which permitted the installation of a two-inch well. Coring continued until water-bearing fractures were encountered (minimum 15 feet) as shown by an inspection of the retrieved rock core and borehole water level.

Each core run was 5 feet in length. When retrieved, the core was logged by the field geologist to characterize rock attributes. The rock quantity designation (RQD) was determined by adding the lengths of all sound rock pieces in a core run which are greater than 5 inches (or two times the core diameter) and dividing that total number by the total length of the core run. The resulting percentage gives an indication of rock competency. The length of individual pieces was determined considering only naturally occurring breaks in the core, not mechanically induced fractures resulting from vibration of the core barrel as it was advanced. Naturally occurring and mechanically induced fractures were distinguished based on fracture weathering, coloring, fracture fillings, and other diagnostic features.

2.2.2 Concrete Sampling

Concrete samples were collected as described in the QAPP from potentially impacted floor drains, building floors, and slabs that would remain on site following decommissioning. Concrete was collected at ½ inch depths and was typically collected from stained areas and floor low points following paint removal. Samples were collected using a ¾ or 1 inch diameter carbide drill bit fitted in a rotary impact hammer, which generated a fine concrete powder to support laboratory analysis. The concrete powder was placed in a stainless-steel bowl, mixed with a spoon to homogenize the sample and placed in pre-cleaned, glass jars for analysis. All sampling equipment was decontaminated between sampling locations in accordance with protocols specified in the QAPP.

2.2.3 Surface/Seep Water Sampling

Surface water and seep water samples were collected using similar methods as described in the QAPP. Where conditions allowed, the samples were collected from areas of least to worst potential contamination and working from downstream to upstream, so that any suspended particles would be transported away from the sample point. Surface water samples were taken from the top foot of the water column and seep samples were obtained directly from the point of water seep. Water quality field parameters were obtained prior to collecting the water samples using methods described in the QAPP. Surface water samples were obtained using an adjustable rate peristaltic pump connected to a flow-through cell, in much the same manner as groundwater sample collection described below. Samples were collected following removal of the flow-through cell, filling the appropriate pre-cleaned aqueous sample container directly from dedicated tubing.

2.2.4 Groundwater Sampling

Groundwater samples were collected following installation and development of monitoring wells. The following section outlines the methods for well installation, development and sample collection using methods specified in the QAPP.

Monitoring Well Installation and Development

Monitoring wells were installed in both soil borings and bedrock core holes as required by the QAPP. The monitoring wells were constructed using 2-inch schedule 40 polyvinyl chloride (PVC) risers and 10-foot schedule 40 PVC screens with 0.10-inch wide slot openings. In summary, the wells were assembled within the borehole by adding riser sections to the screen until the screened section was set at the desired depth. The annular space surrounding the well screen was filled with filter sand, while simultaneously measuring the depth of the filter pack and removing the augers or casing. The filter sand was initially added until it extended no more than two feet inside the auger or casing, then the augers or casing were pulled upward allowing the filter sand to flow from the bottom of the borehole, filling the resultant annular space. The augers or casing were not extracted in greater than 2-foot increments, which minimized the potential for native material to cave or slump into the annular space. The filter pack was extended approximately two to three feet above the top of the screen. A bentonite pellet seal was placed directly above the filter pack. If the pellets were above the water table, deionized water was poured over the bentonite pellets to hydrate the bentonite seal. The remaining annular space was filled with bentonite chips/pellets or bentonite slurry to a depth of approximately 1-foot below the ground surface.

Following installation of the PVC riser, either a seven-foot length of 4-inch diameter steel guard pipe or a road-box at the ground surface was placed over the 2-inch diameter monitoring well and seated at least 2 feet below ground surface. Bentonite chips/pellets were added to the remainder of the annular space surrounding the guard pipe. Labeling the outer and inner well cap permanently identified the wells. Locks were placed on all wells protected by guard pipes following installation.

The installed well was developed by pumping the well and monitoring pH, temperature, specific conductivity, and turbidity. Well development was considered complete when a minimum of three well volumes had been removed from the well, and pH, temperature, conductivity, and turbidity had stabilized (three successive measurements vary by less than 10%).

Groundwater Sampling

Upon completion of the installation and development of the monitoring wells, groundwater from the monitoring wells was sampled using low-flow techniques and dedicated sampling equipment as outlined in the QAPP. Flow-through cells were used to measure field parameters and assess groundwater quality stabilization. Prior to collecting the sample, the field parameters were stabilized to levels described in the QAPP. Following removal of the flow-through cell, the appropriate pre-cleaned aqueous sample containers were filled directly from dedicated tubing in the well.

2.2.5 Sediment Sampling

Sediment samples were collected from inland freshwater locations and intertidal and subtidal outfall locations as directed by the QAPP. In general the samples were collected from a depth interval of 0 to 3.5 inches from areas of least to worst potential contamination and working from downstream to upstream, so that any suspended particles will be transported away from the next sample point. Prior to placing the sample in the collection jar, the sediment was de-watered to remove as much standing water as possible without losing the fine particulate matter at the sediment/surface water interface.

Inland freshwater sediment samples were collected using a large stainless-steel spoon. Marine sediment samples were collected using a 3-inch diameter, 18-inch long plastic core tube fitted with end caps. Sediment collected for non-VOC analysis was placed in a stainless-steel mixing bowl, screened with a PID, homogenized, and placed in a pre-cleaned glass jar for chemical analysis. Discrete VOC sediment samples were collected first using a cut-off syringe and placed into a glass vial pre-preserved by the laboratory with 30 ml of methanol. Care was taken to avoid the collection of organic material such as seaweed.

Samples for possible analysis of PCB analysis using a PCB homologue and congener method and benthic community structure analysis (BCSA) were also collected concurrent with the intertidal and subtidal samples for bulk chemistry analysis. A BCSA sample consisted of four petite Ponar grab samples (6 by 6 inches) collected from each sampling location. The samples were sieved (0.5 mm), preserved with formalin, and archived at the laboratory pending the results of the bulk sediment chemical screening.

Based on an evaluation of analytical results from the initial round of outfall sediment sampling, additional samples were collected at selected locations for analysis of bulk sediment toxicity to amphipods (BSTA) and sand worms (BSTS). The second round of sediment samples for toxicity testing included collection of samples for chemical analysis using the same sampling methods described above. The evaluation of initial sample results also dictated the location for which to perform BCSA analysis.

The collection of deep-water sediment samples in and around the underwater diffuser system was consistent with the method described above for collection of intertidal sediment samples; however a diver retrieved the samples. To assist with deep-water sample collection, the plastic core tubes were filled with analyte-free water and marked to orient the diver. During sample collection the diver avoided disturbing the sediment as much as possible, and worked from down-current to up-current locations.

2.2.6 Biota Sampling

Blue mussel, soft-shell clams, mummichog, and lobster were collected for tissue analysis using methods outlined in the QAPP. Lobster was collected at the request of the MDEP to assess risk to humans, and mummichog was sampled to assess the potential risk to intertidal fishes and piscivorous (fish-eating) wildlife. A biota sample consisted of the collection and compositing of approximately 20 organisms (clams, mussels and lobster) and 50 organisms (mummichog).

Typically, soft-shell clams were collected from intertidal locations and blue mussels were collected from subtidal locations. Biota collection was performed by traditional handpick methods in areas where organisms are commonly located. Mummichogs and lobster were collected using minnow traps and lobster traps, respectively, which were deployed from a boat. Whole organisms were collected and placed in zip-top plastic bags, put on ice to cool to 4^0C, and forwarded to the appropriate analytical laboratory for analysis. Enough sample volume was collected and frozen at the laboratory for possible PCB analysis at a later date using a PCB homologue and congener method.

2.2.7 QA/QC Sampling

Field duplicates, Matrix Spikes (MS), Matrix Spike Duplicates (MSD), and equipment/rinsate blanks were collected for QA/QC purposes as outlined in the QAPP. The following is a brief definition and description of the acquisition method used for QA/QC samples required for the RFI.

<u>Field Duplicates</u>

Field duplicates provide a measure of overall sampling and test method precision as well as sample heterogeneity. They were collected immediately adjacent to the sample to be duplicated, at the same time and in the same manner. The field duplicate samples were identified so that the laboratory did not know the samples were duplicates, thereby eliminating potential analytical bias. A duplicate sample was collected at a frequency of 1 for every 10 field samples.

<u>Matrix Spike and Matrix Spike Duplicates</u>

The MS/MSD samples were used to evaluate the potential effect of the matrix of the sample on the laboratory analysis. MS/MSD samples also provide an indication of precision and accuracy. An MS/MSD was collected for organic analysis and an MS for inorganics. Additional sample volume was collected at the designated location to support MS/MSD analysis based on visual or screening results and at a frequency of 1 for every 20 field samples.

Equipment Rinsate Blank

Equipment rinsate blanks were collected to provide information on the efficiency of the decontamination process. They were generated by using HPLC-grade analyte-free water to rinse the field equipment after decontamination and prior to sample collection. The analyte-free water was poured over the field equipment, collected in a stainless steel bowl, agitated, and poured into the appropriate sample container. At least one equipment rinsate blank was collected each day of sampling for each specific sampling activity.

Trip Blanks

Trip blanks accompanied all VOC sample shipments to provide an indication of any contamination source arising from the trip to the laboratory. The primary analytical laboratory (Katahdin) provided the trip blanks (vials containing organic-free water), with one trip blank placed in each outgoing cooler containing samples for volatile analysis.

Temperature Blanks

Temperature blanks are water-filled bottles supplied by the primary analytical laboratory (Katahdin) for use in measuring the temperature of the samples upon arrival at the laboratory. A temperature blank accompanied each cooler shipped from, or picked up, at the site.

2.2.8 Sample Handling and Tracking

Samples were labeled, packaged and shipped off site to the appropriate analytical laboratory in accordance with procedures developed in the QAPP. Following collection in the field, all sample containers were placed on ice to cool to 4^0C, and shipped under appropriate chain of custody protocol within 24 hours of collection to the laboratory.

All sampling points were surveyed in the field to determine the horizontal and vertical location of the sampling point. The survey was conducted as described in the QAPP using Global Positioning Satellite (GPS) techniques whenever possible to establish the vertical and horizontal control and locate the sampling points. Conventional survey techniques were employed in the event that a specific sampling point was not locatable by GPS. Sampling locations within buildings were located by measuring vertical and horizontal distance to the nearest corner of the building and height above known floor elevations, as all building footprints were included as part of the Geographical

Information System (GIS) database for the RFI. The deep-water sediment samples collected in and around the submerged diffuser system were located using a combination of GPS techniques and in relation to nozzles on the diffuser.

2.2.9 Data Handling and Management

Data generated as part of this RFI included information recorded in the field, laboratory analytical reports, and data validation assessments. A central project file is maintained at Maine Yankee, which will archive all essential project documents both in hard copy and electronically. All project documentation is organized and categorized to facilitate ease of project use. Long-term storage will be accomplished in accordance with Maine Yankee's document control program, ensuring that all RFI-related documents are retained for a minimum of 10 years.

Data management for the RFI includes the use of a GIS and Oracle database interfaced with the Internet. This web-based system uses standard GIS platforms including ArcIMS, ArcView, ArcInfo, MapInfo and CARIS, and supports both GIS and database tasks. All field information, analytical data and geographic information is stored and managed using this system. As the system is web-based, it supports external (e.g., regulators and/or public) interface to the system.

2.3 Laboratory Sample Analysis

Soil, sediment, biota, surface water, and groundwater samples collected as part of the RFI were generally analyzed for full suite analysis as defined in Section 2.1.3 above. As documented in the third QAPP Change Order, the MDEP requested that analysis of groundwater for petroleum hydrocarbons be accomplished using the MDEP DRO method in lieu of the MA DEP EPH method. This change took place prior to collection of Phase 1B groundwater samples. Concrete samples required analysis of PCBs and EPH. In addition to TCL and TAL, sediment samples were also analyzed for SIM PAHs, grain size and TOC. Analysis of sediment toxicity (BSTA and BSTS), BCSA and PCB homologues and congeners was performed at specific outfall locations based on the results of the initial round of chemical analysis. Tissue analysis included TCL (minus VOCs), TAL metals, SIM PAHs, and lipids. Additional samples of solid media were collected for analysis of Total Solids to support an adjustment to analytical results for comparison to PALs, which were determined on a dry-weight basis. A summary of the analytical methods utilized in the RFI for each type of media is included in **Table 2-1**. The sample analysis was performed in accordance with Standard Operating Procedures (SOPs) identified in Appendix B of the QAPP.

The QAPP outlined the Project Quantitation Limits (PQLs) for each analyte, which was typically set three to ten times less than the PAL or using the laboratory quantitation limit (QL) when the QL is at least three to ten times below the PAL. The QL is the quantitation limit that the laboratory routinely expects to achieve during the analysis of samples for the RFI. Lower QLs were developed for compounds believed to be site related when the standard method was not able to achieve the PAL or PQL. For example, sediment analysis incorporated SIM 8270 for PAHs, Induced Coupled Plasma/Mass Spectroscopy (ICP/MS) was used for some metals in groundwater and surface water, and SIM 8260 for vinyl chloride was used for surface water and groundwater. Compounds not believed to be site-related may have QLs in excess of the PQL or PAL.

To support a determination of laboratory accuracy and ability to perform the various analytical methods, the primary laboratories analyzed standard reference material (SRM) for each media prior to initiating the analytical program. The results of this analysis were compared to standard values and were evaluated as part of the QA assessments outlined in the QAPP and summarized in this RFI Report.

2.4 Field Parameter Data Collection

Field parameters were monitored as part of the low-flow groundwater sampling activities and screening with a Photoionization Detector (PID) as required by the QAPP. Water quality parameters were monitored as part of low-flow sampling procedures to demonstrate that the water-bearing formation had stabilized and that groundwater samples were representative of ambient groundwater conditions. This information was obtained using a flow-through cell, pH meter and/or a turbidity meter. The field parameters monitored as part of low-flow sampling included:

- turbidity;
- dissolved oxygen (DO);
- specific conductance;
- temperature;
- pH; and
- oxygen reduction potential (ORP).

Water level measurements were recorded from each of the monitoring wells following well development as outlined in the QAPP. At least two sets of water levels were obtained: one during traditional high and one during traditional low groundwater periods. Water level measurements were obtained using an electronic water level indicator, recording levels to the nearest 0.01 foot. Water level measurements were collected from the same location (i.e., on the PVC riser) on each monitoring well and were recorded on field sampling sheets and/or field logbooks.

PID screening was conducted on soil samples collected during the RFI in accordance with procedures outlined in the QAPP. The procedure for headspace screening required obtaining a soil sample immediately following removal from the ground in order to reduce loss of volatile compounds. Approximately 250 to 300 grams of soil was placed into a clear glass jar at least 500 ml in size, or a one quart polyethylene bag. A PID reading was collected from the container at least 10 minutes following sample collection and was recorded on field sampling sheets and/or field logbooks.

PID screening was also conducted to monitor the workspace-breathing zone during field activities. The PID screening results from workspace-breathing zone are included in the project field logbooks and will be maintained in the RFI project files.

2.5 Field Sampling Program

The following section outlines the locations that were investigated as outlined in the QAPP. The investigation of the backland area (Study Areas 1 and 2) was summarized in the Backlands RFI Report, which included an evaluation of reference soil and groundwater samples collected from unaffected portions of this area. Reference sediment and biota samples were collected from an area outside of the influence of Maine Yankee and are summarized in this RFI Report. The reference sampling program and the investigation performed within Study Areas 3, 4, 5, and 6, which comprise the Bailey Point area, are summarized in this section and in **Tables 2-2 and 2-3**, respectively.

2.5.1 Reference Locations

Reference samples for soil, groundwater, sediment and biota were collected to characterize comparable distribution of chemicals for each media. A summary of the reference sampling program described in this section is provided in **Table 2-2**.

<u>Soil and Groundwater</u>

The Backlands RFI Report details the investigation of reference soil and groundwater samples collected for comparison to samples collected as part of this RFI.

A total of five reference soil borings (MYRSSB01 through MYRSSB05) and four reference surface soil samples (MYRSSS01 through MYRSSS04) were completed in Study Areas 1 and 2 (**Figure 2-3**). With the exception of MYRSSB02, which was logged for geological data only since no groundwater was present in the overburden soils, the soil samples were analyzed for VOCs, SVOCs, PCBs, pesticides, EPH, and TAL metals.

As shown in **Figure 2-3**, four of the reference soil borings from the two study areas had monitoring wells installed in the overburden (RW-01 and RW-02) and the bedrock aquifer (RW-03 and RW-04). The two bedrock wells replaced the three existing monitoring wells (BWI-1 through BWI-3) originally proposed in the QAPP, which were vandalized as outlined in QAPP Change Order No. 1. Groundwater samples (MYRSGW01 through MYRSGW04) from these four wells was collected in Phase 1A and analyzed for VOCs, SVOCs, SIM vinyl chloride, PCBs, pesticides, EPH, TAL metals, and nitrate. A second round of groundwater samples (MYRSGW01-1B through MYRSGW04-1B) from these four wells was collected in Phase 1B and analyzed for VOCs, SVOCs, SIM vinyl chloride, PCBs, pesticides, DRO, TAL metals, and nitrate. A third round of groundwater samples (MYRSGW01-1C through MYRSGW04-1C) was collected only for metal analysis.

A summary of the soil boring and monitoring well construction details is provided in **Table 2-4** and the monitoring well water quality parameters are summarized in **Table 2-5**. Groundwater elevations were recorded from each of these wells, which are summarized in **Table 2-6**. Boring logs, well installation diagrams and bedrock core logs are included as **Appendix A and B**.

Sediment and Biota

Reference samples for sediment and biota were collected from Brookings Bay in September 2001, which provided comparable conditions to tidal waters surrounding Bailey Point (**Figure 2-4**). This was a change from the Damariscotta River location originally proposed in the QAPP, which was documented in QAPP Change Order No. 1.

Sediment was collected at 3 intertidal and 3 subtidal locations (MYRSSD01 through MYRSSD06). The sediment samples from each location were analyzed for VOCs, SVOCs, PCBs, pesticides, TAL metals, grain size, SIM PAHs, and TOC. Additional samples (MYRSBI01A-D through MYRSBI06A-D) were collected to support an evaluation of benthic community structure analysis (BCSA) and PCB congener/homologue analysis, if necessary, at a later date. These samples were archived at Katahdin Analytical Services (KAS) of Portland, Maine.

A second round of reference sediment samples was collected in November 2001 for chemistry and toxicity analysis to support an assessment of toxicity at the intertidal location MYRSSD02. The bulk-chemistry sample (MYRSSD02A) was analyzed for VOCs, SVOCs, SIM PAHs, PCBs, pesticides, grain size, TOC, and PCB congeners/homologues, and the sample for toxicity analysis (MYRSTX02) was assessed for bulk sediment toxicity to amphipods (BSTA) and sand worms (BSTS). For comparative purposes, one reference intertidal location (MYRSBI02A-D) and one reference subtidal location (MYRSBI05A-D) collected in the initial round of sampling and archived at KAS, was processed for BCSA.

The biota samples collected include soft-shell clams from the 3 intertidal locations (MYRSBC01 through MYRSBC03) and blue mussel from the 3 subtidal locations (MYRSBM01 though MYRSBM03). At least 20 individuals were collected at each location for analysis of tissue for SVOCs, PCBs, pesticides, TAL metals, SIM PAHs, lipids, and PCB congeners/homologues. In addition, at least 20 individual mummichog (MYRSMM01) were collected and analyzed for the same parameters.

2.5.2 Study Area 3 – Foxbird Island

Foxbird Island is a small, 12 acre island located adjacent to and south of Bailey Point. In the early 1970s the construction of the Forebay linked Foxbird Island to Bailey Point. No industrial activities have occurred on Foxbird Island except those associated with the construction in 1974-1975 of the diffuser pipeline buried beneath Foxbird Island. Due to the lack of historic industrial activity on Foxbird Island, the soil characterization was limited to three surface soil samples (MY03SS01, MY03SS14, and MY03SS15) located along the northern, central, and southern portion of the island where the diffuser pipeline construction occurred (**Figure 2-5**). The surface soil samples were analyzed for TCL and TAL compounds.

2.5.3 Study Area 4 – ISFSI

The ISFSI area comprises the bermed area in the central portion of the Bailey Point area (**Figure 2-2**). During construction, soil and rock from basement excavation for plant area structures was placed in this area, and a concrete batch plant operated in a portion of this area. During plant operation the area was occasionally used as a contractor parking lot, and a Spare Generator Storage Building was located near the railroad tracks on the west side of this area. No significant industrial activities were conducted in the ISFSI area during plant operation. The RFI sampling program within this area was performed in two phases: soil and groundwater sample collection prior to construction and additional monitoring wells installed following construction of ISFSI. The analytical results from the pre-ISFSI construction sampling were submitted to MDEP August 3, 2000, and are further evaluated as part of this RFI Report (MY, 2000d).

Soil and groundwater samples were collected from this area as a part of preliminary RFI sample collection activity conducted during the spring of 2000 to support construction of the ISFSI scheduled for later that summer. The scope of sampling was developed with the MDEP and USEPA during QAPP planning meetings held February 9 and 10, 2000. Groundwater samples were collected from three existing wells (98-1-OW, 98-9-OW, and 98-10-OW) located in the northeast, northwest and southeast corners of the ISFSI area, respectively (**Figure 2-6**). These groundwater samples (MY04GW01 through MY04GW03) were analyzed for TCL, TAL metals, and EPH.

The area of the former contractor parking lot was visually inspected for evidence of spills or other possible contamination on April 27, 2000. One minor area of oil-contaminated soil was identified in the northwest portion of the area during the visual inspection (**Figure 2-6),** and the contaminated soil was removed. A test pit was dug and sampled to verify removal on May 31, 2000. A composite sample from each of the four walls was collected (MY04SS01), and a grab sample was collected from the bottom of the pit (MY04SS02). Both samples were analyzed for SVOCs, PCBs and EPH.

In addition to the samples specifically taken as part of the RFI study, additional soil samples were collected from two utility trenches in the associated with the ISFSI construction (S&W, 2000d). The utility trench samples were taken to support MDEP Site Location of Development Order L-17973-26-Q-M, and were located in the southern and western portions of the ISFSI (**Figure 2-6**). The two samples were analyzed for VOCs, RCRA-8 metals, and DRO. The ISFSI construction activities also included four large excavations for the concrete pads that support the spent fuel containers. The four excavations were monitored for the presence of potential contamination. A small petroleum release was identified in northern-most excavation. The identified release was appropriately remediated and the petroleum-contaminated soils were disposed off-site (MY, 2000e).

To support a more complete understanding of groundwater in the ISFSI, four overburden and four bedrock wells were installed around the perimeter of the area Fall 2001 **(Figure 2-6)**. Three of the well pairs were located along the northeastern (MW-303A/B), southeastern (MW-304A/B) and northern (MW-302A/B) sides of the ISFSI area. A fourth overburden/bedrock well pair (MW-305A/B) was located downgradient of the ISFSI area and the historic kerosene spill area remediated in summer 2000. Groundwater samples (MY04GW04A/B through MY04GW07A/B) from each of the newly installed monitoring wells were sampled for analysis of TCL, TAL metals, SIM vinyl chloride, and EPH. Based on petroleum hydrocarbon detected in these initial groundwater samples, a second round of sampling (MY04GW04A/B-1B through MY04GW07A/B-1B) was performed on the four newly installed well pairs for DRO analysis. To further assess DRO detections in three of the overburden wells (MW-302B, MW-303B and MW-304B), a third round of groundwater samples (MY04GW04B-1C, MY04GW05B-1C, and MY04GW06B-1C) was collected for DRO analysis.

Summaries of the monitoring well construction details and water quality parameters are provided in **Table 2-4** and **Table 2-5**, respectively. Groundwater elevations were also measured in the ISFSI monitoring wells, which are documented in **Table 2-6**. Boring logs, well installation diagrams and bedrock core logs are included as **Appendix A and B**.

2.5.4 Study Area 5 – Southern Plant Area

The southern portion of Study Area 5 is the area south of the ISFSI where the majority of plant operations took place (**Figure 2-7 and 2-8**). The field sampling program for this area is further divided into sub-areas to focus the investigation in accordance with site geometry and like features.

Radiological Restricted Area

The Radiological Restricted Area (RA) is the area within the industrial fence with restricted access (**Figure 1-4**). The investigation within this area included sampling soils, concrete and groundwater (**Figure 2-7 and 2-8**). RA buildings within this area that were investigated as part of the interior program include: Containment Building, Spray Building, Primary Auxiliary Building (PAB), and Fuel Building. Investigation within some buildings was deferred as a result of decommissioning activities.

Exterior Sampling Program

To detect any contaminants moving through the groundwater within the bedrock aquifer, the three existing monitoring wells around the Refueling Water Storage Tank (RWST) (B-202, B-205, and B-206), the Containment Building foundation drain (CS-1), and the existing monitoring well near the yard crane (BK-1) were sampled. A new well was installed (B-203B) to replace existing well B-203A, which could not be located in the field as described in QAPP Change Order No. 1. A new well (B-206A) was installed to replace B-206, however B-206 was subsequently found, repaired and both were sampled in the initial round of sampling. Groundwater samples (MY05GW03, MY05GW05 through MY05GW09, and MY05GW29) from each of these wells were analyzed for TCL, TAL metals, SIM vinyl chloride, and nitrates.

To evaluate historic spills and releases associated with the RWST and Spray Chemical Addition Tank (SCAT), six soil borings (MY05SB04 through MY05SB09) were completed in this area. Five of the soil borings were located around the perimeter of the former RWST and the SCAT, and one soil boring was through the former RWST pad. Analyses included pH, TCL, TAL, and EPH on the groundwater or soil bedrock interface sample from each of the borings. The samples screened and found to have the highest PID reading were tested for EPH.

To provide additional soil characterization within the RA yard, four more soil borings were installed in the western portion of the RA yard. One boring was located south of the yard crane near the "high radiation bunker" (MY05SB10) and a second soil boring was located west of the Equipment Hatch (MY05SB11). Two soil borings were installed in the PAB alleyway between the Service Building and the Containment Building: one near the test tanks (MY05SB12) and the other near the Demineralized Water Storage Tank (DWST) (MY05SB13). Soil from all four borings was continuously sampled and field-screened. Samples were collected at the groundwater or soil/bedrock interface for analyses of pH, TAL, TCL and EPH. In addition, the soil samples from the boring adjacent to the yard crane (MY05SB10) was PID screened, and the segment with the highest reading was tested for EPH. A surface soil sample from the boring west of the Equipment Hatch (MY05SB11) was analyzed for PCBs.

To further support groundwater characterization in this portion of the facility, the soil boring in the PAB alleyway between the Service Building and Containment Building (MY05SB12) was completed as a monitoring well (MW-312) in the shallow bedrock. Groundwater from this monitoring well was sampled (MY05GW14) and analyzed for TCL, TAL metals, SIM vinyl chloride, and EPH.

Three surface soil samples (MY05SS01 through MY05SS03) were collected around the outside of the Containment Building in the vicinity of the Equipment Hatch and analyzed for pesticides and EPH.

A second round of groundwater sampling was performed on the RA wells, which included MW-312, B-202, B-203B, B-205, B-206A, BK-1, and CS-1. The groundwater samples collected from these locations (identified with the suffix "-1B" added to the original sample identifiers outlined above) were analyzed for TCL, TAL metals, SIM vinyl chloride, DRO, anion/cation, and nitrates. Groundwater was also collected during this round from existing monitoring well B-201 (MY05GW04) located just east of the RA area and the PAB test pit (MY05GW100) for the same analytes. A follow-up sample (MY05GW04-1C) was collected from B-201 for analysis of TAL metals and DRO.

The PAB test pit is a covered opening in the PAB basement floor that provides access to the bedrock under the PAB and the adjacent Containment Building outer wall. The dimensions of the pit are approximately four by four feet by three feet deep and the volume of the space is approximately 360 gallons. The initial water sample from the PAB test pit (MY05GW100) was a grab sample retrieved from the pit. To further assess the test pit, filtered and unfiltered samples (MYPAB02U and MYPAB02F, respectively), were collected using a pneumatic pump and tubing from a newly installed standpipe through the cover plate.

Four monitoring wells (MW-401A/B, MW-402 and MW-403) were installed in the RA area and Industrial Area as part of the License Termination Plan (LTP) hydrogeology assessment (Stratex, 2002a and b). As outlined in QAPP Change Order No. 2, groundwater was collected from these four wells (MY05GW101 through MY05GW104) for analysis of TCL, TAL metals, SIM vinyl chloride, DRO, anion/cation, and nitrates. Based on detections in the initial round of sampling, the four wells were sampled a second time (MY05GW101-1C through MY05GW104-1C) for analysis of TAL metals and DRO.

Summaries of the monitoring well construction details and water quality parameters are provided in **Table 2-4** and **Table 2-5**, respectively. Groundwater elevations were also collected from the monitoring wells, which are documented in **Table 2-6**. Boring logs, well installation diagrams and bedrock core logs are included as **Appendix A and B**.

Interior Sampling Program

An interior sampling program was developed for this area, which included collection of sub-slab soil and/or concrete samples. Several sub-slab soil samples proposed in the QAPP could not be obtained from this area since soil did not exist beneath the slab. Collection of sub-slab samples at other locations was deferred to a later date as a result of decommissioning activities during the RFI. The following is a description of the interior sampling program for this area:

Containment Building: Four confirmatory concrete samples will be collected from the minus two-foot elevation of the Containment Building following radiological remediation and interior demolition activities, currently scheduled for late 2003. The samples (MY05CS17 through MY05CS20) will be analyzed for PCBs and EPH.

Spray Building: One soil sample (MY05SS62) will be collected beneath the three-inch wide shaker space in the southwest corner of the 21-foot elevation (HV 7/9 area) following decommissioning work in this area, currently scheduled for late 2003. The sample will be analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH. As described in QAPP Change Order No. 2, samples MY05SS61 and MY05SS63 from the 4 foot elevation were not collected as no soil existed beneath the slab at these locations.

PAB Building: Thirteen confirmatory concrete samples were collected from the 11-foot elevation of the PAB following paint removal. Six concrete samples were collected within the concrete slab of the trenches and drainage system. One concrete sample was collected from the sump in the southeast corner. Three concrete samples were collected within the concrete slab of cubicles FL-34A, FL-34B, and FL-35B in northeast corner. Three concrete samples were collected within the concrete slab where two structural joints intersect. The concrete samples (MY05CS03 through MY05CS14, and MY05CS22) were analyzed for PCBs and EPH (**Figure 2-8**). As described in QAPP Change Order No. 2, samples MY05SS21 through MY05SS23 from the 11-foot elevation were not collected as no soil existed beneath the slab at these locations. The shaker space sample (MY05SS20) was not collected based on field confirmation that no soil exists at this location, as documented in QAPP Change Order No. 4.

Fuel Building: Two confirmatory concrete samples will be collected from the Fuel Building/RCA following removal of spent fuel and radiological remediation, which is currently scheduled for late 2004. One concrete sample will be collected within the sump on the 11-foot elevation (tunnel of the Fuel Building) and the other sample will be collected within the concrete slab of the 6-foot elevation, in the northeast corner of the room where TK 85 is housed. The samples (MY05CS15 and MY05CS16) will be analyzed for PCBs and EPH.

Steam Valve House: As described in QAPP Change Order No. 2, the sample proposed in this space (MY05SS60) was not collected, as no soil exists beneath the slab at this location.

Turbine Hall Area

The Turbine Hall Area encompasses the area within the industrial fence which includes the Service Building, Turbine Hall, Wart Building, Circulating Water Pump House and the Sewage Treatment Plant (**Figure 1-4**). The field sampling for this portion of the site includes collection of soil, concrete and groundwater samples (**Figure 2-7**). The investigation plan for the two transformer pits located in this area is outlined in the Transformer Area program described later in this section.

Exterior Sampling Program

Two new wells were installed to complete the semicircular ring of wells south of plant structures in the RA and Industrial Area. One monitoring well (MW-306) was located off the southeast corner of the Turbine Hall in the area where the Hazardous Waste Storage Shed was once located, downgradient of the Spare Transformer. The second new monitoring well (MW-307) was located in the vicinity of the former underground fuel oil bunker, downgradient from the former Water Treatment loading dock. Groundwater from each of these wells was sampled (MY05GW01 and MY05GW02) and analyzed for TCL, TAL metals, SIM vinyl chloride, anion/cation, and nitrates. In addition, because of their proximity to the fuel oil handling area, the wells were also tested for DRO. Follow-up sampling (MY05GW01-1C and MY05GW02-1C) was performed at these two wells based on initial detections of metals and DRO.

Continuous split-spoon soil samples (MY05SB01 and MY05SB02) were collected during boring advancement for the installation of each new well. Both the surface (0 to 6 inches) and the groundwater interface (or soil/bedrock interface if the water table occurs within the bedrock) samples were analyzed for TCL and TAL. The groundwater or soil/bedrock interface sample was also tested for EPH. The segment screened and found to have the highest PID reading in each boring was analyzed for VOCs and EPH. Where there was no PID reading above background nor evidence of staining in a boring, then a sample was taken from the bottom of the interval that appeared to have the highest permeability based on visual inspection in the field. If there was no evidence of an interval having a high permeability, a soil sample was composited between the bottom of the surface sample and the top of the groundwater or bedrock interface sample and a discrete sample for VOC analysis was collected from the depth interval half-way between the surface sample and the groundwater or bedrock interface. A new soil boring (MY05SB03) was completed in the roadway south of the Turbine Hall between wells MW-306 and MW-307. Split-spoon samples were collected from the groundwater or soil/bedrock interface and analyzed for EPH.

At the request of the MDEP, a monitoring well (MW-318) was drilled in the eastern portion of this area to measure groundwater elevation and to verify groundwater modeling results. During boring advancement the geology was recorded. The well was sampled (MY05GW25) for analysis of TCL, TAL metals, SIM vinyl chloride, DRO, and nitrates. The well was sampled a second time (MY05GW25-1C) for analysis of TAL metals and DRO.

Four surface soil samples (MY05SS05 through MY05SS08) were collected in the high traffic area along the north/south roadway east of the Turbine Hall to evaluate the potential residual contamination from the release of oil during the main transformer fire. These surface soil samples were analyzed for TCL, TAL and EPH.

Summaries of the monitoring well construction details and water quality parameters are provided in **Table 2-4** and **Table 2-5**, respectively. Groundwater elevations were also collected from the monitoring wells, which are documented in **Table 2-6**. Boring logs, well installation diagrams and bedrock core logs are included as **Appendix A and B**.

Interior Sampling Program

An interior sampling program was developed for this area, which included collecting sub-slab soil and/or concrete samples from the Turbine Hall, Service Building, Wart Building, Circulating Water Pump House and the Sewage Treatment Plant. Several sub-slab soil samples proposed in the QAPP in the Turbine Hall area could not be obtained since soil did not exist beneath the slab. Collection of sub-slab soil from beneath the Service and Wart Building were deferred to a later date as a result of decommissioning activities during the RFI. The following is a description of the interior samples collected from this area:

Turbine Hall: Because of the volume, concentration, and corrosive nature of some of the chemicals used in the former Water Treatment Area (AOC-2), eight soil samples were collected beneath the sumps and drainage system (MY05SS37 through MY05SS44). Two soil samples were collected beneath the concrete slab of each sump on the north side, and four samples were collected from areas beneath the extensive drainage system. Two soil samples were collected several feet north and south of the bermed sump. The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Three soil samples were collected beneath the concrete slab on the east side of the former Auxiliary Boiler Room in the northern, central, and southern area of the trench (MY05SS24, MY05SS79, and MY05SS80). The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Four soil samples were collected beneath the concrete slab of the former Emergency Diesel Generator Rooms (MY05SS25 through MY05SS28). Two samples were collected beneath the northern one-inch diameter pipes, and two samples were collected from beneath the corner of the trenches on the east side of each room. The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Four soil samples were collected beneath the concrete slab of each of the former outlet pits supporting the Feedwater Heaters and Pumps (MY05SS29 through MY05SS32). The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Three soil samples were collected beneath the concrete slab of the former Turbine Oil Reservoir and Electrohydraulic Control (EHC) oil pump (MY05SS34 through MY05SS36). One soil sample was collected beneath the sump of the oil reservoir containment in the south-central area. Two soil samples were collected on the west and south side of the EHC oil pump beneath the concrete slab. The samples were analyzed for PCBs and EPH.

Two soil samples were collected beneath the concrete slab of the former Cold Side Machine Shop (MY05SS48 and MY05SS49). One soil sample was collected beneath the concrete slab of the sump, adjacent to the north wall of the machine shop, and the other soil sample was collected beneath the concrete slab, in the northwest corner. The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Three soil samples were collected beneath the concrete slab of the former Primary and Secondary Component Coolant (PCC/SCC) Pump and Heat Exchanger Area (MY05SS50 through MY05SS52). Two of the soil samples were collected beneath the concrete slab of the PCC/SCC area. The final sample was collected beneath the concrete slab of the sump on the south end. The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

One soil sample was collected from beneath the center of the concrete slab of the former Vacuum Priming Sump (MY05SS53). The sample was analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

The Lube Oil Storage Room, Maine Yankee's former Interim Hazardous Waste Storage Facility, was located along the south end of the Turbine Hall. This room was investigated in accordance with an MDEP-approved closure plan, which included an investigation of soils beneath the slab following demolition and removal of the room (Stratex, 2001a). In accordance with the closure plan, since minor detections of petroleum products exist in sub-slab soil above PALs, the results of that investigation were evaluated as part of this RFI (MY, 2002j). The five sub-slab soil samples (MYLOSS01 through MYLOSS05) were analyzed for VOCs, SVOCs, PCBs, DRO, and Gasoline-Range Organics (GRO).

As described in QAPP Change Order No. 2 and 4, several sub-slab soil samples proposed in the QAPP in the northern end of the Turbine Hall area (MY05SS33, and MY05SS45 through MY05SS50) were unable to be collected since the concrete slab was poured over bedrock.

Service Building: One soil sample was collected beneath the concrete slab at the center of the hydraulic lift pit in former Warehouse No. 1 (MY05SS54). The sample was analyzed for PCBs and EPH.

Two soil samples were collected beneath the trench system of the former Chemistry Laboratory, one on the west end of the trench and one on the east-central side (MY05SS58 and MY05SS59). The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Four soil samples (MY05SS55 through MY05SS57, and MY05SS81) will be collected from beneath the concrete slab in this area when decommissioning activities are completed in this area, currently scheduled for late 2003. A sample will be collected in the tool crib beneath a stain, in the central area of the main machine shop beneath a crack, in the seal rebuild room beneath a stain, and beneath the concrete slab of the former Planning Office to determine if the historic leak from the Waste Neutralization Tank to the service water line impacted the soil. The samples will be analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Wart Building: One soil sample (MY05SS66) will be collected from beneath the concrete slab corresponding to the stained area in the Instrument and Controls Shop when decommissioning activities are completed in this area, currently scheduled for late 2003. The sample will be analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Circulating Water Pump House: Two concrete samples were collected following paint removal and prior to building demolition from the former pump area to determine if oils and lubricants may have migrated to the concrete (MY05CS01 and MY05CS02). The samples were analyzed for PCBs and EPH.

Sewage Treatment Plant: One concrete sample was collected prior to demolition from the former sump location in the south central area of the room (MY05CS21). The sample was analyzed for PCBs and EPH.

Transformer Areas

Four transformer areas were investigated as part of the RFI program. Two areas (Spare Transformer and Main Transformer) were located on the east side of the Turbine Hall (**Figure 1-4**). The other two areas (Construction Transformer and North Transformer) will remain active through decommissioning (**Figure 1-4**). The investigation approach in these four areas was enhanced to provide characterization consistent with decommissioning plans (i.e. additional hand augers and test pits in lieu of soil borings), as documented in through the QAPP change order process.

Construction Transformer: Four hand auger locations (MY05HA07, MY05HA08, MY05HA09, and MY05HA11) were initially installed around the transformer and soil samples were collected at two intervals (0 to 0.5 and 2 to 2.5 feet.). These samples were analyzed for VOCs, PCBs and EPH. Following an evaluation of initial sampling results, four additional hand auger locations were installed at a distance of 10 feet from each side of the transformer pad. Soil samples from these additional hand augers (MY05HA101 through MY05HA104) were collected from the surface and a depth interval of 2 to 2.5 feet for analysis of PCBs and EPH.

Spare Transformer: A test pit evaluation (MY05TP105) was performed following removal of the interior gravel and concrete walls of the pit. A composite side sample and a bottom sample were submitted for analysis of PCBs and EPH.

Main Transformers: A test pit evaluation (MY05TP106) will be performed following removal of the interior gravel and a portion of the concrete wall surrounding the pit, currently scheduled for late 2003. A discrete soil sample from each side of the pit will be collected, as well as two bottom samples. The samples will be submitted for PCB and EPH analysis.

North Transformers: A test pit evaluation (MY05TP108) will be performed when the transformer is deenergized and following removal of the interior gravel and a portion of the concrete wall surrounding the pit, currently scheduled for late 2004. A discrete soil sample from each side and two bottom samples will be submitted for analysis of PCBs and EPH.

Additional information from the area around the North Transformers (as well as groundwater flow into the plant industrial complex from the north) was collected by the installation of a new monitoring well (MW-308) north of the Service Building in the vicinity of former monitoring well B-204. A groundwater sample (MY05GW10) was collected and tested for TCL, TAL metals, SIM vinyl chloride, EPH and nitrate. Soils (MY05SB15) were sampled continuously during installation of the well and the surface and groundwater interface soils from the boring were collected and analyzed for TCL and

TAL, as well as EPH for the groundwater or soil/bedrock interface sample. The segment screened with the highest PID reading was analyzed for VOCs and EPH. A second groundwater sample (MY05GW10-1B) was collected from MW-308 during Phase 1B activities for analysis of TCL, TAL metals, SIM vinyl chloride, DRO, anion/cation, and nitrate.

Summaries of the monitoring well construction details and water quality parameters, groundwater elevations, and test pit construction details are provided in **Table 2-4 through Table 2-7**. Boring logs, well installation diagrams, bedrock core logs, and test pit logs are included as **Appendix A, B and C**.

Ferrous Sulfate Tank

Following removal of the Ferrous Sulfate Tank, the excavation was inspected for evidence of leaks or spills (**Figure 2-7**). One soil sample (MY05SS04) was collected from the bottom of the tank grave for iron analysis. A soil boring (MY05SB14) was collocated with monitoring well (MW-317) installed off the southeast corner of the Information Center, as outlined in the first QAPP change order, for comparative evaluation with iron collected from the tank grave. MW-317 was installed at the request of MDEP and is described later as part of the evaluation in the area of the Information Center.

Forebay Area

The forebay was a structure engineered to convey licensed water discharges to the submerged diffuser system in the Back River (**Figure 1-4**). Investigation and remedial plans for the forebay are coordinated with various MDEP departments through the State of Maine Site Law and Natural Resource Protection Act (NRPA) permit process (MDEP, 2002a). A remedial plan for the forebay has been submitted to and approved by the MDEP, which outlined the remedial methods and final restoration plan following removal of interior sediments containing radiological constituents (MY, 2002g and 2002p).

Prior to remedial work, sediment and soil samples from the forebay were obtained for chemical analysis, which were presented in the remedial plan (**Figure 2-7**). Two sediment samples (MY05SD01 and MY05SD03) were obtained from within the forebay from each side of the weir. Additionally, six sediment samples were taken from sediments located outside of the forebay. Three samples were collected on the west side (MY05SD09 through MY05SD11), and three samples were collected from the east side (MY05SD12 through MY05SD14) of the forebay structure. All sediment samples were tested for TCL, SIM PAH, TAL metals, and EPH.

To evaluate potential migration of contaminants into the forebay berm, six hand auger soil samples were taken from soils below the rip-rap on the inside of both berms which, based on the presence of coarse gravel and cobbles beneath the rip rap, were collected at a depth of one foot. Three samples were collected from the east berm (MY05HA01 through MY05HA03) and three samples were collected from the west berm (MY05HA04 through MY05HA06). Each soil sample was analyzed for TCL, TAL metals and EPH.

Two seeps located along the western berm of the forebay were sampled (**Figure 3-1**). To characterize the water flowing from the seeps, a surface water sample (MY05SW04) was taken and analyzed for TCL, TAL metals, SIM vinyl chloride, and EPH.

As outlined in the remedial plan for the forebay, following completion of remedial work the remaining sediment and/or soil was sampled to confirm that remaining TCL, TAL metals and EPH concentrations are acceptable for the protection of human-health and the environment. The results of confirmatory sampling will be presented in closure documentation submitted to the MDEP.

<u>115 kV Switchyard Area</u>

The 115 kV Switchyard provided site power since the beginning of plant operations until October 2003. Thereafter, site power has been and will continue to be provided by the construction transformer (X-5). The 115 kV Switchyard Area was visually inspected for the presence of surface soil staining. No surface soil staining was observed, and three test pits (MY05TP06 through MY05TP08) were installed within this area (**Figure 2-8**). The test pits were excavated to a depth of 6.5 feet and a side wall composite sample and bottom sample was collected from each test pit. The bottom sample was analyzed for TCL, TAL, and EPH. The side wall composite sample was tested for PCBs and EPH. A summary of the test pit construction details is provided in **Table 2-7**.

A surface soil sample (MY05SS10) was collected from a ditch west of this area that runs south from Warehouse 2/3 (**Figure 2-8**). The sample was analyzed for TCL, TAL and EPH.

<u>Fire Pond</u>

The Fire Pond was an earthen structure constructed to impound water for fire protection needs (**Figure 1-4**). The pond was drained and removed as part of decommissioning activities, which was coordinated through various MDEP departments (MY, 2002f). Prior to sediment removal, one bottom sample (MY05SS09) was collected and analyzed for TCL, TAL and SIM PAHs (**Figure 2-8**).

As outlined in QAPP Change Order No. 4, since no soil existed beneath the slab of the former Fire Pump House, concrete samples were obtained from a stain identified during the building inspection program (Stratex, 2000a). Concrete samples were collected from the surface (MY05CS101) and depth (MY05CS103) and assessed for EPH (**Figure 2-8**). Based on the elevated levels of EPH from these initial samples, the impacted concrete was removed, sampled a second time (MY05CS107) for EPH, additional concrete was removed, and a final confirmatory sample (MY05CS109) was collected for analysis of EPH.

In addition, a soil test pit (MY05TP119) was excavated on the west side of the concrete slab adjacent to the stained area (**Figure 2-8**). The soil removed from the pit was PID-screened in 2 foot intervals and a sample was collected from the wall and base of the pit for analysis of EPH. A summary of the test pit construction details is provided in **Table 2-7**.

Lower Bailey Point Area

The lower Bailey Point area is an open area south of the industrial fenced area that extends into Montsweag Bay (**Figure 1-4**). A drainage ditch running along the north side of this area was sampled just beneath the crushed stone bottom (MY05SS11) and analyzed for TCL, TAL metals and EPH (**Figure 2-7**). A soil boring (MY05SB16) was installed and continuously sampled on the north, downhill side of the concrete barrier bounding the storage area (**Figure 2-7**). The surface and groundwater or soil/bedrock interface soils were tested for TCL and TAL. The interface sample was also analyzed for EPH. The sample screened and found to have the highest PID result was analyzed for VOCs and EPH.

A summary of the soil boring construction details is provided in **Table 2-4**.

Personnel Buildings

Three personnel buildings, the Staff Building, Administration Building and Information Center, are located north of the industrial fenced area in the central portion of the Bailey Point area (**Figure 1-4**). No industrial activities were conducted in these areas except for the historic use of the northern end of the Information Center as a garage during the early years of plant operation. The sampling activities were limited to sub-slab soil samples collected beneath each building and in addition, a monitoring well was installed, and surface water was collected, immediately east of the former Information Center (**Figure 2-7**).

Exterior Sampling Program

At the request of the MDEP, a monitoring well (MW-317) was drilled adjacent to the southeast corner of the former Information Center to measure groundwater elevation and verify assumptions on direction of groundwater flow (**Figure 2-7**). The soil boring was continuously sampled and the geology was recorded during the drilling process. The well was sampled (MY05GW24) for analysis of TCL, TAL metals, SIM vinyl chloride, EPH, and nitrates. A soil boring (MY05SB14) was collocated with this monitoring well for comparative iron analysis to support closure of the Ferrous Sulfate Tank, as outlined in QAPP Change Order No. 1. Summaries of the monitoring well construction details and water quality parameters are provided in **Table 2-4 and Table 2-5**, respectively. Groundwater elevations were also collected from the monitoring well, which are documented in **Table 2-6**.

Outfall 011, located east of the Information Center, was found to have surface water flow in excess of flow from storm water discharge. The additional flow was believed to be associated with infiltration to the pedestrian tunnel foundation drain, which is connected to the storm water system associated with this outfall. To assess the potential impact of this flow, a surface water sample (MY05SW05) was collected from the outfall and analyzed for TCL, TAL metals, SIM vinyl chloride, and EPH.

Interior Sampling Program

Staff Building: Three soil samples (MY05SS67 through MY05SS69) were proposed beneath the Staff Building (**Figure 2-7**). One sample (MY05SS67) was collected from beneath the HVAC room. The sump in the HVAC room will remain active until the building is demolished, therefore MY05SS68 will be collected at a later date following removal of the sump, currently scheduled for late 2004. The sample in the HVAC room will be analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH. The third sample (MY05SS69) was collected from beneath the elevator pit and was analyzed for PCBs and EPH.

Administration Building: One soil sample was collected from beneath the most stained portion of the concrete slab of the HVAC room (**Figure 2-7**). The sample (MY05SS70) was analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Information Center: Prior to demolition of the Information Center in fall 2001, a visual inspection was performed on the floor slab as outlined in the QAPP (MY, 2002m). No additional stains were identified, and therefore following removal of the building slab, one soil sample was collected from the area of the former vehicle repair shop (**Figure 2-7**). The sample (MY05SS75) was analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

Based on the Phase 1B sampling results for MY05SS75 where elevated lead (969 mg/kg) was detected, additional sampling and analysis was conducted at the former Information Center. Four Geoprobe sampling locations (MY05GP202 through MY05GP205) were sited 10 feet the east, west, north, and south of MY05SS75, and a fifth sample (MY05GP201) was located at MY05SS75. The five locations were sampled at 0.0-5, 1.8-2, and 3.8-4 feet below ground surface, and each soil sample was analyzed for lead and sulfate.

<u>Parking Lot Areas</u>

Three parking lots exist across the Bailey Point area serving the various personnel buildings (**Figure 1-4**). One lot is located to the north of the former Information Center, and Parking Lot C and D are located north of the Administration and Staff Buildings, respectively. Industrial activities were minimal in theses parking lots and the RFI sampling activities were limited to six soil borings (**Figure 2-7**). A summary of the soil boring construction details is provided in **Table 2-4**.

Parking Lot C: One soil boring (MY05SB17) was installed at a location correlating to a known surface gasoline leak from a vehicle waiting at the security gate formerly at this location. Both surface and groundwater or soil/bedrock interface soil samples were collected from this boring for analysis of TCL, TAL, EPH, and VPH. The highest screened PID interval was tested for VOCs, EPH and VPH.

Parking Lot D: Four soil borings (MY05SB18 through MY05SB21) were installed at equally spaced locations throughout the lot. One sample was collected from each boring at the groundwater or soil/bedrock interface and analyzed for TCL, TAL and EPH.

Information Center Parking Lot: To verify no residuals remain following the previous removal of an underground gasoline storage tank (UST) east of the lot, a soil boring (MY05SB22) was installed in the footprint of that former UST. The soils were sampled continuously and screened with a PID. The soil sample from the groundwater or soil/bedrock interface was analyzed for both EPH and VPH.

Warehouse 2/3 Area

The Warehouse 2/3 area includes an investigation surrounding the exterior and below the slab of the warehouse (**Figure 2-8**). Additional evaluations were performed in this area as sample results were evaluated and conditions became better understood. The investigation included installation of soil borings, geoprobes, monitoring wells, and test pits, the details of which are summarized in **Table 2-4, 2-5 and 2-7**.

Exterior Sampling Program

Historic information indicated that the area adjacent to the loading dock of the main Warehouse 2/3 may have had releases from drums temporarily staged or managed in that area. To evaluate this potential, six soil borings were initially installed to a depth of 20 feet or to the soil/groundwater or soil/bedrock interface in this area (MY05SB36 through MY05SB41). Refusal was encountered at approximately three feet below grade at soil boring location MY05SB38, MY05SB40 and MY05SB41, and therefore a sample at the soil/bedrock interface was collected for TCL, TAL and EPH analysis. The remaining locations were sampled as follows: collect a sample from the highest PID reading for analysis of EPH and VOCs, and collect a soil sample from the groundwater or bedrock interface for analysis of TCL and TAL. Based on field PID screening results, soil boring location MY05SB37 was completed as a monitoring well (MW-311). Groundwater was sampled (MY05GW13) and analyzed for TCL, SIM vinyl chloride, TAL metals, and EPH.

To determine if any residual heavy metals or other contaminants were present behind Warehouse 2/3 in the area where sand blasting grit was disposed, three test pits were installed (MY05TP01 through MY05TP03). Soil samples were taken from both the surface and groundwater or soil/bedrock interface (i.e., base of test pit) and were analyzed for TCL and TAL. The interface samples were also analyzed for EPH. A composite sidewall sample from soils between the surface and interface were taken based on visual indications for the presence of blasting grit and analyzed for TCL and TAL.

The program in the Warehouse 2/3 area was expanded in the first QAPP Change Order based on an evaluation of initial sample results. Nine additional investigative test pits were constructed behind the warehouse in the vicinity of MY05TP01. Geologic and PID-headspace information was recorded at each test pit, and based on the PID headspace screening results; six samples (MY05TP10, MY05TP12, MY05TP13, MY05TP15, MY05TP16, and MY05TP19) were submitted for analysis of VOCs, SVOCs and EPH. The sampling program in this area was expanded in QAPP Change Order No. 2 based on detections of PAHs in the vicinity of MY05TP02. Three additional surface soil samples were collected (MY05SS101 through MY05SS103) for analysis of SVOCs.

QAPP Change Order No. 2 also included an expanded program to address detections in the Phase 1A samples collected on the east side of the warehouse (trichloroethane [TCA] and TCA breakdown products) and to further evaluate the former alleyway between Warehouse 2 and Warehouse 3. Monitoring wells were installed in six locations around the warehouse complex (MW-404 through MW-409). Three of the monitoring wells (MW-406, MW-407 and MW-409) were completed as a pair of wells; one installed at the top of the soft clay-silt zone and one installed below the soft clay-silt zone to a maximum depth of 25 feet into rock. The six monitoring wells were installed in six soil borings (MY05SB101 through MY05SB106) that were sampled at two depths, the highest PID-screened interval and the soil/groundwater or soil/bedrock interface, for analysis of VOCs and SVOCs. The groundwater samples (MY05GW106 through MY05GW114) collected from the installed wells were assessed for VOCs, SVOCs, SIM vinyl chloride, and TAL metals.

The groundwater investigation around the warehouse area was further expanded based on detections in Phase 1A and 1B samples, as outlined in QAPP Change Order No. 4. Six additional monitoring wells (MW-420, 421, 422A/B, and 423A/B) were installed around and downgradient of the warehouse complex and sampled (MY05GW120 through MY05GW125) for analysis of VOCs, SIM vinyl chloride and TAL metals. An additional round of groundwater samples were collected from the ten previously installed monitoring wells (MW-311 and MW-404 through 409A/B) for analysis of VOCs, SIM vinyl chloride and TAL metals. Placing the suffix "-1C" to the original sample identifiers identified these groundwater samples.

QAPP Change Order No. 4 also expanded the soil investigation around the warehouse area. A soil boring (MY05SB110) was installed on the south side of the warehouse to assess the depth to bedrock. Thirteen (13) soil geoprobes (MY05GP101 through MY05GP113) were installed on the east side of the warehouse based on detections of TCA in previous soil borings. These geoprobe soil samples were submitted for analysis of VOCs.

The water levels from the wells were recorded, and are summarized in **Table 2-6**.

Interior Sampling Program

Four soil samples were collected beneath the concrete slab in the warehouse (MY05SS71 through MY05SS74). Three of the soil samples were collected beneath the concrete slab where two structural joints intersect in the later constructed Warehouse 3. One sub-slab soil sample was taken from the northern side of the Warehouse 2 under an area of greatest staining. The samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, and EPH.

2.5.5 Study Area 5 – Northern Plant Area

The northern portion of Study Area 5 is the area north of the ISFSI and 345 kV switchyard, including the ball field and Bailey Farm House area (**Figure 2-9**). The investigation in this area included collection of soil, sediment, groundwater, and surface water samples. Soil borings, monitoring wells and test pits were installed, the details of which are summarized in **Table 2-4, 2-5 and 2-7**. Boring logs, well installation diagrams, bedrock core logs, and test pits are included as **Appendix A, B and C**.

<u>345 kV Transmission Line Area</u>

Prior to plant construction, there was a deep tidal drainage area located in the northwest corner of this study area through which much of the area north of the 345 kV switchyard drained into Bailey Cove (**Figure 1-4**). During construction, fill was placed in this area and a portion of the area was used for silt spreading during operation. Four monitoring wells (MW-309, MW-319, MW-320 and MW-323) were installed in the area and the groundwater samples collected (MY05GW11, MY05GW19, MY05GW20, and MY05GW23) were analyzed for TCL, TAL, SIM vinyl chloride, EPH, and nitrate. Soils from the borings (MY05SB23, MY05SB48, MY05SB49 and MY05SB52) were continuously sampled and analyzed as follows: surface soil, TCL/TAL; highest PID-screened sample, VOCs and EPH; and groundwater interface, TCL, TAL and EPH. Another soil boring (MY05SB24) was installed in the former silt spreading area and analyzed in the same manner. In addition, two surface soil samples (MY05SS12 and MY05SS13) were collected from this area and analyzed for TCL and TAL metals.

To assess the potential impact of the 345 kV switchyard on this portion of the facility, two monitoring wells (MW-321 and MW-322) with soil borings (MY05SB50 and MY05SB51) were located along the northern end of the switchyard. Groundwater samples (MY05GW21 and MY05GW22) from the two monitoring wells were analyzed for TCL, TAL, SIM vinyl chloride, EPH, and nitrate. Soils from the completed borings were continuously sampled and analyzed as follows: surface soil, TCL/TAL; highest PID-screened sample, VOCs and EPH; and groundwater interface, TCL, TAL and EPH. Two sediment sampling locations were identified in the natural drainage that flows northwest from the switchyard towards Bailey Cove. The two sediment samples (MY05SD19 and MY05SD20) were analyzed for TCL, SIM PAHs, TAL metals, and EPH.

Several seeps were identified along the western portion of this area (**Figure 3-1**). The seeps were believed to represent the breakout of groundwater along the original ground surface and fill boundary. The two largest seep locations were sampled (MY05SW01 and MY05SW02) and analyzed for TCL, SIM vinyl chloride, TAL metals, and EPH.

Following an assessment of Phase 1A results, the investigation in this area was expanded to include additional surface soil samples, an investigation trench and additional groundwater monitoring wells. This modification to the RFI program was outlined in QAPP Change Order No. 3.

To further assess the potential for surface soil contamination from the central portion of the area, ten additional surface soil samples were collected. These samples (MY05SS104 through MY05SS113) were analyzed for TCL, TAL and EPH. To further assess the northern portion of this area, including the ball field, six composite surface soil samples (MY05SS114 through MY05SS119) were collected. The composite samples were developed from four grab samples collected within six approximate one-acre sub-areas and were analyzed for SVOCs, pesticides, PCBs, TAL metals, and EPH.

To further assess the potential for sub-surface contamination, an approximate 575-foot long investigation trench was excavated across the central portion of this area (**Figure 2-9**). The investigation trench was excavated in the fill material to a depth of approximately 15 feet. Observations and PID field screening (headspace) results were documented in field logbooks. Field screening was performed about every 25 feet along the trench, collecting samples for visual observation and PID headspace screening from the surface, mid-depth and base. Based on field screening results, nine (9) soil samples (MY05TP107A, 110A, 111A, 113, 115, 116, 118, 125, and 129) were collected for testing of TCL/TAL and EPH.

Four monitoring wells were added to the program to further assess petroleum hydrocarbons and elevated metals observed in groundwater west of the railroad tracks. The four wells (MW-413 through MW-416) were located downgradient of the former truck maintenance garage area, the ISFSI area and the pre-operation cleaning basin, and were installed as phreatic wells through the fill to the original ground surface. Groundwater samples (MY05GW115 through MY05GW118) collected from these wells were analyzed for DRO and TAL metals.

An additional round of groundwater samples was collected from these wells as outlined in QAPP Change Order No. 4. The four previously installed wells in the northern portion of this area (MW-309, MW-319, MW-320, and MW-323) were resampled for TAL metals and DRO to support the expanded investigation. MW-321 and MW-322, located just north of the 345 kV switchyard, were also resampled for analysis of DRO and nitrates. These groundwater samples were identified with the suffix "-1B" added to the original sample identifiers outlined above. In addition, a second round of groundwater samples (MY05GW115-1C through MY05GW118-1C) was collected from the additional monitoring wells installed in this area as part of Phase 1B (MW-413 through MW-416). These groundwater samples were analyzed for TAL metals and DRO.

Water levels from the wells were recorded, and are summarized in **Table 2-6**.

At the request of MDEP as outlined in QAPP Change Order No. 4, three sediment samples (MY06SD50 through MY06SD52) were collected from the gully west of this area. These samples, to be evaluated as part of Study Area 6, were analyzed for SVOCs, PCBs, pesticides, TAL metals, and EPH.

Pre-Operation Cleaning Basin

To assess this portion of Study Area 5, samples were collected from soil borings, monitoring wells, surface water, and sediment (**Figure 2-9**). Summaries of soil boring and monitoring well construction details are provided in **Table 2-4 and Table 2-5**.

A group of five soil borings (MY05SB42 through MY05SB46) was installed in the area of the former cleaning basin. Soils from the completed borings were continuously sampled and analyzed as follows: between elevation 21.0 feet (the bottom of the basin) and 19.0 feet, TCL/TAL; highest PID-screened sample, VOCs and EPH; and groundwater interface, TCL, TAL and EPH. Three of the soil borings (MY05SB44 through MY05SB46) had monitoring wells (MW-313 through MW-315) installed to evaluate potential impacts to groundwater. The monitoring wells were screened in the overburden aquifer, and groundwater from each monitoring well was sampled (MY05GW15 through MY05GW17) and analyzed for TCL, SIM vinyl chloride, TAL metals, EPH, and nitrates.

Based on the results of Phase 1A groundwater results, a second round of groundwater samples were collected from monitoring wells MW-313 through MW-315. This round of groundwater samples (MY05GW15-1B through MY05GW17-1B) was submitted for analysis of DRO and pesticides. A third sample (MY05GW15-1C) was collected from MW-313 for analysis of DRO.

The water levels from the wells were recorded, and are summarized in **Table 2-6**.

The former cleaning basin area includes a small pond. To assess the potential impact of the former cleaning basin on the pond, a surface water sample (MY05SW03) and a sediment sample (MY05SD18) were collected from the pond and analyzed for TCL, TAL, SIM vinyl chloride/PAH, and EPH.

To assess the drainage west of the railroad tracks where wastewater from the cleaning basin was released, three sediment samples from the drainage to Bailey Cove were collected (MY05SD15 through MY05SD17). Each sediment sample was analyzed for TCL, TAL metals, SIM PAHs, and EPH.

Bailey Farm House Area

The Bailey Farm consisted of a house that was an environmental field office and a storage barn. The barn was used to store equipment associated with environmental studies. No significant industrial activities occurred in the Bailey Farm House area. Accordingly, a phased approach was adopted and as part of Phase 1A the features investigated included a septic system/leach field, a gray water leach field and a fuel oil tank in the basement of the Farm House (**Figure 2-9**). One monitoring well was installed in each of the leach fields (MW-310 and MW-324). Soil samples from the completed borings (MY05SB25 and MY05SB54) in which the wells were installed were sampled continuously and tested for TCL and TAL at all three levels: surface, highest PID segment and groundwater interface. The lower two samples were also analyzed for EPH. Groundwater samples (MY05GW12 and MY05GW28) collected from these wells were tested for TCL, TAL, SIM vinyl chloride, EPH, and nitrate.

To provide additional characterization of the former leach field west of the Farm House, based on detections in Phase 1A three test pits (MY05TP101 through MY05TP103) were excavated within the leachfield. As described in QAPP Change Order No. 2, the soil from these test pits was assessed for VOCs, PCBs and EPH.

One soil sample (MY05SS76) was collected beneath the concrete slab of the oil tank in the northeast corner of the house basement. The sample was submitted for analysis of EPH.

Summaries of the monitoring well construction details, water quality parameters and groundwater elevations are provided in **Table 2-4 through Table 2-6**.

Former Truck Maintenance Garage

To assess potential soil and groundwater contamination in the vicinity of a former truck maintenance garage, a soil boring (MY05SB47) was installed (**Figure 2-9**). Soils from the completed boring were continuously sampled and analyzed as follows: surface soil, TCL/TAL; highest PID-screened sample, VOCs and EPH; and groundwater interface, TCL, TAL and EPH. The soil boring was completed as a monitoring well (MW-316), which was screened in the overburden aquifer. A groundwater sample (MY05GW18) was collected from the installed monitoring well and analyzed for TCL, TAL metals, SIM vinyl chloride, EPH, and nitrate.

To evaluate the area for the presence of dry wells or old floor drains, a soil investigation trench was excavated in Phase 1A in a north/south orientation, downgradient of the former maintenance building. Visual observations and PID headspace screening were noted in field logs during installation of the investigation trench.

Based on field observations (stained soil and olfactory evidence) made while excavating the investigation trench and an evaluation of Phase 1A groundwater results, further investigations were proposed in this area as outlined in QAPP Change Order No. 2. A series of test pit trenches (MY05TP104A through MY05TP104Q) were installed in the suspected area of contamination. Two samples were collected from two depths (7 to 9 feet and 9 to 11 feet) within the trench (MY05TP104I) based on visual observation and PID screening results and were submitted for analysis of TCL/TAL and EPH. In addition, a second round of groundwater sampling (MY05GW18-1B) was performed in the downgradient well (MW-316) for analysis of DRO.

QAPP Change Order No. 4 outlined additional characterization performed in this area based on detections in groundwater samples collected in Phase 1B. Three additional monitoring wells (MW-424A/B and MW-425) were installed in the area. The wells were sampled (MY05GW126 through MY05GW128) and the groundwater was analyzed for DRO. In addition, the existing well (MW-316) was sampled a third time (MY05GW18-1C) for SVOC and DRO analysis.

Summaries of the monitoring well construction details, water quality parameters, and test pit construction details are provided in **Table 2-4, Table 2-5 and Table 2-7**, respectively. Groundwater elevations were also collected from the monitoring wells, which are documented in **Table 2-6**.

2.5.6 Study Area 6 – Shoreline (Outfalls)

Study Area 6 comprises the intertidal and subtidal zones surrounding the Bailey Point area where the majority of industrial area stormwater discharges occurred. A gully in the northern reach of Bailey Cove that received runoff from the construction debris/silt spreading area north of the 345 kV Switchyard is also included as part of Study Area 6. Stormwater Outfalls 005 and 006 drain into Bailey Cove to the west of the plant, while Outfalls 008, 009, 010, 011, 012, and N12 drain to the east into the Back River. To support the RFI program, intertidal sediment and biota samples were collected from Outfalls 005/006, 008, 010, 011, and 012/N12, and subtidal sediment and biota samples were collected from Outfalls 008, 009, 011, and 012/N12 (**Figure 2-10 and 11**). Outfall biota samples consisted of the soft-shelled clam (*Mya arenaria*) and blue mussel (*Mytilus edulis*). In addition, mummichog (*Fundulus heteroclitus*) was collected in shallow water off Bailey Point and American lobster (*Homarus americanus*) was collected off Long Ledge. The mummichog and lobster collection areas are shown in **Figure 2-11** and **Figure 2-4**, respectively.

Sediment Sampling Program

The general strategy for collection and analysis of sediment samples (MY06SD01 through MY06SD36) at each of the identified outfalls was as follows:

- With the exception of Outfall 009, 3 intertidal sediment samples were collected and analyzed for TCL, TAL metals, SIM PAHs, grain size, and TOC. Outfall 009 exists within a steep bank and does not have a clearly defined intertidal area.

- With the exception of Outfalls 005/006 and 010, 3 subtidal sediment samples were collected and analyzed for TCL, TAL metals, SIM PAHs, grain size, and TOC. Due to the close proximity of Outfall 005 and Outfall 006, and the extent of mudflats in this area, four intertidal samples were collected from the mudflats, and two subtidal samples were collected in the area of Outfalls 005 and 006. Subtidal sediment could not be collected at Outfall 010 because of hard, scoured substrate in the subtidal region.

Sediment samples for possible PCB analysis using a PCB homologue and congener method and grab samples for BCSA (MY06BI01A-D through MY06BI36A-D) were also collected concurrent with the intertidal and subtidal samples collected for chemical analysis. These samples were forwarded to the off-site laboratory (KAS) to archive for potential analysis at a later date.

Based on the results from the initial round of sediment chemical analysis, additional sediment samples were collected in November 2001 for analysis for bulk sediment toxicity to amphipods (BSTA) and sand worms (BSTS) (CH2M Hill, 2001b). These additional tests were conducted at the sediment sampling locations where the chemical results exceeded applicable screening levels. At sediment sampling locations where sediment-screening criteria was exceeded, samples were taken for both the previously performed chemical analysis for comparison purposes, and the BSTA and BSTS toxicity analysis. Samples were collected at Outfall 005/006 (MY06SD04A and MY06TX04), Outfall 009 (MY06SD16A and MY06TX16) and Outfall 010 (MY06SD20A and MY06TX20).

For comparability of data, BCSA analysis was performed on selected samples collected in the initial round of sediment sample collection. BCSA analysis was performed at Outfall 005/006 (MY06BI01A-D through MY06BI04A-D), Outfall 009 (MY06BI16A-D) and Outfall 010 (MY06BI20A-D).

PCB congener and homologue analysis, which produces lower detection limits, was performed at the sample location nearest to the outfall, since the initial round of sample results did not indicate detection of PCBs using the 8082 methodology. This additional analysis was performed at sediment sample locations MY06SD04A, MY06SD08, MY06SD16A, MY06SD20A, MY06SD26, and MY06SD32.

Additional sediment samples were collected from the Outfall 009 area to bound the extent of PAHs identified in the initial round of sampling. The additional sediment samples from this outfall area (MY06SD101 through MY06SD108 and MY06SD110 through MY06SD114) were collected at three intervals (0 to 3.5 inches, 3.5 to 9 inches and 9 to 15 inches) using a sediment gravity corer. A deep-water sediment sample (MY06SD116) was collected from the intake channel just north of Outfall 009 using a petite ponar dredge. The sediment samples were analyzed for SVOCs/SIM PAHs.

At the request of MDEP as outlined in QAPP Change Order No. 4, three sediment samples were collected from the small intertidal mudflat area west of the ballfield area in the northern reach of Bailey Cove (**Figure 2-10**). These samples (MY06SD50 through MY06SD52) were analyzed for SVOCs, PCBs, pesticides, TAL metals, and EPH.

Biota Sampling Program

The general strategy for collection and analysis of biota samples was as follows:

- With the exception of Outfall 009, collect up to 20 soft-shell clams from three intertidal locations (MY06BC01 through MY06BC18) for analysis of SVOCs, pesticides, PCBs, TAL metals, SIM PAHs, and lipids. Outfall 009 exists within a steep bank and does not have a clearly defined intertidal area.

- With the exception of Outfall 005/006, collect up to 30 blue mussel from three subtidal locations (MY06BM01 through MY06BM15) for analysis of SVOCs, pesticides, PCBs, TAL metals, SIM PAHs, and lipids. Outfall 005/006 is associated with an extensive mud-flat area.

- Twenty (20) lobster specimens were collected from Montsweag Bay in the vicinity of Long Ledge. The lobster were divided into four groups (MY06BL01 through MY06BL04) consisting of up to four lobsters. A composite tomalley (pancreas) sample (MY06BL06) was generated from the 20 lobster. The samples were submitted for analysis of SVOCs, pesticides, PCBs, TAL metals, SIM PAHs, and lipids.

- A total of approximately 400 mummichog were collected from shallow water on the east and west side of Bailey Point. Two composite samples (MY06MM01 and MY06MM02) were submitted for analysis of SVOCs, pesticides, PCBs, TAL metals, and lipids.

2.5.7 Diffuser Sampling Program

Deep-water sediment samples were collected from the Back River in and around the plant submerged diffuser system to support an evaluation of decommissioning options and potential impact of operational releases through the forebay (**Figure 2-12**). A summary of the sampling program in and around the diffuser system is provided in **Table 2-8**.

One sediment sample was collected from inside the approximate middle of each diffuser. The sample from within the north diffuser (MYSDDIF01) was taken adjacent to Nozzle 11N and the sample from within the south diffuser (MYSDDIF02) was taken adjacent to Nozzle 10S. Two additional sediment samples were collected from the immediate vicinity of the outside of each diffuser. The north diffuser was sampled directly outside Nozzle 8N (MYSDDIF03) and Nozzle 19N (MYSDDIF05). The south diffuser was sampled directly outside Nozzle 6S (MYSDDIF06) and Nozzle 19S (MYSDDIF07). All sediment samples from in and around the diffuser system were analyzed for TCL, TAL metals, PCBs (including congener and homologue analysis), EPH, grain size, and TOC.

Two deep-water reference sediment samples were collected from the Back River approximately 2,000 feet north (MYSDDIF09) and south (MYSDDIF10) of the diffuser system to support an evaluation of sediment in and around the plant diffuser system (**Figure 2-4**). The deep-water sediment samples were analyzed for VOCs, SVOCs, SIM PAHs, PCBs, TAL metals, pesticides, EPH, grain size, TOC, and PCB congeners/homologues.

2.6 Analytical Data Validation

Data verification and validation activities were performed to ensure that data collected as part of this RFI were consistent with project quality objectives and measurement performance criteria specified in the QAPP. These activities included a review of laboratory processes and reporting that affect RFI data reporting.

All of the data collected as part of this RFI were validated in accordance with the QAPP and USEPA Region I validation guidelines (USEPA, 1996b). A Tier II data validation was completed for all laboratory results, except the first sample delivery group for each media, which received Tier III data validation. Tier III data validation was also performed for all tissue data. Data validation qualifiers were applied to the data for use as the validated RFI data set. Validation qualifiers were input into the GIS database for use in data interpretive analyses. The following is a summary of specific data qualifiers, which are applied as a result of data validation:

- U - The analyte was not detected above the PQL;
- J - The analyte was detected but the associated reported concentration is approximate and is considered estimated;
- R - The reported analyte concentration is rejected due to serious deficiencies with associated quality control results; and
- UJ - The analyte was not detected above the PQL. However, due to quality control results that did not meet acceptance criteria, the quantitation limit is uncertain and may not accurately represent the actual limit.

All analyte concentrations were reported to the PQL. Sample detections below the PQL were reported with a "J" qualifier.

A data usability assessment was performed to determine if data generated for the project was consistent with project goals as outlined in the QAPP. All data evaluation and validation procedures used on the project were reviewed to compare results with project-specific data quality requirements. The data usability assessment was documented and reassessed if data were found to be inadequate for remedial decision making. Details on the data usability assessments performed for the RFI environmental information and analytical data are included in Sections 3.9 and 4.9, respectively.

2.7 Quality Assurance Assessments

Quality assurance assessments were performed for this RFI in the form of technical system audits (TSAs) in accordance with criteria established in the QAPP. The TSAs reviewed major activities, including field sample collection, the fixed based laboratories, and data validation to determine if procedures completed were consistent with those outlined in the QAPP.

2.7.1 Field Technical Systems Audit

The Field TSA was performed early in the RFI field program (Phase 1A) so that necessary corrective action measures, if warranted, could be implemented. The TSA observed sampling of various media critical to field activities, including low-flow groundwater sampling and drilling programs. The audit consisted of an evaluation of sampling techniques, field parameter measurements, record keeping including logbooks and Chains of Custody (COCs), sample collection and handling, sample design, subcontractor oversight, and health and safety.

Following the field audit, a Field Sampling TSA Report was prepared that presented the audit findings, recommendations and corrective actions that were implemented as a result of the audit (MY, 2001e). The report outlined the activities performed in the audit and attached the checklists used during the audit. The audit noted several positive aspects and did not identify any deficiencies that would have an adverse impact on data quality. A summary of the Field Sampling TSA, including any corrective actions taken, is provided in **Table 2-9**.

2.7.2 Laboratory Technical Systems Audit

The Laboratory TSA was performed prior to shipping samples to the lab with follow-up early during the sample analysis program. A TSA was performed at each laboratory used in the RFI and consisted of a review of sample handling procedures, equipment condition and operation, analytical methods, and overall conformance with SOPs provided in the QAPP. Each audit was performed over a few days so that various types of analytical procedures could be observed.

A Laboratory TSA Report was prepared that presented the findings of the laboratory audits and presented recommendations and corrective actions implemented as a result of the audit (MY, 2002b). The report outlined the activities completed for the audit and presented checklists that were followed during the auditing process. The audit noted several positive aspects and did not identify any deficiencies that would have an adverse impact on data quality. A summary of the Laboratory TSA, including any corrective actions taken, is provided in **Table 2-10**.

2.7.3 Data Validation Technical Systems Audit

The Data Validation TSA was performed following completion of data validation of the first phase of sampling data (Phase 1A). The TSA included a review of the data validation reports and procedures used, data deliverables for completeness, determining if the QC acceptance criteria specified for the project were met by the laboratory, and calculations were checked for completeness and accuracy. The TSA also checked for conformance with data validation procedures outlined in the QAPP.

A Data Validation TSA Report was prepared that presented the findings of the data validation processes and procedures audit (MY, 2002e). Conclusions regarding data quality and conformance with project quality objectives and measurement performance criteria were presented, as well as the activities completed for the audit. The audit noted several positive aspects and did not identify any deficiencies that would have an adverse impact on data quality. A summary of the Data Validation TSA, including any corrective actions taken, is provided in **Table 2-11**.