U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No.: 50-271/90-12

Docket No.: 50-271

License No.: DPR-28

Licensee: Vermont Yankee Nuclear Power Corporation
Brattleboro, VT 05301

Facility Name: Vermont Yankee Nuclear Power Station

Inspection At: Vernon, Vermont

Inspection Conducted: October 1 - 5, 1990

Inspector: P. Drysdale, Sr. Reactor Engineer, OPS, DRS — Date: 11/19/90

Approved by: N. Blumberg, Chief, Operational Programs Section, Operations Branch, DRS — Date: 11/19/90

Inspection Summary: Inspection on October 1-5, 1990 (Inspection Report No. 50-271/90-12)

Areas Inspected: Routine announced safety inspection by one region based inspector to review the status of unresolved items and maintenance program weaknesses identified in the maintenance team inspection (Report No. 50-271/89-80).

Results: No deficiencies were identified. All unresolved items identified in NRC inspection 50-271/89-80 have been satisfactorily resolved by the licensee. Seven maintenance program weaknesses have been adequately addressed and improvements in these areas have been implemented, or are in progress.

DETAILS

1.0 Persons Contacted

Vermont Yankee Nuclear Power Corporation

J. Durborow, Operations Engineer
*R. Loprior, Maintenance Supervisor
R. McCullough, Assessment Coordinator
*R. Pagodin, Technical Services Superintendent
D. Phillips, Sr. Electrical Engineer
*D. Reid, Plant Manager
E. Taintor, Quality Assurance Coordinator
*R. Wanczyk, Operations Superintendent
M. Watson, Sr. I&C Engineer
T. Watson, I&C Supervisor

Yankee Nuclear Services Division

*R. Gippardi, QA Supervisor

United States Nuclear Regulatory Commission

*H. Eichenholz, Sr. Resident Inspector
T. Hiltz, Resident Inspector

During the course of the inspection, the inspector also contacted other members of the licensee's Operations, Technical and Quality Assurance staff.

*Denotes those present at the exit meeting on October 5, 1990.

2.0 Background

The NRC maintenance team inspection (MTI), report 50-271/89-80, identified one violation, three unresolved items, and seven maintenance program weaknesses.

This report provides a current status on all findings from the MTI and consolidates in one location all inspection activity conducted to date to follow-up on these findings.

3.0 Review of Maintenance Team Inspection Findings

To evaluate the licensee's response to the MTI findings, the inspector interviewed representatives and reviewed documentation that was revised or initiated in response to the findings. The resolution of some findings resulted in long term project efforts which extended over several months or years. If the completion of activities in response to the MTI findings had not yet been completed, the inspector identified sufficient management

commitments to implement activities and establish goals to ensure that the activities are tracked and progress monitored to ensure timely completion. The documentation reviewed to verify items described in this report are listed in Attachment A. In some cases, MTI findings have been closed by previous inspection activity. Their reporting here serves to consolidate and summarize the total of activities to date conducted to resolve the MTI findings.

4.0 Follow-up on licensee's actions to items previously identified in the Maintenance Team Inspection (IP 25597)

4.1 (Closed) Unresolved Item 89-90-01 - Potential for peeling drywell paint to clog the ECCS pump suction screens

The potential for the drywell liner topcoat material to adversely effect ECCS pump performance was originally questioned in 1983 by the NRC resident inspectors after a tour of the drywell revealed that large areas of the topcoat (epoxy paint) had blistered, peeled away, and fallen to the bottom of the drywell. The inspectors' concerns were increased during a subsequent inspection when another tour of the drywell revealed approximately 5% of the upper drywell topcoat had peeled away. The licensee's evaluation indicated that clogging of the ECCS pump suction strainers was not credible. Further NRC inspector concerns were expressed after it was determined that approximately 20% of the upper drywell surfaces had peeled away and excessive debris was accumulating at the bottom of the drywell. The licensee responded by correspondence (letter VY 89-124, 7/1/89) to an NRC request for formal documentation of the bases for their evaluation of this issue, and for the establishment of site instructions to conduct periodic inspections, scraping away peeled areas as necessary. UNR 85-40-02 was closed by NRC inspection report no. 50-271/87-02 after the licensee's actions were determined to be adequate.

During the maintenance team inspection in 1988, it was noted by visual inspection that many additional large areas (up to 1 ft. in diameter) of peeled and chipped paint existed on drywell surfaces. UNR 89-80-01 was generated due to inspector's concerns regarding both the amount of paint debris generated after an 18 month operating cycle, and the need for further NRC review of the licensee's evaluation of the potential for ECCS suction screen clogging. On August 2, 1990, the NRC (NRR/EMCB) issued the results of a safety evaluation performed to assess this potential. The report concurred with the licensee's evaluation and concluded that the amount of epoxy paint material likely to be transported to Residual Heat Removal and Core Spray system pump strainers during post-LOCA conditions would be insufficient to adversely effect pump performance. This evaluation is contained in Attachment 'B' to this report. Based upon these results, this item is closed.

4.3 Unresolved Item 89-80-02. Maintenance team inspectors developed a concern about personnel access to the drywell during transfer of spent fuel since lethal dose rates could be present in some locations if a postulated fuel drop accident occurred. Drywell access controls during refueling were also a general concern expressed by Inspector Follow Item 88-02-03. NRC inspection report 50-271/89-16 addressed this UNR; report 50-271/90-06 addressed both the UNR and the IFI and closed the IFI; and report 50-271/90-09 closed this UNR.

4.4 Unresolved Item 89-80-03 concerned the need for strengthening administrative controls over "tagouts" to specify methods for adding additional work parties to an existing tag. This item was closed by NRC inspection report 50-271/90-05.

4.5 Violation 89-80-04 identified three instances of the licensee's failure to follow procedures, for example, by not using the most current revision of calibration data sheets to document the calibration of a torque wrench. The corrective actions taken by the licensee to address this issue were reviewed by the NRC and the violation was closed in inspection report no. 50-271/90-05 after it was determined that the specific deficiencies had been corrected and that appropriate revisions to administrative procedures had been made to prevent recurrences.

However, after the MTI, one incident of out-of-date data sheets were noted to be in use at the site. In addition, in August 1990, the plant operations department authorized and issued a change to auxiliary operator round sheets adding an item to be checked during rounds. The change was made by a temporary clerk on a version which did not contain the last change. When copies of the form were added to the operations department files, forms which did contain the previous change were removed from the files and destroyed. This caused auxiliary operators to perform rounds for 4 days using incorrect round sheets. Potential Reportable Occurrence (PRO)-26 was issued to determine if this incident was reportable to the NRC; however, it was not.

The inspector reviewed the existing administrative controls and the long term corrective actions identified in the licensee's response to violation 89-80-04 (letter BVY 89-58, June 30, 1989) to determine if current instructions for processing revisions were adequate to prevent the use of outdated forms to perform work or to create official records. The inspector also interviewed the maintenance, I&C, and operations department managers, supervisors, technicians, and administrative personnel to determine if their current practices and level of understanding of current requirements were consistent with existing administrative procedures. No instances of improper practice or inadequate administrative control were identified. The incident with the operator round sheets was caused by a temporary administrative clerk who inadvertently went to the wrong location to

obtain what she thought was the most recent version of this form. Also, all departments on site perform regular monthly audits of procedure files to ensure that they contain only the most recent revisions. The QSD auditors on site also perform random audits of procedure files for the same purpose. The inspector determined that this incident was isolated, that the potential for recurrence is low, and that no additional actions by the licensee are considered necessary at this time.

4.5 Weakness #1; Lack of comprehensive and formally documented maintenance plan and policies:

The inspection team found that the licensee did not have a unified comprehensive document or set of documents that clearly spelled out policies, objectives, and other elements of the plant's maintenance program. The maintenance program was scattered in various administrative and departmental procedures, instructions, flow charts, etc., which also contained the organizational structure, personnel responsibilities, and duties. In addition, no corporate directive or policy statement existed which required the establishment of a comprehensive maintenance plan. Although the elements of an adequate maintenance program appeared to be in place, they were not readily apparent from documented procedures.

On October 1, 1990, the licensee issued the "Vermont Yankee Nuclear Power Corporation Maintenance Program" document. This document contains a comprehensive outline of maintenance department policies and states the purpose, objectives, scope, and responsibilities for the program. It also contains a description of requirements for major program elements such procedures, training, major types of maintenance, coordination and control of maintenance work, post-maintenance testing, root cause analysis, and corrective actions. The inspector noted that this document also contains a program mission statement which defines the general goals of maintenance performed at the facility, and provides a common focus and a consistent approach for all licensee personnel in achieving the program objectives. Although the document was not developed or issued as a corporate directive, it does have the concurrence of the Senior Vice President. The document has not yet been incorporated into the station Administrative Procedures System; however, this is currently planned to occur so that other APs can incorporate it directly by reference.

The inspector determined that the development and issuance of this document satisfies the need to have a comprehensive policy document for the conduct of maintenance. The weakness has been adequately addressed and resolved by the licensee.

4.6 Weakness #2; Lack of comprehensive and structured reviews for the adequacy and applicability of the plant's maintenance requirements:

The maintenance inspection team determined that the licensee had not performed a comprehensive and structured review of the applicability and adequacy of the plant's maintenance requirements. Maintenance requirements in place at the beginning of commercial operation appeared to remain as the basis for the overall program. Individual improvements on the program since then were implemented without the advantage of periodic and coherent formal review to determine their applicability within the overall program.

The inspector reviewed the most recent version of AP-0200, "Conduct of Maintenance Activities," which outlines and specifies major Maintenance Department functions in the areas of maintenance planning and administration, equipment records, preventive and corrective maintenance, surveillance inspections, equipment trending, root cause failure analysis, and the Equipment Technical Information Program (vendor manual packages). Responsibilities for periodic reviews in all of these program areas have been explicitly defined and structured to ensure that changes to program requirements and activities are reviewed, that they reflect actual and current needs, are applicable to the overall maintenance program, and are implemented in a consistent manner. These responsibilities have been given primarily to the Senior Maintenance Engineers who are also required to provide annual reports to the Maintenance Department Supervisor summarizing the activities in each of these areas by evaluating the effectiveness, the correctness, and the applicability of major changes and accomplishments. The Maintenance Department Supervisor is required to periodically review the entire maintenance program to identify necessary changes to requirements on an on-going basis. A formal biennial review of all maintenance department administrative procedures is also conducted which requires program content to be evaluated and approved by department supervisors, managers, and the Plant Operations Review Committee. In addition, the licensee's Operating Experience Review and Assessment/Committment Tracking system (AP-0028) provides a mechanism whereby equipment problems, malfunctions, and failures are evaluated within the maintenance department to ensure that current maintenance requirements and practices are appropriate to maximize equipment reliability and availability.

Based upon the above actions, the inspector considers that this weakness has been adequately addressed and that improvements have been adequately implemented.

4.7 Weakness #3; Reviews for the appropriateness and technical adequacy of completed maintenance activities were not being performed in a timely manner:

Maintenance inspectors noted that the technical adequacy of maintenance activities were not being reviewed in a timely fashion and that the backlog of Maintenance Requests (MRs) awaiting such review was

large. The licensee was compiling information on equipment performance trends; however, the information was not being communicated to or reviewed by upper management.

The inspector noted that the licensee issued a complete revision to AP-0021, "Maintenance Requests," (MRs) which now provide means for identifying, assigning, planning, approving, tracking documenting, and certifying all corrective and preventive maintenance (CM & PM) performed on plant equipment. With regard to this weakness, the most significant change in this procedure was a revision to the overall method by which MRs are processed. Of key importance was the creation of an Operations Planning Coordinator. This individual is responsible for coordinating and processing all corrective maintenance requests (CMRs) and preventive maintenance requests (PMRs) after they have been initiated and continuing through the final steps of work certification and closeout.

This individual maintains a CMR and PMR log to track the status of all active MRs. MRs that have completed repair work and post-maintenance testing, and are pending final maintenance department supervisory review are tracked by the Operations Planning Coordinator. MRs which do not receive a timely review and closeout are given the appropriate amount of attention at the management level to prevent the growth of backlogged MRs and to ensure timely closeout.

Based upon the licensee's implementation of the MR processing and tracking methods required by AP-0021, the inspector regards this weakness to be adequately addressed with corrective actions fully implemented.

4.8 Weakness #4; Lack of effective policy and procedures for controlling and updating manufacturer's technical manuals:

Maintenance inspectors observed that the licensee had no effective mechanism to update manufacturer's technical manuals for equipment. Formal manual revisions were infrequent due to several factors relating to the sources of information, and the means by which technical information was received by the licensee. The manner in which updated technical information was organized, filed, and disseminated in procedures were also noted problems during the maintenance inspection.

To address this weakness the licensee developed the "Equipment Technical Information" system (AP-0312) to establish a consistent program to control the preparation, review, revision, and approval of Vermont Yankee Equipment Manuals (VYEMs). AP-0312 was issued in December 1989, and establishes the administrative requirements and responsibilities for the conduct of the program. The licensee has contracted out the initial project to create, revise and update all VYEMs and to establish a consistent format for maintaining them.

Each VYEM is placed under the control of a cognizant person who has both technical awareness of the equipment and an understanding of this responsibilities under AP-0312 for maintenance of the manuals. Under the equipment technical information program, all VYEMs become "controlled" documents and, therefore, fall within the administrative controls defined by AP-6805, "Document Control," and AP-0200, "Maintenance Program". The cognizant person is responsible to ensure that new technical information received from vendors and manufactures is reviewed for applicability to plant equipment and that the information is reviewed within the AP-0028 Experience Assessment process, the licensee's Design Change Review process, or another formal review process as applicable.

As of this inspection, approximately 75% of the safety related VYEMs had completed the revision process and had been entered into the site document control system. The remainder of these are expected to be incorporated under formal controls by the end of 1990.

The inspector reviewed five different completed VYEMs on plant components and found them to be well structured, organized, accurate, and readily useable for the support of maintenance activities at the site. Based upon the actions identified above, the inspector considers the licensee's resolution of this weakness to be adequate and proceeding in a timely manner.

4.9 Weakness #5; PRA concepts are not incorporated into Vermont Yankee's maintenance program.

One objective of the maintenance team inspection was to determine the extent to which PRA concepts and methodology were considered in maintenance program elements such a planning, scheduling, and prioritizing work. It was determined that the licensee did not have either a formal program or documented goals to incorporate PRA concepts into the maintenance program.

In October 1989, Vermont Yankee responded (letter BVY 89-100) to NRC Generic Letter 88-20, Supplement 1, "Initiation of the Individual Plant Examination (IPE) for Severe Accident Vulnerabilities - 10 CFR 50.54 (f)," by stating their intention to develop a plant-specific IPE, in part, to understand the most likely severe accident sequences and to gain a more quantitative understanding of the overall probabilities of core damage. This letter also outlined the purposes, methods, and schedule for achieving these objectives. The principle method the licensee intends to use will be to develop a plant-specific Level 1 Probabilistic Risk Assessment (PRA). This project has been assigned to the licensee's primary engineering support organization, Yankee Atomic Electric Company's (YAEC) Safety Assessment Group. Work commenced in January 1990, and it is currently expected to be completed before January 1994. In July 1990, the Safety Assessment Group presented the licensee with an overview of the PRA

work in progress whi ncluded a listing of future applications for the PRA. Although m ntenance was not specifically listed as an application, system reliability was listed as a key application. The maintenance department supervisor indicated that plant-specific information derived from maintenance activities was provided to the Safety Assessment Group. However, other than maintaining syste relibility as one of the maintenance department's primary goal there are still no documented plans or goals to incorporate specific PRA concepts into the maintenance program. The PRA effort has not developed to an extent that would make this possible. The PRA project is currently proceeding on a system-by-system basis, and no conclusions have yet been reached which would be of value for planning, scheduling, or prioritizing maintenance work.

Based upon the above actions, the inspector considers that this weakness has received only preliminary attention. Although the initial steps have been taken toward development of the PRA, it appears that a full resolution of this weakness can be addressed only over an extended time period. The progress made to date is considered to be satisfactory; however, this item will remain subject to further NRC review as the PRA develops and useable conclusions become available to the plant maintenance department.

4.10 Weakness #6; No integrated Master Equipment List (MEL) existed for Vermont Yankee.

The maintenance inspection identified that Vermont Yankee does not have a single Master Equipment List that meets generally accepted industry standards (INPO) for such lists. The licensee had several discrete lists in use by different departments and at least three major equipment lists in use by the maintenance and I&C departments that were referred to as the "Master Equipment List" by approved plant procedures.

In recognition of the need for improved information technology both at the plant and the corporate offices, licensee management directed the development of corporate-wide information system improvements. This plan included the development of a centralized "Maintenance and Materials Management" (3M) computerized database system to provide Vermont Yankee personnel with improved maintenance planning, scheduling, preparation, efficiency, and communications. One key feature of this system will be a component database able to accommodate a detailed information file on approximately 50,000 plant components. In January 1990, the Information Systems Steering Committee (ISSC) approved the 3M System Objectives document which outlined the principle objectives and a basic schedule for the development of this system. The inspector reviewed the current status of this project with the lead project engineer directing its development. Project personnel were currently assembling information on all plant equipment, component, and system from multiple sources such as the VISI-

Records, the ISI/IST index, EQ lists, vendor manuals, technical specifications, et. al. This effort will systematically standardize all available component information into an "Engineering Database" and a "Maintenance Database," both of which will eventually be combined by the 3M system into a "Total Database." The Total Database is expected to be completed by December 1990 and will essentially comprise a Master Equipment List available for use by all site and corporate departments. The 3M system will be further developed to adapt software applications for each user department. Maintenance and I&C department planning, scheduling, prioritizing, and work control will eventually be managed through the use of the 3M system.

Based upon the above actions, the inspector considers that this weakness has been addressed and that the development of the 3M project provides necessary improvements in this area. This item has been adequately resolved.

4.11 Weakness #7; Post-Maintenance Testing requirements were not proceduralized in administrative procedures.

Maintenance team inspectors noted that the licensee did not have proceduralized requirements for their post-maintenance testing (PMT). Although PMTs were being accomplished in a satisfactory manner, a formalized comprehensive approach to this activity was not provided.

The licensee subsequently assembled a special task force to review the PMT needs for all types of maintenance requests at the plant. The results of this task force culminated in June 1990 with a major revision to the site instruction for processing MRs, i.e., AP-0021, "Maintenance Requests."

In addition to addressing PMT requirements throughout this procedure, a special appendix was added to provide all criteria for the specification and documentation of PMTs for all types of preventive and corrective maintenance (PM & CM) at the plant. This appendix contains a complete set of instructions for determining specific PMT requirements and provides an extensive list of types of maintenance activities (e.g., circuit breaker repair, MOV operator repair, solenoid valve repair, air compressor rebuild or repair, et. al.) and correlates a detailed listing of recommended PMT items for each activity.

The inspector considers that the incorporation of the this revision into the processing of all MRs at the plant resolves the need for improvements in this area. This item has been adequately resolved.

5.0 Management Meetings (IP 30703)

Licensee management was informed of the purpose and scope of this inspection at an entrance meeting conducted on October 1, 1990. The findings of

the inspector were discussed periodically with licensee representatives during the course of the inspection. An exit meeting was held on October 5, 1990 (see paragraph 1.0) at which time the inspector's findings were presented to the station management.

At no time during the inspection did the inspector provide written material to the licensee, nor did the licensee indicate that any of the areas covered in this report contain proprietary information.

Attachment A

Documents Reviewed

Administrative Procedures

AP0021, Rev. 17, Maintenance Requests
AP0028, Rev. 12, Operating Experience Review and Assessment/Committment Tracking
AP0200, Rev. 12, Conduct of Maintenance Activities
AP0310, Rev. 6, Surveillance, Preventative, and Corrective Maintenance Program
AP0312, Rev. 0, Equipment Technical Information
AP0625, Rev. 2, Quality Control/Independent Inspection

Memoranda

VY Memo BVY 89-58, 6/30/89, Response to Inspection Report 89-80, Notice of Violation
VY Memo BVY 89-100, 10/24/89, Vermont Yankee Response to Generic Letter 88-20, Supplement 1
VY Memo BVY 89-75, 8/11/89, Additional Response to Inspection Report 89-80, Request for Information
VY Memo, 4/26/90, 3M Plant Staff Goals 1990
VY Memo, 12/29/90, MMMS Subcommittee Progress Report

QA Surveillance Reports

90-119, Corrective Actions Associated with NRC Maintenance Inspection 89-80
90-33, Post-Maintenance Testing

Other

Vermont Yankee Strategic Plan, 8/10/90
VYNPC Maintenance Program Mission Document, Rev. 1, 10/1/90
VYNPC Maintenance Materials Management Objectives Document, 1/4/90
NRC Inspection Report 50-271/89-80
Safety Assessment Group Presentation to Vermont Yankee, 7/11/90
Potential Reportable Occurrence - 26, 8/20/90, Incorrect version of VYAPF 0150.01 in use.

ATTACHMENT B

Vermont Yankee Drywell Topcoat Degradation (ECMB)

NRR evaluated the potential problem resulting from the transport of paint chip debris following a loss-of-coolant accident (LOCA). We conclude that the amount of paint chips that peel off the upper drywell region and is likely to eventually deposit on RHR and core spray suction strainers is insufficient to adversely affect ECCS pump performance in a post-LOCA condition.

During the short term transport phase, i.e., initial 30 seconds following the LOCA while the reactor vessel depressurizes, steam, gas, and water at a high velocity are vented through the downcomers to the torus. Since the degraded topcoat paint, which is subject to debris formation, is in the upper section of the drywell, which is not exposed to the turbulent flow, insignificant quantities of paint chips should be transported to the torus. Paint topcoat chips that may have settled in the drywell prior to the LOCA should be broken up into small fragments by the heavy turbulence produced during the first 30 seconds of LOCA blowdown because of the observed brittle nature of the chips. These small paint chip fragments could be transported from the drywell to the torus via the downcomers. Because of the small paint chip particle size, most of the chips should pass through the 1/8 inch ECCS suction strainers. The small quantity of paint chips that may be transported to the suction strainers collect on the thermal insulation mat and should not significantly reduce the NPSH of the RHR and Core Spray Pumps.

During the long term transport phase, i.e., after the 30 seconds of LOCA depressurization through continuing ECCS pump flow for days or weeks, additional quantities of paint chips may be released from the drywell surfaces due to the LOCA environment. The paint debris generated during this phase is not likely to be transported to the ECCS suction strainers because of the following factors:

- Paint chips have a higher density than water and should settle out on the floor of the drywell.

- The settled paint chips should not be re-suspended in the drywell bottom and transported through the downcomers due to the low velocities generated by the ECCS flow.

- The entrance to the downcomer vents is protected by a blast shield and the downcomer openings are about 9 inches above the drywell floor. These factors should restrict paint chip transport to the torus.

- The downcomers distribute drywell flow via spray headers into the 16 torus bays (4 of which contain ECCS intakes).

- Due to low torus transport velocities, paint chips should settle out in the bays which are separated by ring girders that should restrict particle transport between bays.

- The ECCS suction strainers are located a few feet from the torus bottom. Therefore, any paint chips entering the bays with these suction strainers are likely to settle to the torus bottom. Transport to the suction strainers is not likely due to the low velocities.

It is concluded that the peeling of topcoat paint in the upper drywell area should not affect ECCS pump performance in a post-LOCA condition. NRR concurs with the Vermont Yankee's paint consultant, that surveillance of the drywell surfaces should be carefully performed each refueling outage and that all loose topcoat material should be removed by thorough scraping without damaging the primer. Damaged or degraded Carbozinc-11 primer should be repaired with approved procedures since this primer is relied upon for primary containment interior surface corrosion protection.