

U.S. NUCLEAR REGULATORY COMMISSION
MAINE YANKEE ATOMIC POWER COMPANY
DOCKET NO. 50-309
MAINE YANKEE ATOMIC POWER STATION
ENVIRONMENTAL ASSESSMENT RELATED TO CONSIDERATION OF
LICENSE TERMINATION PLAN

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) (or the staff) is considering Maine Yankee Atomic Power Company's (the licensee's) request for approval of the License Termination Plan (LTP) submitted for the Maine Yankee Atomic Power Station (MY). Consistent with the decommissioning ruling that appeared in the *Federal Register* on July 29, 1996, (61 FR 39278), the NRC has prepared this environmental assessment (EA) to determine the environmental effects from LTP approval and subsequent release of the site for unrestricted use (as defined in 10 CFR 20.1402). As discussed in Section 1.3 below, the primary scope of this EA is the determination of the adequacy of the radiation release criteria and the adequacy of the final status survey as presented in the LTP.

1.1 Background

The MY nuclear reactor is a deactivated pressurized-water nuclear reactor located on an 820-acre site in Lincoln County at 321 Old Ferry Road, Wiscasset, Maine. The plant is owned by the Maine Yankee Atomic Power Company, a consortium of 11 New England electric utilities representing consumers in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. MY was constructed between 1968 and 1972 and operated from 1972 to 1996; the reactor was licensed to commercially operate at 2,700 megawatts thermal. Certification of permanent cessation of operations was submitted on August 7, 1997. At present, most of the nuclear fuel is stored onsite in the spent fuel pool; however, the licensee began transfer of the fuel to an onsite Independent Spent Fuel Storage Installation (ISFSI) in August 2002.

In January 2000, the licensee submitted the LTP with a goal to complete decommissioning by April 2004 (MY, 2000). Subsequent LTP revisions were submitted in June 2001 (MY, 2001a), August 2001 (MY, 2001b), and October 2002 (MY, 2002a). These revisions were in response to large numbers of comments received from various stakeholders and from NRC requests for additional information dated October 13, 2000, (NRC, 2000), February 2, 2001, (NRC, 2001a), and December 18, 2001, (NRC, 2001b) and January 17, 2002, (NRC, 2002a). The licensee is proposing to decontaminate the MY site to meet unrestricted release criteria of Title 10 of the Code of Federal Regulations, Part 20, Section 1402 (10 CFR 20.1402). Additionally, the licensee has stated that it intends to comply with the State of Maine cleanup criteria (see Section 3.4). By 2004, most structures will be demolished to approximately three feet below grade and the basements/foundations filled with suitable material (currently planned as sand or flowable fill). The resulting concrete demolition debris will be disposed of offsite at either a low-level waste facility or other appropriate disposal facility. The following structures will remain: 345 kilovolt (kV) and 115 kV switchyards, the ISFSI, the ISFSI security building, access roads, a rail spur, boat ramp, diffuser pipe, portions of the dikes around the remediated forebay, and possibly several administrative/office buildings.

1.2 Need for the Proposed Action

As specified in 10 CFR 50.82, licensees of nuclear facilities may apply to the NRC for authority to surrender a license voluntarily and to decommission a facility. The licensee has submitted the required LTP prior to requesting license termination, as allowed in the regulation.

The NRC must determine whether procedures and activities (adequacy of radiation release criteria and the final status survey) planned for completing decommissioning appear sufficient as described in the LTP, and, if implemented according to plan, would demonstrate that the site is suitable for unrestricted use (as defined in 10 CFR 20.1402) or whether additional planning, investigation, and/or other activities would be needed to support such a decision. This EA describes the potential environmental effects (both radiological and non-radiological), from the decision to approve the licensee's LTP to subsequent release of the site for unrestricted use (as defined in 10 CFR 20.1402).

1.3 Scope

Major rule changes in 1996 (61 FR 39278) allow the licensee to perform major decommissioning activities after submittal of a Post Shutdown Decommissioning Activities Report (PSDAR). These 1996 rule changes also prohibit decommissioning activities that could result in significant environmental impacts that have not been previously analyzed. The licensee is also required to include in the PSDAR a discussion of the reasons for concluding that the planned decommissioning activities are bound by previously issued environmental impact statements. The scope of NRC's approval of the LTP is stated in the final rule:

The Commission must consider: (1) the licensee's plan for assuring that adequate funds will be available for final site release, (2) radiation release criteria for license termination, and (3) the adequacy of the final survey required to verify that these release criteria have been met.

In fulfilling its obligations under the National Environmental Policy Act (NEPA), the NRC must evaluate the environmental impacts associated with approval of the LTP and subsequent termination of the license as discussed above. Both radiological and non-radiological impacts must be considered. These impact evaluations will typically involve an assessment of the remaining buildings/structures and residual material present at the site at the time of license termination.

1.3.1 Issues Studied in Detail

The well-defined scope of license termination activities at MY results in relatively few resource areas reasonably expected to be impacted. Consistent with NEPA regulations and guidance to focus on environmental issues of concern, land use, water resources, and human health resource areas were selected because of their potential to be affected by license termination. These resource areas are discussed in detail in this EA due to the potential for impacts from remaining structures and/or residual material left at the site.

1.3.2 Issues Eliminated from Detailed Study

For reasons cited above, impacts to air quality, historical and cultural resources, ecological resources (including endangered and threatened species), socioeconomic factors, transportation, noise, visual and scenic quality, waste management, and accident analyses are not reasonably expected to be impacted by approval of license termination activities (i.e., adequacy of radiation release criteria and the final status survey) and subsequent release of the MY site for unrestricted use (as defined in 10 CFR 20.1402). Also, financial assurance review is not related to the environment and will not be discussed in this EA.

It is important to note that impacts from decommissioning activities are not studied in this document. Decommissioning impacts have been assessed previously by the NRC in program-level NEPA documents, specifically, the Generic Environmental Impact Statement for Decommissioning (NRC, 1988, 2002b). Impacts from decommissioning activities are addressed at the PSDAR stage. The licensee submitted their PSDAR on August 27, 1997, along with a discussion of the environmental impacts from decommissioning activities.

Additionally, the Commission has made a generic determination (64 FR 68005; 10 CFR 51.23) that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation. Therefore, no discussion of environmental impacts of spent fuel storage in reactor facility storage pools or ISFSI's are provided in this document.

2.0 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 The Proposed Action

The proposed action is the NRC's review and approval of the licensee's LTP. Before approving the LTP, the NRC staff will review the LTP to ensure that the license termination activities (i.e., adequacy of radiation release criteria and final status survey) will be performed in accordance with NRC regulations to ensure that public health and safety are protected and there will be no significant impact on the quality of the human environment from the unrestricted release of the MY site.

The licensee plans to complete decommissioning of MY for unrestricted use, as described in NRC regulations at 10 CFR 20.1402. In addition, the licensee intends to comply with the State of Maine cleanup criteria. In order to meet the unrestricted release criteria, areas of the site will be divided into survey units and sampled/surveyed in accordance with LTP to verify derived concentration guideline levels (DCGLs) will be met, thus demonstrating compliance with the release criteria. The DCGLs are discussed in Sections 3.4, "Human Health" and 4.3 "Human Health Impacts."

2.2 No-Action Alternative

The NRC considered the no-action alternative relative to the licensee's request for approval of the LTP. The no-action alternative would mean that the NRC would not approve the LTP, and therefore, would not be able to terminate the license. This alternative is in conflict with NRC regulations at 10 CFR 50.82, which require the NRC to approve the LTP, by license

amendment, if the LTP demonstrates that the remainder of the decommissioning activities will be performed in accordance with the regulations, will not be inimical to the common defense and security, and will not affect the quality of the environment. The NRC is required to terminate the license after the remaining dismantlement has been performed in accordance with the approved LTP and successful compliance with release criteria, as demonstrated by the final status survey. Because of these requirements and NRC's statutory mission to protect public health and safety, the NRC has determined the no-action alternative is not reasonable unless the staff determines the LTP does not satisfy NRC regulations. Therefore, the no action alternative is eliminated from further consideration in this EA.

3.0 AFFECTED ENVIRONMENT

3.1 Site Description

MY is located approximately 20 miles south of Augusta and about 40 miles northeast of Portland, Maine. The populations of the two nearest cities, Lewiston and Auburn, are 39,757 and 24,309, respectively (MY, 2000a).

The site itself is irregularly shaped, consisting of approximately 30 developed acres and 790 undeveloped acres (see partial site release description below). The site is located in the northeast coastal region of Maine, characterized by glacially formed hills and estuaries. The gently rolling hills generally vary in elevation from 100 to 200 feet above mean sea level. The estuaries run inland 10 to 20 miles, forming long fingers of land between tidal rivers. The site itself varies in elevation from sea level to 80 feet above sea level. The plant proper is founded upon bedrock at an elevation of 20 feet. The Back River (tidal estuary) forms the eastern edge of the property; Bailey Cove (tidal estuary) runs into the western portion of the property, creating the peninsula on which the plant is located. Both of these contiguous water features experience dramatic tidal fluctuations daily, up to as much as nine feet (MY, 2002a).

3.1.1 Radiological Contamination

Site characterization activities were performed in two phases, initial and continuing. The initial phase was completed in 1998. After a review of the results of the initial characterization, the continuing phase was initiated, and it will be ongoing throughout the remainder of the decommissioning activities. The results will be used not only to guide the remediation activities, but also to confirm the appropriateness of the radiological source terms used for the dose model and basis for the corresponding DCGLs by media.

Site characterization surveys are conducted to determine the nature and extent of radiological contamination at the site. The purpose of the site characterization survey is to: (1) permit planning for remediation activities; (2) demonstrate that it is unlikely that significant quantities of residual radioactivity have gone undetected at the site after remediation; (3) provide information to design the final site survey (i.e., identify survey unit classifications for impacted areas); and (4) provide input to dose modeling. Site characterization activities include the collection of various types of samples, including soil, sediment, water, concrete, metal, and surface residues. Surveys and sampling conducted during site characterization are based on biased and judgmental measurements. In accordance with 10 CFR 50.82(a)(9)(ii)(A), radiological conditions of the site were provided in Section 2.0 of the LTP (MY, 2002a). The

results of sample analyses and the use of the results in identifying the significant radionuclides expected to be present after remediation are described in Attachments 2A through 2I of Section 2.0 of the LTP (MY, 2002a).

The licensee has conducted a series of sample analyses using site media believed to represent the distribution of radionuclide contaminants, and their decay-corrected isotopic distribution, over the operational history of the plant. Appendix 2F of the LTP lists 31 radionuclides. They include: ^3H , ^{14}C , ^{54}Mn , ^{55}Fe , ^{57}Co , ^{58}Co , ^{59}Ni , ^{60}Co , ^{63}Ni , ^{65}Zn , ^{90}Sr , ^{94}Nb , ^{99}Tc , ^{106}Ru , $^{110\text{m}}\text{Ag}$, ^{125}Sb , ^{129}I , ^{134}Cs , ^{137}Cs , ^{144}Ce , ^{147}Pm , ^{154}Eu , ^{155}Eu , ^{238}Pu , $^{239/240}\text{Pu}$, ^{241}Pu , ^{241}Am , ^{242}Cm , and $^{243/244}\text{Cm}$. These radionuclides include fission and activation products, which are typical of those found in pressurized-water reactor plants and are similar to those radionuclides described in: NUREG/CR-0130, "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," (Smith et al., 1978); NUREG/CR-3474, "Long-Lived Activation Products in Reactor Materials," (Evans et al., 1984); and NUREG/CR-4289, "Residual Radionuclide Contamination Within and Around Commercial Nuclear Power Plants," (Carrick and Leale, 1986).

Based on dose model assumptions (including the expected time at which the site will be remediated) the licensee has identified the following radionuclides as contributing to the dose after license termination: ^3H , ^{14}C , ^{54}Mn , ^{55}Fe , ^{57}Co , ^{60}Co , ^{63}Ni , ^{90}Sr , ^{125}Sb , ^{134}Cs , ^{137}Cs , ^{152}Eu , ^{154}Eu , ^{238}Pu , $^{239/240}\text{Pu}$, ^{241}Pu , ^{241}Am , and $^{243/244}\text{Cm}$. Accordingly, these radionuclides will form the basis in planning and conducting all final status surveys, and demonstrating compliance with the site release criteria.

Based on both the Historical Site Assessment (MY, 2001c, 2002b) and additional characterization surveys, a large portion of the site located to the West of Bailey Cove and North of the Old Ferry Road was determined to be non-impacted, as documented in the licensee's partial site release applications (MY 2001d, 2001e). The NRC granted the requested license amendment (i.e., release of approximately 600 acres from the 10 CFR Part 50 license) as described in its letter to MY, dated July 30, 2002 (NRC, 2002c).

Impacted areas of the site extend from Old Ferry Road in a southerly direction towards Bailey Point (MY, 2002a). For a more detailed description of initial radiological characterization of the Bailey Point area, the reader is referred to Section 2.4 of the MY LTP (MY, 2002a).

3.1.2 Hazardous and Chemical Contamination

Cleanup at the MY site is also required to comply with Resource Conservation and Recovery Act (RCRA) requirements for several reasons (e.g., the licensee was a large quantity generator of hazardous waste and had documented spills). The licensee has completed a RCRA Quality Assurance Plan (MY, 2001f) that outlines the RCRA Facility Investigation Plan. This State of Maine-approved plan will address contamination associated with non-radiological hazardous material. Over the operational lifetime of the plant, small spills to the environment have occurred, the majority of which were immediately cleaned up. Four significant releases have occurred over the years of operation, including: (1) a release of an unknown amount of chromated water from the Primary Component Cooling system to a storm drain in October 1985; (2) a release of approximately 12,000 gallons of de-mineralized water containing sodium chromate in December 1988; (3) an accidental release of approximately 200 gallons of low

viscosity transformer oil to the Back River in May 1991; and (4) a release of kerosene to subsurface soils in the former Spare Generator Storage Building adjacent to the west side of the ISFSI area in June 1994 (MY, 2002a). These four releases have been studied and remediated to the satisfaction of the Maine Department of Environmental Protection (MDEP), but it is expected that additional characterization of these former releases will be conducted as part of the RCRA facility investigation to support risk assessment and final site closure.

It is expected that the licensee will continue to work with the MDEP to demonstrate that these areas and the remainder of the site have been adequately characterized and remediated, and are sufficiently clean to ensure public health and safety. Following RCRA closure activities, it is expected that no hazardous material above remediation criteria will remain onsite.

3.2 Land Use

During MY operation, a 2,000-foot exclusion zone, measured as a radius from the reactor, was maintained and limited to power production. This exclusion area was originally established to protect the public and the environment. However, since shutdown, land use by both workers and the public within this area has increased. Land uses associated with the increased activity include boating, fishing, worming, and clamming that takes place in the Back River, Montsweag Bay, and Bailey Cove (both from the river bank along the MY property, and in small boats), as well as camping and hunting.

Commercial activities known to occur on the property surrounding the MY site are primarily limited to electrical distribution, although worming may be considered as light commercial. Central Maine Power Company has a right-of-way and easements to operate a 345 kV switchyard and 345 kV transmission lines and towers. The Wiscasset Water District owns the drinking water supply system available onsite and the town of Wiscasset owns the wastewater system located onsite. Land uses in the MY vicinity include residential, small businesses, summerhouses, and idle farmland and forest. Land use in the town of Wiscasset area includes fishing, hunting, worming, shell fishing, tourism, power production, electrical distribution, the Bath Iron Works, and recreation (MY, 2002a).

Additionally, as part of a rate case settlement with Federal Energy Regulatory Commission, the licensee agreed to convey the Eaton Farm property, composed of approximately 200 acres, to a tax exempt organization. The purpose of this donation is to create a nature preserve and an environmental education center, as well as to provide public access to coastal lands in the mid-coast region of Maine. The NRC has previously approved the licensee's request to release this land (NRC, 2002c). As discussed in the previous license amendment, the released land was determined to be non-impacted by MY operations and is not expected to have any impact on the remaining release of the site. As part of this approved license amendment, the licensee was allowed to release an additional 400 acres of non-impacted Backlands from the jurisdiction of the license. It is expected that the release of these lands will facilitate potential redevelopment and reuse of property that has been part of the MY site.

3.3 Water Resources

The discussion of water resources is divided into surface water and groundwater. The sections that follow provide a summary overview of the characteristics of each at and near the MY site.

3.3.1 Surface Water

Surface water in the vicinity of the site includes the Back River, Montsweag Bay, and Bailey Cove. Onsite surface water includes the fire pond, reflecting pond and Forebay. Historically, except along the shorelines, there is no flooding at the site, which is situated above the 100-year floodplain, as well as the probable maximum flood elevation. Current discharges do not cause flooding in the receiving waters (MY, 2002a). Prior to license termination, all manholes, catch basins, and outfall pipes south of the 345 kV switchyard will be inspected, characterized, remediated if necessary, and demolished to three feet below grade and backfilled. More information is provided in the licensee's "Comprehensive Natural Resource Protection Act Application" (MY, 2002c). The plant's Maine Pollutant Discharge Elimination System permit will be in effect until the end of license termination activities. The permit currently imposes limits for flow, and effluent chemistry.

The sewer system lift pumping station and the sewer main discharging from that station are properties of the Wiscasset Sewer District and will remain to serve the ISFSI. Additionally, the storm drains and outfall discharge pipes associated with the 345 kV switchyard and ISFSI will remain.

3.3.2 Groundwater

The groundwater regime at MY consists of a discontinuous surficial water-bearing unit and a bedrock aquifer. The surficial water-bearing unit consists of unconsolidated glaciomarine soils, the Presumpscot Formation, which contains an upper stiff clay-silt, a lower soft clay-silt, and, frequently, a basal sand unit. In some areas, a lodgment till underlies the glaciomarine soils. In the southern portion of Bailey Point, the facility South of Old Ferry Road, fill materials from plant construction activities have been placed in some areas on the surficial water-bearing unit or the bedrock aquifer. The thickness of the surficial water-bearing unit varies throughout the facility; however, in the southern portion of Bailey Point, this unit is thin to non-existent in some areas.

The bedrock aquifer, which is present throughout the facility, is composed of three rock units: (1) the Cape Elizabeth Formation, a biotite schist with locally thin quartzite interbeds; (2) localized granite and migmatite (alternating layers of granite and schist -- composite gneiss); and (3) pegmatite (very coarse-grained granite). The biotite schist, which exhibits well-developed foliations and layered fabric, is the predominate bedrock at the facility, and it forms North-South trending valleys, which are caused by the strike or trend of the schist foliations and by the schist preferential erosion during the last continental glaciation. The granite and pegmatite, which were intruded into the schist, are more resistant to erosion than the schist; therefore, they form the tops of the ridges at the site. The bedrock well yield varies based upon the rock types. The biotite schist, because of its foliation planes and joints or fracture sets, is more amenable to groundwater flow than the granite and pegmatite rocks. The in-place bulk permeabilities in units of centimeters/second (cm/sec) for the rock materials at this site are:

(1) biotite schist - 1.5×10^{-5} across foliation and 7.5×10^{-5} along foliation, (2) pegmatite - 7.5×10^{-5} to $< 1.5 \times 10^{-6}$, (3) clay-silt - 5×10^{-8} , and (4) fine sand to medium sand - 10^{-3} to 10^{-4} (MY, 2002d).

Groundwater for human use was provided by the Knoll bedrock aquifer well located midway between the Forebay and Old Ferry Road on Bailey Point until 1995, when water was obtained from the Wiscasset Water District system. Two additional bedrock wells, the Bailey Farm and Eaton Farm wells, are located on the MY site. In years past, residents in the area obtained their drinking water from shallow wells either dug or drilled in the surficial water-bearing unit or from deeper wells drilled in the bedrock aquifer. The yield from these wells seldom exceeded 5 to 10 gallon per minute. Some residents in the area may still use their individual wells, but most residents currently receive their domestic water from the Wiscasset Water District system.

Although the groundwater in this area is not used for municipal drinking water or other water-supply systems, the groundwater chemistry of the bedrock aquifer wells onsite (i.e., Bailey Farm well, Knoll well, and Eaton Farm) is adequate for drinking water. The licensee has provided additional information in Appendix G of the February 20, 2002, (MY, 2002d), submittal which describes the water chemistry for these wells for the period of 1988 through 1995.

The NRC evaluated the potential that groundwater in the Backlands located west of Bailey Cove and North of Old Ferry Road contained plant-generated radionuclides. This evaluation was based upon the licensee's Historical Site Assessment (HSA) (MY 2001c, 2002b) and radiological characterization survey of the Backlands, an Oak Ridge Institute for Science and Education (ORISE) confirmatory survey of the Backlands, the licensee's groundwater monitoring in the Backlands, radiological and hydrogeological investigations in the industrial area and the Backlands by the licensee and others, and groundwater flow principles. The NRC has concluded that the groundwater in the Backlands has not been impacted by plant-generated radionuclides (NRC, 2002c).

MY performed a groundwater sampling event in May 2002 to evaluate potential plant-generated radionuclides in their industrial area. Fifteen monitoring wells screened in the bedrock aquifer, the surficial water-bearing unit, or both units were sampled. Synoptic groundwater level measurements were also performed on these wells in early June 2002. Twelve of the well samples were analyzed for tritium, ^{134}Cs , ^{137}Cs , ^{60}Co , ^{125}Sb , ^{90}Sr , $^{238/239/240}\text{Pu}$, ^{241}Pu , ^{241}Am , and $^{243/244}\text{Cm}$. The NRC selected six of these wells to collect split samples, and NRC's independent laboratory, ORISE, analyzed these water samples for the above radionuclides and gross alpha and gross beta. The licensee's and ORISE's analytical results were similar. The only significant analytical results above either the minimum detection concentrations or background levels in the groundwater were four groundwater samples that were above the background levels of 200 to 400 picoCuries per liter (pCi/L) for tritium. The tritium in these four samples ranged from 490 to 1,530 pCi/L (MY, 2002e). These concentrations of tritium are significantly below the U.S. Environmental Protection Agency (EPA) Primary Drinking Water Standard for tritium of 20,000 pCi/L.

The hydrogeological investigations for the plant siting and for the spills and releases at this site indicate that groundwater flows southward on Bailey Point and discharges into the surface water. Furthermore, the position of MY's industrial area adjacent to Montsweag Bay, Bailey Cove, and the Back River enhances the likelihood that plant-generated radionuclides that are mobile in groundwater, like tritium, would be discharged into the surface water within a few months.

3.4 Human Health

Potential human health hazards associated with the MY site range from potential exposure to very low levels of radioactivity in soils, to relatively high levels of radioactivity within the remaining containment vessel and associated support structures and systems (e.g., remaining tunnels, lines, and sumps).

The intent of the final decommissioning activity at MY is to reduce radiological contamination at the site to meet NRC's unrestricted release criteria. After decommissioning activities are complete, license termination activities will verify adequacy of the radiological release criteria (i.e., DCGLs) and the Final Status Survey. Unrestricted use of the site is defined in 10 CFR 20.1402, as follows:

“A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE [total effective dose equivalent] to an average member of the critical group that does not exceed 25 mrem [millirem] (0.25 mSv) [milliSievert] per year, including that from groundwater sources of drinking water, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). . .”

The licensee has further limited the total dose from all sources and pathways to 0.1 mSv/yr (10 mrem/yr) TEDE and an additional limit of 0.04 mSv/yr (4 mrem/yr) TEDE for the drinking water pathway to meet a State of Maine requirement. As planned, the 0.1 mSv/yr (10 mrem/yr) TEDE all-pathway limit and 0.04 mSv/yr (4 mrem/yr) TEDE drinking water limit (hereafter, referred to as the 10/4 limit) would be achieved at the site through the application of DCGLs used to measure the adequacy of remediation activities. The DCGLs in use at the MY site were calculated using dose models based on guidance provided in NUREG/CR-5512 (Kennedy and Strenge, 1992) and the computer codes DandD 1.0 and RESRAD 5.82 code for generating the DCGLs. These dose models translate residual radioactivity into potential radiation doses to the public, based on select land-use scenarios, exposure pathways, and identified critical groups. A critical group is defined as the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity given the assumptions of a given scenario. To ensure a high level of conservatism, such scenarios and their associated modeling are designed to overestimate, rather than underestimate, potential dose.

4.0 ENVIRONMENTAL IMPACTS

4.1 Land Use

Termination of the MY license is not reasonably expected to result in any adverse impacts to onsite and adjacent land use. Land use at and directly adjacent to the MY site would be expected to remain relatively diverse and would continue to include residential, commercial, summerhouses, and idle farmland and forest. Offsite land use in the area of the town of Wiscasset would continue with fishing, hunting, worming, shell fishing, tourism, power production, electrical distribution, the Bath Iron Works, and recreation.

The NRC has previously approved the licensee's request for a partial site release (NRC, 2002b). As discussed in the license amendment, the released land was determined to be non-impacted by MY operations and is not expected to have any impact on the remaining license termination activities.

4.2 Water Resources

Termination of the license for the MY site is not anticipated to result in any potentially significant and adverse impacts to either surface or groundwater.

4.2.1 Surface Water

Land areas from which precipitation runs off to surface waters, will be subject to further investigations, remediation, if necessary, and Final Status Survey in accordance with LTP Section 5 to verify that DCGLs will be met, thus demonstrating compliance with the release criteria. In addition, as a conservative measure, dose directly from surface water was calculated using the maximum measured tritium concentration found in the onsite pond, with a portion of this concentration being attributable to naturally-occurring sources. License termination would also not be expected to result in any adverse impact to river or tidal flow or quality, as batch discharges would cease along with other license termination activities.

Prior to license termination, the amount of impervious area would be reduced by approximately 17 acres (MY, 2002c), primarily due to revegetation of areas currently occupied by buildings, roads, and parking lots. Storm water drainage that currently exits at the site through sheet flow and point discharges would in the future continue through sheet flow runoff alone, as outfall pipes are blanked and closed out.

Until decommissioning is complete, effluent discharges would continue to be monitored for compliance with discharge standards. The current Maine Pollutant Discharge Elimination System permit reflects the decommissioning activities. Storm water outfall discharges associated with the construction activity of decommissioning are authorized under EPA's Storm Water Construction Permit. Both the existing water supply system and sewage system would remain in place (MY, 2002a).

4.2.2 Groundwater

If the remediation and decontamination of this site and its structures increases the level of plant-generated radionuclides dissolved in the groundwater, the monitoring program at this facility should be able to detect this change. During the remediation, the Containment Foundation Sump (CFS) will be the only existing monitoring site that the licensee is committed to monitor. Groundwater samples from the CFS should indicate changes in the groundwater both up gradient from the Containment Building and down gradient near the Containment Building. Because several monitoring wells will be abandoned during the remediation activities, new monitoring wells may need to be installed to characterize potential changes in the level of plant-generated radionuclides dissolved in the groundwater.

4.3 Human Health Impacts

Compliance with 10 CFR Part 20.1402 for unrestricted release is conditional upon successful remediation and/or removal of contaminated soil, groundwater, ancillary contaminated materials, and structures to acceptable levels (corresponding to a total dose of 0.25 mSv/yr (25 mrem/yr) or less per year) to an average member of the critical group. In addition, residual radioactivity must meet the ALARA requirements of the rule. As previously discussed, the licensee has proposed to limit the total dose from all sources and pathways to 0.1 mSv/yr (10 mrem/yr) TEDE, and an additional limit of 0.04 mSv/yr (4 mrem/yr) TEDE for the drinking water pathway to meet a State of Maine requirement.

The licensee has shown compliance by defining acceptable levels for various sources of residual radioactivity at the site. These acceptable levels are defined as the DCGLs. Potential radiation doses for the bounding exposure scenarios are calculated by assuming an average fixed concentration level of nine potential sources of residual radioactivity. These are embedded piping, buried piping, activated concrete/rebar, groundwater, surface water, basement surfaces, surface soil, deep soil, and forebay sediment. The DCGLs for each source were then derived using the radiation doses per unit activity and the 10/4 limit proposed by the licensee. Each DCGL was selected at a fraction of the 10/4 limit so that the total dose to the average member of the critical group from all sources would meet the 10/4 limit. Because of the conservatism in both the modeling and the assumption that the entire source would have residual radioactivity at the DCGL (e.g., all basement surfaces would be at the DCGL for basement surfaces), any actual doses would likely be much less than the 10/4 limit being used by the licensee. Provided compliance with the 10/4 limit is demonstrated through the results of the FSS, there would be no anticipated adverse impacts to human health from approval of license termination, as described in the final rule "Radiological Criteria for License Termination" (62 FR 39058).

The manner in which the DCGLs are derived for MY is documented in Chapter 6 of the LTP, Revision 3 (MY, 2002a). Before approving the LTP, the NRC evaluated the adequacy of the DCGLs in providing protection for members of the public after the site is released for unrestricted use. Generally, licensees create a DCGL for each source and each radionuclide. The licensee has used the surrogate approach to streamline the compliance approach. The DCGLs have been developed for each source, accounting for the expected abundance of each radionuclide compared to either ¹³⁷Cs, gross beta, or tritium activity measurement. Using this surrogate approach takes into account the dose from all relevant radionuclides not just the measured value.

The partial site release, discussed previously, was based upon the determination that residual radioactivity, if any, in the land released was indistinguishable from background. Therefore, there are no issues concerning how the site is parceled for release (i.e., the entire site, including portions previously released, will meet the release criteria). Additionally, there are no issues concerning possible multiple-use scenarios (e.g., living on the partial release area but having a garden on another area of the site).

In deriving the DCGLs, an adult resident farmer is considered to represent the average member of the critical group. The hypothetical resident farmer is assumed to build a house on the contaminated soil, draw water from a well placed into one of the buried basements, grow plant

food and fodder on the contaminated area, raise livestock on the contaminated area, and catch fish from a pond on the contaminated area. The resident farmer scenario is considered the bounding scenario because it embodies the greatest number of exposure pathways, represents the longest exposure durations, and includes the greatest number of sources, of all scenarios envisioned. The DCGL's are shown in Table 4-1.

Each of the nine potential sources are modeled on how it may contribute to the concentration in one or more of the five possible media that will provide a pathway to man. These media include surface soil, deep soil, surface water, groundwater, and basement fill. Each source is then assigned a DCGL for either the ¹³⁷Cs activity level, the gross beta measurement, or tritium activity level. For both the deep soil and the forebay sediment, the licensee assigned the surface soil DCGL after performing ancillary analyses showing that this was the more conservative assumption. The licensee has divided the embedded piping into two groups: the Spray Building Pump piping and the piping in the rest of the site, called the balance of plant. The Spray Building piping has a higher DCGL because of its relatively shorter length.

TABLE 4-1: DERIVED CONCENTRATION GUIDELINE LEVELS FOR MY.

LOCATION OF RESIDUAL RADIOACTIVITY	DCGL
Basement Contaminated Concrete (gross beta dpm/100 cm ²)	18,000
Special Area Contaminated Concrete (gross beta dpm/100 cm ²)	9,500
Basement Activated Concrete (Cs-137 pCi/g)*	1.00
Surface Soil (¹³⁷ Cs pCi/g)*	3.20
Deep Soil (¹³⁷ Cs pCi/g)*	3.20
Balance of Plant Embedded Piping, (gross beta dpm/100 cm ²)	100,000
Spray Building Pump Piping, (gross beta dpm/100 cm ²)	800,000
Groundwater (tritium, pCi/l)*	6,812
Surface Water (tritium, pCi/l)*	960
Buried Piping, Conduit and Cable, (gross beta dpm/100 cm ²)	9,800

* To convert to Bq from pCi, multiply by 0.037.

The NRC evaluated the appropriateness of the postulated exposure scenarios and the methodology used for deriving the DCGLs. The licensee has requested that it be permitted to modify the material-specific DCGLs during the license termination process, as long as the methodology does not change and that the final concentrations at the site meet the 10/4 limit. The staff has concluded that any potential radiation exposures from residual radioactivity present after license termination have not been underestimated by the licensee and are protective of the general public. The NRC staff's Safety Evaluation Report will provide more complete details.

The licensee will use a series of surveys, including the FSS, to demonstrate compliance with the radiological release criteria consistent with the Multi-Agency Radiation Survey and Site Investigation Manual (NRC, 1997a). Planning for the FSS involves an iterative process that requires appropriate site classification (on the basis of the potential residual radioactivity levels relative to the DCGLs) and formal planning using the Data Quality Objective process. The licensee has committed to an integrated design that will address the selection of appropriate survey and laboratory instrumentation and procedures, including a statistically-based measurement and sampling plan for collecting and evaluating the data needed for the FSS. The licensee has requested that it be permitted to modify the classification levels based on new information during the decommissioning process. The staff has determined that the sampling strategy and survey data evaluation methodology presented in the LTP are adequate.

4.4 Cumulative Impacts

The NRC approval of the MY LTP (the proposed action), when combined with known effects on notable resource areas at the site, is not anticipated to result in any cumulative impacts. Rather, decommissioning and remediation of the MY facility, resulting in the release of the site for future unrestricted use, would reduce the opportunity for potential negative cumulative impacts.

5.0 AGENCIES AND PERSONS CONSULTED AND SOURCES USED

The draft Environmental Assessment was provided to the State of Maine on December 6, 2002. Comments were received by three organizations: State of Maine, Friends of the Coast (FOTC), and Maine Yankee Atomic Power Company. The staff responded to the State's comments in a letter dated February 13, 2003 (NRC, 2003). The comments received from Maine Yankee were mostly editorial in nature and were incorporated where appropriate.

The FOTC comments were reviewed by the staff and minor changes were made to clarify portions of the document. The FOTC major comments questioned the DCGL's, in particular that for embedded piping. The staff does not agree with the comments based on several factors including: 1) location of embedded piping, 2) state of embedded piping (i.e., grouted), and 3) the conservative nature of the dose modeling. The FOTC also questioned the use of the PSDAR as a bounding scenario. The staff wishes to point out that the PSDAR is a statement made by the licensee that the licensee is not going to perform any activity that is outside the bound of previously existing environmental reviews and was not used in the staff's review of this EA. Another FOTC comment expressed concern over endangered species. In making its statements regarding endangered species the staff relied on the finding in the "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC Licensed Facilities" (NRC, 1997b) that the residual dose criteria are well below where effects on biota are observed. Another FOTC comment requested that NRC prepare an EIS, however, based on the findings made in this environmental assessment, the staff does not believe an EIS is required nor would preparation of an EIS further the purposes of NEPA. The staff also noted several FOTC comments related to the ISFSI, however, the current licensing action does not address the MY ISFSI. Finally, FOTC provided several comments that resulted in text being clarified in the EA (e.g. discussion of no-action alternative, possibility of administrative buildings remaining after license termination, and time frame for NRC license termination activities).

The NRC staff has determined, based on the scope of this action, that the proposed action will not affect listed species or critical habitat. Therefore, no further consultation is required under Section 7 of the Endangered Species Act. Likewise, NRC staff have determined that the proposed action (i.e., undertaking in Section 106 language) are not the type of activities that have potential to cause effects on historic properties. Therefore, no further consultation is required under Section 106 of the National Historic Preservation Act.

6.0 CONCLUSION

The NRC has prepared this EA (ADAMS Accession No: ML030340122) related to the issuance of a license amendment to Facility Operating License No. 50-309, approving the LTP. On the basis of this EA, the NRC has concluded that there are no significant environmental impacts and the license amendment does not warrant the preparation of an Environmental Impact Statement. Accordingly, it has been determined that a Finding of No Significant Impact is appropriate.

The documents related to this proposed action are available for public inspection and copying at NRC's Public Document Room at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. Additionally, most of these documents are available for public review through our electronic reading room: <http://www.nrc.gov/reading-rm/adams.html>.

7.0 LIST OF PREPARERS

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8.0 LIST OF ACRONYMS

ALARA	As Low As is Reasonable Achievable
CFR	<u>Code of Federal Regulations</u>
DCGL	Derived Concentration Guideline Limit
dpm/100cm ²	disintegrations per minute per 100 square centimeters
EA	Environmental Assessment
EPA	Environmental Protection Agency
FR	<i>Federal Register</i>
FOTC	Friends of the Coast
FSS	Final Status Survey
ISFSI	Independent Spent Fuel Storage Installation
kV	kilovolt
LTP	License Termination Plan
MDEP	Maine Department of Environmental Protection

mrem/y	millirem per year
mSv/yr	milliSievert per year
MY	Maine Yankee Atomic Power Station
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
pCi/L	picocurie per Liter
PSDAR	Post Shutdown Decommissioning Activities Report
RCRA	Resource Conservation and Recovery Act
TEDE	Total Effective Dose Equivalent

9.0 REFERENCES

10 CFR 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, “Standards for protection against radiation.”

10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, “Domestic licensing of production and utilization facilities.”

10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, “Environmental protection regulations for domestic licensing and related regulatory functions.”

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