UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
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March 19, 2010

The Honorable Virginia Lyons
Senate Committee Chair
House Committee on Natural Resources
And Energy
State of Vermont
115 State Street
Montpelier, VT 05633-5201

Dear Senator Lyons:

This is in response to your questions that were posed in your letter dated February 17, 2010, relative to our previous briefing to your legislative committees on February 12 regarding the matter of tritium contaminated ground water at the Vermont Yankee Nuclear Power site. We appreciated the opportunity to describe NRC's regulatory role and responsibility relative to the matter. At that time we also described the nature and scope of our inspection and oversight effort, explained the application of pertinent NRC rules and regulatory requirements, provided our current assessment of the impact of the condition on public health and safety, and presented our perspective on the matter based on our assessment of the currently available information and previous experience with similar conditions. The following are responses to your questions.

1(a) Please translate the three millirem (mrem) into picocuries per liter (pCi/l) so that committee members can obtain a sense of how the current readings in pCi/l relate to the three millirem standard?

Based on information to-date, there has been no detectable plant-related radioactive material from liquid effluents identified in any unrestricted area. The current estimated annual dose for any individual in an unrestricted area is less than 0.01 millirem, well below the 3 millirem As Low As Reasonably Achievable (ALARA) objective. The tritium concentrations currently identified in on-site ground water monitoring wells are not indicators of concentrations in the off-site environment, i.e., unrestricted areas beyond the site boundary.

Title 10, Code of Federal Regulations, Part 50, Appendix I-Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Reasonable Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents, specifies that liquid effluent releases to unrestricted areas will not result in an estimated annual dose for any individual in an unrestricted area in excess of 3 millirems to the total body or 10 millirems to any organ. To meet this objective, the licensee is required to correlate the amount of radioactivity in liquid effluents actually released to unrestricted areas (i.e. areas beyond the site boundary of the nuclear power plant) in terms of actual dose consequence to a maximally exposed individual. Such correlation is accomplished by a prescribed method that is described

in NRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I." (http://adamswebsearch2.nrc.gov/idmws/doccontent.dll?library=PU_ADAMS^PBNTAD01&ID=082670334)

In the case of Vermont Yankee, the exposure pathways that are evaluated for liquid effluents include drinking water, ingestion of fish from the Connecticut River, the ingestion of vegetables and leafy vegetables which were irrigated by river water, the consumption of milk and meat from cows and beef cattle who had river water available for drinking as well as having feed grown on irrigated land, and the direct exposure from activity deposited by the water pathway. The licensee's Off-site Dose Calculation Manual (ODCM) specifies dose factors for total body exposure and critical organ exposures for 4 human age groups: infant, child, teen, and adult. The highest calculated dose from the four age groups for both total body and maximum organ is calculated by the licensee on a quarterly and annual basis and reported in annual radiological effluent release reports, which are available on the NRC web page at http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html.

1(b) Using the highest pCi/l readings of tritium to date found in monitoring wells at the VYNPS, how much water would one have to drink to reach the three mrem standard?

There is no drinking water taken from any of the on-site ground water monitoring wells. The monitoring wells are shallow wells, about 30 to 40 feet deep, that were established only for the purpose of investigating the source of the tritium contaminated ground water condition at Vermont Yankee. Drinking water is taken from deep aquifers, within the bedrock region, approximately 300 feet below the site. There has been no tritium or any plant-related radioactivity detected in any drinking water wells, on- or off-site. The most recent hydrological assessment of the Vermont Yankee site does not indicate any connectivity between the contaminated ground water detected in the shallow areas, and the deep aquifer that is situated in the bedrock from which drinking water is taken.

2. What options for action are available to the NRC if the three mrem standard is exceeded? How would the NRC decide the option of options to pursue?

The NRC radiation exposure limit is 100 mrem per year for members of the public. This limit is based on the recommendations of both the International Commission on Radiological Protection and the USA National Council on Radiation Protection and Measurements. The NRC also imposes a much lower dose control of 3 millirem per year for liquid effluent releases from licensed nuclear power plant facilities to assure that public dose is ALARA.

NRC requires nuclear power plants on a quarterly basis to measure the radioactive effluent releases and determine the estimated public dose from those effluents. If the quarterly dose exceeds 50% of the annual dose control, the plant must submit within 30 days a report of the results of the investigation as to the causes of the higher than anticipated effluent releases, the corrective actions taken to reduce the releases, and the results of the radiological analyses. To date, the Vermont Yankee plant has never exceeded this dose control threshold.

If the radioactive liquid effluent dose control objective of 3 millirem per year is exceeded, 10 CFR 50, Appendix I, requires the licensee to initiate an investigation to identify the causes for the release, define and initiate a program of corrective actions and report these actions to the

NRC within 30 days from the end of the quarter during which the release occurred. In addition, if radioactive effluent releases are greater than the environmental radiation standards in 40 CFR 190 (25 millirem per year to the total body), the condition would constitute an NRC reportable event in accordance with our regulations. Based on a review of these reports, the NRC would consider a variety of enforcement actions based on the circumstances and the need to protect the public and the environment.

3. Does the NRC consider tritiated water to be low level radioactive material?

Tritium, including tritiated water, is a reactor byproduct radioactive material. Byproduct material means any radioactive material that was made radioactive by exposure to radiation from a nuclear reactor. Tritiated water has low radiation intensity relative to most other reactor byproduct radioactive materials, and would be considered low level radioactive material.

4. At what point in remediation would tritiated water become low level radioactive waste?

In the case of remediation, such as decommissioning, tritiated water would be considered as low-level radioactive waste if removal of the material was required to reduce residual radioactivity to a level that permits release of the property for either unrestricted or restricted conditions. In such case, any residual radioactive material, including tritium, would be dispositioned in accordance with established regulatory requirements.

5. Do the NRC standards for liquid effluent apply only to planned releases of liquid effluent containing radioactive material?

No. The NRC limits and ALARA dose controls apply to both normal discharges and abnormal releases, such as leaks or spills. Regardless of the nature or source, the licensee is responsible to account for the release, and evaluate the release relative to NRC regulatory requirements.

As such, Vermont Yankee is required to account for all radioactivity released to the environment, including planned, and unplanned releases; and report each year the quantity of radioactivity released and the highest radiation dose to any member of the public. Vermont Yankee (as are all nuclear power plants) is required to submit annual effluent release reports to the NRC. These effluent reports are publicly available on the NRC web site at the following URL: http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html

6. Does the NRC have authority to enforce criminally an unplanned release of liquid effluent containing radioactive material from a nuclear energy plant? If so, under what circumstances would that authority apply?

Yes. The Atomic Energy Act of 1954, as amended, (Act) at Section 223, authorizes criminal sanctions for willful violations, including attempted violations or a conspiracy to violate regulations under this Act, including all of the regulations specified in10 CFR Part 20, "Standards For Protection Against Radiation," which includes regulations pertaining to the release of liquid effluent containing radioactive material. The Act also provides for sanctions such as orders, civil penalties, license modification or revocation, as appropriate.

7. Does the NRC have standards concerning the managerial competence of a licensee for a nuclear plant?

- **A. If so, what requirements do those standards impose on a licensee with respect to knowledge and maintenance of underground pipes associated with the plant?**
- **B. At what point would the NRC intervene to determine if standards for licensee managerial competence are being met?**

The NRC does not specifically differentiate between managerial and staff competence; and there is no specific standard or criteria for managerial competence that is applied by NRC. However, nuclear power plants are required by the NRC to have trained and qualified personnel in management and technical staff positions. NRC Regulatory Guide 1.8 provides guidance as to what is acceptable to the NRC regarding qualifications and training for nuclear power plant personnel. This guidance endorses American National Standards Institute (ANSI) "Selection, Qualification, and Training of Personnel for Nuclear Power Plants." ANSI N-18.1-1971 is the specific revision of the standard to which Vermont Yankee is committed. The NRC holds licensee management accountable for the safe operation and maintenance of the nuclear facility in all modes of operation.

8. Does the NRC require that licensees maintain drawings or other information showing or describing all above ground and underground structures and facilities at a nuclear plant?

Yes, for structures described in Vermont Yankee's licensing and design basis. 10 CFR 50, Appendix B, Criterion III states "Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in Sec. 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. The requirements in 10 CFR 50, Appendix B, Criterion III do not distinguish between items based on their location with respect to ground level.

The design basis, regulated by this criterion, is predicated on a safety function. The NRC requires licensees to maintain drawings and other information related to systems structures and components described in their licensing basis. The licensing basis includes safety-related systems, structures and components, and may also include nonsafety-related items that are important to safety operation, or that are involved in material processing, security or other regulated activities

9. Does the NRC require that licensees provide the NRC with information showing or describing all above ground and underground structures and facilities at a nuclear plant?

As addressed in Question 8 above, Vermont Yankee's licensing and design bases establishes drawings and other information. Such information is maintained and available to support NRC

inspection and licensing activities. Recent NRC inspection activities have reviewed such information in evaluating and assessing the current contaminated ground water occurrence at Vermont Yankee.

We hope that we've sufficiently answered your follow-up questions. Please feel free to contact Mr. John White, Chief, Plant Support Branch 2, at 610-337-5114, if you need further clarification or additional information.

Sincerely,
/RA/
Peter R. Wilson for:

Darrell J. Roberts, Director
Division of Reactor Safety

cc:
Representative Tony Klein
Representative David L. Deen
David O'Brien, Commissioner, Vermont Department of Public Service
Nancy McNamara, NRC Region I State Liaison Officer

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