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REGION I

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Licensee: New York Power Authority

Facility: Indian Point 3 Nuclear Power Plant

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Buchanan, New York 10511

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## EXECUTIVE SUMMARY

### Indian Point 3 Nuclear Power Plant NRC Inspection Report No. 50-286/97-06

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covered a six-week period of resident inspection; in addition, it included the results of reviews by region-based inspectors in the areas of inservice inspection and physical security.

#### Operations

Overall, the licensee conducted activities safely and conservatively. Good management oversight was noted, as evidenced by around-the-clock and extended operations management coverage during most of the inspection period. Also, management presence on site was noted during significant work activities such as manipulation of components in the electrical distribution system. Good initiatives were taken by the licensee in the development of additional defense-in-depth plans, such as for the isolation of the residual heat removal system, and the development of new procedures, such as the fill and vent of the residual heat removal system after extensive outage work. (Section O1.1)

The licensee's control of tagged components was weak as evidenced by several deficiencies in which tagged equipment configuration was not properly maintained. The licensee's identification of these issues was good, particularly identification by the quality assurance organization. Although the reviews of some tagging deficiencies were thorough, the quality of the licensee's review and corrective actions to other tagging deficiencies was inconsistent. In one example, the licensee did not identify a maintenance and test tagging process weakness, which did not provide for a second check to ensure that equipment was properly isolated prior to work. In another example, previous corrective actions to the inadequate configuration control of weld channel nitrogen valves were ineffective and failed to prevent recurrence. This is a violation of NRC requirements. **(VIO 97006-01)** (Section O1.2)

The licensee conducted a thorough review of the circumstances surrounding the trip of the feeder breaker for the 6A vital bus. Although the exact cause of the event could not be determined, the licensee took appropriate corrective actions for the personnel error which was the most likely cause. (Section O1.3)

During refueling activities, several weaknesses were noted associated with procedural adherence and quality. These weaknesses resulted in a dropped thimble plug, inadvertent isolation of containment ventilation and entanglement of the refueling mast with the fuel assembly guide cable. The failures to adhere to procedures associated with the dropped thimble plug and cable entanglement, and the failure to establish a procedure for bypassing radiation monitor R-14 were a violation. However, these instances were non-cited due to prompt and appropriate corrective actions taken by the licensee. **(NCV 97006-02)** (Section O4.1)

## Executive Summary (cont'd)

### Maintenance

Foreign material exclusion controls for a reactor vessel head lift and work on a pressurizer safety valve were inadequate. A cleanliness zone II work area was not established as required by procedures. Corrective actions to a previously identified example of inadequate foreign material exclusion controls were ineffective and in violation of NRC requirements. (VIO 97006-01) (Section M1.6)

Test procedure 3PT-R003A was weak in that the test failed to verify a function of recirculation switch No. 1. The late completion of the Generic Letter 96-01 efforts caused a missed opportunity for the licensee to identify the recirculation switch No. 1 test deficiency. However, risk assessment personnel identified the need for core temperature monitoring during periods when the residual heat removal system was isolated for the test. This was an example of effective risk assessment. (Section M1.8)

The test procedures for dynamic valve testing on the residual heat removal and safety injection systems appropriately established test conditions for obtaining valid test data. However, the development of the test procedure was completed just prior to its performance. This contributed to administrative and technical errors encountered during its performance. (Section M1.9)

The 314 emergency diesel room fan failed in a manner that caused the 31 emergency diesel generator to be inoperable. Because 32 emergency diesel generator was inoperable for preventive maintenance, this failure resulted in less than two emergency diesel generators being operable and is a violation of technical specifications. Although good actions were being taken to improve the reliability of the emergency diesel room fans, the failure is another example of the equipment problems noted with the diesel ventilation system since 1996. (VIO 97006-03) (Section M2.1)

The inservice inspection program was consistent with inspection schedule requirements of ASME Section XI and Technical Specification Section 4.9, steam generator tube inservice surveillance. The program was well organized and data was easily retrievable for auditing purposes. The quality assurance oversight of non-destructive examinations performed at IP3 was excellent. (Sections M1.1 - M1.4)

### Engineering

Overall, the licensee conducted a significant amount of work in the service water system. The identification of service water system deficiencies was good. In one case, an effective questioning attitude by system engineering and maintenance personnel led to the identification of degraded flanges. The licensee has taken good corrective actions in response to identified deficiencies. However, the licensee's actions with respect to pin hole leaks in the three inch service water lines of the fan cooler units did not assure that pin hole leaks would be precluded during the next operating cycle. Also, communications within the engineering organizations were weak with respect to the assessment of the continued acceptability of the degraded service water elbows downstream of two zurn strainers. (Section E1.1)

## Executive Summary (cont'd)

A significant number of dynamic and static motor operated valve tests were conducted during this outage. The licensee effectively used industry information to identify several equipment deficiencies. (Section E1.2)

The approach and review performed in response to Generic Letter 96-01 was reasonable. The licensee performed two independent reviews of the circuitry and identified several issues. However, engineering completion of the safety-related circuit reviews delayed the performance of some tests and did not effectively support operations. This also contributed to weaknesses in refueling test procedures. (Section E1.3)

Licensee event report 50-286/97-011 documented a breaker that was not tested to verify that it would automatically strip from a safety bus on a safety injection/undervoltage signal. The failure to test this safety-related circuit is a violation of technical specifications. However, based on the licensee's identification, the violation is not being cited in accordance with section VII.B.2 of the Enforcement Policy. **(NCV 97006-04)** (Section E8.2)

### Plant Support

Housekeeping practices within the radiological controlled areas was poor. Section M1.6 of this report documented poor housekeeping in the reactor cavity and pressurizer enclosure. Also, the slots in the base plates of the steam generator supports contained debris. (Section R1.1)

The licensee generally maintained an effective security program. Good management support was evident. Audits were thorough and in-depth, alarm station operators were knowledgeable of their duties and responsibilities, and assessment aids had excellent picture quality. Maintenance of security equipment was being performed in a timely manner. Controls were in place for personnel access; however, the licensee failed to properly control personnel access into a vital area. This is a violation. **(VIO 97006-05)**

The licensee's provisions for land vehicle control measures generally satisfy regulatory requirements and licensee commitments. However, the licensee did not review and revise as necessary, procedures addressing access control measures for vehicles to ensure inclusion of the vehicle barrier system (VBS) and operations procedures necessary to safely shut down the unit after a bomb blast at the VBS.

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## Report Details

### Summary of Plant Status

At the beginning of this inspection period, the plant was in a de-fueled condition with the core off-loaded into the spent fuel pool. During this period, the licensee completed fuel reload and installed the reactor vessel upper internals and head. At the end of this period, the plant was in the cold shutdown condition.

## I. OPERATIONS

### O1 Conduct of Operations

#### O1.1 General Comments (71707)

During this inspection period, the inspectors conducted frequent reviews of operational activities with specific focus on refueling operations such as reactor cavity drain down, reactor assembly, reactor vessel head lift, and fuel reload. Also, plant systems required to support refueling activities were reviewed and walked down. These systems included the emergency diesel generators, the residual heat removal system, the service water system, intermediate loop level indication system and containment integrity.

Overall, the licensee conducted activities safely and conservatively. Good management oversight was noted, as evidenced by around-the-clock and extended operations management coverage during most of the inspection period. Also, management presence on site was noted during significant work activities such as manipulation of components in the electrical distribution system. Good initiatives were taken by the licensee in the development of additional defense-in-depth plans, such as for the isolation of the residual heat removal system, and the development of new procedures, such as the fill and vent of the residual heat removal system after extensive outage work.

#### O1.2 Protective Tagouts (VIO 97006-01)

##### a. Inspection Scope (71707)

The inspectors conducted walkdowns of tagged equipment and reviewed deviation event reports to assess the effectiveness of the tagging program.

##### b. Observations and Findings

During walkdowns, the inspectors identified two deficiencies associated with tagged components. On July 22, the inspector noted that a flange that was caution tagged for modified containment integrity was improperly removed and the caution tag was lying adjacent to the flange. On July 1, the inspector observed that valve TCV-1103, service water flow control valve, was removed with a protective tag still attached. However, in both cases, quality assurance independently identified the issues; deviation event reports were documented; and, appropriate immediate corrective actions to correct the deficiency were taken. The inspector considered

the quality assurance organization's independent identification of these two problems examples of effective independent oversight.

During the period, the inspector reviewed several deviation event reports concerning tagouts and concluded that the quality of the licensee's review and corrective actions was not consistent. DER 97-1464 documented the removal of a nitrogen three-way supply valve with a protective tag still attached during work on the station auxiliary transformer. The licensee's review of the event was thorough. Apparent causes and contributing factors were identified. Good corrective actions were taken including a review of the extent of condition.

In contrast, the corrective actions in response to a nitrogen isolation valve to weld channel zone 4 were not effective. DER 97-1852 documented the weld channel zone 4 nitrogen isolation valve, PS-PCV-1110-27, in the incorrect position as required by a protective tagging order. The licensee concluded that the likely cause was personnel inadvertently bumping and repositioning the valve. An action commitment tracking system was initiated to provide protection to the weld channel valves. However, the inspector noted that the same valve was inadvertently repositioned on February 27, 1997, and was documented in DER 97-0358. In this event, the inadvertent repositioning of the valve isolated the backup supply to weld channel zone 4. On December 5, 1996, a corresponding valve for weld channel zone 3, PS-PD-1110-26, was also bumped out of position. The inspector considered the licensee's configuration control of these valves inadequate. From the earlier events, a work request was initiated to replace these valves with new valves designed to be less susceptible to bumping. This work was subsequently rescheduled for installation in the next refueling outage. The licensee's corrective action failed to prevent the repetition of the inadvertent repositioning of the weld channel isolation valves. This is a violation of 10 CFR 50 Appendix B, Criterion XVI, Corrective Action. (VIO 97006-01)

The inspector reviewed DER 97-1709, which documented a contractor who received a mild electrical shock while working on a motor operated valve. The contractor had opened the breaker under the maintenance and test tagging process. Although the cause of the breaker being closed was not determined, the inspector considered the licensee's response to the event weak, because it did not address the lack of a second verification to ensure adequate protection was established for personnel safety. The inspector noted that neither the maintenance procedures nor the maintenance and test tagging procedures require a second verification that a component is properly isolated before work is commenced.

c. Conclusions

The licensee's control of tagged components was weak as evidenced by several deficiencies in which tagged equipment configuration was not properly maintained. The licensee's identification of these issues was good, particularly identification by the quality assurance organization. Although the reviews of some tagging deficiencies were thorough, the quality of the licensee's review and corrective actions to other tagging deficiencies was inconsistent. In one example, the licensee

did not identify a maintenance and test tagging process weakness, which did not provide for a second check to ensure that equipment was properly isolated prior to work. In another example, previous corrective actions to the inadequate configuration control of weld channel nitrogen valves were ineffective and failed to prevent recurrence. This is a violation of NRC requirements.

### O1.3 Inadvertent Emergency Diesel Generator Actuation

#### a. Inspection Scope (71707, 93702)

On June 18, the normal feeder breaker for the vital 480 volt bus 6A tripped. The 32 emergency diesel generator (EDG) started and tied to the bus, and loads were automatically restored. The inspector reviewed the circumstances surrounding the event, the licensee's review of the event and the licensee's corrective actions.

#### b. Observations and Findings

On June 18, the normal feeder breaker for the vital 480 volt bus 6A tripped. The 32 EDG automatically started and tied onto bus 6A and the non-safety inject blackout logic function restored the 33 component cooling water (CCW) pump and the 36 service water (SW) pump. The inservice residual heat removal (RHR) pump and spent fuel pool (SFP) cooling pump were not affected. At the time of the event the plant was in a refueling condition, the 31 EDG was inoperable due to maintenance, the 32 and 33 EDG's were in standby.

The licensee conducted an investigation and troubleshooting procedure to determine the cause of the 6A feeder breaker trip. At the time of the event there were several work activities in the vicinity of the 6A bus relay cabinet, including installation of scaffolding in the area and a modification to the 6A relay cabinet which required cutting through portions of the cabinet walls. Workers installed herculite over the relays inside the cabinet to prevent any metal filings from entering the relay housings during the modifications. This portion of the 6A modification was originally scheduled to be conducted with the bus de-energized but was rescheduled and performed with the bus energized. The inspector's review of the risk assessment of this activity indicated that the decision was acceptable.

The specific cause of the breaker trip was not identified. Subsequent troubleshooting and testing of the 6A bus circuitry revealed no equipment failures. Based on the nature of work performed in the vicinity of the bus during the event, the licensee concluded that the most probable cause of the trip was personnel error, more specifically, inadvertent actuation of one of the under-voltage relays which were located behind the herculite drape. Tests conducted by the licensee indicated that one of these relays could have been actuated by inadvertently depressing the external plunger through the herculite. The licensee took appropriate corrective actions to possible causes of the event, including discussions with personnel associated with nearby work, and review/revision to procedures and standards used for the modification.

c. Conclusions

The licensee conducted a thorough review of the circumstances surrounding the trip of the feeder breaker for the 6A vital bus. Although the exact cause of the event could not be determined, the licensee took appropriate corrective actions for the personnel error which was the most likely cause.

**04 Operator Knowledge and Performance**

**04.1 Refueling Activities (NCV 97006-02)**

a. Inspection Scope (71707)

During this inspection period, the inspectors reviewed licensee activities associated with refueling. This review included observations of core reload and verification of containment integrity and equipment operability required to support the refueling.

b. Observations and Findings

During refueling activities, several weaknesses were noted associated with procedural adherence and quality. On June 25, a refueling operator inadvertently dropped a thimble plug in the spent fuel pool (SFP). On July 28, the containment ventilation system inadvertently isolated due to failure to bypass radiation monitor R-14, the plant vent gas radiation monitor. On July 31, the containment manipulator mast became entangled with the fuel assembly guide cable.

On June 25, a thimble plug was inadvertently dropped in the SFP by contractor personnel performing fuel assembly insert change-outs. Contractor personnel under the supervision of NYPA removed the thimble plug from the fuel assembly at SFP location VV-39 and inserted it into the fuel assembly at SFP location XX-37. The operator unlatched the thimble plug, but the plug remained in the thimble plug tool. Procedure RP-ROI-5, "Thimble Plug Handling Tool Operating Instruction," required a spotter to visually verify that the plug was properly installed; however, the spotter's relief had just arrived and the two were in the process of turnover, so neither noticed that the plug remained in the tool. The operator moved the tool to the next location (ZZ-49) in the sequence and attempted to latch onto the next plug but was unable to do so since there was still a plug in the tool. When operator's relief arrived and attempted to latch the plug at ZZ-49 he noticed that there was a plug on top of the assembly in ZZ-49 and no plug installed in the last location (XX-37). When the tool was removed from location ZZ-49, the plug fell out of the tool and landed on top of the plug in ZZ-49. Subsequent inspections revealed only damage to the dropped thimble plug had occurred. The licensee decided to not re-use the thimble plug.

On July 28, during the transfer of the first fuel assembly from the spent fuel building to the containment, the containment ventilation system isolated due to the actuation of radiation monitor R-14. Radiation monitor R-14 is located in the plant vent in a location between the containment and spent fuel building. During fuel

movement through the transfer tube, radiation levels are expected to increase in this area and actuate the radiation monitor setpoint for isolating containment ventilation. Therefore, this monitor is required to be bypassed during fuel transfer. However, the licensee did not bypass the monitor due to weak procedural guidance that failed to identify bypassing the radiation monitor as a pre-requisite. In the past, licensee personnel recognized that this action was required and bypassed the monitor, but did not incorporate the requirement into procedures.

On July 31, the refueling manipulator mast became entangled in the fuel assembly guide cable while enroute to the upender to retrieve another fuel assembly. The guide was dislodged from its position on the core plate and dragged across the lower core plate near the fuel assemblies. The cable was severed under the tension. Procedure RP-ROI-12, "Fuel Assembly Guide Operating Instruction," requires that visual verification of the guide cables be made to prevent entanglement during normal fuel movement operations. The operators did not ensure that the refueling bridge automatic drive path would be clear of the guide cables. Also, the inspector noted that the guide was used for every fuel assembly movement; however, the procedure indicated the guide is used when fuel assembly bow is sufficient to justify the use of the fuel assembly guide. Subsequent inspections of potentially affected components revealed no damage.

In each of the above events, the inspectors reviewed the licensee's causal evaluation and corrective actions. Overall, corrective actions taken were prompt and appropriate, and associated activities were stopped until the cause of the events were understood and corrected. Regarding the thimble plug drop, the licensee inspected the thimble plug, thimble plug tool, and fuel assembly for damage, and conducted a stand down of the night shift until NYPA expectations for refueling personnel could be re-enforced. Regarding the isolation of containment ventilation, the licensee revised the applicable procedure and conducted a review of other procedures. Regarding the guide cable entanglement, the licensee thoroughly inspected potentially affected components for damage, searched for potential cable pieces which may have fallen in the reactor vessel, and stopped the use of the automatic feature of the bridge for the remainder of the core reload.

Technical Specification 6.8.1 requires written procedures to be established, implemented and maintained for refueling operations. Contrary to this requirement, refueling procedure RP-ROI-5, requiring visual verification of proper thimble plug installation, and refueling procedure RP-ROI-12, requiring verification that the guide cables would not be entangled during fuel movement, were not adequately implemented. Also, no procedure was established to bypass radiation monitor R-14 during fuel movement through the fuel transfer tube. However, this violation is not being cited in accordance with Section VII.B.1 of the NRC Enforcement Policy, based on the licensee's immediate response to the event, thorough corrective actions to these self-revealing events, and the lack of reasonable opportunity to prevent the event from previous findings or information (NCV 97006-02).

c. Conclusions

During refueling activities, several weaknesses were noted associated with procedural adherence and quality. These weaknesses resulted in a dropped thimble plug, inadvertent isolation of containment ventilation and entanglement of the refueling mast with the fuel assemble guide cable. The failures to adhere to procedures associated with the dropped thimble plug and cable entanglement, and the failure to establish a procedure for bypassing radiation monitor R-14 were a violation. However, these instances were non-cited due to prompt and appropriate corrective actions taken by the licensee.

**O8 Miscellaneous Operations Issues**

- 08.1 (Closed) Licensee Event Report (LER) 50-286/97009: automatic actuation of an emergency diesel generator following a loss of normal power feed to a safeguards bus. This event is discussed in section O1.3 of this report and the LER is closed.
- 08.2 (Closed) LER 50-286/97005 and Inspector Follow Item (IFI) 97003-05: manual reactor trip initiated due to overpower delta temperature channel signal and turbine runback. On May 14, 1997, the operators tripped the reactor from 70 percent power due to an unexplained turbine runback originating from the overpower delta temperature circuitry. All instrumentation displayed normal operating values at the time of the transient which is indicative of a circuitry failure. Specifically, the No. 2 reactor coolant bistable which makes up a portion of the overpower delta temperature tripped inadvertently. By letter dated June 6, 1997, the licensee submitted LER 97-005-00, providing information about the reactor trip and actions to be taken for root cause identification. These actions included troubleshooting of the overpower delta T (OPDT) circuitry by the NYPA I&C department and troubleshooting of the channel I and II bistables to be performed by an outside vendor. The I&C department was unable to identify a specific cause for the circuitry failure and has deemed it as an inadvertent failure with no specific cause identified. The original commitment in the LER to have additional troubleshooting performed by an outside vendor has been retracted. Instead the I&C department performed the necessary troubleshooting on the bistables. By I&C memorandum No. 97-100, the bistable troubleshooting efforts, testing results and recommendations to replace the bistables were transmitted to I&C supervision. The inspectors concluded that the licensee's efforts in this matter were reasonable and the conclusions as well as the replacement of the bistables were appropriate.

## II. MAINTENANCE

### M1 Conduct of Maintenance

#### M1.1 Inservice Inspection (ISI) Program Review

##### a. Inspection Scope (73753)

The inspectors reviewed NYPA's implementation of the Indian Point Unit 3, 2nd 10 year interval, 3rd period, ISI program. The review included the consistency of the RO9 ISI inspection with requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Section XI requirements. Included in the review was weld and component ISI data, relief request documentation and responses thereto and equipment certification. ISI deviation event reports (DERs) were reviewed, together with corrective actions completed or to be taken.

##### b. Observations and Findings

The inspectors found the current ISI program to be consistent with inspection schedule requirements of ASME Section XI, Paragraph IWB-2412-1 and Technical Specification Section 4.9, steam generator (SG) tube inservice surveillance.

The inspection results covered 648 inspection points, of which 9 DERs were issued. The inspector reviewed the Deviation Event Reports written against ISI exams that did not meet the acceptance criteria in the licensee's procedures. The licensee corrected and/or repaired the items discussed in the DERs during RO9. The inspectors reviewed the engineering evaluations written for those DERs that required technical justification and found them to be in accordance with the ASME Code.

The requirements at each inspection point followed the Examination Category requirements in ASME Section XI IWB-2500-1, IWC-2500-1, and IWD-2500-1. Activities governed by relief requests were reviewed and NRC approval for these requests ascertained.

The inspectors found that the status of completion of each general ISI piping and component inspection, and that of the steam generator inspection, was monitored and documented. This provided for careful auditing of the inspection program.

Additionally, the inspectors examined the implementation of repair/replacement activities in the following work packages:

95-4997-09: Fabrication of new penetration #SS IAW MMP 96-03-303

96-05403-02: Repair line #1083 service water elbow

97-02052-06: Fan cooler unit (FCU) service water (SW) pipe support upgrade

The inspectors found the repair/replacement work packages followed Procedure AP-39, IP3 ASME Code Section XI Repair/Replacement Program.

c. Conclusions

The ISI program is consistent with inspection schedule requirements of ASME Section XI and Technical Specification Section 4.9, steam generator (SG) tube inservice surveillance. The program is well organized and data is easily retrievable for auditing purposes.

M1.2 Non-Destructive Examination (NDE) Observation and Data Review

a. Inspection Scope (73753)

The scope of this inspection was to observe NDE activities as performed on important plant components. Additionally, the inspectors reviewed the ISI program related NDE activities as required by the ASME Code. Included in the review were the ISI NDE procedures and the qualification documentation of the NDE personnel.

b. Observations and Findings

The licensee utilized NDE subcontractors at Indian Point Unit 3 to perform the ISI NDE examinations. The subcontractor is responsible to submit the final data to the NYPA NDE Level III examiner for evaluation. The NYPA NDE Level III examiner has the final acceptance or rejection of the NDE examination and data. The inspectors reviewed several ISI examination data packages for the reactor vessel closure head, the pressurizer support ring weld, loop 32 reactor coolant piping welds 7 and 8, and loop 33 reactor coolant piping welds 5 and 6. These welds were chosen for review as the licensee had limitations to the extent of coverage that could be obtained when performing these exams due to physical limitations of the hardware. The licensee was thorough in appropriately addressing these limitations within the Code boundaries and submitting relief requests as appropriate.

The inspectors reviewed procedures submitted by ISI contractors. The review included ultrasonic testing (UT), liquid penetrant testing (PT), magnetic particle testing (MT) and radiographic testing (RT) procedures. It was noted that a NYPA Level III examiner reviews all procedures submitted by ISI contractors and makes comments to be incorporated prior to using these procedures on site.

The inspectors observed that the NYPA Level III examiner reviews personnel certifications. The licensee identified two ASME certification requirements that were not documented in the subcontractors qualification paper work; clearance was not given for those individuals to perform exams at IP3 until the matter was corrected. The inspectors independently verified that NDE personnel were qualified to the requirements of ASME Section XI, Paragraph IWA-2300. Surveillance reports, overviews, and over-checks by the licensee provide additional assurance that the quality level is consistent with standards and procedures. The NYPA Level III examiners provide strong oversight of the NDE vendor.

The inspectors observed the NDE subcontractor performing magnetic particle testing (MT) on the steam generator studs and ultrasonic examination (UT) on containment spray piping welds. The inspector noted that the exams were performed in accordance with the licensee's procedures. In addition to following the procedures for the examinations, the NDE technicians took the time to ask questions about specific plant characteristics that could potentially affect the results of the exam and to discuss ALARA practices with the NYPA health physics personnel.

The inspector also observed the licensee's NDE Level III examiners over-check (re-performance of an examination) of the UT performed by the subcontractor on feedwater weld (FW 1). Two NYPA level III examiners performed the over-check, employing several ultrasonic methods to interrogate the weld. The inspector observed a thorough exam with excellent questioning attitudes and a high degree of knowledge on the part of the site examiners.

c. Conclusion

The NDE performed at IP3 was given a high level of quality oversight by the NYPA level III examiners. NDE was performed in accordance with the ASME Code and site NDE procedures. The NYPA NDE Level III examiner oversight of the NDE subcontractor was an effective means to identify missed indications and/or defects. The results of the examinations were reviewed and accepted by a NYPA NDE Level III examiner. Overall, the NDE program was thorough and the NYPA oversight of the subcontractors was excellent.

M1.3 Steam Generator Inspection

a. Inspection Scope (50002)

The inspectors reviewed the steam generator tube eddy-current inspection implementation and results. Also included were results of related steam generator maintenance such as tubesheet cleaning and water chemistry control. Attention was given to the implementation of a program to find and disposition loose parts in the secondary side of the steam generators.

b. Observations and Findings

*Steam Generator Tube Eddy-Current Inspection and Data Analysis*

IP3 is a 4 loop plant having Westinghouse Model 44F replacement steam generators (SGs). Each SG has 3214 Alloy 690 thermally treated seamless tubes, .875 inch outside diameter with a nominal wall thickness of .050 inches. The tubes are full depth hydraulically expanded into the tubesheet. Six tube support plates of ASME SA-240 stainless steel are broached concave quatrefoil holes on a 1.2344 inch square pitch. Below the first support plate is a flow distribution baffle with octafoil shaped broached holes.

The inspection details and results as reported in "Westinghouse Nuclear Services Division - Steam Generator Field Services - Field Service Report INT-20" for NYPA's Indian Point 3 Plant, were reviewed by the inspectors. The inspectors also

observed results of the SG eddy current (E/C) inspection transmitted via fibre optic cable from inside the containment to the training center outside the protected area. E/C analysis and site specific performance demonstration was performed offsite by Westinghouse.

During refueling outage 9 (RO9), the tubes of SGs 33 and 34 were E/C inspected for the third time since their installation in 1989. Prior to this refueling outage, a total of 40% of all steam generator tubes were inspected using bobbin probes. During the RO9 inspection, 60% of the tubes in SGs 33 and 34 were examined full length with bobbin probes. Furthermore, a 20% random pattern of hot leg top-of-tubesheet tubes were examined using plus-point rotating pancake coil (RPC) probes and a 20% random pattern of row 1 and row 2 tube U-bends were examined using U-bend magnetic-bias plus-point RPC probes. Also examined with bobbin probes were all tubes with a previous history of denting, tubes indicating adjacent loose parts, and tubes not having had full length inspection during previous outages. As a result of the RO9 inspection and previous inspections, SGs 33 and 34 have had 100% bobbin inspection of the tubes. Furthermore, all tubes with tube support plate dent indications were re-inspected with an RPC probe.

As a result of the E/C inspection of SG 33 and 34 tubes during RO9, the following number of tubes were examined:

<u>Inspection Type</u>	<u>SG 33</u>	<u>SG 34</u>
Full length bobbin	1966	2065
Hot leg top-of-tubesheet	643	681
U-bend	37	37
Hot leg dent	0	5
Cold leg dent	0	28
Hot leg - near loose object	0	4

No pluggable indications were found in either SG. The following indications were identified during the inspection:

<u>Indication</u>	<u>SG 33</u>	<u>SG 34</u>
Manufacturing buff mark	7	21
Ding	1	3
Dent	0	49
Free span differential signal	3	7
Free span non-confirmed	0	1
Possible loose part	0	10

There were no changes from the original baseline data showing manufacturing buff marks. There were no new dents reported by bobbin probe inspection not present in the baseline data. All dents reported from bobbin inspection at tube support plates were inspected by plus-point probes and revealed no degradation or cracking. SG 34 tube inspection identified a dent at an anti-vibration bar (AVB) location 36 inches above the tube support plate. This indication had not changed from the baseline data.

Small loose parts were identified in SGs 33 and 34. These included flexitallic gasket material, wire brush bristles, apparent weld slag, weld rod, wire and sludge rock. These objects were up to 3 1/2 x 1/4 x 1/8 inches in size. All objects were retrieved, except the flexitallic gasket material. Ten top-of-tubesheet tubes were identified as having indications from loose parts. Four of these were caused by a piece of wire later removed. After removal, the indications were not found. DERs 97-1517 and 97-1519, "Foreign Objects Found In #34 Steam Generator," were written to disposition the items found in the SG. The inspectors concluded that the licensee's actions regarding the materials identified in the SG were appropriate.

NYPA contracted the steam generator inspections to Westinghouse for data acquisition and analysis. The inspectors reviewed the contractor's procedures and probe authorization sheet and determined the tube inspection techniques were qualified or equivalent to techniques qualified by the Electric Power Research Institute (EPRI) in accordance with Appendix H. The inspectors observed the data acquisition for the number 33 and 34 steam generator tubes and reviewed the preliminary examination data. The inspectors observed that the data reviewed had no reportable indications.

The NYPA steam generator coordinator provided good oversight throughout the tube inspections. In particular, NYPA personnel found an inaccurate calibration serial number had been entered into the electronic acquisition program for the eddy current tube summaries, data reels 2 through 26 (SG #33). As a result, deviation event report (DER) No. 97-1511 was written to correct the serial number for the remainder of the tube inspections and to track the correct the serial number for those tubes which already had the wrong number assigned. The inspectors noted that this was a good example of the level of detail to which the NYPA personnel were providing vendor oversight.

#### *Tubesheet Cleaning*

Sludge lancing was performed on all four steam generators and both the tubesheet and flow distribution baffle cleaned. The sludge weight removed during the lancing and cleaning procedure was 49.8 lbs. in SG 31, 63.2 lbs. in SG 32, 55.3 lbs. in SG 33, and 54.7 lbs. in SG 34.

#### *Maintenance of Steam Generator Secondary Water Chemistry*

The inspectors reviewed the IP3 secondary water chemistry maintenance of the replacement steam generators performed to preclude future steam generator tube degradation. Steps taken to mitigate tube damage due to faulty treatment of secondary water were consistent with EPRI guidelines. The chemical elements of secondary water are closely monitored and trended to observe any deleterious variance.

#### c. Conclusions

The steam generator tube eddy-current and related inspection implementation performed at IP3 was comprehensive and in accordance with Technical Specification requirements. The inspection revealed no deleterious damage to the

tubes since the last inspection. Water chemistry control was good. Loose parts found in the secondary side of the SG were located, dispositioned and removed. The steam generator inspection program was well organized and incorporated a high level of quality assurance to provide a technically sound SG inspection.

**M1.4 Extraction Steam Header/Vent Chamber Pipe Vibration (IFI 96011-01)**

**a. Inspection Scope (92702)**

The scope of this inspection is to review and assess the implementation of the IP3 action plan to provide for fatigue evaluation, root cause and corrective actions for the vibrating extraction steam header/moisture separator reheater (MSR) vent chamber pipes originally discussed in NRC Inspection Report 50-286/96-11.

**b. Observations and Findings**

The inspector reviewed implementation of the fatigue evaluation program of the vibrating main steam line (MSL) 35 extraction steam header/MSR vent chamber piping discussed in IR 96-11. Vibration is monitored by measuring displacement at eleven points on the header in three orthogonal directions. The fatigue stress is obtained from evaluating the pipe displacement in a natural vibration modal pattern of the system. Conservatism is obtained through using the double amplitude measured vibration as a single amplitude in the evaluation. Furthermore, the weight of the system is considered as part of the vibrating system force. The stress intensification factors were those derived from known component stress intensification values. There is sufficient conservatism in the fatigue evaluation, the length of successful operation at these vibrating amplitudes, and the unchanging characteristic of the vibration, to warrant consideration of the piping system as operable.

The licensee has given consideration to many possible causes of pipe vibration, including high velocity conditions, fluctuating flow, inadequate supports, fluctuating pressures, periodic flashing or condensing, or dynamic effects from turbine rotation. However, the cause of the vibration is inconclusive. The corrective action to date includes the installation of snubbers at locations determined on the basis of the pipe system analysis.

To date, the licensee believes the vibration of the pipe is due to the random forces associated with moisture in the steam lines and/or transitional two phase flow. Eccentricity of piping is believed to cause accumulation of moisture. Modifications are being planned to assure concentricity of the pipe where necessary.

**c. Conclusions**

NYPA corrective action implementation continues toward reduction of piping system vibration levels and determining the root cause of the vibration. Analytic and experimental methods have provided reasonable assurance that the system remains operable. The vibration issue will continue as an inspector follow-up item IFI 96011-01, pending review of system performance upon return to power.

#### M1.5 Maintenance General Comments (62707)

The inspectors observed all or portions of the following work activities:

WR 96-01604-01, Replace Studs on 10" Flanges from 35 Fan Cooler Unit  
WR 95-01970-06, Air Operated Valve Testing of BFD-FCV-406C  
WR 95-03107-03, Motor Operated Valve Dynamic Testing of SI-MOV-1835A  
WR 95-04997-08, Replace 2" Line from 35 Fan Cooler Unit - Inside Containment  
WR 95-04997-15, Replace 2" Line from 35 Fan Cooler Unit - Outside Containment  
WR 95-05256-04, Motor Operated Valve Static Testing of SI-MOV-1802B  
WR 96-01604-01, Replace Studs on 10" Flanges from 35 Fan Cooler Unit

The inspectors observed that the work performed under the above work requests (WR) was conducted satisfactorily and in accordance with applicable maintenance and administrative procedures. The inspector also reviewed significant equipment failures that occurred, such as the emergency diesel room fan (section M2.1) and the service water flanges (section E1.1), to determine whether the equipment was within the scope of the maintenance rule, whether the licensee's corrective actions were appropriate, and whether the licensee was appropriately monitoring equipment performance. The inspector concluded that the licensee was properly implementing the maintenance rule for these equipment failures.

#### M1.6 Foreign Material Exclusion Control (VIO 97006-01)

##### a. Inspection Scope (62707)

The inspector observed inadequate foreign material exclusion (FME) controls during work on the reactor coolant system (RCS). The inspector reviewed previous examples of poor FME control during maintenance activities and corrective actions taken by the licensee.

##### b. Observations and Findings

On August 4, 1997, the inspector observed the reactor vessel head lift conducted in order to inspect the vessel flange surface prior to head stud tensioning. The inspector noted that FME controls were not in accordance with procedure requirements. Refueling procedure RP-1, "Reactor Auxiliary Equipment Disassembly and Reassembly," required the refueling cavity area to be designated a cleanliness zone II as per AP-27.2, "Housekeeping and Cleanliness of Fluid Systems." Cleanliness zone II requirements include personnel, tool, and material entry accountability as well as pre-work cleanliness controls. The refueling cavity was posted as a high radiation area at the time of the head lift and the licensee was relying on this to control personnel and equipment entering the area. In addition, cavity decontamination was in progress prior to the head lift which included the use of peelable paint on the cavity walls. The peelable paint had been removed from sections of the walls and was left on the cavity floor.

On August 6, 1997, the inspector was conducting a walk-down of the intermediate loop level indication system (ILLIS) inside containment. The walk-down included an inspection of vent connections in the enclosure above the pressurizer. The

inspector noted that RC-PCV-468, a pressurizer safety valve, had not yet been re-installed and the pressurizer flange connection for the valve was covered with plastic mesh screen. The inspector also noted poor housekeeping in the enclosure including debris which was small enough to fit through the plastic mesh. The licensee was implementing FME control in this area via a high radiation area posting. AP-27.2 requires a cleanliness zone II FME work area for intrusive work on the pressurizer.

NRC inspection report 50-286/97-03 documented another example of loss of FME control and a notice of violation for failure to implement FME controls per plant procedures. Specifically, on April 9, 1997, the inspectors identified that FME controls were not maintained for the 31 instrument air compressor, in that openings to the crank case were not covered when the case was unattended. Corrective actions from the previous NRC identified FME control issue were ineffective as evidenced by the repetitive occurrence of similar deficiencies during work on the reactor coolant system. The repetitive failure to implement FME controls was an example of a violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Actions (VIO 97006-01).

c. Conclusions

Foreign material exclusion controls for a reactor vessel head lift and work on a pressurizer safety valve were inadequate. A cleanliness zone II work area was not established as required by procedures. Corrective actions to a previously identified example of inadequate foreign material exclusion controls were ineffective and is a violation of NRC requirements.

M1.7 Surveillance General Comments (61726)

The inspectors observed all or portions of the following surveillances:

- 3PT-R003A, Safety Injection System Test Recirculation Switches
- 3PT-R003F, Auxiliary Feedwater Pump Auto-Start Functional Test
- 3PT-R172A, 31 Station Battery Modified Performance Test
- ENG 610, Differential Pressure and Flow Test of Safety Injection Valves
- ENG 614, Residual Heat Removal System Valves Differential Pressure Testing

The licensee conducted the above surveillances appropriately and in accordance with procedural and administrative requirements. As applicable, good coordination and communication with the operations department was observed during performance of the surveillance.

M1.8 Recirculation Switches Test

a. Inspection Scope (61726)

The inspectors reviewed and observed the performance of surveillance test procedure 3PT-R003A, "Safety Injection System Test Recirculation Switches." The focus of the inspection was to assess procedural quality and verify that all functions of the recirculation switches were adequately tested.

b. Observation and Findings

During a postulated design basis accident, eight recirculation switches are provided to transition from the injection phase to the recirculation phase. Each switch performs multiple actions based on power and equipment availability to realign the safety related equipment for either low head or high head injection. However, due to emergency diesel generator loading issues, three switches that involve starting loads are no longer used.

In response to NRC Generic Letter 96-01, "Testing of Safety-Related Logic Circuits," the licensee had a contractor review the logic circuitry associated with the recirculation switches. Because the licensee had concluded that the recirculation switches were not within the scope of the Generic Letter, the licensee intended to perform an independent review of the recirculation switch logic after the test was scheduled to be performed. The licensee performed an independent review and revised the affected refueling test procedures prior to testing the logic circuits which were determined to be within the scope of the Generic Letter.

The inspector conducted an independent review of the recirculation switch logic and identified that the test failed to verify a function of recirculation switch No. 1 (RS-1). RS-1 trips the 32 safety injection (SI) pump and the 32 containment spray (CS) provided that all three SI pumps and both CS pumps are running. RS-1 will also shut valve MOV 866B, the 32 containment spray discharge isolation valve. The inspector noted that the elementary logic schematics indicated that if 31 CS pump is not running, operation of RS-1 will not trip the 32 CS pump, but will shut valve MOV-866A, the 31 containment spray discharge isolation valve. However, the refueling test procedure 3PT-R003A did not test the RS-1 function to shut MOV-866A if the 31 CS pump is not running.

After notifying the licensee of this discrepancy, the licensee conducted an independent review of the logic circuitry. Also, the contractor review of the recirculation switches had identified portions of the logic which were not tested. The licensee originally decided not to include these changes into the refueling test for this refueling outage because the discrepancies were determined to be associated with parallel circuits for alarm indication functions, were associated with recirculation switches no longer used due to EDG loading concerns or were determined to not impact operability. Subsequent to this finding, the licensee incorporated these changes into the procedure prior to performance. The inspector considered that the late completion of the Generic Letter response efforts caused a missed opportunity for the licensee to identify this RS-1 test deficiency.

The inspector noted that the procedure precaution and limitations did not identify that when the residual heat removal system is temporarily isolated for testing, a technical specification limiting condition for operations is required to be entered. Also, concerning the temporary loss of the component cooling water pumps, the procedure did not call for monitoring of the spent fuel pool temperatures. These observations were incorporated by the licensee prior to the performance of the test.

The risk assessment group identified that during the temporary isolation of the residual heat removal pumps, the contingency plan should provide for temperature

monitoring of the core. At the time the test was scheduled, the core exit thermocouples had not yet been installed. The inspector considered the identification of this contingency was an example where the licensee's risk assessment was effective.

c. Conclusions

Test procedure 3PT-R003A was weak in that the test did not verify a function of recirculation switch No. 1. The late completion of the Generic Letter 96-01 response efforts caused a missed opportunity for the licensee to identify the recirculation switch No. 1 test deficiency. However, risk assessment personnel identified the need for core temperature monitoring during periods when the residual heat removal system was isolated for the test. This was an example of effective risk assessment.

M1.9 Motor Operated Valve Testing

a. Inspection Scope (61726)

The inspector observed portions of motor operated valve (MOV) static and dynamic testing. The purpose of the inspection was to assess the quality of the procedures and independently observe valve performance.

b. Observations and Findings

The inspector reviewed the engineering tests to verify that the system configurations specified by the tests were appropriate to ensure valid data was obtained during dynamic MOV testing. Because the procedures were not yet approved and the test was scheduled to start within two days, the inspector reviewed a preliminary copy of the test. The inspector considered that the testing appropriately established plant conditions for obtaining valid dynamic testing data.

However, the inspector noted several administrative errors in the procedure. For example, procedural steps required signoffs in attachments for which the attachment had no corresponding step. Also, some valves were identified by incorrect valve numbers. This was discussed with the test coordinator, who indicated that those discrepancies and others had been identified and that the procedure was in the process of being revised. However, during the performance of the tests, other problems were encountered requiring temporary procedure changes and delays. The most notable problem was a system configuration which subjected a flow instrument to excessive pressures and contributed to subsequent failure. Other discrepancies included incorrect identification of valve numbers and incorrect ranges of temporary gauges. The inspector considered that the timeliness of the test development contributed to errors encountered during the test performance.

c. Conclusions

The test procedures for dynamic valve testing on the residual heat removal and safety injection systems appropriately established test conditions for obtaining valid test data. However, the development of the test procedure was completed just

prior to its performance and contributed, in part, to administrative and technical errors encountered during its performance.

## **M2 Maintenance and Material Condition of Facilities and Equipment**

### **M2.1 Emergency Diesel Room Fan Failure (VIO 97006-03)**

#### **a. Inspection Scope (62707, 71707)**

On August 1, 1997, with the plant in the cold shutdown condition, the inspector identified that the 314 emergency diesel room fan louvers were open, but the fan blades were not rotating. Subsequent investigation revealed that the fan shaft bearing failed and caused the fan belt to become misaligned and fall off the pulley. The inspector reviewed the operational impact of the fan failure and its failure history.

#### **b. Observations and Findings**

At the time of the event, the plant had been shutdown for 78 days and the licensee recently completed fuel reload into the reactor vessel. The 32 EDG was inoperable due to planned maintenance and refueling blackout testing. Although the redundant 315 fan was functional at the time, the manner in which the 314 fan failed left the louvers in the open position creating a short circuit path for air flow around the 315 fan. As a result, the licensee declared the 31 emergency diesel generator (EDG) inoperable, because the emergency diesel room cooling support system was not functional. Further the two residual heat removal pumps, which are required for decay heat removal are powered from the 480 volt busses associated with the 31 and 32 EDGs.

Upon notification by the inspector that the fan louvers were opened but the fan blades were not rotating, the licensee promptly dispatched a nuclear plant operator to investigate. The louvers were closed and the 31 EDG was declared operable. The licensee inspected the other five emergency room fans and identified no visual indications of misalignment or anomalies. Deviation event report 97-1920 was initiated, and the licensee determined that a licensee event report to the NRC was required in accordance with 10 CFR 50.73.

The 314 emergency diesel room fan, which is a belt driven fan, previously failed on June 17, 1996 and again on October 14, 1996. NRC inspection report 50-286/96-07 documented the first failure. The licensee had determined that the bearing sleeve rotated on the shaft due to a set screw failure. NRC inspection report 50-286/96-10 documented the October 1996 failure. At the time, the licensee had not determined the cause of the failure, and an NRC unresolved item (96-10-02) was initiated to track the root cause analysis. Subsequently, the licensee determined that the cause was fan blade contact with the safety screen due failures of the screen tack welds. The weld failures caused progressive displacement of the screen toward the fan blades. The licensee's corrective actions with respect to the fan welds were previously reviewed in NRC inspection report 50-286/96-10. The first fan failure was determined to be a maintenance preventable functional failure. The second was attributed to an inadequate design.

At the end of the inspection period, the licensee had not completed the equipment failure evaluation of the recent 314 fan failure. During this refueling outage, the licensee was modifying the emergency diesel generator room fans to enhance reliability. Included in this modification was a configuration change to allow predictive vibration testing of the EDG fans.

Technical specification 3.7.F.4 requires that two emergency diesel generators are operable under all conditions including the cold shutdown condition. Contrary to this requirement, only the 33 EDG was operable during the period when the 314 fan failed and the louvers remained opened. This is a violation of technical specification 3.7.F.4. (VIO 97006-03)

c. Conclusions

The 314 emergency diesel room fan failed in a manner to cause the 31 emergency diesel generator to be inoperable. Because the 32 emergency diesel generator was inoperable for preventive maintenance, this failure resulted in less than two emergency diesel generators being operable and is a violation of technical specifications. Although good actions were being taken to improve the reliability of the emergency diesel room fans, the failure is another example of a number of equipment problems associated with the diesel ventilation system since 1996.

**M8 Miscellaneous Maintenance Issues (92702)**

- M8.1 (Closed) Unresolved Item (URI) 96010-02: emergency diesel room fan 314 failure. After a failure in June 1996, 314 emergency diesel room fan failed for a second time in October 1996. The unresolved item was issued pending the completion of the licensee's equipment failure evaluation for the second failure. As documented in section M2.1 of this report, the equipment failure evaluation was completed. The cause for the second fan failure was failure of tack welds for the fan safety screen. This cause was different from the failure in June in which the set screw for the fan hub failed. This item is closed.

### III. ENGINEERING

**E1 Conduct of Engineering**

**E1.1 Service Water Material Upgrade**

a. Inspection Scope (37551)

The licensee planned significant inspections and replacement of service water piping during this outage. During this effort, several emergent material condition issues were addressed by the licensee. The inspector reviewed the licensee's response to these emergent material condition issues.

b. Observations and Findings

During this outage, the licensee replaced an extensive amount of small bore service water piping and conducted an expanded inspection scope of large bore service

water piping. In addition to the planned outage scope, several emergent service water problems were being addressed.

As a result of a system engineer's observation of the corrosion on the studs of the 10 inch flanges above the 31 and 35 fan cooler units, the licensee initiated a work activity to replace the bolts. Upon disassembly, the maintenance personnel noted that the upper flange was severely corroded. The upper flange was carbon steel but the bottom flange was stainless steel. The licensee subsequently inspected and replaced all ten carbon steel flanges. The preliminary cause was determined to be dissimilar metal causing galvanic corrosion and incorrect gaskets installed in 1982. The inspector considered the engineering and maintenance personnel identification of the deficiency to be excellent.

Upon returning the fan cooler units to service, leaks were identified on a three inch line to the fan coolers. The licensee conducted an extent of condition review and identified another through wall leak. During radiography, the licensee identified that many welds lacked penetration, with the lack of penetration of up to 33% in some cases. With regard to the pinhole leaks, the licensee's evaluation concluded that the leaks would not present a plant safety issue. With regard to the lack of penetration, the licensee performed an evaluation to ensure that there was structural integrity due to the generic nature of these lack of penetrations on the weld. This evaluation assumed all the weld performed in 1982 lacked penetration and used the most limiting stress location. Also, the additional stresses due to potential water hammer identified in NRC Generic Letter 96-06 was also considered. Review of the Code requirements indicated that their approach to accepting this met the code requirements, however, the inspector considered that the licensee was susceptible to pinhole leaks in these lines during the next operating cycle.

The inspector reviewed the extent of condition associated with the through wall leak identified in the summer of 1996 on the elbow downstream of the zurn strainer. The specific leak was repaired, however, the extent of condition showed two similar locations to have 3.3 and 4.0 years of service before potentially exceeding minimum wall thickness. The inspector discussed this issue with the system engineer responsible for this portion of the service water system during the outage. He indicated that the thickness measurement taken in 1996 provided justification that the elbows would be acceptable through the next cycle. However, the inspector subsequently found that the quality controls organization had taken new measurements of the piping thickness during this outage in response to a 1996 request of a different system engineer. Further, structural engineering was not aware of the thickness measurements taken during this outage nor were they provided with the results to assess the continued acceptability of the degraded service water piping. The inspector concluded that weak communications within the engineering organizations.

c. Conclusions

Overall, the licensee has conducted a significant amount of work in the service water system. The identification of the service water deficiencies was good. In one case, an effective questioning attitude by system engineering and maintenance personnel lead to the identification of degraded flanges. The licensee has taken

good corrective actions in response to identified deficiencies. However, the licensee's actions with respect to pin hole leaks in the three inch service water lines of the fan cooler units did not assure that pin hole leaks would be precluded during the next operating cycle. Also, communications within the engineering organizations was weak with respect to the assessment of the continued acceptability of the degraded service water elbows downstream of two zurn strainers.

#### E1.2. Motor Operated Valve Testing and Inspections

##### a. Inspection Scope (37551)

The inspector reviewed the scope of the work performed under the motor operated valve testing program and the licensee's corrective actions to identified deficiencies from this testing.

##### b. Observations and Findings

The licensee conducted a significant number of dynamic and static motor operated valve tests and preventive maintenance activities during this outage. The scope of work included over 100 tests, 90 preventive maintenance activities, and 20 modifications. Most of the modifications and a large percentage of the as-left static testing was included as a result of industry information and NRC Information Notice 96-48, "Motor-Operated Valve Performance Issues." As a result of this industry information, the licensee inspected several motor shafts for cracks. One motor shaft was identified to have a crack and was replaced.

The licensee also disassembled and inspected the residual heat removal suction isolation valves, in part, due to their evaluation of Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Condition." The inspection revealed that the disc retainers had broken on both valves. In response to the missing parts, the licensee conducted a thorough search for the parts; however, the licensee was not able to locate the missing parts. A nuclear safety evaluation and vendor evaluation were performed to ensure that the missing parts would not impact plant equipment.

##### c. Conclusions

A significant number of dynamic and static motor operated tests were conducted during this outage. The licensee effectively used industry information to identify several equipment deficiencies.

#### E1.3. Generic Letter 96-01 Review

##### a. Inspection Scope (37551)

The inspector reviewed the licensee's effort relative to the review of testing of safety-related circuits per NRC Generic Letter 96-01, "Testing of Safety-Related Logic Circuits."

b. Observations and Findings

The licensee's approach to the review appeared appropriate. The review was conducted by two groups working independently. An engineering group was contracted to review the engineered safeguards feature actuation system, the reactor protection system, and emergency diesel generator loading circuitry. The licensee's staff conducted a separate and independent review. The results of these two reviews were then compared. Overall, the inspector considered the approach to be reasonable.

By a letter dated April 16, 1996, the licensee committed to complete the engineering review of safety-related circuits and change applicable surveillance test procedures before startup from the next refueling outage. The inspector observed that the engineering effort to review the adequacy of testing associated with safety-related circuits did not effectively support operations. The licensee did not start this review until just before the start of the outage. As a result, numerous changes had to be incorporated into the safety injection signal tests and delayed the scheduled performance of some portions of the tests. This created greater challenges to operations and contributed to weaknesses in the test procedures. During the performance of procedure 3PT-R003C, "Safety Injection Test Train 1 and Train 2," one change due to the generic letter review was not properly incorporated and resulted in the degradation of two emergency diesel generators for about five minutes.

c. Conclusion

The approach and review performed in response to the Generic Letter 96-01 appeared reasonable. The licensee performed two independent reviews of the circuitry and identified several issues. However, engineering completion of the safety-related circuit reviews delayed the performance of some tests and did not effectively support operations. This also contributed to weaknesses in the test procedure.

**E8 Miscellaneous Engineering Issues**

- E8.1 (Closed) Violation 97080-01: failure to properly document, review and approve changes to safety-related surveillance tests performed in 1995. The licensee responded to the violation by letter dated July 21, 1997, and indicated that management expectations for strict procedural adherence have been further communicated, enforced or monitored since 1995. Also, the licensee indicated that the procedural deficiencies identified during the 1995 test would be corrected prior to use. During this inspection period, the inspector observed performance of several of the tests, and noted that procedural changes were made in accordance with NRC requirements. Also, extensive changes were made to the safety injection test procedure prior to its use. This violation is closed.
- E8.2 (Closed) LER 50-286/97-011 (NCV 97006-04): Incomplete testing of safety-related logic circuits failed to fully demonstrate technical specification requirement. In response to NRC Generic Letter 96-01, "Testing of Safety-Related Logic Circuits," the licensee identified a test deficiencies associated with breaker 52/MCC-210, an

alternate power supply to a non-essential motor control center. The breaker was not tested to verify that it would automatically strip from safety bus 2A on a safety injection/undervoltage signal. The licensee revised the procedure during this outage to test the feature. The safety consequence of this deficiency was low because the breaker is normally deenergized during power operations so that the electrical contacts need not function. During testing this outage, the breaker appropriately stripped from the bus. The failure to test this contact was caused by an inadequate procedure change. This failure to test this safety-related circuit is a violation of technical specifications. However, based on the licensee's identification the violation is not being cited in accordance with section VII.B.2 of the Enforcement Policy. (NCV 97006-04)

#### IV. PLANT SUPPORT

##### R1 Radiological Protection and Chemistry (RP&C) Controls

##### R1.1 Tour of the Radiologically Controlled Area (RCA)

##### a. Inspection Scope (71750)

The inspectors toured the radiologically controlled areas to observe radiological control practices and assess housekeeping.

##### b. Observations and Findings

The inspectors observed good radiological work practices during tours of radiologically controlled areas. Health physicists were noted to be in the field and to be providing good oversight of work activities. Personnel were observed adhering to dosimetry and protective clothing requirements.

The inspector observed poor housekeeping practices during the inspection period. Tygon tubing and protective clothing were observed laying across contaminated boundaries. Lead shielding over a letdown line was inadvertently shifted. Debris was observed in the slots in the base plates of the steam generator supports. The inspector considered the failure to keep these slots clean could impact seismicity by limiting the free movement of the hold down bolts within the slots during a seismic event. Also, as discussed in section M1.6, cleanliness around the reactive vessel and in the pressurizer doghouse was poor. The inspectors discussed these discrepancies with the licensee and verified that the discrepancies were subsequently addressed.

##### c. Conclusions

Housekeeping practices within the radiological controlled areas was poor. Section M1.6 of this report documented poor housekeeping in the reactor cavity and pressurizer doghouse. Also, the slots in the base plates of the steam generator support contained debris.

**S1 Conduct of Security and Safeguards Activities****a. Inspection Scope (81700)**

Determine whether the security program, as implemented, met the licensee's commitments in the NRC-approved security plan (the Plan) and NRC regulatory requirements. The security program was inspected during the period of July 7-11, 1997. Areas inspected included: management support and audits; alarm stations and communications; protected area detection aids; vital area access control of personnel; testing, maintenance and compensatory measures; and the vehicle barrier system.

**b. Observations and Findings**

A violation of NRC requirements involving the licensee's failure to properly control personnel access into a vital area was identified (see section S7.2) based on the inspector's review of the circumstances associated with the event. Management support is ongoing as evidenced by the procurement of new X-ray equipment, the installation of an uninterruptable power supply (UPS) for the security access management system, the manning levels were adequate to permit effective program implementation, and the Security Manager's position in the organizational structure and reporting chain permits management's awareness of issues and concerns. Protected area detection aids were installed and maintained as required by the NRC-approved physical security plan (the Plan), alarm station operators were knowledgeable of their duties and responsibilities, assessment aids had excellent picture quality and audits were thorough and in-depth. Security equipment testing was being performed as required in the Plan and maintenance of security equipment was being performed in a timely manner as evidenced by minimal compensatory posting associated with security equipment repairs.

Based on the inspector's observations and discussions with plant engineering and security management, the inspector determined that the licensee's provisions for land vehicle control measures satisfy regulatory requirements and licensee commitments. However, the inspector noted that the licensee did not review security and operations procedures to assure necessary revisions were made to incorporate the requirements of the VBS. The licensee committed to review and revise the applicable procedures as necessary.

**c. Conclusions**

The inspector determined that, except for the violation associated with vital area access control of personnel, the licensee was conducting its security and safeguards activities in a manner that protected public health and safety and that the program, as implemented, met the licensee's commitments and NRC requirements.

**S2 Status of Security Facilities and Equipment****S2.1 Protected Area Detection Aids****a. Inspection Scope (81700)**

Conduct a physical inspection of the PA intrusion detection systems (IDSs) to verify that the systems were functional, effective, and met licensee commitments.

**b. Observations, Findings and Conclusion**

On July 9, 1997, the inspector conducted a walkdown of the protected area perimeter and determined, by observing licensee testing of selected IDS zones, and by reviewing applicable testing and maintenance records, that they were functional and effective, and were installed and maintained as described in the Plan.

**S2.2 Testing, Maintenance and Compensatory Measures****a. Inspection Scope (81700)**

Determine whether programs are implemented that will ensure the reliability of security related equipment, including proper installation, testing and maintenance to replace defective or marginally effective equipment. Additionally, determine that when security related equipment fails, the compensatory measures put in place are comparable to the effectiveness of the security system that existed prior to the failure.

**b. Observations and Findings**

The inspector reviewed testing and maintenance records for security-related equipment and found that documentation was on file to demonstrate that the licensee was testing and maintaining systems and equipment as committed to in the Plan. A priority status was being assigned to each work request and repairs were normally being completed within the same day a work request necessitating compensatory measures was generated. The inspector also noted that the working relationship between security, maintenance and the instrumentation and control (I&C) departments was excellent as evidenced by no open work requests requiring compensatory measures.

**c. Conclusions**

Documentation on file confirmed that security equipment was being tested and maintained as required. Repair work was timely and the use of compensatory measures was found to be appropriate and was being minimized.

**S2.3 Alarm Stations and Communications****a. Inspection Scope (81700)**

Determine whether the Central Alarm Station (CAS) and Secondary Alarm Station (SAS) are: (1) equipped with appropriate alarm, surveillance and communication capability, (2) continuously manned by operators, and (3) use independent and diverse systems so that no single act can remove the capability of detecting a threat and calling for assistance, or otherwise responding to the threat, as required by NRC regulations.

**b. Observations and Findings**

Observations of CAS and SAS operations verified that the alarm stations were equipped with the appropriate alarm, surveillance, and communication capabilities. Interviews with CAS and SAS operators found them knowledgeable of their duties and responsibilities. The inspector also verified through observations and interviews that the CAS and SAS operators were not required to engage in activities that would interfere with the assessment and response functions, and that the licensee had exercised communication methods with the local law enforcement agencies as committed to in the Plan. Additionally, the inspector evaluated the effectiveness of the assessment aids by observing a walkdown of the protected area on closed circuit television (CCTV). The inspector determined that the assessment aids in both alarm stations had excellent picture quality.

Interviews with CAS and SAS operators found them knowledgeable of their duties and responsibilities. The inspector also verified through observation and interviews that the CAS and SAS operators were not required to engage in activities that would interfere with the assessment and response functions, and that the licensee had exercised communications methods with the local law enforcement agencies as committed to in the Plan.

**c. Conclusion**

The alarm stations and communications met the licensee's Plan commitments and NRC requirements.

**S6 Security Organization and Administration****a. Inspection Scope (81700)**

Conduct a review of the level of management support for the licensee's physical security program.

**b. Observations and Findings**

The inspector reviewed various program enhancements made since the last program inspection, which was conducted in February 1997. These enhancements included the procurement of new X-ray equipment and the installation of an uninterruptable power supply (UPS) for the security access management system.

The inspector reviewed the Security Manager's position in the organizational structure and reporting chain. The Security Manager reports to the General Manager Support Services, who reports to the Site Executive Officer. Additionally, the inspector noted that the access authorization and fitness-for-duty (FFD) programs, being safeguards related, reports directly to the Security Manager.

c. Conclusions

Management support for the physical security program was determined to be effective. No problems with the organizational structure that would be detrimental to the effective implementation of the security and safeguards programs were noted.

**S7 Quality Assurance in Security and Safeguards Activities**

**S7.1 Audits**

a. Inspection Scope (81700)

Review the licensee's Quality Assurance (QA) report of the NRC-required security program audit to determine if the licensee's commitments as contained in the Plan were being satisfied.

b. Observations and Findings

The inspector reviewed the 1997 QA audit of the security program, conducted February 24 - March 17, 1997, (Audit No. A97-03-I) and the 1996 QA audit of the FFD program, conducted December 11-18, 1996, (Audit No. 96-07 W). The audits were found to have been conducted in accordance with the Plan and FFD rule.

The security audit report identified seven deviation/event reports (DERs) and six recommendations. The DERs involved needed changes of the training and qualification plan, correction of the VBS diagram as noted in the Plan, security department documentation deficiencies, and I&C and security's failure to adhere to procedural requirements. The FFD audit identified two findings and two recommendations. The FFD findings were related to lab reporting requirements and FFD purchase orders. The inspector determined that the findings were not indicative of programmatic weaknesses, and the recommendations would enhance program effectiveness. The inspector determined, based on discussions with security and FFD management and a review of the responses to the findings, that the corrective actions were effective.

c. Conclusions

The review concluded that the audits were comprehensive in scope and depth, that the findings were reported to the appropriate levels of management, and that the audit program was being properly administered.

## S7.2 Vital Area Access Control (VIO 97006-05)

### a. Inspection Scope (81700)

Determine if the licensee has positive control over access to the vital areas such that unescorted access during non-emergency conditions is limited to authorized personnel who need access to perform duties.

### b. Observations and Findings

The inspector determined, based on a review of the licensee's vital area (V/A) access revalidation process, that individuals are granted access to specific V/As on an "as needed" basis. A review of applicable documentation and discussions with security supervision by the inspector verified that the lists receive management's review every 31 days to ensure unauthorized names have not been added to the V/A access lists and names have been deleted for access into specific V/As once the need for access no longer exists.

However, on June 12, 1997, the licensee informed the NRC that on May 23, 1997, the security department caused a degradation of a V/A barrier by unlocking the barrier and deactivating the intrusion detection system (IDS) without implementing any compensatory measures. Specifically, under the direction of the Security Manager, security removed the lock and alarm capabilities of a ground level hatch which was designed to restrict access into a valve pit that contained vital equipment to only individuals with a specific need to be in the area. The inspector was informed, by security management, that the decision was based on an assumption that the area in question could be devitalized because of an outage condition. However, security management failed to perform an evaluation of the safety significance of the valve pit, with plant operations, prior to removing the lock and alarm capabilities of the V/A. Because the licensee failed to implement compensatory measures, for a period of 19 days, anyone granted protected area access had undetected access to the V/A regardless of authorization or a specific need to be.

### c. Conclusion

The licensee's failure to establish compensatory measures for a degraded V/A for a 19 day period is a violation of NRC requirements. (VIO 97006-05)

## S8 **Miscellaneous Security and Safety Issues**

### S8.1 Vehicle Barrier System (VBS) - General

On August 1, 1994, the Commission amended 10 CFR Part 73, "Physical Protection of Plants and Materials," to modify the design basis threat for radiological sabotage to include the use of a land vehicle by adversaries for transporting personnel and their hand-carried equipment to the proximity of vital areas and to include the use of a land vehicle bomb. The amendments require reactor licensees to install vehicle control measures, including vehicle barrier systems (VBSs), to protect against the malevolent use of a land vehicle. Regulatory Guide 5.68 and NUREG/CR-6190 were

issued in August 1994 to provide guidance acceptable to the NRC by which the licensees could meet the requirements of the amended regulations.

An April 26, 1996, letter from the licensee to the NRC forwarded Revision 15 to its physical security plan that detailed the actions implemented to meet the requirements of 10 CFR 73.55 (c)(7),(8), and (9) and the design goals of the "Design Basis Land Vehicle" and "Design Basis Land Vehicle Bomb." A NRC February 27, 1997, letter advised the licensee that the changes submitted had been reviewed and were determined to be consistent with the provisions of 10 CFR 50.54(p) and were acceptable for inclusion in the NRC-approved security plan.

This inspection, conducted in accordance with NRC Inspection Manual Temporary Instruction 2515/132, "Malevolent Use of Vehicles at Nuclear Power Plants," dated January 18, 1996, assessed the implementation of the licensee's vehicle control measures, including vehicle barrier systems, to determine if they were commensurate with regulatory requirements and the licensee's physical security plan.

## S8.2 Vehicle Barrier System

### a. Inspection Scope (TI 2515/132)

The inspector reviewed documentation that described the VBS and physically inspected the as-built VBS to verify it was consistent with the licensee's summary description submitted to the NRC.

### b. Observations and Findings

The inspector's walkdown of the VBS and review of the VBS summary description disclosed that the as-built VBS was consistent with the summary description and met or exceeded the specifications in NUREG/CR-6190.

### c. Conclusion

The inspector determined that there were no discrepancies in the as-built VBS or the VBS summary description.

## S8.3 Bomb Blast Analysis

### a. Inspection Scope (TI 2515/132)

The inspector reviewed the licensee's documentation of the bomb blast analysis and verified actual standoff distances provided by the as-built VBS.

### b. Observations and Findings

The inspector's review of the licensee's documentation of the bomb blast analysis determined that it was consistent with the summary description submitted to the NRC. The inspector also verified that the actual standoff distances provided by their as-built VBS were consistent with the minimum standoff distances calculated

using NUREG/CR-6190. The standoff distances were verified by review of scaled drawings and actual field measurements.

c. Conclusion

No discrepancies were noted in the documentation of bomb blast analysis or actual standoff distances provided by the as-built VBS.

S8.4 Procedural Controls

a. Inspection Scope (TI 2515/132)

The inspector reviewed applicable procedures to ensure that they had been revised to include the VBS.

b. Observations and Findings

The inspector reviewed the licensee's procedures for VBS surveillance and compensatory measures. The procedures contained effective controls to provide adequate surveillance, inspection, and compensation for any degradation of the VBS. However, the inspector noted that the licensee did not review security and operations procedures to ensure any necessary revisions were made to incorporate the requirements of the VBS.

c. Conclusions

The licensee committed to review and revise, as necessary, access control procedures for vehicles. In the interim, the licensee issued temporary post instructions. The inspector determined, by observing security force members performing their vehicle access control duties, that the additional guidance ensured inclusion of the VBS. Additionally, the licensee is in the process of reviewing and revising operation procedures, as necessary, to ensure inclusion of the VBS. This will be reviewed during a subsequent inspection.

S8.5 Review of Updated Final Safety Analysis Report (UFSAR)

A recent discovery of a licensee operating its facility in a manner contrary to the UFSAR description highlighted the need for a special focused review that compares plant practices, procedures, and parameters to the UFSAR description. Since the UFSAR does not specifically include security program requirements, the inspectors compared licensee activities to the NRC-approved physical security plan, which is the applicable document. While performing the inspection discussed in this report, the inspector reviewed Section 7.2 of the Plan, Revision 15, dated April 26, 1996, titled, "Intrusion Alarms." The inspector determined, by observing licensee testing of the intrusion detection systems, discussions with security supervision and reviews of applicable procedures and records, that the intrusion alarms are being tested and maintained as required in the Plan and applicable procedures.

## V. MANAGEMENT MEETINGS

### X1 Exit Meeting Summary

The inspectors presented the inspection results to members of the licensee management at the conclusion of the inspection on August 17, 1997. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

### X2 Pre-Decisional Enforcement Conference Summary

On July 30, a pre-decisional enforcement conference was held at the NRC Region I office to discuss potential enforcement issues identified in NRC inspection report 50-286/97-80. The issues related to the translation of design basis information into the emergency operating procedures. Slides used in the licensee's presentation at the conference have been included as Attachment A to this report.

**ATTACHMENT A**

**PARTIAL LIST OF PERSONS CONTACTED**Licensee

J. Knubel, Chief Nuclear Officer  
H. Salmon, Vice President, Nuclear Operations  
R. Barrett, Site Executive Officer  
J. Comiotes, General Manager, Operations  
J. Russell, General Manager, Maintenance  
D. Quinn, General Manager, Plant Support  
J. DeRoy, Director, IP3 Engineering

NRC

G. Wunder, Project Manager  
M. Modes, Chief, Emergency Preparedness and Safeguards Branch  
D. Dempsey, Reactor Engineer  
K. Kolaczyk, Reactor Engineer

**INSPECTION PROCEDURES USED**

IP 37551: Onsite Engineering  
IP 50002: Steam Generators  
IP 61726: Surveillance Observations  
IP 62707: Maintenance Observation  
IP 71707: Plant Operations  
IP 71750: Plant Support Activities  
IP 73753: Inservice Inspection  
IP 92901: Followup - Operations  
IP 92902: Followup - Maintenance  
IP 92903: Followup - Engineering  
IP 93702: Prompt Response to Events at Operating Power Reactors  
IP 81700: Physical Security Program for Power Reactors  
TI 2515/132: Malevolent Use of Vehicles at Nuclear Power Plants

**ITEMS OPENED, CLOSED, AND DISCUSSED**Opened

- VIO 97006-01: Corrective actions in response to foreign material exclusion and valve configuration control were ineffective.
- NCV 97006-02: Failure to adhere to refueling procedures caused entanglement with the fuel assembly guide cable and dropping of a thimble plug.
- VIO 97006-03: Less than two emergency diesel generators were operable in cold shutdown.
- NCV 97006-04: Failure to test that a breaker strips on a safety injection/blackout signal.
- VIO 97006-05: A vital area was left unlocked and unalarmed for 19 days.

Closed

- IFI 97003-05, review licensee's determination of the cause for a turbine runback
- LER 97005, manual reactor trip due to overpower delta T runback
- LER 97011, failure to test a breaker function identified by Generic Letter 96-01 review
- LER 97009, automatic actuation of an emergency diesel generator
- URI 96010-02, equipment failure analysis of the 314 emergency diesel room fan
- VIO 97080-01, procedure changes inadequately performed during the 1995 refueling tests

Updated

- IFI 96001-01, secondary piping vibrations

## LIST OF ACRONYMS USED

ASME	American Society of Mechanical Engineers
AVB	Anti-vibration Bar
B&PV	Boiler and Pressure Vessel
CAS	Central Alarm System
CCTV	Closed Circuit Television
CCW	Component Cooling Water
CFR	Code of Federal Regulations
CS	Containment Spray
DER	Deviation Event Report
DID	Defense in Depth
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
E/C	Eddy Current
EDG	Emergency Diesel Generator
EPRI	Electric Power Research Institute
FCU	Fan Cooler Unit
FFD	Fitness for Duty
FME	Foreign Material Exclusion
FOSAR	Foreign Object Search and Recovery
FW	Feedwater Weld
IDS	Intrusion Detection Systems
IFI	Inspection Follow-up Item
ILLIS	Intermediate Loop Level Indication System
IP	Inspection Procedure
IP3	Indian Point 3
IR	Inspection Report
IRSE	Inspection and Repair Strategic Evaluation
ISI	Inservice Inspection
LER	Licensee Event Report
MSL	Main Steam Line
MSR	Moisture Separator-Reheater
MT	Magnetic Particle Test
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NRC	Nuclear Regulatory Commission
NYPA	New York Power Authority
OPDT	Overpower Delta T
PT	Liquid Penetrant Test
QA	Quality Assurance
RHR	Residual Heat Removal
RO9	Refueling Outage RO9
RP&C	Radiological Protection and Chemistry
RPC	Rotating Pancake Coil
RS	Recirculation Switch
RT	Radiographic Testing
RTD	Resistance Temperature Detector
SAS	Secondary Alarm System
SFM	Security Force Members

SFP	Spent Fuel Pool
SG	Steam Generator
SI	Safety Injection
the Plan	NRC-Approved Physical Security Plan
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UPS	Uninterruptible Power Supply
URI	Unresolved Item
UT	Ultrasonic Test
V/A	Vital Area
VBS	Vehicle Barrier System
VIO	Violation
WR	Work Request