NUCLEAR REGULATORY COMMISSION

[Docket No. 50–029]

Environmental Assessment and Finding of No Significant Impact Related to License Termination Plan for the Yankee Atomic Electric Company; License DPR–003, Rowe, MA

AGENCY: Nuclear Regulatory Commission.

ACTION: Environmental Assessment and Finding of No Significant Impact.

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SUPPLEMENTARY INFORMATION:

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) (or the staff) is considering Yankee Atomic Electric Company's request for approval of the License Termination Plan (LTP) submitted for the Yankee Nuclear Power Station (YNPS) in Rowe, Massachusetts. The NRC has prepared this environmental assessment (EA) to determine the environmental impacts (radiological and non-radiological) of approving the LTP and of subsequently releasing the site for unrestricted use (as defined in 10 CFR 20.1402). This is consistent with the final rule, 10 CFR 50.82 that appeared in the **Federal Register** on July 29, 1996 (61 FR 39278, Decommissioning of Nuclear Power Reactors), which established the criteria for license termination and the requirement for a license termination plan.

As discussed in Section 1.3 below, the primary scope of this EA is the evaluation of the impacts of the radiation release criteria and the adequacy of the final status survey, as presented in the LTP.

1.1 Background

YNPS is a deactivated pressurized-water nuclear reactor situated on a small portion of a 2,200-acre site. The site is located in northwestern Massachusetts in Franklin County, near the southern Vermont border. The plant and most of the 2,200-acre site are owned by the Yankee Atomic Electric Company (YAEC). A small portion on the west side of the site (along the east bank of the Sherman Reservoir) is owned by USGen New England, Inc. The YNPS plant was constructed between 1958 and 1960 and operated commercially at 185 megawatts electrical production (after a 1963 upgrade) until 1992. In 1992, YAEC determined that closing the plant would be in the best economic interest of its customers. In December 1993, NRC amended the YNPS operating license to retain a ''possession-only'' status. YAEC began dismantling and decommissioning activities at that time. These activities continue and their relevance with respect to this EA is discussed in Section 1.3. The spent nuclear fuel remaining onsite was transferred in 2003 from the spent fuel pool to the independent spent fuel storage installation (ISFSI) located adjacent to the plant. The spent fuel pool was subsequently drained in compliance with regulatory requirements.

In November 2003, YAEC submitted its LTP with a goal to complete decommissioning by mid-2005 (YAEC, 2003). Draft Revision 1 to the plan was submitted September 2, 2004 (YAEC, 2004a), in response to a NRC request for additional information (NRC, 2004). Subsequently, on November 19, 2004, YAEC submitted Revision 1 to the LTP (YAEC, 2004f).

YAEC is proposing to decontaminate the YNPS site to meet the unrestricted release criteria of 10 CFR 20.1402. Additionally, YAEC has stated that it intends to comply with the Commonwealth of Massachusetts cleanup criteria of 105 CMR 120.291 established by the Massachusetts Department of Public Health (MDPH) and the Massachusetts Department of Environmental Protection (MDEP). Most site structures will be demolished to grade or entirely removed, and most buried piping or utilities removed. Basements will be perforated to allow groundwater to flow through during remediation. The following structures will remain after phased release of the site: the administration building, guard building, a small switchyard outside the guard building, the ISFSI, the ISFSI security building, and access roads. After the irradiated fuel has been removed from the site and prior to license termination the ISFSI and ISFSI security building will be removed.

1.2 Need for the Proposed Action

Licensees of nuclear facilities must apply to the NRC before terminating a license voluntarily and decommissioning a facility. YAEC submitted the LTP, as required by 10 CFR 50.82, before requesting license termination. The NRC must determine whether the proposed procedures, adequacy of radiation criteria for license termination, and the final status survey planned for completing decommissioning appear sufficient and, if implemented according to the plan, would demonstrate that the site is suitable for release.

1.3 Scope

To fulfill its obligations under the National Environmental Policy Act (NEPA), the NRC must evaluate the radiological and nonradiological environmental impacts associated with approval of the LTP and subsequent termination of the license. These evaluations involve an assessment of the impacts of the remaining buildings or structures and residual material present at the site at the time of license termination.

As described in the Statements of Consideration accompanying the Final Rule on Decommissioning of Nuclear Power Reactors (61 FR 39278), the NRC must consider the following in order to approve the LTP:

(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.

1.3.1 Issues Studied in Detail

Consistent with NEPA regulations and guidance to focus on environmental issues of concern, impacts to land use, water resources, and human health were selected for detailed study because of their potential to be affected by an approval of the LTP. These issues are discussed 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

Issues eliminated from detailed study in this EA include air quality, historic and cultural resources, ecological resources (including endangered and threatened species), socioeconomic conditions, transportation, noise, visual and scenic quality, off-site waste management, and accident scenarios. These issues were eliminated because they would not be affected by implementation of the LTP at the site (*i.e.*, ensuring the site meets radiation release criteria in the final status survey). The financial assurance review, which is a required part of the LTP approval, is not related to human health or the environment and will not be discussed in this EA.

Impacts from decommissioning activities at the YNPS site are not evaluated in this EA. NRC has already assessed power plant decommissioning impacts in programmatic NEPA documents. Specifically, the environmental impact statement for decommissioning activities (NRC, 1988, 2002) discusses the range of impacts expected from power plant decommissioning activities. Further, in reviewing the LTP, the staff also determined that the environmental impacts were enveloped by the generic analysis performed in support of ''Radiological Criteria for License Termination.'' (62 FR 39058) Decommissioning impacts at the YNPS site were also addressed in the YAEC's Post-Shutdown Decommissioning Activities Report (PSDAR) (YAEC, 2000).

Additionally, the Commission has made a generic determination 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 plant's licensed operating life (64 FR 68005 and 10 CFR 51.23). Therefore, this EA does not evaluate environmental impacts of spent fuel storage in the onsite independent spent fuel storage installation (ISFSI). However, the ISFSI is discussed briefly in Sections 3.2 and 4.1.

2.0 Proposed Action and Alternatives

2.1 The Proposed Action

The proposed action is the NRC's review and approval of YAEC's LTP. The NRC staff will review the plan to ensure that the license termination activities (*i.e.*, designation of radiation release criteria and design of the final status survey) will comply with NRC regulations. If NRC approves the plan, the approval will be issued in the form of an amendment to the YNPS license (Possession Only License No. DPR–3).

YAEC plans to complete decommissioning of the YNPS site for unrestricted use, as described in the LTP and consistent with NRC regulations at 10 CFR 20.1402. In addition, YAEC intends to comply with the Commonwealth of Massachusetts cleanup criteria in 105 CMR 120.291 specified by the MDPH and by the MDEP in the Massachusetts Contingency Plan (MCP) and Solid Waste Regulations, as applicable. To meet NRC's unrestricted release criteria, areas of the site will be divided into survey units. These units will be sampled or surveyed in accordance with the LTP to verify that site-specific criteria have been met. These criteria, known as ''derived concentration guideline levels'' (DCGLs), are discussed further in Sections 3.4 and 4.3.

Initially, YAEC plans to release all but 87 acres of the site for unrestricted use after having passed the final survey. The remaining 87 acres would remain on the license until the spent fuel is shipped offsite for permanent disposal (see Section 4.1) and the ISFSI is decommissioned. At that time, the remaining acreage would again be surveyed and, contingent on survey results, the license terminated.

2.2 Alternatives

As an alternative to the proposed action, the staff considered the ''no-action alternative.'' The no-action alternative would maintain the status quo. This would result in no change to current environmental impacts, which are larger than those resulting from the proposed action.

3.0 Affected Environment

3.1 Site Description

The YNPS site is located at 49 Yankee Road, approximately three miles north-northwest of the northwestern Massachusetts town of Rowe, in Franklin County.

The site is adjacent to the Vermont border on land characterized by heavily wooded, steep hills. It is situated within the Deerfield River Valley and abuts the eastern shores of the Deerfield River and Sherman Reservoir. Hills bounding the Deerfield River valley rise 500 to 1000 feet above the site, reaching elevations of 2100 feet above mean sea level (ERM, 2004a). The combined population of the two nearest towns, Rowe and Monroe, is less than 500.

The YNPS property consists of about 2,200 acres in the towns of Rowe and Monroe. Most of this property (approximately 1,825-acres) is owned by YAEC; the remaining portion is owned by USGen New England, Inc., (USGen). The USGen property is a narrow strip of upland to the west of the plant, extending along the entire eastern bank of Sherman Reservoir. USGen also owns the reservoir itself, the Sherman Dam, property west of the Sherman Reservoir, and property downstream of Sherman Dam encompassing both banks of the Deerfield River. YNPS operations have been conducted on about 15 developed acres, primarily on land owned by YAEC, but extending onto property owned by USGen (ERM, 2004a).

The YNPS site is divided into three areas based on past site activities and land use:

1. Industrial Area: approximately 12-acre fenced portion of the site that contains industrial plant structures and operations.

2. Radiologically Controlled Area (RCA): 4-acre parcel within the industrial area that contains radiological materials associated with plant operation.

3. Non-Industrial Area: remaining land outside the fenced industrial area that contains the USGen Sherman Station hydroelectric plant, the Sherman Reservoir and Dam, transmission lines traversing the site, administration building and visitor center, roadways, fill areas and undeveloped woodland (YAEC, 2004b; ERM, 2004a).

During construction of the YNPS facility, some construction and demolition debris was placed into what is now the Southeast Construction Fill Area (SCFA). This area of approximately 1.5 acres contains soil and rock, in addition to wood, concrete, asphalt, and metal debris. In accordance with MDEP Solid Waste permits, YAEC plans to remove the materials from this area, returning native soils to other areas of the site for regrading.

Ecology and Cultural Resources

The U.S. Fish and Wildlife Service confirmed in correspondence with YAEC that no federally listed endangered or threatened species occur on the site. (ERM, 2004b) Massachusetts species of concern have been identified on the YNPS site. A northern spring salamander was identified in a headwater channel of Wheeler Brook. The bristly black currant was discovered in a drainage area along the Wheeler Brook Divertment, outside the site's eastern fenceline. Longnose suckers are documented to exist in the Sherman Reservoir. YAEC is working with the Massachusetts Division of Fisheries & Wildlife under the National Heritage and Endangered Species Program (NHESP) to develop a plan for the protection of these species during the remainder of decommissioning activities.

Several resources of cultural and historic significance exist at the site; however, none of these have been affected by decommissioning activities. A 2003 report documents these resources, most of which are located in the undeveloped uplands (PAL, 2003). The report also includes a management plan that meets Massachusetts Historical Commission guidelines.

3.1.1 Existing Radiological Contamination

The majority of the site located outside the industrial area was determined to be non-impacted (about

2170 acres), as documented in Section 2.5 of the LTP. The non-impacted area consists mostly of forested, rugged terrain that has not been disturbed. This determination is based on both the Historical Site Assessment (YAEC, 2004c) and additional characterization surveys.

Radiologically-impacted areas of the site include the industrial area and surrounding open land areas extending out approximately 1000 feet from the vapor container (now dismantled). The radiologically impacted areas comprise approximately 30 acres, the majority of which are minimally impacted (contain residual radioactivity at levels no greater than a fraction of the proposed DCGLs). For a more detailed description of initial radiological characterization of the impacted area, refer to the YNPS Historical Site Assessment and Section 2.4 of the LTP.

The Historical Site Assessment also identified low levels of contamination, primarily Co-60, in the sediments of Sherman Reservoir. This radioactive material was deposited as a result of permitted and monitored radioactive liquid releases. Characterization surveys showed the radioactive material concentration is a small fraction of the proposed DCGLs. Areas with potentially contaminated sediments are included in the final status surveys for further evaluation.

Characterization Process

Site characterization activities were performed in two phases, initial and continuing. The results of the initial phase were submitted to the NRC in January 2004. After a review of the results of the initial characterization, YAEC initiated the continuing phase, which will be ongoing throughout the remainder of the decommissioning activities. The results would be used to guide the remediation activities, and 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 YNPS 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 (NRC, 2003). 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 knowledge of the plant history and likely areas of contamination. 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. 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 2B and 2C of Chapter 2 of the LTP.

YAEC 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. In its technical basis document, YAEC describes the method that was used to determine radionuclides that could be present at the site (YAEC 2003). The radionuclides include, but are not limited to: ^{3}H, ^{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, ^{108m}Ag, ^{125}Sb, ^{129}I, ^{134}Cs, ^{137}Cs, ^{144}Ce, ^{145}Pm, ^{152}Eu, ^{154}Eu, ^{155}Eu, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am, ^{243}Cm, and ^{244}Cm. These radionuclides include fission and activation products, which are typical of those found in pressurized-water reactor plants. These radionuclides are also described in two NRC documents: NUREG/CR–0130, ''Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station,'' (Smith *et al.*, 1978) and NUREG/CR–3474, ''Long-Lived Activation Products in Reactor Materials,'' (Evans *et al.*, 1984).

Based on dose model assumptions (including the expected time at which the site will be remediated) YAEC has identified the following 22 radionuclides as potentially contributing to the dose after license termination: ^{3}H, ^{14}C, ^{55}Fe, ^{60}Co, ^{63}Ni, ^{90}Sr, ^{94}Nb, ^{99}Tc, ^{108m}Ag, ^{125}Sb, ^{134}Cs, ^{137}Cs, ^{152}Eu, ^{154}Eu, ^{155}Eu, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am, ^{243}Cm, and ^{244}Cm. Accordingly, these radionuclides would form the basis in planning and conducting all final status surveys, and demonstrating compliance with the site release criteria.

3.1.2 Existing Hazardous and Chemical Contamination

Chemical Use

Over the YNPS plant's operating life, a number of hazardous materials or chemicals were used throughout the industrial area. Some of these materials are: water treatment and other maintenance chemicals, fuel, lubricating and transformer oils (including oils containing polychlorinated biphenyls (PCBs)), and chemicals used for the various reactor systems (including boron, hydrazine, 1,1,1-trichloroethane, and trisodium phosphate). Additionally, some of the building structures and surfaces contain asbestos, PCB-containing paint, and/or lead-based paint (ERM, 2004a).

While the plant was operating, it was classified as a small quantity generator of hazardous wastes under the Resource Conservation and Recovery Act (RCRA). However, YAEC is currently a large quantity generator (generating over 1,000 kilograms of hazardous wastes per month) due to the increased volume of hazardous and mixed wastes associated with decommissioning activities. The MDEP regulates YAEC's hazardous waste generation and storage activities.

Contamination and Remediation

Nonradiological chemical cleanup at the site must comply with MDEP regulations under the Massachusetts Contingency Plan (MCP) (310 CMR 40.00), which regulates the investigation and cleanup of oil and hazardous materials releases to soil or water (ERM, 2004a), and the MDEP Solid Waste Regulations at 310 CMR 19.000, which regulate the investigation and remediation of the SCFA and the review of beneficial reuse determination (BUD) permits. YAEC had intended to remediate onsite contamination to enable future use of the site without restrictions, however deed restrictions will be utilized in the remediation of the industrial use of the site.

The primary non-radiological contaminant of concern at the site is PCBs. A release of PCB-containing paint chips from the vapor container (reactor containment) into the Sherman Reservoir was discovered in the spring of 2000. The paint chips migrated to the reservoir through the stormwater drainage system. Immediate action was taken to remediate some of the storm drain sediments. Additional cleanup has been ongoing since 2001, including remediation of soils in landscaped areas onsite and of the sediments in the Sherman Reservoir and western storm drainage ditch. PCBs in soils and sediments are being remediated to meet the requirements of both the MDEP and the U.S. Environmental Protection Agency (EPA) Toxic Substances Control Act (TSCA) generally to a level of 1 milligrams/kilogram (mg/kg, or parts-per-million). YAEC has documented its PCB remediation program in three reports prepared according to MCP

requirements: Phase II Comprehensive Site Assessment, Phase III Remedial Action Plan, and Phase IV Remedy Implementation Plan.

Massachusetts and Vermont public health agencies have issued advisories due to the presence of mercury in fish from the Sherman Reservoir. Atmospheric deposition from industrial activities is a likely source of the mercury found in these fish. Additionally, PCBs were detected at trace levels in the tissues of fish in the vicinity of the East Storm Drain Outfall. The source of the PCBs is likely the PCB-containing paint chips that migrated into the reservoir. The licensee is controlling any remaining PCB-containing paint so no further environmental impact is expected. As discussed in Section 3.1.2, YAEC is in the process of remediating the PCB-contaminated areas of the reservoir near the East Storm Drain Outfall (ERM, 2004a).

YAEC began an additional site-wide characterization of soils, groundwater, and sediments in 2003 and identified several areas for further study. According to the June 2004 Site Characterization Status Report (ERM, 2004c) and the January 2005 Phase II Comprehensive Site Assessment Report, minor contamination in groundwater and sediment, as well as localized areas of contaminated soil, were identified as requiring further evaluation. Groundwater contaminants are discussed in Section 3.3.2. Sediment impacts include PCBs, which is consistent with previous investigations. Soil impacts include low levels of the following compounds: petroleum hydrocarbon impacts near parking areas; PCBs near the transformer yard; dioxin near the former incinerator; lead around the former shooting range; and beryllium near the ISFSI and former cooling water discharge structure. YAEC will continue to work with the MDEP to fulfill MCP requirements and demonstrate that the entire site has been adequately characterized and remediated where necessary, according to MDEP regulations. When the site is released from NRC jurisdiction, it will remain under state jurisdiction until all nonradiological contamination issues are resolved with the MDEP.

As discussed earlier, most site buildings are being demolished to ground level, and some foundations (notably, the Spent Fuel Pool/Ion Exchange Pit, or SFP/IXP) will be removed entirely. Basements will be remediated to meet the DCGLs before they are perforated to facilitate groundwater flow. Soils will be used to backfill the basements and other holes. Additionally, concrete demolition debris generated from dismantlement activities may be used as backfill material if it passes the final status survey or contains no detectable contamination. Backfill using concrete demolition debris will be conducted under a BUD permit from MDEP, which will include a deed restriction and compliance with MDEP and MDPH requirements for such reuse.

3.2 Land Use

YNPS industrial and administrative operations are conducted on approximately 15 acres of land, primarily owned by YAEC but also including property owned by USGen, as discussed in Section 3.1. The USGen property, consisting of a segment that extends along the entire eastern bank of the Sherman Reservoir, is subject to a 2001 Grant of Conservation Restriction issued by the Massachusetts Department of Environmental Management. USGen has agreed to restrict future uses of its property for preservation purposes, except as necessary for operation of its hydroelectric power plant (ERM, 2004a).

Approximately 87 acres of the site is dedicated to the long term storage (about 20 years) of spent fuel and other high-level radioactive waste in the ISFSI. The ISFSI consists of a concrete pad within a fence and a buffer area with a 300-meter radius.

Transmission lines and two public roads traverse the site. Readsboro Road runs in a north-south direction approximately 1500 feet west of the plant, across the river. Monroe Hill Road is approximately 2500 feet from the plant to the southwest, running in a north-south direction between the towns of Rowe and Monroe.

Some farms and a few commercial sites are located in the surrounding area. There are no exclusively commercial areas within five miles of the site. The only industrial property in the area is the adjacent USGen hydroelectric station and five associated powerhouses that are situated near the Sherman and other reservoirs along the Deerfield River. The nearest highway and railroad right-of-way are each located about five miles south of the site. Several public lands and conservation areas are located within five miles of the site (YAEC, 1999, 2004a). The river is used for recreation and sport fishing, as well as for producing hydroelectric power.

3.3 Water Resources

The discussion of water resources is divided into surface water and groundwater. The following sections provide a summary of the characteristics of each within and around the YNPS site.

3.3.1 Surface Water

Surface Water Features

Surface water bodies on the site or in its immediate vicinity include the Deerfield River, Sherman Reservoir, Wheeler Brook and an associated tributary, a divertment from Wheeler Brook, a discharge canal, and the stormwater drainage systems for the eastern and western halves of the Industrial Area. Wheeler Brook and its tributaries flow about 400 to 500 feet outside the Industrial Area around the south and east sides of the site before Wheeler Brook discharges into Sherman Reservoir (Framatome, 2003).

Sherman Reservoir was formed by the installation of Sherman Dam on the Deerfield River. The reservoir is approximately two miles long, a quarter mile wide, and up to 75 feet deep along its central channel (Framatome, 2003). The discharge canal, which discharges into the Sherman Reservoir, was constructed to receive return water from the plant's cooling water processes.

Stormwater at the site flows into two systems, the East Storm Drain System and the West Storm Drain System, draining the eastern and western halves of the Industrial Area, respectively. The East Storm Drain System discharges to the Sherman Reservoir, while the West Storm Drain System discharges to the Deerfield River. Stormwater from the undeveloped uplands is captured by the Wheeler Brook Divertment. The divertment flows into Wheeler Brook, which flows into the Sherman Reservoir.

Wetlands on the site are located in several areas and primarily border water bodies such as the Sherman Reservoir, Deerfield River, Wheeler Brook, and associated tributaries. Additional wetland areas were identified in the two stormwater detention basins at the site. Some isolated wetlands exist in the southern part of the site. Wetlands were formally delineated in an Abbreviated Notice of Resource Area Delineation (Woodlot, 2004), which was approved by the Town of Rowe Conservation Commission in March 2004.

Wastewater Discharges

During the plant operation, stormwater, service water, and noncontact cooling water were discharged as wastewaters through seven outfalls to the Sherman Reservoir and the West Storm Drain System (to the river). Currently, stormwater and treated wastewaters from the laboratory or from decommissioning activities are

discharged through three remaining outfalls. Discharges are approved under a National Pollution Discharge Elimination System (NPDES) permit issued jointly by the MDEP and EPA, which sets specific limits for pH, oil and grease, suspended solids, and flow, and also requires the maintenance of a Stormwater Pollution Prevention Plan (ERM, 2004b). These discharges are also monitored and treated for radiological materials according to NRC requirements.

A temporary wastewater processing system treats and stores wastewaters received from the radioactive laboratory sump discharge line. This water is treated and then batch-discharged. Discharges of these wastewaters through the treatment plant or through the stormwater drainage system are covered under the NPDES permit. The temporary treatment system will be dismantled and disposed of off-site as radioactive waste (YAEC, 2004a).

The auxiliary service water system is being used to supply water from the Sherman Reservoir to support decontamination and dismantling activities. The system will be dismantled once it is no longer needed for these activities (YAEC, 2004a).

Three septic systems with several associated leach fields have been used at the YNPS site. The leach fields are located generally on the western portion of the site. Three of these leach fields have been in use since 1978, when two formerly-used leach fields were abandoned in place.

3.3.2 Groundwater

Aquifers and Geology

The groundwater system at the YNPS site is a product of the geology, particularly the petrology and hydraulic conductivity of the rocks, the glacial history, the geomorphology, and the hydrology of this area. The YNPS site is located on the east side of the Berkshire Mountains predominantly on a terrace of the Deerfield River. The terrace is recessed into the east side of a two mile wide glacially-derived river valley where the valley walls rise to over 1,000 feet above the river elevation. The YNPS plant is adjacent to a dammed portion of the Deerfield River, Sherman Dam and Sherman Reservoir. The local gradient for this portion of the Deerfield River is 28.4 feet/mile over a river distance of about 33 miles from the Vermont border at the Sherman Pond to the West Deerfield, Massachusetts gauging station (Framatome, 2003).

The local groundwater system is extremely complex, with three groundwater-bearing units, from top to bottom: stratified drift, glaciolacustrine, and bedrock. The stratified drift unit contains permeable surficial sands and gravels,10 to 20 feet thick, that are water-laid, ice-contact deposits derived from a melting glacier. The glaciolacustrine unit comprises sediments up to 260 feet thick of glaciolacustrine origin, containing multiple, relatively thin water-bearing units of fine to medium-grained sand, interspersed within relatively impermeable, fine-grained sand and silts. The bedrock unit is a gray, medium-grained, moderately foliated metamorphic rock that contains significant amounts of megacrystals of plagioclase feldspar albite. This bedrock is the upper member of the Lower Cambrian Hoosac Formation, which is relatively competent with few fractures (YAEC, 2004e).

Contamination and Monitoring

As discussed in Section 3.1.2, YAEC began additional site-wide characterization of groundwater in 2003 and identified several areas for further study. According to the June 2004 Site Characterization Status Report (ERM, 2004c), nonradiological contamination in groundwater and sediment, as well as localized areas of contaminated soil, were identified that required further evaluation. Non-radiological groundwater contaminants identified were found to be in isolated areas and do not suggest the presence of a plume. These contaminants include low levels of 1,1-dichloroethane, PCBs, and petroleum hydrocarbons. YAEC will continue to work with the MDEP to fulfill MCP requirements and demonstrate that groundwater has been adequately characterized and remediated where necessary.

Radiological groundwater monitoring at the YNPS site (excluding monitoring for the Radiological Environmental Monitoring Program) has occurred since the plant shut down in 1992. Currently, 39 monitoring wells are in operation throughout the site. Monitoring wells were installed in stages, as follows: two in the late 1970s, 15 in 1993–94, 21 from 1997 through 2001, and 17 during the summer of 2003, with 14 of the older wells properly abandoned due to decommissioning (demolition) activities. Most of the wells that were installed prior to 2003 are located in the RCA, although a few are either downgradient or upgradient of the RCA. All of the wells installed before 2003 except one are shallow, ranging in depth from 7 to 31 feet below the land surface. The exception is a 49-foot bedrock monitoring well in the RCA. The monitoring wells installed during the summer of 2003 contain wells screened as follows: three in the stratified drift unit, seven in the glaciolacustrine unit, and seven in the bedrock unit.

Groundwater samples have been collected for radiological analysis since 1993. Until 2003, YAEC analyzed the groundwater samples for tritium, gross alpha, gross beta, and gamma spectroscopy. The analytical results for these samples (*i.e.*, groundwater samples from monitoring wells screened primarily in the stratified drift unit) indicated that only tritium was present above the minimum detection concentration. The largest tritium concentrations were observed in wells located immediately downgradient of the spent fuel pit and ion exchange pit (SFP/IXP).

In 2003, YAEC made several changes to improve site characterization and sampling and analytical procedures:

1. During the summer of 2003, YAEC installed 17 monitoring wells, as mentioned above, to characterize the glaciolacustrine and bedrock units more adequately. YAEC installed additional monitoring wells in 2004 and will install more as required by MDEP to improve its characterization of groundwater at the site.

2. YAEC began quarterly sampling events in 2003, and in 2004 improved sampling procedures by measuring the groundwater levels in all monitoring wells within a few hours before any water samples were collected. YAEC has also committed to collecting the water samples from the monitoring wells over a shorter time period.

3. YAEC improved and explained its analytical analysis of the groundwater samples by analyzing for the radionuclides of concern at the YNPS site. Table 2–6 of the LTP lists the radionuclides of concern (or see Section 3.1.1). In July and November 2003, YAEC conducted analyses for these radionuclides of concern and for Mn-54. Tritium was the only plant-generated radionuclide that was detected in samples from the July and November 2003 events.

The largest tritium concentration historically observed at the YNPS site was groundwater flowing from Sherman Spring early in plant operation, which is downgradient from the Sherman Dam and Sherman Pond near the Deerfield River. Groundwater from Sherman Spring had a tritium concentration of 7,195,000 picoCuries/liter (pCi/L) in December 1965. The tritium contamination is reported to have been caused by a leakage from the SFP/IXP, which was repaired in May 1965 and in 1979, when a stainless-steel liner was installed. Tritium levels in groundwater

samples from Sherman Spring have decreased steadily over time, and have varied from non-detectable (ND) to 890 picoCuries/liter in recent monitoring rounds.

Tritium concentrations from the July and November 2003, sampling events are variable by space and time throughout the hydrogeologic units at the site. The tritium plume extends from the source area at the SFP/IXP towards Sherman Spring and the Deerfield River, with the highest tritium concentrations present immediately downgradient of the SFP/IXP. The maximum tritium concentrations were approximately 2,000 pCi/L in the stratified drift unit, 45,000 pCi/L in the glaciolacustrine unit, and 6,000 pCi/L in the bedrock unit.

3.4 Human Health

Potential human health hazards associated with the YNPS site range from potential exposure to very low levels of radioactivity in soils and groundwater, to limited areas of relatively high levels of radioactivity within the remaining portions of the reactor support structures and systems.

The intent of the final decommissioning activity at the site is to reduce radiological contamination at the site to meet NRC's unrestricted release criteria, and to also meet the criteria of the MDPH and MDEP. 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) * * *.

As planned, the 0.25 mSv/yr (25 mrem/yr) TEDE all-pathway 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 YNPS site were calculated using dose models based on guidance provided in NUREG/CR–5512, Volumes 1, 2, and 3, NUREG/CR–6697, and the computer codes RESRAD Version 6.21 and RESRAD-BUILD Version 3.21 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. Such scenarios and their associated modeling are designed to overestimate, rather than underestimate, potential dose.

YAEC has also agreed to meet the following radiological site criteria of the Commonwealth of Massachusetts: 1 mrem/yr for concrete rubble used on-site as fill; 10 mrem/yr for the entire site; and the risk criteria for cumulative radiological and non-radiological risk as determined by a Risk Assessment according to the MCP.

4.0 Environmental Impacts

4.1 Land Use

YAEC plans to release eventually all of the property associated with the YNPS site to local, state, or federal government or non-profit entities for conservation purposes. YAEC has developed an American Land Title Association survey to document the site's legal boundaries. In addition, natural and cultural resources inventories and management plans have been developed. The management plans specify the obligations necessary to preserve the site for conservation (YAEC, 2004b).

Termination of the YAEC license is not reasonably expected to result in any adverse impacts to onsite and adjacent land use. Soils not meeting the radiological criteria for license termination will be removed and disposed of at a licensed facility as low-level radioactive waste. Initially, most of the YAEC-owned property would be released, except for approximately 87 acres containing the spent fuel storage facility and associated buffer zone. That acreage would be released when the fuel is removed to a permanent repository and the storage facility is decommissioned.

Land on and directly adjacent to the site is expected to remain heavily wooded, with lightly populated communities in the surrounding area. Recreational opportunities afforded by the Deerfield River will likely continue and could increase.

The deed restriction required by the MDEP Solid Waste BUD permit will require prior written approval by the MDEP for any use of the former industrial area of the site other than as passive recreation, and will prohibit excavations in that area.

4.2 Water Resources

Approval of the LTP and eventual termination of the license are not anticipated to result in any significant impacts to either surface water or groundwater. The approved radiation release criteria must be met as a condition of license termination and release of the site.

4.2.1 Surface Water

Land areas from which precipitation runs off to surface waters, will be subject to further investigation, remediation where necessary, and the final status survey. YAEC will need to verify that DCGLs have been met in accordance with Section 5 of the LTP, thus demonstrating compliance with the release criteria. Further, YAEC will need to demonstrate compliance with the MCP surface water requirements for both nonradiological and radiological contaminants. YAEC's future license termination also would not be expected to result in any adverse impact to surface water flow or quality, as batch discharges will cease along with other license termination activities.

Prior to license termination, the amount of impervious area will be reduced by about 8 acres (from about 9.5 acres) due to revegetation of areas currently occupied by buildings, roads, and parking lots (ERM, 2004d). YAEC intends to leave the current stormwater drainages unaltered to prevent the destruction of wetland areas that have formed in the drainages. Drainage pipes will be closed, so that discharges will likely continue as sheet flow from the drainages into water bodies.

Both the existing water supply system (upgradient supply well) and sewage system will remain in place. YAEC will inspect the remaining septic systems (discussed in Section 3.3.1) for compliance with state septic system regulations before the property title is transferred. Groundwater monitoring wells have been installed and monitored in the vicinity of the site septic systems.

Several closure activities are being conducted on or near wetlands resources. YAEC has prepared an Integrated Permit Package to address the regulatory requirements applicable to such activities (ERM, 2004d). The activities requiring wetlands-related permits include PCB remediation, decommissioning of circulating water intake and discharge structures, removal of the Southeast Construction Fill Area, implementation of Sherman Dam flood control measures, and regrading of the site. Additionally, a wetlands restoration plan has been developed (Woodlot, 2004) to implement the

permit requirements. Further information concerning wetlands activities can be found in the Integrated Permit Package and the Wetland Restoration and Replication Plan (Woodlot, 2004).

YAEC samples three surface water sites for its Radiological Environmental Monitoring Program (REMP) at the YNPS site. The Deerfield River is sampled downstream from the YNPS site at Bear Swamp Lower Reservoir with an automatic sampler every two hours. These samples are composited each month. YAEC also collects monthly grab samples from Sherman Pond and from an upstream Deerfield River site at the Harriman Reservoir. Samples from all three sites are analyzed for gamma emitting radionuclides, tritium, and gross beta. The tritium and gamma spectroscopy results for 2003 indicated that no surface water samples contained detectable levels of plant-generated radionuclides. Also, the gross beta averages for 2003 were slightly greater at the upstream Deerfield River site than at the downstream site (YAEC, 2004d). Based upon these recent data, YAEC states that the surface waters do not require remediation pertaining to plant-generated radionuclides.

4.2.2 Groundwater

YAEC states that remediation will not likely be required for groundwater at the YNPS site to meet NRC's license termination criteria because H–3 levels are expected to meet NRC's unrestricted release criteria when the site is released (when the ISFSI is decommissioned and the license terminated). If decommissioning activities at the YNPS site increase the concentrations of plant-generated radionuclides dissolved in the groundwater, the monitoring program at this site should detect this change. Groundwater samples from the existing 39 monitoring wells should indicate changes in the groundwater downgradient from the radiologically-controlled area. Because some monitoring wells have been abandoned during decommissioning, new monitoring wells will need to be installed to meet MDEP requirements to characterize potential changes in the level of plant-generated radionuclides dissolved in the groundwater.

Groundwater at the site also will be required to meet the dose-based radiological criteris of the MDPH and the risk-based criteria of the MDEP Risk Assessment process (for both radiological and non-radiological parameters).

4.3 Human Health Impacts

Compliance with 10 CFR 20.1402 for unrestricted release (and, therefore, human health protection requirements) is contingent 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 noted in Sec. 3.4, YAEC also has agreed to meet the more restrictive radiological release criteria of the MDPH and the MDEP.

Derived Concentration Guideline Levels

YAEC has defined levels of residual radioactivity for various sources at the site that correspond to meeting the dose limit. 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 for each of the potential sources of residual radioactivity. The sources are soil, building surfaces, subsurface partial structures, and concrete debris. Two critical groups were identified to whom the DCGLs would be applicable: A full-time resident farmer group (associated with soil, building surfaces, subsurface partial structures, and concrete debris sources) and a building occupancy group (associated with the building surfaces source).

The DCGLs for each source were derived using the radiation doses per unit activity and a separate dose constraint for each source. Table 4–1 lists the DCGLs for each radionuclide from each source. Within each critical group, each DCGL was selected to correspond to a fraction of the 0.25 mSv/yr (25 mrem/yr) dose limit so that the total dose to the average member of that group from all sources would equal the limit.

For the resident farmer critical group, the doses corresponding to DCGLs (and totaling 25 mrem/yr) are:

- Subsurface partial structures: 0.005 mSv/yr (0.5 mrem/yr)
- Groundwater: 0.0077 mSv/yr (0.77 mrem/yr).
- Concrete debris and soil: 0.2373 mSv/yr (23.73 mrem/yr)

In areas that have co-mingled soil and concrete debris, YAEC would use the smaller of the two DCGLs for each radionuclide (see Table 4–1), and for areas with only soil, YAEC would use the soil DCGLs.

For the building occupancy critical group, YAEC would take a sum-of-fractions approach to ensure that if a member of the public were both a member of the building occupancy critical group and the resident farmer critical group, their total dose would be less than 0.25 mSv/yr (25 mrem/yr).

Any actual doses would likely be much less than the 0.25 mSv/yr (25 mrem/yr) limit. This is due to the conservatism in both the modeling and the assumption that the entire source would have residual radioactivity at the DCGL. (It is more likely that the sources will have residual radioactivity at considerably less than the DCGLs.) Provided compliance with the 10 CFR 20.1402 limit is demonstrated through the results of the final status survey, there would be no anticipated adverse impacts to human health from approval of license termination, as described in the environmental impact statement for license termination (NUREG–1496) (NRC, 1997a).

Exposure Scenarios

The manner in which the DCGLs are derived for the YNPS site is documented in Chapter 6 of the LTP, Revision 1. 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 (or soil/concrete debris mix), draw water from a well placed into the tritium plume, 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 DCGLs are shown in Table 4–1.

The NRC will evaluate the appropriateness of the postulated exposure scenarios and the methodology used for deriving the DCGLs as part of its review of the LTP. The NRC staff's Safety Evaluation Report will provide the details of this review.

Survey Design

YAEC would use a series of surveys, including the final status survey, to demonstrate compliance with the radiological release criteria consistent with the Multi-Agency Radiation Survey and Site Investigation Manual (NRC, 1997a). Planning for the final status survey 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. YAEC has committed to an integrated design that would 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 final status survey. YAEC has requested that it be permitted to modify the classification levels based on new information during the decommissioning process.

TABLE 4–1.—DERIVED CONCENTRATION GUIDELINE LEVELS*

Radionuclide	Soil (pCi/g)†	Building surface (dpm/100 cm^2) ‡	Subsurface partial structures (pCI/g) §	Concrete debris† (pCi/g)
H-3	3.5E+02	3.4E+08	1.35E+02	9.5E+01 (cellar holes). 2.8E+02 (grading).
C-14	5.2E+00	1.0E+07	2.34E+03	7.2E+00.
Fe-55	2.8E+04	4.0E+07		1.4E+02.
Co-60	3.8E+00	1.8E+04	3.45E+03	4.3E+00.
Ni-63	7.7E+02	3.7E+07	6.16E+04	1.0E+02.
Sr-90	1.6E+00	1.5E+05	1.39E+01	7.5E01.
Nb-94	6.8E+00	2.6E+04		7.0E+00.
Tc-99	1.3E+01	1.4E+07		6.1E+01.
Ag-108m	6.9E+00	2.5E+04		7.0E+00.
Sb-125	3.0E+01	1.0E+05		3.1E+01.
Cs-134	4.7E+00	2.9E+04		4.7E+00.
Cs-137	8.2E+00	6.3E+04	1.45E+03	6.7E+00.
Eu-152	9.5E+00	3.7E+04		9.5E+00.
Eu-154	9.0E+00	3.4E+04		9.1E+00.
Eu-155	3.8E+02	6.5E+05		3.8E+02.
Pu-238	3.1E+01	5.7E+03		9.5E+00.
Pu-239	2.8E+01	5.1E+03		8.8E+00.
Pu-241	9.3E+02	2.5E+05		1.4E+02.
Am-241	2.8E+01	5.0E=03		4.1E+00.
Cm-243	3.0E+01	7.2E+03		4.7E+00.

* To convert to Bq from pCi, multiply by 0.037.
† Represents a dose of 23.73 mrem/yr.
‡ Represents a dose of 25 mrem/yr.
§ Represents a dose of 0.5 mrem/yr, radionuclides based upon those found in concrete samples.

5.0 Agencies and Persons Consulted and Sources Used

A copy of the Environmental Assessment was provided to the Commonwealth of Massachusetts on March 3, 2005. The Massachusetts Department of Environmental Protection provided comments by letter dated March 31, 2005, which were incorporated into this EA.

The NRC staff has determined that the proposed action would not affect listed threatened or endangered species or critical habitat designated under the Endangered Species Act. Therefore, no consultation is required under Section 7 of the Endangered Species Act. Likewise, the NRC staff has determined that the proposed action would not affect historic or archaeological resources. Therefore, no consultation is required under Section 106 of the National Historic Preservation Act.

6.0 Conclusion

The NRC has prepared this EA related to the issuance of a license amendment that would approve the LTP. On the basis of this EA, the NRC has concluded that there are no significant environmental impacts and the proposed 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, 1555 Rockville Pike, Rockville, Maryland 20852. Most of these documents also are available for public review through our electronic reading room (ADAMS): *http://www.nrc.gov/reading-rm/adams.html*.

7.0 List of Preparers

C. McKenney, Health Physicist, Division of Waste Management, dose assessment.

J. Peckenpaugh, Hydrologist, Division of Waste Management, groundwater issues.

C. Schulte, Project Manager, Division of Waste Management and Environmental Protection, non-radiological environmental issues.

J. Thompson, Health Physicist, Division of Waste Management and Environmental Protection, Final Status Survey, radiation release criteria.

8.0 List of Acronyms

ALARA as low as reasonably achievable
BUD beneficial reuse determination
CFR Code of Federal Regulations
DCGL derived concentration guideline limit
dpm/100cm^2 disintegrations per minute per 100 square centimeters
EA environmental assessment
EPA Environmental Protection Agency
FR Federal Register
FSS final status survey
ISFSI independent spent fuel storage installation
kV kilovolt
LTP license termination plan
MCP Massachusetts Contingency Plan
MDEP Massachusetts Department of Environmental Protection
MDPH Massachusetts Department of Public Health, Radiation Control Program
mrem/y millirem per year
mSv/yr milliSievert per year
NEPA National Environmental Policy Act
NHESP National Heritage and Endangered Species Program
NPDES National Pollution Discharge Elimination System
NRC Nuclear Regulatory Commission

ORISE Oak Ridge Institute for Science and Education
PCBs Polychlorinated biphenyls
pCi/L picocurie per liter
PSDAR post shutdown decommissioning activities report
RCA Radiologically-controlled area
REMP Radiological Environmental Monitoring Program
RCRA Resource Conservation and Recovery Act
SCFA Southeast Construction Fill Area
TEDE total effective dose equivalent
TSCA Toxic Substances Control Act
YAEC Yankee Atomic Electric Company
YNPS Yankee Nuclear Power Station

9.0 References

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

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Dated at Rockville, Maryland, this 23rd day of May, 2005.

For the Nuclear Regulatory Commission.

Andrew Persinko,

Acting Deputy Director, Division of Waste Management and Environmental Protection, Office of Nuclear Material Safety and Safeguards.

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RAILROAD RETIREMENT BOARD

Agency Forms Submitted for OMB Review

Summary: In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35), the Railroad Retirement Board (RRB) has submitted the following proposal(s) for the collection of information to the Office of Management and Budget for review and approval.

Summary of Proposal(s)

(1) *Collection title:* Statement Regarding Contributions and Support.
(2) *Form(s) submitted:* G–134.
(3) *OMB Number:* 3220–0099.
(4) *Expiration date of current OMB clearance:* 09/30/2005.
(5) *Type of request:* Extension of a currently approved collection.
(6) *Respondents:* Individuals or households.
(7) *Estimated annual number of respondents:* 100.
(8) *Total annual responses:* 100.
(9) *Total annual reporting hours:* 259.
(10) *Collection description:* Dependency on the employee for one-half support at the time of the employee's death can be a condition affecting eligibility for a survivor annuity provided for under Section 2 of the Railroad Retirement Act. One-half support is also a condition which may