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Licensee: Vermont Yankee Nuclear Power Corporation
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Brattleboro, Vermont 05301

Facility Name: Vermont Yankee Nuclear Power Station and
Yankee Atomic Electric Company
Corporate Offices

Inspection At: Vernon, Vermont and Framingham, Massachusetts

Inspection Conducted: April 4-8, 1988

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date

Inspection Summary: Special, Announced Team Inspection on April 4-8, 1988, Report No. 50-271/88-05

Areas Inspected: Special, announced inspection of facility radiological controls, effluent radiological controls, plant operations, surveillance testing, plant maintenance activities, design changes, engineering support and licensing and safety reviews.

Strengths and weaknesses are summarized in paragraph 2.0 of the details section of this report.

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## DETAILS

### 1.0 Inspection Scope

A NRC Region I Team Inspection was performed at Vermont Yankee Nuclear Power Station from April 4-8, 1988. This team consisted of four region based inspectors, one resident inspector based at another nuclear plant, one Project Manager from NRR, and a team leader.

The team reviewed the following areas of plant operations:

- Plant Operations
- Facility Radiological Controls
- Effluent Radiological Controls
- Surveillance Activities
- Maintenance Activities
- Design Changes/Engineering Support
- Licensing and Safety Review

In each of the above areas emphasis was placed on the following criteria:

- Management and staff attitudes
- Adequacy of staffing
- Adequacy of training
- Effectiveness in implementation of program and procedures
- Organizational interfaces
- Management involvement in work activities
- Interfaces with other organizations
- Management involvement in day to day activities
- Work control
- Quality assurance and quality control oversight

Inspectors held discussions with plant management, plant operators, maintenance and test personnel, and staff engineers as well as other personnel as appropriate. One team member and the team leader spent one day at the Yankee Atomic corporate engineering offices, located at Framingham, Massachusetts. The inspection also involved review of control room activities, surveillance testing, and maintenance activities. Plant tours were conducted to determine the condition of plant equipment, general plant operations, and overall housekeeping. Each area was given an in-depth review and activity interrelationships were evaluated.

### 2.0 Executive Summary

The objective of this team inspection of Vermont Yankee was to assess licensee performance in key operations areas. Based on the review by the inspectors and discussions with licensee representatives, the inspectors

were able to form conclusions as to significant strengths and weaknesses. These are summarized below and further detailed in later sections of this report. Each strength or weakness is based on perceptions by the inspector of specifically observed conditions.

a. Strengths

- Control room operations are excellent (program controls, use of logs, procedural adherence, operator knowledge, awareness of plant status, professional attitude and decorum). (Paragraph 3.1.2)

- The addition of a senior staff ALARA Engineer and use of dedicated ALARA coordinators for Maintenance and I&C Departments during outages provides effective intra-departmental communication. (Paragraph 3.2.3)

- Strong efforts to minimize number and total area of plant contaminations and facility housekeeping. (Paragraph 3.2.4)

- The use of two responsible engineers for plant modifications (plant cognizant and cognizant for every project provides breadth of talent in systems and home office engineering. (Paragraph 3.6.5)

- Stable and experienced staff in the areas of radiological effluents program, maintenance and engineering. (Paragraphs 3.3.2, 3.5.2 and 3.6.5)

b. Weaknesses

- The respirator program does not require penetrant testing of respirator filter cartridges prior to reuse. (Paragraph 3.2.6)

- There is a lack of aggressiveness to address deficiencies in procedures in the Radiation Protection area. (Paragraph 3.2.7)

- There is an over-reliance by plant staff on surveillance procedures to satisfy Technical Specification requirements without recognizing their responsibility to identify and correct procedural inconsistencies. (Paragraph 3.4.3)

- Inadequate supporting bases for 10 CFR 50.59 reviews. (Paragraph 3.7.4)

c. Unresolved Item

- Establish the adequacy of temporary modification procedure AP 0020 as a vehicle to expeditiously implement permanent design changes (88-05-01). (Paragraph 3.5.4.3)

## 3.0 Detailed Inspection Findings

### 3.1 Operations

#### 3.1.1 Scope and Review

The inspector observed routine operations on all three shifts, witnessed shift turnover activities and noted operator response to alarms, and the use of logs, drawings and procedures. Several operators were interviewed, as was line management up through the operations superintendent. The interfaces between control room personnel and the plant auxiliary operators, other station departmental personnel and the operations administrative staff were evaluated for the adequacy of control over routine and planned maintenance and testing activities. A review of component operability and alarm status, as determined by walk-downs of the main control board, was conducted. The inspector attended a weekly operations planning meeting and noted inter-departmental liaison and the discussions of problem resolution options. Programmatic controls over lifted lead and jumper usage were evaluated and one Licensee Event Report (LER) was selected for further review of the adequacy of licensee response, corrective actions and subsequent analysis.

#### 3.1.2 Shift Routine and Control Room Activities

Interviews with operators on shift provided evidence of a well trained staff. Their knowledge of plant conditions, annunciator status and equipment tagging and availability was not only complete, but also indicative of the quality interfaces with other plant departmental activities in progress on their shift. Control room decorum was professional and also consistent from shift to shift. The control room environment and layout of work stations appeared to combine the necessary administrative controls with the requisite overview of plant status required of the shift supervisory personnel.

The inspector noted logkeeping activities and checked the control and availability of logs to be consistent with the requirements of the applicable procedure, AP 0153. Certain informational books were reviewed and found to effectively communicate management instructions (e.g., the administrative handling of the switchover to Daylight Savings Time), technical information (e.g.; procedural revisions) and standing orders. Discussions with operations personnel regarding the utilization of logs, control of reference and informational material and operations shift manning revealed a knowledgeable and well staffed department. Full crew complements lack a couple of shift technical advisor positions, but this situation is being adequately handled by minimizing the use of overtime, other STA

qualified personnel, and training in progress for additional individuals to fill the open assignments.

The inspector also reviewed the use and control of temporary electrical jumpers and lifted leads from an operational standpoint. The lifted lead and jumper logbook was scanned and the performance of safety evaluations was noted, where appropriate. In accordance with the applicable procedure, AP 0020, the inspector confirmed that lifted lead/jumper (LL/J) requests, outstanding greater than 60 days, were reviewed and provided to the PORC for appropriate comments and recommendations. With respect to two LL/J Requests (81-006 & 84-188), the inspector indicated that these items, having been open for several years, somewhat diminished both the intent and impact of both the sixty-day review requirement and the classification of these items as "temporary" changes. Particularly in the case of LL/J Request 84-188, implemented in 1984, the latest revision, dated November 14, 1985, to an affected alarm response procedure (CRP 9-7, 7-B, 8-A) provided implicit recognition of the modification as a permanent, rather than temporary change.

The inspector noted that the licensee is making a concerted effort to close out old LL/J items and reviewed the Quarterly Lifted Lead/Jumper and Mechanical Bypass Report which documented such effort. Also, a YAEC audit findings, (Audit Report VY-87-01) had identified the need to close out old LL/J Requests more expeditiously. In response to this finding, the licensee planned appropriate corrective measures and has carried the audit action item on its Commitment Status List, and is documenting PORC comments and recommendations, by date, on each outstanding LL/J Request Tracking form. While the inspector confirmed that corrective action was in progress which appeared commensurate with the identified problem and task, it was noted as an observation item of this inspection that the identified lifted lead/jumper items that have remained open for several years (e.g.; 81-006 & 84-188) appear to conflict with the intent to utilize such items as "temporary" controls. The inspector discussed this observations with operations management and has no further questions on this issue.

3.1.3 Licensee Event Report (LER) Review

The inspector reviewed several Licensee Event Reports issued by the licensee in 1987 and selected one LER for further followup concerning its relationship to and impact on plant operations. As is documented in LER 87-11 and is discussed in NRC inspection report 50-271/87-16, a self-identified violation of Technical Specification 3.5.H.4 was found by the licensee for the failure to maintain minimum core cooling system availability during

refueling operations. The root cause for this event was a misinterpretation of the requirements for the supply of emergency dc power to a diesel generator.

Immediate operator actions, after the discovery of this violation, included the suspension of refueling operations and the placement of the mode switch in the shutdown mode. Subsequently, an Operations Superintendent memorandum, dated September 1, 1987, clarified the operations department position on the dc power supply required for consideration of diesel generator operability. Licensee measures taken to address this issue, to date, have been both adequate and effective.

The inspector reviewed the above Operations Superintendent memorandum, noting that the intent of its issuance was to provide interim guidance to the operations staff. A more detailed document, providing further clarification and recommendations, is currently in process. In reviewing a one-line sketch of the diesel generator dc control power details, the inspector determined that the system design was in complete compliance with FSAR section 8.6.3. This current design had its origin in the implementation of EDCR 82-12, which added an additional battery, battery charger, backup battery charger and dc bus as the normal supply of control power to the "A" diesel generator. However, the VYNPS Technical Specifications (TS) appear to have not addressed this design change and the added equipment. For example, TS 3.10.A.2.b addresses the three battery chargers for the two original dc buses (DC-1 & DC-2), but does not mention the two additional battery changers for the new dc bus (DC-2AS). This situation is further complicated by the following fact. TS 3.10.B.2.b describes action to be taken if one of the two 125 volt station battery systems becomes inoperable. While the FSAR clearly describes one of these two 125 volt station battery systems to consist of both the DC-2 and DC-2AS buses and their associated power supplies, it is not clear that the DC-2AS components are covered by TS. Also, since the DC-2AS bus provides the normal supply of control power to the "A" diesel generator and the DC-2 bus provides the normal supply of control power to the "A" diesel generator breaker, it would appear that the components associated with both of these dc buses are required for the operability of the "A" diesel generator.

The inspector indicated that further clarification of how diesel generator operability (particularly the "A" diesel generator) is affected by its dc power supply and the associated components, may be necessary. Technical Specification revisions appear warranted, given the latitude for interpretation and the apparent inconsistency between the

FSAR and the current specifications. Since the licensee has drafted, but not yet issued, a document further clarifying the diesel generator dc control power design, NRC review of the final licensee position on this subject, including recommendation for design modification or TS revision, would be appropriate. The resident inspectors have already documented followup of LER 87-11 with NRC item 50-271/87-16-01. Thus, the resident inspectors are aware of the specific details and cause of this event. Since operator training and operational interpretations will be based upon the licensee position that has been drafted, further NRC followup of this issue can be addressed by routine resident inspection activities in the future.

3.1.4 Findings/Conclusions

As the inspection details in the above paragraphs indicate, routine control room activities, including program controls, the use of logs, procedural adherence, operator knowledge, awareness of the plant status and demonstration of a professional attitude and decorum, are all considered an observed strength in the operations area at the VYNPS. A well trained operations staff with experienced supervisory support personnel and management involvement in daily activities has directly contributed to the effective implementation of routine operations.

One observation was noted in regard to the need to close out old lifted lead and jumper requests. Additionally, further NRC followup of the final licensee clarification and position related to LER 87-11 appears warranted. Overall, a good performance in operational areas was observed and no generic programmatic weaknesses were identified.

3.2 Facility Radiological Controls

3.2.1 Scope and Review

The scope of this review was to determine the level of licensee performance as it related to the implementation of the Radiation Protection program. The various aspects of the program and inter-departmental communications were evaluated. The areas reviewed included the following:

- Organization and Staffing
- ALARA
- Material and Contamination Control
- Radiation Area Access Control
- Respiratory Protection
- Assurance of Quality

3.2.2 Organization and Staffing

The organization of the Radiation Protection Department provides an adequately defined management structure reporting to the Operations Superintendent. Although the Radiation Protection Supervisor no longer has responsibilities for Chemistry, both Health Physics and Chemistry draw upon a common pool of technicians. The licensee has recognized the need to provide the Health Physics staff with a dedicated support group and negotiations are currently underway with Union representatives to expedite this change.

Staffing seemed adequate for the support of current plant activities. During the previous outage, the Health Physics Department was supplemented with outside contractor technicians. In addition, the Health Physics Department assigned a senior technician to both the Instrumentation and Control, I&C, and Maintenance Departments. Their job was to act as a liaison between the groups, coordinating pending work activities and Radiation Work Permit, RWP, requests. Discussions with the I&C and Maintenance Supervisors indicated strong support for this initiative and has resulted in increased intra-departmental communication and support.

3.2.3 ALARA

The position of ALARA Coordinator was permanently filled approximately one year ago. In addition to implementing the ALARA program, the ALARA Coordinator also has responsibility for the internal and external dosimetry monitoring and respiratory protection programs. Formal ALARA procedures were implemented in March, 1987, to define the required processing and documentation of work packages.

At the conclusion of the outage, a summary ALARA report for the 1987 Refueling and Maintenance Outage was prepared and distributed in January, 1988. This document should provide management with valuable information as to the effectiveness of ALARA measures utilized and identify areas for improvement. The total dose expended for the 1987 Refueling and Maintenance Outage was 226 man-rem and compares favorably with the initial estimate of 243 man-rem.

For major work evolutions (ex. outages) the licensee has assigned a senior health physics technician to both the I&C and Maintenance Departments as a dedicated ALARA coordinator to assist the work groups in job planning and work package

preparation. This has resulted in more accurate ALARA estimates and provides an effective path for intra-departmental communication.

Within the scope of this review, the inspector observed that the licensee's policies and procedures were adequate for maintaining exposures ALARA. Inspector review of ALARA documentation found adequate mechanisms in place for planning and execution of work packages with respect to dose reduction and dose-saving materials and techniques. A comparison of estimated and actual exposures indicated realistic pre-job ALARA reviews.

3.2.4 Material and Contamination Control

Tours of the facility indicated a strong licensee commitment to housekeeping. The fuel floor was exceptionally clean with all stored equipment properly posted and labeled. The licensee has taken steps to reduce the number and size of contaminated areas within the facility to minimize exposures and the use of respiratory equipment.

A recent incident in the Radwaste Building has resulted in cross contamination of the Service Air system also used for breathing air. The licensee immediately assigned a fact finding committee to determine the root cause and any necessary corrective actions. The extent of the contamination was determined to be limited to the Radwaste Building. Use of breathing air has been halted pending further investigation. Those individuals on breathing air at the time of the incident were Whole Body Counted and determined to have no internal depositions. Licensee actions will be more fully evaluated during the next routine inspection of this area.

3.2.5 Radiation Area Access Control

Normal access to the Radiologically Controlled Area (RCA) is through a central access control point located outside the HP technician's office. RWP's are posted in a central location for review by workers prior to entry. Upon leaving, all individuals must first use one of four available PCM-1B friskers. Use of these whole body friskers has resulted in an increase in the number of documented personnel contaminations due to their higher sensitivities. The access control point was adequate for the control of personnel entries to the RCA.

3.2.6 Respiratory Protection

The licensee has recently upgraded the equipment used for quantitative fit testing. Previous equipment problems

required contractor services to support outage requirements. In addition, a new respirator cleaning facility was recently completed. A review of MPC-hour logs indicated that the licensee is effectively controlling internal exposures.

One item of concern was the testing performed prior to reuse of filter cartridges for respirators. The licensee performs a radiological survey, a visible inspection, and a differential pressure (DP) test on both the particulate filters and the sorbant canisters (charcoal). A review of the DP test procedure revealed only an upper action level which would identify those filters which could cause the user some difficulty in breathing. No lower action level existed which would give the licensee an indication of a punctured filter. Although the filters do not have to be "recertified" as High Efficiency Particulate Air (HEPA) filters prior to reissue, some form of penetrant testing is warranted to verify the integrity of the filter unit. The licensee committed to evaluate the technical basis for the testing of HEPA filters prior to reuse. This item will be reviewed in a future inspection.

3.2.7 Assurance of Quality

The licensee has taken actions to identify and correct deficiencies in the Radiation Protection (RP) area through annual Corporate audits. In-house audit findings and NRC identified items are tracked by an Assessment Coordinator. Although appropriate corrective actions appear to have been taken to identified items, RP responsiveness to these items lack aggressiveness, especially in areas involving procedural modifications. For example, although weaknesses in procedural guidance relative to hot particle dose assessment were documented in NRC Inspection Report No. 87-15 (87-15-01), this area remains open. In addition, all documentation supporting actions taken in responding to these items were not centrally located for effective summary review.

3.2.8 Findings and Conclusions

3.2.8.1 Strengths

- The addition of a senior staff ALARA Engineer
- Use of dedicated ALARA Coordinators for Maintenance and I&C Departments during outages.
- Strong efforts taken to minimize both the number and total area of plant contaminations.
- Facility housekeeping.

3.2.8.2 Weaknesses

- Lack of penetrant testing of respirator filter cartridges prior to reuse.
- Lack of agressiveness/timeliness in procedural modifications.

## 3.3 Radiological Effluent Controls

### 3.3.1 Scope and Review

The licensee's radiological effluent controls program was reviewed in the following areas: compliance with Technical Specification requirements, process and effluent radiation instrumentation, audits and appraisals, and program changes. The reviews were operationally oriented and performance based, systematically assessing the following areas: policies, planning, corporate involvement, corrective action systems, and technical understanding and approaches.

### 3.3.2 Organization and Planning

The radiological effluent controls program at Vermont Yankee is administered by the Chemistry Department. The Chemistry Department consists of the Chemistry Supervisor with an Environmental Coordinator, Chemical Engineer, and two Chemistry Assistants all reporting to the Chemistry Supervisor. Technicians report to the Chemistry Assistants. The Chemistry Supervisor reports to the Operations Superintendent who in turn reports to the Plant Manager. The chemistry department was formerly part of the health physics department. At that time the chemistry staff included a plant chemist but did not include a chemistry supervisor.

In 1987, when chemistry was made a separate department, the position of chemistry supervisor was created and the plant chemist position was eliminated.

The chemistry/health physics technicians are currently combined with a split of technician duties expected after June, 1988.

The inspector noted that licensee management planning for the chemistry/health physics split included provisions for procedure revision (split of combined department procedures into chemistry or health physics procedures) as well as the number of technicians required for an independent chemistry department.

The licensee stated that procedure revisions would be completed by May, 1989. Presently a memo details how combined procedures are to be handled by each department.

The inspector noted that the reorganization of chemistry/ health physics appeared to strengthen the licensee's effluents radiological control program in that the radiological effluents program is now focused and controlled by one department with an experienced staff.

3.3.3 Facilities and Equipment

The licensee maintains adequate facilities and equipment for the control of radioactive effluents. Effluent and process radiation monitors are calibrated and tested as required by Technical Specifications. Chemistry response to a recent problem with the service water effluent radiation monitor (Licensee Event Report 88-01) was technically sound and thorough. The licensee maintains a state of the art counting room as evidenced by periodic updates of the gamma spectrometry system software, hardware, and detectors.

3.3.4 Effluent Control

The inspector reviewed the following procedures for control of radioactive effluents:

- OP 4511, Source Calibration of Process Radiation Monitoring System (PRMS)
- OP 4609, Periodic Evaluation of Off-Site Radiological Doses
- DP 2631, Radiochemical Instrumentation
- AP 0653, Validation and Verification of Designated Chemistry Computer Software
- OP 0631, Radiochemistry
- OP 2610, Liquid Waste Disposal
- OP 2611, Gaseous Radwaste
- AP 4601, Environmental Radiation Surveillance Program
- OP 4605, Environmental Radiation Sampling and Analysis

The licensee's procedure for the control of radioactive effluents implements the Technical Specification requirements

with respect to sampling, analysis, effluent monitor calibrations, surveillance tests, and required calculations. A review of the semi-annual effluent release reports for 1987 indicated that the required reports met the Tecnnical Specification requirements and were complete and comprehensive.

Offsite Dose Calibration Manual (ODCM) calculations are performed at the frequency required by the Technical Specifications. The results of these calculations are distributed in a report to chemistry and health physics department supervisors. The inspector suggested that these reports also be made available to other plant management. The licensee implemented this suggestion during this inspection.

The inspector noted that liquid releases were not made from the facility on a routine basis. Discussions with licensee personnel indicated that there was no formal station policy regarding liquid releases. However, the "operating philosophy" of the facility was such that routine radioactive liquid releases would not be made from the facility; water would be reprocessed and recycled as necessary to accomplish this goal.

3.3.5 Assurance of Quality

The inspector reviewed the licensee's program for the assurance of quality in the radioactive effluents control program. This included a review of the licensee's laboratory QA/QC program as well as QA audits of the licensee's effluent control program and onsite QC surveillance activities. The licensee is implementing a laboratory QA/QC program which meets acceptable industry guidelines. This includes both fixed laboratory instrumentation and effluent radiation monitors.

A review of the latest QA audit of the effluent radiological controls program (Audit Report No. VY-88-02, conducted 2/1-5/88) indicated that the audit was thorough and of sufficient technical depth to adequately assess capabilities and performance in the effluent radiological controls area. Technical specialists were part of the audit team. Also reviewed were responses to a similar audit performed during February 1987. The responses to the identified audit findings appeared to be thorough and technically sound and were responded to within a specified time. In addition, the inspector reviewed selected surveillance reports including Report No. 88-14, Chemistry Surveillance of Plant Stack Filter Cartridge Analysis and Source and Linearity Check of Process Rad Monitors. Again the response to an identified audit item appeared to be thorough and sound.

Both audits and QC surveillance activities are performed at scheduled frequencies.

The Chemistry Supervisor also performs periodic reviews of chemistry department activities, including, for example, calibrations of instrumentation used for measuring radioactivity in effluents.

3.3.6 Training and Qualifications

The inspector reviewed the licensee's position descriptions for the following positions: Chemistry Supervisor, Environmental Coordinator, Chemistry Engineer, and Chemistry Assistant. These position descriptions listed specific qualification requirements in the areas of education, experience, skills, and knowledge. Also listed in the position descriptions are duties and responsibilities as well as specific authorities.

The inspector also reviewed the technician training and retraining program. The retraining program, which applies to most of the technicians, details specific areas to be covered as part of retraining. The inspector reviewed the 1988 retraining schedule and noted that specific periods of time were allotted throughout the year for retraining.

The inspector had no further questions in this area.

3.3.7 Findings and Conclusions

The licensee is implementing a radiological effluents control program which meets the requirements of the Technical Specifications. The reorganization of the chemistry/health physics departments appears to enhance implementation of the effluents radiological controls program. A noted strength in this area is the experienced, dedicated staff. A potential improvement would be the recreation of the plant chemist position in order to provide additional technical expertise in the chemistry department.

3.4 Surveillance

3.4.1 Scope and Review

The inspector reviewed the existing program for Surveillance Testing Control and discussed planned program revisions with the Surveillance Testing Coordinator. Two LERs and one Potential Reportable Occurrence, all related to surveillance control problems, were evaluated for generic applicability and programmatic impact. Both the Master Surveillance List and the Surveillance Test Schedule for April, 1988 were examined and specific monthly, quarterly refueling outage tests were selected to

follow-up proper test planning, conduct, procedural compliance with the technical specifications, the accountability and tracking of test periodically, and evidence of adequate records for previous test performance.

The inspector witnessed the conduct of portions of certain surveillance tests from the control room, noting the controls, communications and data collection activities in progress during and after test performance. Interfaces between the Operations Department and the Engineering Support group were examined for effective communications, liaison and the correct processing of surveillance program changes and procedural revisions. Station personnel were interviewed with respect to general knowledge of the surveillance program controls and selective information on specific test performance.

3.4.2 Program Planning and Scheduling

The inspector reviewed both the current issue (Revision 9) and a draft version (Revision 10) of procedure AP 4000, which provide implementation instructions on the Surveillance Testing Program. Programmatic controls for surveillance planning and scheduling were discussed with the Surveillance Testing Coordinator. Examination of both the Master Surveillance List and the Annual Surveillance Test Schedule Matrix revealed that effective planning is dependent upon accurate and complete information in the data bases of both of these documents. While the annual test matrix provides a weekly schedule for each surveillance activity for the responsible plant departments, it only lists test numbers with no further information. The Master Surveillance List correlates the test number with the plant procedure to be used and the technical specification requirement that must be satisfied. Because these two informational data bases are separate and cannot electronically communicate with each other, the current system of surveillance scheduling, while workable, appears inefficient and prone to error, particularly when program or procedural changes are effected.

In recognition of these problems, the newly formulated surveillance testing program (AP 4000, Revision 10) prescribes additional checks and controls, as follows. The inspector noted that an independent review of the surveillance schedule is mandated by the direction of the Engineering Support Supervisor. Also, a standard form (VYAPF 4000.01) will be utilized to provide accountability for changes to the surveillance program and as a "feedback" mechanism to the Surveillance Testing Coordinator. The processing of the information provided on this form would be subject to independent review. As an additional initiative, not

currently proceduralized, the licensee is developing a computer data base containing both the scheduling information (i.e.; from the test matrix) and the reference information (i.e.; from the master surveillance list) which will allow for more efficient planning and handling of surveillance changes. Trial usage of the computer based files and scheduling system is intended to be implemented over several months in conjunction with the existing system to evaluate its effectiveness.

As is discussed in the following report section (3.4.3), the inspector noted that some surveillance problems resulted from departmental interfacing and scheduling errors. These problems are directly related to a weakness in the current surveillance test control program. As described above, the licensee has recognized this weakness and initiated action to strengthen the program of controls. The inspector concurs with the licensee position that the new program (i.e.; Revision 10 to AP 4000) along with the continued development and future use of a computer based system provides an overall enhancement to an area where weaknesses have been evident. Implementation of these new initiatives and the results achieved will provide the final measure of future program effectiveness.

3.4.3 Potential Reportable Occurrence (PRO) and LER Review

The inspector selected two LERs issued in 1987 (87-04 & 87-19) and one PRO (88-012) for further review. All three issues were similar in that they all resulted in missed Technical Specification (TS) surveillance tests. One involved a TS revision which changes a specific test periodicity; another related to moving a TS required test performance to a different operating procedure; while the third issue involved a system hardware change which was incorrectly interpreted as rendering inapplicable the TS test requirements. In all three cases, some type of program revision was not correctly processed; thus, providing a common root cause connection to the separate incidents.

The inspector discussed this event commonality with licensee engineering and operations personnel and determined that their recognition of these problems had played a role in the development of new initiatives and program enhancements for the surveillance testing program which are discussed in section 3.4.2 above. However, an additional aspect of the program performance for surveillance testing controls requires further licensee management attention. This aspect relates to the VYNPS emphasis upon the surveillance procedures as the focal point in program implementation. Although the Technical Specifications prescribe

the requirements, each department appears to acknowledge its responsibility and focus its attention to the procedural performance and tracking without a corresponding awareness and recognition of the interrelationship between the procedures and Technical Specifications. This emphasis places an additional burden upon the system which crosschecks the procedures to the Technical Specifications. In the past, the scheduling system was also encumbered by the interfacing weaknesses discussed in section 3.4.2 and the missed surveillance tests were a direct result.

In inspection reports 50-271/87-23 and 88-03, the resident inspectors discuss followup of LER 87-19 and PRO 88-012, respectively. In both cases, a generic concern is raised that the licensee was more preoccupied with ensuring that procedural surveillance activities were completed rather than satisfying the TS surveillance requirements. The inspector determined that such a reliance on procedural performance, versus TS compliance, for surveillance activities remains as a programmatic weakness. While the program changes resulting from implementation of the new revision to AP 4000 and a computer based surveillance tracking system may adequately compensate for this weakness, it remains to be seen whether more comprehensive corrective measures are required. An existing NRC unresolved item, 50-271/88-03-04, currently is tracking the specific technical resolution to PRO 88-012. Because of the relationship of this PRO and the subject LERs to the perceived surveillance program weakness, this open item will be expanded to follow up overall licensee corrective measures in the surveillance area and to ensure that Technical Specification compliance from a surveillance standpoint is both appropriately directed and programmatically emphasized.

3.4.4 Surveillance Conduct and Records

The inspector reviewed the surveillance requirements associated with three specific operations procedures (OP 4113, 4120 and 4124), evaluating the written instructions with respect to the technical specification requirements and examining licensee records for documented evidence of proper test conduct. Specific questions were raised as to how overdue tests were tracked and scheduled prior to expiration of the grace period; how accountability for ISI cold shutdown surveillance requirements were handled; and whether surveillance tests not required for a particular mode of operation had been performed prior to entering the mode mandating the subject operability. In all cases selected by the inspector, either records were available to provide evidence of timely test performance or discussion with operations personnel and a log review were able to confirm nonapplicability of the TS requirement because of the operational mode at the time.

For one selected procedure (OP 4113), the inspector reviewed the control wiring diagram and interviewed a knowledgeable engineer to confirm that the MSIV stroke timing tests were consistent with the component design and logic development encountered with an actual protection system signal. With other procedures, the inspector checked HPCI and RHR valve operability, verifying that where valves could not be operated under hot conditions, cold shutdown testing had been scheduled and conducted. Certain other 1987 refueling outage surveillance records were reviewed and no major problems or omissions were identified. While a few minor record discrepancies were noted, overall the test completion dates were readily retrievable from the Surveillance Testing Coordinator and the records provided objective evidence of both TS compliance and system operability.

3.4.5 Findings/Conclusions

No major problems with the surveillance program were identified; planning and scheduling controls are evident, records documenting technical specification compliance are retrievable, and operability requirements are being adequately addressed. Where weaknesses in the program interfaces and data base capabilities have been recognized, licensee corrective measures are either in progress or planned. However, a related weakness involving plant staff's apparent over-reliance on surveillance procedures to satisfy Technical Specification requirements without recognizing their responsibility to identify and correct inconsistencies merits additional licensee management attention and NRC followup. The current program is working and knowledgeable personnel appear to make it effective. However, further programmatic enhancements may be necessary to improve system efficiency and prevent the reoccurrence of past problems with missed surveillances.

3.5 Maintenance

3.5.1 Scope and Review

Plant maintenance programs and procedures were reviewed to determine their effect on the safe operation of the plant. The NRC team reviewed ongoing and completed maintenance activities, and discussed maintenance-related activities and administrative controls with appropriate personnel. Interviews were conducted with I&C and maintenance department personnel. Maintenance and I&C department training for craftsmen qualified to perform maintenance on safety-related equipment were evaluated, as well as the Quality Assurance/Quality Control (QA/QC) involvement in maintenance activities. The adequacy of post maintenance testing activities, including programmatic and functional, was evaluated. The impact of the maintenance backlog on safety-related equipment was also reviewed.

3.5.2 Organization and Planning

The maintenance organization at Vermont Yankee consists of two departments, I&C and maintenance. The maintenance department includes electrical and mechanical, and consists of the maintenance supervisor, three engineers, one foreman, five assistant foremen, lead mechanics and utility men, and various levels of craft personnel. The I&C department consists of the I&C supervisor, one senior engineer, three assistant engineers, one foreman, one assistant foreman, and various levels of I&C specialists.

Both the I&C and maintenance departments are responsible for the respective preventive and corrective maintenance programs including scheduling, planning, performance, post maintenance testing, documentation and trending. On a daily basis the foreman for each functional area meet with the assistant to the operations supervisor to determine the daily work priority list. Planning and scheduling of preventive maintenance is performed using a manual Visicard system.

The maintenance organization appears to be a well managed and knowledgeable group with a high degree of stability. Maintenance activities are effectively planned and conducted. The inspector did not identify any areas of concern regarding organization and planning.

3.5.3 Process/Procedures

Upper tier procedures exist to adequately control maintenance work activities. These include maintenance program functional requirements, maintenance responsibilities of each department and the use of the maintenance request (MR) system. In general, the MR is used to control corrective maintenance activities not covered by other specific procedures. However, it is also used to control preventive maintenance activities when equipment is required to be taken out of service. The plant staff is presently conducting a review of the MR to evaluate it's adequacy and to recommend any necessary changes to the program.

3.5.3.1 Instrumentation and Control (I&C) Department

Work performed by I&C is, to a large extent, proceduralized. The inspector reviewed several equipment calibration and functional test procedures. The procedure process appears to be evolutionary in nature, and the existing procedures are detailed, thorough, well controlled and provide good documentation of results. Control of the preventive maintenance (PM) program, although manual, is good. Technical

Specification (TS) required testing is tracked to the exact due date to ensure that it is accomplished within its required performance window. Weekly schedules are prepared in advance, submitted to the foreman for approval and work assignment, and posted. The I&C department is currently performing an evaluation of maintenance performed on balance of plant instruments to determine if the maintenance frequency should be increased, decreased or allowed to run-to-fail.

In order to ensure the TS required testing is performed, a semi-annual review is conducted to verify the accuracy of the surveillance program. Additionally, when a TS amendment is generated PORC assigns review responsibility to I&C to verify/update TS surveillance requirements as necessary. The I&C supervisor is considering computerizing the PM program.

Although no proceduralized trending program exists, a computerized data base has been established to track out-of-specification data and to generate reports to the responsible system engineer. The responsible engineer is tasked with responsibility for reviewing and evaluating the data. The inspector reviewed with one I&C engineer how the out-of-specification data was tracked and analyzed. The data was plotted for each instrument and trends evaluated to determine possible replacement or increase in surveillance frequency.

3.5.3.2 Maintenance Department

Many of the routine, generic activities conducted by the mechanical and electrical maintenance department, are proceduralized. The existing procedures are detailed, thorough, well controlled and provide good documentation of results. Post maintenance testing requirements are frequently satisfied by using the appropriate sections of existing procedures. Control of the preventive maintenance program appears to be adequate.

The maintenance department graphically trends failure data for major safety-related equipment. An annual review and evaluation of this data is performed and a report is issued. A micro computer based vibration analysis system has been implemented. Raw vibration data is taken in the field and transferred to the computer for storage and analysis. Both tabular and graphic displays can be generated. When this system is fully implemented and formalized it should provide a valuable predictive maintenance tool.

The latest revision to AP 0200, Maintenance Program, requires that craft personnel evaluate equipment failures and record this evaluation on an Equipment Failure/Probable Cause Record. This record is then reviewed by the responsible engineer to determine if changes to the corrective maintenance program are required, to determine if other similar equipment should be evaluated and to evaluate for trends.

3.5.4 Maintenance Activities Reviewed

3.5.4.1 Core Spray Valve MOV-14-11B Operator Repair

The inspector reviewed the completed Maintenance Request (MR 88-0756) package for the repair of MOV-14-11B operator. During the conduct of alternate testing while in an action statement due to failure of Uninterruptible Power Supply (UPS), B core spray valve 11B stopped in mid-stroke while being operated. Maintenance personnel removed the motor and operator from the valve and determined that the motor pinion gear key had worked loose, made contact with the declutch fork assembly, broke off and became lodged between the motor pinion gear and worm pinion gear. This in turn caused the motor to overload and burn up. The MR package is very well documented including a thorough root cause analysis. The procedure used to inspect the operator is very detailed and provides a logical, methodical approach to motor operator inspection, documentation and repair. Additionally, MOVATS testing was performed to verify motor/operator performance and conditions.

3.5.4.2 Uninterruptible Power Supply (UPS) B Repair

UPS B failed during operation at power on March 29, 1988. The maintenance department electrical group initiated the required MR (88-0731) and commenced troubleshooting. The initial approach to determine the problem with UPS B appeared to be disorganized and consisted of swapping out parts in the UPS with parts from stores. The initial methods used to troubleshoot were not conducted in accordance with a maintenance department internal procedure prepared specifically for the UPS. Eventually the UPS trouble shooting procedure was implemented, a technical representative from the UPS vendor was called in, and the failed components in the UPS were identified and replaced. It appears that if the UPS troubleshooting procedure had been used initially, the UPS B repairs could have been affected in a more controlled and expeditious manner.

3.5.4.3 Modification of MOV-14-11B Circuitry

During the conduct of repairs on MOV-14-11B (item 3.5.4.1 above), it was discovered that the wiring for the interlock with MOV-14-12B was not correct. The problem was traced to Temporary Electrical Lifted Level/Installed Jumper Request (LL/JR) 87-0137 which omitted moving the connections for the interlock from the torque switch rotor to the limit switch rotor. The inspector questioned why an apparent permanent modification to a safety-related valve control circuit was made using a LL/JR. The licensee indicated that the modification was a safety enhancement and the Engineering Design Change Request (EDCR) could not be completed prior to the end of the outage. The decision was made to implement the design change via a LL/JR prior to bringing the plant back on-line. Although special reviews were conducted, and a clear decision on the part of plant management was made to implement this permanent modification via a procedure (AP-0020) typically used for temporary changes; it is not clear that this is the intent of the procedure. Additionally, the design process was not complete, including final determination of post installation testing requirements. The question of the adequacy of AP-0020 as a vehicle to expeditiously implement permanent design changes is an unresolved item (88-05-01).

3.5.4.4 Hydrogen/Oxygen Monitor A Repair

The inspector reviewed MR 88-0632 for repair of the hydrogen/oxygen monitor "A" low flow problem. Troubleshooting resulted in identification of problems associated with solenoid operated isolation valves. The MR appropriately identified requirements for interface with the environmental qualification program and local leak rate testing requirements. Documentation was adequate and post maintenance testing was appropriate.

3.5.5 Backlog

The inspector reviewed the system in place to track backlog work items in both the I&C and maintenance departments. The licensee has a computerized system to maintain the backlog lists. Items are identified by MR, priority, safety class, system and description of the item. There is a clear identification of those items that can be repaired while the plant is at power and those repair items requiring a plant shutdown. The present backlog lists contain a limited number of high priority or safety-related repair items. Interviews with maintenance managers indicate a healthy awareness of items on the list and a concerted effort to manage and reduce the backlog. The inspector identified no items of concern in this program area.

3.5.6 Post Maintenance Testing

Over the past year the licensee has instituted a number of improvements in the area of post maintenance testing. Recent program improvements consisted of implementing a Motor Operated Valve Analysis and Testing System (MOVATS) program, a Limitorque Operator Inspection procedure, upgrading the testing sections of maintenance procedures and the performance of an Assessment of Maintenance Practices including post maintenance testing. These initiatives appear to be a measurable improvement to the post maintenance testing philosophy and are considered a strength.

During the review of the MRs, the inspector noted that there is no clear identification on the MR form as to what post maintenance testing was performed. However, detailed review of the MR packages showed that adequate post maintenance testing is being performed, but is not summarized on the MR form. The licensee indicated that the MR process, including the MR form, is being reviewed and that the lack of a post maintenance testing summary had been identified and will be addressed in the next revision of the MR procedure.

Based on the licensee's implementation of programmatic changes in the area of post maintenance testing it appears that a commitment has been made to continued improvement. The inspector reviewed a draft copy of the "Assessment of Maintenance Practices" and it appears that this is an initial step to a comprehensive evaluation of the post maintenance testing program and the development of a ongoing improvement program.

3.5.7 Training and Qualification Effectiveness

Technical training programs have been developed and implemented for both the I&C and maintenance department craftsmen. Each individual has a defined program which is implemented in the department long range and short range training plans. The current training programs have not been accredited, however, it is expected that final INPO accreditation will be received in June 1988.

3.5.8 Assurance of Quality

The Vermont Yankee plant organization has adopted and implemented a peer QC program. As with other traditional QC programs, procedures are in place which define QC inspection/audit requirements. This program is implemented by craft foreman who assign other members of the crew to inspect the activities of their

peers. The inspector interviewed maintenance department personnel and found that there is a healthy attitude about "building quality in," and a universal acceptance and belief in peer QC. The low percentage of rework seems to indicate that the program, as it is presently being implemented, is effective.

The inspector reviewed Audit Report VY-87-06 conducted in the functional area of maintenance. The audit appeared to be both programmatic and performance oriented, and identified meaningful observations/deficiencies. The report was detailed and clearly documented the audit effort.

3.5.9 Findings/Conclusions

The maintenance department was found to be adequately staffed in all areas. Personnel interviewed appeared to have a good safety perspective, were knowledgeable and were confident in their managers and subordinates. The craft training program seemed to be on track for INPO accreditation in June 1988. The quality of work performed is high as is evidenced by the low percentage of rework required. Several initiatives have been implemented or are underway to improve the area of post maintenance testing, these programs include MOVATS, Limitorque operator inspection and an assessment of maintenance practices. Managers in the maintenance department appear to be performing self assessment to determine necessary changes and improvements.

The temporary modification procedure is used, on a selective basis, to implement design changes until they can be made permanent. The team is concerned that the existing procedure does not adequately address the requirements which need to be imposed for using this procedure in this fashion.

3.6 Design Change/Engineering Support

3.6.1 Scope of Review

The scope of the inspection in this area was to assess the adequacy of design change and engineering support provided to the plant by the licensee's onsite and corporate engineering organization. The review was specifically focused to determine the adequacy of: the management attention/involvement and support; adequacy of staffing; the quality of engineering effort and design control measures; and the implementation of established design change/modification program to achieve desired results.

The above evaluation was carried out by review of a sample of Engineering Design Change Requests (EDCRs) and Plant Design Change Requests (PDCRs); interviews and discussions with engineering management and technical personnel; review of quality assurance audits in the area; and the interface control amongst various groups for design inputs. The review and discussions were performed at plant site and at Yankee Atomic Electric Company's corporate offices in Framingham, Massachusetts.

Several EDCRs were selected to assess the adequacy of the design change process at different levels of development; requiring different levels of effort; complexity of the proposed change; interdisciplinary/vendor interactions; and interface controls. EDCRs selected for review included:

- One at development stage, (EDCR No. 88-401);
- One with completed engineering effort, but before implementation (EDCR No. 87-408); and
- One closed EDCR with all efforts complete (EDCR No. 86-412).

In addition, other areas of engineering effort were reviewed for general adequacy and effectiveness of independent design reviews and appropriateness

3.6.2 Organization, Staffing and Planning

Organization

The engineering services for the plant are provided by two groups: the plant engineering group which is located on-site, and the project engineering group which provides design/modification services from Yankee Atomic Electric Company's (Yankee) offices at Framingham, Massachusetts. Both groups are organized on the line of engineering disciplines.

The Yankee project engineering group for the Vermont Yankee plant is headed by an engineering manager, and the different disciplines of engineering are supervised by lead engineers. The project engineering provides technical support to the plant on a request basis.

Generally, the plant requests project engineering services for work that is complex, requires a high level of technical expertise, or for which the plant does not have engineering resources on-site. These assignments are handled by Yankee engineering through the EDCRs program.

The on-site engineering group is also organized on a similar discipline basis as the project engineering group. Any engineering assignment in the group is handled through the Plant Design Change Request (PDCR) program. Generally, the plant engineering group handles work of immediate or minor nature, and supports plant operations on a day-to-day basis. The inspector observed that although, the two engineering groups were separate and had different objective, the interaction between them was very close, and they contributed to each others effectiveness.

Staffing

The staffing of both engineering groups, i.e, the project and on-site, appeared to be adequate with knowledgeable and experienced personnel assigned to key positions. This was evident by project and on-site engineering generally meeting the schedule of design change and modifications without any appreciable backlog of work in safety-related areas. Also, the quality and depth of engineering effort was very good in the sampled EDCRs/PDCRs.

The inspector interviewed several members of both the on-site engineering and Yankee Nuclear Services Division, (YNSD), engineering staff, and found them to be knowledgeable. The level of education and experience of engineering and management personnel were appropriate to their position and assignments. Formal and informal, original and refresher training appeared to be effective.

Backlog and Planning

YNSD engineering staff is working on eleven (11) design changes scheduled for the next refueling outage. In addition, they are working on approximately 80 requests for technical and engineering service over and above the design changes. Work on these activities is generally on schedule. Very little overtime has been required to meet design change schedules. Currently, there are no YNSD contractors working on Vermont Yankee work. At this point, no YNSD contractors appear to be needed for the remainder of the year. Generally, YNSD has been able to take on limited new high priority work and still maintain a manageable workload.

The YNSD schedule for completing design changes is approximately six months before start of the refueling outage. Of the eleven design changes scheduled for the next refueling outage, all were scheduled for delivery to the plant in July 1988. As a result of increased engineering effort to support the fuel pool cooling system upgrade, two relatively minor scope design changes had to be delayed a few months.

Interfaces

Monthly management meetings are held at the plant with top corporate, plant and Yankee Atomic personnel to discuss the progress of design changes and other technical issues important to plant operation. These meetings focus on the progress and priorities of work.

3.6.3 Modification Design Process

The procedures that govern the design change and modification process (APs-6000, 6003 and 6004), both at the plant and at Yankee Nuclear Services Division (YNSD) are clear and comprehensive. Design interface, design process, and corrective action requirements are adequately addressed in the procedure with appropriate controls and instructions. Also, the review and approval authority is clearly established.

The inspector reviewed several design change requests (listed in Attachment 2). The level of licensee review, verification, and approval in all cases was appropriate for the complexity and detail of the change. Review comments were sound, and were resolved with appropriate technical justification. In all cases, required interdisciplinary review was performed and documented. The design change packages were complete and supported by background analyses, evaluations, calculations, and drawings. Calculations were performed, checked and reviewed in adequate detail, and were in accordance with applicable procedures.

There was a strong interface between on-site engineering and project engineering of YNSD. The process of designating a cognizant engineer from plant engineering (PCE) and one from YNSD (CE) is very effective in encouraging close cooperation between the groups. The process also provides ready access to resources and expertise that may not be available in the group. Both the PCE and CE are involved in the design change/modification process from planning stage to the closeout.

The licensee engages external consultants for engineering services for which in-house expertise or resources are not available. On complex design change/modification work, such as high density fuel racks, several outside consultants were engaged for specific areas. The licensee exercises strong and centralized control amongst these external organizations in the area of design input and interface. Each consultants input is

submitted to the licensee (onsite or YNSD as appropriate) for review and acceptance before the input is transmitted to other organization for use in analysis or design.

The effectiveness of such controls was evident in the process of EDCR No. 86-412, high density fuel racks, in which several engineering consultants were retained for difference parts of the engineering analyses.

One of the modifications reviewed was EDCR No. 86-03. This modification relates to Appendix R fire zone separation of the 280 foot elevation. This modification was completed during the last refueling outage. The inspector's review of the supporting documentation indicated that this modification was performed in accordance with the required procedure. Discussion with the responsible VY and YNSD engineers demonstrated their in depth knowledge of Appendix R requirements and the modification.

During the course of this review of EDCR No. 86-03, the inspector questioned licensee personnel regarding Appendix R training and procedures to assure that future design changes do not degrade current 10 CFR 50 Appendix R compliance to assure safe shutdown capability. The licensee noted that Instruction No. WE-100 of the YAEC Engineering Manual requires that Appendix R concerns be addressed as a part of the design input and review of all EDCRs.

It was determined that the VY project has not received Appendix R training. However, since all design changes receive multi-disciplinary review and since many engineers working on the VY project participated in the Appendix R compliance program, there is reasonable assurance that current EDCRs receive an adequate Appendix R compliance review. The licensee indicated that to perpetuate knowledge gained during the recently completed Appendix R compliance inspection cycle, they have begun work on a longer term training procedure to maintain the VY Appendix R program. This program is scheduled for full implementation the next complete design change cycle (1989-90).

3.6.4 Assurance of Quality

Management controls provided by the licensee to assure quality in engineering effort is codified in the Engineering Manual of YNSD for the project engineering and Yankee Operations QA Program (YOQAP) manual for the on-site engineering group. The

responsibilities for engineering work are delineated in Section I of the YOQAP. The engineering managers are responsible for assuring that the applicable elements of the QA program are effectively implemented in their area of responsibility.

In addition to the administrative procedures (APs), further control and guidances are established by Engineering Instruction issued for specific routine tasks, and are identified by a prefix WE in the instruction designations. The inspector reviewed selected engineering instruction, and found them to be clear, detailed, and adequate for the purpose.

In addition to the above management and procedural control, the Yankee QA organization audits the design change program to assure effectiveness of implementing procedures and departmental policies in assuring the quality of engineering effort.

The inspector reviewed several QA audits to assess the breadth and depth of audits in this area. It was noted that the QA audits were comprehensive in nature, and had significant findings. Especially, the audit conducted by Joint Utility Assessment Team was noteworthy for its depth, and findings. The licensee evaluated the findings, and implemented appropriate corrective action where needed.

The inspectors questioned the licensee regarding management overview of Appendix R activities following the deficiencies identified in the 1983 NRC Appendix R inspection. It was determined that in 1985 the YNSD VY Assistant Project Manager was charged, as Appendix R coordinator, with closing out all remaining Appendix R issues. At that time, EPM, an engineering firm with Appendix R expertise was contracted to provide an overview of the VY Appendix R program. The EPM closeout reviews consisted of compliance review, documentation, design changes, procedures, and licensing. Since 1985, VY project management, the plant, and corporate management has been involved in the closeout of Appendix R issues through monthly management meetings at the plant.

It appears that the management controls established to assure quality in engineering and design change efforts are effective.

3.6.5 Findings and Conclusions

Based on the above review, discussions, and personal observations, the inspector determined the following:

- The management is supportive of quality engineering efforts, and is involved in the day-to-day operations of the engineering organization. This was evident by their in-depth and extensive knowledge of the status of work in progress, stage of implementation, and the plant status.

- Staffing appeared to be adequate. It was evident by Framingham and site engineering generally meeting the schedule of design change effort, and lack of any appreciable backlog of work in safety-related areas.

- The quality and depth of engineering effort was very good in the sampled EDCRs. The complexity, extent of effort, interface control, and depth of engineering analysis and review was clearly evident in the change package. The description and the basis of change included in the design package was very good.

- The effectiveness of the engineering support to the plant by both the site engineering and Framingham was evident by the interaction of plant and engineering personnel, lack of in-process problems during installation/erection, and general quality of engineering effort during the development of design change.

The engineering support provided to the plant in the area of design change and modification is generally of high quality and effective. Staffing is adequate and management is sensitive to the needs of the plant. The engineers, both at site and at Framingham, are safety oriented and exhibit a depth of expertise necessary to carry out assigned work.

Strengths:

1. Depth and breadth of knowledge and experience of YNPD engineers due to organizational stability and extensive interaction with plant personnel.

2. The use of two responsible engineers (plant cognizant and cognizant) for every project to provide breadth of talent in systems and home office engineering.

## 3.7 Licensing and Safety Review

### 3.7.1 Scope and Review

The inspection consisted of review of licensing documentation and control practices including an in depth review of tasks involved in preparing the license amendment proposal for the cycle 14 reload. Several 10 CFR 50.59 determinations were also

reviewed, and training and management involvement in 10 CFR 50.59 determinations, both at the Framingham offices and at the plant, were reviewed.

.2 Licensing Organization and Processes

The Licensing Engineer at the Framingham Office is the primary contact between the NRC staff and the licensee on licensing matters. The Licensing Engineer reports directly to the Project Manager who heads the Vermont Yankee project organization at Yankee Atomic Electric Company (YAEC). This places him in the immediate organization providing electrical, instrumentation and control, mechanical, and systems engineering support from YAEC to the Vermont Yankee plant, and in a position to draw on specialized services such as environmental and nuclear engineering support from the YAEC Engineering Department through the coordinating services of a Project Engineer. The distance from the plant and organizational separation makes necessary close communication between YAEC and VY personnel for this arrangement to be workable. The inspector sought to determine if licensing priorities adequately reflected considerations important to plant safety-related needs, and whether the interaction of VY and YAEC in producing and gaining approval for a proposed licensing action from the NRC resulted in complete, organized, and retrievable written records. It was determined that the Project organization meets monthly with the corporate and plant people at Brattleboro, VT in order to establish licensing priorities reflecting integrated interest. The priority lists produced by this process are deliberately kept short to enable focusing of resources. The March 25, 1988 priority list had been shortened by deleting an item for the NRC review of LCOA methods and applications in order to add the NRC review of Core Spray Safe End Overlay (which needed an early NRC response to facilitate outage planning).

Records pertaining to licensing activities were examined and found to be organized and complete. The licensee has prepared a comprehensive listing of all proposed license changes, identifying and referring to microfilm numbers for all docketed correspondence, and associated Technical specification amendments. This listing is current from the time the license was granted. It includes internal as well as external correspondence. A sampling of internal correspondence showed it to be clear and sufficiently detailed.

The Vermont Yankee licensing practices appear to be working in a way which achieves a proper safety balance of the plant, corporate, and engineering support activities. The records produced related to licensing appear to be complete and readily retrievable.

3.7.3 Preparation of the Cycle 14 Reload Proposal

As an example of a recurring licensing activity, the preparation of the cycle 14 (startup Spring of 1989) reload was examined, with special attention given to the extent of independent checks of analysis, committee oversight, and involvement by management. Data on which fuel irradiation history is based is passed by data link from the VY site to Framingham, with separate transmittal of TIP calibration results every two wee. Throughout the analysis which follows, VY people are participants in monthly reload analysis meetings at Framingham, and get copies of relevant memoranda. Preliminary calculations sufficiently characterize the fuel loading pattern to permit fuel to be ordered about eleven months before it is shipped to the site. A more precise characterization of the core (transient and accident response, reactivity coefficients, and shutdown margin) is determined by analysis throughout the cycle. Results are compiled in a Core Performance Analysis Report (CPAR) which undergoes a series of draft reviews and comment incorporations before being submitted for PORC and NSARC Committee reviews, and is finally submitted to the NRC. Reload analysis is largely performed using YAEC developed or modified codes, and is done at Framingham. When the fuel is outside the envelope of currently approved LOCA analysis, GE provides a new LOCA analysis.

Within the YAEC organization, provision is made for QA review of each analysis task done at Framingham by a co-worker (often a senior employee). Analytical work done by GE is audited by YAEC. VY reactor and computer engineers audit all analyses with special attention to operating margins. They are assisted by GE in confirming final core loading patterns recommended by YAEC.

The preparation of the cycle 14 reload analysis appears to include sufficient QA, committee review, and management involvement.

3.7.4 Quality of 10 CFR 50.59 Determinations

An audit of 10 CFR 50.59 determinations reported in the Vermont Yankee 1987 Annual Operating Report was undertaken to determine the validity of the determination, and also if the written record showed logical support for the conclusion.

Four changes in the facility design were examined; (PDCR 85-07, LL/J 87-029, Mech Bypass 87-0021, and Mech Bypass 87-0012) from the 1987 Annual Report, and a recent determination in (EDCR 87-405).

In all cases the inspector agreed with the conclusions of the 50.59 determination. However, in four of the five cases examined the written support was judged inadequate. Support for the assertion that no unreviewed safety question existed was typically a reiteration of the three criteria from the regulation without any supporting discussion. The fifth case examined (EDCR 87-405) was supported with a fully developed written discussion.

3.7.5 10 CFR 50.59 Training and Management Involvement

The deficiencies in the written support for 50.59 determination conclusions raised questions as to the adequacy of training and management involvement in the 50.59 determination process. VY places responsibility for ensuring that changes meet the 10 CFR 50.59 requirements on the plant cognizant engineer, with oversight responsibility by the Plant Operations Review Committee (PORC). In the case of changes prepared by YAEC (EDCR's), determinations may be performed by project engineering personnel at Framingham with subsequent review by the plant cognizant engineer. The licensee stated that all PORC members, plant cognizant engineers, and appropriate YAEC personnel receive 10 CFR 50.59 training. A new improved 50.59 training module was reported to be in the final stages of management approval at the VY site.

The inspector discussed 50.59 training with the YAEC manager who conducts the training. This individual also represents YAEC on the AIF/NSAC 50.59 Working Group. The new training module was reported to reflect the most recent Working Group draft guidance which reflected all NRC comments that had been received. Further, training has been modified to reflect results of a recent NRC Inspection at another facility (Report No. 50-331/86010 (DRS)) which focused on 50.59 determinations. The new training utilizes inadequacies noted in the inspection report as classroom examples. The inspector reviewed a recently issued (12/31/87) memorandum from the YAEC VY Project Manager to VY Project Engineering Personnel calling for more detailed support for 50.59 conclusions, and providing two satisfactory examples.

Recent management attention and training activities are addressing the observed shortcomings in written support for conclusions in 10 CFR 50.59 determinations.

3.7.6 Findings/Conclusion

Communication between YAEC and VY personnel appears to be satisfactory, so that licensing products and prioritization reflect a proper balance. Licensing safety review documentation appears to be complete, organized, and readily retrievable. The

cycle 14 reload analysis task, which was examined as an example of a recurring license activity, showed sufficient QA, committee review, and management involvement. Examination of 50.59 determinations disclosed no instances of disagreement with conclusions, however in most cases the written record did not adequately support the conclusions. Recent efforts to improve 50.59 training and evidence of management attention to 50.59 determinations was observed. It remains to be seen whether these efforts will result in the desired improvements in written support for 10 CFR 50.59 conclusions. In summary the licensing activities seemed to be well managed, with appropriate efforts to improved the one identified area of weakness.

## 4.0 Unresolved Items

Unresolved items are matters for which more information is required in order to ascertain whether they are acceptable, violations, or deviations. An unresolved item is discussed in Section 3.5.4.3.

## 5.0 Management Meetings

Licensee management was informed of the scope and purpose of the inspection at an entrance interview conducted on April 4, 1988. The findings of the inspection were periodically discussed with licensee representatives during the course of the inspection. An exit interview was conducted on April 5, 1988 (see Attachment for attendees) at which time the findings of the inspection were presented.

At no time during this inspection was written material concerning inspection findings provided to the licensee by the inspectors. The licensee did not indicate that any material discussed during the inspection contained proprietary information.

## ATTACHMENT 1 - PERSONNEL CONTACTED

*J. Pelletier, Plant Manager
*R. Pagodin, Technical Services Superintendent
*S. Jefferson, Assistant to Plant Manager
*R. Wanczyk, Operations Superintendent
*J. Thayer, Engineering Manager
*W. Wittmer, Construction Superintendent
*P. Donnelly, Maintenance Superintendent
*R. Lopriore, Maintenance Supervisor
*R. Grippardi, QA Supervisor
*T. Watson, I&C Supervisor
*G. Johnson, Operations Supervisor
*H. Metell, Engineering Support Supervisor
*R. Leach, Radiation Support Supervisor
*S. Skibniowsky, Chemistry Supervisor
*S. Miller, VY Project Manager
*J. Herron, Technical Program Manager
D. Legere, Senior Engineer
H. Heilman, Engineer
R. Capstick, Licensing Engineer
D. Yasi, Lead Systems Engineer
R. January, Lead I&C Engineer
R. Oliver, Lead Mechanical Engineer
J. Cop, Lead Electrical Engineer
R. Martin, Vendor QA Supervisor
T. Trask, Mechanical Engineer
E. Meegan, Environmental Coordinator
J. Kinsey, Mechanical Engineer
R. McCullough, Assessment Coordinator
D. Dyer, Site QA Engineer
L. Savard, Chemistry Assistant
S. McAvoy, Chemistry Assistant

*Present at Exit Meeting

## ATTACHMENT 2 - DOCUMENTS REVIEWED

PROCEDURES:

| | |
|---|---|
| AP-0021, Revision 15, | Maintenance Requests |
| AP-0200, Revision 11, | Maintenance Program |
| AP-5212, Revision 05, | Maintenance of Safety System Electrical Equipment |
| AP-0310, Revision 01, | I/C Department Surveillance, Preventive and Corrective Maintenance Program |
| OP-4245, Revision 01, | Calibration of Class 1E Safety Related Relays |
| OP-4324, Revision 14, | Main Steam Line Low Pressure Functional/Calibration |
| OP-4338, Revision 13, | Drywell High Pressure ECCS Functional/Calibration |
| OP-5201, Revision 08, | Safety System Valves |
| OP-5220, Revision 09, | Limitorque Operator Inspection |
| OP-0303, Revision 06, | I&C Department Training and Retraining Program |

MAINTENANCE REQUESTS:

88-0756, MOV-14-11B Motor/Operator Repair
88-0731, UPS B Repair
88-0632, Hydrogen/Oxygen Monitor Repair

OTHER DOCUMENTS:

Temporary Electrical Lifted Lead/Installed Jumper Request 87-0137.
I&C Department Worklist.
Maintenance Department Worklist.

ENGINEERING DESIGN CHANGE REQUESTS:

| | |
|---|---|
| EDCR 86-412; | Spent Fuel Reracking |
| EDCR 87-408; | Limitorque Limit Switch |
| EDCR 88-401; | HPCI Pump Impeller Replacement |
| EDCR 86-03; | Cable Rerouting |

# ATTACHMENT 2 - DOCUMENTS REVIEWED

## ENGINEERING CALCULATIONS:

Calculation No. VYC-661; Qualification of Fuel Pool Structure for High Density Rock Loads, Revision 0.

Calculation No. VYC-011/Bechtel No. 006-C001; Spent Fuel Pool High Density Rock Loadings, Revision 0.

Calculation No. VYC-010/Ebasco No. 103735-C-1; Structural Analysis and Evaluation of Reactor Building Spent Fuel Pool, Revision 0.

Calculation No. VYC-270; Evaluation of Lead Blankel Shielding, Revision 0.

## YANKEE NUCLEAR SERVICES DIVISION PROCEDURES:

AP-6000; Plant Design Change Requests, Revision 12
AP-6003; Plant Alteration Requests, Revision 12
AP-6004; Engineering Design Change Requests, Revision 11

## YNSD - ENGINEERING INSTRUCTIONS:

WE-002; Design Document Control, Revision 7
WE-004; Training, Revision 6
WE-100; Engineering Design Change Requests, Revision 15
WE-101; Plant Design Change Requests, Revision 9
WE-102; Design Criteria, Revision 8
WE-103; Engineering Calculations and Analyses, Revision 3
WE-108; Computer Codes, Revision 0

## QUALITY ASSURANCE AUDITS

Combined Utility Assessment Report, 1985
Report for the Combined Utility Assessment, 1986

## MISCELLANEOUS:

NRC Bulletin 87-01;
NRC Information Notice 87-36; Significant Unexpected Erosion of Feedwater Lines.
NRC NUREG-0800, Standard Review Plant, Section 3-8.4. Revision 1, 1981.
Response Spectrum - Taft Earthquake, Taft, California.
Yankee Procedure YR-W1-15; Inspection of Secondary Plant Piping for Erosion/Corrosion, Revision 0, 4/1/87 and Revision 1, 4/24/87.