

April 20, 2006

MEMORANDUM TO: William Dean, Assistant for Operations
Office of the Executive Director for Operations

FROM: Larry W. Camper, Director **/RA/**
Division of Waste Management
and Environmental Protection
Office of Nuclear Material Safety
and Safeguards

SUBJECT: NUCLEAR ENERGY AGENCY - ORGANIZATION FOR
ECONOMIC CO-OPERATION AND DEVELOPMENT -
WORKING PARTY ON DECOMMISSIONING AND
DISMANTLING TOPICAL MEETING ON "STAKEHOLDER
INVOLVEMENT IN DECOMMISSIONING NOVEMBER 14-17,
2005, PAPER FOR PUBLICATION IN PROCEEDINGS

In accordance with Management Directive 3.9 and subsequent Office of the Executive Director of Operations (EDO) guidance, information is provided below regarding a presentation made while on foreign travel or to an international group. The presentation slides were previously approved and are in ADAMS (ML053010024). On April 4, 2006, the Nuclear Energy Agency - Organization for Economic Co-operation and Development - Working Party on Decommissioning and Dismantling (NEA/OECD/WPDD) requested a paper be submitted for publication in the proceedings. The enclosed paper reflects the slide presentation from the November 2005 meeting. The paper and presentation do not involve policy issues. This information is for your transmittal to Commissioner Assistants, for information.

Meeting: NEA/OECD/WPDD Annual Meeting
Place: Brussels, Belgium
Date: November 12-17, 2005
Author(s): Bruce Watson, NMSS/DWMEP
Title: "Stakeholder Involvement in the Decommissioning of Trojan and Maine Yankee Nuclear Power Plants"

ADAMS
Accession # : ML061010607

Enclosure:
Paper

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Office of Economic Cooperation and Development/Nuclear Energy Agency
Working Party on Decommissioning and Dismantling
Topical Workshop on Stakeholder Involvement in Decommissioning
Brussels, Belgium - November 14-18, 2005

Stakeholder Involvement in the Decommissioning of Trojan and Maine Yankee Nuclear Power Plants

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ABSTRACT

Trojan Nuclear Plant (Trojan) and Maine Yankee Nuclear Plant (Maine Yankee) were the first two power reactors to complete decommissioning under the U. S. Nuclear Regulatory Commission's (NRC's) License Termination Rule (LTR), 10 CFR Part 20, Subpart E. The respective owners' decisions to decommission the sites resulted in different approaches to both the physical aspects of the decommissioning, and the approach for obtaining approval for completing the decommissioning in accordance with regulations. Being in different States, the two single-unit pressurized water reactor sites had different State requirements and levels of public interest that impacted the decommissioning approaches. This resulted in significant differences in the decommissioning planning, the conduct of decommissioning operations, the volume of low-level radioactive waste, and the final status survey (FSS) program. While both licensees have Independent Spent Fuel Storage Installations (ISFSIs), Trojan obtained a separate license for the ISFSI in accordance with the requirements of 10 CFR Part 72 and terminated its 10 CFR Part 50 license. Maine Yankee elected to reduce the 10 CFR Part 50 license to only the requirements for the ISFSI. While the NRC regulations are flexible and allow different approaches to ISFSI licensing, there are separate licensing requirements that must be addressed.

In 10 CFR 50.82, the NRC mandates public participation in the decommissioning process. For Maine Yankee, stakeholder and public input resulted in the licensee entering into an agreement with a citizen group and resulted in State legislation that lowered the dose limit below the NRC radiological criteria of 0.25 milliSievert/year (mSv/yr) (25 mrem/yr) in 10 CFR 20.1402 for unrestricted use. The lowering of the radiological criteria resulted in a significant dose modeling effort using site-specific Derived Concentrations Guideline Levels (DCGLs) that were well below the NRC DCGL screening values. This contributed to a longer than anticipated period to obtain NRC approval of the Maine Yankee License Termination Plan (LTP).

While both licensees provided final status survey reports (FSSRs) for NRC approval, the Trojan approach to decommissioning and data management allowed NRC to review FSS records and supporting documentation more efficiently. This paper will describe the stakeholder and regulatory impacts of the differing approaches to decommissioning, development of licensee required plans, decommissioning operations and records, and the differences in licensing processes.

Enclosure

INTRODUCTION

The NRC regulates the decommissioning and license termination of approximately 80 complex, commercial nuclear facilities, including power, research and test reactors, material sites and fuel cycle facilities. The LTR provides requirements for either unrestricted release or restricted use. Specific requirements for power reactor "Termination of License" are described in 10 CFR 50.82, whereas 10 CFR 50.83 defines the requirements for the "Release of part of a power reactor facility or site for unrestricted use." Portland General Electric Company (PGE) elected to pursue license termination for the Trojan site in accordance with 10 CFR 50.82. Maine Yankee Atomic Power Company (MYAPC) chose to use 10 CFR 50.83 to release the site backland areas and use 10 CFR 50.90 to reduce the Maine Yankee site footprint through a license amendment request.

Both Trojan and Maine Yankee had public, operational, and economic issues that caused the two respective Boards of Directors to elect to close the plants. PGE faced the cost of replacing the Trojan steam generators and the lost power generation, and was affected economically by the less expensive hydro-electric power in the Northwest. Maine Yankee had operational issues with fuel performance and fire protection issues that would be expensive to resolve. These issues, coupled with the on-going opposition to nuclear energy in Maine, caused the MYAPC Board to close the plant.

Trojan was shutdown in November 1992. In January 1993, PGE decided to permanently shutdown the plant in order to begin decommissioning with the intent to terminate the Part 50 operating license with no restrictions on the future use of the site. Trojan proceeded to license its ISFSI in accordance with 10 CFR Part 72, and followed the requirements of 10 CFR 50.82 process for license termination. The Trojan LTP called for dismantling the radioactively contaminated steam supply and auxiliary systems while retaining the non-radioactive secondary systems, including the turbine and condenser for future re-use or re-cycling. In addition, all concrete structures including the containment, fuel and auxiliary buildings, were decontaminated for unrestricted release. Since there was no groundwater contamination found during site characterization prior to major decommissioning activities, PGE elected to use the NRC's Screening Level – Derived Concentration Guideline Levels for demonstrating compliance with the 10 CFR Part 20, Subpart E.

Maine Yankee was shutdown in December 1996, with the MYAPC Board of Directors electing to permanently shutdown the plant in August 1997. Unlike Trojan, Maine Yankee had well established intervenor groups that solicited the State of Maine to impose lower dose criteria on Maine Yankee. The stakeholders included the Friends of the Coast, the Chiwonki Group, and numerous individual citizens. The State of Maine passed legislation that required that Maine Yankee comply with a 0.04 mSv/yr (4 mrem/yr) drinking water limit and a 0.1 mSv/yr (10 mrem/yr) limit from all sources. The State of Maine also required additional long term ground monitoring, and the out-of-state disposal of decommissioning concrete waste. In order to fulfill the State requirements, the Maine Yankee LTP called for the removal of all site structures to approximately 1 meter (3 feet) below grade and the removal of all debris from the State.

DECOMMISSIONING PERFORMANCE

Table I shows general comparative decommissioning information for the Trojan and Maine Yankee projects. A discussion of the information follows:

Trojan: Trojan permanently shutdown in January 1993. Being one of the first large nuclear plants to start decommissioning, PGE had to address new issues, such as steam generator and reactor vessel removal and disposal, the LTP approval process and its approach to decommissioning. PGE chose to perform the radiological decommissioning while leaving major structures intact, including the containment, auxiliary, and turbine buildings, and while leaving the major non-contaminated secondary steam system; turbine, condenser, moisture separators, and piping, in place. One objective was to minimize radioactive waste volumes and recycle as much material as practical. Trojan generally has met this goal based on only having to dispose of 12,375 cubic meters (m^3) of radioactive waste, and plans to recycle concrete and metal when the industrial demolition of the site is performed. The total worker dose for completing the radiological decommissioning was 3.35 Sv (335 Rem) and was well below the decommissioning estimate. The NRC terminated the Trojan 10 CFR Part 50 license on May 23, 2005.

Maine Yankee: Maine Yankee was shutdown in August 1997 and started decommissioning in the same month. To achieve unrestricted use, the decommissioning approach focused on removal of all site structures to 3 ft below grade. All above-ground structures were removed, and approximately 100,000 m^3 of radioactive waste was disposed of offsite. During its eight year decommissioning period, Maine Yankee had a total worker dose of approximately 5.15 Sv (515 Rem), and was well below the Generic Environmental Impact Statement goals. Maine Yankee incurred more dose than Trojan, due in part to a higher radiation source term and the shorter time period from the shutdown to the start of decommissioning activities. On September 30, 2005, the NRC amended MYAPC's 10 CFR Part 50 general license reducing the site to a 12 acre parcel of land with an ISFSI.

Table I - Comparative Decommissioning Project Data for Trojan and Maine Yankee

ISSUE	Trojan	Maine Yankee
Shutdown Date	November 1992	August 1997
Decommissioning Started	January 1993	August 1997
Decommissioning Completion Date	January 2005	October 2005 ⁽¹⁾
Total Time for Decommissioning	12 Years	8 Years
OSHA Reportables	83	65
OSHA Rate	<< 7.8	2.6
Total Dose	3.35 Sv (335 Rem)	5.15 Sv (515 Rem)
Radioactive Waste	12,375 m ³	100,000 m ³
Cost	~ \$ 422 M	~ \$420 M
<i>NRC Licensing Action</i>	<i>10 CFR Part 50 License Termination May 23, 2005</i>	<i>10 CFR Part 50 License Amendment September 30, 2005</i>

Note: (1) Maine Yankee had contaminated soil/debris from decommissioning stored at ISFSI for shipment offsite.

REACTOR DECOMMISSIONING REGULATORY PROCESSES

The decommissioning process for reactor licensees is outlined in Table II. This table compares the decommissioning process for reactors with 10 CFR Part 72 specific ISFSI licenses to the process for 10 CFR Part 50 general ISFSI licenses. The process is principally the same with some minor differences. After the ISFSI is completed and decommissioning activities are complete, licensees with 10 CFR Part 72 specific ISFSI licenses may request to terminate the 10 CFR Part 50 license. On the other hand, licensees with 10 CFR Part 50 general ISFSI licenses may request a license amendment to reduce the boundary of the license to the footprint of the ISFSI. In both requests, the licensee must demonstrate that the LTR requirements have been met. The NRC handles both requests by noticing the request in the *Federal Register*, reviewing the FSSR, issuing a Safety Evaluation Report (SER), and issuing the respective approval, either for the amendment or termination. One additional administrative action required for the Part 72 specific ISFSIs, is that licensees must request an exemption from 10 CFR 72.3(c)(5), to transfer financial assurance methods from the 10 CFR Part 50 to 10 CFR Part 72 license. The NRC staff completes the SER and environmental review, publishes a Notice of the licensing action in the *Federal Register* and approves the request. Each licensee must continue to maintain \$100 M in nuclear liability insurance for the ISFSI. One final internal action for 10 CFR Part 50 licensees is the transfer of project management responsibilities from the Division of Waste Management and Environmental Protection (DWMEP) to the NRC Spent Fuel Project Office (SFPO). From the NRC perspective, the differences between the two licensing processes are very minor.

Table II – Reactor Decommissioning Licensing Process

10 CFR Part 72 Specific ISFSI License	10 CFR Part 50 General License
Licensee obtains 10 CFR Part 72 license. Licensee completes decommissioning.	Licensee completes decommissioning.
Licensee submits FSSR to NRC for approval.	Licensee submits FSSR to NRC for approval.
Licensee submits request to terminate Part 50 license. Licensee requests exemption from 10 CFR 72.30(c)(5) to transfer financial assurance methods from 10 CFR Part 50 to 10 CFR Part 72. ISFSI is licensed under specific 10 CFR Part 72 license.	Licensee submits license amendment request to shrink boundary of site to the footprint of the ISFSI.
NRC notices licensee's request in <i>Federal Register</i> .	NRC notices licensee's request in <i>Federal Register</i> .
NRC approves FSSR, prepares license termination letter, SER, and <i>Federal Register</i> Notice. - licensee required to maintain \$100 million in nuclear liability insurance until all spent fuel removed from the ISFSI.	NRC approves FSSR, prepares license termination letter, SER, and <i>Federal Register</i> Notice. - licensee required to maintain \$100 million in nuclear liability insurance until all spent fuel removed from the ISFSI.
SFPO has project management responsibility for the 10 CFR Part 72 ISFSI license.	Project management responsibility for the 10 CFR Part 50 generally licensed ISFSI transferred from DWMEP to SFPO.

LESSONS LEARNED

The NRC is always seeking ways to improve the decommissioning process. Because Trojan and Maine Yankee were decommissioning at the same time, the NRC staff was able to compare the decommissioning processes used by both reactors and identify a number of lessons learned that can be used by other licensees to improve the decommissioning process. In the following discussion, the staff offers lessons learned in the areas of communications, LTP development and implementation, and FSS records. Maine Yankee, in conjunction with the Electric Power Research Institute (EPRI), also documented lessons learned from its entire decommissioning experience which is available from EPRI at www.epri.org and www.MaineYankee.com. The NRC staff is using the feedback from stakeholders to revise

decommissioning guidance, and to evaluate rule changes to improve the decommissioning process as part of the Integrated Decommissioning Improvement Plan (IDIP).

Stakeholder Communications

The NRC License Termination Rule requires that the NRC solicit comments from the public, and 10 CFR 50.82 requires that a public meeting be held prior to the License Termination Plan approval for power reactors. This meeting allows for the public to present concerns to the NRC staff for consideration of the License Termination Plan. The stakeholder participation can vary widely. This may result in significant actions being taken by the stakeholders that may impact a licensee's decommissioning plan.

Trojan: The NRC-sponsored Trojan public meeting was well attended. The meeting was more of a briefing for the interested public participants. The State of Oregon did not impose any additional requirements on the plant owner. However, at the end of the decommissioning, the NRC was invited to provide a presentation to the Oregon Energy Siting Board (OESB) on the status of the Trojan decommissioning. The OESB was also a public-invited meeting at which the NRC staff provided the conclusions that the site had been cleaned up well below the 0.25 mSv/yr (25 mrem/yr) release criteria and the 10 CFR Part 50 license would be terminated for free release with no site restrictions.

Maine Yankee: The NRC-sponsored Maine Yankee public meeting attracted a number of non-government authority groups and resulted in over-capacity crowd. The forum allowed the public and group representatives to express their views regarding the utility's ability to complete the decommissioning safely and the decommissioning process. This resulted in the State of Maine passing legislation with the specific requirements for Maine Yankee. These included a lower dose release criteria, waste disposal requirements and the final end state of the property. Included in the State of Maine legislation was the requirement for Maine Yankee to create a Citizens Advisory Panel (CAP). Many stakeholders were invited to participate on the panel. The NRC attended many of the CAP meetings and frequently provided information on the decommissioning progress and the NRC inspection program for overseeing the decommissioning.

LTP Development and Implementation

The lesson learned is that licensees need to produce a clear, concise, and detailed LTP, because it results in quicker approval. Further, a clearly written LTP requires less interpretation and allows the NRC to easily verify compliance with approved LTP requirements. The following discussion describes how the Trojan and Maine Yankee LTPs affected the decommissioning process.

Trojan: PGE took a straightforward approach to the Trojan LTP and the decommissioning. In the original site characterization, no groundwater contamination was found, so Trojan adopted the NRC Screening level DCGLs versus the development of site specific DCGLs. This

simplified the approach for demonstrating that the residual radioactivity would be less than the 0.25 mSv/yr (25 mrem/yr) criteria. Trojan's goal was to release the site for unrestricted use. The Trojan FSS Plan employed an approach which required a minimum of 30 samples to be taken in each survey unit. Most radiological measurements did not subtract background. In addition to the beta surface measurements, Trojan recognized the importance of performing gamma surveys to determine the presence of contamination-at-depth on concrete structures and in the floor-wall interfaces. PGE also planned for the future removal of the spent fuel from the site and performed FSSs of the ISFSI footprint prior to construction. The Trojan LTP was approved by the NRC in 18 months and over the course of the decommissioning, there were no major revisions to the LTP.

Technical issues that were resolved during the decommissioning included:

- q Paint Removal
- q Embedded Pipes

Maine Yankee: Maine Yankee's LTP was written with very broad and general methods for demonstrating compliance with NRC requirements and guidance. Although licensees generally believe that a less specific LTP allows for greater decommissioning flexibility, the potential for differing interpretations of the LTP commitments by NRC and licensee staffs is increased. The different interpretations during the LTP review lead to numerous meetings and teleconferences to resolve NRC questions, which required 37 months for LTP approval.

Technical issues that were resolved during the decommissioning included:

- q Fore Bay Underwater Measurements
- q E-600 Survey Instrument Issues
- q Determination of Background Radiation Activity
- q Groundwater Modeling

As permitted by the NRC in 10 CFR Part 50, licensees can revise the LTP using 10 CFR 50.59. During the course of the decommissioning, the LTP was revised by Maine Yankee three times. Most of the changes were updates to the LTP citing the physical progress in the decommissioning the site. However, there were changes to the technical methods and survey requirements that impacted the staff review of FSSRs.

FSS Records and Confirmatory Surveys

The FSSR demonstrates that residual radioactive material at the site does not exceed the NRC criteria for release of the site. NRC reviews the FSSR to verify that the results of the FSSs demonstrate that the site meets the radiological criteria for license termination. As part of the FSSR review process, NRC may review a variety of records associated with the FSSR such as actual survey data packages, FSS instrument calibration records, and survey technician qualification and training records.

The lessons learned regarding FSS records include:

- q The licensee and regulator should agree on the format and content of the FSSR
- q Records that support the FSSR (i.e. FSS data, instrument calibration logs, and technician qualification and training records) should be readily retrievable for inspection
- q FSSR supporting records should be of high administrative quality.

Trojan: Trojan submittals followed the original agreed-upon format, were consistent, and of high administrative quality, which allowed the NRC staff to review the information efficiently. Of the 10 FSSR Supplements containing 510 FSS records submitted by Trojan, the NRC staff had three formal Requests for Additional Information (RAIs), which were promptly resolved. Overall, the Trojan staff designed quality survey packages, managed the survey data and documentation, and provided FSSRs that were consistent with the agreed upon format and content. In addition, the records that supported the FSSRs were complete and comprehensive. The NRC confirmatory surveys were scheduled with Trojan and were performed as planned.

Maine Yankee: The content of the FSSR was described in the LTP. However, because the LTP was general in nature, Maine Yankee provided general FSS records. In response to review of the 12 FSSR Supplements, containing 180 FSS records submitted by Maine Yankee, the NRC staff submitted 21 RAIs. In addition, the NRC staff raised questions regarding the quality of the FSS supporting documentation. Maine Yankee was able to resolve these issues, but it took time to recover archived information due to data management practices. To facilitate the NRC review, technical reviewers conducted two additional site inspections to specifically review Maine Yankee records that supported their FSSR submittals.

The NRC had difficulty in scheduling confirmatory surveys and scheduled surveys resulted as in-process surveys being performed at Maine Yankee. At the time, the in-process surveys were not thought to be as valuable to the NRC staff as confirmatory surveys. However, the in-process surveys can confirm that the licensee is performing the surveys adequately since the surveys are conducted side-by-side with the licensee.

Table III summarizes the review of Trojan's and Maine Yankee's FSSRs.

Table III - Final Status Survey Report Data Summary

	Trojan	Maine Yankee
LTP Approval	18 Months	37 Months
FSSR Supplements	10	12
FSS Release Records	510	180
Formal RAIs Submitted –	3 RAI	21 RAIs
Avg Time to Resolve Issues	Less than 1 Month	15 Months
Public Invited Meetings to Discuss Technical Issues	0	3
FSSR Review Schedule	3 months ahead of original schedule	8 months behind original schedule
Final Dose	Less than 0.01mSv/yr (1 mrem/yr)	Less than 0.01 mSv/yr (1 mrem/yr)

CONCLUSIONS

- q From an NRC perspective, there is no significant difference in the two licensing approaches at the completion of decommissioning.
- q The NRC License Termination Rule mandates the opportunity for stakeholder involvement.
- q Individual States may vary in their role in the decommissioning process.
- q Stakeholder interest can vary and must be addressed.
- q High quality decommissioning submittals from the licensee to the NRC are critical.

REFERENCES

NUREG 1757, Consolidated NMSS Decommissioning Guidance, September 2003,

NRC Proceedings - Decommissioning Workshop, University of Maryland at Shady Grove, Maryland, April 2005.