NYR2008-014

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WESTERN REGIONAL OFFICE
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October 16, 2008

Yankee Atomic Electric Company
49 Yankee Road
Rowe, MA 01367
Attention: Wayne Norton, President

RE: Rowe-BWSC-RTN #1 ›411
Phase II – Comprehens‹ e Site Assessment Report
Final Report - Review
310 CMR 40.0000
Yankee Nuclear Power Station
49 Yankee Road

Dear Mr. Bourassa:

The Massachusetts Department of Environmental Protection (the MassDEP) has completed review of the Final Phase II - Comprehensive Site Assessment (Phase II) Report for environmental assessment of the Yankee Nuclear Power Station (YNPS) in Rowe, MA, according to the MassDEP's Bureau of Waste Site Cleanup (BWSC) regulations at 310 CMR 40.000 (the Massachusetts Contingency Plan, or the MCP). The MassDEP's approval of this Final Phase II Report, as described below, represents the final approval necessary to achieve site closure under the Massachusetts Contingency Plan. The Final Phase II Report consists of a number of individual reports, submitted on behalf of Yankee Atomic Electric Company (Yankee) by its consultants to satisfy the requirements of the MassDEP's October 7, 2005 review of the Interim Phase II Report (the Interim Phase II Review). The primary environmental consultant for the Final Phase II reports was ERM, Inc. of Boston, MA, and the Licensed Site Professionals (LSPs) of record for these reports were John McTigue and Gregg Demers of ERM.

YNPS was shut down in 1992 and has undergone decommissioning in accordance with Nuclear Regulatory Commission (NRC) regulations under 10 CFR Part 50. All radiological issues associated with decommissioning fall under the authority of the NRC, the Massachusetts Department of Public Health's Radiation Control Program (the MADPH), the MassDEP and the United States Environmental Protection Agency (the EPA), as applicable. The NRC issued on August 10, 2007 a partial release of the YNPS License Termination Plan (LTP) for all areas of the YNPS site except the Independent Spent Fuel Storage Installation (ISFSI). The MADPH issued its partial release approval to YNPS on March 14, 2008.

Non-radiological contamination at the site falls under the authority of the MassDEP and the EPA, as applicable. The assessment and remediation of polychlorinated biphenyls (PCBs) at the YNPS was primarily performed according to the authority and oversight of the EPA, in accordance with EPA Toxic Substance Control Act (TSCA) requirements and approvals. The EPA approval letter for the PCB remediation was issued to Yankee on April 26, 2006, and the required PCB Remediation Certification statement was completed by Yankee on March 28, 2007. The MassDEP had previously classified the YNPS site as a Tier 1B site, according to the BWSC regulations at 310 CMR 40.000.

The Final Phase II Report contains the results of assessment for both radiological and non-radiological parameters at the site. All assessment and remedial actions at the YNPS site have at this point been completed (with the exception of the ISFSI utilized for spent fuel storage, which is not within MassDEP authority). Yankee completed cumulative (radiological and non-radiological) Human Health and Ecological Stage II Risk Assessments (the Risk Assessment) for the YNPS site, according to MCP regulations and requirements, following remedial actions. As agreed to by the MassDEP, the Phase II investigation and Report were completed within the context of the MCP for the purposes of site closure, but not as a formal Release Tracking Number (RTN) for the entire site. The MassDEP is issuing this Review of the Final Phase II Report according to its authority under M.G.L. c. 21E and the regulations promulgated thereunder at 310 CMR 40.000.

The Final Phase II Reports submitted by Yankee in response to MassDEP's Interim Phase II Review included the reports outlined below (note that all documents associated with the YNPS site are public information and may be viewed or copied at the MassDEP Regional Office in Springfield, MA, or at the Yankee Public Document Repository in Greenfield, MA):

- Groundwater Monitoring Plan to Support Closure under the Massachusetts Contingency Plan, dated September 1, 2006;
- Supplemental Phase II Comprehensive Site Assessment Report, dated September 21, 2006, by ERM, Inc.;
- Human Health Risk Assessment Work Plan & Environmental Risk Characterization Work Plan, dated September 11, 2006, by Gradient Corp.;
- Revised Beneficial Use Determination (BUD) for Structures, dated November 6, 2006, by ERM, Inc.;
- Addendum to the Phase II Comprehensive Site Assessment Report, dated February 6, 2007, by ERM, Inc.;
- Method 3 Risk Characterization, dated November 2007, by Gradient Corp.;
- Response Action Outcome Statements, RTN 1-13411, dated February 25, 2008, by ERM, Inc.; and
- Post-Closure Maintenance and Monitoring Report, dated May 6, 2008 by MACTEC, Inc.

On June 9, 2007, MassDEP issued to Yankee the Revised Beneficial Use Determination (BUD) Permit approval (the BUD Permit) regarding the disposition of on-site structures and fill material within the historical Industrial Area of the plant site. As required, Yankee submitted to MassDEP a Groundwater Monitoring Plan, which was approved by MassDEP on June 19, 2007 (copy of approval attached).

The YNPS site was divided into three land areas for the purposes of assessment and remediation. These areas are:

- The Radiologically Controlled Area (RCA), which is approximately a 4-acre parcel immediately surrounding the former operating nuclear plant area;
- The Industrial Area, which is approximately a 13-acre parcel immediately surrounding the RCA, within the previous YNPS plant fence line, which formerly contained industrial structures

associated with the plant; and

- The Non-Industrial Area, which is that portion of YNPS property outside the fenced Industrial Area, containing woodlands, roadways, etc., which encompasses approximately 1,783 acres, including surface water bodies adjacent to and downstream from YNPS site. The Southeast Construction Fill Area (SCFA) is just outside the previous Industrial Area, and has been assessed and remediated according to separate permit approvals from the MassDEP's Solid Waste Section.

The Interim Phase II Review contained a detailed summary of environmental assessment work performed as part of the Interim Phase II Report - that summary will not be repeated in this Review; however, a copy of the Interim Phase II Review is attached for reference. This Final Phase II Review will not summarize in detail the additional assessment results, but will address whether the requirements of the Interim Phase II review have been satisfactorily completed, for each of the environmental media assessed at the site. For each of the following review sections, the applicable conditions of the Interim Phase II Report requirements are listed.

1. Final Phase II Report – General (Interim Ph. II Condition 14)

The cumulative Final Phase II Report contained the following information, as required:

- Summaries of additional assessment work, including analytical data (non-radiological and radiological) in tabular form, with appropriate standards or criteria for each media shown (for reference purposes);
- Updated basemaps, depicting the locations of soil sampling locations, groundwater monitoring wells, surface water and sediment sampling locations, and fish sampling locations;
- Groundwater contour maps of the Industrial Area and immediate vicinity, and updated maps of tritium concentrations in groundwater;
- Contour maps of the top of bedrock, top of till, and top of glaciolacustrine unit;
- Contour maps of gross alpha and gross beta activity in site groundwater monitoring wells;
- Historic summaries of Radiological Environmental Monitoring Program (REMP) monitoring performed prior to 1971;
- The ASTM Phase I BWSC (21E) assessment report for the Non-Industrial Area of the Facility; and
- Cumulative (radiological and non-radiological) Human Health and Ecological Stage II Risk Assessments for the YNPS site, prepared in accordance with approved Scopes-of-Work (SOWs), according to MassDEP regulations and requirements.

2. Soil - Assessment (Interim Ph. II Conditions 2, 3, 4 & 6)

Decommissioning activities within the Industrial Area resulted in the removal of substantial volumes of soil (and demolition material, including concrete rubble) for proper disposal as radiological waste at permitted off-site disposal facilities, according to NRC requirements. Soil remediation was also completed for non-radiological parameters within the Industrial Area, and in more limited amounts in the Non-Industrial Area. Confirmatory soil samples were obtained after remedial activities were completed. As required in the BUD Permit, following assessment and soil removal, a 3-foot thick layer of clean soil was placed over the entire, 3.5-acre BUD Fill Area, which encompasses the RCA at the center of the Industrial Area.

A total of approximately 2,700 soil samples have been obtained and analyzed for non-radiological

parameters as part of the assessment of the YNPS site. The soil sampling required by the Interim Phase II Review was completed, both within the Industrial Area and in the Non-Industrial Area. All of these additional soil samples were analyzed at a minimum for the standard non-radiological parameter list for the YNPS site (as approved by MassDEP), which consists of all samples being analyzed for volatile organic compounds (VOCs) by EPA Method 8260 and the thirteen (13) Priority Pollutant metals by EPA Method 6010B, and selected additional samples being analyzed for various portions of the following parameter list:

- Semi-volatile organic compounds (SVOCs) by EPA Method 8270;
- Polychlorinated biphenyls (PCBs) by EPA Method 8082;
- Extractable petroleum hydrocarbons/volatile petroleum hydrocarbons (EPH/VPH) by the MassDEP method;
- Dioxins and furans;
- Hydrazine;
- Pesticides; and
- Herbicides by EPA Method 8151.

The results of full radiological analyses for approximately 1,600 soil samples were utilized in the Risk Assessment review, including the specific additional soil sampling required by the Interim Phase II Review. A large amount of additional radiological monitoring and assessment of soils (and other media) was performed at the YNPS site to satisfy the NRC and MADPH requirements for the NRC License Partial Site Release , as part of the Final Status Survey (FSS) for the site.

All soil samples were analyzed for the presence of radionuclides by gamma spectroscopy, and as outlined in the LTP requirements, a minimum of 5% of these samples were also analyzed for the Hard-To-Detect (HTD) radionuclides H-3 (tritium), Am-241, C-14, Cm-243/244, Fe-55, Ni-63, Pu-238, Pu-239/240, Pu-241, Sr-90 and Tc-99. For all media samples, including soil, the radiological analyses by gamma spectroscopy at a minimum quantified the FSS list of radionuclides Ag-108m, Cs-134, Cs-137, Co-60, Eu-152, Eu-154, Eu-155, Nb-94 and Sb-125. The LTP states that these radionuclides are analyzed as part of the entire gamma spectroscopy library, and that if any other radionuclides were detected by gamma spectroscopy above minimum detectable activities (MDAs), they would have been reported as part of these analyses. **Following remedial activities, the results of soil analyses (both radiological and non-radiological) do not exceed the risk criteria of the Risk Assessment.**

3. <u>Groundwater - Assessment</u> (Interim Ph. II Conditions 2, 3, 4, 7, 8, 9 & 10)

A total of 83 groundwater monitoring wells have been installed and monitored at the site to date, including 22 wells installed in 2006 subsequent to (and, in part, in response to) the Interim Phase II Review. Due to decommissioning activities, 26 monitoring wells have been properly abandoned in accordance with MassDEP guidelines. Currently, there are a total of 57 monitoring wells on-site, consisting of shallow (water-table) wells, intermediate depth wells, and deep, bedrock wells. Groundwater flow maps show that groundwater flow beneath the previous Industrial Area is primarily towards the Deerfield River below Sherman Dam (towards the vicinity of Sherman Spring), with some indication of a minor amount of deeper, radial flow towards Sherman Reservoir.

Groundwater samples were analyzed for the standard YNPS non-radiological parameter list, and the additional samples required in the Interim Phase II Review were also analyzed for boron, as required. Several monitoring wells have historically shown limited exceedances of groundwater standards for non-radiological parameters, primarily for arsenic.

All groundwater samples were analyzed during at least four quarterly Phase II monitoring rounds for the presence of radionuclides by gamma spectroscopy, and also for the HTD radionuclides. All groundwater samples from all monitoring rounds were analyzed at a minimum for tritium, gross alpha and gross beta, and a significant number of selected monitoring wells have also been analyzed historically for the gamma spectroscopy and the HTD parameter list.

The former Visitors' Center potable well was sampled and analyzed for radiological analyses, and the results of the last two years of sampling and analysis of the YNPS Facility potable well were included in the Final Phase II Report. The results showed no exceedances of any MA Drinking Water Standards & Guidelines (MCLs), and no detectable tritium or other plant-related radionuclides.

The Final Phase II Report states that tritium continues to be the only plant-related radionuclide detected in groundwater at YNPS site. The source of the tritium contamination in groundwater at the site was the result of a documented leak(s) in the former Spent Fuel Pool/Ion Exchange Pit complex (SFP/IXP complex) which began in the 1960s, within the center of the former Industrial Area/RCA. The tritium contamination in groundwater extends laterally downgradient from the former SFP/IXP complex location towards Sherman Spring and the Deerfield River, primarily in the shallow glaciolacustrine unit. The deeper tritium contamination is more limited in extent and concentrations, extending at depth into the sand layers within the glacial till and into bedrock in one well, MW-105B (within the former RCA), and extending laterally from the former SFP/IXP complex a shorter distance towards Sherman Reservoir.

The June 19, 2007 Post-Closure Groundwater Monitoring Plan approval issued to Yankee by MassDEP requires continued sampling of 4 monitoring wells and Sherman Spring, within and downgradient of the BUD Area, during the post-closure monitoring period of 30 years and includes analyses for the radionuclides by gamma spectroscopy, Sr-90 and tritium. Tritium monitoring is also required at 2 additional site monitoring wells, non-radiological monitoring is required at 4 additional site monitoring wells, and 30-year post-closure monitoring (radiological and non-radiological) is also required at 3 monitoring wells located at the SCFA.

During the most recent monitoring in March of 2008, tritium continued to be detected in 8 of the site monitoring wells, with the highest tritium concentration of 25,700 picoCuries/liter (pCi/l) in well MW-107C, an intermediate-level well screened at a depth of 27 to 32 feet immediately downgradient of the former SFP/IXP complex location (this has decreased from a concentration of 48,000 pCi/l in 2003 in this well). In 2008, tritium continued to be detected in bedrock monitoring well MW-105B, at 4,710 pCi/l (equivalent to 2003 levels), while the water sample from Sherman Spring was non-detectable (ND) for tritium (decreased from previous levels).

The groundwater sample from well MW-107C continues to exceed the USEPA drinking water criteria (MCL) of 20,000 pCi/L. However, as required by the BUD Permit, the recorded deed notification(s) for the BUD Area, which encompass this well location and the central area of groundwater tritium contamination, prohibits the installation or use of any water supply wells within the BUD Area. **Given the BUD Area deed restrictions and based on the remaining data outside the BUD Area, the results of groundwater analyses for both radiological and non-radiological parameters do not exceed the risk criteria of the Risk Assessment.**

4. **Surface Water - Assessment** (Interim Ph. II Conditions 2, 3, 4, & 11)

As part of the entire Phase II Assessment, a total of 126 surface water samples were collected from the site and surrounding vicinity, with samples collected from upstream (background) locations, Sherman Reservoir, the Deerfield River, Sherman Spring, the East and West Storm Drain Ditches, and in Wheeler Brook (as part of the SCFA assessment). Initial Phase II surface water samples were analyzed for the standard YNPS non-radiological parameter list and for radionuclides by gamma spectroscopy and for HTDs. All of the additional surface water samples required in the Interim Phase II Review were obtained as required and analyzed for the thirteen (13) Priority Pollutant metals plus lithium and boron, and for radionuclides by gamma spectroscopy plus tritium.

The additional surface water samples showed slightly elevated levels of some metals in Sherman Spring and the Deerfield River immediately downriver of the YNPS. Tritium was detected in Sherman Spring and the West Storm Drain Ditch in 2006. **The results of the surface water analyses for both radiological and non-radiological parameters do not exceed the risk criteria of the Risk Assessment.**

5. **Sediment - Assessment** (Interim Ph. II Conditions 2, 3, 4, & 11)

As part of the entire Phase II Assessment, a total of approximately 700 sediment samples were collected from the site and surrounding vicinity, with samples generally collected from the same locations as surface water samples. Initial Phase II surface water samples were analyzed for the standard YNPS non-radiological parameter list and for radionuclides by gamma spectroscopy and for HTDs. All of the additional sediment samples required in the Interim Phase II Review were obtained as required and analyzed for the thirteen (13) Priority Pollutant metals plus lithium, boron and total uranium, and for radionuclides by gamma spectroscopy plus HTDs.

As part of decommissioning activities, PCB-contaminated sediments (from PCB-containing paints previously used at the YNPS) were remediated from Sherman Reservoir and the West Storm Drain Ditch in accordance with TSCA approvals from the EPA, as noted previously. Confirmatory sediment samples were obtained from these areas after remediation.

The additional sediment samples showed slightly elevated levels of some metals and some radionuclides (including Cs-137) in Sherman Spring, the Deerfield River immediately downriver of the YNPS, and in Sherman Reservoir near the Cooling Water Discharge. Total uranium was slightly elevated in the Deerfield River immediately downriver of the YNPS. **The results of the sediment analyses for both radiological and non-radiological parameters do not exceed the risk criteria of the Risk Assessment.**

6. **Fish - Assessment** (Interim Ph. II Conditions 2, 4, & 12)

Fish were collected in the Summer/Fall of 2006 from background locations upriver at Harriman Reservoir; two locations within Sherman Reservoir (the East Storm Drain Outfall near the YNPS facility, and the northern end of Sherman Reservoir); and the Deerfield River immediately downriver of the YNPS facility, upriver of the Monroe Bridge dam. Fillets from the fish were analyzed for PCBs (both Aroclors and congeners), for radionuclides by gamma spectroscopy, and for tritium.

Fish samples from Sherman Reservoir showed slightly elevated levels of PCBs, relative to the background samples from Harriman Reservoir. Fish samples from Sherman Reservoir showed

detectable, but very low levels of tritium, while the background samples from Harriman Reservoir and the samples from the Deerfield River were non-detectable for tritium. The Final Phase II Report concluded that the detectable levels of tritium were naturally-occurring and not related to YNPS plant operations. No other radionuclides were detected by gamma spectroscopy in the fish samples, except for naturally-occurring K-40. **The results of the fish analyses for both radiological and non-radiological parameters do not exceed the risk criteria of the Risk Assessment.**

6. **Risk Assessment – Results** (Interim Ph. II Conditions 13 & 14)

As required by the Phase II Interim Review, Yankee's consultant, Gradient Corp., submitted to MassDEP the Scopes-of-Work (SOWs) for cumulative (radiological and non-radiological) Human Health and Ecological Stage II Risk Assessments (the Risk Assessment) for the YNPS site, according to the regulations, requirements and guidance as outlined in the MCP. The SOWs were approved by MassDEP's Office of Research & Standards (ORS) on December 6, 2006. The completed Method 3 Risk Characterization (the Risk Assessment) for the YNPS was submitted to MassDEP on November 13, 2007. **The Risk Assessment concludes that the YNPS site meets the MassDEP's Risk Assessment standards for cumulative risk attributable to the site (radiological and non-radiological) of no more than 1 X 10^{-5} Excess Lifetime Cancer Risk (ELCR) and no more than a Hazard Index (HI) of 1.**

USEPA/Region I provided assistance to MassDEP/ORS in the review of the Risk Assessment. The ORS review of the Risk Assessment was issued on December 31, 2007 (copy attached). **The ORS review memorandum states that the Risk Assessment is consistent with the risk assessment requirements of the MCP.**

The NRC's August 10, 2007 Partial Site Release issued in accordance with the YNPS License Termination Plan (LTP) concluded that the YNPS site meets the NRC approved Yankee Atomic Electric Company's LTP/FSS standard of no more than 25 millirem/year (mrem/yr) total radiation dose above background, or Total Effective Dose Equivalent (TEDE) attributable to the site. The MADPH's March 14, 2008 partial site release approval concluded that the YNPS site meets the MADPH standard of no more than 10 mrem/yr TEDE attributable to the site. Neither of these approvals required the placement of the 3-foot soil cover over the BUD Fill Area (the RCA) to meet these respective dose-based standards.

The MassDEP's approval of the Risk Assessment conclusions are contingent, in part, on the Deed Notifications (Activity and Use Limitations, or AULs) for the YNPS site, which contain the following requirements (among others) for 30-year post-closure maintenance and monitoring by Yankee:

- The continued maintenance of the three-foot layer of clean soil placed over the 3.5-acre BUD Fill Area in the central portion of the YNPS site, and the requirements for no excavations or other invasive procedures within that soil layer;
- The requirement that no potable water supply wells may be installed or used within the BUD Area; and
- The requirements for continued monitoring of the YNPS site, including the BUD Area and the SCFA.

Yankee recorded the Deed Notification for the SCFA on October 3, 2007, and the Deed Notification for the YNPS portion of the BUD Area on February 1, 2008, and TransCanada recorded the Deed Notification for the TransCanada portion of the BUD Area on June 27, 2008. Yankee executed Financial Assurance Mechanisms (FAMs) for the BUD Area on November 25, 2007, and for the SCFA on February 11, 2008, consisting of letters-of-credit in the monetary amounts approved by MassDEP, for 30-

year post-closure maintenance and monitoring costs. As noted previously, the MassDEP's June 19, 2007 approval of the Groundwater Monitoring Plan requires long-term monitoring of the BUD Area and the SCFA.

II. MASSDEP DETERMINATIONS

Personnel of the MassDEP have reviewed the Final Phase II Report for the YNPS in accordance with MGL c. 21E, the regulations promulgated thereunder at 310 CMR 40.0000 (the Massachusetts Contingency Plan, or the MCP), and applicable MassDEP policies and guidance. The MassDEP has determined that the Final Phase II Report is acceptable in accordance with MGL c. 21E and 310 CMR 40.0000, and that YNPS has achieved site closure under the MCP, subject to the conditions outlined below.

1. Yankee shall continue to comply with the requirements for post-closure maintenance and monitoring of the entire BUD Area (both the YNPS portion and the TransCanada portion of the BUD Area), as outlined in the MassDEP's Revised BUD Permit Approval, dated June 9, 2007.

2. Yankee shall continue to comply with all of the stipulations contained within the Deed Notification for the YNPS portion of the BUD area, as recorded on February 1, 2008, at the Greenfield Registry of Deeds, Book 5455, Page 320.

3. Yankee shall continue to comply with all of the stipulations contained within the Deed Notification for the SCFA, as recorded on October 3, 2007 at the Greenfield Registry of Deeds, Book 5401, Page 167.

4. Yankee shall continue to comply with the requirements for post-closure monitoring of the YNPS BUD Area (including the portion of the BUD Area on the TransCanada property) and the SCFA, as outlined in the MassDEP's approval of the Groundwater Monitoring Plan dated June 19, 2007, including the requirement for submittal of monitoring results to MassDEP within 45 days of the date of sampling. As outlined in the attached ORS Risk Assessment review memo, the metal thallium shall be added to the analytical parameter list for sampling of Sherman Spring as part of post-closure monitoring.

5. Yankee shall continue to comply with the post-closure maintenance and monitoring requirements for the SCFA, as outlined in separate correspondence from MassDEP.

6. Yankee shall continue to comply with all other applicable local, state and federal regulations and requirements, including those of the NRC, EPA, MADPH, and the Rowe Conservation Commission.

7. Appropriate Health & Safety (H&S) measures shall be utilized for all post-closure maintenance and monitoring work at the YNPS.

MassDEP is issuing this Final Report Review for public comment. In accordance with 310 CMR 40.1400, Yankee shall publish a legal notice in a newspaper which circulates in the community of Rowe, which shall identify that the Final Report Review has been issued and which shall identify the 30-day public comment period. MassDEP will accept public comments on the Final Report Review for a period of 30 days following MassDEP's receipt of documentation that the legal notice has been published.

The MassDEP reserves the right to require additional investigatory or remedial work at the YNPS site, if continued monitoring results indicate such a need. If you should have any questions or comments regarding this correspondence please contact Larry Hanson (#413-755-2287) or David Howland (#413-755-2280) of this office.

Sincerely,

Michael J. Gorski
Regional Director

Yankeeph2final908 LH

cc: Joe Bourassa - Yankee Atomic Electric Company
Robert Mitchell – Yankee Atomic Electric Company
John McTigue – ERM, Inc.
Rowe Board of Selectmen
Rowe Board of Health
Michael Whalen, MA DPH - Radiation Control Program
John Hickman - Nuclear Regulatory Commission
Anna Symington, Tony Kurpaska – DEP/WERO/BWSC
David Howland, Steven Ellis, Daniel Hall – DEP/WERO
Nancy Bettinger, Carol Rowan -West – DEP/Boston/Office of Research & Standards
Earnest Waterman, Kimberly Tisa, Mary Ballew, Philip Newkirk – EPA
Franklin Regional Council of Governments
Citizens Awareness Network – Deborah Katz
TransCanada – William Taylor, Thomas Hwang, Esq.

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MEMORANDUM

To: Larry Hanson, Project Manager
David Howland, Regional Engineer CRW
Through: Carol Rowan West, Director, ORS
From: Nancy Bettinger, ORS
Date: December 31, 2007

Subject: Method 3 Risk Characterization
Former Yankee Nuclear Power Station
Rowe, Massachusetts

As requested, ORS has reviewed the revisions made to the Method 3 Risk Characterization for the former Yankee Nuclear Power Station site in Rowe, Massachusetts. The revised Method 3 Risk Characterization was submitted to MassDEP by Gradient Corporation on behalf of Yankee Atomic Electric Company in response to ORS's August 24, 2007 comments on the June 2007 draft of the Method 3 Risk Characterization.

The risk assessment is comprehensive, clearly presented, and consistent with the risk assessment requirements of the MCP. Gradient has incorporated most of the recommendations offered by ORS in our August 2007 memorandum. In our view, the risk assessment is essentially complete. For the record, however, ORS wishes to note the following:

- Where surface water concentrations of contaminants of concern exceed Massachusetts Surface Water Quality Standards, a condition of "no significant risk" does *not* exist by definition under the MCP. For toxics, the National Recommended Water Quality Criteria (NRWQCs) are cited as Massachusetts Surface Water Quality Standards. The Risk Characterization report acknowledges that the maximum detected levels of some inorganics (cadmium, copper and lead) in Wheeler Brook surface water do exceed the criteria (surface water standards), but it does not state explicitly that a condition of "no significant risk" does not exist in Wheeler Brook. The practical implication of a condition of significant risk in Wheeler Brook is that long term monitoring, which is already planned, will be needed to confirm that the sources of contamination to the Brook

and thus to Sherman Reservoir have been eliminated, and that contaminant concentrations in surface water are decreasing as expected.

- The maximum detected concentration of cadmium in Sherman Reservoir of 0.00009 mg/L slightly exceeds the hardness-adjusted surface water standard of 0.00008 mg/L. This apparent exceedance may be insignificant by itself for two reasons: (1) The maximum detected concentration reported in Table 3-20 is the same as the maximum Sherman Reservoir concentration; and (2) The absolute value of the exceedance is small. Nevertheless, considering that the maximum is based on only three samples, additional monitoring may be warranted in order to evaluate whether exceedances persist.
- The thallium concentration (0.003 mg/L) in the sample collected from Sherman Spring in the Deerfield River Study Area is significantly higher than the NRWQC for protection of human health (0.00047 mg/l). Sherman Spring discharges to the Deerfield River. The human health-based surface water standard is not applicable to the Sherman Spring itself, which is not fishable. Nevertheless, additional monitoring in Sherman Spring may be prudent to ensure that contaminant levels in the spring decrease as expected.
- In ORS's August 24, 2007 memorandum, the fourth bullet under the "Human Health" heading calls for a fuller description of uses and activities that will be prohibited by Activity and Use Limitations and other institutional controls applied in the vicinity of the site. This comment was not explicitly addressed in the November 2007 revision of the Method 3 Risk Characterization. Nevertheless, ORS understands that the activities of concern will be addressed in the AULs that are applied.
- In ORS's August 24, 2007 memorandum, the sixteenth bullet under the "Human Health" heading notes several typographical errors in the toxicity value tables. Most appear to have been corrected in the November 2007 revision. At least one error remains, but it will not affect the outcome of the risk assessment.

If you have any questions about this memorandum, please feel free to contact me at (617)556-1159 or at nancy.bettinger@state.ma.us.

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OCT 3 1 2008

Yankee Atomic Electric Company
49 Yankee Road
Rowe, MA 01367
Attention: Wayne Norton, President

RE: Rowe-DSWM-08-253-008
DEP Solid Waste Permitting
SE Construction Fill Area (SCFA)
Closure Certification & **Permit Approval**
Yankee Nuclear Power Station
49 Yankee Road
BWPSW43
Transmittal #W120065

Dear Mr. Norton:

The Solid Waste section of the Massachusetts Department of Environmental Protection (the Department) has completed review of the Final Closure Certification (Closure Certification) report and permit application for the Southeast Construction Fill Area (the SCFA) of the Yankee Nuclear Power Station (YNPS) in Rowe, MA. The Closure Certification report was prepared on behalf of Yankee Atomic Electric Company (Yankee) by its consultant, Environmental Resources Management (ERM) of Boston, MA, and was signed and stamped by Gregg A. Demers, Massachusetts-registered Professional Engineer (P.E.) #39434 of ERM.

As a part of decommissioning activities for the YNPS, the SCFA was assessed and closed in accordance with the Department's Solid Waste regulations at 310 CMR 19.000. The SCFA is a fill area of approximately 1.2 acres in size, located immediately southeast of the former Yankee industrial facility (within Yankee property), where soil and debris from construction activities at the site was historically placed.

MassDEP previously issued to Yankee the following Solid Waste permit reviews/approvals for the SCFA:

- the Final Comprehensive Site Assessment (CSA) permit approval, dated April 9, 2002;
- the Corrective Action Alternatives Analysis (CAAA, or remedial feasibility) permit approval, dated April 13, 2004; and
- the Corrective Action Design (CAD) Final Closure Plan permit approval, dated January 11, 2005.

The Closure Certification Report was submitted in compliance with

MassDEP's CAD Plan approval for the remediation of the SCFA. The Closure Certification report documents that the closure activities were performed at the SCFA in accordance with the approved plans and as required by the MassDEP, and proposes post-closure maintenance and monitoring of the SCFA.

The Closure Certification report includes the following information:

- Summary text describing the final closure activities completed for the SCFA;
- Plans and cross-sections of the SCFA following remediation;
- Test-pit logs and photographs; and
- A post-closure maintenance and monitoring plan.

As a part of decommissioning activities for the YNPS, the SCFA was assessed and closed in accordance with applicable environmental regulations, including the Nuclear Regulatory Commission (NRC) regulations 10 CFR Part 50, and the applicable regulations of the Massachusetts Department of Public Health's Radiation Control Program (the MA RCP), the United States Environmental Protection Agency (the EPA), and the MassDEP.

Assessment of the SCFA consisted of the installation and monitoring of groundwater monitoring wells, sampling and analysis of surface water and sediment from Wheeler Brook near the SCFA, landfill gas monitoring around the perimeter of the SCFA, and sampling and analysis of soils from the SCFA prior to and during remediation. The CSA report and the Closure Certification Report state that radiological monitoring of the SCFA, Wheeler Brook and the surrounding area has shown results that are consistent with natural background levels, i.e., there has been no evidence there of any facility-related radionuclides or radioactivity, except for a small amount of radiologically-impacted asphalt removed from the SCFA during remedial activities, as outlined below.

As part of the Final CSA, ERM previously completed a Qualitative Risk Assessment for the SCFA in accordance with the requirements outlined in the Department's Landfill Technical Guidance Manual (the LAC). ERM concluded that no significant risk of harm to human health or the environment was identified for the SCFA, although several metals, including iron and manganese, were elevated in the surface water of Wheeler Brook immediately downgradient of the SCFA. The MassDEP's Office of Research & Standards (ORS) December 31, 2007 review of the Method 3 Risk Characterization (the Quantitative Risk Assessment) for the entire YNPS site noted that the exceedance of surface water standards for cadmium, copper and lead in Wheeler Brook immediately downgradient of the SCFA requires that long-term surface water monitoring of Wheeler Brook be continued to demonstrate that these levels are decreasing over time.

Remediation of the SCFA was performed from July, 2005 through May, 2006, and consisted of excavation of the upper portion of the SCFA, with removal of approximately 13,000 cubic yards of non-conforming material (primarily soil) from the excavated area. Non-conforming material consisted of soil impacted by polychlorinated biphenyls (PCBs), construction & demolition (C&D) debris (primarily scrap metal), C&D debris and soil containing asbestos-containing material (ACM), and approximately 50 cubic yards of radiologically-impacted asphalt (containing the radionuclide Co-60 slightly above background levels).

Portions of the soils within the SCFA were contaminated by PCB-containing paint chips generated during the maintenance of the YNPS facility; the assessment and remediation of PCBs at the SCFA was governed by an EPA Toxic Substances Control Act (TSCA) permit approval. All of the non-conforming material was removed off-site for disposal at proper, permitted disposal facilities, except for approximately 1,800 cubic yards of PCB-impacted soil which was thermally treated on-site at YNPS according to an EPA TSCA permit approval, and which was reused on-site as fill according to the MassDEP's June 19, 2007 Beneficial Use Determination (BUD) permit.

Upon completion of excavation and removal activities, Yankee completed a total of 14 test pits at the SCFA, to the natural soils at the base of the SCFA fill (maximum 22 feet in depth). The test pits, which were inspected by MassDEP personnel, contained only very minor amounts of remaining C&D debris. Several of the test pits contained sawdust at the base of the SCFA, which had apparently been produced by an historic sawmill which operated at the location of the SCFA, prior to the construction of the YNPS. The maximum residual PCB concentration remaining in the soils of the SCFA following remediation was 6.45 milligrams/kilogram (mg/kg), which meets the EPA TSCA Low Occupancy Criteria of 25 mg/kg.

Clean fill was used to grade the SCFA excavation area to proper slopes to facilitate drainage, and 6 inches of clean topsoil was then placed over the SCFA and seeded with grass. MassDEP inspections subsequent to the seeding showed that the grading work was acceptable and that a healthy grass cover had been established.

ERM proposes to inspect the SCFA on a quarterly basis for three years, and to repair any erosion which might be observed. In accordance with Yankee's "Post-Decommissioning Planting Plan and Specifications", the SCFA will not be mowed but will be allowed to undergo natural plant succession. Groundwater monitoring will be performed at one upgradient well and two downgradient wells in accordance with Yankee's "Post-Closure Groundwater Monitoring Program", annually for 5 years, then every 2 years for the remainder of the 30-year post-closure monitoring period, with analyses for the non-radiological parameters outlined at 310 CMR 19.132, as well as tritium. Surface water will be sampled at the previous five locations along Wheeler Brook on the same frequency and for the same parameters as groundwater.

Yankee submitted to MassDEP a copy of the Record Notice of Landfill Operation for the SCFA, as outlined in 310 CMR 19.141, including a survey map of the SCFA and appropriate supporting documentation. The documentation contained proof that the Record Notice was recorded on October 3, 2007 at Book 5401, Page 167, in the Franklin County Registry of Deeds. On February 11, 2008, Yankee executed a Financial Assurance Mechanism (FAM) in the amount of $72,625.00 for post-closure maintenance and monitoring at the SCFA, and provided documentation to the MassDEP of such execution.

MASSDEP DETERMINATIONS

In accordance with 310 CMR 19.130 (31)(d), the MassDEP has reviewed the Closure Certification Report and has performed inspections of the SCFA both during and after closure. Based on the review of the Report, the

inspections and the consultant's certification; the MassDEP is issuing this letter of compliance certifying that the SCFA has been closed in accordance with the approved plans.

In accordance with 310 CMR 19.140(6), the post-closure period begins on the date of this determination. In accordance with 310 CMR 19.142, the post-closure period extends for a minimum period of 30 years from the date of this approval, however, the MassDEP may reduce (upon written request by the permittee) or extend (in order to ensure protection of public health, safety or the environment) the 30-year post-closure period. This certification permit shall remain valid for the entire post-closure period.

Note that this document is a permit issued pursuant to MGL Chapter 111 Sections 150A and 150A1/2 and the regulations promulgated thereunder at 310 CMR 16.00 and 310 CMR 19.000. This permit is subject to the standard conditions presented at 310 CMR 19.043(5) and to the conditions and requirements listed below:

1. Yankee Atomic Electric Company (Yankee) is the permittee for the SCFA.

2. During the post-closure period, the permittee shall perform the following activities at the SCFA as described in 310 CMR 19.142, Landfill Post-Closure Requirements, of the Solid Waste Management Facility Regulations, and as further specified in this permit:

   (a) Perform inspections for settlement and erosion during all monitoring rounds for the entire post-closure period;

   (b) Take corrective actions to remediate and/or mitigate conditions that would compromise the integrity of the final cover (topsoil and vegetative cover);

   (c) maintain the integrity of the final cover (topsoil and vegetative cover); and

   (d) monitor and maintain the environmental monitoring systems for surface water and groundwater.

3. All maintenance/repair of the SCFA final cover conducted as a result of storm damage, erosion, or other circumstances shall be summarized and reported to the MassDEP within thirty (30) days of the date of the repair/maintenance.

4. The permittee shall submit a post-closure report, as required by 310 CMR 19.142 (6) Reporting Requirements, not later than February 15th of each year.

5. The SCFA shall not be used for any post-closure activity without prior written approval from the MassDEP. The performance of any activity on the SCFA that compromises the final cover or failure to adequately maintain the final cover shall invalidate the certification and may be considered to be a violation of this permit. Under no circumstances shall excavations or penetrations be made into the SCFA surface without prior written MassDEP approval.

6. Yankee shall comply with all of the stipulations contained within the Deed Notification for the SCFA, as recorded on October 3, 2007 at the Greenfield Registry of Deeds, Book 5401, Page 167.

7. Yankee shall comply with the continuing requirements for post-closure groundwater monitoring of the SCFA, as outlined in the MassDEP's approval of the YNPS Groundwater Monitoring Plan dated June 19, 2007, including the requirement for sampling of monitoring wells CFW-1, CFW-5, and CFW-6 annually for 5 years, then every 2 years for the remainder of the 30-year post-closure period. As proposed in the Closure Certification Report, surface water samples shall be obtained from each of the five previous SCFA surface water sampling locations on the same frequency and for the same timeperiods as the SCFA groundwater sampling.

8. The SCFA groundwater and surface water samples shall be analyzed for the parameters outlined in 310 CMR 19.132 (1)(h)(1-3), including VOCs by EPA Method 8260 and dissolved metals, and also for tritium. All VOC analyses by EPA Method 8260 shall be performed as outlined in 310 CMR 19.132(h)(1-3), specifically methyl ethyl ketone, methyl isobutyl ketone, and acetone shall be included, and unknown peaks having intensities greater than 5 times the background intensity shall be identified.

9. Results of SCFA monitoring, including data in tabular form and laboratory analytical data sheets, shall be submitted to the MassDEP within 45 days of the date of sampling.

10. MassDEP reserves the right to modify the SCFA environmental monitoring program at any time.

11. Yankee shall comply with all other applicable local, state and federal regulations and requirements concerning the SCFA, including those of the NRC, EPA, MADPH, and the Rowe Conservation Commission.

12. Appropriate Health & Safety (H&S) measures shall be utilized for all post-closure maintenance and monitoring work at the SCFA.

13. Should utilization of FAM monies be required according to the regulations outlined at 310 CMR 19.051(9), the MassDEP reserves the right to utilize any portion of the FAM for post-closure maintenance and monitoring at the SCFA. The permittee shall submit to the MassDEP revised estimates of post-closure maintenance and monitoring costs every two years following the issuance of this Closure Certification approval.

14. The MassDEP and its agents and employees shall have the right to enter upon the SCFA site at all reasonable times and with reasonable notice, to inspect the SCFA and any equipment, structure or land located thereon, take samples, recover materials or discharges, have access to and photocopy records, to perform tests and to otherwise monitor compliance with this Permit and all environmental laws and regulations. This right of entry and inspection shall be in addition to the MassDEP's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and the MassDEP.

Pursuant to 310 CMR 19.037(5), any person aggrieved by the issuance of this approval, except as provided for under 310 CMR 19.037(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A and C. 30A not later than thirty [30] days following notice of this decision. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30 A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the permit by a court of competent jurisdiction, the permit decision shall remain effective or become effective at the conclusion of the 30 day period.

Any aggrieved person intending to appeal the decision to the superior court shall provide notice to the MassDEP of said intention to commence such action. Said Notice of Intention shall include the MassDEP File Number (08-253-008) and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of the MassDEP and the Regional Director for the regional office which made the decision. The appropriate addresses to which to send such notices are:

Office of General Counsel
MassDEP
One Winter Street
Boston, MA 02108

&

Regional Director
MassDEP
436 Dwight Street - 5th Floor
Springfield, MA 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

This approval pertains only to the solid waste management aspects of the proposal and does not negate the responsibilities of the owners or operators to comply with any other local, state or federal laws and regulations now or in the future.

The MassDEP reserves the right to require additional investigatory or remedial work at the SCFA, if continued monitoring results indicate such a need. If you should have any questions or comments regarding this correspondence please contact Larry Hanson (#413-755-2287) of this office.

Sincerely,

Daniel Hall
Section Chief, Solid Waste Management
Western Regional Office

Yankscfacert
cc: Joe Bourassa - Yankee
Gregg Demers - ERM, Inc.
Rowe Board of Selectmen
Rowe Board of Health
Michael Whalen, MA DPH - Radiation Control Program
John Hickman - Nuclear Regulatory Commission
David Howland - DEP/WERO
Nancy Bettinger - DEP/Boston/Office of Research & Standards
Kimberly Tisa - EPA
Franklin Regional Council of Governments
Citizens Awareness Network - Deborah Katz

File

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WESTERN REGIONAL OFFICE
436 Dwight Street • Springfield, Massachusetts 01103 • (413) 784-1100

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

ARLEEN O'DONNELL
Commissioner

Yankee Atomic Electric Company
49 Yankee Rd
Rowe, MA 01367
Attention: Joseph Bourassa, Director of Site Closure and Project Support

JUN 19 2007

&

TransCanada Hydro Northeast, Inc.
4 Park St.
Concord, NY 03301
Attention: Michael G. Kline, General Manager

RE: Rowe-DSWM-07-253-009
MADEP Solid Waste Permitting
Beneficial Use Determination (BUD)
Subsurface Structures/Concrete Rubble
Revised Permit Approval
Yankee Nuclear Power Station
49 Yankee Road
BWPSW013
Transmittal #W050861

Revised BUD Permit Approval

Dear Mr. Bourassa:

On September 9, 2005 the Solid Waste section of the Massachusetts Department of Environmental Protection (MassDEP) issued a Final Beneficial Use Determination (BUD) permit, hereinafter referred to as "the original BUD" to leave subsurface structures (foundations and buried utilities) in place, along with concrete and asphalt rubble from demolition of site structures, and SCFA soils, at the former industrial facility area of the Yankee Nuclear Power Station (YNPS) in Rowe, MA. A revision to the BUD permit application, entitled Revised Beneficial Use Determination (BUD) for Structures, hereinafter referred to as "the Revised BUD" was submitted to MassDEP on November 8, 2006, which contained some modifications and updated information relative to the original application. The original and revised BUD permit applications were prepared on behalf of the YNPS owner, Yankee Atomic Electric Company (Yankee), by

Yankee's consultant, Environmental Resources Management (ERM) of Boston, MA.

This Revised BUD approval will not repeat all of the summary information or requirements of the September 9, 2005 Original BUD approval; only the proposed modifications and updated information will be addressed.

General Information

The "Facility" portion of the YNPS is defined as the former industrial area where facility structures were located, and the BUD area coincides with the Facility area. Yankee has completed the demolition of concrete or cinder-block building foundations and/or slabs within the Facility area, the removal of many of the buried utilities within the Facility area, crushing of the concrete rubble on-site, the placement of the 3-foot thick soil cover over the BUD Fill Area, and final site grading. Within the Facility area, Yankee was allowed by the Original BUD permit approval to leave in-place a number of sub-surface building foundations, slabs, and buried utilities, and to use a portion of the clean crushed concrete rubble (and asphalt rubble), along with SCFA soils, as fill in this area.

Radiological assessment of the BUD Area and BUD materials was performed in accordance with: NRC requirements for the LTP; MADPH correspondence to Yankee dated December 17, 2004; MassDEP requirements for the BWSC Phase II Risk Assessment; and MassDEP requirements as outlined in the September 9, 2005 Original BUD permit approval. Non-radiological assessment of the BUD Area and BUD materials was performed in accordance with: MassDEP requirements for the BWSC Phase II Risk Assessment; and MassDEP requirements as outlined in the September 9, 2005 Original BUD permit approval.

Proposed Modifications to the Original BUD permit

The Revised BUD contains a list of all previous structures at the facility, which details whether the structure was fully or partially removed, and the amount of concrete left in place if the structure was not fully removed. Yankee has completed the majority of the work required under the Original BUD permit, including completion of the following:

- Yankee completed removal of all of the structures which were required to be removed by Condition 3 of the Original BUD permit approval;
- Radiological and non-radiological assessment of the BUD Area was completed in accordance with Condition 5 of the Original BUD permit approval;
- All rubble used as fill in the BUD Area, and all buried utilities left on-site in the BUD Area, contained no distinguishable plant-related radioactivity above background levels, as required by Condition 6 of the Original BUD permit approval;
- The remaining concrete structures, soil, rubble fill, and groundwater in the BUD Area will meet the remedial requirements of the MassDEP, NRC, MADPH, and USEPA;
- A 3-foot thick layer of soil was placed over the entire BUD Fill Area, and seeded with grass. The soil contained no distinguishable plant-related radioactivity above background levels, as required by Condition 12 of the Original BUD permit approval; and
- The concrete rubble from the Reactor Support Structure, which contained plant-related tritium above background levels, was not used as fill, but rather was shipped off-site for proper disposal.

This Revised BUD approval formally approves several minor modifications to the Original BUD, which

have been completed by Yankee, as noted below.

The Revised BUD contains the following modifications or updates to the Original BUD:

- Additional concrete structures were removed in their entirety beyond those originally proposed;
- Approximately 250 lineal feet of 2-inch thick creosote wooden timbers were left in place at the top of portions of the buried concrete duct banks;
- Approximately 300 lineal feet of the original site railroad lines, including the steel tracks, creosote wooden railroad ties, and stone ballast, were left buried in-place;
- The volume of on-site rubble used as fill was reduced from the estimated volume in the Original BUD;
- The boundaries of the BUD Area were modified slightly from those outlined in the original BUD permit application; and
- Only a small portion of the SCFA soil was used as fill in the BUD Area, as the majority of the SCFA soil remained in the SCFA.

MASSDEP DETERMINATIONS

MassDEP has reviewed the Revised BUD permit application to reuse on-site structures and rubble as fill, within the industrial Facility area of the YNPS, in accordance with the Massachusetts Solid Waste Regulations 310 CMR 16.00 & 19.000, and also in accordance with the Massachusetts Contingency Plan, 310 CMR 40.0000. MassDEP approves the Revised BUD permit in accordance with the regulations for Beneficial Use of Solid Wastes at 310 CMR 19.060 and the permit review process at 310 CMR 19.037, subject to the following conditions and requirements.

1. All of the requirements of MassDEP's Original BUD permit approval, dated September 9, 2005, remain in force and unchanged, unless specifically modified by this Revised BUD permit approval.

2. In addition to the BUD requirements, Yankee shall also comply with all of the requirements of MassDEP's October 7, 2005 BWSC Interim Phase II Assessment review for the YNPS site, as well as future requirements of MassDEP's review of the Final BWSC Phase II Assessment for the YNPS site, including the Final Risk Assessment, consistent with the requirements of the Massachusetts Contingency Plan, 310 CMR 40.0000 (the MCP).

3. MassDEP approves Yankee's proposal to leave in-place within the BUD Area a limited amount of asbestos-containing material (ACM) within mastic coatings on subsurface concrete structures. As outlined at Condition 16 of the Original BUD permit and Condition 9 of this Revised BUD permit, Yankee must identify all specific locations of buried ACM left on-site on the as-built plan to be contained in the Deed Restriction for the BUD Area. Yankee (or any subsequent successor, heir or assignee) is responsible to ensure that these areas containing ACM are not disturbed without prior written approval of MassDEP, and that all proper precautions and Health & Safety measures are taken to avoid any release of asbestos to the environment from the subject ACM.

4. Yankee shall establish a Financial Assurance Mechanism, as outlined at 310 CMR 19.051, and in an amount approved or required by MassDEP, to cover the costs of maintenance and monitoring of the BUD Fill Area for the 30-year post-closure maintenance and monitoring period. The Final FAM shall be included with the Deed Notification for the BUD Area,

and shall be fully established and funded at the time of the submittal of the Deed Notification to MassDEP. A Draft FAM mechanism and FAM estimate shall be submitted to MassDEP for review and approval prior to submittal of the Final FAM.

As outlined at 310 CMR 19.142, MassDEP may, in writing, extend or shorten the 30-year post-closure maintenance and monitoring period, if deemed appropriate based on protection of public health, safety, and the environment.

5. No transfer of this permit shall be permitted except in accordance with the MassDEP's regulations at 310 CMR 19.044.

6. **Deed Notification/Activity and Use Limitation:** Prior to issuance of the Final BWSC Phase II Assessment approval from MassDEP, a notification shall be placed on the deeds for both the YNPS property and the TransCanada property, consistent with MassDEP's Solid Waste regulations at 310 CMR 19.141, relative to the BUD permit area. MassDEP will not issue the Final Phase II approval until the documentation of placement of the deed notifications is received. The deed notifications shall specifically contain the following:

   A. Identification of record owners of the property;
   B. A description of the BUD Area on the property, by metes and bounds and by reference to an appropriate map or plan to be recorded therewith, signed by a Massachusetts-registered professional engineer or land surveyor, depicting:
      a. the boundaries of the BUD Area;
      b. the boundaries of the BUD Fill Area for asphalt and concrete rubble and SCFA soils;
      c. the boundaries of the 3-foot soil cover area;
      d. the location and identification of all subsurface structures remaining within the BUD Area, including all foundations, slabs, and buried utilities;
      e. the location of any asbestos-containing materials (ACM), i.e. mastics on subsurface structures, remaining within the BUD Area; and
      f. the location of any and all groundwater monitoring wells within and immediately downgradient of the BUD Area;
   C. A cross-section depicting the type and extent of the soil cover on the BUD Fill Area;
   D. A description of the nature and duration of post-closure maintenance for the BUD area;
   E. Reference to the MassDEP file number (Solid Waste File #253-009) for identifying the Structures BUD file; and
   F. The deed notification shall contain the following statement " The premises described herein are subject to the provision of MGL c. 111, sec. 150A and 310 CMR 19.000. Said premises shall not be used for any purpose other than as a closed, regulated fill area, and in no case shall be used as a residential area, without prior written approval of the Massachusetts Department of Environmental Protection (MassDEP). Continued maintenance and monitoring of the site as a regulated fill area is required, consistent with the terms of MassDEP's Beneficial Use Determination Permit Approval. Any transfer of the Beneficial Use Determination permit for the premises shall be performed in accordance with 310 CMR 19.044. The procedure for MassDEP approval for any use other than as a closed, regulated fill area is set forth at 310 CMR 19.143. Such MassDEP approval of other use is transferable or assignable only upon written approval of MassDEP.".

Yankee shall submit to MassDEP documentation that the deed notifications were completed as required above and recorded at the Franklin County Registry of Deeds.

7. The post-closure requirements at 310 CMR 19.143 shall apply to the BUD Area, including the requirement that there shall be no disturbance of the 3-foot soil layer, excavation of the BUD Area, or any other invasive procedures in the BUD Area (i.e soil borings, well installation, etc.), without prior written approval from MassDEP. There shall be no use of the BUD area for residential purposes. Post-closure maintenance shall be performed for the BUD Area, as outlined at 310 CMR 19.142, including maintenance of the soil layer and grass cover. Any erosion of the soil cover layer shall be immediately repaired. The BUD Area shall be maintained in accordance with the "Post-Decommissioning Grading Plan and Stormwater Management Analysis" and the "Post-Decommissioning Planting Plan and Specifications" dated August 2004 or as subsequently updated (as approved by MassDEP). Post-closure environmental monitoring of the BUD Area shall be performed as outlined in MassDEP's written review of: the Final Post-Closure Groundwater Monitoring Plan; and the Final BWSC Phase II Report and Risk Assessment. The requirements set out in this paragraph may be modified in the future only upon written approval by MassDEP.

8. The material within the BUD Area, including all building foundations, slabs, and buried utilities, all concrete and asphalt rubble, SCFA soils and concrete/asphalt rubble, and existing soil and groundwater, must be included in the site-wide Risk Assessment (for both non-radiological and radiological parameters) to be completed as part of the site-wide Final BWSC Phase II Report.

9. Yankee is responsible for obtaining (and complying with) any other local, state or federal permits which may be necessary for utilization of the subject materials in the BUD permit, including any permits required by MassDEP, USEPA, NRC, MADPH, or the Rowe Conservation Commission, as appropriate.

10. MassDEP reserves the right to modify or rescind this approval at any time, should the conditions of this approval not be met, should nuisance conditions be created, or should MassDEP otherwise determine that the BUD materials or BUD Area poses a threat to public health, safety or the environment. MassDEP reserves the right to restrict, modify or rescind this BUD permit approval based on its review of the results of monitoring data, including soil and groundwater sampling and analysis.

11. MassDEP and its agents and employees shall have the right to enter upon the site at reasonable times and with reasonable notice, to inspect the BUD Area and to otherwise monitor compliance with this Permit and other MassDEP environmental laws and regulations. This right of entry and inspection shall be in addition to MassDEP's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and MassDEP.

Pursuant to 310 CMR 19.037(5), any person aggrieved by the issuance of this decision, except as provided for under 310 CMR 19.037(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A and C. 30A not later than thirty [30] days following notice of this decision. Any aggrieved person intending to appeal the decision to the superior court shall provide notice to MassDEP of said intention to commence such action. Said Notice of Intention shall include the MassDEP File Number (05-253-009) and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such

notice shall be provided to the Office of General Counsel of MassDEP and the Regional Director for the regional office which made the decision.

The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street
Boston, 02108

&

Regional Director
Department of Environmental Protection
436 Dwight Street - 5th Floor
Springfield, MA 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

This Determination pertains only to the solid waste management aspect of the proposal and does not negate the responsibility of the owners or operators to comply with any other applicable state, local, or federal laws or regulations now or in the future.

MassDEP has determined that the filing of an Environmental Notification Form ("ENF") with the Secretary of Environmental Affairs, for solid waste management purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act and Regulation 301 CMR 11.00, Section 11.04 provide certain "Fail-Safe Provisions" which allow the Secretary to require the filing of an ENF and/or Environmental Impact Report at a later time.

If you have any questions concerning this matter, please contact the undersigned of this office, at #413-755-2280, or Larry Hanson of this office, at #413-755-2287.

Sincerely,

David Howland
Regional Engineer

DH/LGH/lgh
Word:yankstruxbudrev507
cc: Rowe Board of Selectmen
Rowe Board of Health
Rowe Conservation Commission
ERM, Inc. – John McTigue, LSP
MA DPH – Radiation Control Program – Michael Whalen
USEPA, Washington – Philip Newkirk
USEPA, Region 1 – Ernest Waterman, Kimberly Tisa
NRC – John Hickman
DEP/WERO – David Howland
DEP/Boston/BWP – Paul Emond
DEP/Boston/ORS – Nancy Bettinger, Carol Rowan-West
Franklin Regional Council Of Governments
Citizens Awareness Network – Deborah Katz

File

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WESTERN REGIONAL OFFICE
436 Dwight Street • Springfield, Massachusetts 01103 • (413) 784-1100

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IAN A. BOWLES
Secretary

ARLEEN O'DONNELL
Commissioner

JUN 19 2007

Yankee Atomic Electric Company
49 Yankee Rd
Rowe, MA 01367
Attention: Joseph Bourassa, Director of Site Closure and Project Support

RE: Rowe-DSWM-07-253-009
MADEP - **Approval**
Post-Closure Groundwater Monitoring Plan
310 CMR 19.000 & 310 CMR 40.0000
Yankee Nuclear Power Station
49 Yankee Road

Dear Mr. Bourassa:

On June 12, 2007 the Massachusetts Department of Environmental Protection (MassDEP) received the Final Post-Closure Groundwater Monitoring Plan (the Groundwater Monitoring Plan) for the former Yankee Nuclear Power Station (YNPS) in Rowe, MA. The Groundwater Monitoring Plan was prepared and submitted by Yankee Atomic Electric Company (Yankee), the owner of the YNPS, in accordance with MassDEP regulations and requirements governing groundwater monitoring at the YNPS site, including the following:

- Massachusetts Solid Waste Regulations at 310 CMR 19.000 for post-closure maintenance and monitoring of the Southeast Construction Fill Area (SCFA) on the YNPS site;
- Massachusetts Solid Waste Regulations at 310 CMR 19.000 for post-closure maintenance and monitoring of the Subsurface Structures Beneficial Use Determination (BUD) permitted fill area, which allows subsurface structures (foundations and buried utilities) to remain in place, along with concrete and asphalt rubble from demolition of site structures, and SCFA soils, at the former industrial facility area of the YNPS site; and
- Massachusetts Bureau of Waste Site Cleanup regulations (the Massachusetts Contingency Plan, or MCP), at 310 CMR 40.0000, for the YNPS site-wide, Final BWSC Phase II Assessment, including the Final Risk Assessment for the YNPS site.

MASSDEP DETERMINATIONS

MassDEP has reviewed the Groundwater Monitoring Plan in accordance with the Massachusetts Solid Waste Regulations 310 CMR 19.000, and also in accordance with the Massachusetts Contingency Plan, 310

CMR 40.0000. MassDEP approves the Groundwater Monitoring Plan in accordance with the regulations at 310 CMR 19.000 and 310 CMR 40.0000, subject to the following conditions and requirements.

1. Yankee shall perform groundwater monitoring at the YNPS site in accordance with the attached Post-Closure Groundwater Monitoring Plan table, which was included within the Groundwater Monitoring Plan. MassDEP may, in writing, extend or shorten the post-closure monitoring period, or modify the post-closure monitoring requirements, if deemed appropriate based on protection of public health, safety, and the environment.

2. Except as modified by the conditions of this approval, Yankee shall also comply with all of the requirements of: MassDEP's Corrective Action Design (CAD) and Closure Certification permit approvals for the SCFA; MassDEP's June 19, 2007 Revised Beneficial Use Determination (BUD) for Structures permit approval; and the MassDEP's review of the Final BWSC Phase II Assessment for the YNPS site, including the Final Risk Assessment.

3. Yankee shall submit the results of all groundwater monitoring data to MassDEP within 45 days of the date of sampling.

4. MassDEP reserves the right to modify this approval at any time, based on its review of the results of monitoring data, should MassDEP determine that additional groundwater monitoring is required to protect public health, safety or the environment.

5. MassDEP and its agents and employees shall have the right to enter upon the YNPS site at reasonable times and with reasonable notice, to inspect the groundwater monitoring network, and to otherwise monitor compliance with this Approval and other MassDEP environmental laws and regulations. This right of entry and inspection shall be in addition to MassDEP's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and MassDEP.

This Determination pertains only to MassDEP requirements for groundwater monitoring at the YNPS site and does not negate the responsibility of the owners or operators to comply with any other applicable state, local, or federal laws or regulations now or in the future.

If you have any questions concerning this matter, please contact the undersigned of this office, at #413-755-2280, or Larry Hanson of this office, at #413-755-2287.

Sincerely,

David Howland
Regional Engineer

DH/LGH/lgh
Word:yankgwmonplanapprov61807
Attachment - table
cc: Rowe Board of Selectmen
Rowe Board of Health
Rowe Conservation Commission
ERM, Inc. – John McTigue, LSP
MA DPH – Radiation Control Program – Michael Whalen
USEPA, Washington – Philip Newkirk
USEPA, Region 1 – Ernest Waterman, Kimberly Tisa
NRC – John Hickman
DEP/WERO – David Howland
DEP/Boston/BWP – Paul Emond
DEP/Boston/ORS – Nancy Bettinger, Carol Rowan-West
Franklin Regional Council Of Governments
Citizens Awareness Network – Deborah Katz

Post-Closure Groundwater Monitoring Program
Yankee Nuclear Power Station Rowe, MA

Monitoring Well/Location	Analytical Program and Frequency	Comments
MW-104A	• Tritium, Gamma and Sr-90 - annually for 4 years, every 2 years for 6 years and every 5 years for 20 years	Post Closure Downgradient Sample Location
MW-105B	• Tritium, Gamma and Sr-90 - annually for 4 years, every 2 years for 6 years and every 5 years for 20 years	Post Closure Sample BUD Location
MW-106A	• Tritium, Gamma and Sr-90- annually for 4 years, every 2 years for 6 years and every 5 years for 20 years	Post Closure Downgradient Sample Location
CFW-1 (Note 1)	• SCFA Parameters - annually for 5 years and every 2 years to 30 years	Required by Solid Waste Regulations
CFW-5 (Note 1)	• Tritium - annually for 4 years • SCFA Parameters - annually for 5 years and every 2 years to 30 years	Required by Solid Waste Regulations
CFW-6 (Note 1)	• Tritium - annually for 4 years • SCFA Parameters - annually for 5 years and every 2 years to 30 years	Required by Solid Waste Regulations
MW-101A	• Arsenic - annually for 4 years or until 2 consecutive rounds below < RC (Note 2)	Arsenic exceeded RC in December 2006, other metals below RCs
MW-101C	• Acetone - until 2 consecutive rounds below < RC (Note 2)	Acetone exceeded RC in March 2007
MW-102D	• Tritium • Gamma and Sr-90 - every 2 years for the first 4 years (years 2 and 4)	
MW-107A	• Arsenic - until 2 consecutive rounds below < RC (Note 2)	Arsenic exceeded RC in Dec 2006, other metals below RCs
MW-107C	• Tritium, Gamma and Sr-90 - annually for 4 years, every 2 years for 6 years and every 5 years for 20 years	Long-Term Sample Location
MW-107D	• Tritium - annually for 4 years • Gamma and Sr-90 - every 2 years for the first 4 years (years 2 and 4)	
MW-107E	• Tritium - annually for 4 years • Gamma and Sr-90 - every 2 years for the first 4 years (years 2 and 4)	
MW-107F	• Tritium - annually for 4 years • Gamma and Sr-90 - every 2 years for the first 4 years (years 2 and 4)	
MW-111C	• Arsenic - until 2 consecutive rounds below < RC (Note 2)	Arsenic exceeded RC in March 2007
SP-1 (Sherman Spring)	• Tritium, Gamma and Sr-90 - annually for 4 years, every 2 years for 6 years and every 5 years for 20 years • RCRA 8 Metals and VOCs - annually for 4 years, every 2 years for 6 years and every 5 years for 20 years	Post Closure Downgradient Sample Location

Note 1: Annual monitoring started in August 2006 after remediation was complete for the SCFA. All other monitoring started in March 2007.

Note 2: Samples will be taken at the same frequency as the post closure monitoring locations, but could be taken more frequently to achieve 2 consecutive samples below the Reportable Concentration (RC).

File

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WESTERN REGIONAL OFFICE
436 Dwight Street • Springfield, Massachusetts 01103 • (413) 784-1100 • FAX (413) 784-1149

ITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

STEPHEN R. PRITCHARD
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

October 7, 2005

Yankee Atomic Electric Company
49 Yankee Road
Rowe, MA 01367
Attention: Joseph Lynch, Site Closure Project Director

RE: Rowe-BWSC-RTN #1-13411
Phase II - Comprehensive Site Assessment Report
Interim Report - Review
310 CMR 40.0000
Yankee Nuclear Power Station
49 Yankee Road

Dear Mr. Lynch:

On January 28, 2005, the Massachusetts Department of Environmental Protection (the Department) received a Phase II - Comprehensive Site Assessment (Phase II) Report for the Yankee Nuclear Power Station (YNPS) in Rowe, MA, as required according to the Department's Bureau of Waste Site Cleanup (BWSC) regulations at 310 CMR 40.000 (the Massachusetts Contingency Plan, or the MCP). The Phase II Report was submitted on behalf of Yankee Atomic Electric Company (Yankee) by its consultant, Environmental Resources Management (ERM) of Boston, MA. Additional Phase II information was submitted by Yankee to the Department subsequent to the January 28, 2005 Report.

The Yankee plant was shut down in 1992 and is in the process of decommissioning, in accordance with Nuclear Regulatory Commission (NRC) regulations 10 CFR Part 50. As a part of decommissioning activities, the YNPS site is being assessed and remediated in accordance with applicable environmental regulations. All radiological issues associated with decommissioning fall under the authority of the NRC, the Massachusetts Department of Public Health's Radiation Control Program (the MADPH), the Department, and the United States Environmental Protection Agency (the EPA), as applicable. Any non-radiological contamination at the site falls under the authority of the Department and the EPA, as applicable. The Department has previously classified the YNPS site as a Tier 1B site, according to the BWSC regulations at 310 CMR 40.000.

The Phase II Report contains the results of assessment for both radiological and non-radiological parameters at the site (Stage I of the assessment), but does not contain a Risk Assessment (Stage II of the assessment).

Assessment and remedial actions (excavation, treatment and/or disposal) of soil and sediment are progressing concurrently with site decommissioning (dismantlement of structures, demolition and restoration). Yankee will complete cumulative (radiological and non-radiological) Human Health and Ecological Stage II Risk Assessments for the YNPS site, according to Department regulations and requirements, following cleanup actions and upon the Department's determination that the Phase II Report is complete and satisfactory. The Department considers the Report that was submitted to be an Interim Report, as additional assessment work is still required before the Risk Assessments may be performed (i.e. there are data gaps which need to be filled). As agreed to by the Department (due to the separate yet overlapping authorities of the regulatory agencies involved), the Phase II investigation and Report is being performed within the context of the MCP for the purposes of site closure, but not as a formal Release Tracking Number (RTN) for the entire site. The Department is issuing this Review of Report (the Review) for the Interim Phase II Report according to its authority under M.G.L. c. 21E and the regulations promulgated thereunder at 310 CMR 40.000.

I. ASSESSMENT SUMMARY

1. List of Reports Reviewed

In addition to the Phase II Report dated January 28, 2005, the Department has reviewed numerous other reports for the YNPS site, as part of the Phase II review process. It should be noted that these reports were generally prepared and submitted for other agency purposes (i.e. the NRC, MADPH or the EPA), so the Department has not issued specific reviews of these reports. Rather, the Department utilized these reports as reference documents to aid in review of the Phase II Report. These additional reports include the following:

- Decommissioning Environmental Report, dated December, 1993
- Analysis of Historical Aerial Photography for the YNPS Site, dated April, 1997;
- Technical Basis Document for Background Cs-137 in Soil and Sediment, dated March 3, 1998;
- Deerfield River Sediment Screening Study; dated October, 2000;
- Deerfield River Sediment Screening Study: Follow-Up Assessment; dated March 19, 2001;
- Site Ground Water Data Collection for YNPS Decommissioning, dated February 3, 2003;
- License Termination Plan, Revision 1, dated November, 2004;
- Evaluation of Cs-137 Concentration in Soils of Non-impacted and Reference Areas in the Vicinity of YNPS, dated December 17, 2003;
- Historical Site Assessment, dated January 21, 2004;
- Hydrogeologic Report of 2003 Supplemental Investigation, dated March 15, 2004;
- Baseline Environmental Report, dated April 30, 2004;
- YNPS Site Characterization Status Report, dated June 4, 2004;
- Interim Groundwater Monitoring Report – September 2004, dated September 27, 2004;
- An Overview of Sources of Radioactivity in the Environment of the YNPS and Associated Measurement and Control Programs, dated November, 2004;
- Environmental Risk Characterization Work Plan, dated January, 2005;
- Human Health Risk Assessment Work Plan, dated January, 2005;
- Ground and Well Water Monitoring Program, dated February, 2005;
- Subsurface Soil Scoping Sample Plan Close-out, dated February 2, 2005;
- Report of Continuing Hydrogeological Investigations in 2004, dated April 14, 2005;
- 2004 Annual Radiological Environmental Operating Report, dated April 26, 2005;

- Storm Drain & Septic Drain Sample Plan Close-out, dated May 6, 2005

Assessment and remedial activities, particularly radiological assessment and remedial activities being performed to support the Final Status Survey (FSS) of the License Termination Plan (LTP), are ongoing at the site at this time. This Interim Phase II Report review is based on the data contained within the January 28, 2005 Phase II Report and information from the additional reports cited above; the Department acknowledges that more recent data may have been collected by Yankee but is not addressed in this Report or review.

2. General Information

The YNPS site was divided into three land areas for the purposes of outlining the results of the Phase II Report, and these areas will be referenced in this review. These areas are:

- The Radiologically Controlled Area (RCA), which is the approximately 4-acre parcel immediately surrounding the former operating nuclear plant area;
- The Industrial Area, which is the approximately 13-acre parcel immediately surrounding the RCA, within the YNPS fenceline, which formerly contained industrial structures associated with the plant, also referred to in this Review as "the Facility"; and
- The Non-Industrial Area, which is that portion of YNPS property outside the fenced Industrial Area, containing woodlands, roadways, etc., which encompasses approximately 1,783 acres, including surface water bodies adjacent to and downstream from YNPS.

The Phase II Report contained the following information:

- A summary of previous assessment work, including analytical data (non-radiological and radiological) in tabular form;
- Updated basemaps, depicting the locations of soil sampling locations, groundwater monitoring wells, and surface water and sediment sampling locations, as well as exceedances of applicable standards;
- A brief description of site history;
- A description of site geology and hydrogeology;
- Groundwater contour maps of the Industrial Area and immediate vicinity;
- Updated maps of tritium concentrations in groundwater; and
- Recommendations for completing the cumulative radiological and non-radiological investigations at the site, in coordination with the completion of decommissioning activities.

3. Non-Radiological Assessment Results

Non-radiological analyses have been performed at the site on numerous samples of soil and groundwater, and to a lesser degree for sediments, surface water and fish. Non-radiological analyses at the site began in a limited fashion as part of regular monitoring in the late 1990s, and have been performed recently as part of Phase II assessment activities. Non-radiological analyses were also performed at the Southeast Construction Fill Area (SCFA) located at the site, as part of the Department's Solid Waste requirements for assessment and remedial activities at the SCFA. Non-radiological analyses at the site have included various portions of the following parameter list (i.e. not all samples in each medium have been analyzed for the whole list):

- Volatile organic compounds (VOCs) by EPA Method 8260;

- "Heavy" metals, including the thirteen Priority Pollutant metals, plus hexavalent chromium, and limited analyses of boron and lithium;
- Semi-volatile organic compounds (SVOCs) by EPA Method 8270;
- Polychlorinated biphenyls (PCBs) by EPA Method 8082;
- Total petroleum hydrocarbons (TPH);
- Extractable petroleum hydrocarbons/volatile petroleum hydrocarbons (EPH/VPH) by the Department's Office of Research & Standards method; and
- Dioxins and furans.

The assessment and remediation of PCBs at the YNPS is being performed according to the authority and oversight of the EPA, in accordance with EPA/TSCA requirements and approvals.

A. Soil:

A total of 23 soil samples were obtained from 10 background locations, to establish background conditions for soils. A total of 250 soil samples were obtained from various depths from 36 locations within the Industrial Area of the YNPS, and a total of 192 soil samples were obtained from the Non-Industrial Area of the YNPS. Analytical results were compared to the Department's BWSC Method 1 S-1 and S-2 soil standards, which are outlined in the MCP. Note – the classifications for soils at the site range from S-1/GW-1 (unrestricted), to S-2/GW-1 (accessibility restricted), to S3/GW-1 (inaccessible). It should also be noted that these Method 1standards were used for preliminary evaluation, comparison and planning purposes in guiding, assessment and remedial actions, but that once these actions are completed, the final Risk Assessment will be a Method 3 site-specific assessment to establish that site conditions are protective of human health, safety, public welfare and the environment into the future.

Exceedances of soil standards were found in the Industrial Area as follows:

- Sample SB-005, located near the eastern boundary of the Industrial Area, exceeded the S-1 standard of 200 milligrams/kilogram (mg/kg), or parts-per-million (ppm) for EPH, with a concentration of 226 mg/kg;
- Samples SB-020, SB-020F, SB-020G, SB023, & SB-074, located south of the former site trash incinerator (on the hillside between the Industrial Area and the Administration Building), exceeded the S-1 standard of 4 picograms/gram (parts-per-trillion, or ppt) for dioxin, with the highest dioxin level at 36.9 ppt;
- A number of soil samples (in areas either currently undergoing PCB remediation or in areas slated for PCB remediation), exceeded the S-2 standard for PCBs of 2 mg/kg (due to PCBs in paint chips), with the highest PCB level beneath the former Vapor Container (VC) at 240 mg/kg and the highest level within the Southeast Construction Fill Area (SCFA) at 12 mg/kg;
- Sample SB-056, along the site access roadway near the Industrial Area entrance, exceeded the S-2 standards for several polyaromatic hydrocarbons (PAHs), with a benzo(a)pyrene (BAP) level of 1,400 micrograms/kilogram (ug/kg), or parts-per-billion (ppb), versus the S-2 standard of 700 ug/kg;
- Sample SB-071, near a former fuel oil tank, exceeded the S-2 standards for several polyaromatic hydrocarbons (PAHs), with a BAP level of 1,000 ug/kg.

Exceedances of soil standards were found in the Non-Industrial Area as follows:

- Samples SB-157 and SB-158, in the Visitors Center parking lot, exceeded the S-1 standard of 200 mg/kg for TPH, with a concentration of 320 mg/kg;
- Nine samples in the vicinity of the former railroad bed on-site (near SB-105), just outside the northwest corner of the fenced Industrial Area, exceeded S-2 standards for up to seven different

PAHs, at levels up to 300 mg/kg total PAHs; and

- Nine samples in the area of the Old Shooting Range (near SB-135) exceeded the S-2 criteria of 600 mg/kg for lead, with lead levels up to 2,900 mg/kg (the contamination was limited to surficial soils).

B. Groundwater

The first groundwater monitoring well was drilled at the site in 1977, and a total of 65 monitoring wells have been installed at the site to date. A total of 27 new, intermediate-depth and deep monitoring wells were installed in 2003 and 2004 (with Department oversight), and 22 existing, shallow monitoring wells were properly abandoned (in accordance with Department guidelines) in 2004 and 2005 due to demolition activities as part of decommissioning. Currently, there are a total of 42 monitoring wells on-site, with 20 shallow (water-table) wells, 12 intermediate depth wells, and 10 deep, bedrock wells. A total of 58 monitoring wells, and the Facility potable supply well were sampled in 2003 and 2004.

Monitoring well drilling revealed the following information on the geology and hydrogeology of the site:

- The geologic stratigraphy of the site, from top to bottom, consists of up to 40 feet of stratified sand and gravel ("stratified drift") at the surface, underlain by up to 210 feet of glacial lodgement till, which is underlain by up to 170 feet of glaciolacustrine sediments, underlain by metamorphic bedrock (albite gneiss) of the Lower Cambrian Hoosac Formation;
- The entire sequence of unconsolidated ("overburden") materials above bedrock thickens considerably towards the Deerfield River, with a maximum depth to bedrock of 280 feet at monitoring well MW-103B;
- There are a number of thin, discrete, permeable sand layers ("stringers") within the relatively impermeable glacial till;
- Groundwater flow maps show that groundwater flow beneath the Industrial Area (shallow, intermediate and bedrock) is primarily towards the Deerfield River below Sherman Dam (towards the vicinity of Sherman Spring), with some indication of a minor amount of radial flow towards Sherman Reservoir.

Analytical results of groundwater samples were compared to the Department's groundwater standards for the site, as contained in the MCP. The Department has determined that the GW-1 groundwater classification applies for the entire site. Exceedances of groundwater standards were outlined as follows:

- Shallow well MW-5, bedrock well MW-107B, and intermediate well MW-107D, located in the immediate vicinity of the former Vapor Container, exceeded the GW-2 standard of 0.3 micrograms/liter (ug/l, or parts-per-billion) for PCBs, with the highest PCB level at 5.5 ug/l in well 107B (PCBs are attributed to paint chips washed into the flush-mounted wells by surface water);
- Intermediate well MW-105C, located just northwest of the former Turbine Building, exceeded the GW-2 standard of 1.0 ug/l for the VOC 1,1- dichloroethylene (1,1-DCE), with a 1,1-DCE level at 1.7 ug/l.
- Intermediate well MW-101C, located in the immediate vicinity of the former Vapor Container, contained a TPH level of up to 3,470 ug/l (above the GW-1 standard of 1,000 ug/l), and also contained the VOC acetone up to 14,000 ug/l, above the GW-1 standard of 3,000 ug/l.
- Intermediate well MW-102C, located in the immediate vicinity of the former Vapor Container, and bedrock well MW-103B, near the Industrial Area entrance, exceeded the GW-3 standard of 30 ug/l for lead, with lead levels of 37 ug/l and 100 ug/l, respectively;
- Bedrock well MW-108B, located near the former Screenwell House, exceeded the GW-2 standard of 30 ug/l for the SVOC bis-2-ethylhexylphthalate (bis-2) with a bis-2 level of 36 ug/l.

C. Surface Water

Eleven surface water samples were collected from five locations along Wheeler Brook, as part of the Solid Waste Comprehensive Site Assessment (CSA) investigation for the SCFA. Surface water samples were also collected in 2003 and 2004 from: Sherman Spring; four locations in Sherman Reservoir near the East Storm Drain outfall; one location in Sherman Reservoir near the Facility discharge structure; one location at the beginning of the West Storm Drain Ditch, and two locations in the Deerfield River at the outfall of the West Storm Drain Ditch.

Surface water results were not provided in the Phase II Report (the Department previously received and separately reviewed the non-radiological surface water analyses as part of the CSA for the SCFA).

D. Sediment

Sediment samples were collected in 2003 and/or 2004 from the following locations: 6 background samples from the northern portion of Sherman Reservoir; a total of 44 samples from 36 locations in Sherman Reservoir near the Facility; 19 samples from the Deerfield River just below Sherman Dam (primarily near the outfall of the West Storm Drain Ditch); 11 samples from the West Storm Drain Ditch; and 5 locations on Wheeler Brook (as part of the Solid Waste SCFA CSA). Analytical results of sediment samples were compared (maximum to maximum) with the background samples, as background sediments contain naturally-occurring inorganics and potentially other contaminants. The background samples were non-detectable (ND) for PCBs and SVOCs, ND for most VOCs (except for low levels of 1,1-DCE, 2-butanone, acetone and toluene, apparently due to laboratory contamination) and contained low levels of TPH. Although not performed by ERM, contaminant levels can also be compared to the Department's Threshold Effects Concentrations (TEC) levels for sediments.

The Phase II Report states that the following samples were greater than three times the background samples, for the following parameters:

- Samples SD-008 and SD-009, in Sherman Reservoir near the Discharge Structure, contained copper at least five times the background level;
- Samples SD-011 and SD-012, in Sherman Reservoir near the Intake Structure, contained lead at least five times and three times the background level, respectively;
- Sample SD-041 in Sherman Reservoir north of the facility (700 feet from shore), contained TPH at 250 mg/kg, at least three times the background level;
- Sample SD-302 and SD-303 in the West Storm Drain Ditch contained total SVOCs at least three times and five times the background level, respectively; and
- Sample SD-304 in the West Storm Drain Ditch contained lead at least three times the background level.

The Department's sediment screening guideline for PCBs in sediments is 60 ug/kg. PCBs were detected in sediments as follows:

- 11 of the 44 samples in Sherman Reservoir had detectable PCBs, ranging from 47 ug/kg to 980 ug/kg;
- 10 of the 19 samples from the Deerfield River (at the West Storm Drain Ditch outfall) had detectable PCBs, ranging from 15 ug/kg to 1,020 ug/kg;
- 8 of the 11 samples from the West Storm Drain Ditch had detectable PCBs, ranging from 72 ug/kg to 950 ug/kg; and
- All 5 samples from Wheeler Brook were ND for PCBs.

The areas of PCB detection in Sherman Reservoir and the West Storm Drain Ditch are the areas of completed, ongoing, and/or planned PCB remediation in accordance with EPA TSCA requirements.

E. Fish

Fish were collected and analyzed for PCBs as part of Phase II assessment work at three locations – near the East Storm Drain Outfall in Sherman Reservoir; the northern end of Sherman Reservoir, and Harriman Reservoir.

The Phase II Report states that PCB levels were detected in the fish samples from Sherman Reservoir near the East Storm Drain. The Phase II Report states that "...the levels...do not pose a risk to consumers of recreationally-caught fish.".

4. Radiological Assessment Results

Radiological assessment for the YNPS has been performed by Yankee as part of various programs. Regularly scheduled monitoring was performed on-site and off-site according to the Radiological Environmental Monitoring Program (REMP) for the YNPS, and radiological monitoring was also performed on-site during the operation of the plant for various reasons, outside the scope of the REMP program. As part of the decommissioning of the plant, considerable radiological assessment of the YNPS facility and site has been performed, and is ongoing at the present time, to satisfy the NRC requirements for License Termination, as demonstrated by the Final Status Survey (FSS).

A. REMP MONITORING

The REMP program was initiated at the site in 1958, prior to startup of the YNPS, and has continued to the present. The REMP program has been conducted to satisfy NRC regulations to continuously monitor the areas surrounding the YNPS for possible radiological releases to the environment, and has consisted of the following:

- Radiological monitoring of air, soil, groundwater, surface water, sediment, fish, food crops, milk and direct radiation at various locations at or surrounding the site;
- Analysis of REMP samples by gamma spectroscopy, including Ag-108m, Ag-110m, Ba/La-140, Ce-141, Ce-144, Co-57, Co-58, Co-60, Cr-51, Cs-134, Cs-137, Fe-59, I-131, Mn-54, Nb-95, Ru-103, Ru-106, Sb-124, Sb-125, Se-75, Zn-65, and Zr-95. The Phase II Report states that any other gamma-emitting radionuclides would be detected and reported by these analyses, if they were present. In addition to the gamma spectroscopy, REMP samples have also been routinely analyzed for the presence of gross beta and tritium (as quarterly analysis of the composite of monthly samples of water from the Deerfield River). Tritium (H-3) is a weak beta emitter and is a Hard-To Detect (HTD) radionuclide;
- Air sampling has been performed at 2 background and 5 other "indicator", i.e. downwind, locations at and around the YNPS site, for both airborne particulates and gases, on a bi-weekly (composited quarterly) basis. The Phase II Report states that "No Yankee plant-related radioactivity was detected on either the particulate filters or the charcoal cartridges in the last twenty years". Charcoal cartridges were used during plant operation (and for a short time after shutdown) for radioiodine sampling;
- Soil sampling has been performed at the air sampling locations on 4 occasions since 1978, and numerous soil samples were also analyzed for Cs-137 in the "Evaluation of Cs-137 Concentration

in Soils of Non-impacted and Reference Areas in the Vicinity of YNPS" study, dated December 17, 2003. The Phase II Report states that review of this data indicates the presence of only naturally-occurring K-40 and Th-232 and Cs-137 from weapons testing fallout;

- Groundwater samples have been collected from the Facility's potable water well and from Sherman Spring at the site (which flows overland to the Deerfield River), on an annual basis. The Phase II Report states that no gamma-emitting radionuclides were found in either location. Tritium was detected in Sherman Spring beginning in 1963, with a maximum concentration of approximately 2 million picocuries/liter (pCi/l) in 1965. Tritium levels in Sherman Spring have declined steadily since at least 1983, with levels in 2004 ranging from non-detectable (ND) to 890 pCi/l.
- Tritium in Sherman Spring is attributed to discharge (to the spring and the river) of the tritium-contaminated groundwater plume at the site, which originated from leak(s) in the Spent Fuel Pool/Ion Exchange Pit Complex (SFP/IXP Complex). Tritium concentrations were measured in the water within the SFP/IXP Complex in 1966, at a concentration of 5.4 million pCi/l. There are no specific drinking water, surface water, or groundwater standards established in Massachusetts for tritium; the EPA drinking water standard (MCL) for tritium is 20,000 pCi/l;
- Surface water samples have been collected at a background location upriver at Harriman Reservoir, at Sherman Reservoir near the Facility Discharge Structure, and at Bear Swamp Reservoir (4 miles downstream from the plant), on both a continuous (composited monthly) and monthly grab-sampling basis. The Phase II Report states that no gamma-emitting radionuclides were found in surface water at any of the locations. Tritium was detected at the Bear Swamp location from at least 1985 to 1991, at concentrations ranging from approximately 300 pCi/l to approximately 600 pCi/l, versus ND to approximately 200 pCi/l at the upriver Harriman Reservoir location (background levels of tritium are present in rainwater, primarily from natural sources but with some residual component from weapons testing). As noted above, there is no surface water standard for tritium; the EPA MCL for tritium is 20,000 pCi/l;
- Sediment samples were collected at a background location upriver at Harriman Reservoir, at apparently 3 locations in Sherman Reservoir (including near the Facility Discharge Structure), and at the Deerfield River #4 Station dam (the #4 Dam, 22.5 miles downstream from the plant), on a semi-annual basis. The Phase II Report states that, due to previous licensed liquid releases, low levels of Co-60 and Cs-137 were found in some Sherman Reservoir sediments near the Facility's Circulating Water outfall. Yankee states that: "these low levels were most likely due to the increased amount of organic material in the sediments of that area"...; "the impacts are localized to the south end of the reservoir and the areas in the immediate proximity of the storm drain outlets"...; "samples from other areas of the Sherman Reservoir and the Deerfield River contained no detectable amounts of plant-related radioactivity."...; and "Sediment samples in a follow-up study were also analyzed for Sr-90. Although detected, the results of Sr-90 were consistent with background from fallout associated with nuclear weapons testing.". The "2004 Annual Radiological Environmental Operating Report, dated April 26, 2005" states that in 2004, Cs-137 levels were approximately 7 times higher than the background levels in samples from station SE-91 in Sherman Reservoir, near the plant, "attributable in part to plant licensed discharges".
- The "Deerfield River Sediment Screening Study; dated October, 2000" contains data showing that Co-60 was present in sediment samples from 1971 (earliest data reported) until 1976 at an average of 1.40 pCi/g behind Sherman Dam, 0.61 pCi/g behind the #5 Dam (Monroe Bridge), and 0.19 pCi/g behind the #4 Dam, versus non-detectable (ND) levels at the Harriman Reservoir background location. Cs-137 levels were elevated during this time period behind Sherman Dam, but apparently not downriver.
- The October, 2000 Report shows that from 1979 to 1994, Co-60 levels averaged 0.12 pCi/g behind Sherman Dam, 0.07 pCi/g behind the #5 Dam, and 0.09 pCi/g behind the #4 Dam, versus ND levels at the Harriman Reservoir background location.

- Fish were collected semi-annually for sampling at a background location upriver at Harriman Reservoir, and in Sherman Reservoir. The 2004 REMP Report states that "No plant-related gamma-emmitting radionuclides were detected in 2004 fish samples". However, the data presented in the Phase II Report indicates that Cs-137 levels in fish from the Sherman Reservoir location were higher than those from the Harriman Reservoir background location in 10 out of the last 14 years. Yankee states that variations in Cs-137 levels in fish may also be due to species differentiation and eating habits (i.e. bottom feeders tend to accumulate more Cs-137 and there may be a greater proportion of bottom feeders near the Facility than at the Harriman Reservoir background location);
- Food crops (fruit and leafy vegetables) were collected annually from 1 to 4 indicator locations in the area of the YNPS, with one background location at Williamstown, MA. Maple syrup was also collected annually from one or more locations in the area of YNPS. The Phase II Report states that no plant-related radionuclides were detected;
- Milk sampling was performed until 1999 at two indicator dairy farms within 5 miles of YNPS, and at one control dairy farm location. Sampling was performed monthly from June to November of each year (grazing season), however sampling was discontinued after 1999 as no dairy farms remained in the area to sample. The Phase II Report states that levels of Sr-90 and Cs-137 found in both the indicator and control locations are typical of weapons testing fallout values; and
- Direct radiation measurements have been monitored at 33 locations around YNPS, using dosimeters, which are collected quarterly for readout. The 2004 REMP Report states that "... there was no significant overall increase in direct radiation exposure rates in the plant vicinity beyond the industrial area of the plant.".

B. FINAL STATUS SURVEY MONITORING

In order to satisfy NRC requirements for the FSS, numerous soil samples and a limited number of additional sediment samples have been obtained and analyzed for radiological analyses by gamma spectroscopy, to at a minimum quantify the radionuclides Ag-108m, Cs-134, Cs-137, Co-60, Eu-152, Eu-154, Eu-155, Nb-94, and Sb-125. As outlined in FSS requirements, a minimum of 5% of soil samples have also been analyzed for the Hard-To-Detect (HTD) radionuclides H-3 (tritium), Am-241, C-14, Cm-243/244, Fe-55, Ni-63, Pu-238, Pu-239/240, Pu-241, Sr-90, and Tc-99, all groundwater samples have been analyzed for tritium, and a majority of the groundwater samples have also been analyzed for gross alpha, gross beta, and the gamma spectroscopy and HTD radionuclides.

Yankee states that the FSS list of radionuclides is analyzed as part of the entire gamma spectroscopy library (with the exception of HTD radionuclides). If any other radionuclides were detected by gamma spectroscopy above minimum detectable activities (MDAs), they would have been reported as part of these analyses, however Yankee reports that no such additional plant-related radionuclides have been detected by gamma ray spectroscopy above MDAs, in any media at the YNPS site. Yankee also states that the REMP analysis is more simplified than the FSS and served as an indicator of any radionuclides which may have resulted from plant operation.

ERM and Yankee state that the Derived Concentration Guideline Levels (DCGLs), or radiological cleanup levels, established at the site for all media will meet the following:

- The NRC LTP/FSS standard of no more than 25 millirem/year (mrem/yr) total radiation dose above background, or Total Effective Dose Equivalent (TEDE) attributable to the site; and
- The MADPH standard of no more than 10 mrem/yr TEDE attributable to the site.

Yankee states that compliance with the Department's Risk Assessment standards for cumulative risk

(radiological and non-radiological) of no more than 1 x 10^{-5} Excess Lifetime Cancer Risk (ELCR) and no more than a Hazard Index (HI) of 1 will be demonstrated by the following:

- Calculations which include the data collected during the FSS; and
- As required by the Department's July 29, 2005 Beneficial Use Determination (BUD) permit for subsurface structures at the site, the incorporation of a three-foot layer of clean soil over the central portion of the YNPS site (the 3.5 acre BUD Fill Area).

1. Soil:

More than 1,500 samples have been obtained from the RCA and the remainder of the Industrial Area, and numerous soil samples have been obtained from the Non-Industrial Area. Decommissioning activities within the Industrial area have resulted in the proper removal of substantial volumes of soil off-site, as radiological waste, according to NRC requirements. Confirmatory soil samples are being obtained after remedial activities are completed. Samples for the FSS are taken to demonstrate that the established soil DCGLs are being met to comply with the NRC and MADPH standards.

2. Groundwater

All 58 monitoring wells were sampled in 2003 and 2004 for gross beta, gross alpha and tritium. Additional analyses for specific wells were performed in accordance with site procedure AP-8601, Ground and Well Water Monitoring for the Yankee Nuclear Power Station Site, including gamma spectroscopy and Hard-to-Detect radionuclides. The Phase II Report states that "Tritium continues to be the only plant-related radionuclide detected in groundwater at YNPS". The source of the tritium plume in groundwater at the site appears to have been the leak(s) in the Spent Fuel Pool/Ion Exchange Pit complex (SFP/IXP complex). The Phase II Report and 2004 Hydrogeological Report include the following information:

- The shallow tritium plume extends laterally from the SFP/IXP complex towards Sherman Spring and the Deerfield River;
- The deeper tritium plume extends from the base of the SFP/IXP complex into the sand layers within the glacial till and the glaciolacustrine unit, to the top of bedrock (and into bedrock in at least one well), and is more limited laterally, extending from the SFP/IXP complex a shorter distance towards Sherman Reservoir;
- Detectable tritium levels in groundwater in 2004 range from a maximum of 41,800 pCi/l in the vicinity of the SFP/IXP complex to 620 pCi/l in well MW-106C, between Sherman Spring and the river;
- The highest levels of tritium in groundwater at the site in 2004 were found in well MW-107C (near the SFP/IXP complex) at a depth of approximately 30 feet, with a maximum concentration of 41,800 pCi/l;
- The highest levels of tritium at depth in 2004, in glaciolacustrine sands just above the top of bedrock, were found in well MW-107D (near the SFP/IXP complex) at a depth of approximately 70 feet, with a maximum concentration of 12,760 pCi/l; and
- Tritium was detected in 1 of the 10 bedrock monitoring wells on-site in 2004, at well MW-105C, with a maximum concentration of 5,280 pCi/l.

Yankee has stated that groundwater being dewatered from excavations during decommissioning activities, specifically at the base of the SFP/IXP complex, will be collected, sampled and discharged in accordance with the YNPS NPDES permit and NRC protocol, and that regularly scheduled groundwater sampling will resume in the Fall of 2005, or when demolition and site re-grading activities are completed. Yankee has proposed to install two new, monitoring well clusters at locations within and adjacent to the SFP/IXP complex, once remedial work is completed in that area.

3. Sediment

In addition to the REMP sediment monitoring program, Yankee performed additional sediment sampling at Sherman Reservoir and the Deerfield River (between Sherman Dam and the Monroe Bridge dam) as part of the 2000 and 2001 sediment studies. The Phase II Report states that the studies mirrored the results of REMP sediment monitoring, with no plant-related radioactivity found in the Deerfield River, and low levels of Cs-137 and Co-60 found in sediments in Sherman Reservoir near the plant.

II. DEPARTMENT DETERMINATIONS

Personnel of the Department have reviewed the Phase II Report for the YNPS in accordance with MGL c. 21E, and the regulations promulgated thereunder at 310 CMR 40.0000, i.e. the Massachusetts Contingency Plan (the MCP), and the Department's publication Standard References for Monitoring Wells (WSC-310-91). The Department has determined that the Phase II Report is acceptable in accordance with MGL c. 21E and 310 CMR 40.0000, subject to the conditions outlined below.

1. The Department considers the Phase II Report that was submitted to be an Interim Report, as additional assessment work is still required before the Phase II Report can be considered complete and the Risk Assessment may be performed. The assessment work outlined below at Conditions 2 through 12 shall be completed, and the results of this additional assessment work shall be included in the Final Phase II Report and Final Risk Assessment Scope-of-Work, which shall be submitted to the Department by July 15, 2006, as outlined at Condition 14 of this Review.

2. The additional environmental monitoring work required for the Final Phase II Report (as outlined in this review) shall be analyzed for the following parameters:

   A. Non-radiological:

      1. All VOC analyses shall be performed by EPA Method 8260, which shall specifically include methyl ethyl ketone, methyl isobutyl ketone, and acetone. Tentatively identified compounds (TICs) will be reported in a minimum of 5% of the VOC samples and will be quantified as required by CAM-WSC-II-A, Quality Assurance and Quality Control Requirements for SW-846B Method 8260B, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) for the Massachusetts Contingency Plan (MCP);
      2. All soil samples shall be analyzed for VOCs by EPA Method 8260, and for the thirteen Priority Pollutant metals;
      3. All groundwater samples shall be analyzed for VOCs by EPA Method 8260, and for the thirteen Priority Pollutant metals (plus boron);
      4. All surface water samples shall be analyzed for the thirteen Priority Pollutant metals plus lithium and boron;
      5. All sediment samples shall also be analyzed for the thirteen Priority Pollutant metals plus lithium, boron and total uranium;
      6. In any areas (soil, groundwater, surface water and sediment) where previous data indicates levels of oil and hazardous materials (OHM) greater than applicable reportable concentrations or substantially elevated relative to background for sediment and surface

water, and confirmatory sampling (showing reduction to acceptable risk levels as outlined in Condition 5 of this review) following remediation has not yet been performed, the following analyses shall also be performed:

A. Semi-volatile organic compounds (SVOCs) by EPA Method 8270;
B. Polychlorinated biphenyls (PCBs) by EPA Method 8082; and
C. Extractable petroleum hydrocarbons/volatile petroleum hydrocarbons (EPH/VPH) by the Department's Office of Research & Standards method.

B. Radiological:

1. Radiological analyses by gamma spectroscopy, as required below at Conditions 2.B.2 through 2.B.6, shall at a minimum quantify the radionuclides Ag-108m, Cs-134, Cs-137, Co-60, Eu-152, Eu-154, Eu-155, Nb-94, and Sb-125. In addition, any other plant-related radionuclides detected by gamma spectroscopy above MDAs shall be reported as part of these analyses;
2. All soil samples shall be analyzed for the presence of radionuclides by gamma spectroscopy, and, as outlined in the LTP requirements, a minimum of 5% of these samples shall also be analyzed for the Hard-To-Detect (HTD) radionuclides H-3 (tritium), Am-241, C-14, Cm-243/244, Fe-55, Ni-63, Pu-238, Pu-239/240, Pu-241, Sr-90, and Tc-99;
3. All groundwater samples shall be analyzed in accordance with site procedure AP-8601, Ground and Well Water Monitoring for the Yankee Nuclear Power Station Site, which includes analysis for the HTD radionuclide tritium and gross alpha/gross beta for all samples, and gamma spectroscopy analysis plus analysis for the remaining HTD radionuclides Am-241, C-14, Cm-243/244, Fe-55, Ni-63, Pu-238, Pu-239/240, Pu-241, Sr-90 and Tc-99 in any samples which contain elevated levels of tritium;
4. All surface water samples shall be analyzed for the presence of radionuclides by gamma spectroscopy and also for the HTD radionuclide tritium;
5. All sediment samples shall be analyzed for the presence of radionuclides by gamma spectroscopy, and a minimum of one (1) sediment sample from each sediment location shall also be analyzed for the HTD radionuclides tritium, Am-241, C-14, Cm-243/244, Fe-55, Ni-63, Pu-238, Pu-239/240, Pu-241, Sr-90, and Tc-99; and
6. All fish samples shall be analyzed for the presence of radionuclides by gamma spectroscopy, and also for the HTD radionuclides tritium, Am-241, C-14, Cm-243/244, Fe-55, Ni-63, Pu-238, Pu-239/240, Pu-241, Sr-90, and Tc-99.

3. Quality Assurance/Quality Control Plan (QA/QC) protocols for non-radiological environmental monitoring should follow those outlined in the Quality Assurance Project Plan (QAPP) for Site Closure, Yankee Nuclear Power Station (YNPS), Rowe, Massachusetts, QAPP YNPS-001 (Revision 2, August 6, 2004, with Revision 3 update pending in September 2005). This follows the requirements of the current revision of USEPA SW-846 methods (USEPA, Region I, 1999) and, where applicable and appropriate, according to the procedures and methods defined in MA DEP's *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Response Actions for the Massachusetts Contingency Plan (MCP), Waste-Site Cleanup Compendium of Analytical Methods* (WSC-CAM) VIIA (MA DEP, May 21, 2004). Radiological monitoring shall follow applicable NRC, EPA, and MADPH protocol.

4. All radiological analytical data shall be reported as appropriate in the Phase II Report as activity concentrations, not as modeled doses, i.e. pCi/l or pCi/g, not as mrem/yr or mrem/hr, unless the analysis result is defined as mrem (i.e., dosimeter results).

5. Ongoing assessment activities shall be planned and completed in order to be able to document that the following remedial standards will be met for the site: The NRC LTP/FSS standard of no more than 25 mrem/yr total radiation dose (above background) attributable to the site; the MADPH standard of no more than 10 mrem/yr total radiation dose (above background) attributable to the site; and the Department's Risk Assessment standards for cumulative risk attributable to the site (radiological and non-radiological) of no more than 1×10^{-5} Excess Lifetime Cancer Risk (ELCR) and no more than a Hazard Index (HI) of 1. As noted previously, the cumulative Risk Assessment will include the data collected during the FSS, and will incorporate the completion of a three-foot layer of clean soil over the BUD Fill Area.

6. Yankee shall demonstrate in the Final Phase II Report that sufficient soil samples have been obtained and analyzed for the appropriate soil parameters as outlined at Condition 2 of this Review, at the locations outlined below (the Department acknowledges that a considerable amount of soil sampling has already been performed for non-radiological parameters, and that extensive radiological soil surveys and sampling have been, or are being, performed to complete the FSS):

   A. Sufficient background sample locations;
   B. Sufficient samples to fully characterize the scope and extent of all of the previously detected areas of non-radiological soil criteria exceedances outlined in Sec I.3.A of the Assessment Summary of this Review, and to comply with EPA requirements for PCB assessment and remediation; and
   C. Sufficient samples to fully characterize the scope and extent of radiological contaminants in soil at the site, including, at a minimum, the following:
      - Soil sampling at the former SFP/IXP Complex and any other potential sources of radiological contamination at the site, at depths sufficient to define the lower limits of such soil contamination;
      - Soil sampling in the new Facility septic system leach field, and the new and old Administration Building septic system leach field; and
      - Soil sampling at the base of all excavations or excavated areas, sufficient to ensure that soil levels meet the remedial cleanup standards for the site, **prior to any backfilling or regrading of those areas**; and
   D. Sufficient samples to complete the cumulative Risk Assessment for the site.

7. New groundwater monitoring well clusters (triplets) shall be installed by May 1, 2006 at the proposed locations near the SFP/IXP complex (MW-110 & MW-111), consisting of shallow, intermediate and deep wells. In addition, a shallow and intermediate-depth monitoring well cluster shall be installed by the same deadline along the downgradient edge of the old Facility septic system leach field.

8. All remaining site groundwater monitoring wells, the new monitoring wells required in Condition 7 of this Review, and the former Visitors' Center potable well (radiological analyses only), shall be sampled and analyzed during a minimum of one additional monitoring round as part of the Phase II Investigation for all of the groundwater parameters outlined at Condition 2 of this Review, and the analytical results shall be included as part of the Final Phase II Report. All wells which were temporarily closed during decommissioning activities shall be rehabilitated, sampled and resurveyed as part of the Phase II Investigation, if possible. Yankee shall identify all wells which remain closed as part of decommissioning activities, and any additional wells which may be required to be abandoned. The results of the last two years of sampling and analysis of the Facility potable well shall be included in the Final Phase II Report.

9. The groundwater monitoring wells required in Condition 7 shall be installed in accordance with the procedures outlined in the Department's publication Standard References for Monitoring Wells (WSC-310-91), and all groundwater sampling shall be performed in accordance with the USEPA publication Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated July 30, 1996.

10. Groundwater elevations shall be measured at all site monitoring wells during at least one additional monitoring round as part of the Phase II Investigation, and a groundwater contour map shall be prepared from this data. Groundwater elevation data from the new monitoring wells shall be included in the groundwater contour map, if available.

11. Surface water samples and sediment samples (as co-located samples, unless otherwise specified) shall be obtained during one additional monitoring round as part of the Phase II Investigation from the following sampling locations, and shall be analyzed for the appropriate surface water and sediment parameters as outlined at Condition 2 of this Review (unless otherwise modified by this Condition).

    A. Background: A minimum of 3 additional surface water and 6 additional sediment samples located in the Deerfield River, above the Hairiman Station outfall to Sherman Reservoir;
    B. Sherman Reservoir: Sufficient samples to fully characterize the nature and extent of any plant-related contaminants, to include at a minimum characterization of:
        1. elevated levels of metals near the Intake Structure, Discharge Structure, and the East Storm Drain Ditch Outfall (a minimum of 1 surface water and 4 sediment samples at each of these three areas); and
        2. elevated levels of radionuclides in the vicinity of the Facility (number of additional samples to be in accordance with FSS sampling requirements for that area);
    C. Surface springs: One location along the true, seep line of Sherman Spring; one location at the historic "Sherman Spring" sampling site; and one location at the seep area of the "second spring" south of Sherman Spring. If any of these locations cannot be sampled because they are dry during the Fall of 2005, they shall be sampled in the Spring of 2006;
    D. Deerfield River below Sherman Dam: A minimum of three sediment samples shall be collected from each of the following river sediment sampling locations, which shall be analyzed separately, not as a composite sample (one surface water sample shall be collected at each of the following river sediment sampling locations):
        1. One location at the outfall location of Sherman Spring, in the river;
        2. One location at the outfall location of the "second spring" in the river;
        3. One additional location in the river between Sherman Dam and the West Storm Drain Ditch;
        4. Two locations in the river at the West Storm Drain Ditch outfall to the river (these samples shall also specifically include PCB analyses);
        5. Three additional locations between the West Storm Drain Ditch and the Monroe Bridge Dam, upstream of the former, capped Monroe Sludge Landfill (these samples shall also specifically include PCB analyses);
        6. One location behind the Bear Swamp (Fyfe Brook) dam (for radiological analyses only); and
        7. One location behind the No. 4 dam in Charlemont (for radiological analyses only).

12. Fish sampling shall be performed during one additional monitoring round as part of the Phase II Investigation using the same protocol as that used in the REMP fish sampling program. Fish samples shall be obtained at the following sampling locations, and shall be analyzed for the radiological

parameters as outlined at Condition 2.B.6 of this Review:

A. The historical background REMP fish sampling location at Harriman Reservoir;
B. A location near the facility at the southern end of Sherman Reservoir; and
C. A location in the Deerfield River, between the outfall of the West Storm Drain Ditch and the Monroe Bridge Dam.

The Department reserves the right to require additional fish (and possibly other biota) sampling of Sherman Reservoir and/or the Deerfield River, after the results of the Phase II surface water, sediment and fish sampling are received from Yankee.

13. Yankee shall comply with all other applicable local, state and federal regulations and requirements, including those of the NRC, EPA, MADPH, and the Rowe Conservation Commission.

14. By July 15, 2006, Yankee shall submit to the Department the Final Phase II Assessment Report for the YNPS site, which shall include the following:

(A) Updated basemap(s), depicting the locations of all: existing and abandoned groundwater monitoring wells; soil, surface water, sediment and fish/biota sampling locations, and geologic cross-sections;
(B) Tabular summaries of all analytical data obtained as part of the Phase II Assessment, including both radiological and non-radiological data, detection limits for all parameters, and appropriate standards or criteria for each media shown (for reference purposes);
(C) A groundwater contour map;
(D) Contour maps of the top of bedrock, top of the glaciolacustrine unit, and top of the glacial till unit;
(E) Contour maps of gross alpha and gross beta activity in site groundwater monitoring wells for at least one previous (2003 or 2004) monitoring round;
(F) All historic summaries (or data), if available, of REMP monitoring performed prior to 1971; the ASTM Phase I BWSC (21E) assessment report for the Non-Industrial Area of the Facility; and the actual PCB analytical data for the fish sampling previously performed; and
(G) A Final Scope-of-Work (SOW) to complete a cumulative (radiological and non-radiological) Risk Assessment in accordance with the requirements at 310 CMR 40.0000.

15. The cumulative (radiological and non-radiological) Risk Assessment shall be completed in accordance with Department requirements and submitted to the Department by no later than October 1, 2006. Upon review of the Risk Assessment, the Department will determine the extent of additional remedial activities which may be required at the site, and the Department will establish the long-term monitoring requirements for the site.

16. Appropriate Health & Safety (H&S) measures shall be utilized for all assessment and remedial work at the YNPS.

The Department reserves the right to require additional investigatory or remedial work at the YNPS site, if continued monitoring results indicate such a need. If you should have any questions or comments regarding this correspondence please contact Larry Hanson (#413-755-2287) or David Howland (#413-755-2280) of this office.

Sincerely,

Michael J. Gorski
Regional Director

Yankeeph2revB605

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Rowe Board of Selectmen
Rowe Board of Health
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