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Submitted: March 28, 2012

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 22, 2011

Vice President, Operations
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249

SUBJECT: INDIAN POINT NUCLEAR GENERATING UNIT NO. 3 - SAFETY EVALUATION RE: SPENT FUEL MANAGEMENT PROGRAM AND PRELIMINARY DECOMMISSIONING COST ESTIMATE (TAC NO. ME5257)

Dear Sir or Madam:

By letter dated December 10, 2010, as supplemented by letter dated April 1, 2011, Entergy Nuclear Operations, Inc. (Entergy) submitted the Indian Point Nuclear Generating Unit No. 3 (IP3) Program for Maintenance of Irradiated Fuel and Preliminary Decommissioning Cost Analysis. These submittals addressed how Entergy will meet the requirements for IP3 set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Sections 50.54(bb) and 50.75(f)(3).

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review. The NRC staff finds that Entergy's program for the long-term storage of spent fuel and the preliminary cost estimate for IP3 decommissioning are adequate and provide sufficient details associated with the funding mechanisms. The staff therefore concludes that the licensee's spent fuel management program for IP3 complies with 10 CFR 50.54(bb) and approves the program on a preliminary basis. In addition, the staff finds that the preliminary cost estimate for IP3 complies with the requirements of 10 CRF 50.75(f)(3) and the staff finds that the preliminary cost estimate for IP3 is not unreasonable.

Entergy's supplemental contribution of $55.6 million in 2023 is necessary to support the spent fuel management costs. The decommissioning trust fund (DTF) balance is sufficient to address the radiological costs. Entergy acknowledged that before having access to the radiological DTF for anything beyond decommissioning activities as defined in 10 CFR 50.2, Entergy would be required to submit an exemption request pursuant to 10 CFR 50.12(a). However, if there are changes in the DTF balance that materially impact the licensee's cost analysis, or if new disposal rates are significantly higher, given these considerations, the licensee would be under an obligation under 10 CFR 50.9 to update any changes in projected cost, or available funds.

Please contact me at (301) 415-2901 if you have any questions on this issue.

Sincerely,

John P. Boska

John P. Boska, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-286

Enclosure:
Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO SPENT FUEL MANAGEMENT PROGRAM AND THE PRELIMINARY DECOMMISSIONING COST ESTIMATE FOR ENTERGY NUCLEAR OPERATIONS, INC. INDIAN POINT NUCLEAR GENERATING UNIT NO. 3 DOCKET NO. 50-286

1.0 INTRODUCTION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(bb), nuclear power plants that are within 5 years of expiration of their operating license must submit a spent fuel management and funding program to the Nuclear Regulatory Commission (NRC) for review and preliminary approval. The program should discuss the means by which the licensee intends to manage and provide funding for the management of spent fuel until the fuel is transferred to the Department of Energy (DOE) for permanent disposal. In the same time period, the licensee is also required by 10 CFR 50.75(f)(3) to submit a preliminary decommissioning cost estimate, which includes an up-to-date assessment of the major factors that could affect the cost to decommission the reactor.

By letter dated December 10, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103550612), Entergy Nuclear Operations, Inc (Entergy or the licensee) submitted "Unit 3 Program for Maintenance of Irradiated Fuel and Preliminary Decommissioning Cost Analysis in accordance with 10 CFR 50.54(bb) and 10 CFR 50.75(f)(3)," and a supplemental submittal dated April 1, 2011 (ADAMS Accession No. ML111020400), in support of the application. The following sections document the NRC staff's findings resulting from the review of these submittals.

2.0 BACKGROUND

The Indian Point site is located in Buchanan, New York, about 24 miles north of New York City. There are three reactors at the Indian Point site, Indian Point Nuclear Generating Unit No. 1 (IP1), Indian Point Nuclear Generating Unit No. 2 (IP2), and Indian Point Nuclear Generating Unit No. 3 (IP3). IP1 and IP2 are owned by Entergy Nuclear Indian Point 2, LLC, and operated by Entergy Nuclear Operations, Inc. IP3 is owned by Entergy Nuclear Indian Point 3, LLC, and operated by Entergy Nuclear Operations, Inc. IP2 and IP3 are still operating. IP1 was shut down in October of 1974. IP1 is expected to remain in a long-term storage configuration until it can be decommissioned simultaneously with IP2.

IP2 and IP3 are still in operation, with license expiration dates of September 28, 2013, and December 12, 2015, respectively, although Entergy has applied for license renewal for IP2 and IP3. Entergy stated that if IP2 ceases operation in 2013, IP2 would then be placed into safe storage (SAFSTOR) for a period up to 60 years, at which time IP2 would be decontaminated and dismantled. Entergy also stated that if IP3 ceases operation in 2015, IP3 would then be placed into SAFSTOR for a period up to 60 years, at which time IP3 would be decontaminated and dismantled. Entergy stated that its intention is to decommission IP1, IP2, and IP3 as an integrated site activity.

Entergy is seeking renewal of the operating licenses for IP2 and IP3. In the event that IP3 does cease operation in 2015, Entergy will comply with existing NRC licensing requirements, including the operation and maintenance of the systems and structures needed to support continued operation of the IP3 spent fuel pool and the independent spent fuel storage installation (ISFSI) located on the site.

3.0 REGULATORY REQUIREMENTS AND CRITERIA

3.1 Regulatory Requirements on Management of Spent Fuel (10 CFR 50.54(bb))

Pursuant to 10 CFR 50.54(bb), "For nuclear power reactors licensed by the NRC, the licensee shall, within 2 years following permanent cessation of operation of the reactor or 5 years before expiration of the reactor operating license, whichever occurs first, submit written notification to the Commission for its review and preliminary approval of the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor following permanent cessation of the operation of the reactor until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository."

3.1.1 Criteria to Support the 10 CFR 50.54(bb) Review

For the NRC staff to evaluate and provide preliminary approval of the spent fuel management and funding program, the submittal should include:

- Estimated cost to isolate the spent fuel pool and fuel handling systems;
- Estimated cost to construct an ISFSI or a combination of wet/dry storage;
- Estimated annual cost for the operation of the selected option (wet or dry storage or a combination of the two) until the DOE takes possession of the fuel;
- Estimated cost for the preparation, packaging, and shipping of the fuel to the DOE;
- Estimated cost to decommission the spent fuel storage facility; and
- Brief discussion of the selected storage method or methods, and the estimated time for these activities.

3.2 Regulatory Requirement on Funding of Radiological Decommissioning (10 CFR 50.75(f)(3) and (f)(5))

Section 10 CFR 50.75(f)(3) requires that a licensee "...shall at or about 5 years prior to the projected end of operations submit a preliminary decommissioning cost estimate [herein referred

to as the preliminary cost estimate] which includes an up-to-date assessment of the major factors that could affect the cost to decommission." Section 50.75(f)(5) requires a licensee to include plans to adjust decommissioning funding levels to demonstrate a reasonable level of financial assurance, if necessary, in the preliminary cost estimate.

3.2.1 Criteria to Support the 10 CFR 50.75(f)(3) Review

NUREG-1713, entitled "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors," Section C1, provides additional guidance on the information that is to be addressed in the preliminary cost estimate. The principal factors to be addressed are:

- Decommissioning option/method anticipated;
- Potential for known or suspected contamination of the facility or site;
- Low-level radioactive waste (LLW) disposition plan;
- Preliminary schedule of decommissioning activities; and
- Any other factors that could significantly affect the cost to decommission.

The cost estimate should provide costs for each of the following:

- Pre-decommissioning engineering and planning - decommissioning engineering and planning prior to completion of reactor defueling;
- Reactor deactivation - deactivation and radiological decontamination of plant systems to place the reactor into a safe, permanent shutdown condition;
- Safe storage - safe storage monitoring of the facility until dismantlement begins (if storage or monitoring of spent fuel is included in the cost estimate, it should be shown separately). The annual costs for SAFSTOR should be separated by major cost areas;
- Dismantlement - radiological decontamination and dismantlement of systems and structures required for license termination (if demolition of uncontaminated structures and site restoration activities are included in the cost estimate, they should be shown separately); and
- LLW disposition - LLW packaging, transportation, vendor processing, and disposal.

4.0 EVALUATION

4.1 Evaluation of the Program to Manage and Fund the Storage of all Irradiated Fuel

As required by 10 CFR 50.54(bb), Entergy estimated the cost associated with the long-term management of spent fuel for IP3 at $227.9 million (note: all dollar values identified in this evaluation are indicated in 2010 dollars). The long-term management of the spent fuel for IP3 is divided between an initial storage of irradiated fuel from the most recent fuel cycles in the spent fuel pool to allow a reduction in the decay heat generation, followed by transfer to long-term storage in the onsite ISFSI. Interim storage of the IP3 spent fuel, until the DOE takes receipt, will be in the IP3 fuel storage building's spent fuel pool and the ISFSI. IP3 is projected to generate 1,683 spent fuel assemblies through the end of its currently licensed operations in 2015. An ISFSI has been constructed within the owner-controlled area to support current plant

operations. This facility will also be used for post-shutdown dry fuel storage. The majority of the assemblies stored in the IP3 fuel storage building's spent fuel pool at the time of shutdown will be loaded into multi-purpose canisters and moved into storage casks on the ISFSI pad by 2023. Entergy estimates that all IP3 fuel will be removed from the site by the year 2047. The 2047 date is based on a 2023 start date for repository operations and receipt of fuel by DOE. A second ISFSI will be required and is included as part of the $121.11 million direct cost. Direct costs also include the procurement of multi-purpose storage canisters as well as the loading and transfer costs associated with transferring the spent fuel from the pool to the ISFSI pad or into a DOE transport cask and the eventual transfer of the fuel to DOE. The direct cost of $121.11 million is a subset of the $227.95 million. Entergy estimated the annual cost associated with dry storage for the period from 2024 to 2046 at $2.4 million. The licensee stated that, following transfer of the fuel to the DOE, the ISFSI will be decontaminated to the extent necessary to release the facility at an estimated cost of $1.1 million. Conventional demolition and restoration of the ISFSI is estimated to cost an additional $1.9 million.

Entergy has submitted a license renewal application for IP3. If that is unsuccessful and IP3 ceases operation in 2015, Entergy committed to comply with existing licensing requirements, including the operation and maintenance of the systems and structures needed to support continued operation of the spent fuel pool. Entergy has committed to pay $55.6 million (or $43.0 million in 2010 dollars) into the decommissioning trust fund (DTF) in 2023 to address the spent fuel cost. The licensee applied a real rate of return of 2.0 percent to its analysis and deducted the annual expenses associated with SAFSTOR. Entergy acknowledged the need for an exemption pursuant to 10 CFR 50.12(a) to use radiological DTF for anything beyond decommissioning activities as defined in 10 CFR 50.2. Entergy further acknowledged the need for Commission approval pursuant to 10 CFR 50.82(a)(3) for completion of decommissioning beyond 60 years for earlier-shutdown reactors on the site. In addition, Entergy stated that it will also comply with applicable license termination requirements in accordance with 10 CFR 50.82 with respect to plant shutdown and post-shutdown activities including seeking such NRC approvals and on such schedules as necessary to satisfy these requirements consistent with the continued storage of irradiated fuel.

The NRC staff finds the spent fuel management program estimates to be reasonable, based on a cost comparison with similar decommissioning reactors, while acknowledging that there are large uncertainties and potential site-specific variances.

4. 2 Evaluation of the Preliminary Radiological Decommissioning Cost Estimate

Entergy estimated the total radiological decommissioning cost of IP3 to be approximately $836.4 million in 2010 dollars. Entergy has elected to use the SAFSTOR option with decommissioning completed in 2073. Spent fuel will be required to remain in the spent fuel pool for a period of time to decrease the heat loading before transferring the fuel to the ISFSI.

Prior to starting the detailed review of the cost estimate, the NRC staff reviewed the estimate to confirm the supporting systems/structures necessary to support the safe operation had been identified in the estimate. The validity of the cost estimate is based on a reasonable estimate of the cost to decommission the supporting systems and structures, as well as confirming that all of the major equipment necessary to support operation was included.

The licensee has divided the estimated total cost of $836.4 million into the following principal categories: decontamination costs; support systems/component removal; packaging; transportation; waste disposal; program management; insurance and regulatory fees; miscellaneous equipment costs; insurance; energy costs; characterization and licensing surveys; and site and operating and maintenance costs. The licensee included a time line and an annual cost projection that identifies when these activities will take place, and the costs associated with each of these items. In addition, Appendix A of the submittal dated December 10, 2010, identified the contingency factors for the major activities with an overall average contingency of 17.8 percent. The NRC staff reviewed the contingency factors and the work difficulty factors used in the cost estimate and found them to be reasonable.

The NRC staff recognizes that a significant uncertainty exists regarding the low-level waste disposal cost since Barnwell no longer accepts waste from Non-Atlantic Compact members. The NRC staff concluded that the waste volume estimates were in a reasonable range. For disposal cost estimating purposes, the disposal rate is reasonable based on the mix of waste and the available disposal options. However, when new disposal facilities become available, or if the South Carolina disposal site reopens to members outside its compact, disposal rates will likely be significantly higher. Entergy's cost estimates addressed the costs of disposal of an estimated 2.4 million cubic feet of contaminated soil at an estimated cost of $132.2 million, which included an estimated 287,000 cubic feet of contaminated soil for IP3 at an estimated cost of $15.2 million.

The DTF balance could be subject to decline, depending on the performance of the DTF investments. The licensee's decommissioning cost analysis was based on a DTF balance for radiological decommissioning of $486.4 million as of October 31, 2010. In the submittal dated December 10, 2010, Attachment 2, Table 26, Entergy addressed the initial potential shortfall in funding for spent fuel management and decommissioning (assuming an October 31, 2010, trust fund balance, and a 2 percent real rate of return on the DTF) by committing to make a $55.6 million contribution to the trust fund in 2023. The NRC staff's analysis confirmed Entergy's additional contribution of $55.6 million should result in the DTF having sufficient funds to also pay for spent fuel management. Entergy would have to provide the additional funds before the NRC would approve withdrawals for spent fuel management. If there is a change in the DTF balance that materially impacts the licensee's cost analysis, or if new disposal rates are significantly higher, given these considerations, the licensee would be under an obligation under 10 CFR 50.9 to update any changes in the projected cost or available funds.

The NRC staff finds that the preliminary cost estimate to decommission IP3 is not unreasonable.

5.0 CONCLUSION

The NRC staff finds that Entergy's program for the long-term storage of spent fuel and the preliminary cost estimate for IP3 decommissioning are adequate and provide sufficient details associated with the funding mechanisms. The NRC staff therefore concludes that the licensee's spent fuel management program for IP3 complies with 10 CFR 50.54(bb) and approves the program on a preliminary basis. In addition, the NRC staff finds that the preliminary cost estimate for the radiological decommissioning of IP3 complies with the requirements of 10 CFR 50.75(f)(3) and the NRC staff finds that the preliminary cost estimate for IP3 is not unreasonable.

Entergy's supplemental contribution of $55.6 million in 2023 is necessary to support the spent fuel management costs. The DTF balance is sufficient to address the radiological costs. Entergy acknowledged that before having access to the radiological DTF for anything beyond decommissioning activities as defined in 10 CFR 50.2, Entergy would be required to submit an exemption request pursuant to 10 CFR 50.12(a). However, if there are changes in the DTF balance that materially impact the licensee's cost analysis, or if new disposal rates are significantly higher, given these considerations, the licensee would be under an obligation under 10 CFR 50.9 to update any changes in projected cost, or available funds.

Principal Contributor: Clayton L. Pittiglio

Date: June 22, 2011

Please contact me at (301) 415-2901 if you have any questions on this issue.

Sincerely,

/ra/

John P. Boska, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-286

Enclosure:
Safety Evaluation

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