

MAINE YANKEE

LTP SECTION 8

SUPPLEMENT TO THE ENVIRONMENTAL REPORT

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8.0 SUPPLEMENT TO THE ENVIRONMENTAL REPORT

8.1 Introduction and Purpose

8.1.1 Purpose

The purpose of this section of the License Termination Plan (LTP) is to update the Maine Yankee Environmental Report (MYER) with any new information or significant environmental change associated with Maine Yankee's proposed decommissioning/license termination activities. This section of the LTP constitutes a supplement to the MYER pursuant to 10 CFR 51.53(d) "Environmental Report Post-Operating License Stage" and 10 CFR 50.82(a)(9)(ii)(G). In October, 1970, Maine Yankee submitted to the US. Atomic Energy Commission (AEC: NRC's predecessor) its Environmental Report, which was further appended in February 1971 with supplementary information. On April 19, 1972, Maine Yankee submitted to the AEC a "Supplement to Environmental Report." It is this latest supplement which is being updated by this LTP section pursuant to the above regulations. During July 1972 the AEC issued the Final Environmental Statement related to the operation of Maine Yankee Atomic Power Station. On August 27, 1997, shortly after submitting its 10 CFR 50.82(a)(1) shutdown certifications, Maine Yankee submitted its Post Shutdown Decommissioning Activities Report (PSDAR).

This supplement to the MYER describes changes since the issuance of the PSDAR and the MYER. Any identified new information or significant environmental change associated with Maine Yankee's proposed decommissioning/license termination activities is evaluated to determine whether it is bounded by the site-specific decommissioning activities described in Maine Yankee's PSDAR, AEC's Final Environmental Statement or the Final Generic Environmental Impact Statement (FGEIS), NUREG - 0586.

This supplement to the environmental report generally follows the NRC guidance of Regulatory Guide 1.179 "Standard Format and Content of License Termination Plans for Nuclear Power Reactors," dated January 1999 and NUREG 1700 "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans," dated December 1998. The contents of this section have been informed by appropriate sections of NUREG 1727 "NMSS Decommissioning Standard Review Plan," dated September 15, 2000. Much of the information specified in this later guidance document has been previously provided to the NRC in other forms; e.g., Defueled Safety Analysis Report (DSAR) - site description, meteorology, seismology, hydrology etc.

8.1.2 Site Description After Unrestricted Release

A summary description of the site following license termination and unrestricted release is provided in Section 8.2. Generally, the above grade structures will be demolished down to three feet below grade and the resulting concrete demolition debris will be disposed of offsite at either a low-level radioactive waste facility or an appropriate disposal facility. The remaining basement foundations will be filled with a soil fill material following any required remediation and final status survey activities. This section identifies radiological and non-radiological impacts associated with the final state of the site.

8.1.3 PSDAR Update For Remaining Dismantlement and Decontamination Activities

LTP Section 3 identifies the dismantlement and decontamination activities which remain to be completed to allow license termination and unrestricted release. These activities are compared to the descriptions given in the PSDAR and any changes identified. The impacts of the changes to these activities are described in Section 8.3.

8.1.4 Update of Maine Yankee Environmental Report

The MYER was reviewed against Maine Yankee's proposed decommissioning/license termination activities to identify relevant new information or significant environmental changes associated with those activities. Any relevant new information or significant environmental changes identified were reviewed to determine whether they are bounded by the site specific decommissioning activities described in the PSDAR, the AEC's Final Environmental Statement for Maine Yankee or the FGEIS, NUREG-0586. A description of this review is provided in Section 8.4

8.1.5 Radiological Environmental Impacts

A description of the radiological impacts of the site following license termination and unrestricted release is provided in Section 8.5.1. These radiological impacts are identified generally following the guidance provided by the NRC in NUREG 1727 "NMSS Decommissioning Standard Review Plan" dated September 15, 2000. The models and modeling results are described in LTP Section 6. That LTP section shows how Maine Yankee meets the Radiological Criteria for License termination prescribed in 10 CFR Part 20, Subpart E and the enhanced state criteria described in Maine State Law LD 38MRS§1455.

The radiological impact of plant operation versus the site following license termination and unrestricted release is also discussed in Section 8.5.2. During approximately twenty-five years of operation, Maine Yankee operated well within the limits prescribed in the applicable radiological effluent requirements. With the cessation of operations and the decommissioning of the facility, the radiological impacts of the facility have decreased due to both the decrease in the quantity of effluent and the reduction in source term due to radioactive decay. Following license termination and unrestricted release, the radiological impacts are assessed against a postulated member of a group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances. The radiological impact to real individuals under realistic circumstances are expected to be much less than this postulated, low probability situation and are expected to be much less than for plant operation.

8.1.6 Non Radiological Environmental Impacts

The non-radiological impacts of decommissioning activities associated with termination of the license are described in Section 8.6. These non-radiological impacts include: water usage, non-radiological waste generation and transportation, dismantlement and excavation controls. Other non-radiological concerns which are covered by federal, state and local agencies other than the NRC are generally described. More information on the responsibilities of these agencies and Maine Yankee's coordination with these agencies is presented in LTP Section 3.6.

8.1.7 Evaluation of Decommissioning Low-Level Radioactive Waste (LLRW) Volume

The waste volume generated from the decommissioning of Maine Yankee is described and its impact is evaluated in Section 8.7. This waste volume is greater than that which was described in the PSDAR. The increase in volume is a result of the decision to dispose of all concrete demolition debris from structures above grade (above three feet below grade) at either a low-level radioactive waste facility or an appropriate disposal facility. The impacts of this volume are evaluated against the basis for the estimates provided in the FGEIS. In particular, the impacts on LLRW disposal facility resources and the dose to the public resulting from waste transportation are evaluated and described.

8.1.8 Summary/Conclusion

Section 8.8 summarizes the relevant new information and significant environmental changes identified and the evaluation of their corresponding impacts. It is concluded that each of the areas identified is bounded by the site-specific decommissioning activities described in Maine Yankee's PSDAR, AEC's Final Environmental Statement or the FGEIS. Identified changes between this supplement and the previously submitted documents will be expanded upon in the text of this document.

8.2 Site Description after License Termination

The purpose of this section is to present a summary of the final state of the site following license termination and unrestricted release and to identify relevant radiological and non-radiological impacts. LTP Section 3.2.4 provides a more detailed description of the final state of the site following dismantlement activities. The impacts identified in this section are discussed in Sections 8.5 and 8.6.

At license termination, when the site will be released for unrestricted use, the site will be a backfilled and graded land area with some above grade structures remaining depending on the industrial reuse of the site. Remaining above grade structures include the main switchyard and possibly other buildings which were used for administrative, non-radiological purposes. Generally speaking, the rest of the above grade structures will be demolished down to three feet below grade and the resulting concrete demolition debris will be disposed of offsite at either a LLRW disposal facility or an appropriate disposal facility. The remaining basement foundations will be filled with a soil fill material following any required remediation and final status survey activities.

The former Low Level Waste Storage Building [now the ISFSI Security Operations Building-(SOB)] will remain in place until the fuel is transferred to the Department of Energy. The 115 kv switchyard, the 345 kv switchyard, the barge slip and dolphins, and the marina will remain intact. The road that travels west of the ISFSI will remain in place, terminating near the 115 kv switchyard. The original plant access road will remain but terminate between the ISFSI and the former location of the Information Building. The existing railroad that travels the west side of the ISFSI and its two spurs will remain in place, with one spur terminating near the 115 kv switchyard and at the other at the edge of the old road bed (formerly between the Restricted Area and the Service Building). The Old Ferry Road and public boat ramp will remain in place. Some below grade structures and systems will remain.

The foundation basements of the Containment, Primary Auxiliary Building, Fuel Building and Containment Spray Building will remain in place below an elevation equivalent to three feet below grade. Other above grade structures such as the Turbine Building, Service Building, WART Building, Front Office, Circulating Water Pump House, RCA Building, High Radiation Bunker, Main Steam and Valve House, Emergency Feedwater Pump Room, LSA Building, Equipment Hatch and HV-7 and 9 Rooms, Ventilation Equipment Area and the Reactor Motor Control Center Room will be demolished such that primarily only foundation remnants below an elevation equivalent to nominally three feet below grade will be left. The radiological contamination and activation products in the basements and grade level foundations will be cleaned up and surveyed in accordance with the radiological criteria and survey methods described in LTP Sections 3 through 6. Non-radiological contaminants in these buildings include paint that contains low levels of PCB. These and other non-radiological contaminants will be addressed in the RCRA closure plan.

System piping such as Primary Component Cooling, Secondary Component Cooling, sanitary sewer in the industrial area and fuel oil and piping between the DWST/RWST and the Spray Building will be removed. Following piping removal, the excavations will be remediated as necessary and surveyed in accordance with the radiological criteria and survey methods described in LTP Sections 3 through 6. Non-radiological contaminants that were carried in these pipes include chromates and fuel oil. These and other non-radiological contaminants will be addressed in the RCRA closure plan.

Portions of the Service Water (SW), Circulating Water (CW), Fire Water, and storm water drain pipes, and duct banks may remain buried. Most of these pipes/duct banks are not expected to be radiologically contaminated with the possible exception of the storm water drain pipes from the restricted area. These pipes will be remediated, if necessary, and surveyed in accordance with the radiological criteria and survey methods described in LTP Sections 3 through 6. Non-radiological contaminants will be addressed in the RCRA closure plan.

Maine Yankee is continuing to evaluate the final disposition of the Forebay, seal pit, and diffuser piping. As required by the Maine Department of Environmental Protection (MDEP) and the U.S. Army Corps of Engineers, Maine Yankee is analyzing remedial options. The key options under evaluation include: (1) leave in place as exists; (2) secure and leave in place; (3) partial removal and; (4) complete removal. The types of impact that will be considered in the analyses include environmental impacts (water quality, marine wetlands, freshwater wetlands and land use), ecological impacts including flora, fauna and marine resources, and impacts on natural resources. The evaluation will address the following options:

Diffuser Pipe, Foxbird Island – onshore below grade. Options include capping and leaving in place or removal, backfill and restoration to existing grade/conditions.

Diffuser Pipe, Mudflats – below the sediment/water interface. Options include capping and leaving in place or removal, backfill and restoration of the tidal flats.

Diffuser Pipe, Offshore above the sediment/water interface. The first option involves removal, possibly adding rip rap to the thrusters to form an artificial reef and augmented habitat. The second option involves leaving in place, capping, and filling with sand. This option may also include adding rip rap to form an artificial reef.

Forebay. All options involve demolishing the seal pit to three feet below grade, capping piping and trenches, and removing contaminated sediments as required to meet the established DCGL. The first option also includes removal of the west bank of the Forebay to re-establish tidal flow. The second option involves leaving the west bank of the Forebay in place, cutting down berms to above the high water elevation, and using this material as fill for the forebay. The third option involves leaving the berms in their present configuration.

The concrete saddle supports and thrust blocks for the diffuser piping may be left in place.

The impacts of the decommissioning of the Forebay and diffuser piping are described in Section 8.4.1 below.

The previously described Radiologically Restricted Area (RRA) will be radiologically released for unrestricted use. However, to assure compliance with non-radioactive environmental monitoring issues, it may be fenced, and the land deeded with restrictive covenants against excavating basements or drilling wells for drinking or irrigation water. After the DOE transports all the stored spent fuel and GTCC from the ISFSI, it will be decommissioned (as described in LTP Section 3.2).

At Maine Yankee's discretion, the Warehouse, Staff Building and Information Building may remain standing, after radiological release for unrestricted use.

8.3 PSDAR Update for Remaining Dismantlement and Decontamination Activities

LTP Section 3 identifies the dismantlement and decontamination activities which remain to be completed to allow license termination and unrestricted release. These activities are compared to the descriptions given in the PSDAR and any changes identified. The impacts of the changes to these activities are described in this section.

8.3.1 PSDAR Description

On August 27, 1997, shortly after submitting its 10 CFR 50.82(a)(1) shutdown certifications, Maine Yankee submitted its PSDAR. The PSDAR, submitted pursuant to 10 CFR 50.82(a)(4), describes Maine Yankee's planned decommissioning activities, a schedule for accomplishing these activities, an estimate of expected costs and a discussion that provides the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by previously issued environmental impact statements. On November 3, 1998, Maine Yankee submitted an update to the PSDAR regarding cost information.

NRC regulations, 10 CFR 50.82(a)(7), require a licensee to notify the NRC before performing any decommissioning activity inconsistent with, or making any significant change from, those actions and schedules described in the PSDAR, including changes that significantly increase the decommissioning costs. Shortly after Maine Yankee submitted its PSDAR, the NRC issued Draft Regulatory Guide DG-1071 "Standard Format and Content For Post-Shutdown Decommissioning Activities Report." Among other things, this document provided more specific guidance on updating the PSDAR. Maine Yankee established evaluation criteria in its 10 CFR 50.59 determination procedure to determine if the NRC should be notified using these criteria.

The Maine Yankee PSDAR identified the DECON alternative as the approach Maine Yankee had chosen for decommissioning. Under this alternative, Maine Yankee signaled its intention to decontaminate and dismantle the plant in a manner that results in the prompt removal of the existing nuclear plant. This choice was conditioned upon: (1) obtaining timely funding; and (2) continued access to one or more federally-licensed low level radioactive waste disposal sites. A description of planned decommissioning activities includes site characterization, reactor coolant system decontamination, removal of steam generators/pressurizer, reactor vessel internal segmentation, reactor vessel shipment, spent fuel and GTCC waste storage, regulatory approvals, final status survey and site restoration.

A schedule was outlined which included milestones for significant decommissioning activities. These activities included: (1) complete fuel removal from the spent fuel pool by April 2003; (2) dismantlement of systems and structures from 1998 through 2003; and (3) license termination in 2004 to 2005. A summary cost estimate is also provided in the PSDAR. This is augmented by the Site Specific Cost Estimate which was submitted on November 3, 1998. Finally, the PSDAR provides a discussion of the environmental impacts associated with the site specific decommissioning activities and provides reasons for concluding that these impacts are bounded by previously issued environmental impact statements. The impacts evaluated include: (1) radiation dose to the public; (2) occupational radiation exposure; (3) LLRW burial volume; and (4) other non-radiological environmental impacts such as industrial accidents, hazardous materials, noise, fugitive dust, traffic and socioeconomic impacts.

8.3.2 Impacts of Changes to PSDAR

A comparison of remaining dismantlement activities described in LTP Section 3 against the PSDAR has identified some changes. While none of these changes meet the thresholds identified in Draft Regulatory Guide 1071, they are being presented below for information. Maine Yankee continues to pursue the DECON option and has secured funding through a settlement negotiated in concert with a Federal Energy Regulatory Commission (FERC) rate case. Maine Yankee continues to have sufficient access to LLRW disposal facilities and has taken measures to assure that this access is maintained through the completion of decommissioning activities.

The most significant change to the PSDAR is the volume of low level radioactive waste estimated to be generated as a result of the decommissioning of Maine Yankee. The PSDAR estimated that the volume would be 209,000 cubic feet (5,920 cubic meters). The current estimate of LLRW volume to be transported from Maine Yankee is around 927,320 cubic feet (26,262 cubic meters). The LLRW volume estimated for final burial in a radioactive waste facility is less because of volume reduction. The increase in volume over that originally estimated in the PSDAR is a result of Maine Yankee's decision, made in concert with Federal, State and Local stakeholders, to demolish all buildings to an elevation equivalent to three feet below grade and dispose of the demolition debris offsite to a LLRW or other appropriate disposal facility. The impacts of this increase in LLRW volume are evaluated in LTP Section 8.7.

Other changes to planned decommissioning activities include minor adjustments to costs and adoption of the most current methodology for conducting final status surveys. LTP Section 7 describes the current cost estimate for

decommissioning activities. The PSDAR anticipated that the LTP would follow the guidance provided by NUREG/CR 5849, "Manual for Conducting Radiological Surveys in Support of License Termination." About three months after Maine Yankee submitted its PSDAR, the NRC in concert with other federal agencies issued NUREG-1575 "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," dated December 1997. As described in LTP Section 5, Maine Yankee intends to use MARSSIM for conducting final status surveys. The impact of this change in methodology is not significant since it should result in a more efficient and more statistically defensible final site survey.

The PSDAR provided an estimate that a total occupational radiation exposure of 946 person-rem will be incurred during the decommissioning of Maine Yankee. The details of this estimate are provided in LTP Section 3.5.3. The occupational exposure experienced by Maine Yankee over the first few years of decommissioning has resulted in a total occupational exposure below these estimates as a result of good radiation work practices and work planning. This experience encompasses activities with a significant exposure potential including significant progress on the segmentation and packaging of the reactor vessel internals. The FGEIS estimated that the occupational dose associated with dismantling and decontaminating the reference plant would be 1115 man-rem, not including transportation. The FGEIS also estimated the occupational dose (about 100 man-rem) incurred for the transportation by truck of the LLRW volume generated from the decommissioning of the referenced plant. In LTP Section 8.7, Maine Yankee evaluates the impact of the transportation of the increased LLRW volume by truck and rail. The total truck transportation distance (combination of number of shipments and distance traveled) is about 36% less than that assumed in the FGEIS. The exposure to rail workers and engineers is expected to be less than this remaining 36% difference due to the lower rail radiological waste package dose rates (FGEIS: 10 mr/hr at 10 ft versus Maine Yankee: 0.07 mr/hr at 10 ft.) and a comparable total rail transportation distance. Therefore, Maine Yankee remains bounded by the FGEIS for occupational radiation exposure.

The PSDAR stated that the radiation dose to the public will be maintained below comparable levels when the plant was operating through the continued application of radiation protection and contamination controls combined with the reduced source term available in the facility. LTP Section 8.5.2 presents a comparison of the maximum annual total dose commitments from direct external radiation and liquid and gaseous effluents during a portion of the operational period (1996 and before) and decommissioning period (post 1996).

8.4 Update of Maine Yankee Environmental Report

This section of the LTP presents any relevant new information or significant environmental change from the MYER, as supplemented. These instances of new information or significant environmental changes are focused upon that which is relevant to Maine Yankee's proposed decommissioning/license termination activities.

Any identified new information or significant environmental change associated with Maine Yankee's proposed decommissioning/license termination activities has been evaluated to determine whether it is bounded by the site-specific decommissioning activities described in Maine Yankee's PSDAR, AEC's Final Environmental Statement or the FGEIS.

8.4.1 Site Location

Section 2.1 of the MYER described the location and boundaries of the site. At the time the plant site consisted of 740 acres. In 1995, Maine Yankee purchased an additional 80 acres of land from US Gypsum. This additional land had historically been used for coastal farming and as a private residence prior to being purchased by the utility. This land has remained non-impacted by plant operations.

Section 9 of the MYER described the long-term effects of plant construction, including, among other things, the availability of property to the public for recreational and educational purposes.

On January 3, 2001, Maine Yankee submitted an application to amend the license to release approximately 200 acres from the jurisdiction of the license. The recently purchased land was included within land proposed for release. The proposed release of the lands will facilitate the donation of this property to an environmental organization pursuant to a FERC-approved settlement agreement. The purpose of the donation is to create a nature preserve and an environmental education center and to provide public access of coastal lands in the mid-coast region of Maine. This purpose is consistent with the long term use of the property envisioned in the MYER.

On April 10, 2001, Maine Yankee submitted a second application to amend the license to release approximately an additional 440 acres from the jurisdiction of the license. The proposed release of the lands will facilitate potential redevelopment and reuse of the land. This purpose is consistent with the long term use of the property envisioned in the MYER.

Section 3.1 of the MYER described, in general terms, the arrangement of plant structures on the site. Since then, Maine Yankee has constructed a number of additional structures at the site. All of these new structures were permitted by the Maine Department of Environmental Protection (MDEP) under the Site Location of Development Law which requires that new developments have minimal adverse environmental impact. Table 8-1 lists the major projects constructed subsequent to original plant construction, the year constructed, the area of new structures, and the area of new non-revegetated area.

Table 8-1 Construction Projects Subsequent to Plant Construction				
	Project Name	Year	New Bldg. Area ft²	New Non- Reveg ft²
1	Temporary Low Level Waste Storage Trailers		60	600
2	Low Level Waste Storage Building (previously gravel)	1985	10,778	___
3	Security Motorcycle Pad (previously gravel)	___	___	___
4	Temporary Hazardous Waste Storage Buildings (3)	1987	212	212
5	Paving (previously gravel)	___	___	___
6	Cooling Tower (Staff Building Ventilation)	1990	___	348
7	Staff Building (previously gravel and slabs)	1983	17,272	___
8	Cycle Pad	___	___	938
9	Diffuser Control Building	1974	224	224
10	Equipment and Tank Pad (previously gravel)	1980	___	___
11	Foxbird Island Road	1974	___	10,768
12	Diffuser Structures	1974	___	300
13	West Dike	1974	___	47,013
14	Spare Transformer Pad (previously gravel)	1979	___	___
15	Welding Shop (previously gravel)	1978	2,255	___
16	Tank Building (previously gravel)	1980	512	___
17	Diesel Generator Building (previously gravel)	1985	461	___
18	Administration Center Building Additions (2)	1976/89	3,425	3,425
19	Condenser Surge Tank	1977	___	720
20	Administration Building	1977	2,588	2,588

Table 8-1 Construction Projects Subsequent to Plant Construction				
21	Warehouse #2 Addition	—	18,523	18,523
22	Gas Cylinder Building (previously gravel)	1980	889	—
23	Storage Building (previously gravel)	—	2,938	—
24	Guard Towers (3) (previously gravel)	1978	188	—
25	Warehouse #4 (previously slab)	1980	4,000	—
26	Staff Building Parking (previously gravel)	1983	—	—
27	Information Center Parking Paving (previously gravel)	—	—	—
28	Ballfield Infield and Concrete Pad	1988	—	6,644
29	Ballfield Dugouts (2)	—	—	—
30	Warehouse #3 Relocation	—	—	—
31	Gravel Parking Expansion (Areas C&D)	1984	—	36,434
32	345 kV Parking Lot and Lot C Expansion	1997	—	131,000
	Total		65,105	259,977
	Less Credits (structures replaced by new structures):			
1	Warehouse #4 Slab		(4,000)	
2	Staff Building Slabs		(7,050)	
3	Warehouse #3 Downsize		(1,584)	
	Total		52,471	259,977 (5.97 ac)

All site structures constructed subsequent to the original plant are located on areas of the plant site that were disturbed during plant construction with the exception of the addition of the west forebay dike and diffuser piping. These latter two structures were contemplated in the MYER as part of several alternatives discussed that were available if needed to reduce thermal impacts on receiving waters. Maine Yankee also removed a causeway that connected with Westport Island. The causeway, constructed in 1950 across Cowseagan Narrows, was a major impediment to tidal circulation in the Back River/Montsweag Bay in the area of the plant. Removal of the causeway, coupled with the installation of a submerged multipoint diffuser, eliminated localized adverse thermal impacts from surface discharge to Bailey Cove.

Several structures have been constructed as part of the ongoing decommissioning at Maine Yankee. Two temporary solid waste storage areas have been permitted with MDEP and constructed. These two areas are available for the temporary storage of concrete debris from decommissioning prior to shipment offsite. Closure of these two areas will be in accordance with the Maine Solid Waste Management Rules.

In addition, Maine Yankee is building an Independent Spent Fuel Storage Installation (ISFSI) for the onsite storage of used nuclear fuel. Decommissioning of the ISFSI is discussed in Section 3 of the LTP.

The decontamination/dismantlement of the majority of these structures will not alter the anticipated impacts of decommissioning. Impacts will be typical of those associated with demolition of structures and include erosion and sedimentation, fugitive dust emissions, transportation of wastes and disposal of wastes.

Decontamination/dismantlement of the forebay/diffuser piping as discussed in Section 3 will result in short-term mitigable and unavoidable impacts to marine resources. Decommissioning activities will be timed (in consultation with regulatory agencies) to avoid periods when migratory species could be adversely impacted. Activities that will occur within the intertidal zone may cause minor localized disturbance to marine habitats, turbidity, sedimentation, and alteration of substrate. These impacts will be of short duration and the areas are expected to recolonize within a short time period following disturbance.

The decommissioning, including decontamination and dismantlement, of these structures is described in LTP Section 3.

8.4.2 Climate

Section 2.6 of the MYER describes climatology and meteorology of the site. Maine Yankee has collected twenty-five years of additional meteorological data. Much of this data has been submitted to the NRC in the annual (formerly semi-annual) effluent and environmental reports. As might be expected, there has been no significant change in climatology or meteorology.

8.4.3 Demography

Section 2.1 of the MYER described the population of Wiscasset and six other population centers. The following table updates this information with respect to the US Census Bureau 1999 population estimates for these same locations. While the populations of the town of Wiscasset and the two closest population centers have grown modestly, the other larger population centers have not.

Table 8-2 Wiscasset and Other City Population Updates			
Location	1970 Population (Ref.1972 MYER)	1999 Population Est. (US Census Bureau)	Distance from Plant (miles)
Wiscasset	2,250	3,229	-
Bath	9,700	9,829	7
Brunswick	16,200	20,899	14
Augusta	22,000	19,722	27
Lewiston - Auburn	65,900	58,660	29
Portland	65,100	61,925	38
Bangor	33,200	32,662	75

MYER Section 2.2 describes the population density and population totals within a 5 mile radius of the plant and describes the general area. The area surrounding the plant remains rural. It currently has relatively low population density of approximately 90 per square mile within 10 miles of the plant. The population is higher at distances of 30-40 miles (with a slightly lower density in the area between 10 and 20 miles). At 40-50 miles out the population density drops.

The population of the two nearest cities (Lewiston, 36,193 and Auburn, 22,467) are significantly less than the FGEIS model large city population of 64,000 within 29 miles.

The FGEIS evaluation considers the closest large city at about 30 miles away with a population of 1,800,000. There are no large cities (population >1 million) within 100 miles of the Maine Yankee site. The Maine State 2000 population was 1.27 million (1,274,923) and the Boston Metro Statistical Area 1990 census population was 4,171,747.

The FGEIS assumes the total population in a radius of 50 miles at 3.52 million, whereas the total population within 50 miles of MY is approximately 650,000.

This difference between the MY site and the generic site does not affect the conclusions of the environmental statement.

8.4.4 Socioeconomic Data

The number of workers on site at any time is comparable to that when Maine Yankee was in operation, and will be much less than during the initial construction period. It appears that the peak work force on site during final operations was approximately 450 (MY Human Resources Dept.) and during construction was approximately 1300 (1280 - CMP weekly project report week of 6/25/71, a 1338 man peak was estimated in the June 1971 - 1972 Environmental Report (Pg 4-2)).

MY's property taxes from the operation of the plant had a positive impact on the Town of Wiscasset. The reduction in taxes concurrent with the decommissioning of the plant has had a significant impact on the town budget planning based on operating plant tax base, however MY has negotiated a phased reduction of the taxes to minimize the financial impact on the town. Once the site is given unrestricted use release, the property has the potential of being developed as an industrial park which would potentially increase the local tax revenue.

8.4.5 Land Use

MYER Section 2.2 describes the setting of the Maine Yankee site and surrounding environs. The plant area is characterized by home sites, summer home sites, idle farmland, forest, and small commercial establishments. The effects of plant construction and operation are described in Section 5.4 of the MYER.

Since plant construction, the overall character of the area has changed little. While additional private homes have been built near the plant in both Wiscasset and nearby Westport Island, the character of the area remains rural. Considerable commercial development has occurred along the Route 1 corridor located two miles northwest of the site.

As part of a FERC rate case settlement, a 200 acre portion of the plant site will be donated to an as yet unnamed non-profit organization for environmental education purposes. This will continue to provide public access to this parcel which has been allowed during plant operation. Remaining portions of the site will, following license termination, become available for redevelopment.

The small percentage of land used for farming, combined with the low population density, and the commitment to continued application of radiation protection and contamination controls during decommissioning, results in radiological consequences to the public lower than those calculated in the FGEIS.

Decommissioning activities are not expected to have any adverse impact on surrounding land uses both onsite and off.

8.4.6 Surface Water

The surface water regime for the plant site and surrounding areas is described in detail in Section 2.5 of the MYER. Plant operation impacted surface water in two areas. First, fresh water for sanitary uses, plant make-up, and fire protection was piped to the plant from a reservoir located on Montsweag Brook, two miles northwest of the plant. Once through cooling water was provided from the Back River. Potable water for the plant was provided by an onsite bedrock well. Two additional wells supplied water for the Bailey farmhouse and Eaton farmhouse domestic needs.

The maximum water levels at the MY site due to the probable maximum hurricane are predicted to be at elevation 19.9 feet and elevation 21.4 feet on the plant site and screen well structure, respectively. Safety measures were implemented in the design of the plant regarding this design basis flooding. The screen well is protected up to elevation 22 feet 0 inches, while the floor grade of the principal power station structures is elevation 21 feet 0 inches and site grade which varies from elevation 20 to 21 feet should preclude water from entering these areas (UFSAR Section 2.3.3).

Since plant start-up, there have been several changes to surface water use by the plant. In the early 1970's, in coordination with federal and state environmental agencies, several alternatives previously considered in the MYER were implemented to reduce the thermal impacts of the plant on the Back River and Montsweag Bay. Maine Yankee removed the Cowseagan causeway and replaced it with a bridge. This change, discussed in Section 8.4.8 of the MYER, increased the tidal flushing and flow in the Back River. In addition, the west forebay dike was constructed and diffuser piping was installed beneath Foxbird Island that discharged in the Back River channel. These changes helped restore the Back River to its pre-causeway condition and mitigated impacts of the plant's thermal discharge.

In the early 1990's, changes to the federal Safe Drinking Water Act triggered an evaluation of the plant's fresh water supply. The decision was made to connect with the Wiscasset Water District to supply all domestic and drinking water needs for the plant. Use of the bedrock well was then discontinued. Water from Montsweag Brook continued to be used for fire protection and plant make-up through operation. Following permanent plant shut-down, the Montsweag Brook dam and pumphouse are no longer in use. All plant freshwater needs are met by the Wiscasset Water District. The Bailey farmhouse and Eaton farmhouse wells continue in use.

The cooling water system (including the service water system) was originally used for the dissipation of heat and the discharge of domestic wastes and conventional pollutants. Since plant shut-down, the cooling water system has been shut-down. Relatively small volumes of process waste streams continue to be discharged to the forebay in accordance with the National Pollutant Discharge Elimination System (NPDES) permit and Maine Waste Discharge Licenses for the site.

In the mid 1990's, continued problems with the onsite sanitary waste treatment plant resulted in connection of the plant site to the Wiscasset sewer system. At that time, discharge of sanitary wastes from the treatment plant ceased.

Surface water use during decommissioning will be considerably reduced from operational conditions. The demand will primarily be for domestic uses and will certainly be less than during plant operation. Impacts to the Back River from periodic batch discharges of process wastes will be much reduced as compared to plant operation. All discharges will be in compliance with the Offsite Dose Calculation Manual (ODCM), NPDES permit and Maine Waste Discharge License for the site.

8.4.7 Groundwater

Section 2.5 of the MYER states:

“Groundwater in the region occurs as free groundwater within the clay-silt soil mantle and joints in the underlying bedrock.....Precipitation at the power station site will percolate downward to the water table and then move with the normal groundwater flows toward the adjoining salt water areas. Percolation rates however, are low due to the low permeability of the local soils and limited bedrock jointing.... Water wells in areas adjacent to the site are either dug wells, usually less than 25 feet deep, or drilled wells penetrating the bedrock for depths of 100 feet or more. Such wells are for domestic or farm use. Although adequate for the purpose, their yield seldom exceeds 5-10 gallons per minute for short term pumping and even less for sustained pumping. There are no municipal or other important well water supply systems in the area” (1972 Environmental Report 2.5-1)

Section 9 of the MYER states:

“During its operation the Maine Yankee plant will not affect the water it uses so that the water would be unfit for use by others.”

In addition to the pre-operation construction associated with the Bailey Point area, numerous subsurface exploration studies have been conducted over the years of operation at the facility. A description of the site may be found in other Maine Yankee documents including the report, "Summary of Geologic Information Covering the Maine Yankee Nuclear Power Plant Site and Vicinity (RGGI, 1991)."

The groundwater regime at the Maine Yankee facility is comprised of two aquifers: (1) a discontinuous surficial aquifer in the unconsolidated glaciomarine soils and fill material; and (2) a bedrock aquifer. The surficial aquifer is not present continuously across the site, as the overburden soils are thin to non-existent in some portions of the site. This is especially true in the southern portion of Bailey Point. The bedrock aquifer is present below the entire site and vicinity.

To summarize the hydraulic regime at the site, a discussion of a previously developed groundwater flow model is presented below. A three-dimensional groundwater flow and transport model of Bailey Point has been developed (Stratex, 2000e). This model allows an evaluation of flow paths, travel times, and dilution of contaminants from their source locations in the model.

The modeling of the transport of solutes introduced into the groundwater at the Maine Yankee site was developed using the MODFLOW three-dimensional flow model and the MT3D transport model. There has been no attempt to model unsaturated flow and transport. It is expected that unsaturated flow through a 10-foot thick section of soil (the permanent water table is typically about 10 feet down in thick soils at the site) would take on the order of weeks. The model extends from Old Ferry Road to the end of the peninsula to the south. This is a four to five layer bedrock and saturated soil model with varying grid sizes. The southern portion of the model has four bedrock layers and a 20-foot grid square spacing. From the Administration Building north to Old Ferry Road, five layers are included in the model, as saturated soils occur in this portion of the site. The soil thickness in this area can be significant and there is much saturated soil, so the inclusion of the soil, where it occurs, is important. Some of this soil is glaciomarine clay-silt. Where saturated soil occurs, it is modeled as either one or two layers depending on the expected water table position and type and thickness of soil. Cell sizes in the northern area of the model are 50 feet by 50 feet horizontally. The bottom of the model is 700 feet below top of rock. The bedrock is treated anisotropically such that the transmissivity in the north-south direction is 5 times greater than in the east-west direction.

For solute transport problems involving years of application of a solute at a relatively steady rate, the average annual recharge rate is used. For the northern portion of the model, this is 30 percent of average annual precipitation since

most of the area has thick soil cover (which is included in the model). For the southern portion of the model (which is basically a bedrock model), the recharge rate is set at 10 percent of average annual precipitation, with the rest being runoff and evaporation. Depending on the aquifer thickness, porosity and recharge rate, there is a certain amount of time required for a "conservative" solute (one not removed by adsorption, precipitation, radioactive or biological decay, volatilization or otherwise) to reach a steady state distribution in a defined aquifer area. Multiple time plots of concentration were checked to see how close the model is to a steady state condition. For the northern model area, steady state is close after 20 years of simulation; for the southern model area, steady state is reached by 10 years.

The near-surface flow in the saturated soil under the ISFSI area is northwestward, but the head contours suggest the ISFSI area is on a groundwater divide with flow going both northwest and southeast. Travel times from the surface of the ISFSI area to Montsweag Bay discharge points are on the order of 10 years or more because of the relatively thick, low permeability soil under the ISFSI area.

Groundwater originating near the surface in the northern portion of the model area generally moves vertically into the soil except in the wetland areas where groundwater discharge locally occurs. After slow movement through the soil, the groundwater moves into the deeper bedrock and travels toward the bay, discharging upward in the near-shore area. In the southern portion of the model, groundwater originating near ground surface generally stays near the surface, rather than penetrating deep into the bedrock. Movement through the bedrock is expected to be fairly fast because of the low porosity of the rock. Conservative contaminants move through the rock included in the southern model area to shallow discharge areas in a time frame on the order of several hundred days as demonstrated by a 1989 study of a sodium chromate leak in the area south of the Containment Building (Robert G. Gerber, Inc., 1989a).

Measured seasonal changes in groundwater elevations in the area north of Old Ferry Road near in the area of the once-proposed coal ash disposal area. These results demonstrate seasonal changes in the historic on-site wells of two to four feet for most wells, with up to 10 feet north of Old Ferry Road, where topographic relief is greatest.

Groundwater chemistry of the bedrock aquifer is documented by the Maine Department of Human Services (MDHS) well water test results of the plant well, the Eaton Farm well, and the Bailey Farm well for the period 1988-1995. Groundwater quality in the immediate vicinity of the plant structures is summarized in groundwater monitoring studies conducted by Robert G. Gerber, Inc. (1992a).

Groundwater flow and chemistry in the southern portion of the model area are currently influenced by the presence of the Containment foundation drain sump at 47' below mean sea level (MSL) under the reactor and 14 feet below MSL under the remainder of the Containment Building. This has induced a very localized flow toward the Containment Building and induced some seawater intrusion into the sump (up to 10 percent dilute seawater). The granular backfill around buried piping and storm drains also allowed sea water to flow backward from the diffuser forebay into the yard area during times of spring high tides and during plant operation. Previously, during plant operation, the forebay water levels were 5 feet higher than present due to the consistent discharge of 420,000 gallons per minute.

The Maine Yankee plant operated for approximately 26 years (1972-1997). Over that time, minor spills and releases have occurred (primarily petroleum) as well as a few significant releases. These spills and releases are summarized in the MDEP RFA (MDEP 1992) and the Site Historical Report (S&W, 1999c). 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 (Robert G. Gerber, Inc., 1989); (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 (Robert G. Gerber, Inc., 1994d, e). These four releases have been studied and remediated to the satisfaction of MDEP, but additional characterization of these former releases will be conducted as part of the RFI to support risk assessment and final site closure.

In addition to the known spills and releases, the GTS Duratek Characterization Survey Report (GTS Duratek, 1998) has provided additional understanding concerning the distribution of environmental contamination at the Maine Yankee facility. The GTS Duratek study included water, soil, sediment, and groundwater samples from potential areas of concern including historic spills and releases, outfalls, and catch basins. The samples were typically analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and diesel range organics (DRO); however all compounds were not analyzed in each sample.

Groundwater samples were taken as part of the GTS Duratek study from existing monitoring wells located in the southern portion of Bailey Point. This portion of the facility was the locus of the significant industrial activity and the results for VOCs, SVOCs and metals demonstrate that groundwater quality has not been significantly impacted by the long-term industrial activities at the site.

Aside from the localized flow into the Containment Building foundation drain sump, groundwater in the industrial portion of Bailey Point flows in a quasi-radial direction towards Bailey Cove to the west, Back River to the east and the Montsweag Bay to the south. Thus any contaminants dissolved in groundwater will flow into those surface water bodies.

During plant operation, impacts to the groundwater flow regime were limited to localized draw down of the groundwater surface caused by foundation drains around the containment structure and to a lesser extent draw down by active water supply wells. During decommissioning, following decontamination and demolition of the containment structure, groundwater levels will recover to approximate pre-construction levels.

As discussed in Section 2, low levels of tritium have been identified in groundwater around the plant. Dose calculation modeling for the LTP resident farmer scenario addressed in Sections 2 and 6 have included use of this slightly contaminated groundwater for domestic purposes and demonstrated that this level of groundwater contamination would not limit future site use.

8.4.8 Biota

Section 2.7 of the MYER provides an overview of biological resources found at the Maine Yankee site.

The coastline around the site varies between salt marsh and mud flat with some rocky areas where the gradient is steepest. The salt marsh vegetation is dominated by *Spartina patens* and *Spartina alterniflora* which are both obligate wetland species. Where rocky substrate is present, seaweed is also prevalent in the intertidal zone. The mud flats are generally devoid of vegetation with the exception of salt marsh species along the edge. Mud flats are typically found in areas that are slightly sheltered such as small coves. Landward of the salt marsh and mud flat areas, the coast has a steep incline up to the upland areas, which are dominated by trees such as white pine (*Pinus strobus*) and red oak.

“Land animals inhabiting the site include deer, racoons, and smaller mammals. Non-poisonous snakes can be found. ... The bird population varies greatly between seasons and between periods of migration and residency....” (1972 Environmental Report, Pg 2.7-1).

Section 9 of the MYER (pg. 9-1) describes the long-term effects of plant construction, including, among other things, the effect of plant operational heat dissipation on the estuarial system. It states:

“As long as the plant is operated so that the temperature of the discharge is below a damaging temperature for any ecologically important species, there should be no cumulative effect on the river system. If the plant were to be permanently shutdown, repopulation of any disturbed inter-tidal areas by water-borne larva would soon occur.”

Since plant construction, areas of the site disturbed by construction activities have stabilized and revegetated. Mowed areas are dominated by native and exotic grasses and herbaceous species. Unmowed areas have now been colonized by pioneer species such as poplar, white birch and shrubs. Some of these areas will be redisturbed by decommissioning; however, the total area disturbed will be smaller than during plant construction. Mature pines and oaks located along the perimeter shoreline were largely undisturbed by plant construction and operation and those remaining will not be disturbed by decommissioning activities. Following decommissioning, virtually the entire site will be revegetated.

Throughout Maine Yankee’s operating history, onsite sightings of wildlife have been common with red fox, raccoon, white-tailed deer, and other small mammals observed frequently. Protected status and elimination of persistent pesticides from the environment has contributed to a dramatic increase in the population of osprey along the eastern seaboard. Five seasonally active osprey nests are located on plant property in the immediate vicinity of the plant. The osprey are not affected by plant activities and have been observed attempting to build nests on active equipment. Bald eagles are also observed in the plant area but no known nesting sites occur on plant property.

Marine species are discussed in section 2.7 of the MYER. Since plant construction there have been two notable changes in marine biota adjacent to the plant site. First, removal of the Cowseagan causeway significantly improved the circulation of the Back River. As a result, the area has seen an increase in lobster populations and the Back River now supports commercial lobster fishing. Second, management of the striped bass fishery along the eastern seaboard has resulted in a dramatic increase in the numbers of this popular game fish. While commercial fishing for striped bass is not allowed in Maine, recreational fishing is growing in popularity and the Back River is used by recreational fishermen.

Decommissioning of shoreline structures has the potential to have impacts on marine habitats and biota. Impacts may include disturbance of substrate, sedimentation and turbidity. Careful project planning, consultation with regulatory and resources agencies, and permitting requirements will serve to minimize the duration and extent of these impacts. Following disturbances, affected areas are expected to recolonize quickly.

8.4.9 Water Use

Section 2.5 of the MYER states:

“Water wells in areas adjacent to the site are either dug wells, usually less than 25 feet deep, or drilled wells penetrating the bedrock for depths of 100 feet or more. Such wells are for domestic or farm use. Although adequate for the purpose, their yield seldom exceeds 5-10 gallons per minute for short term pumping and even less for sustained pumping. There are no municipal or other important well water supply systems in the area.” (1972 Environmental Report 2.5-1)

Section 8.4.6 outlines the sources of water used at Maine Yankee and describes changes that have occurred since plant start up.

Potable water usage (from the Wiscasset Water district) during decommissioning is summarized in Table 8.3. Based on the average monthly use for the first three years of decommissioning, total water use for decommissioning Maine Yankee is projected at 2.3 million cubic feet (17,385,000 gallons). Additional minor amounts of water from Montsweag Brook were also used early in decommissioning prior to abandonment of that source. The use of water during decommissioning is minor compared to the use of water during operations.

Maine Yankee was connected to the Wiscasset Water District to provide potable water and sewage service to support plant operations in October of 1995. For the last quarter of 1995, Maine Yankee used 73,000 ft³ of water, in 1996 the plant used 235,300 ft³ of water, and for the first seven months of 1997 before cessation of operations, the plant used 211,500 ft³ of water. Before the plant was connected to the Wiscasset Water District, water to support plant operations was obtained from wells on site. Records of water usage from the wells during operations were not maintained.

The FGEIS makes the conclusion that the environmental consequences of decommissioning, including the use of water, are minor compared to the environmental consequences of building and operating the plant. For the generic plant, an operation water usage of 953 million cubic feet of water per year is compared to a total decommissioning usage of 636 thousand cubic feet (4.76 million gallons) of water. While Maine Yankee’s estimated water usage of 17 million gallons is greater than the 4.76 million gallons anticipated based on the FGEIS generic plant, it is much less than the amount used during operation and the amount used by the generic plant in operation. Therefore, the FGEIS conclusion that the environmental consequences of the decommissioning use of

water is minor compared to the environmental consequences of building and operating a nuclear plant is valid for Maine Yankee.

Table 8-3 Maine Yankee Decommissioning Water Use (x 100 ft ³)													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1998	609	1004	483	464	182	426	248	620	236	422	108	88	4890
1999	100	77	100	116	94	252	188	143	194	206	294	121	1885
2000	131	128	320	152	152	215	303	167	897	436	143	142	3186
Annual Average Usage 332,033 ft ³ (2,483,609 gallons)													
Monthly Average Usage 27,700 ft ³ (207,196 gallons)													

The Wiscasset Water District has advised Maine Yankee that continuing to supply this volume of water will not adversely affect the District’s water supply or their ability to provide the required volume to the site.

8.4.10 Effects of Decommissioning

Section 9 of the MYER (pg. 9-1) describes the long-term effects of plant construction, including, among other things, the restoration of the site following permanent shutdown. It states the following:

“If a time were reached when the site was no longer required for electrical production, the plant could be dismantled and completely removed from the site. Grading and landscaping could restore the plant area to natural cover. By using special dismantling procedures all components of the plant could be removed for disposal in approved burial grounds. Since no radioactive material is disposed of on site, this would leave the site radioactivity level at or very close to the background level for the area and suitable for other use.”

Section VIII of the AEC Final Environmental Statement for Maine Yankee describes the decommissioning of Maine Yankee. It states the following:

“Upon termination of use of the power station the Plant can be decommissioned and the site converted to initial uses or used for other industrial and recreational activities. Decommissioning would involve removing and reclaiming fuel, decontaminating and “fixing” accessible surfaces of radioactivity, removal of salvageable equipment, and sealing of the reactor and components. The degree of dismantlement, as with

most abandoned industrial plants, would be contingent on a balance of health and safety considerations, salvage values, and environmental impact as judged by the knowledge and technology developed in future years.”

The dismantlement plan described in LTP Section 3, details the dismantlement of the plant systems and structures. These details compare well with the original decommissioning vision described above in the MYER and the AEC Final Environmental Statement. Radioactive material will be cleaned up to meet the radiological criteria of 10 CFR Part 20, Subpart E and the enhanced state cleanup standards. Maine Yankee is proposing to release the site for unrestricted use.

8.4.11 Historical and Archeological Resources

Section 2.3 of the MYER provides an overview of the historical resources in the plant vicinity. The MYER does not discuss archaeological resources.

Through consultation with the Maine State Historic Preservation Office (SHPO) in 1991, two minor archaeological sites (16.212 & 16.213) were identified on Maine Yankee property within several hundred yards of the plant. Both sites are located immediately adjacent to the shoreline in areas that were undisturbed during plant construction. The SHPO has been contacted in conjunction with decommissioning and has not identified any additional cultural sites on Maine Yankee property.

Because of their locations, the two known archaeological sites will not be disturbed or impacted during decommissioning.

8.4.12 Endangered or Threatened Species

Section 2.7 of the MYER discusses plant and animal life at the Maine Yankee site. At that time there were no identified endangered species as the Endangered Species Act (ESA) was passed in 1973.

In permitting structures constructed after plant start up through the Maine Site Location of Development Permit process, Maine Yankee has consulted with federal and state resource agencies to identify rare and endangered species. These agencies have also been consulted in conjunction with decommissioning.

The U.S. Fish and Wildlife Service (USF&WS) has identified only two federally listed species under their jurisdiction. The bald eagle (*Haliaeetus leucocephalus*) and peregrine falcon (*Falco peregrinus*) are both identified as transient species.

“Accordingly, no further action is required under Section 7 of the ESA, unless: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this review; or (3) a new species is listed or critical habitat determined that may be affected by the identified action” (USF&WS, 1999).

The National Marine Fisheries Service (NMFS) identified the shortnose sturgeon as known to occur in the Back River and Montsweag Bay, especially during the summer months. Insufficient details on decommissioning activities were available at the time of consultation to allow the NMFS to assess the likely impacts to this species (NMFS, 2000). Subsequent to receipt of the NMFS letter, the Atlantic salmon (*Salmo salar*) was listed as endangered species (Federal Register 11/17/00).

Decommissioning of shoreline structures has the potential to have impacts on marine habitats and biota. Impacts may include disturbance of substrate, sedimentation and turbidity. Careful project planning, consultation with regulatory and resources agencies, and permitting requirements will serve to minimize the duration and extent of these impacts. No adverse impacts on rare and endangered species are expected.

8.4.13 Environmental Effects of Accidents and Decommissioning Events

The MYER considered the radiological impacts on the environment of various classes of accidents. These classes ranged from Class 2 events to Class 8. The events discussed are listed in Table 8-4 below:

Table 8-4 Environmental Impacts of Accident Classes		
Event Classification	Classification Description	Event Description
2	Small Releases Outside Containment	a. Leakage from Valves and Mechanical Seals
		b. Cracked Pipe in Chemical Volume Control System
3	RadWaste System Failures	a. Gaseous Radwaste
		b. Liquid Radwaste
4	Events that Release Radioactivity Into the Primary System	Not Applicable

Table 8-4 Environmental Impacts of Accident Classes		
Event Classification	Classification Description	Event Description
5	Radioactivity Release Into Secondary System	a. Steam Generator Tube Leakage
		b. Steam Generator Tube Rupture
6	Refueling Accidents Inside Containment	a. Fuel Assembly Drop
7	Fuel Handling Accidents Outside Containment	a. Cask Drop
		b. Fuel Assembly Drop
8	Accidents Initiated by Events Considered in the FSAR	a. Main Steam Line Break
		b. Control Element Assembly Ejection
		c. Loss of Coolant Accident

On August 7, 1997, Maine Yankee submitted its certification of permanent cessation of operation and permanent fuel removal from the reactor in accordance with 10 CFR 50.82(a)(1). Within months afterward, most systems had been drained and placed in “abandoned status.” In this state several of the above event classifications no longer apply. These include Classes 2, 5, 6 and 8. Class 2 events involved the leakage or flow of reactor coolant from the Chemical Volume and Control System. This system no longer contains or is connected to any system that contains reactor coolant. Class 5 events primarily involve a compromise of the steam generators as the primary interface between the primary side of the plant (reactor coolant system) and the secondary side (main feed/steam system). These systems that make up this interface including the steam generators themselves are abandoned and in many cases have been removed from the site for disposal. Class 6 events involve reactor fuel inside containment. Ever since Maine Yankee submitted its 10 CFR 50.82(a)(1) certifications, there has not been nor will there be fuel in the containment. Class 8 events involve operation of the reactor. Maine Yankee’s 10 CFR 50.82(a)(1) certification effectively precludes operation of the reactor.

There is still a potential for Class 3 and 7 events during decommissioning activities. Class 3 events include radioactive liquid waste system leaks and failure and the Low Level Waste Storage Building (LLWSB) Accident . The LLWSB accident involves the dropping of a highly loaded spent resin liner within the LLWSB, resulting in the liner failure, spillage of the spent resin and the release of a fraction of the radioisotopic contents in a cloud. This is the

bounding accident for decommissioning. Class 7 events include fuel (drop) handling accidents, fuel criticality events (e.g., misplaced fuel assembly) and spent fuel cask drop events. This event classification will become inapplicable when the last fuel assemblies are loaded into dry casks and stored at the ISFSI. The accident analysis for these events is presented in Section 5.0 of the DSAR. The offsite dose consequences of the bounding event are less than the consequences described in the EPA Protective Action Guide (PAG).

In preparation for the implementation of decommissioning activities, Maine Yankee considered the decommissioning events described in the FGEIS. These events included: (1) explosion of liquid petroleum gas (LPG) leaked from a front end loader or forklift; (2) explosion of oxyacetylene during segmentation of the reactor vessel shell; (3) release of radioactivity from the reactor coolant system decontamination ion exchange resins; (4) gross leak during in-situ decontamination; (5) segmentation of reactor coolant system piping with unremoved contamination; (6) fire involving contaminated clothing or combustible waste; (7) loss of local airborne contamination control during blasting or jackhammer operations; (8) temporary loss of services such as water, electric power or airflow; (9) dropping of contaminated concrete rubble; (10) natural phenomena; and (11) transportation accidents. These events are discussed in Section 7 of the DSAR. It is concluded in the DSAR that the spent resin cask drop accident in the LLWSB is expected to contain more potential airborne activity than can be released from other decommissioning accidents. The DSAR also states that administrative controls will be established to ensure that the calculated offsite doses from decommissioning events do not exceed those determined for the spent resin cask drop accident.

8.5 Radiological Environmental Impacts

8.5.1 Radiological Criteria for License Termination

Maine Yankee will comply with the enhanced state cleanup standards contained in Maine State Law LD 38MSRA§1455. These standards specify a residual dose limit of 10 mrem/yr total with a groundwater contribution not to exceed 4 mrem/yr. These requirements are less than 40 % of the NRC's 25 mrem/yr all pathway exposure limit.

8.5.2 Decommissioning versus Plant Operation

The radiological effluent releases and direct exposures to the hypothetical maximally-exposed individual from decommissioning activities are expected to be comparable to or below those experienced by the maximally-exposed individual during operations. Table 8-5 provides a comparison of the maximum annual total body dose commitments reported in Annual Dose Reports during

the operational period (1995 and 1996) versus the decommissioning period (Post 1996). The table is divided into three pathway categories Direct External, Liquid and Gases.

Table 8-5					
Maximum Annual Total Body Dose Commitment (mrem)					
	Operational Period		Decommissioning Period		
Pathway	1995	1996	1997	1998	1999
Direct External	3.5	1.5	0.84	1.3	1.5
Liquid	0.021	0.002	0.0056	0.012	0.0015
Gaseous	0.0034	0.000013	0.000086	0.00012	0.0053
Total	3.5	1.5	0.85	1.3	1.5

Other radiological impacts of decommissioning Maine Yankee are discussed in Sections 8.3, 8.4 and 8.7.

8.6 Non-Radiological Environmental Impacts

8.6.1 Overview of Other Regulators Covering Site Release

In addition to involvement by the NRC, the decommissioning of Maine Yankee involves coordination with a number of federal, state and local agencies as well as several advisory groups. Sections 3.6.1 and 3.6.2 discuss the primary functions, programs, and regulatory authority of these agencies and advisory groups.

8.6.2 RCRA Closure Process

Resource Conservation and Recovery Act (RCRA) - RCRA as applied to Maine Yankee decommissioning pertains to the “closure” of the site with respect to chemical contamination. RCRA closure is required for the Maine Yankee site because Maine Yankee was a large quantity generator of hazardous waste, has documented historical spills and because Maine Yankee temporarily held a RCRA Part A interim license in the early 1980s with final closure deferred until decommissioning. The RCRA closure is being administered by MDEP with technical support being provided by EPA.

The closure process involves a rigorous examination of site history, investigation (including sampling) of the site, evaluation of analytical results against regulatory standards, and possibly remediation if determined necessary to protect

human health and the environment. The closure process includes ample opportunity for public input; for example, the public information meeting held June 12, 2000 and the internet web site (www.janus.state.me.us/dep/rwm/myankee/homepage.shtm) maintained by MDEP. Additional public information meetings will be held throughout the closure process.

In 1998 GTS Duratek, Inc. conducted a preliminary radiological and chemical characterization of the site to determine the nature and extent of contamination (if any) for use by potential bidding on the decommissioning project. A multi-volume report was produced, and is available for viewing at the Wiscasset Public and Maine State Libraries.

Subsequent to the Duratek report and in response to MDEP's questions, a Site History Report (SHR) was written by Stone & Webster, an engineering firm then under contract to Maine Yankee, to serve as a basis for the closure plan that Maine Yankee, as a generator of hazardous waste, will prepare to meet the requirements of the Standards for Generators of Hazardous Waste [06-096-CMR 851(11)]. The report did not address all closure issues, since it did not deal with the characterization of the waste generated by the demolition of buildings and any soil underneath or adjacent to those buildings. To address potential releases to the environment from the buildings, a visual site assessment was performed in November 2000. The SHR and visual site assessment were used to prepare RCRA Facility Investigation (RFI) documents submitted to the MDEP for review and approval in February, 2001. These documents, along with the Stone & Webster report, are available for viewing at the MDEP office in Augusta.

The SHR provided the MDEP with a detailed summary of past or present known hazardous material releases or spills of any significance, Maine Yankee's response to those releases, and the current status of any impacted areas of the facility. Additional spills and releases that were not required to be reported to MDEP or the U.S. Coast Guard were identified by a review of other available records, including operating logs dating back to the beginning of operations at the facility, site inspections, and interviews of past and present employees, and are also addressed.

The RFI documents submitted by Maine Yankee to MDEP in February, 2001 define the extent of additional investigations required to adequately characterize the potential chemical contamination at the site. The documents include development of a three dimensional groundwater model used to assess fate and transport of contaminants and an Ecological Risk Assessment Plan. Proposed sampling activities were outlined in the draft Quality Assurance Project Plan (QAPP) that will adhere to EPA guidelines to ensure that data quality objectives

(DQOs) are met for the project. The final QAPP will incorporate regulatory and public comments. Public comments were solicited at a public meeting held on May 23, 2001. Following the field investigation program, sampling results will be evaluated against project specific cleanup standards to determine what if any additional actions may be required to protect public health and the environment.

8.6.3 Site Location of Development Act Termination or Transfer

Site Location of Development Law (Site Law) - The Site Law and its implementing regulations provide for a comprehensive evaluation of environmental and social impacts of development projects to ensure there are no unreasonable adverse impacts. The Site Law addresses stormwater management, groundwater impacts, solid waste disposal, erosion and sedimentation control, noise (specific standards), air emissions including odors, visual impacts, archaeological and historical resources, wildlife and fisheries, unusual natural areas, financial capacity, traffic, soil suitability (bearing capacity, seismic, erodability, etc.), water supply and waste water disposal.

The Maine Yankee site was permitted under the Site Law in 1992 and all subsequent new construction has been reviewed by MDEP. As part of their review, MDEP consults with other agencies including the State Historic Preservation Office (SHPO), IF&W, critical areas program and others as needed. Two archaeological sites have been identified on Maine Yankee property. Neither site has been impacted by plant construction or operation. Decommissioning activities will also not affect these two sites. The specific location of archaeological sites is not provided to ensure their integrity is protected.

MDEP has reviewed and approved a number of projects related to decommissioning under the Site Law including barge slip improvements, installation of a truck monitor for screening waste materials for radiological materials, construction of the ISFSI, air cooling system for the spent fuel pool and initial demolition projects. The MDEP has determined that remaining waste disposal aspects of demolition of the Maine Yankee site does not require review under the Site Law. These decommissioning activities while temporarily disruptive, will ultimately result in a net decrease in environmental affects. Areas undisturbed by plant construction or operation will continue to be undisturbed as part of decommissioning.

8.6.4 Natural Resources Protection Act (NRPA)

The NRPA requires a permit for certain activities located in, on, over a protected natural resource (includes wetlands) or adjacent to freshwater or coastal wetlands. Topics of NRPA review include impacts to significant wildlife habitat (habitat for state and federal listed rare and endangered species, deer wintering areas,

waterfowl and wading bird habitats, including feeding and nesting areas, and critical spawning and nursery areas for Atlantic sea run salmon, shorebird nesting, feeding and staging areas and nesting islands), erosion and sedimentation control, protection of water supplies, scenic, aesthetic recreational or navigational uses, water flow, flooding and water quality.

MDEP has reviewed and approved a number of projects related to decommissioning under the NRPA including barge slip improvements, construction of the ISFSI and initial demolition projects. Project review under the NRPA includes coordination with other agencies by MDEP including as appropriate, DMR, US Army Corps of Engineers and IF&W. Demolition of several additional structures during decommissioning (such as the circulating water pumphouse and forebay) and final site restoration will require approval by MDEP under the NRPA. Under NRPA, MDEP coordinates interactions with state agencies and the US Army Corps of Engineers. The U.S. Department of the Interior, Fish & Wildlife Service was contacted regarding the presence of rare and endangered species at the Maine Yankee site. Other than occasional transient bald eagles and peregrine falcons, there are no known rare and endangered species present at the site (Letter dated July 21, 1999, K. Tripp to D. Asherman). The federally listed shortnose sturgeon is known to occur in the Back River and Montsweag Bay adjacent to the site.

8.6.5 Solid Waste

Solid waste storage, handling and disposal are regulated by MDEP (38 M.R.S.A. §§ 1301 - 1316-M and associated regulations). As part of decommissioning activities, Maine Yankee has permitted two areas for the temporary storage of cured concrete rubble (CCR) that MDEP is regulating as special waste. Special Waste is a discretionary classification that MDEP applies to waste streams that may warrant special handling, transportation and disposal procedures to be protective of public health, human safety or the environment. MDEP has classified CCR at Maine Yankee as special waste because of the large volume of material that will be generated during decommissioning activities.

As part of their oversight, MDEP has reviewed and approved Maine Yankee's Waste Management Plan (WMP) and associated sampling and verification procedures. Revisions to the WMP and procedures also require MDEP approval. The WMP and procedures also address handling and disposition of painted concrete, recyclable materials (wood and metals) and other categories of solid waste that will be generated in relatively small volumes during decommissioning. The WMP includes by reference Maine Yankee's procedures for controlling radiological materials, specifically provision for the release of materials from the site.

8.6.6 Hazardous Waste and Hazardous Matter Control

Hazardous waste storage, handling and disposal are regulated by MDEP (38 M.R.S.A. §§ 1317 - 1319-Y, §§ 1401 - 1404, §§ 1601 - 1608, and §§ 1651 - 1654 and associated regulations). Included within the hazardous waste regulations is the control of mixed waste (i.e., waste that is both hazardous and radiological). In addition to MDEP, EPA also regulates PCBs under the Toxic Substances Control Act (TSCA).

As with solid waste, hazardous waste handling, storage and disposition are controlled through Maine Yankee's MDEP-approved WMP and associated procedures. The WMP and procedures address mixed waste, PCBs, lead, asbestos, mercury, and other listed and characteristic hazardous wastes. PCBs at concentrations greater than the 50 parts per million (ppm) standard have been identified at Maine Yankee in paint on some steel and concrete surfaces and in the sheathing of some electrical cables. PCBs in these areas meet the definition of Bulk Product Waste under TSCA, which allows them to be handled and disposed of at many landfills. In Maine, PCB-containing materials (>50ppm) are classified as a hazardous waste and must therefore be handled, transported and disposed of accordingly.

8.6.7 Waste Water Discharges

Maine Yankee waste discharges are currently regulated by MDEP. MDEP assumed responsibility for administering the National Pollutant Discharge Elimination System (NPDES) program. MDEP also administers the State Waste Discharge License Program which mirrors the federal program. On April 13, 2001, MDEP issued waste discharge license renewal #ME0002569 and #W000746-SR-D-R. Discharges that have occurred during decommissioning have included drain down and flushing of various tanks, systems and components with cognizance of MDEP and EPA staff. Anticipated future decommissioning discharges include disposal of sump water, draining of the reactor cavity and ultimately, draining of the spent fuel pool.

8.6.8 Storm Water Management

Storm water management at Maine Yankee has historically been addressed as part of the facility's NPDES permit. The NPDES permit requires Maine Yankee to have a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP is incorporated into Maine Yankee's Integrated Spill Plan. As part of the transition from an operating plant to a decommissioning plant, Maine Yankee has filed a Notice of Intent for coverage under EPA's NPDES Storm Water Construction Permit (Permit MER10A416). As such, Maine Yankee has prepared a Pollution Prevention Plan for the decommissioning construction activities. The Pollution

Prevention Plan utilizes Best Management Practices as outlined in the “Storm Water Management For Maine: Best Management Practices” (1995) and “Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices” (1991). MDEP regulates storm water as part of their review of projects under various laws and regulations including Site Law, solid waste regulations and hazardous waste regulations.

8.6.9 Air Emissions

Air emissions from Maine Yankee are regulated by MDEP (License A-82-71-I-R). Stationary sources at Maine Yankee are currently limited to two emergency diesel powered units that provide backup power for the spent fuel pool cooling system and security and for a back up fire pump. Fugitive emissions are addressed in the license which requires a fugitive emissions plan which Maine Yankee maintains and follows. Air emissions are also addressed as part of MDEP review of projects under various laws and regulations including Site Law, solid waste regulations and hazardous waste regulations

8.6.10 Floral and Faunal Impacts

As part of their review of projects under Site Law, solid waste and hazardous waste and NRPA, MDEP consults with other agencies including IF&W, critical areas program and others as needed. Through this process, no unusual natural areas or critical habitat or rare or endangered plant species have been identified on the Maine Yankee site. Other than occasional transient bald eagles and peregrine falcons, there are no known rare and endangered species present at the site (Letter dated July 21, 1999, K. Tripp to D. Asherman). The federally-listed shortnose sturgeon is known to occur in the Back River and Montsweag Bay adjacent to the site. There will be no additional areas disturbed during decommissioning beyond those affected by plant construction or operation.

8.6.11 Confirmatory Surveys

In addition to the confirmatory surveys which may be conducted by the NRC, state law requires Maine Yankee to permit monitoring by the Maine State Nuclear Safety Inspectors (22 MRSA 664, sub-§2, as amended by PL 1999, c. 739, §1 and 38 MRSA 1451, sub-§11, as amended by PL 1999, c. 741, §1) This monitoring includes, among other things, taking radiological measurements for the purpose of verifying compliance with applicable state laws and confirming and verifying compliance with NRC standards for unrestricted license termination.

8.6.12 Cumulative Risk

State of Maine Law (L.D. 2496 Sec.3.38 MRSA 1455) indicates that the MDEP shall evaluate the cumulative risk posed by radiological and chemical contaminants that will remain at the site at which the decommissioning of a nuclear power plant is occurring or has been completed. An MDEP letter (dated February 22, 2001) proposed that Maine Yankee prepare the cumulative risk assessment. In response, by letter dated February 26, 2001, Maine Yankee confirmed its agreement to prepare the subject assessment with the understanding that MDEP will review and evaluate the assessment in accordance with the above cited law.

8.6.13 Possibility of Institutional Controls for Non-Radiological Impacts

After being released for unrestricted use, the area previously known as the Restricted Area may be fenced, and the land deeded with restrictive covenants against specific activities such as excavating basements or drilling wells for drinking or irrigation water. Institutional Controls will be implemented as necessary governing intended site use.

8.7 Evaluation of Decommissioning Low-Level Radioactive Waste (LLRW) Volume

The most significant change to Maine Yankee's plans for decommissioning since the submittal of the PSDAR is the increase in volume of low level radioactive waste estimated to be generated. The PSDAR estimated that the LLRW volume would be 209,000 cubic feet (5,920 cubic meters). The current estimate of LLRW volume to be transported from Maine Yankee is 1,127,320 cubic feet (31,924 cubic meters). The LLRW volume estimated for final burial in a radioactive waste facility is less because of volume reduction. The increase in volume over that originally estimated in the PSDAR is a result Maine Yankee's decision, made in concert with Federal, State and Local stakeholders, to demolish all buildings to an elevation equivalent to three feet below grade and dispose of the demolition debris from the radiologically controlled (restricted) area at a low level radioactive waste disposal facility or other appropriate disposal facility. Another change which has influenced this volume is the enhanced state cleanup standards that establish more restrictive exposure levels than the NRC regulation codified in 10 CFR Part 20, Subpart E.

8.7.1 Estimate of Maine Yankee LLRW Volume

LTP Section 3, Table 3-9 identifies the transportation mode and volume as well as the disposal method and volume for the items to be disposed of as LLRW.

The transportation modes identified by Table 3-9 include barge, rail and truck. Large components such as the reactor vessel, pressurizer and the three steam generators are shipped by barge. The total barge transportation volume for these components is 31,700 cubic feet. Transportation by truck is projected for items such as non-GTCC packaged hardware and cutting grit associated with the reactor pressure vessel internals, dry active waste (DAW), resin containing transportation packages and the reactor pressure vessel head. The total truck transportation volume is 170,000 cubic feet. Rail transportation will transport the majority of the volume of LLRW for Maine Yankee's decommissioning. The items transported by rail include reactor coolant pump motors, contaminated soil and contaminated concrete. The total rail transportation volume is 925,000 cubic feet. The total LLRW transportation volume for all modes of transportation is 1,127,320 cubic feet (31,924 cubic meters).

The LLRW disposal modes identified in Table 3-9 include direct disposal and disposal after volume reduction processing. Items processed for volume reduction include the three steam generators, the pressurizer, other contaminated metal and dry active waste. This volume reduction process reduces the total volume of low level waste from these items from 185,470 cubic feet to 8,700 cubic feet. This represents a volume reduction ratio of about twenty-one to one. The remaining LLRW items are designated for direct disposal. Therefore, their transportation volume is the same as their disposal volume. The majority of the LLRW volume (941,850 cubic feet) designated for direct disposal consists of contaminated concrete (900,000 cubic feet), contaminated soil (25,000 cubic feet) and the reactor pressure vessel (9,500 cubic feet). The total LLRW disposal volume designated for disposal either directly or after processing is 950,550 cubic feet (26,920 cubic meters).

8.7.2 FGEIS LLRW Volume Basis

The FGEIS on Decommissioning Nuclear Facilities, NUREG-0586, dated November 1988, evaluated the decommissioning of a generic "reference" Pressurized Water Reactor. The FGEIS concluded that decommissioning has many positive environmental impacts such as the return of possibly valuable land to the public domain and the elimination of potential problems associated with radioactively contaminated facilities with minimal use of resources. Adverse impacts identified by the FGEIS include routine occupational radiation doses and the commitment of nominally small amounts of land to radioactive waste disposal. Other impacts, including public radiation doses, are minor.

The FGEIS evaluates the generation of LLRW from decommissioning in the context of its impact on the commitment of radioactive waste disposal space and the dose to the public. The commitment of radioactive waste disposal space is related to the volume of LLRW for disposal. The dose to the public is related to the volume of LLRW being transported. The estimated LLRW volume used in the FGEIS for the reference PWR was the same for disposal and transportation. This volume totaled: 18,340 cubic meters (647,600 cubic feet). This volume was estimated based upon a radiological criteria of 25 mrem/yr and an assumption that buildings would be remediated and left standing.

The dose to the public from LLRW transportation was calculated by determining the number of truck shipments that would be required to transport 647,600 cubic feet of low-level waste. The number of shipments was calculated to be about 1,363. The dose to the public was based upon an external package dose rate of 10 mrem/hr at 2 meters away from the package. The dose to the public totaled about 0.015 man-rem per shipment. This resulted in a total dose to the public from transportation of the entire decommissioning LLRW volume of 20.6 man rem.

The commitment of LLRW disposal space for a volume of 647,600 cubic feet was estimated to be less than 2 acres, assuming shallow-land burial of radioactive wastes in standard trenches. The FGEIS concluded that two acres of radioactive waste disposal space is small in comparison to the acreage freed up by decommissioning the reference plant (1,160 acres). The FGEIS also concluded that while decommissioning will generate an appreciable fraction of the LLRW generated by a PWR over its lifetime, the quantity of waste from all operating reactors will considerably exceed that generated from those facilities being decommissioned. Hence, any problems in waste disposal capacity will be the result primarily of operating nuclear plants rather than those being decommissioned. Therefore, the FGEIS recommends that before choosing a decommissioning option, e.g., DECON or SAFESTOR, the licensee should assess current waste disposal conditions and their impact on decommissioning.

8.7.3 Impact of Maine Yankee's LLRW Volume

As described above in Section 8.7.1, Maine Yankee's decommissioning LLRW volume for transportation has been estimated at 1,127,320 cubic feet (31,924 cubic meters) and for disposal at 950,550 cubic feet (26,920 cubic meters). These volumes are greater than the volume estimated for the FGEIS reference plant at 647,600 cubic feet (18,340 cubic meters) by 74 % for transportation and 47 % for disposal.

In order to understand the impact of the increase in LLRW volume, Maine Yankee evaluated the expected dose to public from the transportation and the commitment of radioactive waste disposal space. The increased commitment of LLRW disposal space for the increased LLRW from the Maine Yankee decommissioning was determined by simply multiplying the NUREG 0586 value of 2 acres by 47% resulting in 0.94 acres. Thus, it is estimated that the commitment of LLRW waste facility space is 2.9 acres. This space is small in comparison to the acreage freed up by decommissioning Maine Yankee, 840 acres. Therefore, Maine Yankee's decommissioning LLRW volume is consistent with the conclusions of the FGEIS.

In addition, Maine Yankee considered the availability of LLRW disposal space in choosing its decommissioning option (DECON), as described above in Section 8.3.1, consistent with the recommendation of the FGEIS. Furthermore, the potential impact on LLRW disposal space has been diminished by MY's efficient planning and utilization of volume reduction techniques wherever possible. Disposal space availability for Maine Yankee has increased significantly with the establishment of contracts with Envirocare Waste Disposal Facility in Clive, Utah, and the volume reduction being realized through use of the many services offered by GTS Duratek Facilities in Tennessee.

The expected dose to the public from transportation of Maine Yankee's decommissioning LLRW was determined by examining the different modes of transportation planned for different sources of waste. It was estimated that the volume of concrete would fill 2,167 containers (20 cubic yard roll-offs) assuming a 30% volume swell upon demolition, rubbleization and packaging. This quantity results in about 181 rail shipments assuming two intermodal rail cars per shipment loaded with 6 roll-off containers each. The remaining LLRW volume is conservatively estimated to require 364 truck shipments. This is conservative because some of this volume is transported by barge and by rail, as indicated above in Section 3.5, which imparts less dose to the public.

The dose to the public for each of these transportation modes is divided, consistent with the FGEIS, into two categories: on-lookers and the general public. On-lookers are assumed to constitute 10 persons who are exposed for 3 minutes each at close proximity per shipment. The FGEIS assumes this close proximity is two meters at an exposure rate of 10 mrem/hr. The dose to the general public is a function of the number of shipments and the traveling distance for each shipment. The FGEIS assumes 1363 shipments at a distance of 500 miles.

In order to calculate dose to the onlookers, for intermodal rail, Maine Yankee assumes the same close proximity of two meters at an exposure rate of 10 mrem/hr. For 10 persons (onlookers) exposed for 3 minutes at this exposure

rate the dose is calculated to be 5 mrem per shipment. Therefore, the dose estimated to onlookers, for 181 rail shipments of Maine Yankee decommissioning LLRW waste is 0.91 man-rem. The dose to the general public from rail shipments of Maine Yankee decommissioning LLRW waste was calculated using WASH-1238, "Environmental Safety of Transportation of Radioactive Materials to and from Nuclear Power Plants" dated 1972. Assuming the dose rates for Maine Yankee rail packages, which are about one third of the FGEIS assumed dose rates, the resulting dose to the general public was estimated to be about $6.0 \text{ E-}6$ man-rem per mile. Even though the actual distance for rail shipments is about 2400 miles, the distance was conservatively assumed to be about 3000 miles. This results in a dose to the general public of $1.8 \text{ E-}2$ man-rem per shipment. For 181 shipments, the dose to the general public totals 0.098 man-rem. Therefore, the total dose to the public from rail shipments of Maine Yankee LLRW is estimated to be 3.26 man-rem.

For the 364 truck shipments, Maine Yankee calculated the total number of shipments multiplied by the distance to be traveled by the trucks, 1200 miles. The total miles for all truck shipments of Maine Yankee decommissioning LLRW is 436,800 miles versus the FGEIS total of 681,500 miles. In order to calculate the dose to the public from both onlookers and the general public, the FGEIS dose of 20.6 man-rem was multiplied by the ratio of total truck shipment distance for Maine Yankee to that in the FGEIS. The resulting dose to the public for the truck shipments of Maine Yankee decommissioning LLRW is about 13.4 man-rem.

Therefore the total dose to the public from the transportation of LLRW associated with the decommissioning of Maine Yankee is about 17.6 man rem. This dose impact is less than the impact estimated for the reference plant in the FGEIS (21 man-rem) and is primarily attributed to the choice of rail shipment to a radioactive waste storage facility rather than truck shipments. Thus, the environmental impacts of the volume of low level waste to be generated from the decommissioning of Maine Yankee are bounded by the impacts of the reference plant evaluated in the FGEIS.

8.8 Summary

This supplement to the MYER describes any new information or significant environmental change associated with decommissioning and license termination. The original environmental report for Maine Yankee demonstrated that the construction and operation of the Maine Yankee plant would result in no unacceptable effects on the environment. The change in environmental impact due to decommissioning Maine Yankee is generally favorable; no significant environmental changes have been identified. In most cases decommissioning eliminates or further reduces the already small environmental effects that have

been associated with operation of the facility. There are certain environmental effects which will be increased due to decommissioning activities. These include the occupational radiation necessary for decommissioning activities, the radiation exposure to the public associated with transportation of low-level radioactive waste, and the commitment of small amounts of land at the burial site for disposal of this low-level radioactive waste. However, these estimated effects for Maine Yankee's decommissioning/license termination activities as within the basis and intents of the effects previously evaluated by the NRC on a generic basis. Also, the consequences of postulated accidents and events which could occur during decommissioning would have no significant adverse environmental effects. Therefore, the proposed decommissioning of the Maine Yankee facility will have no unacceptable impacts on the environment.

8.9 References

- 8.9.1 Maine Yankee Environmental Report, October, 1970
- 8.9.2 Supplement One to Maine Yankee Environmental Report, April 19, 1972
- 8.9.3 Final Environmental Statement Related to Operation of the Maine Yankee Atomic Power Station, July 1972
- 8.9.4 Post Shutdown Decommissioning Activities Report, August 27, 1997
- 8.9.5 NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities"
- 8.9.6 NRC Regulatory Guide 1.179, "Standard Format and Content of License Termination Plans for Nuclear Power Reactors"
- 8.9.7 NUREG-1700, "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans"
- 8.9.8 NUREG-1727, "NMSS Decommissioning Standard Review Plan"
- 8.9.9 Defueled Safety Analysis Report
- 8.9.10 NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination"
- 8.9.11 NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual" [MARSSIM]

- 8.9.12 “Summary of Geologic Information Covering the Maine Yankee Nuclear Power Plant Site and Vicinity”, 1991
- 8.9.13 Site History Report, 1999
- 8.9.14 WASH-1238, “Environmental Safety of Transportation of Radioactive Materials to and from Nuclear Power Plants”
- 8.9.15 “Quality Assurance Project Plan for Maine Yankee Decommissioning Project”, February 2001