EDO Principal Correspondence Control

FROM: DUE: 03/15/10 EDO CONTROL: G20100074
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FINAL REPLY:

Raymond Shadis
New England Coalition

TO:

Borchardt, EDO

FOR SIGNATURE OF : ** GRN ** CRC NO:

Leeds, NRR

DESC:

2.206 - Conditions Trending to a Degradation of Public Safety Margin at Vermont Yankee Nuclear Power Station (EDATS: OEDO-2010-0087)

DATE: 02/12/10

ASSIGNED TO: CONTACT:

NRR Leeds

SPECIAL INSTRUCTIONS OR REMARKS:

ROUTING:

Borchardt
Virgilio
Mallett
Ash
Mamish
Burns/Rothschild
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Subject: 2.206 - Conditions Trending to a Degradation of Public Safety Margin at Vermont Yankee Nuclear Power Station

Description:

CC Routing: RegionI; Tanya.Mensah@nrc.gov; Catherine.Marco@nrc.gov; OGC

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Incoming Task Received: Letter

New England Coalition
on Nuclear Pollution
VT . NH . ME . MA . RI . CT . NY
POST OFFICE BOX 545, BRATTLEBORO, VERMONT 05302

By U.S .Mail and by e-mail[secy@nrc.gov, pdr@nrc.gov]
February 8, 2010

Mr. William Borchardt
Executive Director for Operations
Mail Stop 016E15
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: REQUEST FOR EXPEDITED NRC ACTION UNDER 10 CFR §2.206 TO ADDRESS CONDITIONS TRENDING TO A DEGRADATION OF PUBLIC SAFETY MARGIN AT VERMONT YANKEE NUCLEAR POWER STATION (DKT. 50-271)

Dear Mr. Borchardt

New England Coalition (NEC) respectfully submits the following Enforcement Petition and Request for Expedited NRC Action in accordance with 10 CFR §2.206.

I. PETITION

A. Concerns/Factual Bases

This enforcement petition and request for expedited NRC action raises six concerns, all of which have been reported by Entergy, by NRC, are common knowledge, and/or have been reported in the press. The enumerated concerns are further explained and supported in Sections I-B and I-C of this Petition and Request:

(1) Increasing concentrations of radio-contaminants in the soil and groundwater at Vermont Yankee NPS, as well as an increasing area of contamination, are manifest on a daily basis.[1] Entergy Nuclear Vermont Yankee (ENVY) risks aggravating the contamination by continuing to run the reactor at full power while attempting over a period of a month to triangulate the location of a presumed leak by drilling a series of test wells in the affected area.

ENVY has not provided evidence that it has considered any alternative; potentially more environmentally protective approach. ENVY has thus far provided no cost-benefit analysis for allowing the leak or leaks to be pressurized and thus run at full flow for weeks on end while the licensee probes the affected soil up to 300 feet from the plant with test well probes.

(2) ENVY is daily discovering buried piping which the licensee did not take into account when composing its License Renewal Application (LRA).[2] In fact the licensee has averred that until recently [and well past the close of record in the ASLB LRA proceeding] it was unaware of the existence of some buried pipes, now uncovered, and it has yet to discover their path and purpose.[3]

(3.) Entergy has, in eight years of ownership, failed to learn and understand Vermont Yankee's design, layout, and construction. ENVY failure to apprehend and understand the layout, function, and potentially the interaction of its own piping systems constitutes a loss of design basis.

(4) ENVY has demonstrated an inability to manage aging of its below ground components; effectively invalidating the Aging Management of Buried Piping , Section of its LRA. In addition,

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[1] Please see Attachments 1, 2, and 3 (Entergy Nuclear Vermont Yankee Press releases).

[2] SECY-09-0174, December 2, 2009 – "With regard to buried piping, the goals of current regulations are to ensure that the piping is able to perform its intended safety function by supplying sufficient fluid flow *and to maintain inadvertent releases below licensee's technical specifications or other applicable limits which apply at the site boundary*. [pg 7, italics and emphasis added]"

[3] This assertion is based upon statements made by news personnel involved in covering this story and press accounts, please see Attachment 4, "Tritium contamination is near strength of reactor water"

the obvious inadequacy of ENVY's underground piping aging management plan as presented and approved in ENVY's LRA is now made clear in the apparent failure, years in advance of the first scheduled overall aging management inspection, to capture pipe integrity and contain radioactive liquids.[4]

(5) The ENVY LRA did not consider underground piping now found in the search for the tritium leak. It did not consider all systems potentially containing piping that would be subject to buried piping inspection under the terms of NUREG-1801. Nor did the ENVY LRA consider even those systems that are the subject of buried piping inspection in LRAs at other Entergy-owned Mark1 Boiling Water Reactors. Among these systems, apparently assumed not to contain buried piping at Vermont Yankee, are (JAF and PNPS condensate storage, HPCI, RCIC, radwaste drains, and plant drains.

Further NEC notes that in 2004 ENVY received a NPDES permit amendment allowing rerouting of component cooling intake water to service reactor residual heat removal systems prior to its discharge into storm drains. After diligent search of ENVY documents as they would be filed in ADAMS, NEC can find no mention of this rerouting or any consideration of the potential for contamination at the interface of these two systems. Therefore, NEC is led to believe that the ENVY LRA application is neither accurate, nor complete and that these omissions constitute a material misrepresentation.[5]

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[4] 10CFR§54.29(a) states that the Commission, before granting a license renewal application, must find a "reasonable assurance" that the applicant will adequately "manag[e] the effects of aging during the period of extended operation on the functionality of structure and components." See, also NRC Staff VY LRA FSER regarding LRA B.1.1 "Buried Piping Inspection."

[5] Omissions, as well as affirmative statements, may constitute a "material false statement" under Section 186a of the Atomic Energy Act encompasses. Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-691, 16 NRC 897, 911 (1982), citing Virginia Electric and Power Co. (North Anna Power Station, Units 1 and 2),-CLI ,76-22, 4 NRC 480, 489 (1976), aff'd sub nom. Virginia Electric and Power Co. v. Nuclear Regulatory Commission, 571 F.2d 1289 (4th Cir. 1978); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit-1), ALAB-774, 19 NRC 1350,1357 (1984).

Under Section 186a of the Atomic Energy Act, the Liability of an applicant or licensee for a material false statement does not depend on whether the applicant or licensee knew of the falsity. Consumers Power Co. (Midland Plant, Units 1

(6) The NRC's Reactor Oversight Process has apparently failed to capture, anticipate, and prevent ongoing maintenance, engineering, quality assurance and operation issues that have manifested themselves in a series of high profile incidents since Entergy took over Vermont Yankee. The agency has repeatedly failed to catch on to root cause trends until they have, as in this instance, become grossly self revealing.

B. Background and Discussion of Concerns

In early 2006, Entergy Nuclear Vermont Yankee filed a License Renewal Application with NRC. The LAR and the subsequent NRC Staff SER (s) provide no information regarding the true extent of underground piping, piping tunnels, conduit, and drains.

The ENVY Aging Management Plan is limited to a one-time examination to be conducted in the first half of the extended period of operation (within the first 10 years). Otherwise, Entergy offers, underground piping will be examined opportunistically as various excavations occur in the course of construction or other projects on-site. In the LAR (Section B.1.1 ENVY averred that it will confirm

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and 2), ALAB-691, 16 NRC 897, 910 (1982), citing Virginia Electric and Power Co. (North Anna Power Station, Units 1 and 2), CLI-76-22, 4 NRC 480 (1976), aff'd sub nom. Virginia Electric and Power Co. v. Nuclear Regulatory Commission, 571 F.2d 1289 (4th Cir. 1978).

When determining whether there has been a material false statement under Section 186a, intent to deceive is irrelevant. (Midland Plant, Units 1 and 2) ALAB-691, 16 NRC 897, 915 (1982); The Regents of the University of California (UCLA Research Reactor), LBP-84-22,19 NRC 1383,1387 (1984).

In Virginia Electric & Power Co. (North Anna Power Station, Units 1 & 2), ALAB-324, 3 NRC 347 (1976), the Appeal Board held that:
(a) A statement may be 'false" within the meaning of Section 186 even if it is made without knowledge of its falsity - i.e., scienter is not a necessary element of a false statement under Section 186.
(b) Information is material under Section 186 if it would have a natural tendency or capability to influence the decision of the person or body to whom it is to be submitted - i.e., the information is material if a reasonable Staff member would consider it in reaching a conclusion. The information need not be relied upon in fact.
(c) The test for materiality under Section 186a of the Atomic Energy Act is whether the information is capable of influencing the decision maker, not whether the decision maker would, in fact, have relied on it.

that a full examination of all buried piping had been conducted in or since 2003 (within ten years prior to entering the period of extended operation.

ENVY further claimed that seven spot examinations had been opportunistically conducted since 2003; all with findings of no significant corrosion or pipe coating degradation. It is now obvious that either the inspection intervals proposed by ENVY are too long to catch through pipe corrosion in the period between onset and penetration or, ENVY's inspections were ineffectual. In any case, it should also be clear to NRC that ENVYs LRA proposed buried pipe inspection regimen is based on the current ENVY program coupled with false assumptions about plant design and therefore simply cannot be effective at aging management.

In August of 2008, a senior ENVY engineer wrote to the State of Vermont's examiners that Vermont Yankee had no buried piping that could carry radionuclides.[6]

In May of 2009, Entergy's current Site Vice President and his predecessor testified before the Vermont Public Service Board, on three occasions over six days, that Vermont Yankee had no underground piping with the potential to carry radio-contaminants.[7]

In November of 2009, ENVY recorded water samples with tritium levels of approximately 700 -800 picocuries per liter (pCi).

On January 7, 2010, Entergy Nuclear Vermont Yankee (ENVY) reported tritium levels in excess of 17,500 in a test well some three hundred feet south and east of the plant's radwaste building. *

[6] NEC has reviewed the subject document and the matter has also been reported in the Vermont press.
[7] Please See Attachment 7, "Excerpts of Testimony Before the Vermont Public Service Board, May 20, 21, 26, 2009"

Subsequently, ENVY has reported rising levels of tritium in adjacent test wells crossing the mandatory reporting threshold to 32,500 pCi/L and, within a concrete "trench" in the radwaste building, water at 1 to 2 million pCi/L of tritium plus cobalt 60, with more water incoming.*

On February 1, 2010, ENVY reported via the attached press release that a new test well in the vicinity of the other contaminated wells was sampled at >70,000 pCi/L.*

On February 2nd this number had climbed to >84,000 pCi/L. *

On February 4th, ENVY reported a new test well had yielded 774,825 pCi/L of tritium.*

On February 5th , levels of tritium in the new test well had climbed to 800,340 pCi/L.*
On February 9th, ENVY reported test well levels of tritium at 2.45 million pCi/L.*
* *The foregoing Vermont Yankee tritium sampling instances are recorded in Attachments 1-4.*

In the immediate vicinity of the Vermont Yankee plant where these test wells are located there is a relatively short ground water drain off period of less than a day therefore flow from an underground pocket or reservoir would by now be registering declining concentrations. Obviously, this is not the case.

The trend toward increasing concentrations of contaminant more likely indicates that the flow is replenished with contaminant from a leak in a plant system, structure or component.

The test wells showing reportable concentrations of tritium groundwater contamination are all located in a relatively narrow band of ground between the plant and the Connecticut River. The

plant is located on a riverbank bluff. In the vicinity of the affected test wells the substrata of bedrock falls away sharply to the river[8]

Thus it is inescapable that tritiated water in quantity is pouring off of the Vermont Yankee site and into the Connecticut River. This release is deliberate and ongoing, it is not quantified, It is not controlled (save there is little the licensee could now add to make it worse), it is not at NPDES-permitted release points, and it is avoidable.

Vermont Yankee has been in pursuit of the source of this leak for more than a month while at the same time operating at full power and keeping all systems pressurized; aggravating the leak and raising the volume of soil contaminated. ENVY does so with the excuse that a faster leak is easier to find.

Quite to the contrary, poking holes in the ground and sampling is okay for site characterization, but it is an unnecessarily long slow path to isolating and identifying a leak. ENVY has more benign and likely more efficient alternatives. For example, VY could, and should, be put into cold shutdown and depressurize all systems in order to slow or stop the leak.

Entergy would then be able to pressurize one system at a time, possibly using fluorescent dye or odor tracers, in order to isolate the source of the leak. ENVY has thus far provided no cost benefit analysis for allowing the leak or leaks to be pressurized and thus run at full flow for weeks on end.

New England Coalition understands fully that NRC does not concern itself with non-quantified harm to the biotic community. We are also painfully aware that the EPA has issued a disclaimer to its Maximum Concentration Limits (MCLs) for radionuclides to the effect that the MCLs are

[8] See, VYNPS, Final Safety Analysis Report, Vol.1, Section 2, 2.1-2.5 (1971) and ENVY LAR Appendix E, Sec.2.3, provided here as Attachment 5.

considered protective of human health, but that EPA can make no representation that they are also protective of the environment.

Therefore NEC asserts unequivocally that the prolonged search for a leak or leaks while Vermont Yankee operates at full uprated power aggravates the extent of soil and water contamination, is without justification, substantially increases the cost of decommissioning, is harmful to the biotic community of the Connecticut River environment and serves to degrade public assurance of safety.

Further, repeated failures to properly inspect its buried pipes (2003 2010) and therefore the failure to evaluate appropriately an aging management program for VY's full inventory of buried piping in the LRA constitutes a material misrepresentation under section 186a of the Atomic Energy Act.

The failure to list and consider all affected buried piping in ENVY's LAR is clearly a serious flaw in the LRA. The fact that NRC staff missed this gaping omission brings into question the efficacy of the NRC LRA review process.

Therefore NEC respectfully submits the following:

II. REQUEST FOR ENFORCEMENT ACTION

A. Purpose and Effect

New England Coalition, a non-profit membership organization incorporated in the State of Vermont, now requests under provisions set forth in the Code of Federal Regulations (10 CFR§2.206), that the U.S. Nuclear Regulatory Commission act immediately to:

- halt or mitigate ongoing and increasing environmental damage,
- restore reasonable assurance of adequate protection of public heath and safety and the environment that is now degraded by the failure of the licensee to provide full and accurate

information in its License Renewal Amendment (application) and the licensee's failure to maintain its design bases.

B. Specific Actions Requested

Specifically, New England Coalition requests, on the basis of information set forth in this petition and otherwise known to NRC through its inspection efforts, and for the above stated reasons:

1. **Expedited Action. Mitigate the damage. NEC requests that NRC require VY to go into cold shutdown and depressurize all systems in order to slow or stop the leak.**
   NEC proposes that Entergy would then be permitted to pressurize one system at a time, possibly using odor or fluorescent dye tracers, in order to isolate the source of the leak.

   The practice of segregating suspected systems or components for the purpose of identifying leaks is standard practice. (See, Attachment 6, Bart Bales, P.E., M.S.M.E, Leak detection in plant systems with regard to the VT Yankee tritium leak.

   NEC requests NRC require that VY be held in cold shutdown until all leaks of radio-contaminants have repaired, all buried corroded pipes replaced, and until the affected area (of the leaks) is radiologically characterized together with a determination of its potential additional cost of remediation in decommissioning.

   NEC recognizes that the leak(s) at VY may be found and repaired before or shortly after NRC receives this petition, however, NEC requests nonetheless that NRC, as a preventative measure, require cold shutdown until the extent of conditions leading to a leak(s) is fully identified, characterized, and remedied.

2. Since time is of the essence, NEC respectfully requests that NRC, having been apprised of a worsening situation, act promptly to stop or mitigate the leak(s); not waiting until all the issues raised by NEC are resolved.

3. NRC is requested to require that VY re-establish its licensing basis by physically tracing recording, and reporting physical details all plant systems that would be within scope as "Buried pipes and Tanks" in NUREG 1801 and under requirements of 10 CFR 50.54.

4. NRC is requested to investigate and determine why Entergy was allowed to operate VY since 2002 without a working knowledge of all of the plant's systems and why NRC's Reactor Oversight Process (ROP) and License Renewal Amendment Review Process, let this dereliction go unnoticed

5. NRC is requested to take notice of ENVY's many maintenance and management failures (2002 – 2010), and the ROP's failure to get ahead of them, and to undertake a full Diagnostic Evaluation Team Inspection (a process identical in regimen to the 1996 Maine Yankee Independent Safety Assessment) or NRC Inspection Procedure (IP) 95003.

NEC recognizes that under the ROP this team inspection (95003) is reserved for a particular threshold or set of poor performance scores in including degraded multiple cornerstones, etc. (e.g., Palo Verde 1997).

However, NEC respectfully draws NRC's attention to repeated failures to learn from industry experience such as the isophase bus duct failure (and transformer fire and turbine hall hydrogen burn) in 2004, the cooling tower collapse in 2007, and the tritiated water leak in 2009-2010.

6. All three examples, and many more, are also characterized by poor in-service inspection, deferred maintenance, poor quality control, poor interdepartmental communication and overall poor management. In each instance, NRC was also forewarned, but failed to take effective inspection action to preclude the failure events.

7. NRC is requested to require Entergy VY to apply for an amendment to its License Renewal that would address both aging analysis and an aging management for all buried piping carrying or with the potential to carry radionuclides and/or with the potential to interact with any safety or safety-related system.

   NRC is also requested to provide a hearing opportunity on this Amendment.

III. CONCLUSION

For all of the reasons above and because damage is ongoing and cumulative, NEC urges the US NRC to take **immediate and decisive action**.

If in the opinion of NRC, prompt action cannot be taken through the 10 CFR 2.206 process, then New England Coalition urges that the NRC exercise its statutory discretion to require that Vermont Yankee be brought to a condition of cold shutdown with its systems depressurized now in order to prevent or mitigate further pollution, damage and costs.

With respect to request items 2-6, NEC would be please to provide additional supporting information or clarification before a Petition Review Board.

NEC's petition fulfills all of the acceptance criteria under NRC Directive 8.11 and should now be accepted for NRC review and action.

NEC is forwarding a copy of this petition to the Commission together with a request that the Commission stay any further action on the ENVY LRA until the issues raised herein are resolved.

New England Coalition now eagerly awaits a response. Please address all correspondence on this matter to my address below.

Thank you for your prompt attention,

Signed in the Original;
Raymond Shadis

Raymond Shadis
Consultant to
New England Coalition
Post Office Box 98
Edgecomb, Maine 04556
shadis@prexar.com

Cc: Chairman US NRC
US Senator Patrick Leahy
US Senator Bernie Sanders
US Representative Peter Welch
Governors and Attorneys General:
Massachusetts, New Hampshire, Vermont

ATTACHMENT 1

One new well at Vermont Yankee shows tritium levels of 70,500 picocuries per liter

Entergy Nuclear Vermont Yankee Press Release
By E-Mail –as follows:

February 1, 2010

Vermont Yankee engineers working to identify the source of tritium in the plant's groundwater received useful information today that will help focus the investigation on possible sources.

At this point three new monitoring wells have been installed to complement the three drilled in 2007 and two of the three new wells show tritium. Confirmed analysis from the new wells show tritium concentration is at 70,500 picocuries per liter in the nearest new well about 75 feet to the south of the well where tritium was first noted several weeks ago. At a new well about 100 feet further south, the tritium is at a much lower concentration of 1,840 picocuries per liter. Two other monitoring wells to the north, and one to the south, show no elevated levels. The purpose of the monitoring wells is to characterize the tritium concentrations in the ground water to aid in the investigation, so we're on the right track.

Engineers are planning six more wells around the plant buildings to gather further data on the location of the highest tritium concentration and to focus the investigation on the possible source. While our multi-disciplined technical team continues to investigate the source of the tritium, it is important to note that there has been no elevated tritium level found in any drinking water well samples or in Connecticut River water. The existence of tritium in such low levels does not present a risk to public health or safety whatsoever.

For more details on the tritium investigation, the Vermont Department of Health has a thorough status report on the investigation at this web link:
http://healthvermont.gov/enviro/rad/yankee/tritium.aspx

Also helpful is the Nuclear Regulatory Commission web page on tritium monitoring:
http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html

- Rob Williams

Entergy Vermont Yankee

Rwill23@entergy.com

ATTACHMENT 2

Concentrations of tritium in two Yankee wells rise to 32,062 and 80,458 picocuries

By Press Release on February 3, 2010

A Note from Rob Williams at Vermont Yankee

February 2, 2010

Vermont Yankee engineers working to identify the source of tritium in the plant's groundwater received updated well sample analyses late today showing that the well that was the first to show tritium several weeks ago is now at 32,062 picocuries per liter. A newly drilled well, about 75 feet to the south of the original well, that had been reading 70,500 picocuries per liter now has a concentration of 80,458. These increased levels will be compared to the data to be gathered through the hydrology and monitoring studies already underway to further characterize the tritium concentration in the ground water near the plant. While our multi-disciplined technical team continues to investigate the source of the tritium, it is important to note that there has been no elevated tritium level found in any drinking water well samples or in Connecticut River water.

For more details on the tritium investigation, the Vermont Department of Health has a thorough status report on the investigation at this web link:
http://healthvermont.gov/enviro/rad/yankee/tritium.aspx

Also helpful is the Nuclear Regulatory Commission web page on tritium monitoring:
http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html

- Rob Williams

Entergy Vermont Yankee

Rwill23@entergy.com

ATTACHMENT 3

Newly installed VY well tests to 774,825 picocuries per liter

Entergy Nuclear Vermont Yankee Press release
February 4, 2010

Vermont Yankee engineers working to identify the source of tritium in the plant's groundwater are methodically installing new wells closer to several plant structures to further characterize the tritium concentration in the groundwater near equipment and buildings.

The continuing sampling of monitoring wells is helping the investigation team locate the source. The good news is that one newly installed well, located just to the east of the plant's condensate water storage tank and some underground piping, appears to be closer to the source because its concentration is 774,825 picocuries per liter.

The well that was first identified with tritium is now at 36,261 picocuries per liter. However, a well about 75 feet to the south of that one that has been as high as 80,458 picocuries per liter, is now down to 69,392. Another recently installed well further south is at 1,940 picocuries per liter, up from a recent level of 1,800. Such variation is
as expected with variations of groundwater flow.

As has been the routine during this investigation, this information is being used with hydrology and monitoring studies already underway. The data received is helping direct investigators toward the source. While this process continues, it is important to note that there has been no elevated tritium level found in any drinking water well samples or at any location not on plant property.

For more details on the tritium investigation, the Vermont Department of Health has a thorough status report on the investigation at this web
link: <http://healthvermont.gov/enviro/rad/yankee/tritium.aspx>
http://healthvermont.gov/enviro/rad/yankee/tritium.aspx

Also helpful is the Nuclear Regulatory Commission web page on tritium monitoring:
<http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html>
http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-trit
ium.html
Rob Williams
Entergy Vermont Yankee
<mailto:Rwill23@entergy.com> Rwill23@entergy.com

ATTACHMENT 4

Tritium contamination is near strength of reactor water

By **Susan Smallheer**
Staff Writer - Published: February 7, 2010

VERNON – The highest level of radioactive tritium yet — 2.45 million picocuries per liter – was discovered Saturday in a new groundwater monitoring well at the Vermont Yankee nuclear reactor.

The Department of Health announced the discovery, which was in a well near the building holding the advanced off-gas system.

The department said such high concentrations were an indication that one or more pipes are leaking highly contaminated water into the ground.

Nancy Erickson, communications director for the Department of Health, said the new level is very close to the tritium concentration in reactor water, which is usually measured at 2.9 million picocuries for tritium.

Erickson said the contaminated well is near an excavation that was made to inspect a concrete duct that encases a 2-inch drain pipe. It is also near two buried pipes that carry reactor process water, she said.

Saturday's measurements were in a groundwater monitoring well, while Friday's measurement of 2.7 million picocuries was in a sump pit inside the advanced off-gas building.

As has been the case since Jan. 7, when Entergy Nuclear disclosed it had a tritium contamination problem, the Department of Health said that while the levels were very high, they didn't currently pose a risk to the public.

"It's not in drinking water so it's not a danger to people," said Erickson. According to the Environmental Protection Agency, the safe level for tritium in drinking water is 20,000 picocuries per liter.

William Irwin, the radiological health chief for the Department of Health, said the high concentrations indicated the contamination was very close to a source, and something that had recently been in the reactor.

He said he was concerned that the pipes carrying these high levels of radioactivity weren't in any kind of tunnel or vault so they could be routinely inspected for leakage.

"It's personally disappointing," said Irwin, who said he believed that the pipes uncovered Saturday were some of the 40 pipes finally listed by Entergy Nuclear last month, after more than a year of saying such pipes didn't exist at Vermont Yankee.

Irwin said the two groundwater wells with the highest contamination, GZ-10 with 2.45 million and GZ-7, with 834,000 picocuries, were about 100 feet from each other.

"The good news is they are very, very close," said Arnie Gundersen, a nuclear engineer who is a consultant to the Vermont Legislature. "They are almost as high as they could go. This is almost raw reactor tritium."

Entergy Nuclear spokesman Robert Williams said he would issue a news release Saturday evening, but it was not received in time for today's paper.

ATTACHMENT 5

Appendix E , Applicant's Environmental Report
Operating License Renewal Stage
Vermont Yankee Nuclear Power Station

2.3 Groundwater Resources

VYNPS is situated on a glacially derived river terrace, located approximately 30 to 50 feet above the current floodplain of the Connecticut River. This terrace, comprised of glaciolacustrine and fluvial sediments deposited during the last glacial ice age, and have been subsequently incised by the river channel [Reference 2-6, Section 2.2.1]. Groundwater at the site occurs under unconfined conditions within both unconsolidated glacial overburden sediments and underlying fractured bedrock [Reference 2-6, Section 2.3.2].

The local water table level fluctuates differentially depending on the amount of precipitation and is affected by level changes in the Connecticut River. River flooding will cause a temporary reversal in the flow direction of groundwater, so that the local water table will be considerably higher than usual during periods when the river level is high. Natural subsurface drainage is over the rock surface [Reference 2-8, Section 2. 4.2.3.2].

Groundwater levels vary between about 5 feet to 18 feet below ground surface in the northern portion of the site. In the vicinity of the major plant structures, groundwater is approximately 20 feet below ground surface. Along the southern portion of the site, depth to groundwater is approximately 30 feet. Although these levels may vary throughout the year, they do provide a general indication of site area groundwater levels [Reference 2-8, Section 2.4.2.3.2].

Because the river is the natural low point and drainage channel for the region, the groundwater table can be expected to slope toward the river. Surface drainage also will flow toward the river. Thus, it is unlikely that any liquids discharged to the river from the site would mix with domestic water supplies in the area. [Reference 2-8, Section 2.4.8]

ATTACHMENT 6

Leak detection in plant systems with regard to the VT Yankee tritium leak.

By Bart Bales, P.E., M.S.M.E
Gill, Massachusetts
February 9, 2010

This is an evaluation of the facts surrounding the VT Yankee tritium leak as reported in the press and to the public through the VT Dept. of Health's website. It is the opinion of a registered mechanical engineer with twenty-five years of professional experience in energy engineering. It provides approaches to leak detection in power plant piping systems in general, and evaluates the approach being employed, according to public information, to find the tritium leak at VT Yankee.

1. A plant operator should have up-to-date schematics for all piping and the expected pressures and flow rates throughout the piping network.
2. Design pipe layouts and as-built pipe layouts are necessary elements for responsible operation and maintenance of a power plant.
3. **Use of design and as-built drawings and specifications along with gauge and instrumentation operating parameters should provide information sufficient to determine expected flow rates and pressures in the piping networks.**
4. The design documents at VT Yankee should enable plant personnel to identify a limited number of pipes that could contain tritiated water.
5. Plant personnel should determine actual flows through and between elements and components of those piping networks that contain tritium, and determine quantities in various storage vessels **by a mass balance calculation.**
6. These calculations can determine flows from within the plant enclosure to the piping network and storage vessels outside the enclosure and should provide information sufficient to identify the leaking pipe loop.
7. Differences in flows into and out of parts of the network can help localize the leak **as the mass balance will indicate a shortfall in expected values for the piping network containing the leak.**
8. **This is a more prudent approach to leak detection that can allow the plant system to be operated at lower and safer pressures and flow rates until the leak is found and repaired.**
9. It is expected that there would be existing flow meters on all the various piping loops, especially those conveying radioactive liquids or gases. These should be calibrated, serviced or replaced and rendered reliably functional to determine flow rates and diagnose leaks.

10. **Maintenance of full pressure ratings throughout the power plant should not be necessary to accomplish leak detection. Maintenance of even moderate pressures in the piping will produce a sufficient gradient for leak detection.**
11. **There is no justification for maintaining pressures at uprated or even original design conditions for leak detection.**
12. **Fluid flow through holes in the leaking pipes erodes the edges of these holes. Larger holes result in even higher rates of leakage.**
13. **It should be recognized that the higher the pressure the greater the flow through leaks, and the faster the introduction of contaminants into the groundwater.**
14. **A higher influx rate into the groundwater increases the rate of migration of the plume into adjacent areas and into the Connecticut River.**
15. **A more responsible leak detection protocol would be to shut down the plant, evaluate and model analytically, prioritizing the pipe systems most likely to be leaking tritium, then test each system progressively in order of probability that it is the source of the leak.**
16. This approach to leak detection methods from inside the plant employs existing flow gauges or installation of mechanical measuring gauges, and use of ultrasonic or inflow measurements.
17. For a plant operator or engineer to lack knowledge of location of piping networks and their contents is an unacceptable situation, especially in the handling of potentially hazardous fluids.

Attachment 7

Excerpts of Testimony Before the Vermont Public Service Board, May 20, 21, 26, 2009

ENVY Witness Jay Thayer ex-Site Vice President VPSB Docket 7440 May 20, 2009

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19 BY MR. COTTER:
20 Q. Does Vermont Yankee have any underground
21 piping that carries radio nuclides?
22 A. The reason I hesitate is I don't believe there
23 is active piping in service today carrying radio nuclides
24 underground. There was a line that was contaminated,
25 radioactive liquid, which did leak back in the period

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1 before we purchased the plant, that line was abandoned.
2 That is the reason for some of the contaminated soil on
3 site. But I don't -- I can do some research on that and
4 get back to you, but I don't believe there are active
5 piping systems underground containing contaminated fluids
6 today.
7 Q. Okay.
8 MR. MARSHALL: You can ask that question
9 of Mr. Colomb next Tuesday.
10 THE WITNESS: We can confirm that.
11 MR. COTTER: Okay.
12 BY MR. COTTER:
13 Q. And presumably the decommissioning cost
14 estimates that TLG have prepared to date take into account
15 the one line that led to contamination historically?
16 A. Yes.

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Q by Jared Margolis
19 A. Entergy VY has not determined and cannot today
20 determine the volume of contaminated soil that will exist
21 from the VY station's operation and decommissioning.
22 Q. But you stated before that you had determined
23 how much was contaminated today.
24 A. No. What I stated before is we had -- we have
25 a known amount, we increase that amount as a contingency,

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and then we input that amount into the TLG cost analysis. So there would be an adequate amount for soil remediation in the decommissioning cost estimate that Mr. Cloutier present here earlier today.

Q. But by known amount, does that mean that you've determined an actual volume that exists as of today?

A. We have an estimated volume that exists today based on past activities at the site, and the documents that were turned over to us when we bought the site in 2002, documenting those activities and those contamination events.

Q. But the actual amount at this time is not known?

A. No. And that -- that may not be apparent because when you do an estimation like this, you do -- there was a pipe that leaked for example. Okay. Certain amount of ground around that pipe was contaminated. We did some survey work around it, determined what the extent of that was, made an estimate on how many cubic feet of soil that represented. But we didn't dig down and excavate all that soil. It's basically fixed in place.

So we make an estimate on that for future removal during decommissioning.

Q. Where exactly is that pipe?

A. It's on the site inside the protected area. I can't give you an exact location.

Q. Is it underneath a building?

A. No. It's underneath a driveway. Between two buildings.

Q. But does it go underneath those two buildings?

A. Yes, it does.

Q. And so there might have been leakage underneath the buildings themselves?

A. No. I'm sorry. It doesn't go underneath the building. No. Goes between.

Q. A pipe --

A. It goes between the A building and a sump that is out in the yard, a sump tank that's out in the yard.

Q. But it is at one point underneath a building?

A. No. It goes through a building wall and out.

Q. Do you know of any leaks -- other leaks on site that were potentially underneath any buildings?

A. I don't know of any, but I don't have that

document that I referred to. I've seen the documentation. I don't have that in front of me to be able to tell you that.

Q. Can you bring that with you tomorrow?

A. Yes, I suppose I could.

ENVY Witness Jay Thayer ex-Site Vice President VPSB Docket 7440 May 21, 2009

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BY MR. MARGOLIS:

Q. Good morning, Mr. Thayer.

A. Good morning.

Q. I wanted to follow up on a couple of points from yesterday. We had been discussing the known amount of contamination at the site of soil, and I wanted to know if what you had described as the known amount included the chemistry sync ground contamination plume under the turbine building?

A. That's a good question because I intended to correct a statement that I made yesterday in that I misspoke when I was on -- when I answered your question yesterday, and my estimates that I did in my head up here

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on the stand did not include the amount of contamination that is known and was quantified in 1991 related to the chemistry sync [sink]drain line in the turbine building that you referred to.

Q. Have you quantified how much contaminated soil there might be in that plume under the turbine building?

A. I've reviewed a report that was done in the 1991 time frame where the amount of soil was quantified as a maximum possible amount that could be involved, and the reason I say it that way is because the soil is captured underneath a floor slab and between vertical foundations with bedrock on the bottom. So for conservative assumptions we assumed that whole volume might be contaminated because this pipe runs through that soil.

Q. Was that maximum amount included in the potential costs for dealing with contaminated soil on the site in the decommissioning cost analysis?

A. I've confirmed that even adding that amount to that -- I referenced an amount, contingency amount, up to 135,000 cubic feet. The amount we estimated this could be -- this event could be as high as 58,000 cubic feet. So

even if you add that to the estimates that I provided yesterday, that's about half of the estimate that was included in Mr. Cloutier's cost estimate. The basis for that was the 135,000 cubic feet that we talked about

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yesterday.
Q. So that greatly reduces the amount you were using as a contingency then above and beyond what was considered to be known?
A. Yes, it does.
Q. Do you know how many cubic yards or meters of contaminated soil Vermont Yankee is permitted to yard or file in outdoor storage each year?
A. No, I don't.
MR. MARGOLIS: I believe that that was a matter that we were discussing with counsel and there might be a permit forthcoming regarding that.
MR. MARSHALL: I understand that Mr. Shadis has found it and we're just trying to figure out how to transfer it into some form so that we can review it and know what it is.
MR. MARGOLIS: If that is at some point handed around and reviewed, can we ask questions about it at a later point?
MR. MARSHALL: Possibly, but as Mr. Thayer just indicated, he may not be the person who can answer questions about it.

ENVY Witness Michael Colomb – Site Vice President VPSB Docket 7440 - May 26, 2009

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BY MS. HOFMANN:
Q. So there is a difference in that terminology. Do you want to address them to the satisfaction of the Department of Public Service?
A. Yes.
Q. Finally, you had -- I shouldn't say that. You had one question referred to you from Mr. Thayer the other day and I know you weren't here. The discussion was about underground piping and possible contamination. He thought you would know the answer, so do you know if there's any underground piping at Vermont Yankee carrying radionuclides?

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A. I believe we had identified one pipe that was underneath the chemistry laboratory that end -- I believe leaked in the past, did contaminate some soil under the building, has since been sealed, and a new line that is not underground was routed.

Q. And there was discussion about where that line is. Can you clear that up?

A. It is under, yes, I said underneath the chemistry laboratory building and goes to a different building. It's all underneath the structure.

Q. Okay. What building does it go to because we had a pipe starting and ending?

A. I believe it was the radioactive waste building.