Quarterly Status Report

Entergy Nuclear Vermont Yankee (ENVY)

Reliability Oversight

For Joint Fiscal Committee

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Overview

Following an introduction and executive summary, the report itself consists of three sections: a review of Entergy Nuclear Vermont Yankee's (ENVY) progress in taking corrective actions in response to the Panel's findings, a Timeline of Events that impact plant reliability and have occurred after the Panel's review, and three current substantial reliability concerns.

Introduction and Background

Executive Summary

Report:

Section 1. Slow Progress Toward Developing Action Plans including Appendix 4 with 80-action-item matrix.

Section 2. The Timeline of Events in Appendix 3 will be a regular feature of this report for monitoring technical issues and power reductions that may impact operational reliability Entergy Nuclear Vermont Yankee.

Section 3. The following three items are major issues impacting ENVY's reliability:

- 3.1.1. Contaminated Underground Pipe Data Contradicted by State Department of Health
- 3.1.2. Microbiologically Induced Corrosion (MIC) in the Service Water System.
- 3.1.3. Entergy Hiring Freeze

Appendix 1. Service Water System and Alternate Cooling System Schematic

Appendix 2. Letter from Commissioner O'Brien to ENVY re: compliance issues July 15, 2009.

Appendix 3. Timeline of Events (Review Ongoing)

Appendix 4. This detailed 80-action-item matrix will be updated regularly.

Introduction

In July 2009, as an employee of Fairewinds Associates, Inc, I was retained by the Joint Fiscal Committee (JFC) and the Joint Fiscal Office (JF0), to review the progress made by Entergy Nuclear Vermont Yankee (ENVY) toward addressing the challenges identified by *Act 189: An Act Relating To A Comprehensive Vertical Audit (CVA) And Reliability Assessment Of The Vermont Yankee Nuclear Facility*.

Background

The Vermont Yankee Nuclear Plant began operation in 1972 and was licensed to run for 40-years in 2012. ENVY requested a 20-year license extension for its Vermont Yankee Nuclear Plant past its 2012 projected shutdown date. In Vermont such an extension requires a Certificate of Public Good (CPG) and review by the State Legislature. In 2008, the Vermont Legislature enacted the Act 189 Comprehensive Vertical Audit and Reliability Assessment in an effort to give Legislators a more accurate assessment of ENVY's ability to operate its nuclear plant reliably for an additional 20-years.

The Department of Public Service (DPS) contracted the firm Nuclear Safety Associates (NSA) to conduct the reliability assessment ordered by Act 189. In July 2008, I was appointed by the President Pro-Tem of the Vermont State Senate to serve on the Vermont Yankee Public Oversight Panel, and former Nuclear Regulatory Commissioner Peter Bradford was appointed by the Speaker of the House. The Governor appointed former State Nuclear Engineer William Sherman and the Panel itself added two members: David Lochbaum from the Union of Concerned Scientists and Penn State nuclear engineering professor Dr. Fred Sears. The Vermont Yankee Public Oversight Panel issued its report to the Vermont State Legislature in March 2009.

This report is the first quarterly report to the Joint Fiscal Committee by Fairewinds Associates, Inc concerning ENVY's progress toward meeting the milestones outlined by the Oversight Panel in its March 2009 report to the Legislature. During Fairewinds Associates' first three-month review, several issues and areas of concern have arisen and are outlined in the Executive Summary. My report follows in detail.

Executive Summary

This report identifies five major issues at Entergy Nuclear Vermont Yankee (ENVY) that may impact plant reliability:

Section 1. Slow Progress Toward Developing Action Plans

The Vermont Yankee Public Oversight Panel's review and analysis of the DPS instituted Reliability Assessment identified 80 areas of significant concern regarding Vermont Yankee's ability to operate reliably for 20 additional years (See *Appendix 4: 80-action-item matrix*). ENVY has gotten off to a slow start addressing these problems. In September 2009, six months after the Panel's report to the Legislature, ENVY has plans in place to address only 18 percent of the issues identified for action by the Panel and DPS. In July 2009, Commissioner O'Brien expressed concerns about ENVY not taking appropriate action to speedily review and remedy these reliability issues. (*Appendix 2: Letter to ENVY re: compliance issues July 15, 2009*)

Section 2. Operational Issues

A *Timeline of Events* (see *Appendix 3*) will be included as a regular monitoring report regarding technical, operational, and power reduction issues that may impact the reliability of Entergy Nuclear Vermont Yankee. ENVY has had eight significant operational problems at its Vermont Yankee Plant since the DPS supervised reliability assessment was completed in December 2008.

Section 3. The following three items are major issues impacting ENVY's reliability:

3.1. Contaminated Underground Pipe Data Contradicted by State Department of Health

When the Panel wrote its report and testified to the Legislature in March 2009, its members had based its report upon assertions by ENVY that there were no buried, underground pipes carrying radioactivity on site. The Panel even informed the legislature that ENVY had reported this fact.

Unfortunately, the information given to the Panel by ENVY was not correct. In September in hearings held in Montpelier by the Legislative Rules Committee, the Department of Health informed the legislators and public that there is buried radioactive underground pipe at ENVY, which has allowed radioactivity to seep into

the Connecticut River. Since the Panel had been misinformed, the issue of buried radioactive pipe was not addressed in the Panel's report to the legislature. Such buried piping is of concern because many of the aging nuclear power plants throughout the country are having significant trouble with radioactivity, like tritium and cobalt, leaking from old buried pipes and seeping into the surrounding environment.

3.2. Microbiologically Induced Corrosion in the Service Water System

When ENVY identified this concern to the NRC, it noted it as serious and stated, "Trends are not acceptable and are declining." (*Appendix 1: Service Water System and Alternate Cooling System Schematic*)

3.3. Entergy Hiring Freeze

As a result of a 16 percent decrease in profitability, Entergy has instituted a corporate-wide hiring freeze. In its report to the Legislature, the Oversight Panel made it clear that ENVY must hire more personnel, not less.

Fairewinds Associates, Inc has been contracted to review ENVY data for three days each month. A total of 10 days were used in the preparation of this report and therefore, this report is a broad-brush review that may not include other reliability concerns. Fairewinds Associates, Inc will submit a report each quarter that will include updates to the Event Timeline and the ENVY 80-action item progress matrix.

Section 1

Slow Progress Toward Developing Action Plans

As of September 30, ENVY has made only slight incremental progress toward implementing actions on its 80-item list. The 80-action-item list is the result of a combination of the recommendations made by the Oversight Panel and those detailed in the narrative report by Nuclear Safety Associates (NSA). The reliability assessment conducted by NSA and issued to the DPS in January 2009, did not outline its recommendations, but mixed its recommendations within the text of the entire report. At request of the DPS, NSA itemized each recommendation separate from the narrative of the original report, and in February 2009, the firm identified 59 individual issues at the Vermont Yankee Nuclear Plant that it believed required resolution. This 59-item list was passed on to ENVY. Subdividing some issues and incorporating concerns expressed by the Vermont Yankee Public Oversight Panel expanded the NSA preliminary list into a detailed 80-action item list reviewed in detail by the Panel.

At the beginning of my contract with the JFC, six months after the initial report was released, Fairewinds anticipated that ENVY would have already completed an in-depth review and worked with DPS to create detailed plans for a significant fraction of the 80-action items requiring resolution. Unfortunately, as of September 30, 2009 ENVY has made only slight progress on developing the necessary action plans for its 80-action-item list, and DPS and ENVY did not even begin to meet formally on these issues until July 2009. (*Appendix 4 features a detailed matrix of the 80-action items*.)

Department of Public Service Commissioner David O'Brien did an excellent job of alerting ENVY to his dissatisfaction in a July 15, 2009 follow-up letter to ENVY, in which he said,

> "…the Department is going to carefully monitor your compliance with the recommendations of the Comprehensive Reliability Assessment (CRA) and the Public Oversight Panel (POP). My understanding is that Entergy did not have much in the way of compliance documents for the engineers to review earlier in the month. I am puzzled by that since it is important for the Department to see progress on this in order for us to have any confidence in the prospect of license renewal. Please redirect your team to take seriously the need for complete and accurate

> documentation of each and every compliance item. We hope on the next engineering team visit from the DPS, that there will be much more comprehensive progress made toward compliance on the CRA/POP recommendations." (*Appendix 2: Letter from Commissioner O'Brien to ENVY re: compliance issues July 15, 2009*)

At the second meeting between the DPS and ENVY in August 2009, ENVY had only three plans in place that the DPS had reviewed and found acceptable to address some of these 80-action items. In September, when I attended the third meeting between DPS and ENVY, there were only 11 more plans in place to address open items. Therefore, as of the September 2009 meeting, only 14 out of 80-action items or 18 percent of the Panel's and the Reliability Assessment's items have plans in place to address the problems identified in February 2009. In other words 82 percent of the 80-action items still require "plans" to address their remediation. As DPS Commissioner O'Brien noted in his July 2009 letter, ENVY's poor start on this critical effort is hampering results.

More importantly, this Committee and the Legislature should also be aware that ENVY's commitments to address the 80-action items are *only promises to complete said work at some time in the future, but not actual achievement of the goal itself*. DPS is currently in the process of approving "plans" to accomplish these 80-action items at some time in the future, and I believe that some of the terms are confusing. For example, DPS signifies its approval of action items plans by using the term: *"State Review Complete"*. It is important to note the use of this term, so no one misreads the comment and assumes that the corresponding action item may have been completed. The term, *"State Review Complete"* does not mean that the action item being reviewed by DPS has been corrected, rather *"State Review Complete"* only means that a plan has finally been created to address this particular action item.

Furthermore, many of the items on the 80-action item list require a long-term program and/or remediation that will necessitate continuous monitoring by DPS for years in the future in order to assess both the completion and effectiveness of acknowledged repairs and corrections. Therefore, even after all the 80-action items have DPS approved action

plans, an ongoing DPS Monitoring Action Plan (MAP) including outside consultants will also be required in order to track and schedule ENVY's compliance.

While Fairewinds Associates, Inc's involvement with the DPS in this process has been collegial, it has been limited to an examination of the DPS discussions with ENVY. Fairewinds Associates, Inc has not been and is not currently involved in any technical review of any of the ENVY proposed resolutions on this 80-item action list.[1]

Section 2

Timeline of Events: Power Reductions Impacting Reliability

While Vermont Yankee has "operated continuously" since it was refueled in the fall of 2008, *continuous operation does not mean that the reactor has been operating at full power*. There have been several critical reliability issues since the Panel's report was issued which have caused ENVY to reduce the power level at the plant in order to make repairs. Below is a brief summary of potentially significant issues, which have occurred after the NSA report was written that have had an impact on ENVY's reliability. [This *Timeline of Events* is attached as *Appendix 3* at the end of this report.]

1. January 2009: *A leak in feedwater system*. The feedwater system feeds water from the condensate system into the reactor; this is part of the continuous piping loop that sends water out of the reactor, through the turbine and back into the reactor. The feedwater system leaked due to the failure of an old pipe plug installed in 1971 at the junction between the weld and the main feedwater pipe. This leak was repaired and necessitated a 50% reduction in power output. This is an age related issue.
2. January 2009: *A leak in check valve bonnet in the reactor water clean up system*. This leak is located in a critical safety-related pipe. ENVY made four temporary repair attempts before the leak was stopped. The leak has been fixed temporarily,

[1] While some comments by Fairewinds Associates, Inc have been presented and considered by the DPS and their consultants prior to DPS endorsement of some of ENVY's action plans, Fairewinds has not completed any technical or engineering analysis on any action items labeled *"State Review Complete"* and therefore is not endorsing either the technical or scientific analysis of said issues.

and will necessitate full repair at the next outage during Spring 2010. A Nuclear Regulatory Commission (NRC) review stated that poor maintenance on this valve during the fall 2008 outage caused this valve to leak.

3. February 2009: *A leak in the demineralizer body in the reactor water cleanup system has been re-welded*. This is a safety and reliability related system that cleans the reactor. This age-related leak developed in the vessel in which the demineralizer is located.
4. May 2009: *The condenser tube leak was first identified but not repaired*. Unfortunately, this problem *allowed river water to enter the condenser*, which negatively impacts water chemistry and puts an additional burden on the plant clean-up systems. Water chemistry is a critical part of the nuclear plant's operating criteria.
5. June 2009: *A leak in a service water pipe due to microbiologically induced corrosion (MIC)* is also an age related problem, which is endemic in the service water system.
6. June 2009: *The "A" recirculation pump motor-generator unexpectedly reduced power from 98.2 percent to 88.5 percent*. The pump's speed controller locked up, preventing the operators from changing its speed. While repairing this problem, the plant reduced power to 25 percent and also fixed the condenser leak, which first began in May and impacts water chemistry.
7. July-August 2009: *Bi-weekly power reductions to as low as 86 percent power due to chlorination of the condensers to avoid fouling of the condenser tubes during the summer months.* Several times per week the power has been reduced to allow for this chlorination, which seem to be more frequent than in previous years.
8. August 2009: ENVY announced that *monthly radiological monitoring of the new dry cask storage for spent fuel has not been conducted.* ENVY formally notified the Vermont Public Service Board of their error. Monitoring of the dry casks is a required condition of the 2008 Memorandum of Understanding (MOU) between the State of Vermont and ENVY, so that ENVY could have approval for storing its spent fuel outside its current fuel pool storage facility. ENVY has also acknowledged that the required development of a protocol for reporting the

results of cask temperature and radiation data to the Vermont Department of Public Service has not yet been developed. Fairewinds believes that this failure to comply with the MOU is indicative of a management breakdown within ENVY.

Section 3

New Major Issues Impacting ENVY's Reliability

Issue 3.1: Contaminated Underground Pipe Data Contradicted by State Department of Health

The Vermont Legislative Committee on Administrative Rules held hearings September 15, 2009 in Montpelier regarding the Radiation Dose Rate measured at Vermont Yankee's fence-line boundary and how that dose is calculated. In the hearing, Dr. William Irwin informed the Rules Committee that Vermont Yankee's storm drains are contaminated with radiation that has leaked into the Connecticut River. This announcement was a complete surprise to people in attendance at the hearing. Act 189 originally required a complete vertical slice inspection of an "underground piping system that carries radioactivity". However, after ENVY and NSA informed the Panel that there were no underground piping systems carrying radioactivity at the Vermont Yankee nuclear power plant, the Panel substituted a review of the Service Water System, which also has buried piping that is non-radioactive. See Footnote[2] below, with the exact quote from Page 24 of the Panel's Report.

The newly identified stormwater drain contamination at the Vermont Yankee Nuclear power plant included Cobalt 60 and other isotopes that came from the

[2] On Page 10 of the Panel Report, submitted to the legislature in March 2009, the Panel acknowledged Act 189's requirement for a vertical slice inspection of the "underground piping system that carries radioactivity".
On Page 24 of the Panel's Report, "The Panel recommended the following adjustments for the scope identified in Section 3 of Act 189: 1. The Panel was informed that there were no systems with underground piping that carry radioactivity at VY. Therefore the Panel recommended that the review of the service water system… which has buried non-radioactive piping, include a review of ENVY's Buried Pipe and Tank Inspection Program."

nuclear reactor. Since the hearing, a number of Vermont citizens have asked me why the Panel did not discuss this issue in our report. Let me assure this committee, as a member of the Panel, that this contamination of underground pipes was *not* relayed to the Vermont Yankee Public Oversight Panel during our review process between July and December of 2008. Because Act 189 required a complete vertical slice inspection of an "underground piping system that carries radioactivity", the Panel specifically asked Entergy to identify all contaminated underground pipes. We were informed by ENVY that there were no contaminated underground pipes with the exception of one small drain line in the Chemistry Lab that Entergy said had been capped many years ago. Based upon the information provided by ENVY, the legislatively mandated vertical slice inspection of radioactive buried pipes was excluded from the CVA process.

Moreover, Dr. Irwin's September statement to the Rules committee regarding Vermont Yankee's buried, underground, contaminated storm drain piping is in direct contradiction to other reports written by Dr. Irwin for the Department of Health (DOH). Most recently for example, in August 2009, Dr Irwin and the Department of Health released a report entitled "*Vermont Department of Health Report – Surveillance 2008, Vermont Yankee Nuclear Power Station, Report on Public Health Monitoring, August 7, 2009*".

The following excerpts from the report detail issues of concern for public health and safety in relation to Department of Health radiation monitoring.

> "Beginning in 2008, the Department of Health incorporated monitoring of the on-site wells at Vermont Yankee. These seven wells are only accessed on the station property. These groundwater samples were analyzed for gamma radioactivity and tritium in a fashion similar to the other groundwater samples taken from outside the station. ***Neither the on-site groundwater, nor the off-site groundwater, surface water or drinking water samples obtained in 2008 were found to contain radioactive materials attributable to the operations of Vermont Yankee Nuclear Power Station.***" (Page 27) [Emphasis created in original Department of Health document, not by Fairewinds Associates, Inc.]

> "Seven wells within the Vermont Yankee property were sampled by the Vermont Department of Health and the samples were analyzed by the Vermont Department of Health Laboratory. As with the off-site groundwater samples, there was no radioactivity solely attributable to Vermont Yankee operations detected in the samples. The specific results are that the only gamma radiation emitting radionuclides that were detected were of natural origin, and no tritium was detected outside the limits of uncertainty at the 95 percent confidence level." (Page 77)

Therefore, Dr. Irwin's Department of Health August report contradicts his September statement to the Legislative Rules Committee and is also in direct contradiction to Vermont Yankee's original May 2009 filing with the Nuclear Regulatory Commission. This NRC report, entitled "*2008 Annual Radiological Environmental Operating Report*", indicated that the ENVY's nuclear power plant's storm drains are contaminated with radioactivity, which has been leaking into the Connecticut River since at least 1995. The August Department of Health surveillance report is inaccurate, which brings into question the accuracy of the Department of Health's entire ENVY monitoring program and dose assessment.

The following excerpts below, from the May 2009 ENVY Report to the Nuclear Regulatory Commission, clearly delineate radioactive releases to the Connecticut River from Vermont Yankee Nuclear power plant's buried underground pipe which were not identified in the August 2009 Department of Health report.

> "The presence of plant-related radionuclides in the onsite storm drain system has been identified in previous years at Vermont Yankee." (Page 49)

> "The highest detected concentration for all plant related radionuclides that were detected in the sediment samples was found in ... Manhole 12. …The sampling conducted in 2008 indicates that the presence of radionuclides in the storm drains has not changed significantly." (Page 50)

> "The presence of tritium in station air compressor condensate and manholes (Storm Drain System) has been identified since 1995... leakage of tritium to ground water beneath the site will be transported by natural ground water gradient to the Connecticut River." (Page 51)

> "Several sediment samples from onsite locations (from the plant storm drain system) had low levels of radioactivity resulting from emissions from the Vermont Yankee plant." (Page 112)

While these radioactive releases to the river are allegedly below Nuclear Regulatory Commission limits, the issue at hand is not the concentration of radioactivity, but rather that the Department of Health failed to report these releases to the State, and that ENVY denied the existence of *"contaminated" buried underground pipe* to the Public Oversight Panel for legislative review. Fairewinds Associates, Inc has three concerns regarding these inaccuracies.

1. If these radioactive releases are not being correctly tallied and reported, how valid is the remainder of the Department of Health monitoring program?
2. As it stands, the Vermont Yankee Public Oversight Panel Report is inaccurate because it does not include the legislatively mandated complete vertical slice inspection of Vermont Yankee's "underground piping system that carries radioactivity" that was defined in Act 189.
3. These contaminated pipes will add significantly to the cost of decommissioning Vermont Yankee Nuclear power plant, even though their releases are claimed to be below Nuclear Regulatory Commission limits. None of these factors have been considered in the overall decommissioning analysis and cost projections.

Self-reporting[3] is one of the tenets of nuclear law. Since less than 5 percent of all nuclear plant reports and calculations are inspected by the Nuclear Regulatory Commission every year due to a shortage of funding and inspectors, the Nuclear

[3] Nuclear Self-Reporting: Between 1997 and 1999 the Nuclear Regulatory Commission worked on developing new protocols now called the Reactor Oversight Process. During the review of the aforementioned Reactor Oversight Process, Nuclear Regulatory Commission senior managers informed the NRC Chairman and the Commissioners that NRC inspectors audit only about five percent of the daily activities at a typical nuclear power plant. This gives nuclear licensees an inordinate amount of control to determine on their own how to qualify and quantify a nuclear incident. Nuclear licensees must promptly and truthfully report all incidents and releases to the Nuclear Regulatory Commission in order for the NRC's system of regulation to work.

Regulatory Commission and other monitoring agencies throughout the country rely upon each energy company or utility *to accurately self-report any incidents and infractions*. While it is true that ENVY did report this contamination to the Nuclear Regulatory Commission in May 2009, and maybe at other times in the past, this data was withheld from the Vermont Yankee Public Oversight Panel, which was mislead to believe that the only contaminated piping was from one single, small drain line in the chemistry lab which was capped years ago.

Fairewinds Associates, Inc did ask Entergy Nuclear Vermont Yankee about these opposing reports and inconsistent data regarding Yankee's buried underground pipes. Mr. Dave McElwee, senior liaison engineer for Entergy responded in August via email with the following statement.

> "As for your outstanding question on underground piping goes, Act 189 requested that an underground piping system carrying radionuclide's be part of the inspection. Other than piping carrying gaseous material (with very low amounts of contamination and no median to contaminate the ground water which was the intent of this item from the legislature) we have none. Since this is not an item active in the review of CRA recommendations, we consider this issue closed."

In follow-up correspondence August 13, 2009 DPS John Carter said,

> "If you are correct that there are existing underground piping systems being used to carry radionuclides, then those should have been disclosed to us. Point being, if there are, they can still be looked at."

Issue 3.2

Microbiologically Induced Corrosion (MIC) in the Service Water System.

In lay person's terms, Microbiologically Induced Corrosion happens at Vermont Yankee nuclear plant when soil microbes from the Connecticut River enter the Service Water System and attach themselves to the inside of the pipe. These microbes create chemical reactions with the steel in the pipe that causes the pipe to narrow and weaken. An analogy would be a plaque build up in one's arteries.

When ENVY informed the Oversight Panel that there was no radiologically contaminated underground piping, the Oversight Panel substituted a technical review of the Service Water System. While NSA's assessment did not give the Service Water System a clean bill of health, my overall impression was that when the Panel wrote the report, the Service Water system was acceptable, but with some need for improvement.

> "Monitoring Plan for Service Water MIC- The Unit Reliability Team should closely monitor the Long Range Plan for SW System MIC through the period until MIC levels are reduced to plant acceptance criteria". *NSA recommendation #21*

During the Fall 2008 outage, repairs were made to the Service Water System, and NSA did not evaluate these repairs for its January 2009 report. Additionally, in June 2009 there was one leak in the Service Water System, which is of concern. The June 2009 Service Water System leak was due to Microbiologically Induced Corrosion (MIC), a form of internal corrosion in which microbes attack the steel. Since the Service Water System is safety and reliability related, MIC is a major concern to the reliability of the Vermont Yankee Nuclear power plant. The Service Water System cools most of the safety related components inside the plant, similar to the way a water pump cools one's car engine. Losing an automobile water pump causes the car engine to stop, and a similar cooling function is performed on safety and non-safety systems by the Service Water System.

In light of the June 2009 leak, Fairewinds examined the Service Water System in more depth during the September 14, 2009 meeting with Fairewinds, the Department of Public Service, its contractor NSA, and ENVY held at the nuclear plant. This post-leak review of the Service Water System raises more questions about Service Water System integrity than were addressed in the March 2009 Panel report to the Legislature. The new information reviewed by Fairewinds Associates, Inc is based upon information created following the 2008 outage and after interviews with ENVY had ceased.

This information was provided to the September 2009 meeting attendees in response to ENVY's proposed corrective actions relating to the Service Water System. Briefly, the following comments are culled from Entergy documents that were of concern to me during my September review.

1. A single systemic problem plagues the service water system. It is "Microbiologically Induced Corrosion" (MIC) on the inside of pipes.
2. The trend in service water failures appears to have accelerating during the last three years. There have already been 5-thru-wall leaks in the Service Water System in 2009, while only 4-thru-wall leaks for all of 2008 and 3-thru-wall leaks for all of 2007.
3. In January 2009, there was a leak in the Standby Fuel Pool Cooling system, and "extensive MIC on the welds" was found after the fact.
4. In June 2009, there was a pinhole leak in the Service Water System traveling screen wash. In response, ENVY documents state that "Service Water screen backwash piping in need of replacement".
5. While ENVY documented 5-Service Water System leaks in 2009, no documentation was available regarding the other 3-Service Water System leaks.
6. Entergy documents identify that the Service Water "System performance monitoring is red" meaning that "trends not acceptable and are declining".
7. "MIC has been responsible for restrictive flows, caused by tuberculation [nodules found inside the pipes] in piping, components and through wall leaks." [Added]
8. Some 8-inch service water pipes were found to be "40% occluded" due to MIC.
9. Most of the Service Water System is made from carbon steel which means that "Existing established MIC is difficult to control or eliminate" due to the piping material used in the Service Water System. While there are materials that can withstand MIC, they are several times more expensive than carbon steel.

10. There are "major obsolescence/aging issues" in the Service Water System including "degraded welds and leaks".
11. "UT [Ultrasonic Testing] equipment is not state of the art and is barely adequate for a quality MIC exam". Given the critical nature of the Service Water System upon plant reliability and the Service Water System's history of MIC, a high-resolution inspection would ascertain the reliability of the Service Water System and therefore the overall reliability of the Vermont Yankee Nuclear power plant.
12. "Significant wall thinning of the SW supply piping was identified".
13. ENVY states that they are planning major capital expenditures to the Service Water System during the next several outages in order to remove and replace the corroding carbon steel pipe with new carbon steel pipe.

ENVY's schematic of the Vermont Yankee Nuclear power plant's Service Water System, attached at the end of this report as Appendix 1, illustrates how the Service Water System impacts plant reliability. The Reactor Building Closed Cooling Water System, the Emergency Diesel Generators, and the Residual Heat Removal heat exchangers all depend upon Service Water System. With MIC posing a common mode threat to the Service Water System, the Vermont Yankee Nuclear power plant may experience a significant reduction in reliability due to major portions of its piping system that may need replacement.

In January 2009, DPS consultant NSA informed the Panel that ENVY had established a long-range plan to resolve its Service Water System problems. Furthermore, NSA suggested continuous monitoring and evaluation of ENVY's proposed Service Water System changes. However, the increased leaks and MIC issues in the Service Water System coupled with the 13-items identified above leads Fairewinds Associates, Inc to recommend a further review of this critical reliability related system.

Issue 3.3: Entergy Hiring Freeze

Entergy's new corporate-wide hiring freeze should also be a concern to the Vermont Legislature in its assessment of the Vermont Yankee Nuclear power plant's reliability. With the exception of guards and reactor operators, the Nuclear Regulatory Commission does not determine the appropriate number of personnel at any given nuclear power plant. However, if a nuclear plant's performance and reliability begin to decline then the Nuclear Regulatory Commission reviews plant-staffing levels, according to Nuclear Regulatory Commission Region 1 spokesperson Neil Sheehan.

> "As an example, said Sheehan, if engineering staff is reduced to the point where equipment is suffering breakdowns, that can affect a plant performance indicator. That can lead to increased oversight as part of the NRC's Reactor Oversight Program." *Brattleboro Reformer, September 17, 2009*

Because staffing levels at ENVY are a major area of concern to the Panel, we made note of its concern in its report to the Legislature. The following direct quotes from the report detail the Panel's concerns.

> "Staffing turnover issues – VY is experiencing higher staff vacancies and turnovers than in its earlier history. This staff turnover is a new challenge to VY, and it makes other recommendations, such as procedure quality, adherence to procedures, and change management, all the more important." (Page iv)

> "The staffing comparisons show that VY's authorized staffing levels, including long term contractors, are reasonable with respect to the industry and with respect to sister plants. That said, it is important that ENVY aggressively pursue filling the empty positions. The Report also suggests that ENVY should give attention to the workload of those system engineers/managers assigned to oversee system performance because they may be overloaded." (Page 20)

> "Staffing Turnover Issues - According to NSA, ENVY has about forty vacant positions in its existing organization, or about an 8 percent shortfall. This staff shortfall is further compounded by turnover and attrition of experienced personnel. For example, the Component/Programs engineering group had a 40 percent turnover last year alone. In addition, a significant number of employees are

> approaching retirement age. Due to the twelve vacancies in the Engineering Department, some system engineers are responsible for six systems while the norm in the industry is for a System Engineer to have oversight responsibility for an average of two to four engineering systems. High turnover also means that many staff members in key areas are relatively new ENVY employees. According to the NSA team's assessment, 85 percent of the auxiliary operators, 86 percent of the instrumentation and control engineers, and 57 percent of the Electrical staff have worked at ENVY for three years or less. The team also observed that more than 16 percent of ENVY engineers have less than 3 years at the VY nuclear plant. The NSA team observed that "based on interviews with system engineers, it was concluded that due to station challenges and personnel turnover, the ability to develop and maintain current monitoring plans was often a challenge." The Panel concludes that staffing turnover creating a less experienced staff makes the other recommendations in this Report all the more important." (Page 32)
>
> The NSA Report also indicated too great a reliance on individual experience and relationships, and that behavior on occasion is not driven by programs, processes, and procedure adherence. Thus improvements are needed in management leadership to achieve more consistent and improved performance. This is especially true as the work force is changing and the challenges of a maturing physical plant need to be worked in a more integrated and assured manner to maintain reliability. (Page 42)

Compared to other reactors, operating staff levels at ENVY are not in the top quartile in the industry but are considered acceptable and "authorized" by ENVY and Entergy. It is important to note that the Panel felt that "authorized" staffing levels may be adequate for the long term, but that the Panel identified a need for staff beyond the "authorized" levels to implement the solutions to the challenges facing ENVY for license renewal including its 80-action-item list. In clarification of this issue, the Panel said,

> "Although the current authorized staffing levels seem appropriate for routine operations, the suggestions for improvement contained in the NSA Report point to the need for some additional temporary staffing to achieve these improvements particularly in the areas of training, procedure upgrades, use of operations experience, and

> improvement of system engineering. With the numerous age management programs required for any post-2012 operation, consideration of temporary staffing to assure successful implementation of improvements and avoid incidents such as the transformer fire and cooling tower collapse is warranted. (Page 20)

In 2008, ENVY hired approximately 80 new employees, not including any members of the security force. When the NSA report was written, ENVY was still approximately 40 personnel below its "authorized" levels. ENVY has continued to hire new employees following the DPS supervised assessment reviewed by the POP, yet VY is still approximately 12 people below its *authorized* staffing levels.

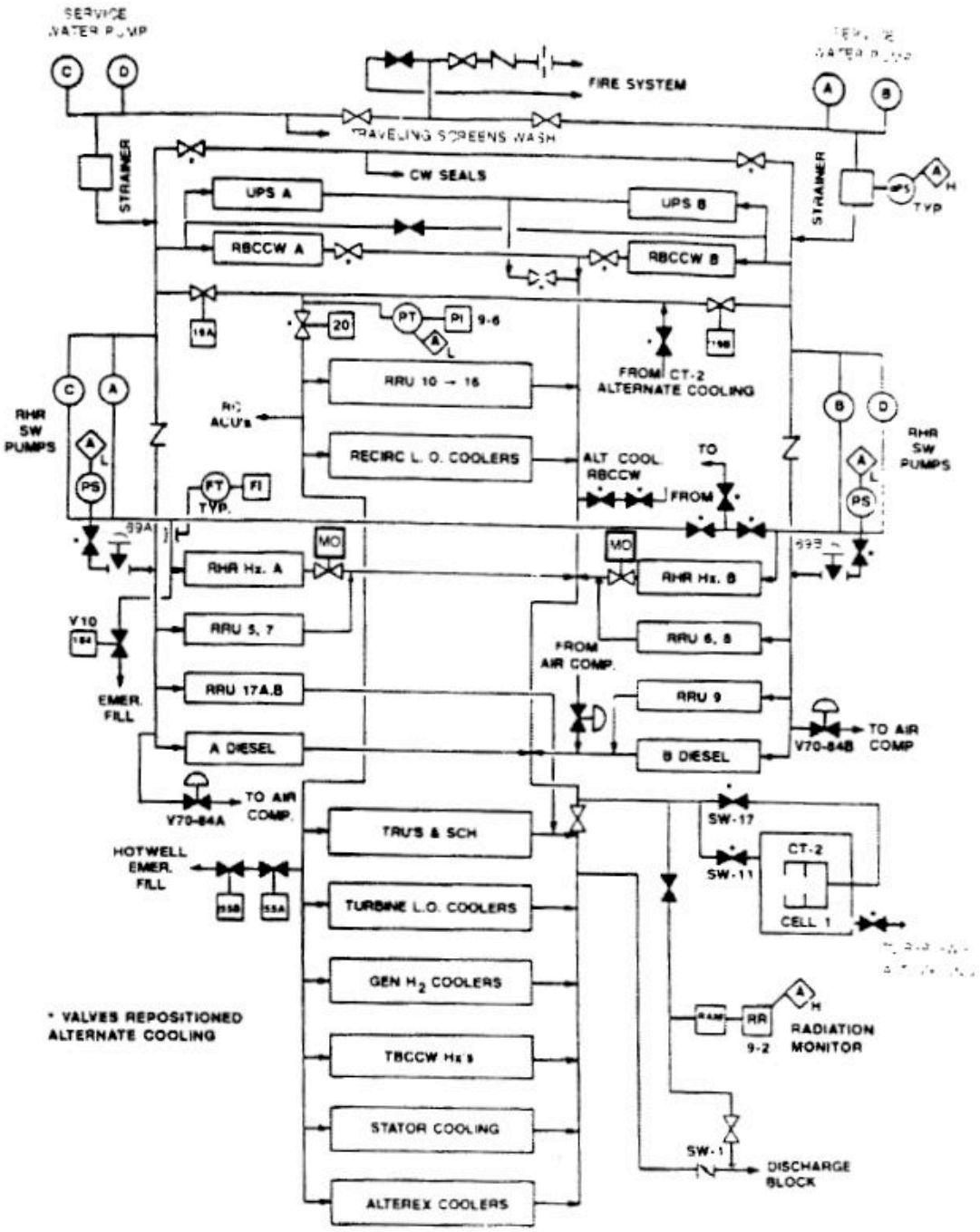
As a result of a 16 percent drop in profits, Entergy Corporate announced a corporate-wide hiring freeze beginning in September for every subsidiary including ENVY.

> "Entergy's hiring freeze is system-wide, said Alex Schott, an Entergy spokesman located in New Orleans, "But there are business critical positions that would get waivers." Those positions are related to safety, reliability or customer service, he said, which might be jeopardized if those jobs were left vacant." *Brattleboro Reformer, September 17, 2009*

While ENVY is now only twelve people below its *authorized* staffing level, the Vermont Yankee Public Oversight Panel stated in its report that *authorized* staffing levels are too low to also accommodate the problems reviewed by the Panel and outlined in its report. In my opinion, if recessionary pressures continue to suppress electric load growth in all of Entergy's subsidiaries, it is possible that with its focus on profit margins, Entergy may not release its hiring freeze. Should the hiring freeze extend for more than one quarter, Fairewinds Associates, Inc believes that ENVY may have great difficulty remediating its 80-action-item list due to insufficient personnel.

Appendix 1

Service Water System and Alternate Cooling System Schematic



Service Water System and Alternate Cooling

State of Vermont
Department of Public Service
112 State Street
Drawer 20
Montpelier, VT 05620-2601
TEL: 802-828-2811

FAX: 802-828-2342
TTY VT: 800-734-8390
email: vtdps@state.vt.us
http://publicservice.vermont.gov/

July 15, 2009

Michael Colomb
Site Vice President
Vermont Yankee Nuclear Power Station
P.O. Box 250
Governor Hunt Road
Vernon, VT 05354

Re: Compliance issues

Dear Mike:

I was distressed to learn from my staff that Entergy Nuclear Vermont Yankee (Entergy) has not been on top of some compliance issues, but appreciate that you are self-reporting these problems. This letter is to outline those omissions and ask you to respond with precisely how Entergy will ensure this will not happen in the future.

First, the Memorandum of Understanding (MOU) entered into by Entergy and the Department required that:

> The Company will monitor the temperature of each cask located on the DFS pad continuously using an electronic-monitoring system contemplated by the Company's current DFS-system design. Monthly, the Company will manually conduct radiation surveillance on each such cask. The DPS and Company, in consultation with the Department of Health, will develop a protocol for reporting the results of such monitoring and surveillance to the DPS and the Department of Health.

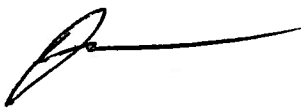
Entergy has been doing the continuous temperature monitoring of the casks but had not been performing the monthly manual radiation surveillance on each cask. You have been monitoring at the site boundary so that would catch any radiation increase, but the MOU specifically required a monthly manual radiation surveillance which has not been done since the five casks were placed on the pad in mid-2008. On top of that, in January of 2009 when the State Nuclear Engineer asked Entergy via electronic mail about the monitoring, he was told he could review the information at the site. This certainly implied that the monitoring was taking place, but we find out months later that it had not

been done.[1] As regulators we need to depend on the utilities we regulate. Without the active cooperation of the utilities, our job to regulate becomes much more difficult and we have to keep uncooperative companies under constant surveillance. I understand that you are checking each of the MOUs entered into between Entergy and the Department to ensure that all other requirements are being fulfilled. Please let me know if that review turns up any other incidences of non-compliance.

Second, the Department is going to carefully monitor your compliance with the recommendations of the Comprehensive Reliability Assessment (CRA) and the Public Oversight Panel (POP). My understanding is that Entergy did not have much in the way of compliance documents for the engineers to review earlier in the month. I am puzzled by that since it is important for the Department to see progress on this in order for us to have any confidence in the prospect of license renewal. Please redirect your team to take seriously the need for complete and accurate documentation of each and every compliance item. We hope on the next engineering team visit from the DPS, that there will be much more comprehensive progress made toward compliance on the CRA/POP recommendations.

Thank you for your attention to these issues. I hope to hear from you about positive progress on each of them.

Very truly yours,



David O'Brien
Commissioner

[1] I will be dealing with my own staff and procedures as to why the reporting protocol referenced in the MOU was not put in place.

Appendix 3

Timeline of Events (Review Ongoing)

1. January 2009: *A leak in feedwater system*. The feedwater system feeds water from the condensate system into the reactor; this is part of the continuous piping loop that sends water out of the reactor, through the turbine and back into the reactor. The feedwater system leaked due to the failure of an old pipe plug installed in 1971 at the junction between the weld and the main feedwater pipe. This leak was repaired and necessitated a 50% reduction in power output. This is an age related issue.
2. January 2009: *A leak in check valve bonnet in the reactor water clean up system*. This leak is located in a critical safety-related pipe. ENVY made four temporary repair attempts before the leak was stopped. The leak has been fixed temporarily, and will necessitate full repair at the next outage during Spring 2010. A Nuclear Regulatory Commission (NRC) review stated that poor maintenance on this valve during the fall 2008 outage caused this valve to leak.
3. February 2009: *A leak in the demineralizer body in the reactor water cleanup system has been re-welded*. This is a safety and reliability related system that cleans the reactor. This age-related leak developed in the vessel in which the demineralizer is located.
4. May 2009: *The condenser tube leak was first identified but not repaired*. Unfortunately, this problem *allowed river water to enter the condenser*, which negatively impacts water chemistry and puts an additional burden on the plant clean-up systems. Water chemistry is a critical part of the nuclear plant's operating criteria.
5. June 2009: *A leak in a service water pipe due to microbiologically induced corrosion (MIC)* is also an age related problem, which is endemic in the service water system.
6. June 2009: *The "A" recirculation pump motor-generator unexpectedly reduced power from 98.2 percent to 88.5 percent*. The pump's speed controller locked up, preventing the operators from changing its speed. While repairing this problem,

the plant reduced power to 25 percent and also fixed the condenser leak, which first began in May and impacts water chemistry.

7. July-August 2009: *Bi-weekly power reductions to as low as 86 percent power due to chlorination of the condensers to avoid fouling of the condenser tubes during the summer months.* Several times per week the power has been reduced to allow for this chlorination, which seem to be more frequent than in previous years.
8. August 2009: ENVY announced that *monthly radiological monitoring of the new dry cask storage for spent fuel has not been conducted.* ENVY formally notified the Vermont Public Service Board of their error. Monitoring of the dry casks is a required condition of the 2008 Memorandum of Understanding (MOU) between the State of Vermont and ENVY, so that ENVY could have approval for storing its spent fuel outside its current fuel pool storage facility. ENVY has also acknowledged that the required development of a protocol for reporting the results of cask temperature and radiation data to the Vermont Department of Public Service has not yet been developed. Fairewinds believes that this failure to comply with the MOU is indicative of a management breakdown within ENVY.

Appendix 4

ENVY 80-action item progress matrix

Recommendation	CA #	Response Status	DPS Comments	Fairewinds Comments
1.0 **Procedure Quality (refer to Executive Summary & Sections #1.31 & 1.33)**				
1a Identify the full scope of procedure upgrades	80	State Review Complete		Note 1 [at end]
1b Develop a detailed schedule which determines which procedures will be completed in order of priority.	81	State Review Complete		Note 1
1c Develop a detailed change management plan with sufficient detail to manage the overall process and ensure its completion.	82	State Review Complete		Note 1
2.0 Human Performance (refer to Executive Summary & Sections #1.2.5, 1.31, 1.33) **Develop a Human Performance improvement plan which addresses the following areas:**				
2a-1 ***Procedure Use and Compliance***: Complete the development of a procedure use and adherence improvement plan which is currently in progress. Implement and track results through the use of specific performance indicators.	83	State Review Complete		Note 1
2a-2	84			No Title Provided
2b-1 ***Procedure Use and Compliance***: Complete the development of a procedure use and adherence improvement plan which is currently in progress. Implement and track results through the use of specific performance indicators.	85	State Review Complete		Note 1
2b-2	86	State Review Complete		Note 1 No Title Provided

2c ***Foreign Material Exclusion (FME) and Housekeeping Practices*** The Housekeeping and FME Programs at ENVY do not meet industry standards. Plants with good FME programs have high standards for housekeeping and FME controls. The low number of Condition Reports (CRs) identifying poor worker practices associated with FME indicates an inadequate threshold for identifying FME and Housekeeping issues. ENVY should develop a FME focus and improvement plan. The plan should include individual department actions and performance indicators.	87	State Review Complete		Note 1
2d ***Human Performance Awareness*** As part of the Human Performance improvement plan, ensure that the Condition Report Review Group and site personnel understand the importance of identifying Human Performance issues when creating and evaluating Condition Reports.	88			
3.0 **Condenser Short Range Reliability Improvement: (refer to Executive Summary & Section 2.4.13)**				
3a ***Short Term Condenser Reliability Planning*** - Create a short term plan for condenser improvements until the option to re-tube or replace the condenser with erosion resistant materials is made after the decision for plant license extension. This plan should clearly identify the risks mitigated as a result of implementing the action plan.	89	State Review Complete		Note 1
3b ***Long Term Condenser Reliability Planning*** – The Entergy Long Range Condenser Asset Management Plan includes line item budgeting for the ENVY condenser replacement to address this reliability challenge. However, implementation is contingent upon ENVY	90	Open	Past Due Date	

receiving approval for license extension. The fully developed detailed plan for condenser replacement should be fully developed in anticipation of the approval so that implementation can be expedited as soon as possible subsequent to the approval of license extension.				
4.0 **Cooling Tower Inspection Plans: (refer to Executive Summary & Section 2.5.13)** Re-evaluate on-line inspection methods and the repair plan/schedule for safety and non-safety related CT cells to ensure long term reliability especially considering that the current plan is based on system conditions that are now known to be degraded beyond their initial assumptions as determined during RFO 27 inspections.	91	State Review Complete		Note 1
5-1 **Prepare Spare Transformer in "Ready Status": (refer to Executive Summary & Sections 2.1.7 & 2.1.13)**	92			
5-2 Develop a strategy and specific action plan with completion dates for the spare main transformer to address gassing issues that existed at the time of replacement and the fact that it is rated at only 80% of the current rated output of the plant. Ensure that the spare transformer is in a "ready status" in case of failure of the in-service main transformer.	93			
6a-1 ***Equipment Reliability Index Metrics (ERI)*** **-** Continue to utilize and evaluate the 'ER Index' (ERI) as part of the Monthly Management Review Meeting and to improve equipment performance. Focused improvements targeted at the specific ERI indicators that are influencing the loss of ERI points should be developed. Identify the specific actions and include these in the ENVY and overall Entergy Equipment Reliability	95	Present to State	Review in Progress	

Improvement Initiative.				
6a-2	96			No Title Provided
6a-3	97			No Title Provided
6b-1 ***System and Component Engineering Staffing and Expertise -*** Continue to attract and retain qualified, experienced personnel in the Systems & Component/Program Engineering Groups. Track the specific reasons/causes for positions evacuated and for rejected offers to better understand and address the specific causal factors.	98	State Review Complete		Note 1
6b-2	99	State Review Complete		Note 1 No Title Provided
6c-1 ***System Health and Performance Monitoring -*** Although ENVY manages system health in a matrix approach, assure that roles and responsibilities are clearly defined and there is single point accountability for ensuring system health. Re-evaluate the System & Component Engineering training programs to ensure that these will be sufficient for lesser experienced personnel expected for training in the future.	100	Present to State	Review in Progress	
6c-2	101/102	Present to State	Documents not Presented	No Title Provided
6d ***System & Component Health Monitoring Procedures -***Evaluate the System & Component Health Monitoring procedures to ensure that guidance is provided for each and every expected information and communication point between the System and Component Engineers (eliminate dependence on people relationships to drive the information exchange and communication).	103/104	Open	Past Due Date	
6e ***Improving System Walkdowns & Notebooks -*** Inconsistencies exist for system performance monitoring, system walk downs, and system notebooks. It is recommended that ENVY clarify the expectation for use and form of checklists to	105/106			

be used for walkdowns and for system notebooks and re-train each system engineer on the expectations. The corporate ER organization should perform an assessment after a predetermined time period to evaluate quality and consistency.				
6f ***Automation of Component Health Reports -*** There is no standard software applied at ENVY or across the Entergy fleet that easily enables the capture of individual component health reporting. Unique Excel spreadsheets are used at ENVY to document component health. Capture of component case histories and sharing of component health and case histories is not easily enabled without a common software/database and process. The corporate Equipment Reliability organization has identified this as a future program enhancement initiative but no formal plans are in place. Entergy has a license for a commercial software application that is recognized as an industry good practice and should be evaluated for implementation to allow for increased information storage and communication between system and component engineers.	107			
6g ***Long Term Asset Management Processes -*** The Long Term Asset Management processes at ENVY include refurbishment and replacement strategies, aging & obsolescence management and capital budgeting. Many fleet standard processes and procedures relating to Long Term Asset Management have been recently developed. The implementation of some of these processes/procedures as they apply to the six selected systems is not yet complete at ENVY. Some application inconsistencies were observed across the six systems. It is recommended that the Entergy Corporate ER group work closely with the ENVY site personnel to ensure effective	108			

implementation of the Long Term Asset Management processes.				
6h ***Develop an ER Process Procedure*** - An overall ER Process procedure does not yet exist across Entergy or at ENVY that integrates each of the individual ER sub-process procedures. There is an initiative identified by the corporate ER Manager to create this document in the near future. It is recommended that this process description be developed and implemented at ENVY.	108/9	Open	Past Due Date	
6i ***Implement a Fleet-wide Standard PM Database*** - ENVY has not yet converted to the Entergy fleet-wide standard PM task/bases database which limits sharing of information. Also an initiative is currently underway at ENVY to re-visit various PM templates within the database to compare these against industry standard PM templates. It is recommended that Entergy Corporate ER work with ENVY to transition to a fleet common database to allow for more effective sharing of information and lessons learned regarding PM tasks/effectiveness.	110	Open	Past Due Date	

6j ***Change Plans for Fleetwide System Health Monitoring*** - The process for system health reporting at ENVY is governed by a recently created Entergy Fleet Procedure EN-DC-143 (August 2008). There was a change management plan created for the roll out of this procedure; however, the NSA team did not believe that the change plan contained adequate detail to ensure effective implementation. It is recommended that the change plan be re-evaluated to ensure it includes: • Detailed communication plan • Clear dates for implementation milestones • List of performance measurements Identification and mitigation strategy for risks	111			
6k ***System Performance Monitoring Improvement -*** The System Performance Monitoring Program is primarily governed by EN-DC-159 System Monitoring Program. The process for creating and implementing performance monitoring plans were inconsistently applied among the system Engineers. It is recommended that ENVY create a focused initiative to ensure consistent application of Performance Monitoring Plans consistent with the newly created fleet-wide procedure.	112	Open	Past Due Date	

7.0 **Change Management Planning Improvement (refer to Executive Summary & Section 1.1)** Detailed Change Management plans should be developed to ensure timely and effective implementation of major changes. These plans should include elements such as: • Detailed communication plan to inform targets and stakeholders • Clear accountability/dates for key implementation milestones • List of performance measurements that will indicate impact of the change • Method to check for compliance after implementation • Identification and mitigation strategy for risks (barriers) ENVY should consider assessing the effectiveness of use of the change management planning process and if required perform the appropriate education/re-training for effective application. Specific initiatives identified as part of the Reliability Assessment that should be reviewed for adequacy of change management planning include:				
7-1	113	Open	Past Due Date	No Title Provided
7-2	114			No Title Provided
7a-1***An integrated 'Fleet Transition Plan'*** - to drive full integration of ENVY into the fleet. A step-by-step plan to go from 'Good to Great' should be developed. The plan should include the Corporate organization's roles in providing Governance and Oversight during the process.	115			

Improve Contractor Oversight (refer to Executive Summary & Sections 1.3.3 & 2.5.8) Contractor Oversight is provided from two organizations at ENVY - Maintenance and Engineering Project Management.				
7a-2	116			
7b ***Procedure Upgrade Project Change Plan*** – to include all site organizational groups, common procedure writers' guides, priorities, etc	117			
7c ***Implementation of EMPAC to INDUS*** **–** this initiative should be evaluated to determine specifically what enhancements are required to the change management plan to enable a successful completion of the transition from one system to the other.	118			
7d ***Transfer of Switchyard Ownership*** - Assure that ENVY develops a Change Management plan is developed for the upcoming proposed transition to Vermont Electric Power Company (VELCO) for operating and maintaining the high voltage switch yard. The plan needs to address all appropriate items, specifically the bases for maintenance tasks required, a prescribed PM task template, and the switchyard relay modifications planned which have been delayed in anticipation of the change of ownership	119			
8a ***Contractor Oversight Practices Evaluation*** - ENVY should perform develop a plan to standardize the processes, procedures, project management, and training for ENVY and Contractor personnel involved with managing projects at the site.	120			
8b-1 ***Improved Application of EN-MA-126*** - To ensure consistent contractor oversight, the expectations for use of Entergy Procedure for Control of Supplemental Personnel EN-MA-126, has to be made clear and reinforced periodically by ENVY Management. This should include	121			

8b-2	122			No Title Provided
9 **Corporate Fleet Managers Governance & Support Process (refer to Section 1.1)** Develop a process to monitor the fleet manager concept that has recently been implemented. Progress should be measured against defined goals and deadlines to assure that Peer Groups are developing fleet best practices and making continuous progress.	123			
10 **Leadership, Setting Goals and Direction (refer to Section 1.2.1)** Entergy Corporate should develop a comprehensive plan to integrate ENVY in to the fleet concept. The Change Management plan should identify opportunities to leverage the benefits for ENVY to be part of the fleet and improve operations.	124	Open	Past Due Date	
11-1 **Organization and Staffing Plan (refer to Section 1.2.3)** Develop an overall plan to address high number of new personnel. The plan should include training, better procedures and additional oversight to minimize the potential for errors that could impact reliability. Review the succession planning process and identify opportunities for line management to more effectively utilize the process.	125			
verifying that personnel are using checklists in the procedure. ENVY should also consider yearly re-qualification for individuals performing contractor oversight.				
11-2	126			No Title Provided
12 Monitor Training Workload Develop a process and indicators to monitor the high training workload for the next 3 to 5 years to assure that quality of training does not suffer;	127			

especially in the auxiliary and licensed operator initial training programs, I&C initial training, and 2 ESP classes.				
13 Evaluate Corrective Action Program Evaluate the Corrective Action Program and consider the following recommendations:	128			
13a ***Increase Utilization of Effectiveness Reviews*** - particularly for CR's dealing with programmatic issues	129			
13b ***Apply the CR Interim and Periodic Review Process*** – for routine application to CR's dealing with programmatic issues.	130			
13c ***Apply the Human Performance Error Review (HPER) process*** - to any CR that has identified a Human Performance issue.	131			
13d-1 ***Perform a more thorough analysis of issues associated with non-NSSS and non-nuclear safety equipment/systems*** - to assure consistency and an appropriate level of conservatism in decision making. Utilize the Human Performance 'Devil's Advocate' tool with these systems on a more routine basis.	132			
13d-2	133			No Title Provided
14 **Continuous Improvement – Self-Assessment (refer to Section 1.2.5) -** Evaluate the effectiveness and timeliness of corrective actions dealing with programmatic issues to determine if they have been as rigorous as technical issues.	135			
15-1 **Continuous Improvement – Operating Experience (refer to Section 1.2.5) -** Evaluate the process to identify work-specific OE which is presently left to the supervisors to identify and collect which may lead to inconsistent utilization. Industry practice at some nuclear stations is to include job-specific OE into individual Work Orders for ready reference by workforce personnel, thereby relieving the first-line supervisor of this administrative burden.	LOCA 80			

15-2	136			No Title Provided
16 **Operations – In Plant Tracking Program (refer to Section 1.3.1) -** Develop a formal tracking program for temporary equipment in the plant. Items such as catch containments, temporary electrical power supplies, hoses and barrels containing liquids were observed with no tags to identify the responsible individual/group, date placed in the plant, and why it was placed in the plant.	137			
17a-1 **Operations – Human Performance Improvements (refer to Section 1.3.1) -** Create an improvement plan to address the following Human Performance areas: ***Increase Oversight of Operations staffing -***. The Operations Department is implementing a plan to fully staff the operations organization and fill existing vacancies. This is critical for operations to reliably operate the plant and to effectively transition to the new NRC work hour rule to be implemented by October 2009.	138			
17b ***Improve Procedure Use and Compliance by Operators***	139			
17c ***Improve Procedure Quality*** - Completion of the procedure upgrade project is important for error free operations. This is especially important with the large number of new operations personnel projected to assume on shift positions	140			
17d ***Improve Equipment Tagging Preparation and Application***	141			
18 **Staffing Plan for Design Engineering (refer to Section 1.3.2) –** A formal staffing plan for Design Engineering should be created to address staffing issues that may occur due to retirements and attrition over the next five years.	142			

19 **Maintenance Action Plans (refer to Section 1.3.3) -** Develop detailed action plans to address the following areas: • Housekeeping and FME Controls • Loss of experienced maintenance personnel, and resultant additional training required • Slow progress on procedure upgrades The amount of work categorized as 'elective' and 'other' maintenance work tasks and slow progress in reducing the backlogs	143			
20 **Work Control Accountability (refer to Section 1.3.4) -** Provide additional oversight and accountability for the Work Management process to meet goals; specifically in the areas of communications, planning, work package quality, and schedule adherence.	144	Open	Past Due Date	
21 **Monitoring Plan for Service Water System MIC (refer to Section 2.6) -** The Unit Reliability Team should closely monitor the Long Range Plan for SW System MIC through the period until the MIC levels are reduced to plant acceptable criteria.	145	Open	Past Due Date	
22 **RHR System Availability Assurance (refer to Section 2.3) -** The unavailability of the RHR system due to cooling tower CT2-1 unavailability is causing the RHR system to be close to the threshold that would impact its Maintenance Rule status. The URT should maintain this as a focus area until improved, as well as include it as a monthly indicator review at the MRM.	146	State Review Complete		Note 1
23-1 **Residual Heat Removal Valve Leakage Trending (refer to Section 2.3.8) -** Trend valve leakage to identify valves that have the potential	147	State Review Complete		Note 1

for failing their local leak rate test. Create contingency work orders to repair valves during the next Refuel Outage instead of deferring them for future outages.				
23-2 "	148			No Title Provided
24 **Primary Containment System (refer to Section 2.8) -** The Primary Containment Structure and its components must be continually monitored and assessed during plant operation and during refuel outages. Detailed visual and non-destructive examinations per the requirements of the ENVY In-service Inspection Program need to be continued at a high performance level for the life of the station. Trending of potentially degraded areas and early identification of adverse conditions can mitigate issues affecting station reliability.	149	Present to State	Documents not Presented	
25 **Cable Separation Database (refer to Section 2.10) -** Transfer the current cable database into an industry accepted computer data management system to assure long term compliance and effective design control.	150			
26 Transfer of Cable Separation Program Develop a plan for transfer of the cable separation program and Appendix R Safe Shutdown Program from the Electrical Group to the Programs and Components Group. Ensure the proper transfer of knowledge considering the prolonged evolution of cable separation requirements over time.	151			
27a **Large Electrical Motor Program Improvements (refer to Section 2.11)** ***Procedure Guidance for Large Electric Motor Starts*** - Within each operational procedure is a precautions and limitations section which typically includes the number of allowable motor starts within a given timeframe. ENVY does include this motor precaution in its procedures;	152			

however they are inconsistent in content. It is recommended that ENVY review procedures that provide guidance for allowable large electric motor starts and ensure that the guidance is consistent in content.				
27b ***EMI and Partial Discharge Testing*** - Investigate the use of EMI and Partial Discharge testing for inclusion into the motor testing routine.	153			
27c ***Motor Component Engineer Position Succession Plan*** - Enhance the Succession Plan for the Motor Component Engineer position to ensure the effective transfer of knowledge and information to any potential successor.	154			
28 **FAC Program Improvement (refer to Section 2.12) -** Future continuation of current testing methods should be monitored to ensure that no FAC issues develop over time. It may be beneficial for ENVY to have an independent assessment of the FAC program in the near future to validate current practices and identify program enhancements that would contribute to further insuring equipment reliability. Consider industry experts such as EPRI or others to perform a FAC program assessment.	155			
29 **Crane/Hoists Program Improvement (refer to Section 2.13) -** It is recommended that the current focus on resolving crane related issues at the ENVY station continue until actual performance improves over the long term. This should include, during review of the Reactor Building Crane MR (a) (1) recovery plan, consideration to expedite corrective actions e.g. Crane control system upgrades. Continue to monitor and trend minor crane/hoist related issues.	156	State Review Complete		Note 1
30 Monitor for Increasing MSIV Leakage (refer to Exhibit DPS-Panel-2 Item #12) - As-found MSIV leakage data was reviewed for the	157	Present to State	Documents not Presented	

past 6 outages. Review of the as-found leakage rate data for each individual valve or valve pair does not indicate a clear long-term trending of increasing leakage rates. As far as the number of failures increasing until ENVY changes the acceptance criteria, a noticeable trend may not as yet be able to be determined. The criteria changed for the RFO 25 outage. The leakage results from the RFO 25 outage showed only 1 failure using the pre RFO 25 (i.e. pre-Amendment 223) acceptance criteria. The leakage results from the RFO 26 outage showed no failures using the pre RFO 25 acceptance. The leakage rates experienced at RFO 27 were not in alignment with the leakage rates seen during RFO 25 and RFO 26. The condition report process at the station addressed the MSIV leakage test results for RFO 27. After the results of the condition report process are implemented at ENVY, it is recommended that additional data from future outages be examined to determine if an upward long-term trend in MSIV leakage rate performance is occurring.				
31 Rev 1 - **Revise design change process to better manage "At Risk" changes.** **[Ref. SEC 3.4.1, Public Oversight Panel Conclusions, Report of Public Oversight Panel, dated 3/17/09, Pg 22.**	158			
32 **Improve ENVY's assessment of operating experience** **[Ref. SEC 3.4.3, Public Oversight Panel Conclusions, Report of Public Oversight Panel, dated 3/17/09, Pg 26.**	159			

Note 1: Many items may be in the "State Review Complete" category that have long-term actions or require on-going monitoring by the Department of Public Service to assess the effectiveness of the actions taken. As such, a DPS Monitoring

Action Plan (MAP) will be developed to track and schedule these monitoring actions. Some of these actions will take several years to complete.

Note 2: Color-coding prepared by Department of Public Service (DPS).