Report
of the
State Nuclear Safety Advisor
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INTRODUCTION

The annual report of the State Nuclear Safety Advisor documents events of the past year and anticipates coming issues concerning the safe storage, transport and disposition of nuclear materials present in Maine. The report primarily focuses on activity at Maine Yankee Atomic Power Company (Maine Yankee or MY), the shutdown nuclear power plant in Wiscasset. Maine Yankee presents issues concerning high level radioactive materials (primarily spent nuclear fuel), low level radioactive materials (classed as A, B and C as the activities of the isotopes increase in intensity) and greater than class C materials.

This year's report departs from last year's in two respects. First, it addresses security. The Advisor is not responsible for nuclear security issues but does participate in a cross-discipline team that informs the state's security network. The reason for the emphasis is the events of September 11 and how those events impacted Maine. Nuclear material is one category of material (the others are biological and chemical) tracked in the United States as potential Weapons of Mass Destruction (WMD). Second, the term "waste" will be used infrequently or not at all when addressing high level and low level radioactive materials. The intent is to more closely reflect international terminology and link the nuclear profession with other industries moving toward socially responsible manufacturing principles. Those principles, discussed briefly below, include the concept that the planet is too small to easily accommodate wastes of any kind. The term "waste" in this sense means material that could be reused, recycled, or transformed but lack of innovation or a market means that it is labeled as 'waste' and isolated from further commerce and human access by means of a land use decision.

EXECUTIVE SUMMARY

During 2001, Maine Yankee concluded year four of its seven-and-a-half-year decontamination and decommissioning (D&D) of the Wiscasset facility. Early in 2001, it decided to be its own Decommissioning Oversight Contractor (DOC) after reviewing bids for the work from three international companies engaged in decommissioning services. **Section I outlines the significant events of Maine Yankee's D&D for the year 2001 and notes key issues for 2002.**

Although Maine Yankee is the prime focus for state activity because it is the prime generator of radioactive materials, other facilities are also engaged in nuclear energy activity. **Section II discusses Portsmouth Naval Shipyard (PNS)** as it continues a transition, during its 202nd year as a premier Navy shipyard, from growth to maintenance in the federal nuclear propulsion program. Benchmarks in privatization efforts underway on Seavey Island are outlined.

Low-level radioactive waste is the byproduct material most common in Maine and elsewhere. It is generated in significant quantity when a facility undergoes decommissioning and decontamination, primarily due to vast volumes of concrete. In addition, Maine has a stable and continuous stream generated by hospitals, research labs and small industry that must be shipped out of state. A traditional disposal facility for Maine businesses and PNS is the Chem-Nuclear facility in Barnwell, South Carolina (Barnwell). Maine generators' disposal choices for the near term are Barnwell and Envirocare of Utah. The Texas Compact (member states Texas, Maine and Vermont) remains dormant due for the most part to the Texas legislature's failure this year to pass legislation for siting a facility. **Section III revisits the low level radioactive waste situation in Maine in context of the situations in South Carolina and Texas.**

High-level waste radioactive waste in Maine exists in large quantity as spent nuclear fuel (SNF) from the Maine Yankee facility and PNS. The SNF from PNS is currently loaded into a SNF wet pool in a railcar directly from a nuclear submarine and shipped to Idaho National Engineering and

Environmental Laboratory (INEEL). MY intends to load SNF from its 'wet pool' into dry storage/transport casks in April, a full year behind last year's schedule, for storage at the on-site Independent Spent Fuel Storage Installation (ISFSI, an acronym that is pronounced "is-FISS-ee"). **Section IV describes spent fuel dry cask storage and security, and outlines options available to the utility to pursue as federal disposal plans for SNF languish**. Maine routinely engages with the federal oversight agencies, particularly the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE), concerning federal duties owed to the State. MY's lawsuit, in cooperation with Yankee Rowe in Massachusetts and Connecticut Yankee in Connecticut, picked up momentum late in the year as the companies pursue money damages from DOE for DOE's failure to timely provide either interim storage or permanent disposal for SNF. The suit does not yet address any costs absorbed by the State of Maine or all the costs of Maine Yankee, including increased security costs implemented or contemplated post-September 11.

When SNF moves from Maine, it should move to a center of management. While Yucca Mountain is debated as the right choice for a federal SNF repository, the private sector continues to search for solutions for some SNF that can't wait for a federal repository decision. Decommissioned plants offer the opportunity for activists and advocates to support custom spent fuel management plans for DOE implementation. The business of a shutdown plant is to clean up all radioactive materials, and that means spent nuclear fuel should be moved to centers of active management before all the plant's expertise leaves. Transport of commercial SNF prior to the opening of a U.S. federal repository could mean a three-party transaction involving international entities or with states hosting existing federal sites. **Section V addresses management of high-level radioactive material elsewhere in the world and in the United States.**

Security and emergency response issues are addressed in Section VI. The events of September 11 caused immediate, heightened concern about security and safety for the community of Wiscasset and surrounding area due to the presence of high-level radioactive material remaining at MY. Renewed

debates by and among the former power producer, the State and activists on risk and information accuracy, dormant while D&D matters took primacy, followed. Safety, security and response duties on spent fuel protection, whether in the pool or at the ISFSI, are now forefront issues in Maine as they are nationally and internationally.

Section VII is a summary outline of the status of federal and state proceedings concluded during 2001. This section primarily identifies the case or proceeding by title and outlines procedural history or outcome.

SECTION I Maine Yankee Decontamination and Decommissioning (D&D)

Background

Maine Yankee Atomic Power Company, owner of Maine's only nuclear power plant, is the decommissioning oversight contractor (DOC) for the facility. The former power producer is undergoing dismantlement, the reactor head was removed and shipped for burial at Envirocare of Utah. The reactor internals were cut up and most stored in the remaining portion of the reactor vessel. Some internal pieces that are greater than class C (GTCC) byproduct are being packaged for shipment in steel canisters. Until shipment, they are stored in concrete casks on site. The company is actively marketing the plant site for a new use. Located on Montsweag Bay in Wiscasset, Maine Yankee generated electricity for 25 years but was officially closed in August 1997 after years of operational challenges. After Maine Yankee closed, it initially engaged Stone and Webster for a decontamination and decommissioning (D&D) project. The company terminated Stone and Webster's contract after the contractor became insolvent. The D&D, which continued during transition from Stone and Webster back to Maine Yankee, is essentially "construction in reverse". It includes four steps:

- preparation and planning;
- removal and disposal of radioactive equipment and materials;
- cleanup of residual radioactivity on the site
- restoration of the site for another use.

This year, Maine Yankee adjusted some schedules so that primary decommissioning completion may move from late 2004 to early 2005. See Appendix A. However, at the time of this report, management expressed confidence for a 2004 end date for all but documentation tasks. The projected completion date for secondary decommissioning (the ISFSI) is 2023.

The Maine Yankee site looks more like a demolition project today than at this time last year. Visible physical change is due to the demolition of more buildings, the largest was the turbine building implosion in late fall, but also demolished were the sewage treatment plant, the circ water pump house, the former nurses station and the so-called "met" and "345" towers.

Significant Events and Notable Activities in 2001

Five significant events and five notable activities, from the State's viewpoint, occurred during the fourth year of Maine Yankee D&D. The significant events were: 1) completion of the ISFSI pad and security building, 2) settlement of significant License Termination Plan (LTP) issues, 3) September 11 response, 4) turbine building demolition and 5) GTCC loading. Notable activities were the State's radiological survey of the Eaton Farm and land north of Ferry Road, ongoing negotiation of secondary side release issues, the reactor cavity water discharge procedure, final site survey and cumulative risk assessment preparation and Maine Yankee security measures post-September 11.

1. EVENT: ISFSI pad and security building completion

In a paradox of failure and success, Maine Yankee largely completed its independent spent fuel storage installation (ISFSI) in August. The installation is comprised of a thick concrete pad for storage of shielded canisters and a retrofitted building for security equipment and personnel. The success comes from its ability to site and build the ISFSI with few apparent technical problems and little significant opposition.

The failure arises from the former power producer's inability to return the site to green space in a single decommissioning; so long as it manages an ISFSI in Wiscasset, it will eventually be responsible for a future ISFSI decommissioning as well as the current nuclear facility decommissioning.

2. EVENT: Settlement of major LTP issues

Maine Yankee, Friends of the Coast (a local activist organization hereafter referred to as FOC) and the State had been engaged in increasingly complicated negotiations over LTP issues in 2001. Maine Yankee's original plan was quickly rejected in late 2000 by the State and FOC. The NRC accepted the company's plan to submit a revision. Maine Yankee promptly initiated a new, major LTP project, adding personnel to oversee the new plan and creating a matrix to address the technical and policy issues raised as a result of its initial effort. In the course of the first LTP revision, Rev 1, the FOC and the State filed as parties in the LTP process before the Atomic Safety and Licensing Board (ASLB). This act resulted in more issue identification and a major effort to settle rather than contend the issues. A settlement agreement, attached as Appendix C, was reached in August. Significant progress on the settlement tasks has been made to date. The current edition of the plan, called "LTP Rev 2," is expected to result in a third revision after the NRC reviews the submission and holds a public meeting in Maine in March for citizen comment and reaction on LTP Rev 2.

3. EVENT: September 11

Maine Yankee managers were scheduled to brief the Governor's Office on the morning of September 11 on the status of low level radioactive materials at the site and its role in Texas Compact financing. Shortly after the towers in New York were struck and the plane hit the Pentagon, the meeting with Maine Yankee was postponed. Maine Yankee and the State then quickly and effortlessly entered into an emergency-mode relationship. In subsequent debriefs, the actions by both appeared to be a nearly textbook-perfect rendition of emergency preparation and execution during a bizarre and unpredictable national security situation. Communication protocols were followed and even improved upon as the day unfolded. State personnel on site remained at the facility with Maine Yankee staff throughout the night.

After 48 hours, Maine Yankee returned to demolition activities under the NRC designation of a Threat Level 3. The State questioned management inaction to add visible security measures to the enhanced protection for the spent fuel pool. A local crisis developed by week's end after unchallenged visits by concerned persons to on-site parking and viewing areas were reported in the media as security breaches. Maine Yankee, after adverse press and meetings with state security officials, reversed its policy on the size of its secured perimeter by creating new, visible perimeter security measures previously considered unnecessary. More about security is described in Section VI.

4. EVENT: Turbine Building demolition

Maine Yankee imploded, a process that makes fewer disturbances to the environment that an explosion, most of a major structure called the turbine building on November 17. The contractor was the internationally renowned Controlled Demolition, Inc. (CDI). Its Vice President Doug Loizeaux gave a presentation on implosion at a Community Advisory Panel meeting on November 15. Terry Peacock, the Maine Yankee Site Restoration Manager for demolition projects, also participated. The demolition implosion occurred with no problems

and as expected. The company effectively publicized the event broadly to the community.

5. EVENT: GTCC loading and reactor shipment

The first storage canister of cut shrouding from the reactor, the GTCC material, was loaded over a period of days in late November. This initial canister moved to the ISFSI pad on December 19. The GTCC project has been delayed at all stages, including the loading stage when Maine Yankee discovered that the lid to the canister needed adjusting by 0.085 inches. The lid was returned to the manufacturer for re-tooling. The State has monitored the GTCC project and maintains steadfast concern through a series of letter to the DOE over hosting GTCC and lack of DOE action to remove the GTCC. A total of four canisters will be loaded with GTCC and moved to the ISFSI.

As was reported last year, it remains the case that due to a low water table in the Savannah River, the date for shipment of the reactor and balance of the reactor internals to the proposed disposal site in Barnwell is still uncertain. In 2001, Maine Yankee renegotiated its service agreement with Barnwell for assurances that the facility will accept the vessel until the year 2008.

The following notable activities were either started in 2001 or reached a significant stage.

1. **ACTIVITY: State surveys**

Pat Dostie and Dale Randall worked diligently in 2000 and 2001 to survey the soil and important features at the Eaton Farm and north of Ferry Road. Maine Yankee requested the NRC in 2001 to release the property prior to license termination; that is, to allow this part of the property an early release from NRC regulatory oversight. Dale Randall supervised interns during the spring and summer. A preliminary report—on file with the Office of Nuclear Safety at the Bureau of Health—was completed in December. The final version is scheduled for February. The independent report's findings validate representations by Maine Yankee that the Eaton Farm property could be released in 2002 for new

use. In addition, the Department of Environmental Protection (DEP) finished a significant work in early 2001—its Quality Assurance Protection Plan (QAPP)—for how the state will test and survey for non-radiological contamination once demolition is complete.

2. **ACTIVITY: Secondary side releases**

An ongoing state concern is how Maine Yankee treats and documents materials that Maine Yankee says are not contaminated. The judgment is based on the surveying of so-called secondary side material. The State's consultant conducted independent verification to confirm the company's decisions and process. The State also spent considerable effort in 2001 to understand the truck monitor's detection equipment settings. The truck monitor is often the final opportunity for the detection and prevention of radioactive material from leaving the site as material designated "non-contaminated".

3. **ACTIVITY: Cavity water discharge**

The GTCC material from the reactor cavity was segmented inside a tank vault of water. The wastewater, called the "cavity water," is scheduled for discharge into the Forebay under procedures that were negotiated and recorded in the MY state license permit for wastewater discharges. The state established a procedure during 2001 for testing the treated water as it flows into the Forebay, an event that is scheduled to take place mid-2002 under NRC guidelines.

4. **ACTIVITY: Final site survey preparations/cumulative risk assessment**

After materials are removed from the site, Maine Yankee is required to prepare a final site survey (FSS). This survey is the test for the quality of clean up and the assumptions and predictions made by the former power producer on the status of the site. As of the date of this report, the NRC is considering several requests by the company on its methodology and assumptions that it needs to have approved to complete the final site survey. More detailed plans for FSS are outlined in Section 5 of the LTP.

In 2001, the federal Environmental Protection Agency, Maine's Department of Environmental Protection and Maine Yankee's contractor had an initial meeting to discuss the state's required cumulative risk assessment (CRA). The CRA is an analysis of 1) the radiological, chemical and hazardous materials used at the site and, after cleanup, 2) the cumulative risk to human health. Several models were considered and harmonization of EPA and NRC models were thought to be a priority until research showed that harmonizing *per se* is not necessary. A key component for the parties responsible for reviewing the report are the inputs, the assumptions and the methodologies used by Maine Yankee. Further meetings will take place early in 2002 to review a draft document that will serve as a basis for the cumulative risk assessment. The CRA schedule is under review for a completion date that varies from two to six years.

5. **ACTIVITY: Post-September 11 responses**

Maine Yankee remains on heightened alert as of the date of this report. In March 2001, Governor King joined with four other New England governors who host commercial plants to suggest to the DOE a new policy for transport of SNF from decommissioned plants. See Appendix B. After September 11, he formally requested that the NRC withdraw its approval of security exemptions granted for the ISFSI prior to September 11. The Governor has also ask the NRC to update its Waste Confidence Report, the basis for further NRC rulemaking on spent fuel storage at reactor sites. NRC Chairman Meserve has acknowledged the requests and incorporated them within the agency's "top to bottom" review of security protocols. Maine Yankee was asked and agreed to provide the executive branch with a review of security measures for the ISFSI to show that spent fuel will be equally or better protected in dry cask storage than a wet pool. That briefing process began on January 10.

Update on Significant Events Scheduled in 2000 for 2001

Five significant events were scheduled for 2001. The first, in order of significance, was the loading of spent nuclear fuel from the wet pool into dry casks for storage and eventual transport. The schedule to load GTCC slipped

from February 2001 to late December. The schedule for loading SNF for dry storage has been delayed to spring of 2002.

The second significant event was loading the segmented GTCC reactor internals into casks for intermediate storage prior to shipment offsite. This is underway as the time of this report.

Third, demolition of several buildings on site is underway as scheduled. At a time when Maine Yankee is approaching a 50% volume level for shipment of low level radioactive material to Barnwell and Envirocare, the company and various State agencies, including the Public Advocate's Office, have had discussions on the equity of Maine Yankee as the responsible party for an inchoate liability of $25 million should the State continue to remain in the Texas Compact. The liability is theoretical in that Texas has not met any host responsibilities and neither Compact partners, Vermont or Maine, will likely have need of a Texas-operated facility in the near future so long as Envirocare and Barnwell provide service for low level waste generators. State law presently places the financial obligation for Compact membership, if conditions should arise for the obligation to be met, on Maine Yankee which is allowed by law to pass those costs on to ratepayers.

The fourth significant predicted event was MY's request to the NRC for a Part 50 license amendment. The amendment requested authorization for partial site release of the 200 acres on what is known as the Eaton Farm and another 450 acres of the Ferry Road north of the industrial site. After partial site release, the company has approximately 170 acres on which it will continue the D&D process. Finally, a revised License Termination Plan (LTP) was submitted to the NRC and resolved as reported above.

Significant Events Scheduled for 2002

The major, significant event scheduled for 2002 is the *President Bush's decision on the suitability of Nevada's Yucca Mountain* as the federal repository for spent nuclear fuel. The Secretary of Energy informed Governor Guinn of Nevada on January 10 that he will make the recommendation to the President

before February 28 but in not less than 30 days, as provided by law. Nevada's governor has vigorously objected to the designation and is allowed by law to decline. When he does, Congress must vote on whether to override Nevada's decision. Other federal events this year include new rules on nuclear plant security proposed by the NRC. Congress may address replacing private security forces regulated by the NRC with federal forces at nuclear plants and decommissioned sites in 2002.

In Wiscasset, Maine Yankee intends to proceed with the scheduled *movement of spent fuel from wet to dry storage* sometime in the spring. No information at the time of this report indicates the spent fuel is safer under current wet conditions than if moved to dry storage. However, the facility remains under heightened alert since September 11. How and under what conditions the fuel will be transported across the site remains open to further State review and NRC oversight.

A public meeting on the LTP Rev 2 is scheduled for March 11 at Wiscasset Middle School. The NRC and Maine Yankee expect to create a Rev 3 after testimony is received on the second revision of the license termination plan.

Maine Yankee plans to *barge the reactor vessel to Barnwell, S.C.* Whether southern drought conditions abate will determine if this long-anticipated event takes place.

Finally, the *standards and criteria for the cumulative risk assessment report* is likely to be agreed upon by Maine Yankee and state agencies this year.

SECTION II Portsmouth Naval Shipyard

Portsmouth Naval Shipyard (PNS) continues to serve the Navy for overhaul of Los Angeles Class nuclear-powered submarines. On October 5, 2001, Captain Kevin McCoy, USN, relieved retiring Captain Vernon T. Williams, USN, as shipyard commander during a traditional Change of Command

ceremony. Capt. McCoy continues work begun under Capt. Williams to keep the base productive by strategic alliances with private industry. The shipyard began leasing so-called underutilized facilities in 1999. Only one building has been leased to date and redevelopment is pending.

After the events of September 11, PNS heightened its security posture and implemented numerous physical security measures that remain in effect. Visible measures include new concrete (jersey) barriers at the entrance, more armed inspectors for vehicles entering Seavey Island and removal of parking near the Seavey Island entrance to a further distance from the gate. New checkpoints for visitors and vehicles once on the Island add increased surveillance. New buoys delineating the water approach and constant marine patrols complete the perimeter measures. Non-visible changes have been made as well to comply with the heightened security status of all nuclear facilities.

In April, the Naval Nuclear Propulsion program issued a new Report NT-01-1 entitled, as it was last year, "Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclear-powered Ships and their Support Facilities." As reported last year, most shipments of radioactive waste and materials are classified as low level or "limited quantity." The predominant radionuclide is cobalt 60. Most low-level shipment is by truck although air transport is occasionally used. PNS continues to ship spent nuclear fuel (SNF) by rail. SNF shipments are less frequent than other materials because the Navy has extended the life of the fuel rods used in the submarines such that only one refueling is used during a sub's service life (approximately 30 years). Since 1957, all SNF has been shipped via rail to the Idaho lab, INEEL. No changes this year were reported in how the spent fuel is shipped. U.S. government representatives escort each SNF shipment and each shipping container is specifically designed to withstand extreme accident impacts, to withstand fire and water immersion, and to prevent release of the material to the environment in the event of an accident. Until 1992, the fuel was reprocessed to recover the unused uranium. In 1992, reprocessing terminated and SNF was sent to INEEL for

interim storage. As a part of the an agreement among the State of Idaho, the Navy and the Department of Energy (called the "Batt Agreement" after then Idaho Governor Batt), PNS may continue to ship SNF to INEEL until 2035 or until the proposed Yucca Mountain repository or a new central interim storage facility is opened. Although military SNF moves away from its site of generation and commercial SNF does not, the ultimate destination for both is the same permanent federal repository. To date, lack of capacity at the proposed federal repository already exists due to the high volume of both military and commercial SNF even before Yucca Mountain opens, assuming that site is approved.

The controversy that the prospect of shipments of commercial fuel sometimes generates does not arise in U.S. military shipments. Those shipments continue as a routine part of the services' nuclear programs. The Naval Nuclear Propulsion Program revised its estimate from last year that nationwide shipments of SNF expose the general population on average to a radiation dose of "3 person-rem" annually. The revised estimate is "about 3 person-rem" over a lifetime. The revised dose total is from 735 containers, up from 719 container shipments of SNF, made over the 43-year period through the end of 2000. The dose, as reported, is a negligible amount from a health viewpoint and reflects estimates made based on rail transport. Only a fraction of the Navy's total shipments originate at PNS. The tracks at Kittery are the only rail lines in Maine that currently move SNF or are capable of supporting the load of a SNF transport cask. The Navy may construct an ISFSI at INEEL for interim storage of SNF in the near future.

Despite a Bush Administration commitment to level funding for the country's nuclear propulsion program this fiscal year, the shipyard faces an issue of closure in 2005 because of a defense department review of redundant bases nationwide, including PNS. With its large, skilled workforce trained in radiological material management, the shipyard offers the State and nation a rare asset in the form of personnel highly experienced with nuclear materials. Given this nation's diminishing and aging civilian nuclear energy workforce, serious political attention

to the opportunities offered by PNS for consultation on and personnel training for management of spent nuclear fuel and other radioactive materials is due.

Finally, in June, the United States Supreme Court ruled on the State of New Hampshire suit filed against Maine in the Court to revisit a settled dispute over the river boundary between the two states. The complaint renewed claims that the Shipyard islands belong to the State of New Hampshire. The Navy's official position was to remain neutral. The Court concluded in its ruling that the 201-year-old facility is in the State of Maine.

SECTION III Low Level Radioactive Waste (LLRW)

Texas Compact

Arrangements between and among Maine, Vermont and Texas to dispose of low level radioactive waste generated in their states led to a compact, called the Texas Compact. Negotiated in 1993, the Texas Compact is authorized by and subject to the Low Level Radioactive Waste Policy Act Amendments to the Atomic Energy Act of 1954 (42 USC § 2011 *et seq.*). To date, Texas has been unable to site a facility or even create a Compact Commission despite a proposal before the Texas legislature last year. The next time the Texas legislature meets for reconsideration of any siting proposal is 2003. Maine's current position on the Texas Compact is that Maine confronts changed circumstances not anticipated during the Texas Compact negotiations just a few short years ago. Private facilities have provided capacity for the low level radioactive waste stream from Maine otherwise requiring disposal at a Texas facility. The primary stream is the result of Maine Yankee's decommissioning, now 57% complete overall, not including spent fuel and GTCC. However, only 18% of all materials classified as contaminated radioactive materials have been shipped off site to date. As reported last year, the expectation is that approximately 1,016,000 cubic feet total of decommissioning waste from Maine Yankee will find disposal at a Utah or South Carolina facility prior to the scheduled completion of Maine Yankee's decommissioning.

Apart from Maine Yankee's waste volumes, low-level waste generators report little change from recent years; their volumes ranging between 1,054 cubic feet to 1,421 cubic feet according to records maintained by Maine's Department of Human Services, Division of Health Engineering. See Appendix D. Whether Maine should withdraw from the compact depends on variables including the likelihood of Texas siting a facility, the ability for Maine to negotiate an appropriate fee amount substantially less than $25 million and whether the Compact offers benefit to Maine after Maine Yankee decommissioning is completed if private facilities are still operating. After Barnwell closes in less than a decade (see below), only one commercial facility will be open to accept low level waste. No matter how small the generator, any radioactive byproduct from a Maine company or hospital will either have to return to the manufacturer, be sent to a disposal facility or remain on site.

Maine's membership in a compact, even a nonfunctioning one, gives some comfort against LLRW remaining in the state so long as the Compact host state (Texas) eventually meets its obligation. In Texas, the needs of the vast medical community for a LLRW site may be the critical factor to resolving location for a site there. In Maine, where both future Compact financial liability and private access opportunities are uncertain, three options are under consideration: 1) withdraw from the Compact under the terms of the federal statute, 2) withdraw provisionally and encourage negotiation among Compact members on new financial terms of Compact membership and 3) if there is strong generator and political interest, renegotiate terms of Compact membership under the *status quo*. Whether Congressional approval is required for any changes to the Compact's financial terms will likely have the most persuasive impact on an action chosen. The issues of equity for Maine Yankee and ratepayers, potentially higher costs for other state LLRW generators as disposal choices decrease and a theoretical Texas LLRW disposal option that, if implemented, would be too costly for Maine's needs, require careful discussion.

Barnwell, South Carolina

One of two national private LLRW facilities is located in Barnwell, South Carolina. Last June, South Carolina entered into the Atlantic Compact with New Jersey and Connecticut. The decision by South Caroline to join Connecticut and New Jersey means the two northern states continue to send their low-level radioactive waste (LLRW) out of state. At the same time, the agreement allows South Carolina to eventually exclude other states from sending LLRW to the Barnwell facility. The facility will remain open commercially for a phase-out period that concludes in or around 2008.

SECTION IV Spent Nuclear Fuel and Greater Than Class C Material

Independent Spent Fuel Storage Facilities (ISFSI)

Since it began operation in 1972, Maine Yankee produced 1,434 used nuclear fuel assemblies. The removal and disposal of the spent fuel (SNF) assemblies is the responsibility of the Department of Energy (DOE) by law and contract with Maine Yankee. Unless and until the DOE accepts and transports the SNF, many nuclear plants around the country are storing used fuel in steel and concrete containers or canisters. The canisters are placed inside a concrete overpack on a concrete pad. Maine Yankee has purchased 64 containers to house its used fuel and GTCC waste. The first GTCC canister was moved to the ISFSI pad in late December after several delays. The movement of the spent fuel will not take place until the GTCC is completely moved, likely in late spring, 2002.

After the events of September 11, local concern for the Maine Yankee spent fuel to move away from Wiscasset strengthened. Local officials asked that fuel move to federal sites that already manage and protect defense-generated and foreign reactor materials, recognizing that they are better suited to manage and protect commercial spent fuel than isolated decommissioned sites with stranded spent nuclear fuel.

Even as the Department of Energy recommends Yucca Mountain to the President based on the science, a paradigm shift occurring in manufacturing could affect nuclear materials management. "There can be no such thing as 'waste' anymore," says industrial designer William McDonough, a professor of design at the University of Virginia and a practicing architect for renewable industrial products. McDonough, along with Ray Anderson (a leader in corporate environmental restoration and author of "Midcourse Correction" which documents his conversion as a manufacturer to environmental restoration practice), believes that waste byproducts should return to the manufacturer of origin. He spoke at the Harvard Center for the Environment and Health in November. Manufacturers, says McDonough, can recycle, reuse or redesign so that materials need not turn into a pollutant or waste product requiring a land use decision. McDonough has lectured for nearly 10 years on the idea that Americans are so infected with NIMBYism that there is no political ability to site "waste" facilities anywhere. No place wants "waste" and no one will tolerate living near it, whether nuclear or any other kind of toxic or potentially toxic substance. Therefore, he and green manufacturers maintain, there must be continuous improvement by the manufacturer of origin to dramatically reduce the potential volume and toxicity of end products.

These principles closely resemble an open cycle principle for nuclear power. Under an historical "open ended cycle," reprocessing of spent fuel would allow most of the radioactive materials to continue in productivity. However, the "cradle to grave" model for burial of waste is not in line with the green manufacturer theory. After 30 years and a boom in worldwide use of nuclear materials, there is simply no place that can sustain continued burial of nuclear waste or byproducts without a dramatic reduction in volume. This dilemma is reaching a critical point with the success of the Nuclear Nonproliferation Treaty (NPT). As weapons are dismantled, the nuclear byproduct must be addressed, just as spent fuel must be addressed. Is it waste or potentially an energy source? Events in the coming year, especially the fate of the South Carolina mixed oxide (MOX) plant in Aiken, will provide more clues for what options may be created as

nuclear military materials are retired and the commercial spent fuel problem increases.

As suggested last year, it is even truer this year that the global market may provide a solution before the DOE. Russia's lower house of Parliament, the duma, voted in December to establish an international commercial SNF interim storage facility. Work continues on making that facility a reality, with monies flowing from the U.S. and with DOE officials actively monitoring progress. England and France also continue to provide service to nuclear countries by reprocessing SNF to reduce the quantity of radioactive waste. The current wait for reprocessing in either country is approximately 10 years but shipment is more readily available. Interim storage is typically provided during the queue period for reprocessing. As more developing countries pursue development of small and medium reactors (SMRs) for both thermal and desalinization uses, the need for byproduct services will grow.

SECTION V Shipments

The State's Turnpike, I-95 and its bypasses and Route 1 are still the primary corridors for the transportation and shipment of radioactive material from nuclear pharmacies or hospitals from York to Fort Kent. Portable gauges used to detect lead in paint, moisture density gauges, and asphalt content gauges travel to wherever they are needed, on road and off road. With the decommissioning of Maine Yankee there is an increase in the amount of low-level radioactive waste (LLRW) being transported through Maine by rail. Rail shipments have been the primary mode of shipments of LLRW to Envirocare's facility in Clive, Utah, the alternative to Barnwell.

When LLRW is shipped to the disposal facilities by ground transportation, it is regulated by the U.S. DOT under 49 CFR Parts 100-179. In the rare occurrence of a transportation accident involving LLRW, the state and federal emergency management agencies have established an emergency response plan. The DOT regulations address third-party bodily injury and property damage

and cleanup. They require minimum limits for insurance per occurrence. All transporters of LLRW must comply with the Motor Carrier Act of 1980.

SECTION VI Security Issues

The events of September 11 heightened and focused attention on nuclear materials security. Prior to those events, however, steady attention had been routinely paid to security as it related to the safety aspects of nuclear materials—both stranded and useful—within Maine's borders. Both nuclear devices (weaponry) and radioactive materials (hospital or utility byproducts) dispersed by conventional explosives are identified as "weapons of mass destruction" (WMD). This year, the office met from time to time with WMD state officials to share information and brief each other on current and emerging ideas in the field of security and WMD. In addition, this office represented the state at gatherings designed to advance knowledge on security and safety of nuclear and radioactive materials. Sessions on security and safety were held at the Waste Management Symposium sponsored by the University of Arizona, the Global Spent Fuel II Symposium sponsored by the Nuclear Energy Institute and the triennial Packaging and Transport of Radioactive Materials (PATRIM) meetings co-sponsored by the Department of Energy and the International Atomic Energy Agency. The international PATRIM meeting was especially timely because it took place in the United States this year during the week of September 4.

This year also marked a personal completion of an advanced program of study at Tufts University's Fletcher School of Law and Diplomacy. The global masters program provided an opportunity to focus on nuclear materials addressed by international treaties, some of which provide opportunities for spent nuclear fuel management and radioactive material services. The coursework and professional sessions provided contacts, drill exercises and background material in advance of the year's new nuclear safety demands in relation to security issues. The issues of the consequences—whether by accident or design—of a spent fuel pool fire (zirconium fire) or dry cask and canister breach and content

disbursement took a higher profile after September 11. A draft report by the NCRP Scientific Committee 46-14 and chaired by Dr. John Poston at Texas A&M had been posted a year before on the Internet to request comments on the effects of events that disperse spent fuel. The committee's official report, issued in November, theorizes on how widespread contamination might occur. Internationally, the literature is still weak to nonexistent on what are the actual consequences of a deliberate attempt to disperse disintegrating radioactive elements in spent fuel, whether stored wet or dry. The DOE and IAEA are in year 3 of a 5-year study to verify that the surrogates used in foundation studies for radioactive materials dispersal estimates are appropriate and reliable.

The toxicity of nuclear byproducts and the potential for psychological fear created by any abnormal situation involving radioactive materials traditionally have been taken into account by robust security programs and a defense-in-depth safety strategy. The meaning of "robust" is fiercely debated, as is many aspects of nuclear programs. In security terms, nuclear power plants and nuclear shipyards are hardened targets. Federal regulations prior to September 11 required that the nuclear industry demonstrate it can protect against a threat by a well-trained paramilitary force, armed with automatic weapons and explosives and intent on forcing its way into a nuclear power plant to commit sabotage. The nuclear shipyard in Maine has had traditional military support for security needs. In September, it stepped up its security protocols in response to new conditions.

Security issues run the gamut from international issues of statecraft to local, technical minutiae. The condition of the fencing around the Maine Yankee perimeter, where and under what conditions badges and security uniforms should be shown in public and the ability of media to take photographs are just some of the security issues re-visited at Wiscasset, and to some extent, Portsmouth. Finding a balance between underprotecting and overprotecting the Wiscasset demolition site is ongoing as the plant attempts to dismantle itself and manage spent fuel at the same time. Maine Yankee's plan to manage spent fuel as a shut down plant created a trying situation for Maine before events of

September 11. Afterwards, Maine people felt as did others in the nation: caught off guard and initially hard pressed to trust any governmental agency to accurately assess adequate security measures at potential targets. Yet, as events have unfolded in the few months since September, it appears that the nature of terrorist security threats and destructive intent is knowable and capable of analysis. The communication and collaboration among radioactive material generators, local, state and federal government remains high. In Maine, the informal and relatively small networks of agencies and personnel in the radiological fields have been an asset to safety and security. As of the time of this report, the attention given to Maine by federal officials—in law enforcement and nuclear regulation—has been prompt and effective.

Section VII Proceedings

At the end of December, the status of state-monitored legal and administrative proceedings is as follows:

Docket # 50-309-OLA/ASLBP #00-780-03-OLA

Settled August 30,2001

In the Matter of Maine Yankee Atomic Power Co.

The State and Maine Yankee executed a settlement agreement after the State petitioned the NRC Licensing Board for party status in order to present formal comments on the Maine Yankee License Termination Plan (LTP). The settlement, concluded on August 30, was the culmination of a year of State comments on the LTP and intense dialogue among the State, Maine Yankee and the Friends of the Coast. As a result, Maine Yankee substantially rewrote the LTP to incorporate the State and FOC comments and to address the State's concerns. In addition, the settlement agreement provided mechanisms that have been implemented successfully to resolve outstanding technical issues and to

determine whether the NRC would consider the intertidal zone in Bailey Cove to be a part of the plant site that must satisfy site-release criteria. See Appendix C.

Docket # 50-309

Pending

NRC Review of Maine Yankee Exemption Request under 10 CFR 73.55 for Revised Security Plan

After the events of September 11, Governor King wrote to Chairman Meserve requesting that exemptions made for the future ISFSI be withdrawn and the same security required at operating plants be maintained at the ISFSI. The NRC is expected to issue new security rulemaking in early 2002.

Docket #s 99-5138, 5139, 5140

Decided August 30, 2000; damage claims pending

(On ***August 30, 2000***, the Court of Appeals in the Federal Circuit issued a decision determining a breach of contract by DOE. There was a motion for rehearing filed on November 15, 2000, that was denied by the court on December 12, 2000. There have been no further proceedings in the Court of Appeals. The Court of Federal Claims lifted its stay on the damages discovery on July 30, 2001. The proceedings are still before the Court.)

Maine Yankee Atomic Power Company, Connecticut Yankee Atomic Power Company and Yankee Atomic Electric Company v. United States,

United States Court of Appeals for the District of Columbia Circuit

Maine Yankee's suit against the U.S. Department of Energy ("DOE") for damages caused by DOE's failure to remove spent nuclear fuel had been stayed pending a government appeal on the question of whether utilities must bring their claims before the DOE instead of in the Court of Federal Claims. The Court of Appeals for the Federal Circuit ruled, however, that Maine Yankee's suit may proceed, and the stay on the damage portion of the proceedings was lifted in the

Court of Federal Claims on July 30, 2001. Since then, DOE has taken extensive discovery from Maine Yankee. DOE must file its response to Maine Yankee's damages claims in early 2002. DOE is expected to contend that Maine Yankee has no damages because it had no absolute right to have its spent fuel removed at any particular time. The State has monitored this litigation closely and has assisted Maine Yankee in pursuing these claims.

Original No.130

Decided May 29, 2001

State of New Hampshire v. State of Maine, U.S. Supreme Court

Boundary dispute between the states over Kittery and Portsmouth environs. New Hampshire claimed Seavey, Jamaica and Clark's Islands where PNS is located. The Supreme Court ruled in favor of Maine. The opinion citation is 532 U.S. 742.

CONCLUSION

Maine Yankee activity dominated the year's nuclear safety agenda. Its decision to be its own Decommissioning Oversight Contractor (DOC) will definitively shape the second half of the seven to eight year D&D project. The company concluded administrative procedures with the NRC that will allow early release of a majority of the land comprising the Wiscasset site. The DOE has yet to demonstrate adequate responsibility for MY spent fuel and greater than class C waste management.

Maine is a forerunner in large scale, dry cask interim storage for spent fuel. The situation still requires vigorous pursuit of answers on both the national and international fronts for better spent fuel management than is currently contemplated. The events of September 11 dramatically increased Maine's challenge with regard to hosting a spent fuel storage facility that anticipates fewer and fewer professionals on site.

The nuclear industry—regarded as a re-emerging industry in a 2001 *The Economist* cover story —once again faces intense public scrutiny and questioning in a time of national concern with terrorism and appropriate security. Yet, from the international perspective, the industry continues to grow. Other nation states tend to view nuclear energy as an energy-independence solution. A new and positive link to environmental enhancement developed in 2001 with recognition of nuclear power's contribution to carbon emission reductions by a United Nations Global Change Climate Working Group report.

Whether the political struggle in the United States to site a federal SNF repository this year will transform old nuclear power issues that deeply divide activists and advocates is an open question. The answer cannot come too soon for Maine.

Resources and References

The following web pages provide facts and images on decommissioning of the Maine Yankee Atomic Power Plant, and general issues of radiation control and management

http://janus.state.me.us/dep/rwm/myankee/homepage.shtm

http://janus.state.me.us/dhs/eng/rad/rad.shtm

http://www.maineyankee.com/

Other sites of interest include:

http://www.nrc.gov/public-involve/public-meetings/webcast-live.html

http://epa.gov/epaoswer/osw/index.htm

http://inel.gov/national/national.html

http://www.envirocareutah.com

http://www.cogema.com/cogema/uk/fs_accueil.htm

http://www.altfutures.com "The Future of Radiation Protection: 2025"

http://www.radwaste.org/decom.htm

http://necnp.org "New England Coalition against Nuclear Pollution"

NOTE: Due to heightened security measures, some websites, including Maine Yankee's, have limited, less specific information available compared to last year. The NRC has a new website to allow Internet users to view NRC meetings live starting January 15.

Prior year Nuclear Safety Advisor Reports are cataloged and on file in the Maine State Legislative Law Library.

Acknowledgments and Errata: Thanks go to Alan Robinson, Harvey Horn, Jack Scibisz and Jerry Solich at Portsmouth Naval Shipyard, State Nuclear Safety Inspector Pat Dostie and assistant Dale Randall, Mike Meisner and Michael Thomas at Maine Yankee, staff members at Maine's Bureau of Health Engineering and Department of Environmental Protection, members of the Governor's Technical Advisory Panel, Lt. Bill Snedeker and Col. Mark Gilbert for assistance in preparation of this report. Any errors are my responsibility, however. If readers find errors or have comments on the information presented in this report, kindly send them via email to paula.craighead@state.me.us or write to State Nuclear Safety Advisor, St. Hs. St. 38, Augusta, ME 04333. If appropriate, an addendum will be published either in advance of or with the 2003 Report. In the 2001 Report, a reviewer pointed out that the illustration depicting a SNF dry storage cask was not to scale.

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GLOSSARY

Excerpts from the 1996 DOE publication *Closing the Circle on the Splitting of the Atom*

Alpha particle. A particle consisting of two protons and two neutrons, given off by the *decay of* many elements, including uranium, plutonium, and *radon.* Alpha particles cannot penetrate a sheet of paper. However, alpha-emitting isotopes in the body can be very damaging.

Atom. The basic component of all matter. The atom is the smallest part of an element that has all of the chemical properties of that element. Atoms consist of a *nucleus* of protons and *neutrons* surrounded by electrons.

Beta particle. A particle emitted in the *radioactive decay of* many *radionuclides. A* beta particle is identical with an electron. It has a short range in air and a low ability to penetrate other materials.

Calcine. A process that uses heat to reduce liquid high-level waste into a dry, powdery form. Also the powdered waste that results from this process.

Cesium. An element chemically similar to calcium. Isotope cesium-137 is one of the most important *fission products,* with a *half-life* of about 30 years.

Chain reaction. A self-sustaining series of nuclear fission reactions, *when neutrons* liberated by fission cause more fission. Chain reactions are essential to the functioning of *nuclear reactors* and weapons.

Chemical separation. Also known as *reprocessing;* a process for extracting *uranium* and plutonium from dissolved irradiated targets *and spent nuclear fuel* and *irradiated targets.* The fission products that are left behind are *high level wastes.*

Cladding. The outer layer of metal over the fissile material of a nuclear fuel *element.* Cladding on the Department of Energy's *spent fuel* is usually aluminum or zirconium.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A Federal law, enacted in 1980, that governs the cleanup of hazardous, toxic, and radioactive substances. The Act and its amendments created a trust fund, commonly known as Superfund, to finance the investigation and cleanup of abandoned and uncontrolled hazardous waste sites.

Criticality. A term describing the conditions necessary for a sustained nuclear *chain reaction.*

Curie. The amount of radioactivity in 1 gram of the *isotope* radium 226. One curie is 37 billion *radioactive decays* per second.

Decay (radioactive). Spontaneous disintegration of the *nucleus* of an unstable *atom,* resulting in the emission of particles and energy.

Decay product. The *isotope* that results from the *decay* of an unstable *atom.*

Decommissioning. Retirement of a nuclear facility, including *decontamination* and/or dismantlement.

Decontamination. Removal of unwanted radioactive or hazardous contamination by a chemical or mechanical process.

Defense Waste Processing Facility. A *high-level-waste vitrification* plant built at the *Savannah River Site.*

Department of Energy (DOE). The cabinet-level U.S. Government agency responsible for nuclear weapons production and energy research and the cleanup of hazardous and radioactive waste at its sites. It was created from the *Energy Research and Development Administration* and other Federal Government functions in 1977.

Depleted uranium. *Uranium* that, through the process of *enrichment,* has been stripped of most of the *uranium 235* it once contained, so that it has more *uranium 238* than *natural uranium.* It is used in some parts of nuclear weapons and as a raw material for *plutonium* production.

Deuterium. A naturally occurring *isotope* of *hydrogen.* Deuterium is lighter than *tritium,* but twice as heavy as ordinary hydrogen. Deuterium is most often found in the form of *heavy water*

Dose. As used here, a specific amount of *ionizing radiation* or toxic substance absorbed by a living being.

Dry cask storage. The storage of *spent nuclear fuel* without keeping it immersed in water.

Enrichment. The process of separating the *isotopes* of *uranium* from each other. Other elements can also be enriched. In the United States this is done using the *gaseous diffusion* process.

Enriched uranium. *Uranium* that, as a result of the process of *enrichment,* has more *uranium 235* than natural uranium.

Environmental contamination. The release into the environment of *radioactive,* hazardous and toxic materials.

Environmental Management. An Office of the *Department of Energy* that was created in 1989 to oversee the Department's waste management and environmental cleanup efforts. Originally called the Office of Environmental Restoration and Waste Management, it was renamed in 1993. Often abbreviated EM.

Environmental Protection Agency. A Federal agency responsible for enforcing environmental laws, including the *Resource Conservation and Recovery Act;* the *Comprehensive Environmental Response, Compensation and Liability Act;* and the Toxic *Substances Control Act.* The Environmental Protection Agency was established in 1970.

Fissile. Capable of being split by a low-energy *neutron.* The most common fissile *isotopes* are *uranium 235* and *plutonium 239.*

Fission. The splitting or breaking apart of the *nucleus* of a heavy *atom* like *uranium* or *plutonium,* usually caused by the absorption of a *neutron.* Large amounts of energy and one or more *neutrons* are released when an atom fissions.

Fission products. The large variety of smaller atoms, including cesium and *strontium,* left over by the splitting of *uranium* and plutonium. Most of these atoms are *radioactive,* and they *decay* into other *isotopes.* There are more than 200 isotopes of 35 elements in this category. Most of the fission products in the United States are found in *spent nuclear fuel* and *high-level waste.*

Fuel (nuclear). *Natural or enriched uranium* that sustains the *fission chain reaction* in a *nuclear reactor. Also* used to refer to the entire fuel *element,* including structural materials such as *cladding.*

Fuel element. Nuclear reactor fuel including both the *fissile* and structural materials, such as *cladding,* typically in the shape of a long cylinder.

Gamma radiation. High-energy electromagnetic *radiation* emitted in the *radioactive decay of* many *radionuclides.* Gamma rays are similar to X-rays. They are highly penetrating.

Gaseous diffusion. The process used to make *enriched uranium* in the United States.

Geologic repository. A place to dispose of *radioactive* waste deep beneath the earth's surface.

Half-life. The time it takes for one-half of any given number of unstable atoms to *decay.* Each *isotope* has its own characteristic half-life. They range from small fractions of a second to billions of years. A general "rule of thumb" in health physics is that the hazardous period for a given isotope is 10 half-lives.

Hanford Site. *A* 570-square-mile Federal government-owned reservation in the desert of southeast Washington State. Established in 1943 as part of the *Manhattan Project,* the Hanford Site's chief mission has been the production of plutonium for use in nuclear weapons. Hanford is home to nine *production reactors* and four *chemical separation plants.*

Health physics. The science *of radiation* protection, established during the Manhattan Project.

Highly enriched uranium. *Uranium* with more than 20 percent of the *uranium 235* isotope, used for making nuclear weapons and also as *fuel* for some isotope-production, research, and power reactors. *Weapons-grade uranium is* a subset of this group.

High-level waste. Material generated by chemical *reprocessing of spent _fuel* and *irradiated targets.* High-level waste contains highly *radioactive,* short-lived fission products, hazardous chemicals, and toxic heavy metals. High-level waste is usually found in the form of a liquid, a solid *saltcake,* a sludge, or a dry powdery *calcine.*

Hydrogen. The lightest element. Two of the three *isotopes* of hydrogen have been used in nuclear weapons: *deuterium* and *tritium.*

Idaho National Engineering Laboratory (INEEL). An 893-square-mile Federal government-owned reservation in the eastern Idaho desert. The Idaho National Engineering Laboratory is the site of many research and test reactors and of the Idaho Chemical Processing Plant, where *spent nuclear fuel* from the U.S. Navy and from *research reactors was reprocessed.*

Inert gas. A gas that does not react chemically with other substances. The inert gases are helium, neon, argon, xenon, and radon. Also occasionally used inaccurately to refer to nitrogen.

Ionizing radiation. *Radiation* that is capable of breaking apart *molecules* or *atoms.* The splitting or *decay of* unstable *atoms* typically emits ionizing radiation.

Irradiate. To expose to *ionizing radiation,* usually in a *nuclear reactor. Targets* are irradiated to produce *isotopes.*

Isotopes. Different forms of the same chemical element that differs only by the number of *neutrons* in their *nucleus.* Most elements have more than one naturally occurring isotope. Many more isotopes have been produced in reactors and scientific laboratories.

Lithium. The lightest metal, and the third lightest element. Lithium has two naturally occurring *isotopes,* lithium 6 and lithium 7. Lithium 6 *targets* are *irradiated* to manufacture *tritium.*

Los Alamos National Laboratory. The U. S. Government laboratory, established in 1943 as part of the *Manhattan Project that* designed the first nuclear weapons. Located in northern New Mexico, about 60 miles north of Albuquerque.

Low-enriched uranium. *Uranium* that has been *enriched* until it consists *of* about 3 percent *uranium* 235 and 97 percent *uranium 238.* Used as *nuclear reactor fuel.*

Low-level waste. A catchall term for any *radioactive* waste that is not *spent fuel, high-level, or transuranic waste.*

Mined geologic disposal. See *geologic repository.*

Mixed waste. Waste that contains both chemically hazardous and *radioactive* materials.

Molecules. Larger structures formed by the bonding of *atoms*

National Environmental Policy Act. A Federal law, enacted in 1970, that requires the Federal government to consider the environmental impacts of, and alternatives to, major proposed actions in its decisionmaking processes. Commonly referred to by its acronym, NEPA.

Natural uranium. Uranium that has not been through the *enrichment process.* It is made of 99.3 percent uranium 238 and 0.7 percent uranium 235.

Neutron. A massive, uncharged particle that comprises part of the *nucleus.* Uranium and plutonium atoms *fission* when they absorb neutrons. The chain reactions that make *nuclear reactors* and weapons work thus depend on neutrons. Manmade elements can be manufactured by bombarding other elements with neutrons in production reactors.

Nevada Test Site. A 1,350-square-mile area of the southern Nevada desert that has been the site of most of the U.S. *underground and* atmospheric tests since it opened in 1951. The site is some 65 miles northwest of Las Vegas.

Nonproliferation. Efforts to prevent or slow the spread of nuclear weapons and the materials and technologies used to produce them.

Nuclear reactor. A device that sustains a controlled nuclear fission *chain* reaction.

Nucleus. The clump of protons and *neutrons at* the center of an atom that determine its identity and chemical and nuclear properties.

Oak Ridge. A 58-square-mile reservation near Knoxville, Tennessee. Oak Ridge was established as part of the *Manhattan Project* in 1943 to produce *enriched uranium.* Today it is the location of K-25 and Y-12 plants and the Oak Ridge National Laboratory (which was initially referred to by the arbitrary code name, "X-10.").

Pad. A flat concrete or asphalt surface used for the temporary storage of wastes. Its purpose is to keep wastes from leaching into the soil.

PCBs. A group of commercially produced organic chemicals used since the 1940s in industrial applications throughout the nuclear weapons complex. Most notably, PCBs are found in many of the gaskets and large electrical transformers and capacitors in the gaseous diffusion plants. PCBs have been proven to be toxic to both humans and laboratory animals. "PCB" is an abbreviation of the full name, "polychlorinated biphenyls."

Plutonium. A manmade *fissile* element. Pure plutonium is a silvery metal that is heavier than lead. Material rich in the plutonium 239 *isotope is* preferred for manufacturing nuclear weapons, although any plutonium can be used. Plutonium 239 has a *half-life of* 24,000 years.

Plutonium residues. Materials left over from the processing of plutonium that contain enough plutonium to make its recovery economically worthwhile.

Plutonium pit. A vernacular term that refers to the spherical core of a thermonuclear weapon. This pit is the "trigger" of the primary portion of the weapon that, when compressed, reaches a critical mass and begins a sustained nuclear fission chain reaction.

Radiation. Energy transferred through space or other media in the form of particles or waves. In this document, we refer to *ionizing radiation,* which is capable of breaking up *atoms* or *molecules.* The splitting, or *decay,* of unstable *atoms* emits ionizing radiation.

Radioactive. Of, caused by, or exhibiting *radioactivity.*

Radioactivity. The spontaneous emission of *radiation* from the *nucleus of* an *atom. Radionuclides* lose particles and energy through the process of *radioactive decay.*

Radionuclide. *A radioactive* species of an *atom.* For example, *tritium* and *strontium 90 are* radionuclides of elements hydrogen and strontium.

Radon. A radioactive *inert gas* that is formed by the decay of radium. Radium is, in turn, a link in the decay chain of *uranium 238.* Radon, which occurs naturally in many minerals, is the chief hazard of *uranium mill tailings.*

Reprocessing. Synonymous with *chemical separation.*

Research reactor. A class of *nuclear reactors* used to do research into nuclear Physics, reactor materials and design, and nuclear medicine. Some research reactors also produce *isotopes* for industrial and medical use.

Resource Conservation and Recovery Act (RCRA). A Federal law enacted in 1976 to address the treatment, storage, and disposal of hazardous waste.

Saltcake. A cake of dry crystals of nuclear waste found in *high-level-waste* tanks.

Saltstone. *A* concrete-like material made with *low-level radioactive waste.*

Savannah River Site. A *plutonium* and *tritium* production site, established in 1950, covering 300 square miles along the Savannah River in South Carolina, near Augusta, Georgia. Five *production, reactors* and two *chemical separation plants* are located here.

Shielding. Material used to block or absorb *radiation.* Often placed between sources of radiation and people or the environment.

Spent nuclear fuel. *Fuel elements and targets* that have been *irradiated* in a nuclear reactor.

Strontium. An element. *Isotope* strontium 90 is one of the most common *fission products.* It has a half-life of about 30 years. Strontium is chemically similar to calcium.

Superfund. A term commonly used to refer to the *Comprehensive Environmental Response, Compensation and Liability Act.*

Thorium. An element. Thorium is a byproduct of the *decay of uranium.*

Toxic Substances Control Act. A Federal law, enacted in 1976 to protect human health and the environment from unreasonable, risk caused by exposure

to or the manufacturing, distribution, use, or disposal of substances containing toxic chemicals.

Transport cask. A container used to transport *spent nuclear fuel* and other *radioactive* materials. Its purpose is to shield people from radiation while it is transported.

Transuranic elements. All elements beyond *uranium* on the periodic table. All *of* the transuranic elements are manmade.

Transuranic waste. Waste contaminated with *uranium 233* or *transuranic elements* having *half-lives of* over 20 years in concentrations *of* more than I ten-millionth *of* a *curie of* per gram of waste.

Tritium. The heaviest isotope of the element *hydrogen.* Tritium is three times heavier than ordinary hydrogen. Tritium gas is used to boost the explosive power of most modem nuclear weapons, inspiring the term, "hydrogen bomb." It is produced in *production reactors* and has a *half-life* of just over 12 years.

Uranium. The basic material for nuclear technology. It is a slightly *radioactive* naturally occurring heavy metal that is more dense than lead. Uranium is 40 times more common than silver.

Uranium 233. A manmade *fissile isotope of uranium.*

Uranium 235. The lighter of the two main *isotopes of uranium.* Uranium 235 makes up less than 1 percent of the uranium that is mined from the ground. It has a *half-life* of 714 million years. Uranium 235 is the only naturally occurring fissile element.

Uranium 238. The heavier of the two main *isotopes* of *uranium.* Uranium 238 makes up over 99 percent of uranium as it is mined from the ground. It has a *half-life of 4.5* billion years. It is not easily split by *neutrons.*

Vitrification. A process that stabilizes nuclear waste by mixing it with molten glass. The glass is poured into metal canisters, where it hardens into logs. Plants for vitrifying *high-level-waste* have been built in the United States at *West Valley,* New York, and the *Savannah River Site.*

Waste Isolation Pilot Plant (WIPP). A *geologic repository* intended to provide permanent disposal deep underground for transuranic wastes. Located 2,150 feet underground in a salt bed near Carlsbad, New Mexico.

West Valley Demonstration Project. A plant near Buffalo, New York, used to demonstrate the *reprocessing of spent nuclear fuel* from commercial nuclear

power plants. West Valley operated from 1966 to 1972. A *vitrification* plant for *high-level waste has* been built at the site.

Yucca Mountain. A site on, and adjacent to, the *Nevada Test Site* that is being examined to determine whether it is suitable for use as a geologic repository for the Department's *high-level wastes* and *spent fuel from* commercial nuclear reactors.

Appendix A

Maine Yankee Decommissioning Schedule Adherence Report January 8, 2002

Distribution:

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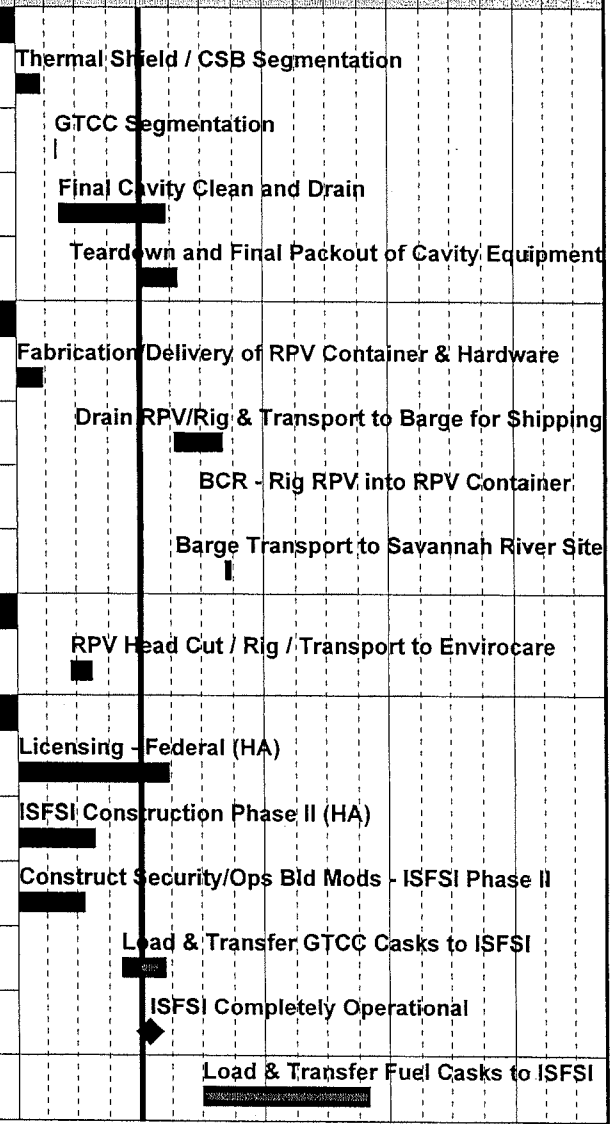
ISFSI *Reactor Internals Segmentation* *Reactor Vessel Removal* *Demolition* *Final Status Survey* *Licensing/Environmental* *Waste Management*

RESP	Activity Description	Early Start	Early Finish	Variance to 12/98 Proposal	Variance To 1 Feb 01 Finish
Rx Internal Segmentation (Rocky Benner - 5813)					
BENNER	Thermal Shield / CSB Segmentation	29DEC00A	23MAR01A	-170	-35
BENNER	GTCC Segmentation	01MAY01A	09MAY01A	-182	-58
BENNER	Final Cavity Clean and Drain	13MAY01A	23MAR02	-447	-259
BENNER	Teardown and Final Packout of Cavity Equipment	03JAN02	24APR02	-481	-276
Reactor Vessel Removal (Dean Wheeler - 5827)					
WHEELER	Fabrication/Delivery of RPV Container & Hardware	11FEB00A	27MAR01A	-19	-15
WHEELER	Drain RPV/Rig & Transport to Barge for Shipping	16APR02	03SEP02	-431	-248
BARNHART	BCR - Rig RPV into RPV Container	24JUN02	24JUN02	0	-239
WHEELER	Barge Transport to Savannah River Site	08SEP02	25SEP02	-422	-247
Reactor Vessel Head Removal (Dean Wheeler-5827)					
WHEELER	RPV Head Cut / Rig / Transport to Envirocare	14JUN01A	16AUG01A	-705	165
ISFSI (Bill Ball- 5622)					
MCCANN	Licensing - Federal (HA)	01OCT98A	28MAR02	0	-327
WASHER	ISFSI Construction Phase II (HA)	31MAY00A	22AUG01A	-247	-72
GERARDI	Construct Security/Ops Bld Mods - ISFSI Phase II	15SEP00A	23JUL01A	0	-78
WASHER	Load & Transfer GTCC Casks to ISFSI	06NOV01A	18MAR02	0	-319
PLANTE	ISFSI Completely Operational		29JAN02	0	-218
WASHER	Load & Transfer Fuel Casks to ISFSI	01JUL02	30OCT03	-436	-401



Start Date 04AUG98
Finish Date 25AUG05
Data Date 03JAN02
Run Date 08JAN02 13:43

0103

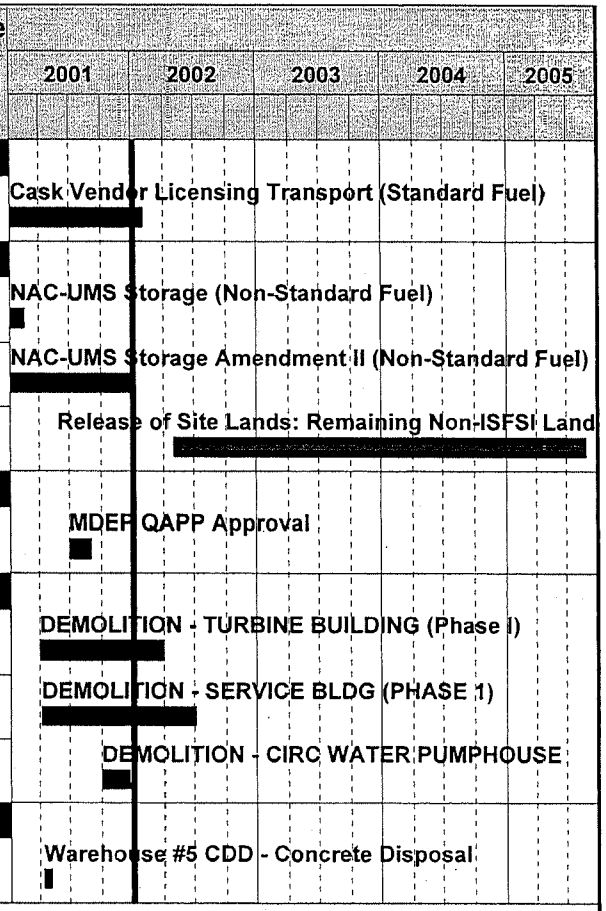
Sheet 1 of 2

Maine Yankee Decommissioning Project

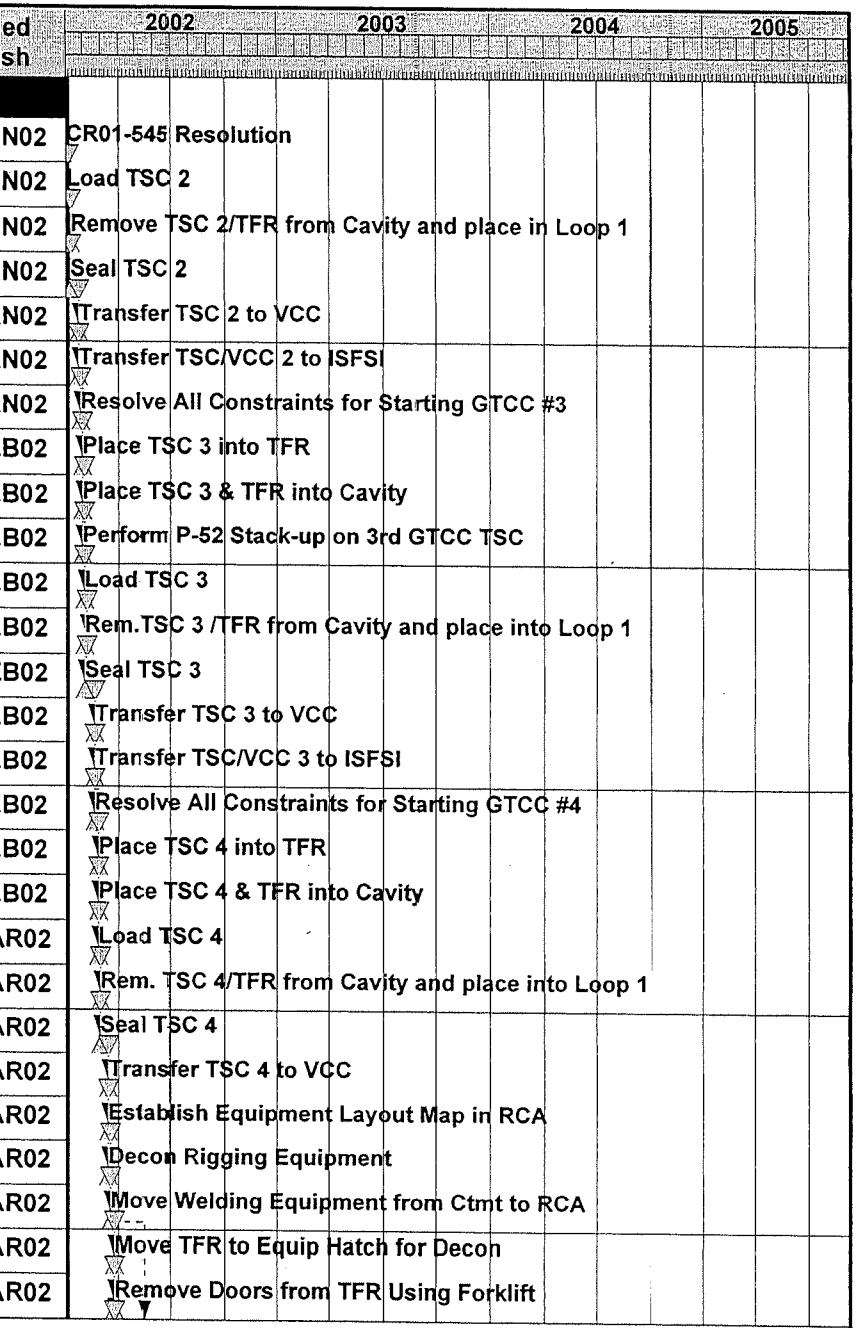
"Major Milestones 2001 - 2002"

08JAN02 13:43

RESP	Activity Description	Early Start	Early Finish	Variance to 12/98 Proposal	Variance To 1 Feb 01 Finish
ISFSI Licensing (Tom Williamson -4530)					
MCCANN	Cask Vendor Licensing Transport (Standard Fuel)	01SEP99A	01FEB02	-346	-139
Licensing (Tom Williamson -4530)					
MCCANN	NAC-UMS Storage (Non-Standard Fuel)	20OCT98A	20FEB01A	-104	0
MCCANN	NAC-UMS Storage Amendment II (Non-Standard Fuel)	24APR00A	31DEC01A	-178	-25
WHITNEY	Release of Site Lands: Remaining Non-ISFSI Land	01MAY02	25AUG05	0	-243
RCRA Closure (John Rendall - 4548)					
COUTURE	MDEP QAPP Approval	29JUN01A	31AUG01A	0	3
Demolition					
	DEMOLITION - TURBINE BUILDING (Phase I)	04APR01A	01APR02	-200	-9
	DEMOLITION - SERVICE BLDG (PHASE 1)	11APR01A	03JUL02	196	-62
	DEMOLITION - CIRC WATER PUMPHOUSE	01OCT01A	24DEC01A	392	16
Waste Process / Transport / Disposal					
COUGHLIN	Warehouse #5 CDD - Concrete Disposal	17APR01A	10MAY01A	0	-4



Activity ID	DEPT	Activity Description	Rem Dur	Sched Start	Sched Finish
Maine Yankee Decommissioning Project					
CR01-545	NAC	CR01-545 Resolution	4*	22DEC01A	07JAN02
FTI1900	NAC	Load TSC 2	2	22DEC01A	09JAN02
FTI-0081C	NAC	Remove TSC 2/TFR from Cavity and place in Loop 1	1	09JAN02	09JAN02
FTI-0081D	NAC	Seal TSC 2	13	09JAN02	23JAN02
FTI-0081E	NAC	Transfer TSC 2 to VCC	1	24JAN02	24JAN02
FTI-0081	NAC	Transfer TSC/VCC 2 to ISFSI	1	25JAN02	25JAN02
GTCC3	NAC	Resolve All Constraints for Starting GTCC #3	5	26JAN02	31JAN02
FTI-0082A	NAC	Place TSC 3 into TFR	1	01FEB02	01FEB02
FTI-0082B	NAC	Place TSC 3 & TFR into Cavity	1	01FEB02	01FEB02
P52-3	NAC	Perform P-52 Stack-up on 3rd GTCC TSC	1	01FEB02	01FEB02
FTI2550	NAC	Load TSC 3	2	02FEB02	04FEB02
FTI-0082C	NAC	Rem.TSC 3 /TFR from Cavity and place into Loop 1	1	04FEB02	04FEB02
FTI-0082D	NAC	Seal TSC 3	13	04FEB02	18FEB02
FTI-0082E	NAC	Transfer TSC 3 to VCC	1	19FEB02	19FEB02
FTI-0082	NAC	Transfer TSC/VCC 3 to ISFSI	1	20FEB02	20FEB02
GTCC4	NAC	Resolve All Constraints for Starting GTCC #4	5	21FEB02	26FEB02
FTI-0083A	NAC	Place TSC 4 into TFR	1	27FEB02	27FEB02
FTI-0083B	NAC	Place TSC 4 & TFR into Cavity	1	27FEB02	27FEB02
FTI3150	NAC	Load TSC 4	2	28FEB02	01MAR02
FTI-0083C	NAC	Rem. TSC 4/TFR from Cavity and place into Loop 1	1	01MAR02	01MAR02
FTI-0083D	NAC	Seal TSC 4	13	01MAR02	15MAR02
FTI-0083E	NAC	Transfer TSC 4 to VCC	1	16MAR02	16MAR02
FLP-095	NAC	Establish Equipment Layout Map in RCA	2	17MAR02	18MAR02
RCA-100	NAC	Decon Rigging Equipment	1	18MAR02	18MAR02
RCA-MOVE	NAC	Move Welding Equipment from Ctmt to RCA	8	19MAR02	27MAR02
LT-102	NAC	Move TFR to Equip Hatch for Decon	1	27MAR02	27MAR02
LT-105	NAC	Remove Doors from TFR Using Forklift	1	27MAR02	27MAR02



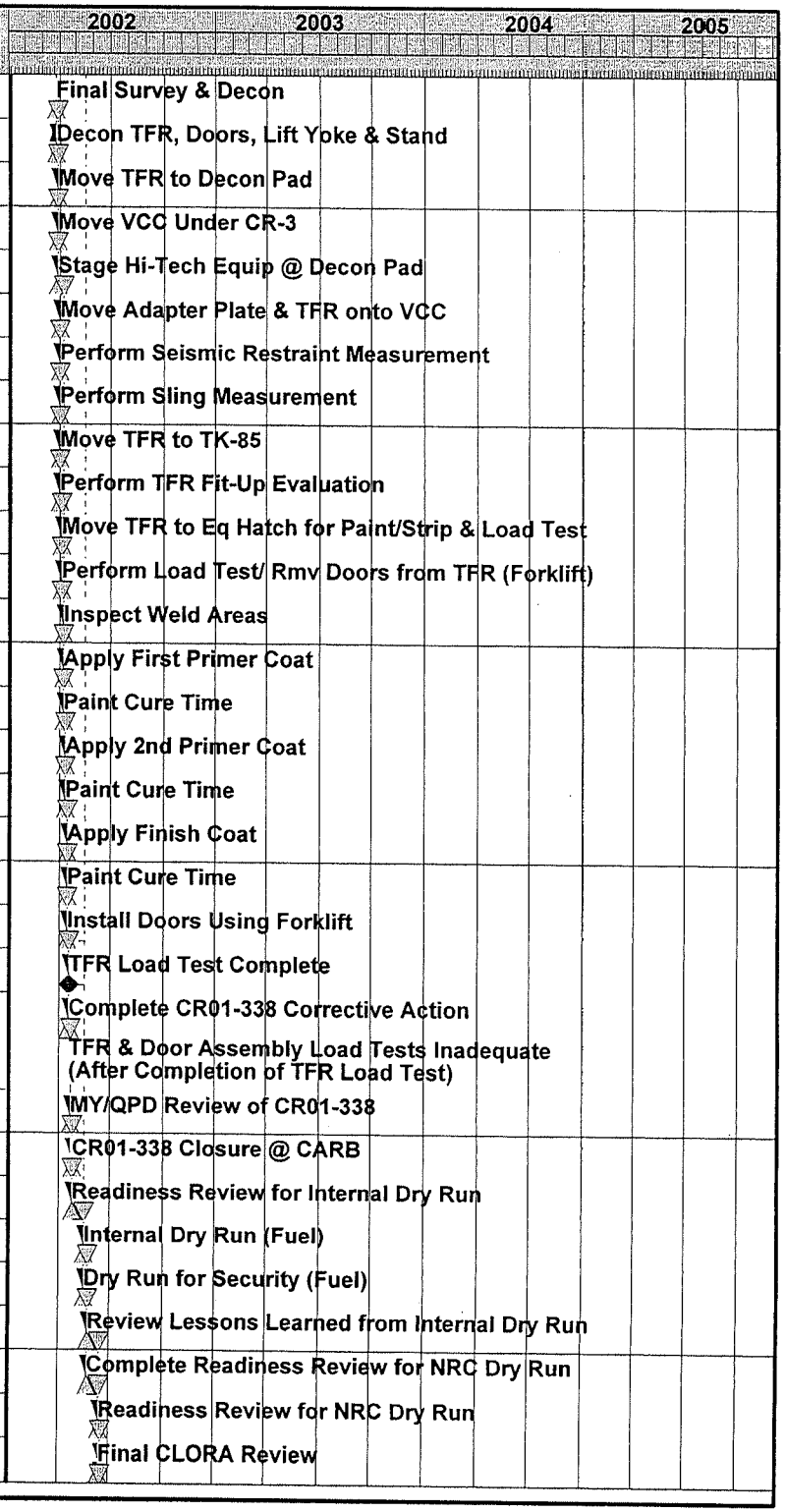
Early Bar
Progress Bar
Critical Activity

Sheet 1 of 3
Maine Yankee Decommissioning Project
CRITICAL PATH
08JAN02 13:46

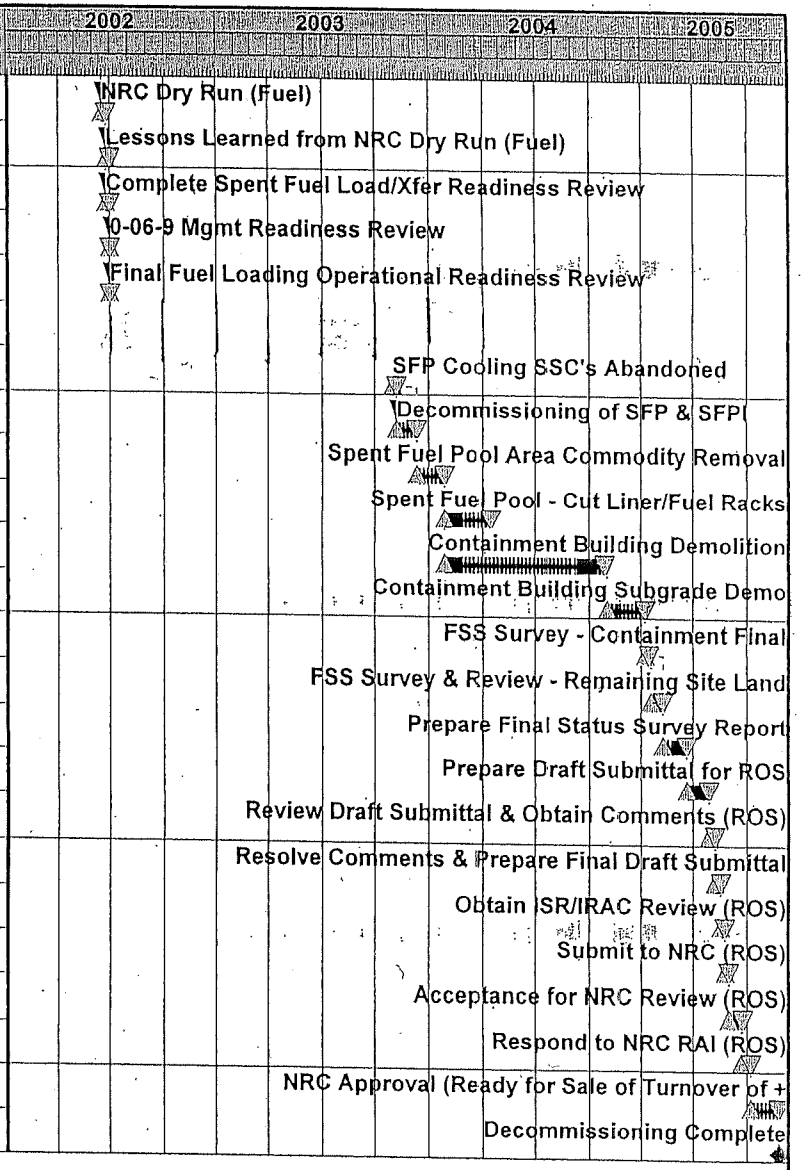
Start Date 04AUG98
Finish Date 25AUG05

GOAL

Activity ID	DEPT	Activity Description	Rem Dur	Sched Start	Sched Finish
LT-120	NAC	Final Survey & Decon	1	28MAR02	28MAR02
LT-110	NAC	Decon TFR, Doors, Lift Yoke & Stand	2	28MAR02	29MAR02
LT-122	NAC	Move TFR to Decon Pad	1	29MAR02	29MAR02
CR3-300	NAC	Move VCC Under CR-3	1	30MAR02	30MAR02
LT-1025	NAC	Stage Hi-Tech Equip @ Decon Pad	8	30MAR02	08APR02
CR3-305	NAC	Move Adapter Plate & TFR onto VCC	1	01APR02	01APR02
CR3-310	MYE	Perform Seismic Restraint Measurement	1	02APR02	02APR02
CR3-315	NAC	Perform Sling Measurement	1	02APR02	02APR02
CR3-325	NAC	Move TFR to TK-85	1	03APR02	03APR02
TFR-205	NAC	Perform TFR Fit-Up Evaluation	1	04APR02	04APR02
TFR-210	NAC	Move TFR to Eq Hatch for Paint/Strip & Load Test	1	05APR02	05APR02
LT-130	NAC	Perform Load Test/ Rmv Doors from TFR (Forklift)	1	06APR02	06APR02
LT-135	NACA	Inspect Weld Areas	1	08APR02	08APR02
LT-1040	NACA	Apply First Primer Coat	1	09APR02	09APR02
LT-140	NACA	Paint Cure Time	2	10APR02	11APR02
LT-145	NACA	Apply 2nd Primer Coat	1	12APR02	12APR02
LT-150	NACA	Paint Cure Time	2	13APR02	14APR02
LT-155	NACA	Apply Finish Coat	1	15APR02	15APR02
LT-160	NACA	Paint Cure Time	2	16APR02	17APR02
LT-165	NAC	Install Doors Using Forklift	1	18APR02	18APR02
LT-DONE	NAC	TFR Load Test Complete	0		18APR02
CR01-338-4	NAC	Complete CR01-338 Corrective Action	4	19APR02	23APR02
MY01-338	QPD	MY/QPD Review of CR01-338	2	24APR02	25APR02
CARB-338	NAC	CR01-338 Closure @ CARB	1	26APR02	26APR02
RR-1	NAC	Readiness Review for Internal Dry Run	21	27APR02	17MAY02
1114	NAC	Internal Dry Run (Fuel)	7	18MAY02	24MAY02
1114-SEC	SEC	Dry Run for Security (Fuel)	6	18MAY02	24MAY02
1114.5	NAC	Review Lessons Learned from Internal Dry Run	20	25MAY02	14JUN02
1114.8	NAC	Complete Readiness Review for NRC Dry Run	20	25MAY02	14JUN02
1114.6	NAC	Readiness Review for NRC Dry Run	1	15JUN02	15JUN02
CLORA2	NAC	Final CLORA Review	1	15JUN02	15JUN02



Activity ID	DEPT	Activity Description	Rem Dur	Sched Start	Sched Finish
1115	NAC	NRC Dry Run (Fuel)	7	16JUN02	22JUN02
1115.5	NAC	Lessons Learned from NRC Dry Run (Fuel)	7	23JUN02	29JUN02
LRR-2	OPS	Complete Spent Fuel Load/Xfer Readiness Review	7	23JUN02	29JUN02
MGMT	MY	0-06-9 Mgmt Readiness Review	1	30JUN02	30JUN02
READY	NAC	Final Fuel Loading Operational Readiness Review	1	30JUN02	30JUN02
FUELLOAD	NAC	Load & Transfer Fuel Casks to ISFSI			
SFPSERT1	MY	SFP Cooling SSC's Abandoned	5	31OCT03	04NOV03
0551	MY	Decommissioning of SFP & SFPI	20	05NOV03	10DEC03
0253	MYC	Spent Fuel Pool Area Commodity Removal	25	11DEC03	27JAN04
0254	MYC	Spent Fuel Pool - Cut Liner/Fuel Racks	45	28JAN04	14APR04
Z-0148	MAN	Containment Building Demolition	156	28JAN04	28OCT04
Z-0148S	MAN	Containment Building Subgrade Demo	39	01NOV04	06JAN05
CTMTFSS	FSS	FSS Survey - Containment Final	6	07JAN05	14JAN05
LANDFSS	FSS	FSS Survey & Review - Remaining Site Land	16	17JAN05	07FEB05
0710	FSS	Prepare Final Status Survey Report	29	08FEB05	18MAR05
ROS-160	LIC	Prepare Draft Submittal for ROS	29	21MAR05	28APR05
ROS-170	LIC	Review Draft Submittal & Obtain Comments (ROS)	6	29APR05	06MAY05
ROS-180	LIC	Resolve Comments & Prepare Final Draft Submittal	8	09MAY05	18MAY05
ROS-190	LIC	Obtain ISR/IRAC Review (ROS)	5	19MAY05	25MAY05
ROS-200	LIC	Submit to NRC (ROS)	3	26MAY05	30MAY05
ROS-210	LIC	Acceptance for NRC Review (ROS)	18	31MAY05	23JUN05
ROS-220	LIC	Respond to NRC RAI (ROS)	12	23JUN05	08JUL05
ROS-230	LIC	NRC Approval (Ready for Sale of Turnover of +	35	08JUL05	25AUG05
0287	MY	Decommissioning Complete	0		25AUG05



Appendix B

March 28, 2001

LETTER FROM FIVE NEW ENGLAND GOVERNORS

The Honorable Spencer Abraham
Secretary of Energy
Washington, DC 20585-1000

RE: Disposition of spent nuclear fuel, GTCC and high-level radioactive waste

Dear Mr. Secretary:

The Governors of all the New England states with operating or decommissioning nuclear power plants are writing to urge you and your staff to move promptly on the issue of disposition of spent nuclear fuel, greater than class C (GTCC) and high-level radioactive waste. The Yucca Mountain review process should be completed as expeditiously as possible, paying close attention to scientific thoroughness and public confidence in the result. That said, we urge that federal policy for the disposition of spent nuclear fuel, GTCC and high-level radioactive waste be based on the following key principles:

1. Once the review process has been completed for Yucca Mountain, you should expedite the recommendation to the President for siting the permanent federal repository. Recognizing, however, that a U.S. permanent repository is still many years away, we ask that you use your authority to create or use currently lawful options for the interim disposition of spent nuclear fuel, GTCC and high-level radioactive waste.

2. Spent nuclear fuel, GTCC and high-level waste should be stored at facilities that have the specific experience, expertise, and capacity for innovation to handle and manage those materials most effectively for extended periods.

3. Spent nuclear fuel and high-level waste should be stored where there is a comprehensive security infrastructure instead of at isolated sites that have no other security requirements. Federally protected sites like those currently used for foreign reactor and military spent fuel should be made available immediately to accept spent nuclear fuel, GTCC and high-level waste from decommissioning nuclear power plants.

We Governors strongly urge you to explore and adopt innovative solutions and options to address the growing spent nuclear fuel problem created as a byproduct of the nation's use of nuclear energy. The New England States require an expeditious resolution that avoids the undesirable -- and, ultimately, untenable -- long-term storage of spent nuclear fuel, GTCC and high-level waste at our decommissioned nuclear plant sites.

Sincerely,

Gov. John Rowland
State of Connecticut

Gov. Angus King
State of Maine

Gov. Argeo Paul Cellucci
State of Massachusetts

Gov. Jeanne Shaheen
State of New Hampshire

Gov. Howard Dean
State of Vermont

cc: NE Congressional delegates

Appendix C

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
Thomas S. Moore, Chairman
Thomas D. Murphy
Dr. Thomas S. Elleman

In the Matter of	)	Docket No. 50-309-OLA
Maine Yankee Atomic Power Company	)	ASLBP No. 00-870-03-OLA
(Maine Yankee Atomic Power Station)	)	August 29, 2001

Maine Yankee License Termination Plan
Settlement Agreement

WHEREAS, Maine Yankee Atomic Power ("Maine Yankee") originally submitted a License Termination Plan ("LTP") to the Nuclear Regulatory Commission ("NRC") on January 13, 2000, and submitted revisions to the LTP on June 1, 2001 (Rev. 1), and August 13, 2001 (Rev. 2);

WHEREAS, the State of Maine (the "State") and Friends of the Coast Opposing Nuclear Pollution ("FOTC") timely petitioned to intervene and for a hearing pursuant to 10 CFR Part 2;

WHEREAS, the NRC appointed an Atomic Safety and Licensing Board to consider the State's and FOTC's petitions and requests for hearing;

WHEREAS, Maine Yankee, the State, and FOTC (the "Parties") have exchanged information and met extensively about the LTP; and

WHEREAS, Maine Yankee, the State, and FOTC desire to resolve any concerns related to the LTP and, thereby, to avoid the delay and expense of a hearing before the ASLB;

THEREFORE, the Parties agree as follows:

A. Maine Yankee and the State agree to the following terms:

1. Status of the Intertidal Zone

   a. Maine Yankee and the State have opposing positions on whether the intertidal zone is within or beyond the site boundary and within or outside the scope of 10 CFR 50.82. (See LTP, Rev. 2, § 1.5.9.) In order to resolve these opposing positions, Maine Yankee and the State will jointly request, no later than October 15, 2001, that the NRC Staff accelerate its review of this question by issuing a separate finding by December 31, 2001. In support of the accelerated review, Maine Yankee and the State will submit the basis for their respective positions to the NRC Staff no later than October 15, 2001. Neither this request for accelerated review nor the resulting NRC determination will nullify the previous agreement with FOTC to conduct intertidal zone sampling and evaluation.

   b. The request to the NRC will also seek the NRC Staff's participation and review in the sampling and evaluation of the intertidal zone, jointly conducted by Maine Yankee and FOTC. So long as the NRC agrees to participate, both Maine Yankee and the State agree to accept the NRC Staff's determination in the matter of the intertidal zone status.

2. Technical Issue Resolution Process

Maine Yankee and the State will jointly participate in a process to resolve certain technical issues with regard to the LTP. These technical issues are related to "Data Variability" and "Alpha Measurements." The Technical Issue Resolution (TIR) process

to be used will be modeled after the Data Quality Objective (DQO) process outlined in Appendix D, NUREG-1575 "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)" and is further defined for this use, as follows:

a. Problem Statements

The TIR process begins with the definition of "problem statements." The problem statement to be evaluated and resolved during the TIR Process is as follows:

The variability and (in some instances) non-intuitive results from Maine Yankee's site characterization efforts raise questions about assumed surrogate nuclide relations that are fundamental to the approach of the current LTP. The TIR is charged with resolving, through the development of mutually agreed approaches, each of the following State concerns:

1. The concrete core data indicates that the Cobalt-60 to Cesium-137 ratios for concrete media cover a very broad range. Assess the method used for deciding where within the measured range an appropriate value for nuclide fraction is chosen. The TIR members will be informed as to the impact that any adjustments made to the ratio will have on dose. Alternate approaches should be explored if the current method is evaluated to be inadequate.

2. The justification in Attachment 2F for comparability of the seven-core and 36 core data sets is not persuasive to all parties. For example, the State is unclear as to what "critical" p-value would change a decision as to whether the two data sets are comparable. Determine what additional analyses (either statistical analyses or sampling for HTD or other analyses) would establish more reliable surrogate radionuclide relationships. If additional analyses or sampling are deemed necessary, the TIR should provide specifics regarding the types of analyses and the placement and number of samples. Alternate methods should be explored if they are likely to produce the desired confidence level more efficiently.

3. Traditionally a surrogate nuclide relationship is assumed to exist between fission products. A common example would be to scale Sr-90 to the level of Cs-137 detected, based on a ratio determined by HTD analysis. Some form of technical confirmation and explanation as to why the Sr-90 to Cs-137 ratios are so small should be provided given that:

   - Cs-137 and Sr-90 have similar half lives;
   - Maine Yankee has had failed fuel in the past;

- According to the ORIGEN 2 analysis presented in MY EC 007-00, Maine Yankee's fuel consists of 11.8%, 7.7% of Cs-Ba-137 and Sr-Y-90 respectively; and
- Sr-90 is a potentially significant contributor to dose.

Confirm that the Sr-90 to Cs-137 ratio is sufficiently accurate and explain why this should be the case for both concrete and soil media.

4. Due to the variability in characterization data and in the interest of greater clarity, a more explicit "road map" of decision rules as they will be applied to FSS data should be incorporated to the LTP. The road map should include how and under what conditions a modification to the nuclide fraction might occur for soil media, in addition to providing a review of the rationale for developing the soil surrogate relationships appearing in the LTP. The TIR members will adopt any changes that are agreed to be necessary and will review and approve the road map.

5. The TIR will review and evaluate the methodology used to treat the alpha component of the site DCGL and develop any modifications that are agreed to be necessary. The TIR members will be informed of the impact that any proposed adjustments will have on dose. The review and evaluation will consider alternate means for verifying and bounding the level of alpha contamination present in site media.

b. Team Membership

Members of the TIR Process team(s)[1] will be identified in the following manner: two elected by Maine Yankee, two elected by the State and one agreed to, non-voting, facilitator[2] to be provided by Maine Yankee. In the unlikely circumstance that a elected member(s) is(are) unable to participate due to extenuating circumstances (accepted by both parties), then the affected party will elect new member(s).

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[1] Multiple teams may be required to address the problem statement defined above. Each team's composition will meet the requirements defined in Item A.2.b.

[2] The facilitator must be familiar with the MARSSIM DQO process.

c. Decision Making Method

The decision making method of the team(s) will be by consensus. Other representatives from Maine Yankee, the State, or FOTC may observe team activities, as appropriate. Interaction by non-team members at team activities is permissible in an effort to provide information or otherwise support the TIR process objectives, as long as the non-team member interaction does not disrupt or delay issue resolution.

d. Changes to the Issue Resolution Process

The parties recognize that the MARSSIM Data Quality Objective (DQO) process is intended to be flexible and to be used more or less intensively as the situation requires.[3] Thus, the process used by the team(s) may be adapted and/or changed as necessary by mutual consent of the team members to facilitate the most efficient and effective resolution of the problem statement at hand.

e. Team Engagement

The team members are expected to be properly engaged in team activities including at least two, day-long meetings per month, the schedules for which will be previously agreed to by the team members and the facilitator.

f. Duration

The term of the TIR Process will be approximately four months starting in September 2001 and ending in December 2001.

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[3] MARSSIM, NUREG-1575, December 1997, p. D-4.

g. Terms Regarding Process Closure and Resolution

If at the conclusion of the TIR term, the State members have not met the minimum engagement expectation described in Section A.2.e above, the default problem statement resolution shall be in accordance with the LTP. If, at the conclusion of the TIR term, the members fail to reach acceptable resolution, the resolution shall be determined by the majority vote of a mutually agreed to and technically qualified panel of arbiters. The number of members on the panel of arbiters shall be either one or three. (If the parties are unable to agree on a panel of arbiters, Maine Yankee and the State shall each select one arbiter, and the third arbiter shall be selected at random based on an equal number of nominations from Maine Yankee and the State.)

3. Free Release Criteria

In a subsequent LTP revision, Maine Yankee agrees to clarify the relationship between the criteria for free release incorporated into LTP Section 3.1.3 and NRC Circular 81-07.

4. License Condition

The license condition authorizing implementation of the LTP includes a process for changing the LTP.[4] The criteria for making changes without prior NRC approval include the conduct of an evaluation pursuant to 10 CFR 50.59. Accordingly, it is understood that Maine Yankee shall obtain a license amendment pursuant to 10 CFR 50.90 prior to implementing a proposed change that would result in a departure from a method of evaluation described in the LTP used in establishing the design bases or in the

[4] LTP, Rev. 2, § 1.4.1. (All LTP references, unless otherwise noted, are to LTP Revision 2, submitted to the NRC on August 13, 2001.)

safety analyses.[5] The parties understand that the dose modeling methods described in LTP Section 6 constitute a method of evaluation for establishing design bases and a departure therefrom will be evaluated using the guidance contained in NEI 96-07, Rev. 1 "Guidelines for 10 CFR 50.59 Implementation," as endorsed by NRC Regulatory Guide 1.187. Regardless of the outcome of this evaluation, Maine Yankee commits to notify the State of Maine promptly prior to making a change to the LTP that would result in an increase, of any amount, in a Derived Concentration Guideline Level (DCGL) and to requesting NRC approval if a change to the LTP would result in an increase in a DCGL by more than a factor of two. Maine Yankee will incorporate this commitment in a subsequent revision to the LTP.

5. Groundwater Sampling

Maine Yankee agrees to obtain additional radiochemical analysis of a sample of groundwater taken from the Containment exterior foundation sump at ***a priori*** minimum detectable activities (pCi/L) described below:

Gross Alpha	10
H-3	1000 (or a lower, mutually agreed upon MDA)
C-14	500
Fe-55	1000
Ni-59	50,000
Ni-63	1000
Sr-89/90	500 (or per the ODCM, whichever limit is lower)
Tc-99	1000
Pu-238,9,40	10
Pu-241	100
Am-241	5
Cm-242,43,44	5
I-129	200

[5] 10 CFR 50.59 (c)(2)(viii).

The results of this radiochemical analysis will be evaluated with regard to the groundwater dose assessment and accounted for, consistent with the commitment described in LTP Section 6.6.6. Maine Yankee will include the results and evaluation in a subsequent revision of the LTP.

Maine Yankee will perform gamma spectroscopy to environmental lower limits of detection ("LLDs") on well water samples taken from wells used as part of the RCRA closure process. If plant derived nuclides are measured above the environmental LLDs, the samples will be subjected to radiochemical analysis, with the results evaluated as described above. Maine Yankee will include a description of this commitment in a subsequent revision of the LTP.

6. Compliance with the Enhanced State Standards (10/4)

Maine Yankee and the State agree that the LTP is designed to demonstrate compliance with the State Law setting forth the Enhanced State Standards in 38 MRSA § 1451, sub-§ 11. State Law also provides that, among other things, Maine Yankee use the analytic methodology approved by the NRC and that the site be determined by the NRC to meet the criteria for release under 10 CFR Part 20. Accordingly, a LTP proposed license condition[6] asserts that the LTP demonstrates compliance with the radiological criteria for unrestricted use, as defined by 10 CFR 20.1402, by meeting a site release criteria of 10 millirem TEDE per year over background (all pathways) and 4 millirem (as distinguishable from background) TEDE per year for groundwater sources of drinking water using appropriate dose modeling methods, pathways, and parameters and acceptable final radiation survey methods. Notwithstanding, to the extent required by

[6] LTP § 1.4.1.

Maine Law, Maine Yankee will take the output of the LTP dose model and the output of the RCRA human health risk assessment and harmonize them for the Cumulative Risk Assessment.[7]

7. Marine Sampling[8]

a. Maine Yankee will include, subject to the approval by Friends of the Coast, the following sampling activities in the development of the bid specification associated with its agreements with the FOTC. The State may participate with Maine Yankee and Friends of the Coast in the development of the bid specification.

(1) The sampling will include biota and marine specimens, as specified in the Maine Yankee agreement with Friends of the Coast related to the intertidal zone area, with priority given to both the highest bio-accumulators and the most significant dose pathways to human populations.

(2) The sampling applies to: (a) areas immediately adjacent to the site from Bailey Cove to the west to Bailey Point on the east (to an agreed upon point south of Old Ferry Road) and (b) areas in the immediate vicinity of the diffuser pipe outlets.

(3) A plan for marine sampling for sediment and biota will be established. The sediment plan will specify random or systematic sampling pattern, number of sample points, the extent of depth profiling, processing and analysis requirements. The biota sampling plan will include sessile (attached) biota and harvested biota (lobsters, mussels, fish) and will specify approximate location, amount, processing and analysis requirements. The sediment plan will be designed to infer with reasonable confidence limits the contaminant variability and distributions.

(4) A biased sampling approach for likely areas of high contaminant deposition in Bailey Cove, adjacent to the diffuser pipe outlets, and at mutually agreed upon locations associated with the outlets where sediment tends to accumulate.

(5) Samples counted, at a minimum, using HPGe or GeLi detectors to measure Cs-137, Co-60 and other gamma emitters at environmental LLDs.

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[7] LTP § 8.6.12.

[8] Maine Yankee continues to hold the position that these sampling activities are not within the scope of the License Termination rule.

b. Maine Yankee will perform gamma spectroscopy analyses on appropriate marine sediment and biota samples obtained in the QAPP[9] on a split sample basis. This would include all the site outfalls.

8. Dose Modeling

Maine Yankee will provide the State with a table or tables, listing all parameters used in the calculations, showing symbols, dimensional units, numerical values, and quantitative distributional information. The basis of the numerical values shall be indicated, even if they are defaults or unsupported assumptions. Maine Yankee will include this information in a subsequent revision to the LTP.

B. Maine Yankee and FOTC agree as follows:

1. Forebay and Diffuser Discharge Piping

a. It is understood that the forebay and diffuser discharge piping are appropriately within the scope of the MYLTP. Maine Yankee has taken additional radiological samples within the forebay and diffuser discharge piping. Maine Yankee will evaluate the sampling results and any impacts on the dose modeling assumptions, dose assessment, remediation plans, and final status survey methods. Maine Yankee commits to including the results of this evaluation in a subsequent revision to the LTP along with any attendant changes to the dose model, remediation plans and final survey methods, as appropriate.

[9] "Quality Assurance Project Plan for Maine Yankee Decommissioning Project," Revision 1, June 28, 2001.

b. Maine Yankee commits to taking a limited number (i.e., two to four samples) of organic material samples within the forebay for the purposes of evaluating the potential for concentration of nuclides in organic material.

c. Maine Yankee will perform Final Status Surveys, including sampling, of the forebay and diffuser discharge piping using best practices to determine radiological contamination levels in soil, sediment and on surfaces of system piping to include organic materials.

d. Prior to remediation Maine Yankee will conduct limited sampling (i.e., two to four samples) in forebay areas that have exhibited elevated Cobalt-60 concentrations. The samples will be thoroughly examined for potential discrete particles. If discrete particles are detected, they will be further evaluated, using best practices, regarding particle activity (including radiochemical analysis using LTP MDA's), possible origin and overall implications to the forebay dose assessment. Maine Yankee will assess contamination pathways and contamination levels between the forebay and containment vicinity drains and the containment foundation sump. The sampling results and associated evaluation will be provided to FOTC and will be summarized in a subsequent revision to the LTP.

e. Maine Yankee will provide an overall plan regarding remaining anticipated activities for the forebay and diffuser discharge piping along with the associated estimated schedule for completion. This plan description, based on the current strategy and expected approach to remediation, will be provided to Friends of the Coast by end the of October 2001.

2. Vegetative and Soil Sampling

Maine Yankee commits to taking vegetative and soil samples in areas of elevated soil contamination (namely between the plant and the forebay and between the plant and Bailey Cove). The purpose of this sampling is to compare the amount of vegetative uptake of radionuclides to the activity of the soil underneath. The general location of the samples will be reasonably agreed to by Maine Yankee and Friends of the Coast before conducting the sampling. Between ten and twenty samples will be taken and evaluated. If the gamma spectroscopy analysis identifies an uptake factor significantly above those stated in NUREG/CR-5512[10], samples will be submitted for hard to detect analyses.

3. Background Radiation Determination

It is understood that background reference areas should have physical characteristics (including soil type and rock formation) similar to the site and shall not be potentially contaminated by site activities. This requirement alone would not preclude the use of non-impacted areas that are onsite. In general, Maine Yankee commits to using background reference areas, when relevant, that are offsite. If non-impacted onsite areas are to be used, then Maine Yankee will verify and justify its use by appropriate comparison with control samples from appropriate off-site locations. This commitment will be included in a subsequent revision to the Maine Yankee License Termination Plan.

4. Historical Site Assessment (Enhancement)

Maine Yankee agrees to place print display ads which invite former Maine Yankee and Maine Yankee contractor employees (exclusively) to contribute to Maine Yankee's Historical Site Assessment and the decommissioning by coming forward to

[10] "Residual Radioactive Contamination From Decommissioning," NUREG/CR-5512 (also PNL-7994), Volume 3, October 1999.

recount knowledge of any spills, incidents, movement of radiological materials, disposal, or storage conditions which may have led to on-site or off-site radiological contamination. Ads will be of average display ad size for the publication in which they appear and will run three times. Ads will appear in Maine's three largest-circulation daily newspapers, three local weekly newspapers and the *Times-Record*. Ads will state a requirement of specificity as to approximate date, location, and associated task for each reported incident. Persons with anecdotal accounts may then be sent a prepared form to be filled out as an aid to filtering and organizing the incoming information. Ads will offer protection of confidentiality. If any new information is obtained, it will be incorporated in the Historical Site Assessment, relayed to NRC, and addressed on-site as appropriate. Results of the public response to these ads will be periodically reported to Friends of the Coast.

5. Storm Drain in Southwest Area of Site (Drainage Outfall 006)

Maine Yankee agrees to make flowrate measurements at Outfall 006 (southwest portion of site, discharging into Bailey Cove). These measurements will be made monthly over a twelve month period. The results will be compared and reconciled with the current description of groundwater flow in LTP Section 6.2.1. The LTP will be revised, if necessary. In addition, during the site Final Status Survey, this outfall will be sampled for nuclide content. The timing of this sample will be mutually agreed upon between Maine Yankee and Friends of the Coast.

6. Specific Applicability of Agreements with the State of Maine

It is recognized that Friends of the Coast has specific interests in the issues described above in items (5) Groundwater Sampling, and (7) Marine Sampling. Friends

of the Coast shall have meaningful participation in the fulfillment of the commitments made by Maine Yankee associated with these items, including the opportunity for input regarding how the commitments will be fulfilled and access to resulting reports and evaluations.

C. Agreement to File Joint Motion

The parties will promptly file a joint motion with the Atomic Safety and Licensing Board to terminate the adjudicatory proceeding. The motion will provide a copy of the settlement agreement.

Agreed to:

Maine Yankee — Date: 8/30/01

State of Maine — Date: 8/30/01

Friends of the Coast Opposing Nuclear Pollution — Date: 8/30/01

Distribution

1 of 4 - ASLB
2 of 4 - Friends of the Coast
3 of 4 - MaineYankee
4 of 4 - State of Maine

ORIGINAL 4 of 4

LBP-01-27

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
Thomas S. Moore, Chairman
Thomas D. Murphy
Dr. Thomas S. Elleman

In the Matter of Maine Yankee Atomic Power Company (Maine Yankee Atomic Power Station)	Docket No. 50-309-OLA ASLBP No. 00-780-03-OLA October 2, 2001

ORDER
(Approving Settlement Agreement and Terminating Proceeding)

On August 31, 2001, Maine Yankee Atomic Power Company (Maine Yankee), the State of Maine, and Friends of the Coast Opposing Nuclear Pollution filed with the Licensing Board a notice of settlement, a copy of the settlement agreement, and a joint motion to terminate this license amendment proceeding involving Maine Yankee's License Termination Plan. The joint motion states that the NRC Staff has no objection to the termination of the proceeding. The Commission looks with favor upon the settlement of licensing proceedings. See, e.g., Statement of Policy on Conduct of Licensing Proceedings, CLI-81-8, 13 NRC 452, 455 (1981). Here, the Board finds that the settlement agreement attached to the joint motion is fair and reasonable and comports with the public interest. Accordingly, the Board incorporates the settlement agreement into this Order and terminates this license amendment proceeding.

The Board would like to commend the participants for their diligence in pursuing settlement and their willingness to compromise to reach agreement. The Board thanks the

participants for their efforts. Indeed, even though the settlement process took much longer than initially anticipated and thus necessarily precluded reaching any notional deadlines for conducting and concluding this proceeding, the efforts of the participants should serve as a model for future license termination plan license amendment proceedings.

It is so ORDERED.

FOR THE ATOMIC SAFETY AND LICENSING BOARD[1]

/original signed by/

Thomas S. Moore
ADMINISTRATIVE JUDGE

Rockville, Maryland
October 2, 2001

[1]Copies of this Order were sent this date by Internet e-mail or facsimile transmission, if available, to all participants or counsel for participants.

State of Maine - Maine Yankee Settlement Agreement: Technical Issue Resolution Process

Participant Consensus Agreement

WHEREAS, Maine Yankee Atomic Power Company, Inc. ("Maine Yankee"), the State of Maine ("State"), and Friends of the Coast Opposing Nuclear Pollution ("FOTC") reached a settlement agreement ("Agreement") related to the State and FOTC petition for intervention and hearing in the matter of Maine Yankee's proposed License Termination Plan ("LTP");

WHEREAS, Maine Yankee, the State, and FOTC provided notice of that settlement to the NRC Atomic Safety and Licensing Board ("Licensing Board") and filed a joint motion to terminate the hearing proceeding (ASLBP No. 00-780-03-OLA);

WHEREAS, the Licensing Board incorporated the Agreement into its order on October 2, 2001 and terminated the license amendment proceeding;

WHEREAS, the Agreement required the joint participation of Maine Yankee and the State in a Technical Issue Resolution Process ("TIRP"), hereinafter "the Parties," to resolve certain technical issues with regard to the LTP;

WHEREAS, the Agreement established the process for electing TIRP team members;

THEREFORE, the elected TIRP team members agree as follows:

1. The undersigned team members participated as elected delegates with proper engagement in TIRP activities.
2. The TIRP was constituted and conducted in accordance with the terms of the Agreement.
3. The TIRP decision making method was by consensus, and the basic problem statement resolution approach was modeled after the Data Quality Objective process outlined in Appendix D to NUREG-1575, the "Multi-Agency Radiation Survey and Site Investigation Manual."

4. The problem statements defined in the Agreement were resolved to the Parties' satisfaction. The specific closure documents to the problem statements are hereby incorporated by reference and are attached as follows:
   - Problem Statements 1 and 2: "TIRP Problem Statements 1 and 2 - Resolution Document," dated 12/12/01 (Appendix A)
   - Problem Statements 3 and 5: "Transuranic and Other Hard To Detect Radionuclides In Maine Yankee Sample Media," dated 12/12/01 (Appendix B)
   - Problem Statement 4: "Application of Unity Rule to Demonstrate Compliance with Soil DCGL's," dated 12/12/01 (Appendix C)
5. The attached TIRP Summary Report summarizes the background, membership, meeting activity, process, general results, and documentation of the TIRP project.

The following signatories affirm they are authorized by the Parties to bind their principals to the Participant Consensus Agreement.

Agreed to:

State of Maine

Jay C. Hyland — 12/15/2001 Date

James D. Berger — 12/13/2001 Date

Maine Yankee

Michael A. Whitney — 12/13/2001 Date

David N. Fauver — 12/13/2001 Date

Appendix D

WASTE GENERATOR	2000 ft^3	2000 Ci	1999 ft^3	1999 Ci	1998 ft^3	1998 Ci	1997 ft^3	1997 Ci	1996 ft^3	1996 Ci
A. E. Staley MFG. Co.										
Bates College										
Bigelow Lab For Ocean Science									3.5	3.00E-03
Boise Cascade										
Bowdoin College			15	3.00E-05	15	3.00E-05				
Champion International Inc.										
Colby College, Dept. of Biology			15	2.00E-05					4.5	6.00E-04
Foundation For Blood Research					7.5	2.00E-06				
Great Northern Paper Co.										
IDEXX Corp.	36	0.0110	58	2.00E-03	25.49	1.60E-02	26	1.10E-02	22.0	1.00E-03
Immunotech					0.5	8.80E-05				
International Paper Co.										
Jackson Laboratories									120.0	0.190
Maine Medical Center									12.3	2.70E-03
Maine Yankee	78643	3160	11712.9	190	7397	1050	826	229	1361.0	3.02E+02
MDI Biological Laboratory			7.5	2.00E-05	75	3.00E-03	38	3.00E-03	52.5	1.36E-02
Philips Elmet			7.5	2.72E-07					423.0	8.67E-03
Portsmouth Naval Shipyard	N/R	N/R	1200.3	17.3	1330.8	17.9	814.9	11.8	594.6	1.38
Scott/Kimberly Clark										
S.D. WarrenCo./SAPPI										
University of Maine			112.5	1.25E-01	15	2.00E-02	175	3.65E+00	21.0	5.00E-03
University of New England			5.3	2.50E-02	7	5.00E-08			1.1	4.94E-03
University of Southern Maine					0.08	8.00E-06	0.000E+00	8.00E-06		
Ventrex Laboratories/HYCOR					202.5	1.50E-01				
LAFB										
TOTALS	**78679**	**3160**	**13134**	**206.97**	**9075.87**	**1069.1**	**1879.9**	**243.99**	**2615.5**	**303.61**
Generators reporting disposal	2		9		11		6		11.0	
Black bars indicate a company that has changed it's name or left the state.						Scientific notation is used to conserve space.				

"The data presented in the chart is reported by the Division of Health Engineering (DHE), Bureau of Health, Department of Human Services and represents the year 2000 low level radioactive waste (LLRW) disposed in that year. The data was collected in the year 2001 during the annual DHE March survey. The information is collected from over 130 Maine radioactive materials licensees who return the information on a written form to DHE before or by August. The DHE charges a fee in the maximum amount of $135,000 (Statutory capped maximum account balance) for the volume and activity of material reported by each generator. The fee is 50% based on volume (FT^3) and 50% based on radioactivity (Ci). The minimum fee for a generator is $100.00 and the total charged is based on the programs expenses and usually ranges from $70,000 to $100,000. DHE reports that it is difficult to compare volumes among generators due to the predisposal processing of waste generated by Maine Yankee Atomic Power Company (MY). MY reports a compacted volume amount and other generators do not because it is not economically feasible to compact small quantities. All LLRW generators except Maine Yankee, which generates all classes of waste, are reporting and generating Class A waste. The types of materials reported are gloves, bench coverings, plastic lab ware, lab coats and biohazard waste. Some liquid wastes are shipped as dry after they are absorbed by clay products, similar to pet litter, or solidified in concrete. These are wastes typically generated and shipped by laboratories, colleges and hospitals. According to DHE files, paper companies generate LLRW that is sealed sources contained within measuring or gauging equipment that are removed from the equipment when replaced or upgraded with new equipment. Those sealed source materials are usually Cesium 137 or Cobalt 60 and are dry wastes that are accepted for disposal as Class A. There have been no filings by new LLRW generators for the previous two reporting years." (prepared January 2002).