

## EXECUTIVE SUMMARY

Maine Yankee is a former nuclear power electrical generating plant that, since ceasing generating electricity in August 1997, is being decommissioned and dismantled. This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report supports closure of the industrial (Bailey Point) portion of the plant site in accordance with RCRA regulations (06-096 Code of Maine Regulations (CMR) Chapter 851, Section 11, and Title 40 Code of Federal Regulations (CFR) Part 265). Radiological closure is addressed in Maine Yankee's License Termination Plan. The goals of this RFI were to collect data to characterize contaminant sources, determine nature and distribution of sources, support fate and transport analysis, conduct risk assessments for human health and the environment, and support future remedial activities, if necessary, to minimize potential risk.

The entire Maine Yankee site is about 820 acres, of which about 150 acres lie within the Bailey Point peninsula, the portion of the site most impacted by construction and operation of the facility. Tidal waters of Montsweag Bay, a part of the Sheepscot River estuary system, surround the Bailey Point area. This RFI Report presents the field investigation within this portion of the site, including an investigation beneath buildings, remaining concrete foundations and along shoreline areas. Risk assessments for human health and the environment were performed and are included as part of this RFI Report. The remaining 670 undeveloped acres were also investigated and the results were documented in a separate Backlands RFI Report to allow Maine Yankee to expedite ownership transfer of the backlands portion of the site.

Prior to construction of the Maine Yankee facility, the Bailey Point area was used for residential and farming activities. During construction and operation of Maine Yankee between 1968 and 1997, this portion of the site was used to support industrial activities associated with nuclear power generation. For a brief period in the early 1980s Maine Yankee held an Interim Hazardous Waste Storage Facility License for the Lube Oil Storage Room issued by the Maine Department of Environmental Protection (MDEP). After terminating that license in 1985, Maine Yankee continued to operate as a hazardous waste generator. A separate MDEP-approved plan was implemented for closure of the Lube Oil Storage Room, which was certified closed in October 2002. Because of detected petroleum hydrocarbons in Lube Oil Storage Room sub slab soils, these results were assessed as part of the RFI.

RFI planning, which consisted of developing project plans and outlining field investigation activities, was initiated in September 1999. Specifically, a Site History Report (SHR), Building Assessment Plan (BAP) and Quality Assurance Project Plan (QAPP) were developed that identified potentially contaminated areas of the site, summarized the environmental and geologic investigations performed at the site, and proposed the investigation plan. The QAPP describes all field, laboratory and validation activities to be completed as part of the RFI to ensure that quality data were collected. The QAPP was granted final approval by MDEP on December 11, 2001.

The site was divided into six study areas to provide additional focus and grouping of similar areas or features of the site. Two study areas (Study Areas 1 and 2) were associated with the non-industrial backlands portion of the Maine Yankee site. The field program was implemented in two major field mobilizations to coordinate with demolition work, decommissioning activities and to allow for work in favorable weather conditions. Phase 1A was performed between September and December 2001, while Phase 1B was completed between April and October 2002.

The RFI activities included collection of soil, concrete, sediment, biota, surface water, and groundwater samples from specific areas of Bailey Point with the highest potential for contamination and from reference locations sited away from the influence of the facility. A total of 278 soil samples were collected from 188 locations on Bailey Point. A total of 118 groundwater samples were collected for analysis from 65 locations, which consisted of 53 newly installed wells, 10 existing wells and two grab locations. Surface water was sampled from five areas downgradient or within areas of suspected contamination. A total of 103 freshwater and marine sediment samples were collected from 83 locations. Twenty samples of concrete were collected from 20 locations. Forty-two (42) tissue samples of soft-shelled clams, blue mussel, lobster, and mummichog were collected and evaluated for risk assessments.

Some RFI sampling activities were deferred as a result of ongoing decommissioning and demolition work, or the inability to access active building sumps and energized transformers. These areas will be sampled as the decommissioning schedule allows and documentation will be included in final closure documents. Confirmatory sampling will be performed in areas where remediation was conducted as part of RCRA closure activities.

Soil contamination identified in the RFI typically included elevated concentrations of polynuclear aromatic hydrocarbons (PAHs) and petroleum hydrocarbons, and detected concentrations of Polychlorinated Biphenyls (PCBs). Constituents identified in groundwater included petroleum hydrocarbons and metals, with one focused area of chlorinated solvents. The RFI evaluated the fate and transport of these and other constituents, including the leaching from soils to groundwater, biodegradation potential, solubility in groundwater, and flow of groundwater and surface water to near-shore areas.

A number of contaminant migration pathways and receptors are present in the Bailey Point area, including a near-shore environment that consists of populations of benthic organisms that are commercially and recreationally harvested and are a source of food for fish and wildlife. Future receptors at the site include office workers, passive recreation seekers and construction workers. The application of institutional controls will restrict future land use to industrial/commercial.

A baseline Human Health Exposure Assessment (HHEA) was performed to evaluate potential human health risks due to exposure to residual contamination in soils, sediment, fish tissue and groundwater within or surrounding the Maine Yankee site. The risk

assessment was conducted consistent with the HHEA Work Plan and in accordance with United States Environmental Protection Agency (USEPA) and MDEP guidance.

The calculated risks associated with exposure to soils throughout Bailey Point by an on-site or construction worker were at or below MDEP target risk levels ( $10^{-5}$ ). The risks associated with residential exposure to soils, an exposure scenario conducted at the request of Maine Bureau of Health (MBOH), were above the MDEP target risk level for Bailey Point. The potential risk associated with exposure to naturally occurring arsenic represents a significant portion of the overall risk. Arsenic is present throughout Bailey Point soils at concentrations similar to soils from reference locations. Arsenic was neither used nor produced as part of plant operations and the observed arsenic distribution in Bailey Point soils is interpreted as background.

The risks associated with exposure to sediments were evaluated for two additional scenarios requested by the BOH: the commercial fisherman harvesting shellfish and/or worms and an area resident wading in the tidal portion of the Back River. All risk estimates were at or below the MDEP target risk level.

The risks associated with the ingestion of shellfish exceeded the MDEP target risk range for all species (i.e., clams, mussels, lobster tissue and tomalley). However, the risks associated with the ingestion of shellfish obtained from reference locations also exceeded the MDEP target risk range. Similar contaminants were detected in shellfish at both locations with the majority of contaminants being present at greater concentrations in the reference samples. As such, the risks from ingestion of biota are the result of background conditions.

The risks associated with the ingestion of groundwater exceeded MDEP target risk range. In addition, eighteen contaminants were detected at concentrations exceeding their respective Maximum Exposure Guidelines (MEGs) or Maximum Contaminant Levels (MCLs).

The results of this risk assessment indicate that exposure to groundwater from Bailey Point may present a health risk. As such, it is recommended that the Corrective Measures Study (CMS) evaluate potential corrective actions to either reduce exposure to groundwater users or to reduce contaminant concentrations in groundwater. No additional corrective actions are necessary to reduce the risks from exposure to soil, sediment or shellfish for future industrial/commercial land use.

An Ecological Risk Assessment (ERA) was prepared to evaluate the potential risk to ecological receptors associated with the marine habitat surrounding the Maine Yankee site in order to make informed risk management decisions. This risk assessment was conducted consistent with the ERA Work Plan outlined in the QAPP, and in accordance with USEPA and MDEP guidance.

Based on the weight of evidence from the various studies and evaluations conducted for the ecological risk assessment, there are potentially moderate risks to fish and benthic

invertebrates from site-related chemicals in the sediments at Outfall 009. Although some site-related chemicals were detected in the sediments at some other outfalls, the weight of evidence suggests that the potential ecological risk at the other outfalls is minimal.

An evaluation of fate and transport qualities and assessment of risk to human-health and the environment identified several areas that remain for consideration in the CMS which will identify areas to be remediated, methods of remediation and areas that will require ongoing monitoring. The following areas are recommended for consideration in the CMS:

- Subsurface soils containing Volatile Organic Compounds (VOCs) on the southwest side of Warehouse 2/3 that are degrading groundwater quality;
- Surface and shallow soils containing petroleum hydrocarbons and PCBs near the Construction Transformer;
- Subsurface soils containing petroleum hydrocarbons in the area of the Former Truck Maintenance Garage;
- Subsurface soils adjacent to Monitoring Well (MW) 401B in the Radiological Restricted Area (RA) as a result of petroleum hydrocarbons in groundwater;
- Groundwater associated with solvents and various metals downgradient of Warehouse 2/3; and
- Groundwater for Diesel Range Organics (DRO) and various metals throughout Bailey Point.

The petroleum-contaminated soils beneath the residential fuel oil tank at the Bailey Farm House were removed July 2003. A plan to remove petroleum-contaminated (PAHs) sediments at Outfall 009 was approved by MDEP April 2003 and was implemented fall 2003. A plan to further investigate the petroleum-contaminated subsurface soils in the area of the Former Truck Maintenance Garage was submitted to MDEP July 2003 and the additional soil sampling identified in the plan was completed in October 2003. These sampling results and any remedial activities will be documented in the CMS.

Following MDEP-approval of the CMS, areas that remain to be remediated and/or investigated will be performed as part of Corrective Measures Implementation (CMI), leading to final RCRA site closure of the Maine Yankee site.