

UNITED STATES OF AMERICA
 NUCLEAR REGULATORY COMMISSION
 OFFICE OF NUCLEAR REACTOR REGULATION

Eric J. Leeds, Director

In the Matter of)	Docket Nos. 50-247 and 50-286
)	
ENTERGY NUCLEAR OPERATIONS, INC.)	License Nos. DPR-26 and DPR-64
)	
Indian Point Nuclear Generating Unit Nos. 2 and 3)	

DIRECTOR'S DECISION UNDER 10 CFR 2.206

I. Introduction

By letter dated June 25, 2007, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML072140693), Friends United for Sustainable Energy (FUSE, the Petitioner) filed a petition pursuant to Title 10, Sections 2.202, "Orders," 2.206, "Requests for Action under This Subpart," and 2.802, "Petition for Rulemaking," of the *Code of Federal Regulations* (10 CFR 2.202, 10 CFR 2.206, and 10 CFR 2.802) to Chairman Dale E. Klein, Mr. Richard Barkley, and Dr. Pao-Tsin Kuo of the U.S. Nuclear Regulatory Commission (NRC) regarding Indian Point Nuclear Generating Unit Nos. 2 and 3 (Indian Point). The Petitioner requested that the NRC take enforcement actions.

Actions Requested

The FUSE petition included a request for rulemaking concerning 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and requested that the NRC not consider any new license renewal applications until the NRC revises its regulations. The petition asserts that the current regulations in 10 CFR Part 54, are prejudiced and biased, presume that license renewal is a foregone conclusion for all licensees, usurp stakeholder rights protected under the First Amendment of the Constitution, and abridge citizens' rights to due process and equal protection. The FUSE petition also requested that the

NRC refrain from taking any actions relative to the license renewal of Indian Point until the NRC amends 10 CFR Part 54 as requested.

By letter dated October 29, 2007 (ADAMS Accession No. ML072770603), the NRC denied the petition for rulemaking because it did not provide any new information that was not previously considered by the NRC. The denial was published in the *Federal Register* on November 8, 2007 (72 FR 63141).

FUSE also requested that, pursuant to 10 CFR 2.206, the NRC immediately suspend the Indian Point licenses until the issues described in the petition are remedied to full compliance with all local, State, and Federal laws. The issues identified by FUSE include: (1) radiological contamination through groundwater leakage from the Indian Point Unit 2 spent fuel pool (SFP), (2) the licensee's failure to implement a new emergency notification siren system as required by NRC Orders, and (3) over 70 safety, security, and enforcement issues identified over the past 6 years of plant operations.

As discussed in the NRC's acknowledgment letter to Mr. Sherwood Martinelli, dated February 1, 2008, (ADAMS Accession No. ML080080297), the NRC accepted, for review pursuant to 10 CFR 2.206, the FUSE concerns regarding the underground leakage of contaminated water at the Indian Point facility and the failure to implement the new emergency notification siren system in a timely manner. The NRC either denied the remaining issues or found that they did not meet the criteria for acceptance in the 10 CFR 2.206 process. The NRC consolidated the concern regarding the failure to implement the siren system in a timely manner with a similar issue raised in a separate FUSE petition dated September 28, 2007, (ADAMS Accession No. ML072760602). The agency took this step for three reasons: (1) because of the similarity of the issues, (2) because FUSE submitted both petitions at approximately the same time, and (3) because FUSE was the principal external stakeholder for both petitions. Therefore, this Director's Decision will address only the underground leakage of contaminated water. The NRC will address separately the failure to implement the new emergency

notification siren system in a timely matter through its response to the FUSE petition of September 28, 2007.

The NRC sent a copy of the Proposed Director's Decision to the Petitioner and to Entergy for comment on May 30, 2008 (ADAMS Accession Nos. ML081270022 (Transmittal) and ML081270025 (Proposed Director's Decision)). The staff did not receive any comments on the Proposed Director's Decision.

Petitioner's Basis for the Requested Actions

For the past 3 years, underground leakage of water at the Indian Point facility has been found to be contaminated with radioactive fission products, including tritium, strontium-90, and cesium. The Petitioner stated that Entergy has not been able to identify the times of commencement, source(s), extent, and causes of the leaks, and that the assurances by Entergy and the NRC that there is no immediate danger do not adequately address concerns related to these leaks.

The Petitioner stated that if the licensee cannot locate the source of the leak, the licensee cannot repair it. If a leak cannot be located, the effect on the environment increases. The manifest consequence is that the leaks will worsen as the unmitigated and unmanaged problem contributes to an ever more rapid decline of plant stability and integrity. Without proper identification and aging management of the leaks, which will only increase with continued freezing and thawing, the "passive" structures, systems, and components of the plant will continue to weaken to the point of critical failure.

The Petitioner expressed concerns that SFP leaks increasingly indicate that the structural integrity is impaired such that during an event involving a strong impact, intense heat, fire, or explosions, the walls and/or floor could cave and/or break apart.

The Petitioner stated that until the SFP leaks are located, repaired, and certified as structurally safe for the purpose intended, the only reasonable action that the NRC can and

should take is license suspension. The Petitioner further stated that the suspension should also delay license renewal processing for the Indian Point facility.

NRC Petition Review Board's Meeting with the Petitioner

On December 21, 2007, the Office of Nuclear Reactor Regulation's Petition Review Board and the Petitioner held a conference call to clarify the basis for the petition.

The NRC's acknowledgment letter to the Petitioner, dated February 1, 2008, included the transcript of this meeting. This transcript, treated as a supplement to the petition, is available in ADAMS (Accession No. ML080140267) for inspection at the Commission's Public Document Room (PDR), located at One White Flint North, Public File Area O1 F21, 11555 Rockville Pike (first floor), Rockville, MD. Publicly available records are accessible from the ADAMS Public Electronic Reading Room on the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC PDR reference staff by telephone at 1-800-397-4209, or 301-415-4737, or by e-mail to pdr@nrc.gov.

II. Discussion

Background

On September 1, 2005, Entergy informed the NRC that cracks in a Unit 2 SFP wall had been discovered during excavation work, and that low levels of radioactive contamination were found in water leaking from the cracks. The water contained radionuclides similar to Unit 2 SFP water. Entergy initiated a prompt investigation to determine the extent of the condition and potential impact on health and safety. Initially, Entergy determined that on-site ground water in the vicinity of the Unit 2 facility was contaminated with tritium as high as 200,000 picocuries per liter of water (about 10 times the Environmental Protection Agency drinking water standard). Subsequently, Entergy initiated a comprehensive groundwater site characterization to investigate the extent of on-site groundwater contamination, identify the sources, and mitigate

and remediate the condition. This effort required the establishment of several on-site groundwater monitoring wells to characterize groundwater behavior, flow, direction, and migration pathways.

On September 20, 2005, NRC Region I initiated a special inspection of this matter to examine the licensee's performance and determine if the contaminated ground water affected, or could affect, public health and safety. On October 31, 2005, the NRC's Executive Director of Operations (EDO) authorized continuing NRC inspection to assess licensee performance of on-site groundwater investigation activities, and independently evaluate and analyze data and samples to ensure the effectiveness and adequacy of the licensee's efforts. Throughout this effort, the NRC coordinated its inspection activities with the New York State Department of Environmental Conservation (DEC), which initiated its own independent assessment of the groundwater conditions, including observation of NRC's inspection activities.

The NRC issued a special inspection report on March 16, 2006 (ADAMS Accession No. ML060750842), "Indian Point Nuclear Generating Unit 2 – NRC Special Inspection Report No. 05000247/2005011." The report assessed Entergy's performance, achievements, and plans related to radiological and hydrological site characterization; and reported that the on-site groundwater contamination did not, nor was likely to, adversely affect public health and safety. In the report and in subsequent public meetings, the NRC indicated that it would continue to inspect licensee performance in this area, including independent evaluation and analysis of data, to ensure that Entergy continued to conform to regulatory requirements, and that public health and safety were maintained.

On March 21, 2006, NRC's independent on-site groundwater sample analysis effort first determined that strontium-90 was also a contaminant in the ground water, a fact subsequently confirmed by Entergy and DEC. This determination resulted in a significant expansion of the on-site groundwater characterization effort since the source of the strontium-90 contaminant was traced to leakage from the Unit 1 SFP. A full site-wide hydrogeologic investigation was

subsequently scoped to include Units 1 and 3. The NRC inspection charter objectives were similarly revised to provide the necessary oversight. Off-site groundwater samples have also been obtained since the fall of 2005, and have never detected any off-site groundwater contamination attributable to plant operation.

Since that time, the NRC has continued to inspect and monitor Entergy's activities beyond the limits of normal baseline inspection, as authorized by the EDO. During this period, NRC inspectors closely monitored Entergy's groundwater characterization efforts, and performed independent inspection of radiological and hydrological conditions affecting on-site ground water. Additionally, from early 2006 through January 2008, the NRC kept interested Federal, State, and local government stakeholders informed of current conditions through routine biweekly teleconferences.

Status of Current Activities, Plans, and Inspection Results

On January 11, 2008, Entergy submitted the results of its comprehensive groundwater investigation (ADAMS Accession No. ML080320539), and included its plan for remediation and long-term monitoring of the on-site groundwater conditions. In its report, Entergy identified the sources of the groundwater contamination as the Unit 1 and Unit 2 SFPs. While both pools contributed to the tritium contamination of ground water, leakage from the Unit 1 SFP was determined to be the source of other contaminants such as strontium-90, cesium-137, and nickel-63. Entergy identified its plan to remove all fuel from the Unit 1 SFP to an on-site storage location and drain the SFP system by the end of 2008, thereby essentially eliminating the source of the groundwater contamination from that facility. Some water is expected to remain in the bottom of the pool to reduce the potential for airborne contamination and provide shielding until the residual sludge is removed in early 2009. In its report of January 11, 2008, Entergy described its plans to repair or mitigate all identified potential leak locations in the Unit 2 SFP system that may have contributed to the on-site tritium-contaminated ground water in the vicinity of that facility.

Notwithstanding, residual radioactivity is expected to continue to impact on-site ground water for the duration of licensed activities. On-site ground water is expected to continue to be monitored and reported as an abnormal liquid release in accordance with NRC regulatory requirements. No off-site ground water has been impacted, since the on-site groundwater flow is to the discharge canal and the Hudson River. Accordingly, the licensee has established a long-term monitoring strategy to evaluate the effect and progress of the natural attenuation of residual contamination, informing and confirming groundwater behavior as currently indicated by the existing site conceptual model, and determining changes in conditions that may indicate new or additional leakage.

Entergy's performance and effectiveness in successfully draining water from the Unit 1 SFP system by the end of 2008, and the quality and effectiveness of its long-term monitoring program, will be the immediate focus of NRC's continuing inspection of Entergy's performance and conformance with regulatory requirements relative to the existing groundwater conditions. Additionally, NRC will continue to inspect the efficacy of the licensee's long-term monitoring program as part of the Reactor Oversight Process pertaining to radiological environmental and effluents inspection activities.

Notwithstanding, radiological significance of the groundwater conditions at Indian Point is currently, and is expected to remain negligible with respect to impact on public health and safety. The NRC has confirmed with the New York State Department of Health, that drinking water is not derived from ground water or the Hudson River in the areas surrounding or influenced by effluent release from Indian Point. Accordingly, the only human exposure pathway that merits attention is the possible consumption of aquatic foods from the Hudson River, such as fish and invertebrates. Dose assessment of the potential for exposure from this pathway continues to indicate that the hypothetical maximally exposed individual would be subject to no more than a very small fraction of the NRC regulatory limit for liquid radiological effluent release.

Status of Current NRC Inspection Results

1. Upon the initial identification of conditions that provided evidence of an abnormal radiological effluent release affecting ground water, the licensee implemented actions that conformed to the radiological survey requirements of 10 CFR 20.1501, "General," to ensure compliance with dose limits for individual members of the public as specified in 10 CFR 20.1302, "Compliance with dose limits for individual members of the public," including (1) promptly investigating and evaluating the radiological conditions and potential hazards affecting groundwater conditions, on- and off-site, (2) annually reporting the condition and determining that the calculated hypothetical dose to the maximally exposed member of the public was well below established NRC regulatory requirements for liquid radiological release, (3) confirming, through off-site environmental sampling and analyses, that plant-related radioactivity was not distinguishable from background, (4) initiating appropriate actions to mitigate and remediate the conditions to ensure that NRC regulatory dose limits to members of the public and the environment are not exceeded, and (5) developing the bases for a long-term monitoring program to ensure continuing assessment of groundwater effluent release and reporting of the residual radioactivity affecting the ground water. The long-term monitoring program will continue to be refined as data are collected and evaluated to verify and validate the effectiveness of expected natural attenuation of the existing groundwater plumes and to ensure the timely detection of new or additional leakage affecting ground water.
2. The determination of contaminated on-site groundwater conditions at Indian Point was the result of the licensee's investigation of potential leakage from the Unit 2 SFP initiated in September 2005, and subsequent development and application of a series of groundwater monitoring wells to determine the extent of that condition. No evidence was found that indicated that the events at Indian Point, that resulted in the on-site

groundwater contamination (identified to the NRC on September 1, 2005), were the result of the licensee's failure to meet a regulatory requirement or standard, where the cause of the condition was reasonably within the licensee's ability to foresee and correct, and thus preventable. This determination is based on interviews with licensee personnel; comprehensive review of pertinent documentation, including previous condition reports, survey records, radiological liquid effluent and environmental monitoring reports, records of historical spills and leaks documented in accordance with 10 CFR 50.75, "Reporting and recordkeeping for decommissioning planning," and extensive on-site NRC inspection to confirm licensee conformance with required regulatory requirements.

3. The current contaminated groundwater conditions at Indian Point are the result of leakage associated with the Unit 1 and Unit 2 SFP systems. No other systems, structures, or components were identified as contributors to the continuing on-site contamination of ground water.
4. Entergy's hydrogeologic site characterization studies provided sufficiently detailed field observations, monitoring, and test data to support the development and confirmation of a reasonable conceptual site model of groundwater flow and transport behavior. An independent analysis of groundwater transport through fractured bedrock utilizing geophysical well logging data was conducted by the U.S. Geological Survey (USGS). The USGS assessment corroborated the groundwater transport characteristics that were determined by Entergy's contractor.
5. The Entergy hydrogeologic site characterization and conceptual site model provide a reasonable basis to support the determination that the liquid effluent releases from the affected SFP systems migrate in the subsurface to the west, and partially discharge to the site's discharge canal, with the remainder moving to the Hudson River. Current data and information indicates that contaminated ground water from the site does not migrate

off-site except to the Hudson River. This conceptual site model of groundwater behavior and flow characteristics is supported by the results of independent groundwater sampling and analyses conducted by NRC which have not detected any radioactivity distinguishable from background in the established on-site boundary monitoring well locations or in various off-site environmental monitoring locations.

6. Currently, there is no drinking water exposure pathway to humans that is affected by the contaminated groundwater conditions at Indian Point. Potable water sources in the area of concern are not presently derived from groundwater sources or the Hudson River, a fact confirmed by the New York State Department of Health. The principal exposure pathway to humans is from the assumed consumption of aquatic foods (i.e., fish or invertebrates) taken from the Hudson River in the vicinity of Indian Point that has the potential to be affected by radiological effluent releases. Notwithstanding, the most recent sampling and analysis of fish and crabs taken from the affected portion of the Hudson River and designated control locations showed no radioactivity distinguishable from background.
7. The annual calculated exposure to the maximum exposed hypothetical individual, based on application of Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Release of Reactor Effluents for the Purpose of Evaluation Compliance with 10 CFR Part 50, Appendix I," relative to the liquid effluent aquatic food exposure pathway is currently, and expected to remain, less than 0.1 percent of the NRC's "As Low As is Reasonably Achievable (ALARA)" guidelines of Appendix I of Part 50 (3 mrem/yr total body and 10 mrem/yr maximum organ), which is considered to be negligible with respect to public health and safety, and the environment.
8. All identified liner flaws in the Unit 2 SFP, and the initially identified crack affecting the Unit 2 SFP system have been repaired or mitigated. However, not all Unit 2 fuel pool surfaces are accessible for examination. No measurable leakage is discernable from

evaporative losses based on Unit 2 fuel pool water makeup inventory data. Unit 1 SFP water is being processed continuously to reduce the radioactive concentration at the source prior to leakage into the ground water, and actions have been initiated to effect the complete removal of spent fuel and essentially all the water from the Unit 1 SFP system by the end of 2008, thereby terminating the source of 99.9 percent of the dose significant strontium-90 and nickel-63 contaminants (the remaining 0.1 percent is represented by the Unit 2 and Unit 1 hydrogen-3 (tritium) contaminants). Entergy's selected remediation approach for the contaminated groundwater conditions appears reasonable and commensurate with the present radiological risk.

9. The historical duration of leakage from the Unit 1 and Unit 2 SFP systems that resulted in groundwater contamination is indeterminate. The evidence indicates that the volume of leakage was small compared to the available water inventory, and was much less than the normally expected evaporative losses from SFPs. This conclusion is based on NRC staff review and assessment of SFP makeup inventory records and applicable leakage collection data, the results of the continuously implemented Radiological Environmental Monitoring Program affecting the Indian Point site, and evaluation of the developed hydrogeologic groundwater transport model. Accordingly, there is no evidence of any significant leak or loss of radioactive water inventory from the site that was discernable in the off-site environment.
10. No releases were observed or detected from Unit 3.
11. The conditions surrounding the leaking Unit 1 SFP are based on a leakage rate of 10 drops per second (about 25 gallons per day) that was identified in 1992. At that time, the licensee performed a hypothetical bounding dose impact that concluded that this condition resulted in negligible dose impact to the public. At that time, NRC inspectors evaluated this licensee assessment. This early bounding hypothetical calculation agrees with the dose impact now confirmed by the recently completed hydrogeologic site

investigation and NRC's independent assessment. Based on extensive review of the circumstances and inspection records from that period, it appears that the licensee was in conformance with the standards, policy, and regulatory requirements that prevailed at that time.

III. Conclusion

The Petitioner raised issues related to the underground leakage of contaminated water at the Indian Point site. NRC Region 1 Inspection Report No. 05000003/2007010 and 05000247/2007010 issued on May 13, 2008 (ADAMS Accession No. ML081340425), focused on these concerns.

The NRC reviewed Entergy's efforts to determine the cause and source of the groundwater contamination conditions, assess the radiological impact on public health and safety and the environment, effect appropriate mitigation and remediation, and implement long-term monitoring to ensure continuing assessment of the condition, including the expected natural attenuation of remaining residual activity. The NRC has found Entergy's response to identified conditions to be reasonable and technically sound. The NRC has reviewed in detail the existence of onsite groundwater contamination, as well as the circumstances surrounding the causes of leakage and previous opportunities for identification and intervention. The NRC's inspection determined that public health and safety have not been, nor are likely to be, adversely affected, and the dose consequence to the public attributable to current onsite conditions associated with groundwater contamination is negligible with respect to conservatively established NRC regulatory limits. The inspection determined that Entergy conformed to all NRC regulatory requirements that were pertinent in this circumstance and applicable to assessing the cause and effect of the groundwater conditions relative to public health and safety and protection of the environment.

Based on the above, the Office of Nuclear Reactor Regulation has decided to deny the Petitioner's request to suspend the operating licenses of the Indian Point Nuclear Generating

Unit Nos. 2 and 3. The Petitioner's concern regarding underground leakage of contaminated water at the Indian Point facility has been adequately resolved such that no further action is needed.

As provided in 10 CFR 2.206(c), a copy of this Director's Decision will be filed with the Secretary of the Commission for the Commission to review. As provided by this regulation, the decision will constitute the final action of the Commission 25 days after the date of the decision unless the Commission, on its own motion, institutes a review of the decision within that time.

Dated at Rockville, Maryland, this 14th day of August 2008.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation