ENCLOSURE 2 TO OMY-15-001

REVISION 27 TO MAINE YANKEE DEFUELED SAFETY ANALYSIS REPORT

Maine Yankee Atomic Power Company

Defueled Safety Analysis Report
(FSAR)

For

Maine Yankee ISFSI

Revision 27

Effective Date: December 09, 2014

MYAPC

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SECTION 1.0
INTRODUCTION AND SUMMARY

1.1 Introduction

The Maine Yankee nuclear electrical generation plant was located in the Town of Wiscasset, within the midcoast region of the state of Maine, approximately 27 miles northeast from the city of Portland. The plant, a pressurized light water moderated nuclear reactor, was owned by a consortium of 11 New England electric utilities representing consumers in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. During the 24 year operating lifetime of the Maine Yankee plant, more than 125 million megawatt-hours of electrical power were generated and distributed to these consumers.

The Defueled Safety Analysis Report (DSAR) was developed as the principal licensing source document describing the pertinent equipment, structures, systems, operational constraints and practices, accident analyses, and decommissioning activities associated with the defueled condition of the Maine Yankee plant. As such, the DSAR was intended to serve in the same role as the Final Safety Analysis Report of Maine Yankee during the periods of power operation between 1972 and 1997. The DSAR was applicable throughout the decommissioning of Maine Yankee.

The predecessor to the DSAR, the Final Safety Analysis Report (FSAR), was developed to apply for a license under Section 104(b) of the Atomic Energy Act of 1954, as amended, and the regulations of the Atomic Energy Commission (AEC) as set forth in Title 10 of the Code of Federal Regulations (CFR), to construct and operate the Maine Yankee nuclear electrical generation plant. The application for this license was submitted by the Maine Yankee Atomic Power Company (MYAPC) in 1967.

The construction permit was issued on October 21, 1968. The Operating License (OL) was issued on September 15, 1972. This OL authorized power operation of the facility until October 21, 2008. Additionally, the OL authorized power levels up to 75% rated thermal power. Commercial operation of the plant commenced on December 28, 1972. The AEC granted a license to operate the facility at 100% rated thermal and authorized power levels up to and including 2440 megawatts thermal (MWt) in June, 1973.

Various amendments to the operating license were subsequently issued and, for a period, authorized the power station to operate at power levels up to and including 2,700 MWt. This power level corresponds to a nuclear steam supply system (NSSS) output of 2,715 MWt and a gross electrical output of approximately 931 MWe. On January 3, 1996, the successor to the AEC, the Nuclear Regulatory Commission (NRC), restricted power operation at the Maine Yankee plant to 2440 MWt (90% of the currently rated licensed power) pending reviews and assessments regarding use of Small Break Loss of Coolant Accident analysis methods utilizing the computer code RELAP5YA.

Maine Yankee ceased power production on December 6, 1996 to address cable separation and other issues. By June 20, 1997, the reactor had been completely defueled and all spent fuel was resident in the spent fuel pool. On August 6, 1997, the Maine Yankee Atomic Power Company Board of Directors voted to permanently cease power operations and initiate the decommissioning process. On August 7, 1997, Maine Yankee provided written certification to the Nuclear Regulatory Commission, pursuant to 10 CFR 50.82 (a)(1)(I) and(ii), that the Maine Yankee Atomic Power Company permanently ceased operations of the Maine Yankee Atomic Power Station and that all nuclear fuel had been permanently removed from the reactor.

The issuance of this certification fundamentally changed the licensing basis of the Maine Yankee plant in that the NRC-issued 10 CFR 50 license no longer authorized operation of the reactor or emplacement or retention of fuel in the reactor vessel. Therefore, as of August 7, 1997, only those conditions or activities associated with the safe storage of fuel and radiological protection (including waste handling, storage and disposal) were applicable to the defueled Maine Yankee plant.

1.2 Spent Fuel Inventory

Following the cessation of power operation and the removal of fuel from the vessel, the spent fuel inventory consisted of a total of 1432 complete spent fuel assemblies, 2 partially consolidated assemblies, and 2 partially full failed fuel rod containers. Additionally, the spent fuel inventory contained associated Control Element Assemblies (CEAs) and CEA fingers. As of March 2004, all spent fuel was transferred to the Independent Spent Fuel Storage Installation (ISFSI).

1.3 Spent Fuel Inventory Design Overview

Key design data for the spent fuel inventory are listed in Table 1.3.1.

1.4 Plant Site and Population

The Maine Yankee plant was located on the west shore of the Back River approximately 3.9 miles south of the center of Wiscasset, Maine. This location is shown in Figure 2.1-1A.

Within a 5 mile radius of the plant site, the resident population density is estimated to average 85 persons per square mile (2010). The nearest population grouping within 5 miles was situated around the Town of Wiscasset, 3.9 miles NNE of the site. The town of Wiscasset has a population of about 3,732 people (2010). The surrounding towns of Edgecomb, Boothbay, Woolwich, and Westport Island, wholly or partially within a 5 mile radius, have a population of 8,159 persons (2010). The city of Lewiston, 24 miles WNW from the plant site, is the nearest city with a population in excess of 25,000.

The site characteristics are discussed in detail in Section 2.

1.5 Material Incorporated By Reference

Certain program documents and associated topical reports or analyses have been incorporated into the DSAR by reference and are listed in each section as appropriate.

Some documentation that is incorporated by reference continues to be updated to assure that the information used is the latest available. These documents include the following:

1. Quality Assurance Program
2. Emergency Plan
3. Security Plan

Each of these programs and plans may be modified as necessary in accordance with the regulatory and Maine Yankee requirements identified in Section 6.

TABLE 1.3.1
MAINE YANKEE DESIGN CHARACTERISTICS

Note: Selected information in this table is being retained for historical purposes only.

Plant Output

Net Electrical Power Output (MWE) @ 2,700 MWt	905
Gross Electrical Power Output (MWE) @ 2,700 MWt	931
Maximum Expected Gross Electrical Output (MWE)	931

Reactor Core

Total Heat Output (Btu/hr) 9.215×10^9	
Heat Generated in Fuel (%)	97.5
DNB Ratio at Nominal Conditions	
Minimum DNBR for Design Transients	(YAEC-1 Correlation)
Core Power Density (kW/liter)	83.01
Number of Fuel Assemblies	217
Number of Fuel/Poison Rods per Assembly	176
Fuel Rod Pitch (inches)	0.580
Fuel Clad Material	Zircaloy-4 or ZIRLO
Fuel Clad Nominal Thickness (inches) CE & W	0.028
Fuel Clad Nominal Thickness (inches) Exxon	0.031
Fuel Poison Materials	
Number of Control Rod Locations (maximum)	85
CEA Pitch (inches)	11.57
CEA Poison Materials	B_4C/B_4C with Ag in Cd tips Stainless Steel
Control Rod Drive Type	Magnetic Jack
Equivalent Core Diameter (inches)	136
Total Uranium (MTU)	80-83

SECTION 2.0

THE SITE AND ENVIRONS

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SECTION 2.0

THE SITE AND ENVIRONS

2.1 Location And Area

The Maine Yankee Atomic Power Station was located in the town of Wiscasset, Lincoln County, Maine. Site coordinates are approximately 43 degrees 57 minutes 5 seconds north latitude and 69 degrees 41 minutes 45 seconds west longitude. The licensed site is bounded by Back River on the east, Old Ferry Road on the north, and Bailey Cove/Youngs Brook on the west. The plant was located on a peninsula known as Bailey Point which extends south to Montsweag Bay, as shown by the site area map in Figure 2.1-1A. The waters of Back River, Montsweag Bay, and its tributaries are tidal and open to boating, both commercial and recreational. Regulation of this boating is the responsibility of the United States Coast Guard and the state of Maine.

The plant site itself was located on a ridge of bedrock running northeast to southwest to form Bailey Point. The maximum elevation of this rock is a knob 75 feet above mean sea level located about 700 feet northeast of the plant. The general elevation of Bailey Point varies from sea level to 40 feet above mean sea level. The plant area was graded to elevation 20 feet. A layer of glacial till has been deposited above the bedrock and has an average depth of 15 to 20 feet. A detailed description of site geology is given in Section 2.4.

2.1.1 Population

The information provided in this section is "Historical Information".

The concentration of population in the vicinity of the site is low. Within a 5-mile radius of the site, the resident population density is estimated to average about 79 people per square mile in 2000. The nearest population grouping within 5 miles is situated around the center of the town of Wiscasset, 3.9 miles NNE of the site. Scattered housing marks the nature of the balance of the population in the immediate site area. For towns within the 5-mile radius, the resident population has shown a 10% increase between 1990 and 2000, as compared with a 31% and 17% increase for the period 1970 to 1980 and 1980 to 1990, respectively. For those towns wholly or partially within a 10-mile radius, the resident population experienced a 4% growth between 1990 and 2000, and a 15% growth for the both periods 1970 to 1980 and 1980 to 1990.

There is a summer seasonal increase in population associated with recreational activities which takes place along the Maine coast. Based upon Reference 1, there is about a 50% increase in the population within a 5-mile radius of the site during the summer period. The total resident 2000 population within 50 miles is estimated to be about 694,271 (88 people per square mile). This represents about a 7% growth in population from 1990 when the 50-mile population was estimated at 649,895 as opposed to a 13% growth in population between 1990 and 1980 when the 50-mile cumulative population was estimated at 577,300.

Population changes for the areas in the vicinity of the site were estimated in the original FSAR through the year 2000. The fundamental basis for estimating the year 2000 statistics was the U.S. Census Forecast II-D (Reference 2) for the whole state of Maine. This information was extrapolated beyond 1985. On the basis of the change in population between 1940 and 1960, it was assumed that one-half the population increase in the future for the entire state would occur in the following seven counties: Androscoggin, Cumberland, Kennebec, Knox, Lincoln, Sagadahoc and Waldo. A linear extrapolation of the 1960 and 1970 population figures was used to determine the year 2000 distributions. Within 5 miles of the site, no major increase in population is expected.

The original FSAR 50-mile radius population estimate for the year 2000 was approximately 816,000. The actual population for the year 2000 was 121,729 below the estimate in the original FSAR. If the rate of population growth over the 10-year period from 1990 to 2000 (7%) for the 50 mile radius from the site is used as the basis to project the population within 50 miles over the next decade, the year 2010 population would be approximately 743,000.

There is no historical basis for predictions of industrial growth in the area. Commercial and service trades will probably continue to be responsive to needs of residents and tourists. The recreational opportunities with respect to boating, fishing, and local features of historical interest will probably stimulate seasonal trade.

2.1.2 Land Use

The information provided in this section is "Historical Information".

Within 5 miles of the site, land use is largely home sites, small businesses, summer houses, idle farmland and forest. There is one small dairy within this area, with several other locations having a few milk cows for private use. Housing is scattered along principal roads and is concentrated only in the center of Wiscasset.

The waters near the plant are reported to be relatively low in productivity of fish and shellfish. Some lobstering is carried out in Montsweag Bay and the Back River. The primary type of boating in the Montsweag Bay - Back River area is shallow craft pleasure boats. With no commercial traffic in the area, there is no hazard to the site from potential accidents with commercial barges or boats carrying toxic or explosive materials.

The Wiscasset Municipal Airport is the nearest airport to the site and is located over a mile northwest of the Maine Yankee containment. It consists of one runway 3,400 feet long and 75 feet wide. The single runway (7-25) is oriented such that takeoffs and landings are on headings of 070 or 250. Approximately 80% of the time, runway heading 250 is used.

The airport is used almost exclusively by private aircraft such as the Piper Colt, Piper Cherokee, Cessna 150 and 172, King Air, and Queen Air. This type of light aircraft accounts for about 500 takeoffs and landings per month at the facility. The largest aircraft that typically lands at Wiscasset is the King Air 200 type aircraft. This larger type aircraft is estimated to account for about 5 takeoffs or landings per month.

The normal takeoff pattern is a straight climb to 700 feet followed by a 45 degree turn to the left. When the aircraft reaches an altitude of 1,000 feet, it is considered to be out of the pattern. During landing, the planes fly a downwind course parallel to and to the right of the runway at an altitude of approximately 1,000 feet. Upon passing the end of the runway, the aircraft would execute two 90 degree turns to the left to bring it around to the proper heading for landing. The distance between the runway and the airplane during the downwind leg depends on the size of the aircraft.

There are no active plans for expansion of the Wiscasset Airport. Several navigational aid additions to the airport have been made. A non-directional beacon (NDB) approach was installed at the Wiscasset Airport in 1977 and two Global Positioning System approaches were installed in 1996. Neither of these instrument flight rule (IFR) approach capabilities is expected to change the traffic count or type of aircraft that frequent the airport.

The land use within a 10-mile radius of the Maine Yankee site is also mainly farmland, with recreational activities taking place on a series of peninsulas jutting into the Gulf of Maine. Because of its unique coastal terrain and many bays, the area is a summer recreational center for boating and other water related activities. This summer recreation and its supportive businesses, motels, restaurants, shops, etc., provide much of the economic base for the area.

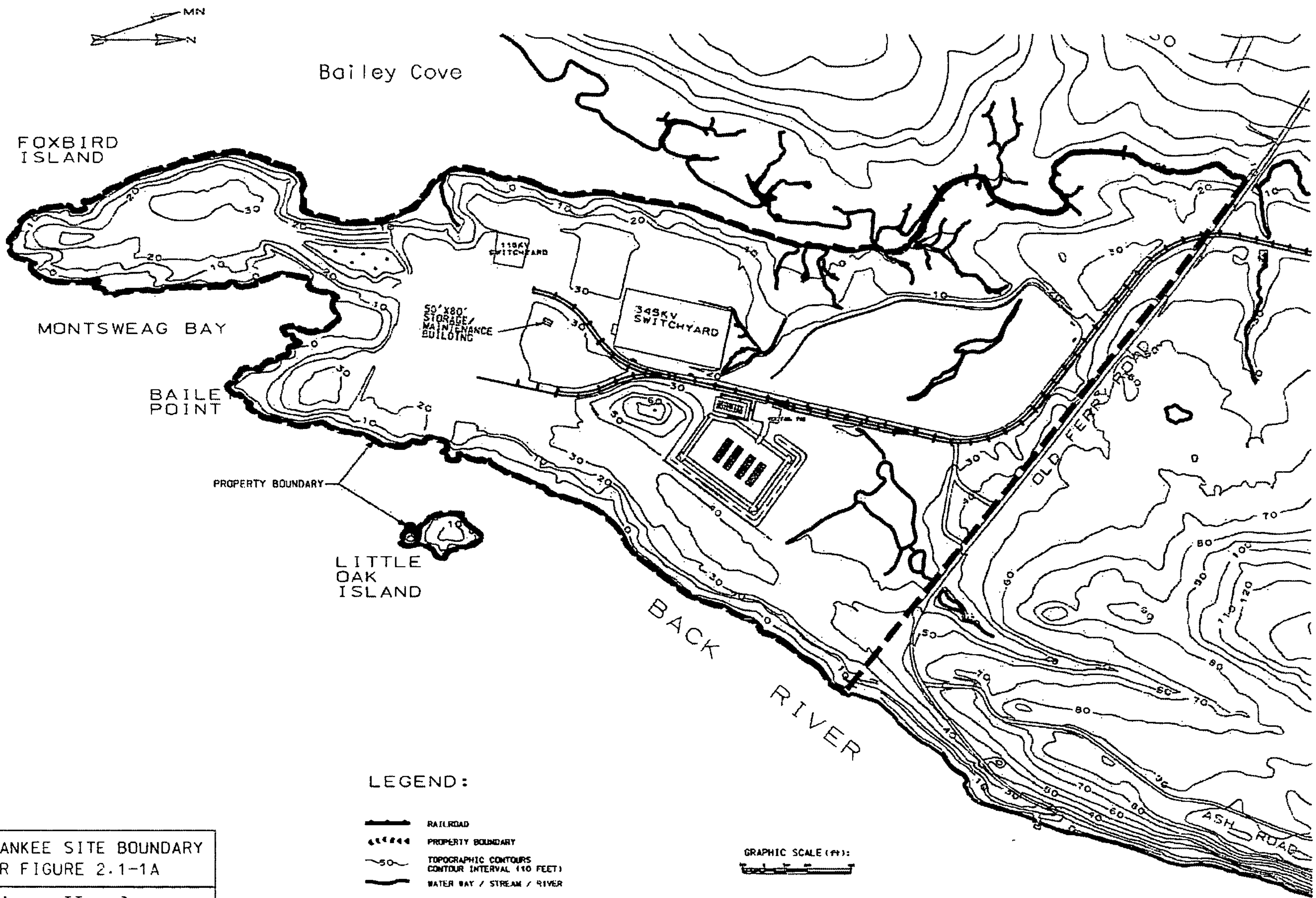
Another activity unique in many respects is the marine worm industry. The marine worm industry harvests two species, the sand worm (the Neveis virens) and the blood worm (Glycera dibranchiata). The worm digging is confined to mudflats in the intertidal areas. These worms are sold for bait to commercial and sports fishermen along the Atlantic coast.

Industrial activity within the 10-mile radius is somewhat limited, with ship building in the city of Bath on the Kennebec River the largest industrial facility in the state.

Section 2.1 References

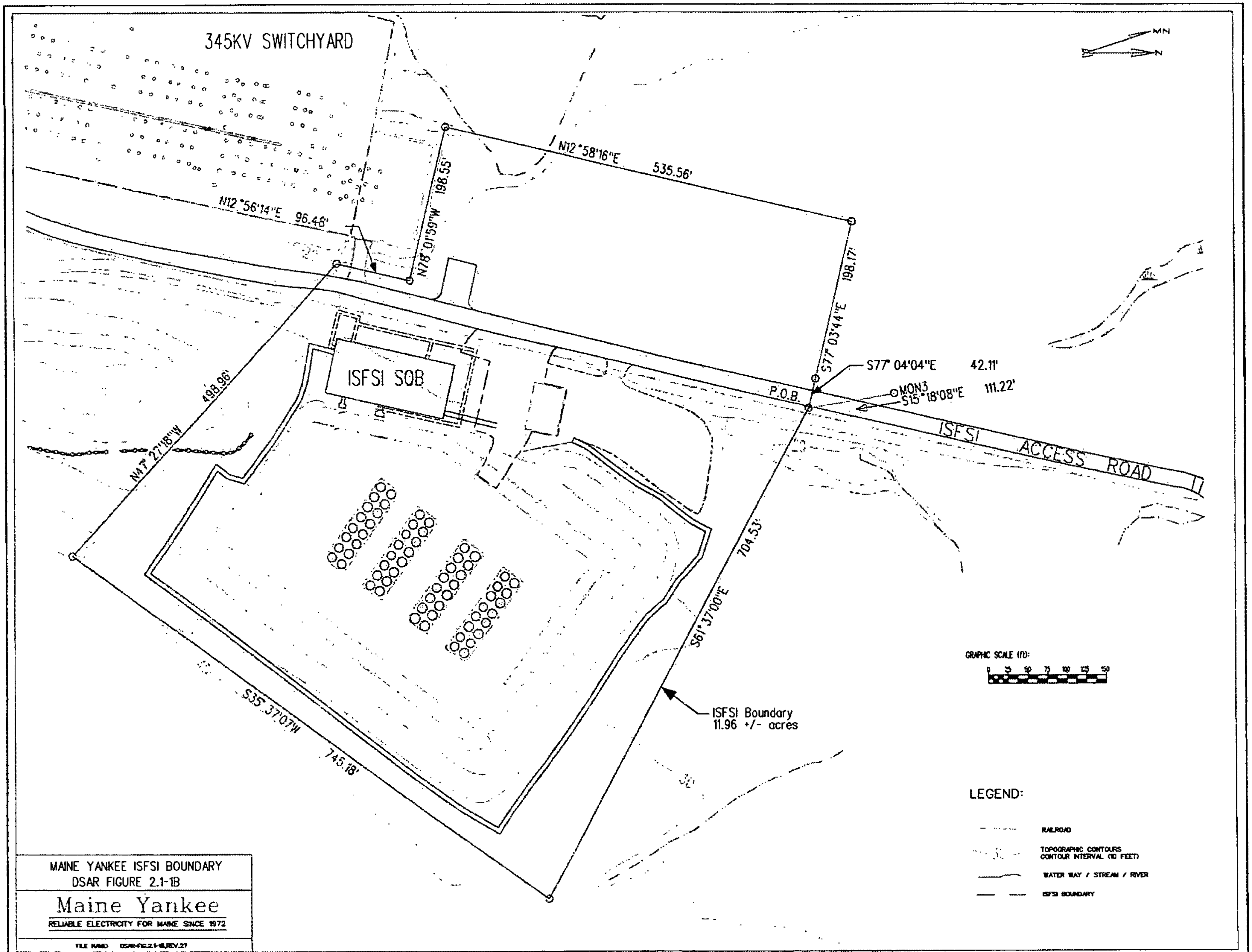
1. Evacuation Time Estimates for the Maine Yankee Plume Exposure Pathway Emergency Planning Zone, HMM Associates, Inc., April 1992

2. US Bureau of Census, Current Population Reports, Series P-25, #326, Illustrative Projection of Population of State, 1960-1985, US Government Printing Office, Washington, D.C., 1965.



MAINE YANKEE SITE BOUNDARY
DSAR FIGURE 2.1-1A

Maine Yankee
RELIABLE ELECTRICITY FOR MAINE SINCE 1972



MAINE YANKEE ISFSI BOUNDARY
DSAR FIGURE 2.1-1B

2.2 Meteorology

2.2.1 General

The information provided in this section is "Historical Information".

The Bailey Point site is located in the mid-coastal region of Maine. This coastal region is characterized by many inlets, bays, channels, harbors, rocky, islands, and promontories. The area adjacent to the site has many small forested hills.

The general climatic regime is maritime with its cool air moving in from the North Atlantic. Of special importance, from an engineering standpoint, are the extremes in annual snowfall for the coastal region; the occasional heavy rains, the coastal storm or "Nor'easter" with its resultant strong winds and heavy rain or snow; and sometimes glaze or "ice storms". These and other pertinent meteorological data which have been compiled by the TRC Corporation of Hartford, Connecticut, are presented in the following sections.

2.2.2 On-Site Meteorological Field Programs

The information provided in this section is "Historical Information".

An initial data collection program was undertaken at the site of the Maine Yankee Atomic Power Station to provide information on meteorological conditions for dispersion analyses for the original FSAR. Data for one year, from July 1, 1967 to June 30, 1968, were evaluated and formed the bases for those analyses. An upgraded on-site monitoring program which met the intent of Revision 0 to Regulatory Guide 1.23 was installed in late 1976.

2.2.3 Coastal Fog

The information provided in this section is "Historical Information".

Heavy fog is frequent and sometimes persistent along the coast, and may occur on one day in six during certain portions of the year. Data for the 11-year period (1951-1962) from the Brunswick Naval Air Station located 13 miles from the site indicate that 4.1% of the time (3,855 out of 95,073 observations), fog conditions exist. A fog condition is said to exist when the visibility is 0 to ½ mile.

The breakdown of fog conditions for the various wind speed classifications is as follows:

0- 2 mph	1.6%
3-14 mph	2.2%
15-23 mph	0.2%
24+ mph	<0.1%
Total	4.1%

2.2.4 Temperature

The information provided in this section is "Historical Information".

The temperature of the coastal region tempered by the Atlantic Ocean is not subject to the wider extremes of the inland areas. The average annual temperature is about 45°F, with the frequency of temperature above 90°F being very small. The average January temperature is about 22°F with between 10 and 20 days of sub-zero temperatures occurring yearly.

2.2.5 Precipitation

The information provided in this section is "Historical Information".

Precipitation along the Maine coast is influenced by the Atlantic Ocean. Summer thunderstorm activity is somewhat suppressed by the effects of the cool ocean, while winter precipitation is increased by coastal storms or "Nor'easters". These combined effects give this area more precipitation in the winter months than in the summer months. Monthly totals are about 4 inches during the winter as compared to 3 inches in summer. Total precipitation (Reference 1) averages nearly 46 inches for the coastal areas. Winter precipitation occurs mostly as rain or wet snow. Also, this area, more than further inland, is subject to occasional glazing or "ice storm" conditions.

Intense rainfall may be produced by the occasional severe thunderstorm, hurricane, or "Nor'easter." The maximum recorded point rainfall (References 5 and 6) of short time intervals for Portland, Maine, (period 1893-1961) is given below.

Short Time Interval Precipitation
Portland, Maine

		Minutes Inches					Hours Inches		
5	10	15	30	60	2	3	6	12	24
0.51	0.78	1.09	1.49	2.11	3.40	4.51	5.84	7.09	7.71

The return period of extreme short-interval rainfall is a useful design and planning guide. The nearest location for available return period data which should be representative for the Bailey Point area is Portland, Maine.

2.2.5.1 Snowfall, Snow and Ice Loading

The average seasonal snowfall has a marked variation along the coastal region, which may be as little as 29 inches or as much as 119 inches (References 2 and 3). Along the coast, the snow cover may entirely melt once or more in the midwinter to be replaced by new snow. The average number of days with 1 inch or more of snowfall for Portland is 20 per season. Snow-load data for the Bailey Point area, from a HHFA study (Reference 7) conducted in 1952, are as follows:

Wt of Seasonal Exceeded 1 Yr. in 10 Snowpack Equaled or 40 lbs ft^{-2}	Wt of Max Snowpack on Record 60 lb ft^{-2}	Wt of Estimated Max Accumulation on Ground Plus Wt of Max Possible Storm 80 lb ft^{-2}

Data relating to freezing rain and resultant formation of glaze ice on highways and utility lines have been obtained from the following studies:

- American Telephone and Telegraph Company, 1917-18 to 1924-25
- Edison Electric Institute, 1926-27 and 1937-38
- Association of American Railroads, 1928-29 to 1936-37
- Quartermaster Research and Engineering Command, U.S. Army, 1959

A polar front wave with an active warm front moving in a north or northeasterly direction toward Maine is the most typical synoptic condition for the formation of glaze or freezing rain. A quasi-stationary high pressure area north of New England, with the center of the ridge or cell usually located somewhere northeast of Newfoundland, causes a flow of continental-polar air over the area from the south or east behind the warm front. If the over-running maritime-tropical air or modified continental-polar air is warmer than 32°F, while the continental-polar air beneath the front has temperatures of 20°F to 30°F, then freezing rain or drizzle may result.

Glaze and ice storms of winter are usually of brief duration, although a few widespread and prolonged ice storms have occurred. The following data for glaze storms (Reference 8) will apply:

1. Time of occurrence - October through April
2. Average frequency without regard to ice thickness, 1-3 storms per year
3. Return periods for freezing rain storms producing ice of various thicknesses are:

Ice	0.25	every year
	0.50	every year
	0.75	at least every 3 years

The extreme radial thickness of glaze on utility wires for the period 1928-29 to 1936-37 for the Bailey Point area was between 1.75 inches to 1.99 inches.

A U.S. Weather Bureau summary for the years 1939-1948 gives the actual number of days with freezing precipitation (without regard to ice formation) for Portland, Maine, as follows:

Nov	Dec	Jan	Feb	Mar	Apr	Total Days in 10 Years
1	27	24	20	12	2	

2.2.6 Tornadoes, Hurricanes and Severe Thunderstorms

The information provided in this section is "Historical Information".

Coastal regions are sometimes seriously affected by a variety of storms. They generate strong winds, heavy rain or snow and, occasionally, a glaze of "ice storm". In winter, these storms produce some of the heavier snowfalls in the coastal area. In summer or fall, a storm of tropical origin may also affect the coastal area. Usually these are similar to the "Nor'easter" but occasionally a few may attain near or full hurricane force.

Collins and Howe (Reference 9) have developed indices of relative storm damage for different parts of the United States using storm data from the 1954-1963 decade. In the study, an "index damage potential" is defined in units of 1,000ths of 1 percent of residential property values per year for various types of storms. The "index damage potential" which excludes tornadoes, hurricanes, tropical storms and hail for the Bailey Point area is 8, compared to a value of 16 for the Oklahoma-Kansas area.

Storms of hurricane origin do not affect Maine in most years. In 1954, two hurricanes affected Maine within a period of less than 2 weeks. The first, "Carol", traveled northward along the Maine-New Hampshire border on August 31. Wind speeds were no longer full hurricane force, but substantial property and crop damage resulted in western Maine. Then "Edna" entered the coastline near Eastport on September 11. In this case, the principal damage was due to heavy flooding and washing rains. Two hurricanes in 1 year should be expected probably less than 1 year in 10. The "index of hurricane and tropical storm damage potential" (Reference 9) (defined in units of 1,000ths of 1 percent of residential property values per year) for the Bailey Point area is 95 as compared to 337 for the Cape Cod area, 606 for the Cape Hatteras/North Carolina areas, and 633 for the Miami, Florida area.

Tornadoes are not a common phenomenon in Maine. Yet they do occur occasionally. Of the few, about 80% occur between May 15 and September 15. About 90% strike between 1:00 and 7:00 p.m. The peak month is July and the peak hour of occurrence is 2:00 to 3:00 p.m.

Fifty year totals (1916-1965) for tornadoes listed by month for the state of Maine and other New England states are as follows:

50-Year Tornado Record

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	50 yr Total
Maine	0	0	1	0	5	6	15	12	8	2	0	0	49
Mass	0	0	0	0	12	15	26	9	6	6	3	2	79
Vt	0	1	1	0	3	7	8	2	0	1	0	0	23
NH	0	0	0	0	6	8	14	6	2	1	0	0	37
Conn	0	0	0	0	7	2	5	8	4	2	0	0	28

A National Severe Storms Forecast Center (NSSFC) listing of tornadoes within a 125 nautical mile radius of the site indicates that 120 tornadoes occurred during the period 1950 through 1993, with a mean path area of 0.101 square miles (Reference 10). Thom (Reference 11) has developed a procedure for estimating the probability of a tornado striking any point from an analysis of mean tornado path area and the frequency of tornado occurrence in the region around the site. Applying Thom's procedure to the NSSFC data gives an annual probability of about $1x10^{-5}$ of a tornado striking any point within 125 nautical miles (144 miles) of the site. This calculation accounts for the water area within the 125 nautical mile region.

Thunderstorms and hail storms occur most frequently from mid-spring to early fall. Thunderstorms occur on about 10 to 20 days a year along the coast. The most severe may be attended by hail. The mean number of days that Portland experiences thunderstorms for the period 1940-1965 is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
0	*	*	1	2	5	4	3	2	1	*	*	19

*Less than one-half day

2.2.7 Environmental Monitoring Program

Direct gamma radiation measurements are obtained from Thermoluminescent Dosimeters (TLDs) employed to record the integrated gamma radiation exposures IAW the requirements in the Off-Site Dose Calculation Manual (ODCM).

Section 2.2 References

1. "Rainfall Intensity - Duration - Frequency Curves", Technical Paper No. 25, 1955, US Weather Bureau.

2. "Climatic Summary of the United States - Supplement for 1951-1960", New England, US Weather Bureau.

3. "Climates of the States - Maine", September 1959, US Weather Bureau.

4. "Local Climatological Data - With Comparative Data", 1965, Portland, Maine, US Weather Bureau.

5. "Maximum 24-Hour Precipitation in the United States", Technical Paper No. 16, US Weather Bureau.

6. "Maximum Recorded United States Point Rainfall for 5 Minutes to 24 Hours", Technical Paper No. 2, Revised to 1961, US Weather Bureau.

7. "Snow Load Studies", Housing Research Paper No. 19, Housing and Home Finance Agency, 1952.

8. "Glaze, Its Meteorology and Climatology, Geographical Distribution and Economic Effects", Quartermaster Research and Engineering Center, 1959 U.S. Army.

9. "Weather and Extended Coverage", George F. Collins and George M. Howe, TRC Service Corporation, 1964.

10. National Severe Storms Forecast Center, A Listing of Tornadoes for Period 1950-1993,@ NCAA, Kansas City, MO.

11. "Tornado Probabilities", H.C.S. Thom, Monthly Weather Review, October/November/December 1963.

2.3 **Hydrology**

2.3.1 Surface Hydrology

The information provided in this section is "Historical Information".

The site is located at the south end of a peninsula (Bailey Point) which is bounded on the east by Back River and on the west by an arm of Montsweag Bay. These two contiguous bodies of water, together with Hockomock and Knubble Bays on the south, are a part of the Sheepscot River estuarial system. Hockomock Bay is connected to the Kennebec River on the west by the Sasanoa River. Surface drainage in the area is generally from north to south, roughly parallel to the strike of the regional bedrock formation. Runoff averages about 50% of the total rainfall on an annual basis, but this ratio varies seasonably from a maximum of 140% in April to a minimum of 10% in August. Due to the moderately sloping terrain, nearly complete vegetational cover and some natural storage, runoff is not excessive and dry period flows are not unusually low.

The principal streams in the vicinity of the site are the Sheepscot River and Montsweag Brook, which have the following watershed areas and approximate flows:

	Drainage Area, Square Miles (Head of Tidewater)	Discharge, cfs (1938-1960) Maximum	Average	Minimum
Sheepscot River	190	6,750	307	6.4
Montsweag Brook	10.8	394	18	0.4

Runoff from the power station site is conveyed by the underground storm drain system or flows overland directly to Back River or to the cove west of Bailey Point.

The fresh water discharge of the Sheepscot River and Montsweag Brook are small when compared with tidal movement of the receiving estuarial waters, and for this reason, have no significant effect on tide levels, tidal flows, or water temperature.

The Wiscasset town water system is the source of fresh water supply for usage at the site.

2.3.2 Oceanographic Features

The information provided in this section is "Historical Information".

The Back River extends in a northerly direction from a point known as Long Ledge, which is at the northern limit of Montsweag Bay, a distance of about 4 miles, to a confluence with the Sheepscot River at the northern tip of Cushman Point. It varies in width from a maximum of 1,500 feet at Berry Island to a minimum of 500 feet at Cowseagan Narrows. Channel depths vary between 10 to over 60 feet at mean low water, with a maximum depth at the plant site of approximately 36 feet.

Montsweag Bay extends southward from Back River in the vicinity of Long Ledge a distance of about 4 miles to Phipps and Hubbard Points, where it connects with Hockomock Bay. Montsweag Bay varies in width from approximately 2,000 feet at its northern and southern limits, to about 8,000 feet midway between these points and has mean tide level area of about 1,800 acres. Except for a relatively narrow central channel, the bay is quite shallow, with mean low water depths generally less than 2 feet. Accordingly, extensive intertidal mud flats are exposed at low tide and especially so during spring low tides. The central channel varies in depth from 13 to 50 feet. Montsweag Brook enters the bay from the northwest. Tidal flows enter and leave the Back River-Montsweag Bay area at the Cowseagan Narrows on the north and through the passage separating Phipps and Hubbard Points to the south.

In order to comply with the August 23, 1972, Department of Environmental Protection Order, which imposed a 25-acre mixing zone on Maine Yankee's discharge, the Cowseagan Narrows Causeway which connected Westport Island to the mainland was removed in November 1974 after a high level bridge was constructed in its place. As a result of this action, natural circulation that existed prior to 1950 has been restored. The net southerly flow into and out of Montsweag Bay through Cowseagan Narrows has increased greatly, thereby inducing currents upwards of 3 to 4 knots (5 to 7 fps). Tidal currents at selected stations are published annually by the National Ocean Survey (NOS) of the National Oceanic and Atmospheric Administration (NOAA).

In addition to changes in currents, the tidal range has increased both in Montsweag Bay and Back River. Data collected since the causeway was removed show a mean tidal range of 9.44 feet. This value coincides closely to the value of 9.1 feet measured in 1943 by the U.S. Coast and Geodetic Survey (now NOS). Mean low tide values are now reported at 4.57 feet below mean sea level. Such a change represents a 0.6 to 1-foot reduction in mean low water. It has also been calculated that as a result of the increased water level fluctuations, approximately 270-391 additional acres of intertidal flats are now exposed at low tide.

The tidal datum for the area is 4.5 feet below mean sea level, measured at Portland, Maine. It should be pointed out that the above differences and ranges are for astronomical tides only. Astronomical tides are frequently affected by meteorological conditions which must be considered separately. The monthly and annual estimated mean and mean maximum ocean water temperatures in the area, based on temperatures published by NOS for Portland and Bar Harbor, Maine, are tabulated below to the nearest half degree Fahrenheit.

Month	Mean	Mean Maximum	Month	Mean	Mean Maximum
January	33.5	37.0	August	59.0	62.0
February	32.5	34.5	September	57.5	61.0
March	34.5	38.0	October	52.0	56.0
April	40.0	44.0	November	45.5	49.5
May	47.0	52.0	December	38.0	42.5
June	53.5	58.0			
July	58.0	62.0	Annual	46.0	

The above temperatures are for coastal waters and estuaries exposed directly to the ocean. Water temperatures in confined estuaries such as Montsweag Bay and Back River average a degree or two higher due to the increased heating of the relatively shallow waters and more widely exposed beaches and flats.

2.3.3 Probable Maximum Flood

2.3.3.1 Maximum Water Surface Elevation

An investigation was made to predict the probable maximum flood level which could occur at the site of the Maine Yankee Atomic Power Station on the Sheepscot River estuary when the probable maximum hurricane is taken as the design basis meteorological event. The investigation is based upon the parameters of the probable maximum hurricane as defined by U.S. Weather Bureau Report HUR 7-97, Interim Report - Meteorological Characteristics of Probable Maximum Hurricane, Atlantic and Gulf Coasts of the United States (Reference 1).

This investigation shows that the maximum water levels at the Maine Yankee 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 pre-existing screen well structure, respectively. These levels are based upon the simultaneous occurrence of the maximum storm surge, maximum predicted astronomical tide, an initial rise in mean sea level, estuarian amplification, the probable maximum flood in the Sheepscot watershed, maximum waves in Montsweag Bay and existence of a channel restriction at the former Cowseagan Narrows Causeway.

Removal of the causeway and replacement with a bridge increases the degree of conservation of this original work because the causeway acted as a dam to the hurricane surge and caused "water pile-up" at its face. This dam effect is included in the maximum water elevation mentioned above. As a result of the causeway removal, the surge resulting from the probable maximum hurricane can now travel well up the estuary, thereby lowering the maximum water levels at the plant site. Thus, the maximum water levels presented above are higher than what could occur during a probable maximum flood caused by a probable maximum hurricane.

The maximum probable flood flow in the Sheepscot River was determined by means of a triangular hydrograph method (Reference 2). This results in a flow at Wiscasset of 126,500 cfs . Due to its vast size, the water levels in the Sheepscot Bay will remain essentially unaffected by this flood flow. Therefore, a backwater curve was calculated for the Sheepscot River from the open coast to Wiscasset, assuming conservatively that none of the flow passes through Back River but that the water surface at the plant site will be the same as Wiscasset. It was assumed that the highest water levels would occur if the peak of the runoff coincided with the peak of the astronomical high tide and storm surge. Uniform flow was assumed with an n= 0.03, and the area and hydraulic radius at Doggett Castle, as taken from USC&GS Chart No. 314, was used as the mean river section. This resulted in a water slope of 0.035 feet per mile, which is equal to a total increase in water levels of only 0.4 feet.

2.3.3.2 Wave Runup and Wave Forces

Wave runup on the slope above still water level is dependent on the roughness and porosity of the material composing this slope as well as period and height. As given in Reference 3, a sandy slope is considered smooth while a rubble-mound structure or a riprap covered structure is considered rough. The slope for which wave runup was determined is covered with trees and brush. Since the trees will break up and retard the waves in the same manner as rubble, the wave runup was determined using a slope roughness equal to the average of smooth and rough as shown in Reference 3. Wave runup from the significant wave at the Maine Yankee site was determined in the probable maximum hurricane to be 5.11 feet on the slope south of the pre-existing turbine building and 6.68 feet on the pre-existing circulating water pump house. The wave runup on the slope increases with greater wave period while the wave runup on the pre-existing screen well increases with shorter wave period. This condition is due to the wave runup at the pre-existing screen well being a standing wave while the wave runup on the slope is due to a breaking wave.

The probability of any wave occurring in a spectrum of waves can be determined using Bretschneider's Joint Distribution as found in Reference 3. Assuming that the design wave occurs during the period of 2.2 hours when the winds in the probable maximum hurricane exceed 110 mph, approximately 1,840 waves can occur. This period of maximum winds we define as the "critical period" of the probable maximum hurricane. Using Bretschneider's Distribution, the distribution of waves with a height of 5.63, the wave runup frequency curve for the pre-existing pump house shows that approximately 10% of the waves during the period of maximum winds would result in a wave runup equal to or greater than 6 feet. For reference purposes, design wave runup for both the slope and the pre-existing pump house is indicated in Graph C. Wave runup equal to or greater than the design runup would occur during approximately 4% of the "critical period." Should any wave runup occur that would overtop the slope or pre-existing pump house, the flow rate due to overtopping would be such that the pre-existing site pump house could drain. It is not considered credible that these waves would be consecutive in the wave spectrum.

An investigation has been carried out to examine the characteristics of waves that could be generated across Back River from the east. Significant wave heights of 3.6 feet or less were predicted for conditions of a 2,000 foot fetch length, a sustained wind speed of 110 mph, and 4 different water surface elevations ranging from -7 feet to +15 feet (MSL). The Thijsse and Schijf method (Reference 4) formed the basis of these computations. Each of the four wave heights was examined according to wave-breaking criteria summarized in Reference 4 and found to be smaller than a breaking wave. Consequently, none of the waves generated under these conditions could break.

2.3.4 Groundwater Hydrology

The information provided in this section is "Historical Information".

Groundwater in the region occurs as free groundwater within the clay-silt soil mantle and joints in the underlying bedrock. The peninsula on which the plant is located widens and increases in elevation toward the north so that the general groundwater movement in the area is from north to south, with a gradual shift toward the east and west in the direction of the adjacent tidal waters. Gradients are expected to be roughly parallel to the surface topography. Percolation rates are low due to the low permeability of the local soils and limited bedrock jointing.

Water wells in the area 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, they seldom exceed 5 or 10 gpm for short-term pumping and even less with sustained pumping. Since the yield of a dug well is sensitive to groundwater levels, those in unfavorable locations can dry up during drought periods. The drilled wells are consistently reliable because water table levels have little effect on their yield. Site potable water is provided from the town of Wiscasset water supply system. Precipitation at the site will percolate downward to the water table and then move with the normal groundwater flows toward the adjoining salt water areas.

<u>Section 2.3 References</u>

1. U.S. Department of Commerce, 1968, Interim Report - Meteorological Characteristics of the Probable Maximum Hurricane, Atlantic and Gulf Coasts of the United States, Weather Bureau Memorandum HUR 7-97.

2. U.S. Department of Interior, 1965, Design of Small Dams, Bureau of Reclamation.

3. U.S. Army, 1966, Shore Protection, Planning and Design, Coastal Engineering Research Center, Technical Report No. 4.

4. A. T. Ippen, 1966, Estuary and Coastline Hydrodynamics, McGraw-Hill.

2.4 Geology

The information provided in this section is "Historical Information".

Site geographical information was developed from study of the available literature, surface reconnaissance and field study, and examination of samples of soil and rock core taken from borings on the site. Refraction seismic surveys were also made to determine the rock surface elevations. References 1, 2 and 3 contain detailed reports on these studies.

Twelve borings were made on the site in the initial studies and these have been supplemented by 12 more borings in the southern portion of the site where the plant was previously located. Overburden in this area consists of medium soft to medium stiff silty clays with occasional sandy lenses and pebbly sands. Overburden varies 15 to 20 feet in thickness. Bedrock is of Silurian-Devonian age characterized by steeply dipping schistose rocks of the Cape Elizabeth formation, interlayered with lenticular masses of granite and coarse crystalline pegmatite.

Joints in the bedrock, as they appear in outcrops and cores, are medium spaced, ranging from 1 to 5-foot intervals and less. Variation from quartzite to mica schist, to granite and pegmatite, is a common geologic feature. Though the mica schist is relatively weaker than the other rocks, it is fresh, sound, and not materially weathered. Both borings and geologic surveys show the presence of tight folds, mostly in the schistose formations. No major faults have been recorded in the area during the site studies or in previous studies by other geologists. Two minor faults, long since healed, have been recorded in the outcrops along the shore. They are located approximately 900 feet northeast of the plant site. These do not show any appreciable brecciation or gouge formation.

The studies show that, geologically, the site is suitable for an atomic power plant. No major or active faults have been detected or are suspected in the vicinity of the site. Bedrock is sound, within reach and provides good foundation support for the structures and equipment. The major structures are founded directly on hard, crystalline bedrock. Minor structures are founded either on rock or on compacted granular fill above the rock.

The seismic surveys at the site show average values of compression wave velocity of 13,000 to 15,000 fps and shear wave velocity of 7,000 fps. From these, values of Poisson's ratio of 0.33 and Young's modulus of 5×10^6 psi were calculated. From work by Eristov, 8th International Conference on Large Dams, Young's modulus for the bulk rock would be equal to

$$\frac{5.0 \times 10^6}{1.7} = 2.9 \times 10^6 \text{ psi}$$ and the shear modulus, 1.1×10^6 psi.

The values of Young's modulus range from 4.94×10^6 psi to 5.67×10^6 psi. The shear modulus varies from 1.80×10^6 to 2.06×10^6 psi. Variations of this amount in the moduli have been shown to have no effect on the containment vibration modes.

Section 2.4 References

1. "Geological Considerations, Maine Yankee Atomic Power Project," John Rand, Consulting Geologist, November 15, 1967.

2. "Seismic Survey, Proposed Nuclear Power Plant, Bailey Point, Wiscasset, Maine," Weston

Geophysical Research, Inc., November 4, 1966.

3. "Seismic Survey, Maine Yankee Atomic Power Project," Weston Geophysical Research, Inc., June 1967.

2.5 Seismology

2.5.1 Tectonics

Despite rather complex interrelations between rocks of various ages and types, New England is generally characterized by competent, unweathered bedrock and stable geologic conditions. The nearest significant fault is located about 75 miles to the west. In the geological investigation, two small inactive faults were found about 900 feet from the historical structures.

Since Triassic time, 180 million years ago, no major geologic changes other than those produced by glaciation have occurred. The southern part of Maine, in vicinity of the site, is composed of three general types of Paleozoic rocks. North of the area, the bedrock consists of consolidated early Paleozoic (350 million years old) sediment which has been metamorphosed through intense folding. Some middle and late Paleozoic (250 to 350 million years old) igneous intrusives are also present. During the late Paleozoic Era (250 to 300 million years old), sedimentary material was deposited and lithified in a series of basins extending from the Narragansett Bay area of Rhode Island through eastern Massachusetts into southwestern Maine almost as far north as the site area. The bedrock of southern Maine was last affected by orogenic movements at the close of Paleozoic time by the Appalachian orogeny.

Regional Seismicity

Seismic activity in New England is small and typified by infrequent shallow focus earthquakes of low magnitude and intensity. Historical records of New England earthquakes date back 300 years; more than 30 years of instrumental data exist for the New England area. A total of 15 earthquakes which have occurred since the middle of the 18th century, with epicenters within about 150 miles of the site.

The largest of these earthquakes have been previously assigned a Modified Mercalli Intensity of VIII. There were three such earthquakes, all of which occurred before 1800. Historical records of earthquakes in this area, especially the older ones, must be evaluated with considerable caution. Much of colonial construction was of poor quality, and this is especially true for chimneys. Population centers tended to be clustered along and at the mouths of rivers on soft, recent alluvium and, in many cases, epicenters have been assigned to population centers. The records are of variable quality, a few indicating careful observation, but many showing obvious exaggerations. A review indicates the intensity assigned to these earthquakes is questionable. There is evidence that all the intensities were less than VIII, in one case probably VI, and in the two other cases, probably VI or VII. Instrumental observations over a period of more than 30 years have indicated 4 areas in New England where concentrations of shocks have been noted. These are the Milo, Maine area, the Ossipee-Lake Winnipesaukee area of New Hampshire, the Cape Ann-Massachusetts Bay area, and Augusta, Maine. The closest earthquake to the plant site was a magnitude 4.0 mb earthquake that occurred on April 17, 1979, approximately four miles from the site.

The largest earthquakes to occur in New England since the installation of seismic instrumentation occurred on December 20 and 24, 1940, in the Ossipee, New Hampshire area. Both of these earthquakes were of Intensity VII with a Richter magnitude of 5.8, which is the largest magnitude determined for any New England earthquake. Magnitude determinations for most of the larger New England earthquakes range between 4 and 5 on the Richter scale.

The St. Lawrence River Valley, lying more than 200 miles north of the site, is an area of significant tectonic activity. Earthquakes occurring along the St. Lawrence are felt throughout New England. A number of large earthquakes of Intensities VIII, IX, and X have occurred in the St. Lawrence River Valley. Nearly all of these earthquakes occurred early in colonial times. The most recent of these occurred on February 28, 1925, and was Intensity IX. Reports of this earthquake in the site area indicate that its intensity was IV, although at Brunswick, Maine the intensity may be estimated as high as V. An earthquake on October 20, 1870, also of Intensity IX, reportedly broke a few windows (Intensity V) at Portland, Maine.

Seismicity of the Wiscasset Area

Seismicity of the southern Maine area surrounding indicates that nearby small earthquakes include the earthquake at Brunswick in 1881, approximately 15 miles from the site, which had an epicentral intensity of approximately IV or V, based on historical data, with a probable Intensity IV at the plant site, and the April 17, 1979, magnitude 4.0 mb event about 4 miles from the site with a site intensity of about V. The earthquake of April 26, 1957, located 25 miles to the south, was offshore, but has been estimated to have had an epicentral intensity of VI. All of the other earthquakes which have occurred within a 20-mile radius of the site were of Intensity III or less. The site may be expected to be subjected to earthquake vibrations from relatively nearby, local quakes of small magnitude or from major earthquakes along the St. Lawrence River Valley.

A number of studies have been made relating maximum ground acceleration and earthquake intensity. These studies have largely been based on experience outside of New England. However, recent comparisons of instrumentally determined magnitudes and intensity in small earthquakes in this region have agreed well with the relations given by TID-7024. Accordingly, these relationships, although based primarily on soil-supported structures, have been accepted as reasonable and conservative for small earthquakes of the range of intensities anticipated. Based upon a relatively long historical record, on the attenuation of earthquake intensity with distance in the northeastern United States and eastern Canada region, on the geology of the area and on the character of the component bedrock on which the facility is founded, an estimate of the probable maximum intensity at the site is a Modified Mercalli Intensity V to low Intensity VI, corresponding to a ground acceleration of 0.04g.

2.5.2 Tsunamis

It is considered that tsunamis would not have any measurable effect on this site. The only tsunami on record on the East Coast is from the Grand Banks earthquake of November 18, 1929, for which a water level height of 1/2 inch was noted at Atlantic City. There was little or no tsunami effect to the Maine coast from this earthquake, nor has there been a record of tsunami effect from any other earthquake.

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ISFSI

3.1 Introduction

The Maine Yankee nuclear power plant was a single unit pressurized water reactor located in Wiscasset, Maine. The plant began operation in December 1972 and permanently shut down in August 1997. The plant last operated on December 6, 1996. By June 20, 1997, the reactor had been completely defueled and all spent fuel resided in the spent fuel pool. On August 6, 1997, the Maine Yankee Atomic Power Company Board of Directors voted to permanently cease power operations and initiate the decommissioning process. On August 7, 1997, Maine Yankee provided written certification to the Nuclear Regulatory. Commission, pursuant to 10 CFR 50.82 (a)(1)(i) and (ii), that the Maine Yankee Atomic Power Company permanently ceased operations of the Maine Yankee Atomic Power Station and that all nuclear fuel had been permanently removed from the reactor (Ref. 1).

The issuance of this certification fundamentally changed the licensing basis of the Maine Yankee plant in that the NRC-issued 10 CFR 50 license no longer authorized operation of the reactor or emplacement or retention of fuel in the reactor vessel. Therefore, as of August 7, 1997, only those conditions or activities associated with the safe storage of fuel and radiological protection (including waste handling, storage, and disposal) were applicable to the defueled Maine Yankee plant.

The Maine Yankee ISFSI was licensed under the "general" license approach in accordance with Subpart K of 10 CFR Part 72 (Ref.20). The ISFSI general license allows a 10 CFR Part 50 power plant licensee to use a cask storage system that is pre-approved by the NRC, provided that all requirements of the cask vendor's license are complied with. The cask storage system selected for use at Maine Yankee is the Universal MPC System (UMS™), which is designed and licensed by NAC International (NAC). To use this system under the general license approach, the ISFSI licensee must comply with the requirements contained in NAC UMS™ Final Safety Analysis Report (FSAR) (Ref. 10) and the NRC issued Certificate of Compliance to the NAC UMS™ system (Ref. 2).

The Independent Spent Fuel Storage Installation (ISFSI) provides safe, economic, and long-term storage of used nuclear fuel and facilitated the decommissioning and dismantlement of the existing Maine Yankee nuclear power plant. The ISFSI provides onsite dry cask storage for the total inventory of used nuclear fuel that was stored in the Maine Yankee spent fuel pool. The ISFSI also stores the Greater-Than-Class C (GTCC) waste, which consists of the irradiated reactor internals. The Licensing Basis for GTCC being stored at Maine Yankee is 10 CFR 30 (Ref 29) which is reflected in Interim Staff Guidance-17, Interim Storage of Greater Than Class C Waste (Ref 30). The design specification for the GTCC is NAC International Document No. 790-S-18 (Ref 31). Placing the used fuel and GTCC waste in dry storage allowed the fuel building, including the spent fuel pool, to be decommissioned and dismantled in the same manner as all other plant structures. The used fuel and GTCC waste will be stored safely in the spent fuel ISFSI storage system, consisting of sealed (airtight) metal canisters placed inside of concrete casks. The ISFSI will remain operational until the US Department of Energy (DOE) or another licensed entity has temporary storage or a permanent high-level waste disposal facility to accept the Maine Yankee spent fuel and GTCC waste, or until another suitable disposal facility becomes available. Construction of the ISFSI facility was completed in the fall of 2001. Spent fuel and GTCC waste transfer to the ISFSI was completed in the spring of 2004.

3.2 General Description of ISFSI Facility

3.2.1 General

The ISFSI is located within the site boundary, of the pre-existing Maine Yankee nuclear power plant in the Town of Wiscasset, Lincoln County, Maine. The site selected for the ISFSI was an open area approximately 1200-ft north of the pre-existing power plant in an area that was used as a vehicle parking lot. The ISFSI is located within the owner-controlled area. There are no permanent occupants that reside in the owner-controlled area. The ISFSI occupies a land area of approximately 12 acres.

3.2.2 Principal Characteristics of Site

The ISFSI consists of the storage system and concrete storage pads, a Protected Area (PA) for spent fuel storage, and a Security/Operations Building for equipment and staff. The PA is surrounded by a 12-ft. high security fence and encompasses an area of approximately 3 acres. Additional security is provided by a second 8-ft high nuisance fence outside the security fence with a 20-ft wide isolation zone between the two fences. The PA contains 16 concrete cask storage pads (each being approximately 31-ft wide by 31-ft long) with driveway access around the pads. Each pad holds up to four spent fuel or GTCC concrete storage casks. A partial earthen berm is provided around the facility to reduce the visual impact of the facility. The ISFSI site plan is shown on Figure 3.2-3. The ISFSI site grading is shown on Figure 3.2-4.

The facility was designed and sized to be only large enough for the existing licensed spent fuel and GTCC at Maine Yankee. Maine Yankee will not store any spent fuel or GTCC from other generators. The storage capacity of the ISFSI utilized a total of 64 concrete storage casks, with one sealed canister per storage cask. The types of canisters stored in the storage casks include 60 for spent fuel and four for GTCC waste. Damaged fuel is stored in special cans having mesh screens, in the same canisters with intact fuel. Sixteen storage pads of equal size are provided for uniformity. The storage pad details are shown on Figure 3.2-6. The ISFSI site is arranged to provide maneuvering room around the storage pads for access to each cask with the heavy haul tractor-trailer. The security/operations building is approximately 10,500 square feet in area approximately (68-ft x 154-ft) and approximately 40-ft high.

3.2.3 ISFSI Facility Principal Design Features

3.2.3.1 ISFSI Site

The ISFSI facility principal design features include the design codes, standards, and design requirements applicable to the site, earthen berm, cask storage pads, and the Security/Operations Building. In May of 1999 Maine Yankee submitted to the Maine Department of Environmental Protection (MDEP) a major amendment application (Ref. 3) to the existing MY Site Location of Development Permit. The major amendment application was to allow construction of an ISFSI for the interim storage of Maine Yankee's spent fuel and GTCC. The application, pursuant to State laws, provides detail design information relative to State environmental compliance in areas, such as, solid wastes generated by the development, anticipated air emissions and noise impact during development, assessment of site soils for the ISFSI, ISFSI impact on groundwater and stormwater management during site development and ISFSI operation.

The ISFSI site area is above the 100-year flood plain, as shown on the "Flood Plain Map" prepared for the Maine Yankee Land Use by Robert G. Gerber, Inc. and dated February 6, 1997 (Ref. 4). The ISFSI site area is also above the Probable Maximum Flood (PMF) elevation as described in Section 2.3.3 of the DSAR, and as such, flooding is not a consideration in design of the facility.

Snow Load - A design ground snow load of 60 psf per ASCE-7 (Figure 7-1) (Ref. 5) has been considered for the site. Snow load data for the Bailey Point area is identified in the site DSAR (Section 2.2.5.1) as 40 psf (10- yr storm), 60 psf (max. recorded), and 80 psf (Estimated max. accumulation plus weight of max. possible storm).

Wind Loads - Site calculated wind loads have been determined in accordance with ASCE-7 using a basic wind speed of 105 mph (Figure 6-1 and linear interpolation), Occupancy Classification III.

Temperature Range - Temperature extremes at the Maine Yankee site are also described in the DSAR (Section 2.2.4) as approximately -40F to +100F. The average annual temperature is approximately 45F.

Tornado Design Criteria - The design basis tornado for the vertical concrete casks (VCC's) is based on Regulatory Guide 1.76 (Ref. 25) and NUREG - 0800 (Ref. 26).

Seismic Design -The Maine Yankee ISFSI site seismic analysis is based on a 0.18g-NUREG/GR-0098 ground response spectrum for the plant site and on an evaluation of the effects associated from appropriate soil amplification and soil-structure interaction (Ref. 27 & 28).

Load combinations, allowable stresses, and factors of safety, are in accordance with NUREG-1567 (Ref. 6), ANSI/ANS-57.9 (Ref. 7), ACI-349 (Ref. 8), ACI-318 (Ref. 11), and/or ASCE-7, as applicable to the design element under consideration.

3.2.3.2 ISFSI Berm

The ISFSI is provided with an earthen berm on three sides to minimize the visual impact of the facility. The earthen berm was classified as a QA Category III structure under the designer's (S&W) Quality Assurance Program (QAP) since it is not used for shielding credit in the site dose assessment. The seismic design of the berm conforms to BOCA NBC Section 1610 (Ref. 9). The seismic design did not necessarily qualify that the berm remains intact after a Design Basis Earthquake (DBE). After such an event, repair of the berm could be performed in a short period of time. However, the berm arrangement is such that a failure of the berm does not have any effect on the storage casks or pads. Design and construction of the berm followed QA Category III requirements under the designer's (S&W) QAP.

3.2.3.3 ISFSI Storage Pad

The cask storage pads are provided to support the storage casks that contain the sealed metal spent fuel canisters. The storage technology selected for use at Maine Yankee is the UMS™ storage system designed by NAC International (NAC).

A design for a light water reactor spent fuel dry cask storage was submitted to the U.S. Nuclear Regulatory Commission (NRC) for licensing approval in the NAC Final Safety Analysis Report (Ref. 10).

The cask storage pads are capable of adequately supporting the storage casks/canisters under all load conditions. The cask storage pads were designed and constructed to assure the pad/soil system is "soft" enough to limit the deceleration forces encountered by the canister during the hypothetical cask tip over event. As such, the cask storage pads were classified as QA Category II under the designer's (S&W) QAP, which provided additional quality assurance and quality control requirements during design and construction of the pads to ensure compliance with the NAC FSAR requirements. Pad construction documents (drawings and specifications) were marked as QA Category II under the designer's (S&W)

QAP, with specific QA/QC requirements identified therein. Pad calculations were prepared in accordance with QA Category I requirements. All geotechnical field investigation work, laboratory testing of soil samples, and geotechnical calculations were classified as QA Category I to assure a conservative approach to data gathering and establishment of the design bases.

The critical attributes identified by the NRC issued Certificate of Compliance (Ref. 2) for the NAC UMS™ system and associated technical specifications (e.g., concrete strength, thickness, surface roughness, subgrade soil properties, etc.) are identified on the construction drawings and specifications. The compressive strength for the concrete met the specified 3,000 psi at 28-days nominal requirements.

The quality attributes described above are based upon the designer's (S&W) quality program definitions. The pads were classified as ITDC/NNS in accordance with the Maine Yankee QA Program during design and construction to assure that the required engineering attributes were verified. The MY ISFSI QAP defines the current classification of MY Important to Safety SSCs.

The storage pad thickness is a maximum of 3 feet with the top of concrete set approximately 2'-6" above grade to accommodate cask transfer. The existing soil beneath the pads has been replaced with compacted structural bedding material (non-frost susceptible) to a depth of 4'-6" with a tolerance of (+6"/-6").

NAC identified the size and weight of the storage system components to be used in the storage pad design in the NAC Final Safety Analysis Report (Section 3.2). The storage pad design considered the different load combinations associated with the progressive placement of storage casks.

The cask storage pads were designed in accordance with ANSI/ANS 57.9 and ACI-349. Computer methods were used to perform the static and dynamic (seismic) analysis of the storage pads. Soil-structure interaction was considered in the computer model and follows recommendations identified in ASCE-4 (Ref. 12).

3.2.3.4 Security/Operations Building

The Security/Operations Building is a steel framed metal sided building. The building is approximately 68 feet wide by 154 feet long and approximately 40 feet high. The Security/Operations building provides an area for security, maintenance, and operations.

The design codes and standards applicable to the design of this facility include the BOCA National Building Code, NFPA 101 (Ref. 13) and security requirements contained in NUREG 0508 (Ref. 14).

The Security/Operations Building houses the ISFSI security staff, security equipment, communications equipment, and provides site access control and issuance of dosimetry for persons entering the Protected Area. The Security/Operations Building also provides support facilities for the ISFSI, such as offices and work space for the operating and maintenance personnel, including a health physics area, lunch/conference room, restrooms, shower/locker rooms, document control room, truck access bay, and a diesel generator for emergency power. Site Access is controlled from the Security/Operations Building with provisions for issuing security badges and dosimetry for personnel entering the ISFSI Protected Area.

Fire Protection - Fire protection is provided in the Security/Operations Building in accordance with the requirements of the BOCA National Building Code (NBC) and NFPA. The Maine Yankee Fire Protection Program provides the requirements for fire protection in support of the ISFSI.

Emergency Power - Emergency backup power is provided for the ISFSI security system and consists of an Uninterruptible Power Supply (UPS-batteries) and a diesel generator. The diesel generator is sized to support the required security loads and emergency exit lighting in the Security/Operations Building. The UPS supports the security loads until the diesel starts and comes up to speed.

3.3 General ISFSI System Description

3.3.1 ISFSI Storage System - General

The ISFSI utilizes the Universal MPC System (UMS™) developed by NAC International. The UMS™ is a canister-based multi-purpose canister (MPC) system designed for both storage and transportation of spent nuclear fuel and GTCC waste. The ISFSI operates under the provisions of a general license utilizing the UMS™ spent fuel storage/transportation system. NRC Certificate of Compliance (CoC) No. 1015 (Ref.2) has been issued, approving use of the NAC-UMS™ system for storage of spent nuclear fuel under the general license provisions of 10 CFR 72.210.

The canister-based spent fuel storage system is a simple and passive system which utilizes an outer concrete cylinder called a "storage cask" to protect and shield the inner sealed metal canister. The storage cask is vented for natural convection cooling and has no moving parts.

3.3.2 ISFSI Universal Storage System Components

The Universal Storage System consists of two principal components

- Transportable Storage Canister (including PWR fuel basket) and
- Vertical Concrete Cask

3.3.2.1 Transportable Storage Canister

The Transportable Storage Canister consists of a stainless steel canister that contains the fuel basket structure and contents. The canister is defined as confinement for the spent fuel during storage and is provided with a double welded closure system. The welded closure system prevents the release of contents in any design basis normal, off-normal or accident condition. The basket assembly in the canister provides the structural support and primary heat transfer path for the fuel assemblies while maintaining a subcritical configuration for all normal conditions of storage, off-normal events, and hypothetical accident conditions.

The major components of the Transportable Storage Canister are the shell and bottom, a basket assembly, shield lid, and structural lid. The canister and the shield and structural lids provide a confinement boundary during storage and lifting of the TSC. The Transportable Storage Canister is designed to the requirements of the ASME Boiler and Pressure Vessel Code (ASME Code), Section III, Division I, Subsection NB (Ref. 21). It is fabricated and assembled in accordance with the requirements of Subsection NB to the maximum extent practicable, consistent with the conditions of use.

3.3.2.2 Fuel Baskets

The transportable storage canister contains a fuel basket which positions and supports the stored fuel in normal, off-normal, and accident conditions. The fuel basket is designed and fabricated to the requirements of the ASME Code, Section III, Division I, Subsection NG (Ref. 22). However, the basket assembly is not Code stamped and no reports relative to Code stamping are prepared. Consequently, an exception is taken to Article NG 8000, Nameplates, Stamping and Reports. The fuel basket is contained within the transportable storage canister. It is constructed of stainless steel, but incorporates aluminum disks for enhanced heat transfer. The fuel basket design is a right-circular cylinder configuration with square fuel tubes laterally supported by a series of support disks. The fuel tubes include Boral sheets on all four sides for criticality control.

3.3.2.3 Vertical Concrete Cask

The Vertical Concrete Cask is the storage overpack for the Transportable Storage Canister. The concrete cask provides structural support, shielding, protection from environmental conditions, and natural convection cooling of the canister during long-term storage. The concrete cask is a reinforced concrete (Type II Portland cement) structure with a structural steel inner liner. The concrete wall and steel liner provide neutron and gamma radiation shielding for the spent fuel. Inner and outer reinforcing steel (rebar) assemblies are contained within the concrete. The reinforced concrete wall provides the structural strength to protect the canister and its contents in natural events such as tornado wind loading and wind driven missiles. The concrete cask is shown in the UMS FSAR.

The Vertical Concrete Cask forms an annular air passage to allow the natural circulation of air around the canister to remove the decay heat from the spent fuel. The air inlets and outlets are steel-lined penetrations that take nonplanar paths to the concrete cask cavity to minimize radiation streaming. The decay heat is transferred from the fuel assemblies to the tubes in the fuel basket and through the heat transfer disks to the canister wall. Heat flows by radiation and convection from the canister wall to the air circulating through the concrete cask annular air passage and is exhausted through the air outlet vents. This passive cooling system is designed to maintain the peak cladding temperature of the Zircaloy-clad fuel well below acceptable limits during long-term storage.

The top of the Vertical Concrete Cask is closed by a shield plug and lid. The shield plug is approximately 5 in. thick and incorporates carbon steel plate as gamma and neutron radiation shielding. A carbon steel lid that provides additional gamma radiation shielding is installed above the shield plug. The shield plug and lid reduce skyshine radiation and provide a cover and seal to protect the canister from the environment and postulated tornado missiles. The lid is bolted in place and has provisions for a tamper indicating seal which was installed as a security measure during transport of the loaded VCC to the ISFSI.

3.3.2.5 Temperature Instrumentation

The Vertical Concrete Cask has four air outlets near the top of the cask and four air inlets at the bottom. Each outlet is equipped with a permanent remote temperature detector mounted in the outlet air plenum to monitor spent fuel in storage in accordance with the NAC Certificate of Conformance (C of C) and the associated Technical Specifications. The detector is used to measure the outlet air temperature, which can be read at a junction box located on the outside surface of the concrete cask or at a remote location.

3.3.2.6 Operational Features

Temperature monitoring of the Vertical Concrete Cask outlet air is the only active system used for monitoring the spent fuel in storage. This temperature is checked as required by the applicable Amendment of the NAC C of C Technical Specifications. This system does not penetrate the confinement boundary and is not essential to the safe operation of the Universal Storage System.

The principal activities associated with the use of the Universal Storage System were loading the canister with spent fuel, closing the canister and loading the canister in the concrete cask. The transfer cask was designed to meet the requirements of these operations. The transfer cask held the canister during loading with fuel, provided for canister exterior surface flushing with non contaminated water while in the spent fuel pool, provided biological shielding during closing of the canister, and provided the means by which the loaded canister was moved to and installed in the concrete cask.

The canister consists of four principal components: the canister shell (side wall and bottom), the shield and structural lids, the vent and drain ports (together with the vent and drain port covers) and the basket assembly. A drain tube extends from the shield lid drain port to the bottom of the canister. The vent and drain ports allowed the draining, vacuum drying and backfilling with helium necessary to provide a dry, inert atmosphere for the contents. The vent and drain port covers, the shield lid, the canister shell and the joining welds form the primary confinement boundary. A secondary confinement boundary is formed over the shield lid by the structural lid and the weld that joins it to the canister shell. The structural lid contains the drilled and tapped holes for attachment of the swivel hoist rings used to lift and lower the loaded canister. The step-by-step procedures of the Universal Storage System are presented in Chapter 8.0 of the NAC-FSAR. The auxiliary equipment needed to operate the Universal Storage System is described in Section 3.3.2.5. Other items required include miscellaneous hardware, connection hoses and fittings and hand tools typically found at a reactor site.

3.4 Identification of Agents and Contractors

The prime contractor for the design of the ISFSI facility was Stone & Webster Engineering Corporation. In this capacity, Stone & Webster provided the design of the ISFSI site, facility berm, cask storage pads, Security/Operations Building and associated support systems. The prime contractor for the design and licensing of the canister-based Universal MPC System (UMS™) is NAC International Inc.

3.5 Material Incorporated by Reference

1. NAC-UMS Final Safety Analysis Report, Docket No. 72-1015.

2. Those items listed in the Reference Section for each ISFSI FSAR Section.

3. NRC issued Certificate of Compliance to NAC UMS System, Amendment 5, dated January 12, 2009.

3.6 References

1. Maine Yankee Letter to NRC dated August 7, 1997, "Certification of Permanent Cessation of Power Operation and That Fuel Has Been Permanently Removed from the Reactor."

2. NRC issued Certificate of Compliance to NAC -UMS System, Amendment 5, dated January 12, 2009.

3. Site Location of Development Permit #L-17973 Application for Amendment, dated May 5, 1999.

4. Maine Yankee Land Use Report by Robert G. Gerber, dated February. 6, 1997.

5. ASCE - 7, "Minimum Design Loads for Buildings and Other Structures," 1995, American Society of Civil Engineers.

6. NUREG - 1567, "Standard Review Plan for Spent Fuel Dry Storage Facilities," March, 2000.

7. ANSI/ANS - 57.9 - 1984, "Design Criteria for an Independent Spent Fuel Storage Installation."

8. ACI - 349, "Code Requirements for Nuclear Safety-Related Concrete Structures and Commentary," 1997, American Concrete Institute.

9. BOCA National Building Code (NBC) - 1996, published by the Building Officials & Code Administrators International, Inc.

10. NAC-UMS Final Safety Analysis Report, Docket No. 72-1015.

11. ACI - 318-95, "Building Code Requirements for Structural Concrete."

12. ASCE - 4, "Seismic Analysis of Safety Related Nuclear Structures and Commentary on Standard for Seismic Analysis of Safety Related Nuclear Structures," 1986, American Society of civil Engineers.

13. NFPA - 101, "Life Safety Code," National Fire Protection Association, 1996.

14. NUREG - 0508, "Design Methodology for the Physical Protection Upgrade Rule Requirements for Fixed Sites," June 1980.

15. NFPA - 2001, "Clean Agent Fire Extinguishing Systems," 1998.

16. NFPA - 10, "Portable Fire Extinguishers," National Fire Protection Association, 1994.

17. UL -299, "Dry Chemical Fire Extinguishers," 1990.

18. UL - 154, "Carbon-Dioxide Fire Extinguishers," 1990.

19. IEEE - 692, "IEEE Standard Criteria for Security Systems for Nuclear Power Generating Stations," 1986.

20. 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste."

21. ASME Boiler and Pressure Vessel Code, Division I, Section III, Subsection NB, "Class I Components," 1995 Edition with 1995 Addenda.

22. ASME Boiler and Pressure Vessel Code, Division I, Section III, Subsection NG, "Core Support Structures," 1995 Edition with 1995 Addenda.

23. Nuclear Regulatory commission, "Control of Heavy Loads at Nuclear Power Plants," NUREG-0612, July 1980.

24. ANSI N14.6-1993, "American National Standard for Radioactive Materials - Special Lifting Devices for Shipping containers Weighing 10,000 Pounds (4,500 kg) or More," American National Standards Institute, Inc., June 1993, 1993.

25. USNRC Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants," April 1974.

26. USNRC, "Standard Review Plan," NUREG - 0800, April 1996.

27. USNRC Letter (NMY 87-48), Patrick M. Sears (Project Manager) to J. B. Randazza, dated March 26, 1987.

28. Stone & Webster Calculation No. 08196.16 -SG-7, "Seismic Analysis of Cask Storage Pads - NUREG-0098 Earthquake."

29. 10 CFR 30, Rules of General Applicability to Domestic Licensing of Byproduct Material.

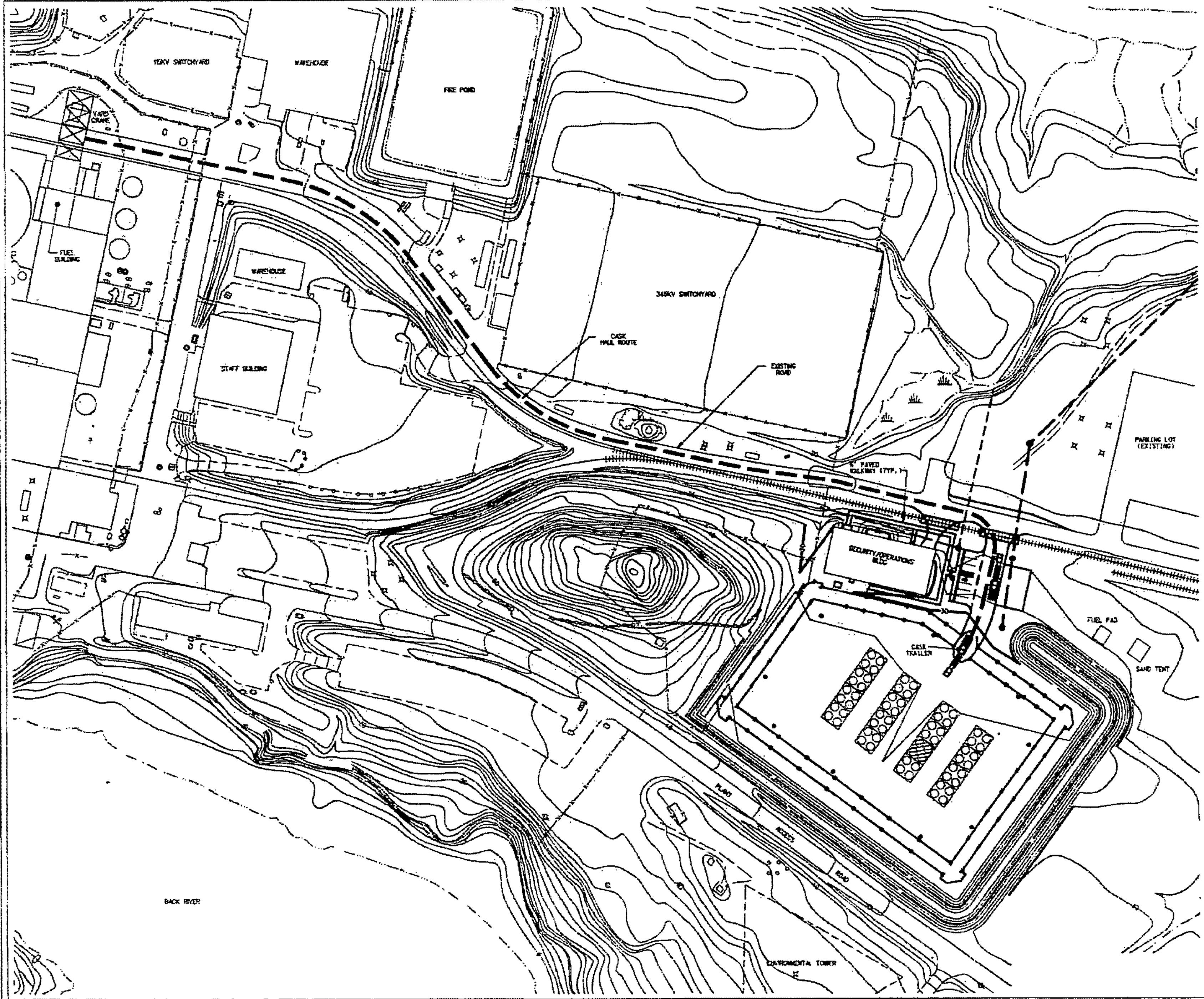
30. Spent Fuel Project Office, Interim Staff Guidance-17, Interim Storage of Greater Than Class C Waste.

31. NAC International Document No. 790-S-18, Design Specification for Greater Than Class C (GTCC) Waste Transportable Storage Canisters for the Maine Yankee Project.

Table 3.2.1
Maine Yankee Principal Environmental ISFSI Design Parameters

Parameter	*Value*
Tornado & Wind Loads	Regulatory Guide 1.76 (Ref. 25) and NUREG-0800 (Ref. 26)
Ambient Temperatures	- 40 degrees F to 106 degrees F (133 degrees F for Accident – Extreme Heat)
Flood Level	El. 11 feet for "100 year flood" El. 19.9 feet for "maximum site water level due to probable maximum hurricane"
Design Basis Earthquake	0.26g for NAC Cask Design 0.18g for Cask Storage Pad Design(Note 1)
Snow and Ice Loads	100 psf for NAC Cask 60 psf for ISFSI Site

Note (1): The site ground response (0.18g NUREG/CR-0098 Median Spectra) must be modified to account for local soil and soil-structure interaction concerns (Ref. 28).



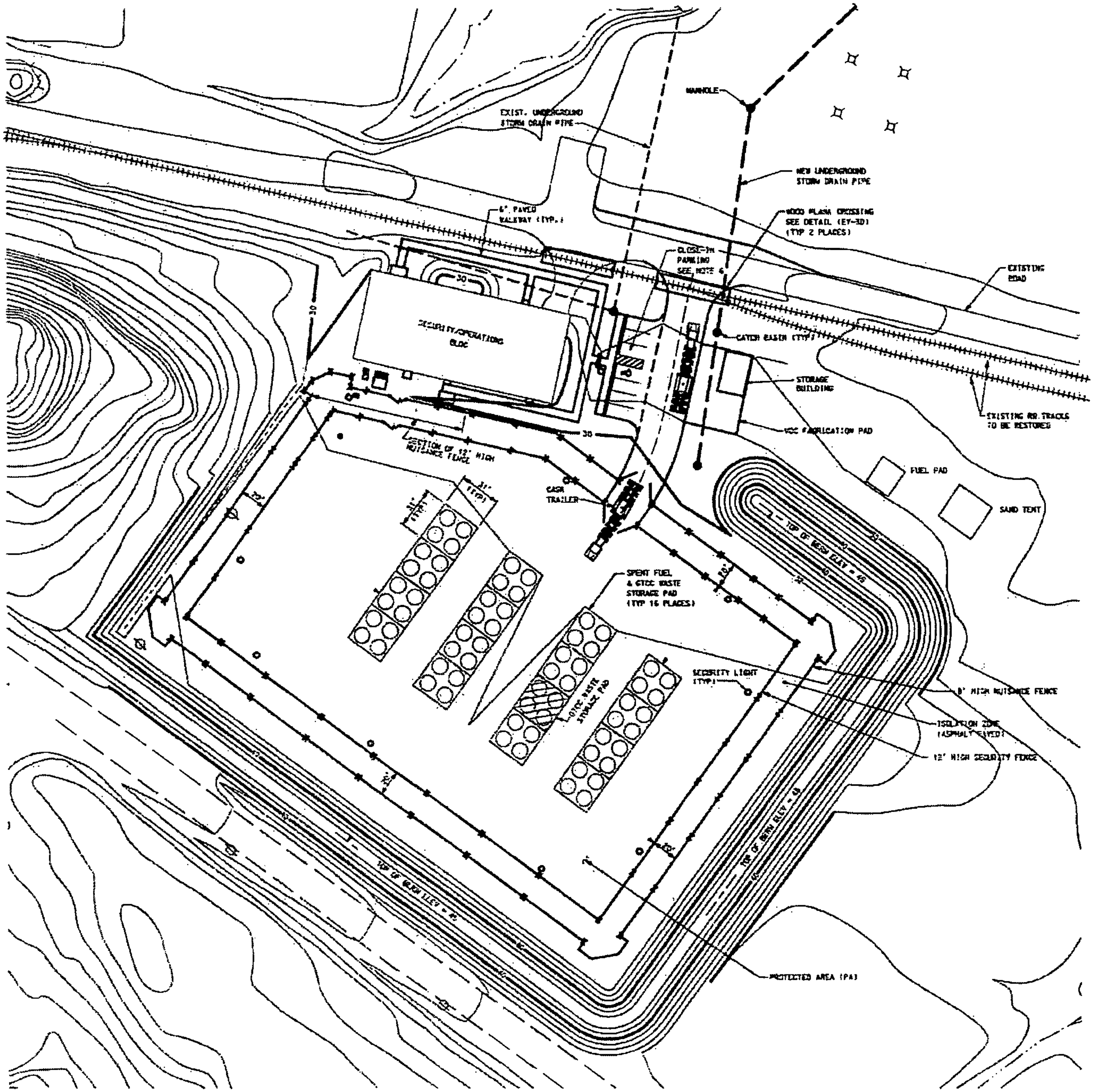
ISFSI GENERAL ARRANGEMENT AND HAUL ROUTE

Maine Yankee

SAFE AND SECURE STORAGE OF SPENT FUEL

FILE NAME: DSAR-FIG.3.2-2, REV.27

MYAPC DSAR



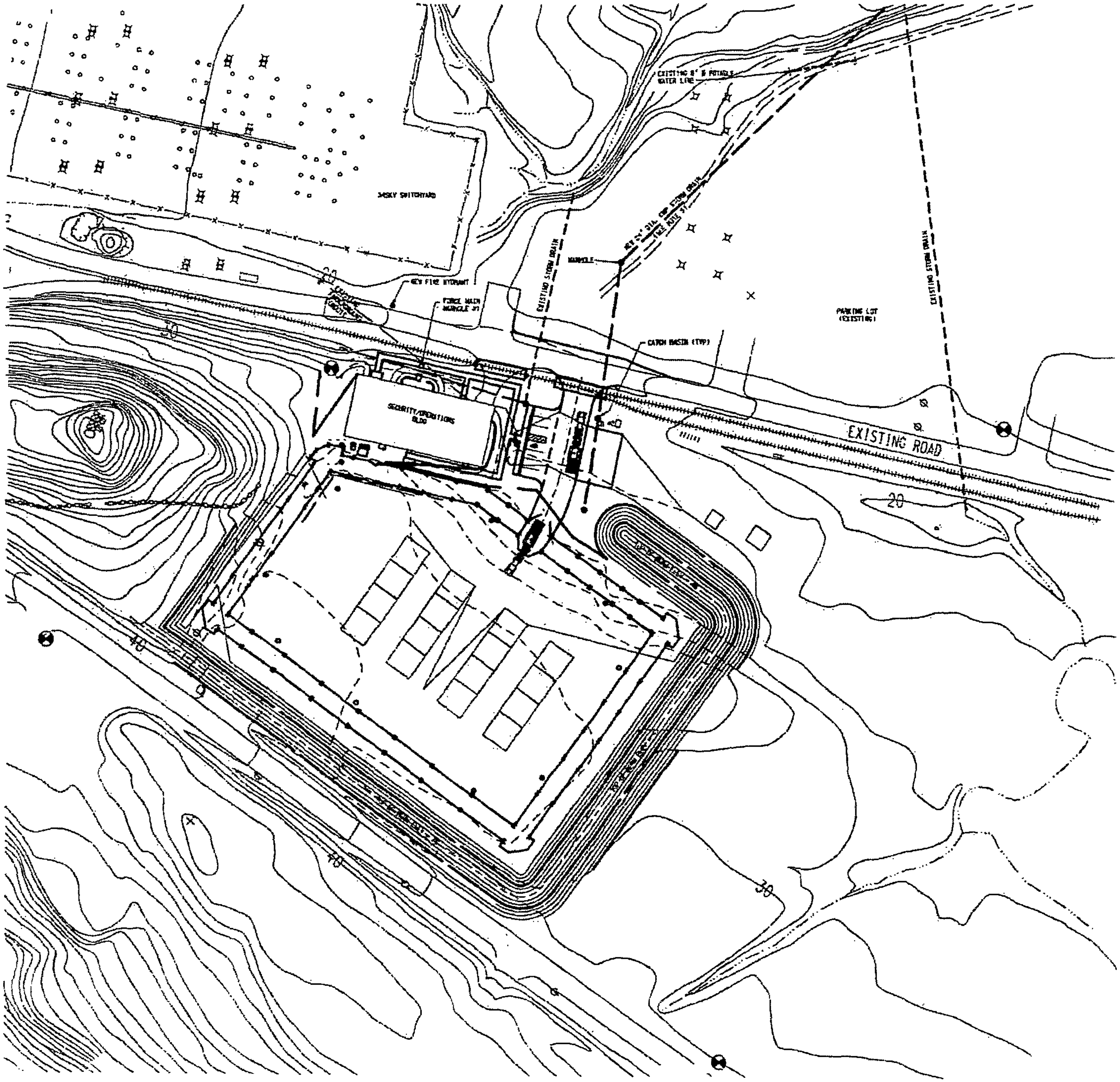
ISFSI SITE PLAN

Maine Yankee

SAFE AND SECURE STORAGE OF SPENT FUEL

FILE NAME DSAR-FIG.3.2-3, REV.27

MYAPC DSAR

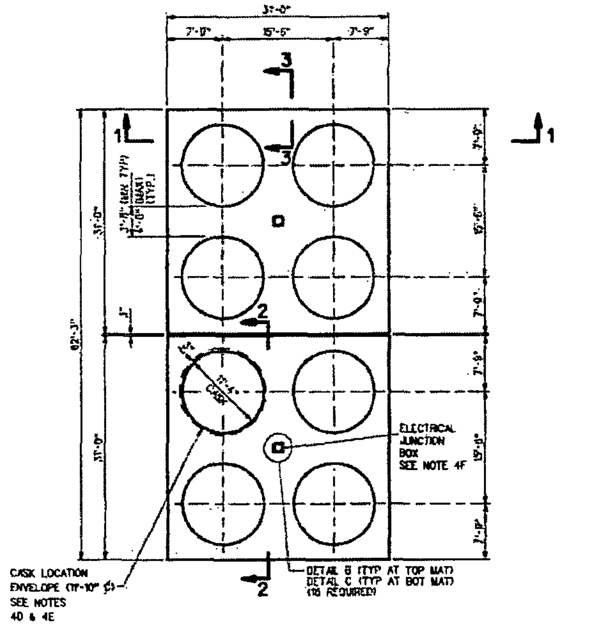


ISFSI GRADING PLAN

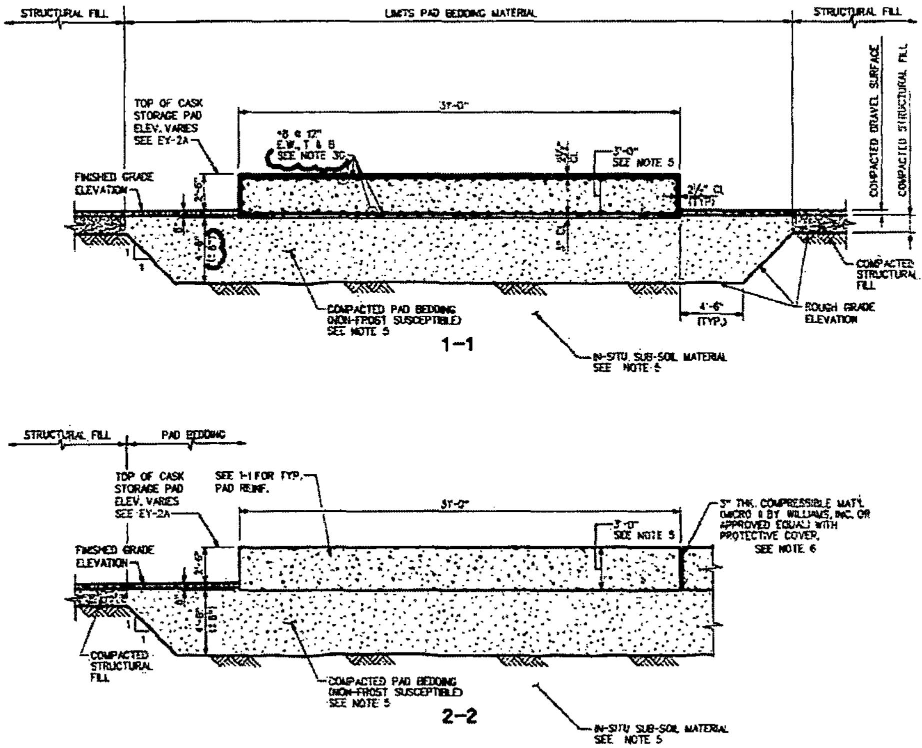
Maine Yankee

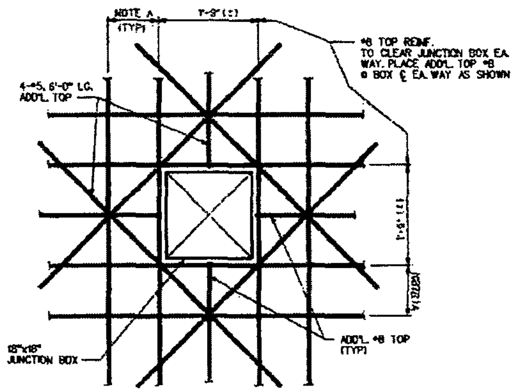
SAFE AND SECURE STORAGE OF SPENT FUEL

FILE NAME DSAR-FIG.3.2-4, REV.27



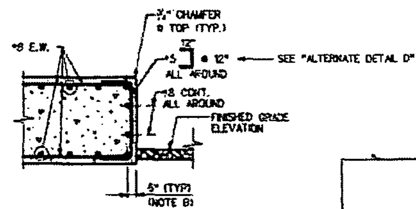
PLAN-STORAGE PAD





DETAIL B
(TOP MAT ONLY)
SCALE: 1"=1'-0"

NOTE A:
14 SPACES MINIMUM AT APPROX 12½" BETWEEN THE BAR AT THE EDGE OF PAD AND THE BAR ADJACENT TO THE JUNCTION BOX.

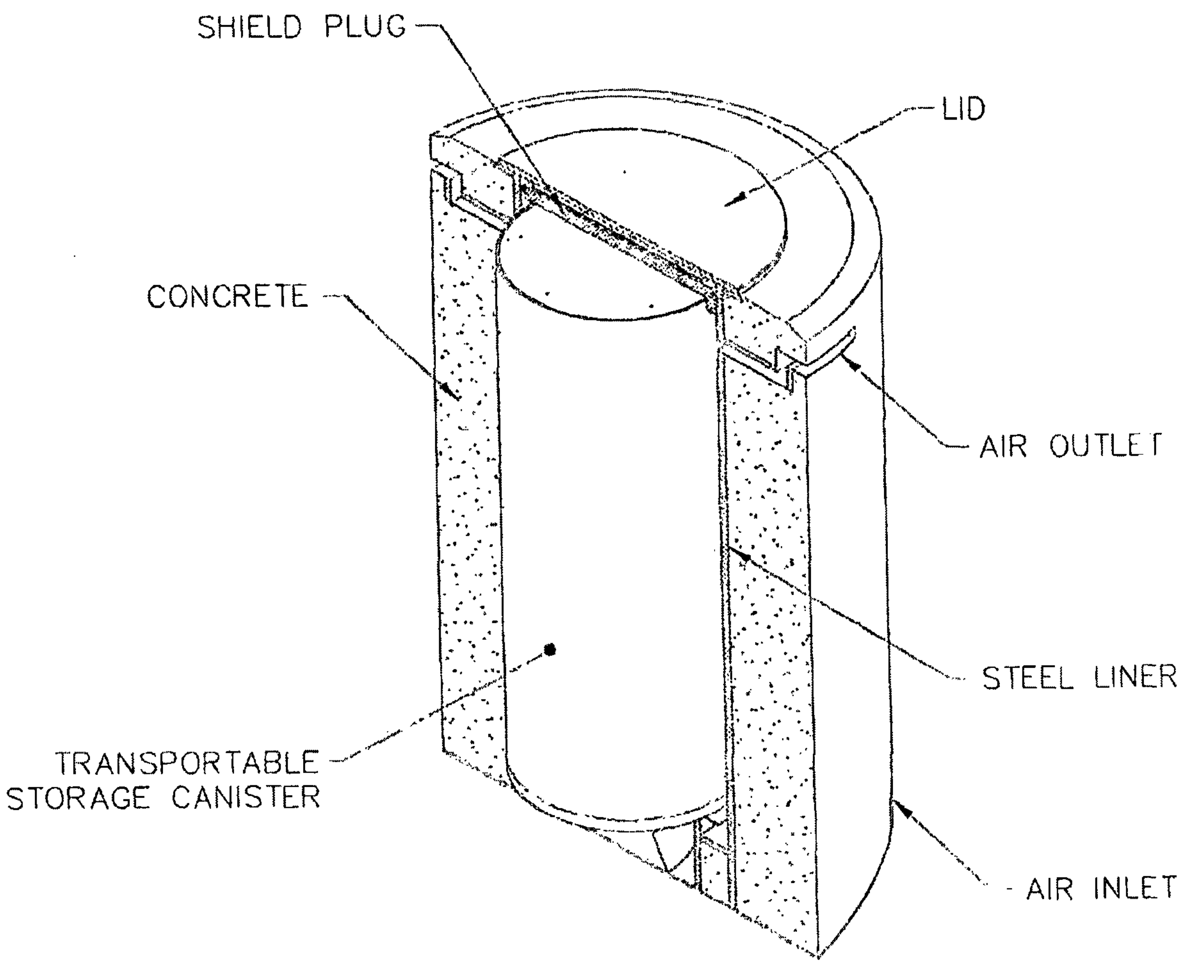


3-3

ISFSI
CASK STORAGE PADS

Maine Yankee
SAFE AND SECURE STORAGE OF SPENT FUEL

FILE NAME DSAR-FIG.3.2-6, REV.27



VERTICAL CONCRETE CASK

Maine Yankee

SAFE AND SECURE STORAGE OF SPENT FUEL

FILE NAME DSAR-FIG.3.3-1, REV.27

SECTION 4.0
RADIATION PROTECTION

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SECTION 4.0
RADIATION PROTECTION

4.1 RADIATION PROTECTION PROGRAM

4.1.1 Health Physics

Personnel requiring unescorted access to radiologically controlled areas are given training in Radiological Health and Safety. Personnel requiring escorted access to radiologically controlled areas are given training commensurate with potential radiological health protection problems in the radiologically controlled areas to be frequented. Administrative controls are established to assure that procedures and requirements relating to radiation protection are followed by site personnel. These procedures include a radiation work permit system. Work on systems or in locations where exposure to radiation or radioactive materials is expected to occur requires an appropriate radiation work permit before work can begin. The radiological hazards associated with the job are determined and evaluated prior to issuing the permit.

Personnel Monitoring Equipment

Personnel monitoring equipment is issued to and worn by personnel within radiologically controlled areas as directed by the radiation work permit in accordance with the applicable procedure. Personnel monitoring equipment is also available on a day-to-day basis for visitors not assigned to the site who have occasion to enter radiologically controlled areas. Records of complete radiation exposure history are obtained for the current year for individuals prior to allowing those individuals to exceed 10 percent of the applicable limit in one year.

Health Physics Instrumentation

Portable radiation survey instruments are provided for use by trained personnel. A sufficient number of instruments for detecting and measuring radiation are available.

4.1.2 Radioactive Materials Safety

4.1.2.1 Materials Safety Program

Site personnel with access to radiologically controlled areas are given training in radiological safety as directed by Radiation Protection Procedures.

Sealed Sources

Additionally, those personnel whose job entails the handling of sealed and unsealed sources are given additional training, as required. Procedures detail methods of leak testing sealed sources and receipt, handling control, and storage of radioactive materials.

Radioactive sealed sources shall be leak tested for contamination. Tests for leakage and/or contamination shall be performed by the licensee or by other persons specifically authorized by the NRC or an agreement State as follows:

1. Each sealed source containing radioactive materials, other than tritium, with a half-life greater than 30 days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months.

2. The periodic leak test required does not apply to sealed sources that are stored and are not being used. The sources exempted from this test shall be tested for leakage prior to any use or transfer to another user unless they have been leak tested within six months prior to date of use or transfer. In the absence of a certificate from a transfer indicating that a leak test has been made within six months prior to the transfer, sealed sources shall not be put into use until tested.

3. The leakage test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, it shall immediately be withdrawn from use, decontaminated, and repaired, or disposed of in accordance with Commission regulations.

4. Notwithstanding the periodic leak tests require above, any licensed sealed source is exempt from such leak test when the source contains 100 microcuries or less of beta and/or gamma emitting material or 10 microcuries or less of alpha emitting material.

4.1.2.2 Personnel and Procedures

Implementation of the radiation protection program, including source, special nuclear material, and byproduct material safety, is accomplished by trained personnel. The qualifications of these personnel in radioactive materials safety stem from formal and informal training, and from applied experience in the radiation protection field. Specific training of other personnel in the safe handling of radioactive materials is covered by other training.

4.2 ALARA PROGRAM

4.2.1 Policy Considerations

It is the policy of Maine Yankee to maintain radiation exposures ALARA. Maine Yankee's ALARA policy complies with 10CFR 20.

4.2.2 Design Considerations

The basic objective of facility radiation shielding is to reduce external doses to site personnel.

4.3 RADIOACTIVE WASTE MANAGEMENT

4.3.1 ISFSI Operations

With the completion of plant decommissioning and the storage of spent fuel and GTCC at the ISFSI, there is only a small potential to generate radiological material that will have to be managed as radioactive waste until decommissioning of the ISFSI. If it becomes necessary to process radioactive waste, then all applicable regulatory commitments will be met using programmatic controls and licensed contractors for handling, shipping and disposal.

MYAPC

SECTION 6.0
CONDUCT OF OPERATIONS

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SECTION 6.0
CONDUCT OF OPERATIONS

Maine Yankee Atomic Power Company is responsible for all aspects of the ISFSI operation.

6.1 Responsibility and Organization

The functional organization and key lines of responsibility for the Maine Yankee ISFSI are described in the Quality Assurance Program for Maine Yankee.

6.2 Technical Specifications

Maine Yankee Atomic Power Station is governed by the Technical Specifications which is provided with the Operating License No. DPR-36, Docket No. 50-309.

6.3 Training

Programs are conducted to train ISFSI personnel. Key personnel receive classroom or guided self-study and on-the-job training. Appropriate personnel receive instruction in emergency plan and radiation protection procedures. Specialized training is utilized as necessary. Continuing Training is used to maintain a high level of proficiency in the staff.

6.4 Procedures

Written procedures are required to be established, implemented and maintained per the Quality Assurance Program.

6.5 Programs

6.5.1 Emergency Plan

The Maine Yankee ISFSI Emergency Plan is docketed as a separate document. Changes to the Emergency Plan are evaluated under 10 CFR 50.54(q) which allows changes to be made without regulatory approval if these changes do not decrease the effectiveness of the plan and the plan, as changed, continues to meet the standards of 10 CFR 50.47(b) and the applicable requirements of 10 CFR 50 Appendix E. A report of such changes is required to be submitted to the NRC within 30 days after the change is made.

6.5.2 Security Plan

The Maine Yankee ISFSI Physical Security Plan is docketed as a separate document and is required by 10 CFR 50.34(c), 50.34(d), and 10 CFR 73. Changes to the Physical Security Plan are evaluated under 10 CFR 50.54 (p) which allows changes to be made without regulatory approval if these changes do not decrease the safeguards effectiveness of the plan. A report of such changes is required to be submitted to the NRC within two months after the change is made.

6.5.3 Quality Assurance Program

The Quality Assurance Program for Maine Yankee is docketed as a separate document and is required by 10 CFR 50.54(a). Changes to the Quality Assurance Program are evaluated under 10 CFR 50.54(a) which allows changes to be made without prior NRC approval if these changes do not reduce the commitments in the program description previously accepted by the NRC. These changes must be submitted to the NRC in accordance with the requirements of 50.71(e), FSAR update requirements.

6.6 Review and Audit

The Review and Audit functions and responsibilities are described in the Quality Assurance Program.

MYAPC
SECTION 7.0
DECOMMISSIONING

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MYAPC

SECTION 7.0

DECOMMISSIONING

7.1 Summary of Activities

Maine Yankee ceased power production on December 6, 1996. By June 20, 1997, the reactor had been completely defueled and all spent fuel was resident in the spent fuel pool. On August 6, 1997, the Maine Yankee Atomic Power Company Board of Directors voted to permanently cease power operations and initiate the decommissioning process. On August 7, 1997, Maine Yankee provided written certification to the Nuclear Regulatory Commission, pursuant to 10 CFR 50.82 (a)(1)(I) and(ii), that the Maine Yankee Atomic Power Company permanently ceased operations of the Maine Yankee Atomic Power Station and that all nuclear fuel had been permanently removed from the reactor.

The decommissioning mission of Maine Yankee was to decommission the plant safely and in a cost effective manner. Prompt decommissioning satisfied both objectives. Maine Yankee intended to decontaminate and dismantle the plant in a manner that resulted in prompt removal of the existing nuclear plant, which was one of the approaches found acceptable to the NRC in NUREG-0586 "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities." The NRC refers to this approach as the DECON alternative.

Maine Yankee's intent was to complete decontamination and dismantlement of the majority of plant structures and facilities within approximately seven years of cessation of operations. Decommissioning of the plant was completed in 2005 which was within 8 years of cessation of operations. The Decommissioning process included the transfer of the spent fuel from the spent fuel pool and the Greater-Than-Class-C waste to the on-site Independent Spent Fuel Storage Installation (ISFSI) for dry storage until the Department of Energy (DOE) takes possession of the stored material.

As of June 30, 2005, all Final Status Survey Packages for the non-ISFSI land had been completed and submitted for NRC for review. License termination for the non-ISFSI land was implemented by Amendment Change No. 172 to the Facility Operating License on September 30, 2005.

The few facilities and structures required to support the spent fuel and Greater-Than-Class-C waste storage will be decontaminated and dismantled after the Department of Energy (DOE) has taken possession of the stored material. FSS of any remaining structures and the ISFSI land will be performed in accordance with the Maine Yankee License Termination Plan at that time.