



# **YANKEE ATOMIC ELECTRIC COMPANY**

49 Yankee Road, Rowe, Massachusetts 01367

November 21, 2006

BYR 2006-108

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555-001

- References:
- (a) License No. DPR-3 (Docket No. 50-29)
  - (b) BYR 2004-133, Submittal of Revision 1 to the Yankee Nuclear Power Station's License Termination Plan
  - (c) Yankee Nuclear Power Station – Issuance of Amendment 158  
Re: License Termination Plan
  - (d) BYR 2006-074, Submittal of Groundwater Compliance Plan for License Termination at YNPS

Subject: Update of Status of Groundwater Compliance Activities

On August 31, 2006, Yankee Atomic Electric Company (Yankee) submitted its groundwater compliance plan (Plan) to demonstrate license termination compliance for groundwater at the Yankee Nuclear Power Station (YNPS) site. The final version of the Plan incorporated comments made by the NRC on the draft version of the Plan and received by Yankee Atomic Electric Company (YAEC) on July 31, 2006. The resolution to those comments is provided as an enclosure to this letter. Yankee has continued to implement groundwater monitoring activities as outlined in the Groundwater Compliance Plan. However, YAEC currently intends to make two changes to the activities described in the Plan.

The Groundwater Compliance Plan contained a list of reports to be submitted, their contents, and a schedule for their submission. The 2006 Interim Groundwater Report, originally scheduled for submittal in early October 2006, was to summarize data analysis performed through May of 2006 and to provide information on wells installed in the spring of 2006. The 2006 Supplement to the Hydrogeological Report, originally scheduled for submittal in November of 2006, was to contain data from groundwater sampling and analysis conducted for summer through fall of 2006, as well as preliminary results from the pumping tests and a summary of the preliminary numerical model. YAEC is making minor modifications to the schedule and content of these two reports. The 2006 Interim Groundwater Report will be submitted in November and will contain: data analysis from winter of 2005 through summer 2006, information on the wells drilled

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in spring and summer of 2006, synoptic water level measurements, results from the pumping tests, and a summary of the preliminary numerical model for fate and transport.

The 2006 Supplement to the Hydrogeological Report, rescheduled for submittal in February 2007, will contain the results of the fall and winter groundwater sampling rounds. This report will also contain drilling information on five groundwater monitoring wells installed in October 2006. Three wells (CB-3R, CW-5R, and MW-6R) were installed to replace existing monitoring wells damaged during decommissioning activities. These wells, and a new well designated as MW-112A, will serve to monitor groundwater conditions primarily from a non-radiological perspective. A new well designated as MW-104D was installed to provide additional data to be used in the fate and transport models.

The second change to the Plan involves the suite of radionuclides for which groundwater samples will be analyzed. As anticipated in the Plan, YAEC evaluated the validity of reducing the number of analyses that groundwater samples undergo and is proposing a reduced set of analyses for the fourth quarter 2006 sampling campaign. It is important to note that tritium continues to be the only plant-related radionuclide identified in groundwater to date. Yankee is proposing to discontinue gross alpha and gross beta analyses and to select radionuclides for which analyses are to be performed, based on the following graded approach:

- Wells that have consistently shown tritium levels below 5,000 pCi/l would undergo analysis for tritium only;
- Wells that have shown tritium levels about 5,000 pCi/l, but less than 10,000 pCi/l, would undergo tritium analysis, gamma spec analysis, and analysis for C-14, Sr-90, and Tc-99; and
- Wells that have shown tritium levels consistently greater than 10,000 pCi/l would undergo tritium analysis, gamma spec analysis, and analysis for C-14, Sr-90, Tc-99, Am-241, Pu-238, Pu-239/240, Pu-241, Cm-242, and Cm-243/244.

If you should have any questions concerning the information provided above, please call Alice Carson at (301) 916-3995, or myself at (860) 267-3938.

Sincerely,



Gerry van Noordennen  
Regulatory Affairs Manager

Enclosure: Response to NRC Comments

cc:

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L. Kauffman, Region I  
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Responses to NRC Comments dated July 31, 2006 on the  
YAEC Groundwater Compliance Plan

General:

The intent of the Compliance Plan is to identify what YAEC will do to demonstrate the groundwater meets LTP requirements for license termination.

1. YAEC is asking the NRC if the Compliance Plan approach (e.g., use a Resident Farmer well, five quarter sampling period) is an acceptable approach to demonstrate compliance with the LTP by using:
  - a. Section 3.3.2 summarizes demonstration of:
    - i. Site-generated radionuclides, except tritium, less than License Amendment No. 158;
    - ii. Show the maximum tritium concentration of <20,000 pCi/L in a well capable of supplying 0.665 gpm;
    - iii. Providing trends through five quarterly sampling rounds to support the determination; and
  - b. Performing pressure sampling, transient testing and numerical modeling to demonstrating compliance.
2. YAEC must implement the Compliance Plan to demonstrate compliance with the LTP. YAEC expects the NRC to review the implementation of the Compliance Plan when it makes the license termination decision.
3. As stated in Sections 1.0 and 4.4 of the Compliance Plan, YAEC will modify the Compliance Plan if the investigations and sampling do not support the Compliance Plan's assumptions, and these changes will be discussed with the NRC prior to their implementation.
4. The results of pressure sampling and transient testing and a summary of preliminary modeling of fate and transport are being included in the report scheduled for submittal to the NRC in November 2006.

Comment 1:

*The results of the aquifer testing discussed in Attachment 1 "Final Aquifer Characterization of the YNPS Rowe Decommissioning Site" of the Groundwater Compliance Plan should be provided before the Final Plan can be approved by the NRC. This information is needed to resolve the hydraulic conductivity of the sand lenses and provide additional insight on the fate and transport of tritium in the sand layers within the till and glaciolucustrine sediments at the site.*

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1. See general comment.
2. YAEC agrees that sand lens hydraulic conductivity must be resolved to provide additional insight on the fate and transport of groundwater in the sand lenses. This item will be included in the 2006 Interim Groundwater Report to be submitted to the NRC in November.
3. Aquifer characterization will be implemented as a part of the Plan execution. The results will be used to determine the performance characteristics of the "Resident Farmer" well as follows:
  - a. Example 1: If MW-107C aquifer is highly conductive, then it will be the sole contributor to the tritium concentration determination.
  - b. Example 2: If MW-107C aquifer has low conductivity, then surrounding aquifers will contribute to the final tritium determination.

Comment 2:

*YAEC has indicated that it will develop a laboratory analytical program for the winter 2006 and spring 2007 quarterly sampling events based upon the results of the first three quarterly sampling events of the LTP monitoring period. The NRC may not be able to approve the Plan until the laboratory analytical program for the winter 2006 and spring 2007 quarterly sampling events is submitted for review.*

1. See general comment.
2. YAEC has evaluated eliminating hard-to-detects from a number of monitoring wells onsite and intends to make a change to the Plan with the December 2006 sampling round. The changes to be made and the justification for making these changes are provided in the cover letter.
3. Section 4.1 of the Groundwater Compliance Plan clarifies the process that YAEC will undergo to make changes to the plan, including briefing the NRC on the changes prior to implementation.

Comment 3:

*YAEC will modify its sampling protocol for handling the groundwater samples. Beginning with the summer 2006 quarterly sampling, groundwater samples will not be filtered in the field or laboratory. All previous groundwater samples were filtered in the laboratory before analyses were performed. YAEC plans to compare the summer 2006 results with previous results, and it has selected a subset of the monitoring wells (those where Hard to Detect (HDT) analyses will be performed) where additional groundwater samples will be collected and filtered in the laboratory. Analytical results from these additional filtered groundwater samples will be compared against the unfiltered analyses. Changing the protocol for handling the groundwater samples during the five quarter sampling interval is not recommended. YAEC should justify why this is necessary and it should discuss any potential impact that the turbidity in the groundwater samples may have on the analytical procedures used for the radiological analyses.*

1. Unfiltered groundwater samples using low-flow sampling techniques are believed to be more representative of site conditions. Moreover, the non-filtered approach is conservative relative to filtered groundwater samples.
2. Other NRC programs (CT Yankee and Maine Yankee) and the general regulatory community have moved to a non-filtered, low-flow groundwater sampling approach for all compounds including metals and radionuclide groundwater samples
3. No significant lab issues have been associated with analysis at other sites where low-flow, non-filtered samples have been collected (i.e.; CT Yankee and Maine Yankee).
4. Unfiltered samples provide a positive bias due to potential material in colloidal or other non-dissolved material that may be present, especially in samples with higher turbidity. The recently completed June quarterly sampling, where both filtered and unfiltered results were collected, provides justification to resolve this potential issue. A comparison of filtered and non-filtered samples was conducted at CT Yankee and showed no significant differences. Based on those results, a non-filtered approach in conjunction with low-flow sampling was utilized at CT Yankee. The results of the filtered and unfiltered samples will be provided in the Interim Groundwater Report.
5. Section 4.1 of the Plan includes a discussion regarding the decision to switch to unfiltered analysis.

Comment 4:

*YAEC needs to provide justification that a resident farmer ("that lives on the plant site, grows all of his/her food onsite, and drinks water from a groundwater source onsite" from the LTP section 6) would require a well with a discharge capacity of 0.665 gpm to provide for his/her water requirements. YAEC should justify the need for irrigation of crops in this area and provide an estimate of the irrigation volume per year. It should justify the need for livestock water and provide an estimate of the livestock water volume. YAEC should also discuss why livestock would not use the nearby Sherman Reservoir for their water needs.*

1. The Groundwater Compliance Plan places a minimum supply limit for a resident farmer's well at 0.665 gpm. This corresponds to the RESRAD input value for the well pumping rate (1323 m<sup>3</sup>/yr) used in calculating soil-related derived concentration guideline limits for demonstrating compliance with the dose limit for unrestricted release. The well pumping rate is based upon the sum of the individual water needs as indicated in NUREG/CR-6697. The value selected for each component and the basis for its selection are included below:
  - a. **Household use.** Assumed use of 374 m<sup>3</sup>/yr. This value is based upon the domestic water use for a family of four (272 g/d or 1.03 m<sup>3</sup>/d) minus the contribution from drinking water, accounted for separately. The value of 272 g/d was taken from U.S. Geological Survey Circular 1200, Estimated Use of Water in the United States in 1995, U.S. Department of the Interior, Government Printing Office, 1998. The document lists domestic freshwater use by state in Table 12,

which for Massachusetts is 68 g/d per person (272 g/d for a household of four) for “self supplied” domestic water supplies.

- b. **Livestock use.** Assumed use of 76.7 m<sup>3</sup>/yr. This value is based on information provided in NUREG/CR-6697, Development of Probabilistic RESRAD 6.0 and RESRAD-BUILD 3.0 Computer Codes, in Table 2.1, and summing the values for water intake for meat livestock (50 l/d) and milk livestock (160 l/d). YAEC does not own the land bordering the Sherman Reservoir. Therefore, it is conservatively assumed the resident farmer would have a fence at the property line and use a groundwater well to provide water for livestock.
- c. **Irrigation of vegetable plot.** Assumed use of 870 m<sup>3</sup>/yr. The water requirement associated with irrigation of the resident farmer vegetable plot is based upon a site-specific irrigation rate, the assumed contamination fraction of food consumed (1), and the assumed size of the vegetable plot associated with the resident farmer (2000 m<sup>2</sup>). Minimum and maximum values for the irrigation rate were calculated using site-specific distributions for the evapotranspiration rate, the precipitation rate, and the runoff coefficient. A median value for the irrigation rate of 0.435 m/y was selected. This value multiplied by the area being irrigated (2000 m<sup>2</sup>) resulted in the assumed use of 870 m<sup>3</sup>/yr.
- d. **Irrigation of pasture land.** Assumed use of 0 m<sup>3</sup>/y. Selection of this value is based upon information from the 1997 Census of Agriculture, Volume 1: Part 21, Chapter 1, irrigation of pastureland is not a common practice in Massachusetts. In fact, only one farm in the Franklin County area claimed irrigation of pastureland.
- e. **Drinking water.** Assumed 1.9 m<sup>3</sup>/yr. This value reflects the yearly intake of a four-person household consuming 478.5 l/yr (1.3 l/d) per person. 1.3 l/d is median value listed for drinking water in Table 6.87 of NUREG/CR-5512, Volume 3, Residual Radioactive Contamination from Decommissioning, Parameter Analysis.

2. Section 2.3.1 of the plan includes the discussion provided above.

Comment 5:

*YAEC should provide its document discussing the requirements for sample security and chain of custody (YNPS Procedure No. DP-8123). If YAEC has already submitted this document to the NRC, please provide the date that it was submitted.*

1. YAEC provided a copy of the latest revision to DP-8123 via email to John Hickman on September 5, 2006.

Comment 6:

*The NRC may not be able to approve the Plan until YAEC submits the following items which may impact the placement of monitoring wells: 1) results of the hydraulic aquifer testing, 2) results of the groundwater modeling, and 3) a discussion on the hydrogeological conceptual site model*

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*using the results from items 1 and 2.*

1. See general comment.
2. YAEC groundwater reports will present the requested information as it is developed. The reports will form the basis for the request for license termination. The scope and anticipated schedule for these reports was discussed in the cover letter and Section 4.4 of the Plan.

Comment 7:

*YAEC should add Sherman Spring, SP-1, to the monitoring sites for the LTP monitoring and to Tables 3-2 and 3-5. Sherman Spring is a groundwater discharge point that has both historically and recently exhibited elevated site-generated tritium concentrations.*

1. YAEC included Sherman Spring in Tables 3-2 and 3-5 of the final version of the plan.

Comment 8:

*The following well logs, which are missing from Attachment 2, "Monitoring Well Construction Diagram", should be added to the Plan: MW-101A, MW-110A, MW-110C, MW-110-D, MW-111A, MW-111C, and MW-113A. Also, the title for this attachment should be modified to include well logs.*

1. These well logs were inadvertently not included in Attachment 2 but are provided as an attachment to the 2006 Interim Groundwater Report and have been emailed directly to Mr. Jon Peckenpaugh.