STATE OF VERMONT
PUBLIC SERVICE BOARD

Investigation into (1) whether Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc., (collectively, "Entergy VY"), should be required to cease operations at the Vermont Yankee Nuclear Power Station, or take other ameliorative actions, pending completion of repairs to stop releases of radionuclides, radioactive materials, and, potentially, other non-radioactive materials into the environment; (2) whether good cause exists to modify or revoke the 30 V.S.A. § 231 Certificate of Public Good issued to Entergy VY; and (3) whether any penalties should be imposed on Entergy VY for any identified violations of Vermont statutes or Board orders related to the releases	)	Docket No. 7600

SWORN AFFIDAVIT OF JEFFERY A. HARDY

Jeffery A. Hardy, being duly sworn, states as follows:

1. My name is Jeffery A. Hardy.

2. I am employed by Entergy Nuclear Operations, Inc. ("ENO"), at the Vermont Yankee Nuclear Power Station (the "VY Station") as Chemistry Manager.

3. In my capacity as Chemistry Manager, I have personal knowledge regarding (i) the groundwater-monitoring program at the VY Station, (ii) the recent detection of low levels of tritium in groundwater wells GZ-24 and also GZ-6 at the site, (iii) the efforts of ENO and Entergy Nuclear Vermont Yankee, LLC ("ENVY" and, together with ENO, "Entergy VY") to identify the source of the tritium found in these monitoring wells and (iv) Entergy VY's interactions with government regulators, the Vermont Department of Public Service ("DPS"), the Vermont Department of Health ("DOH") and the U.S. Nuclear Regulatory Commission

("NRC") to identify and address the source of the tritium that has been detected in these wells.

The Genesis and Purpose of Groundwater-Monitoring Well GZ-24

4. In November 2010, Entergy installed groundwater monitoring well GZ-24 to serve as a sentinel monitoring well for the systems, structures and components ("SSCs")[1] located near the RadWaste Building. As a sentinel monitoring well, GZ-24 was intended to quickly detect any leakage that could occur from the SSCs located in its vicinity.

5. GZ-24 was sited as a sentinel monitoring well based on a risk-ranking assessment of SSCs at the VY Station. This risk-ranking assessment was conducted in 2010 as part of the Entergy Fleet Radiological Piping Project ("EFRPP"). The EFRPP team worked with Entergy VY site engineers to identify all SSCs located at the VY Station that: (i) carried radionuclides and (ii) had a potential leak pathway to the environment.

6. Entergy VY decided to schedule mitigation of the first five lines prioritized by the risk-ranking assessment at its earliest opportunity – during its next refueling outage, as testified to during the hearings held in this docket. Four of the five pipelines scheduled for mitigation during the next refueling outage are located in the vicinity of the RadWaste Building. Accordingly, Entergy VY decided to place GZ-24 near the RadWaste Building to quickly detect any leakage that could

[1] The term SSC is a broad term that includes pipes, sumps, tanks and related components.

occur from the four pipelines before the scheduled mitigation in order to allow Entergy VY the ability to address such a leak in a timely fashion.

Detectable Levels of Tritium in GZ-24

7. Starting January 15, 2011, Entergy VY technicians received an indication of elevated tritium levels at GZ-24, based on samples taken starting December 28, 2010.[2] The Entergy VY technicians confirmed the GZ-24 sample results on January 16, 2011, and notified Entergy VY site management. Once Entergy VY site management reviewed and concurred with the results, senior Entergy management was notified on January 18, 2011. Stakeholders were notified of the tritium readings on January 21, 2011.

8. Previous samples collected from GZ-24, collected on a roughly weekly sampling schedule through December 20, 2010, had not shown any detectable levels of tritium.

9. Samples taken from December 28, 2010, to the present have shown varying levels of activity, ranging from 912 picocuries of tritium per liter of water (or "pci/L") to 9,540 pCi/L. All of the activity levels observed so far are beneath any regulatory reporting requirements.

[2] As explained in a letter to Commissioner Miller of the Vermont Department of Public Service dated January 26, 2011 from T. Michael Twomey of Entergy, a copy of which was filed in this docket on the same date, the delay in test results until January 15, 2011 was due to an equipment failure. On December 28, 2010, technicians at Entergy VY discovered that the machine used to analyze well samples was in need of repair. The machine was repaired in January 11, 2011, and Entergy VY technicians resumed testing of all collected samples.

Entergy VY's Investigation and Identification of the Source

10. Although these elevated levels of tritium in GZ-24 do not represent a threat to nuclear safety or to the health and safety of the public, Entergy VY has marshaled site and ENO fleet resources to identify the source of the elevated readings. It is important to note, that as samples from all of the groundwater monitoring wells on site are tested and analyzed, Entergy VY's understanding of the site's hydrology continues to be refined. Accordingly, Entergy VY has not ruled out the possibility that the elevated levels of tritium could be due to the leak from the AOG Pipe Tunnel previously identified in January 2010. In an abundance of caution, however, Entergy VY, as further described below, established an investigation team to systematically and methodically indentify the source of the elevated levels of tritium in groundwater monitoring well GZ-24.

11. Accordingly, Entergy VY has entered this incident into its Corrective Action Program and assigned it to the highest priority level, which will require a thorough Root Cause Analysis of the elevated tritium levels in groundwater-monitoring well GZ-24 pursuant to Entergy VY's formalized Root Cause Analysis process. The Root Cause Analysis process is a structured component of the Corrective Action Program, which is a requirement of Entergy VY's operating license from the Nuclear Regulatory Commission. The Corrective Action Program is an extensive program by which Entergy VY (i) tracks problems and concerns, (ii) identifies all the issues related to the problem or concern that require

correction or remedial action, and (iii) imposes accountability for completion of such correction or remedial action.

12. As part of the Root Cause Analysis, Entergy VY has undertaken investigation activities with urgency and priority. Entergy VY immediately employed the procedures established for the company in connection with the ENO's adoption of the Industry Groundwater Protection Initiative organized by the Nuclear Energy Institute ("NEI 07-07"). Entergy VY created a multi-disciplined team to investigate the cause of elevated tritium concentrations at GZ-24. The investigation team is operating seven days a week, is sponsored by the Site Vice President, Mike Colomb, and is comprised of experts in Operations, Chemistry, Engineering, Project Management, Radiation Protection, Maintenance and Communications.

13. The investigation team created a plan (the "Action Plan") to identify the source of the elevated levels of tritium in groundwater-monitoring well GZ-24. The Action Plan is dynamic, and changes as Entergy VY's understanding of the leakage is refined through ongoing inspections, testing and analysis of samples collected from other groundwater wells on the site and as testing methods are evaluated.

14. The team started by applying the Kepner-Tregoe problem solving process ("KT Process") to identify SSCs that could contribute to the tritium concentrations identified at groundwater-monitoring well GZ-24. The KT Process is a recognized, systematic process that allows the user to identify and categorize all issues that stem from the problem to be analyzed. The KT Process guides the user

through the following general steps: (1) Identify the problem; (2) Describe the problem; (3) Establish possible causes; (4) Test the most probable causes; and (5) Verify the true causes. The KT Process built off of the previous work Entergy VY had done in upgrading the groundwater-protection plan, including the risk-ranking assessment developed last year.

15. The investigation team identified five potential sources, four of which were described above as being located near the RadWaste Building and identified in this docket as part of the group of five pipelines scheduled for modification or mitigation during Entergy VY's next refueling outage :

    a. RW-204 Stack Sump Discharge Line;

    b. WRW-243-G1 2nd AOG Delay Pipe Drain Line;

    c. RW-186 Drain Line from Steam Packing Exhauster;

    d. RW-176 1st AOG Delay Pipe Drain Line; and

    e. RW-187 Standby Gas Treatment Drain Line

All of these lines are drain, not process lines, with very low energy, which means they have a low pressure and low temperature.

16. Utilizing vendor hydrologist expertise and the VY Station's Site Conceptual Groundwater Model, the investigation team confirmed the results of the KT Process and prioritized which of the five potential sources would be more likely to be a cause or a contributing cause of the tritium detected in groundwater-monitoring well GZ-24. The investigation team assigned high priority to two

specific buried lines: the RW-204 Stack Sump Discharge Line and the WRW-243-G1 2nd AOG Delay Pipe Drain Line.[3]

17. Entergy VY subsequently undertook actions necessary to pursue the inspection and testing of the five lines. Each line presents its own degree of difficulty for inspection or testing; each potentially requires a different methodology. A number of testing methods have been considered, including pressure testing, use of a boroscope for inspection of difficult-to-access SSCs, plugging and freeze-seal technology. Many of these methods require multiple preparatory steps.

18. With respect to the two highest priorities identified above, Entergy VY performed a pressure test of the WRW-243-G1 2nd AOG Delay Pipe Drain Line. The line maintained constant pressure during the test, demonstrating the integrity of the pipe and indicating that it is not contributing to the elevated tritium levels in groundwater-monitoring well GZ-24.

19. Entergy VY has also pressure tested the second line, RW-204 Stack Sump Discharge Line. This line maintained constant pressure during the test, demonstrating the integrity of the pipe and indicating that it is not contributing to the elevated tritium levels in groundwater-monitoring well GZ-24.

20. Entergy VY is scheduled to perform inspections and testing of the remaining three lines identified in the KT Process. The degree of difficulty increases with respect to testing these remaining lines because the piping system may need to be

[3] The WRW-243-G1 2nd AOG Delay Pipe Drain Line is the one pipe not included in the five pipes identified in this docket as scheduled for action during the next outage.

physically modified or changed to support testing. Testing will be accomplished over the next several weeks:

a. Entergy VY is scheduled to perform a pressure test of the RW-186 Drain Line from Steam Packing Exhauster on or about February 17, 2011 (the test is to be performed upon receipt and verification of proper operation of special test equipment that has been ordered);

b. Entergy VY is scheduled to implement a modification to the loop seals located within the RadWaste Building on or about February 24, 2011. This modification will eliminate standing water from the five lines identified in the KT Process;

c. Entergy VY is scheduled to perform a pressure test of the RW-176 1st AOG Delay Pipe Drain Line on or about March 3, 2011 (also upon receipt and verification of proper operation of special test equipment that has been ordered); and

d. Entergy VY has tentatively scheduled a pressure test of the RW-187 Standby Gas Treatment Drain Line to occur in March.

21. While targeting the priorities identified in the KT Process, Entergy VY simultaneously inspected other potential sources of the tritium in groundwater-monitoring well GZ-24. For example, it inspected the RadWaste Pipe Tunnel and the North AOG Valve Vault, both of which are below-grade structures located in the vicinity of GZ-24, to obtain and analyze any liquid present. The inspection

results indicated that neither structure could be causes nor contributors to the elevated tritium levels in GZ-24.

22. Entergy VY further inspected the outdoor RadWaste tanks and tank moats. Entergy VY did not find leakage from the RadWaste tanks, and it did not find any malfunction of the tank moats.

23. In addition, Entergy VY inspected the RadWaste Building sumps, finding that the sump and lining of the sump was in satisfactory condition and was not contributing to the elevated tritium levels in groundwater-monitoring well GZ-24.

24. Meanwhile, Entergy VY has increased the frequency of sampling of groundwater-monitoring well GZ-24 to daily. Also on an ongoing basis, Entergy VY evaluates actions to mitigate promptly any source of leakage once identified.

Groundwater Monitoring Well GZ-6

25. On January 26, 2011, a sample from groundwater monitoring well GZ-6 indicated an activity level of 1,024 pCi/L of tritium. On January 27, 2011, Entergy VY provided the sample results to Uldis Vanags (State Nuclear Engineer) and Dr. Bill Irwin (Radiological Health Chief of the Vermont Department of Health). Groundwater-monitoring well GZ-6 is located near groundwater-monitoring well GZ-24, and therefore Entergy VY expected to see detectable levels of tritium in GZ-6. Prior to January 26, both the Vermont Department of Health and the VY Station had detected tritium in GZ-6 in very low concentrations. GZ-6 is currently being sampled daily.

26. Entergy VY expects that any activity observed in GZ-24 will also be seen in GZ-6, since it is near GZ-24, and the analysis and testing discussed above would thus likely also address the source of tritium found in GZ-6.

Communication Protocol

27. In order to maintain transparency and effective communications with the State of Vermont and other stakeholders, Entergy VY has undertaken the following actions:

a. Daily communications of all applicable sample results to the Department of Public Service (State Nuclear Engineer Uldis Vanags) and the Vermont Department of Health (Dr. Bill Irwin).

b. Weekly, governmental-stakeholder updates: conference calls are held every Thursday to advise governmental stakeholders on Entergy VY's investigation progress.

c. Entergy VY held an on-site, groundwater-hydrology update meeting for technical stakeholders on February 10, 2011.

Date: February 11, 2011

Name: Jeffery A. Hardy
Title: Chemistry Manager

STATE OF VERMONT
COUNTY OF Windham, SS.

On this 11th day of February, 2011, before me, personally appeared Jeffery A. Hardy, and made oath to the truth of the foregoing on his own personal knowledge.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Before me,

Notary Public
My commission expires: 2/10/15

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