March 24, 2000

Mr. Robert J. Barrett
Site Executive Officer
New York Power Authority
Indian Point 3 Nuclear Power Plant
Post Office Box 215
Buchanan, NY 10511

Subject: NRC ENGINEERING TEAM INSPECTION REPORT 05000286/1999011

Dear Mr. Barrett:

The NRC conducted an Engineering Team Inspection at the Indian Point 3 facility from January 10 - January 28, 2000. The purpose of the inspection was to review the effectiveness of the engineering organization in supporting safe plant operation. The inspection also included a review of the results of the 10 CFR 50.59 safety evaluation program. The on-site inspection was completed on January 28, 2000, and the preliminary findings were discussed with you and members of your staff on February 3, 2000, and in a subsequent telephone exit on February 9, 2000.

We determined that overall engineering performance was effective and the quality of engineering work products such as modifications, safety evaluations, calculations and operability evaluations were satisfactory. However, the team identified a number of deficiencies in the corrective actions area. As noted in previous NRC inspections and performance reviews, implementation of the corrective action program continues to be an area warranting additional focus by your staff. We acknowledge that you have also recognized the importance of improving the corrective action program.

Based on the results of this inspection, the NRC has determined that two Severity Level IV violations of NRC requirements occurred. One violation involved the failure to implement appropriate corrective actions for degraded or non-conforming conditions in the plant. Specifically, discrepancies with service water flow indicators and problems with instrument sensing line plugging were not properly addressed. A second violation identified a failure to properly implement procedural requirements when performing at-risk work during the calibration of residual heat removal system flow instruments.

These violations are being treated as Non-Cited Violations (NCVs), consistent with Appendix C of the Enforcement Policy. The NCVs are described in the subject inspection report. If you contest the violations or their severity level, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Senior Resident Inspector at the Indian Point Unit 3 facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room (PDR).

Sincerely,

/RA BY BRIAN E. HOLIAN FOR/

Wayne D. Lanning, Director
Division of Reactor Safety

Docket No. 50-286
License No. DPR-64

Enclosure: NRC Engineering Team Inspection Report No. 05000286/1999011

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REGION I

Docket No.	50-286
License No.	DPR-64
Report No.	05000286/1999011
Licensee:	New York Power Authority
Facility:	Indian Point 3 Nuclear Power Plant
Location:	P.O. Box 215 Buchanan, New York 10511
Dates:	January 10 - January 28, 2000
Inspectors:	Larry Scholl, Senior Reactor Inspector Leonard Prividy, Senior Reactor Inspector Thomas Burns, Reactor Engineer Melvin Gray, Reactor Engineer
Approved by:	Lawrence T. Doerflein, Chief Systems Branch Division of Reactor Safety

EXECUTIVE SUMMARY

Indian Point 3 Nuclear Power Plant
NRC Inspection Report No. 05000286/1999011

During the weeks of January 10 and January 24, 2000, a team of inspectors conducted an onsite inspection of the Indian Point Unit 3 engineering activities and results of the 10 CFR 50.59 safety evaluation program. NRC Inspection Procedures 37550, “Engineering” and 37001, “10 CFR 50.59 Safety Evaluation Program,” were used for guidance during the inspection. The results of the inspection were presented at an exit meeting conducted at the station on February 3, 2000, and during a final telephone exit discussion on February 9, 2000.

The team concluded that the design and implementation of plant design changes and modifications were acceptable. However, deficiencies were observed with the design change for the auxiliary feedwater steam pressure control valve in that a significant design deficiency was not identified until post-modification testing was performed and numerous engineering change notices (ECNs) were necessary to correct other design deficiencies. Also, changes were planned to the main control board residual heat removal system flow indicator scales without utilizing the design change process. (E1.1)

System engineers were generally knowledgeable of system issues and were involved in their resolution. System health reports provided good summaries of system status and overall performance. Open items requiring resolution to improve system performance were appropriately addressed; however, problems with the main feedwater pump oil system accumulators were not addressed in a timely manner. (E2.1)

The control and installation of temporary modifications installed on safety systems was satisfactory. However, the number of installed temporary modifications exceeded the station goal and the temporary modification that disables the main boiler feed pump (MBFP) thrust bearing position instrumentation alarm and trip signals was not properly controlled and no plans or schedules were established to resolve the longstanding issue with a risk significant component. (E2.2)

The team concluded the operability evaluations provided a good bases to support component and system operability. However, the initial evaluation of a condition where station service transformer cooling fans were found to be spinning backwards was inadequate. (E2.3)

The team concluded that engineering resolution of issues was acceptable. However, an NCV was identified regarding implementation of the corrective action program. Several examples were identified where issues were not properly entered into the corrective action program, where root cause evaluations and corrective actions were narrowly focused, and where corrective actions were not timely. (Also refer to Section E3.1) Additionally, an NCV was identified for the failure to properly implement the procedural requirements for performing “at risk” work during instrument calibrations. (E2.4)

NYPA was effective in maintaining design bases documentation. Some minor discrepancies were identified and in one case NYPA failed to initiate a Deviation/Event Report (DER) when errors in the Plant Equipment Data Base (PEDB) were identified. (E3.1)

Executive Summary (cont'd)

NYPA has successfully established controls and procedures for implementing the requirements of 10 CFR 50.59. Training and qualification of personnel has been established and properly tracked. Nuclear safety and environmental impact screens and nuclear safety evaluations were performed when required, and the overall quality of the work was good. (E3.2)

The quality of engineering self-assessments were mixed. The Independent Safety Engineering Group (ISEG) consistently provided good findings in a broad range of activities that impact safe plant operation and issues were appropriately addressed within the corrective action program. (E7.1)

NYPA has demonstrated sustained progress in the last several years in reducing the number of items in the engineering work backlog. (E8.1)

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Report Details

E1 Conduct of Engineering

E1.1 Design Changes and Permanent Plant Modifications

a. Inspection Scope (37550)

The team reviewed design changes and permanent plant modifications to ensure the changes were accomplished in accordance with station procedures and that the changes maintained the ability of affected systems, structures and components to perform their safety functions. The inspection included a review of safety evaluations, design inputs, calculations, engineering change notices (ECNs), acceptance testing, and turnover documentation.

b. Observations and Findings

Procedure MCM-1, "Design Change Process," and supporting procedures establish requirements for the preparation, review, approval and implementation of design changes to plant systems, structures and components.

The team found that modification procedures provided appropriate guidance to the engineering organization for the preparation of design change packages. The modification packages reviewed by the team contained detailed design and installation requirements including; a technical evaluation, bases of current design, reason for the modification, design inputs, material procurement requirements and post-modification test and acceptance criteria.

The modifications reviewed were supported with safety evaluations and associated calculations provided sound technical bases for the change. For example, calculation IP3-CALC-SWS-02307 properly evaluated the effects on the service water system hydraulic model due to the piping changes made by modification MMP 96-3-507. The calculation clearly supported the conclusion that there was a minimal effect on the hydraulic model. Also, the team noted that during the upgrade of the PORV block valves (MMP 98-3-063), NYPA conducted a good extent-of-condition review when a cable not intended for replacement was found degraded. As a result, all EQ cables in the vicinity of the pressurizer were subsequently replaced.

Except for one example, involving modification MMP 97-3-320, plant procedures were appropriately updated to accurately reflect the design changes. During this change, two control air throttle valves, MS-438 and MS-439, which control the opening of MS-PCV-1139 and hence the speed during startup of the turbine driven auxiliary feedwater (AFW) pump, were set during the modification acceptance test at 5 and 5-1/2 turns open respectively. However, in the turnover documentation provided to operations, the valve positions were specified only as "throttled" in the AFW system checkoff list (COL-FW-2, Rev. 25). The team observed that more positive valve control should have been specified in COL-FW-2 by including the precise number of turns open or locking the valves in the throttled position. NYPA acknowledged this concern and issued Deviation Event Report (DER) 00-00226 to evaluate the extent of this practice in system COLs and to evaluate the need for additional actions to reduce the potential for error during future valve lineups.

The team reviewed modification MMP 97-3-320 which replaced the steam supply pressure control valve (MS-PCV-1139) for the turbine driven auxiliary feedwater pump. During post-modification testing the valve failed to control pressure as intended and resulted in the repeated lifting of the downstream pressure relief valve. This problem was a result of design engineering failing to recognize that the valve positioner should have operated in a direct acting mode versus the incorrect setup in a reverse acting mode. Additionally, the team observed that about two thirds of the 20 ECNs issued for this design change were attributed to either the lack of correct design change details or the need to correct test information. This large number ECNs, of which a high percentage were attributed to errors with the initial design, and the significant design error associated with the positioner for MS-PCV-1139, were indicative of a weak engineering product for this modification.

The team also identified a plant change to two main control board flow indicators that NYPA planned to implement without utilizing the design control process. DER 99-01204 documented that flow indicator FI-640 reads approximately 1000 gpm when no flow is present in the line and that a similar condition existed for FI-638. These instruments indicate residual heat removal (RHR) system heat exchanger flow during an accident. The instruments are designed to produce a flow reading from 0 to 3500 gpm based on a differential pressure signal developed across an elbow in the flow path. Downstream of each heat exchanger, the flow path branches into two cold leg injection lines and instruments FI-946A,B,C&D provide flow indication for the branch lines.

During initial plant startup, flow indicators FI-638 and FI-640 were benchmarked against the more accurate downstream FI-946 indicators to achieve sufficient accuracy at higher flow conditions. As a result of using this method to provide accurate calibration data at high flows, the instrument indications were offset at the low end of the scale such that at zero flow the instruments read on scale.

In reviewing the design basis of the FI-638 and FI-640 flow indicators, NYPA engineering determined that FI-638 and -640 were intended to provide qualitative indication at higher flows to prevent pump run out or excessive heat exchanger flows. The more accurate FI-946 indicators would be used to ensure minimum flow to the cold legs during accident conditions. As a human factors improvement, NYPA determined that the indicators for FI-638 and FI-640 should be modified to delete the scale graduations below 2100 gpm. This change was to be implemented using a work order and instructions in an engineering memorandum.

The team considered the modification of control room scales to be a change that should have been controlled in accordance with the design change process. The team noted that the change required engineering to address operator training, document reviews and simulator modifications. Also, a QA category 1 drawing (9321-L-70096) was also developed for the modification. The team concluded these are program requirements that would be systematically addressed by the design change process. Also, during a walkdown of the indicators, the senior reactor operator informed the team that he did not agree that the change was being made in an appropriate manner and denied permission to simply paint over the lower scale graduations. The operator indicated that the correct method would be to provide a replacement scale with the desired graduations. NYPA subsequently initiated DER 00-00272 and deferred implementation of the modification until appropriate design controls were implemented.

The team considered this to be an example of weak engineering performance. However, this issue constitutes a violation of minor significance which, in accordance with Section IV of the NRC Enforcement Policy, will not be subject to formal enforcement action.

c. Conclusions

The team concluded that the design and implementation of plant design changes and modifications were acceptable. However, deficiencies were observed with the design change for the auxiliary feedwater steam pressure control valve in that a significant design deficiency was not identified until post-modification testing was performed and numerous ECNs were necessary to correct other design deficiencies. Also, changes were planned to the main control board residual heat removal system flow indicator scales without utilizing the design change process.

E2 Engineering Support of Facilities and Equipment

E2.1 System Engineering Interviews/Plant Walkdowns

a. Inspection Scope (37550)

The team reviewed the status of several risk-significant systems and assessed the performance of system engineering by conducting interviews, document reviews and system walkdowns.

b. Observations and Findings

The system engineers issue quarterly system status reports that provide detailed information on system status and an assessment of the overall performance of the system. The team reviewed selected system reports for the third quarter of 1999 that included the following systems: main feedwater, service water, auxiliary feedwater, 125 volt DC, 480 volt AC, containment spray and safety injection. The team found the reports provided good summaries of system status, reliability, availability and overall performance. In general, open items requiring resolution to improve system performance were being appropriately addressed. However, one issue affecting system reliability that was not addressed in a timely manner was noted with the main feedwater system.

The team noted that the third quarter 1999 status report for the main boiler feed pump (MBFP) system documented the system health as “poor.” The team discussed the reasons for this system rating with the responsible system engineer who described problems with the MBFP lubrication and control oil system that resulted in flow oscillations during the previous operating cycle. The system engineer also provided a copy of the system improvement plan that documented challenges to the system and actions being taken to restore the system health. The plan stated that while the MBFPs are non-seismic, non-safety related, balance of plant components, the Individual Plant Evaluation (IPE) found that the main feedwater system was risk significant as a high contributor to transients and initiating events.

The team noted that NYPA has upgraded the control and lube oil filtering and had improved system venting such that the pumps currently operated without oscillations. However, in reviewing the system improvement plan, the team identified a longstanding issue with the system control oil accumulators.

The MBFPs, and their associated steam turbines, share a common lubrication and control oil system that consists of a reservoir, two pumps, oil accumulators, coolers and associated piping and valves. The oil accumulators are 80 gallon tanks with a bladder pre-charged with nitrogen. In the event of a trip of the operating oil pump, the standby pump starts to re-establish system oil pressure. In the interim, the accumulators function to maintain system pressure to prevent control oil pressure transients from tripping either or both of the MBFPs. A pressure indicator is located on the nitrogen side of each accumulator bladder and indicates the bladder pre-charge pressure when the pumps are shutdown and normal system oil system pressure when an oil pump is operating.

In 1993, NYPA received information from the vendor stating the accumulator bladders were subject to failure and should be replaced. While the vendor shipped replacement bladders to the plant, no actions were taken by NYPA at that time. In May 1998, the system engineer identified oil leaks on the upper flange connection of each accumulator and initiated work requests to inspect the bladders and replace if required. Although the work requests stated that the replacement accumulators (shipped in 1993) could not be located in the warehouse, no actions were taken to ensure accumulators would be available should replacement be required during the outage. In July 1999, during the refueling outage, the system engineer noted that the accumulator pre-charge pressure gages read 0 psi, indicating the bladders had failed. The two previous work requests were canceled and work request # 98-02178-00 was issued to track development of a design change and installation of new accumulators during the next refueling outage. A design change was required since the new accumulators had minor dimensional changes from the existing accumulators.

Considering the risk significance of the system, the team concluded engineering support to address this long standing deficiency was not timely. The failure to take appropriate actions based on previous vendor and operational information resulted in operation for an additional operating cycle with both MBFP accumulators inoperable. Although not a safety-related component, this issue is an additional example of a failure to implement timely corrective actions.

c. Conclusion

System engineers were generally knowledgeable of system issues and were involved in their resolution. System health reports provided good summaries of system status and overall performance. Open items requiring resolution to improve system performance were appropriately addressed; however, problems with the main feedwater pump oil system accumulators were not addressed in a timely manner.

E2.2 Temporary Plant Modifications

a. Inspection Scope (37550)

The team conducted plant walkdowns and reviewed currently installed temporary modification (TM) documentation to determine if NYPA was effectively controlling the review, implementation, and clearance of temporary modifications.

b. Observations and Findings

The team found that documentation for installed temporary modifications was generally complete, technically adequate and in accordance with procedure requirements. The number of installed temporary modifications remained high with approximately 48 open TMs at the time of the inspection. No issues were identified during a review of a sample of TMs installed on safety systems. However, several issues were identified with the control of a TM installed in the main feedwater system.

TM 92-02691 was implemented in July 1992 to remove the alert and danger signals from both main boiler feed pump (MBFP) thrust bearing position monitoring systems. The alert signal actuates an alarm and a danger signal initiates a trip of the associated MBFP when anomalous thrust bearing positions are sensed. The TM was subsequently revised in 1997 to also remove the alert and danger signals from the MBFP turbine thrust bearing position monitoring system. The TM evaluation determined that the bearing alarm and trip functions should be inhibited due to the thrust bearing float exceeding the established alert and danger set points as a result of a 1990 design change that installed new instrumentation. The engineer also indicated that in implementing that design change, the probes to the new instrumentation were set such that the alarm and danger set points could be exceeded during startup of a MBFP when thrust bearing performance was normal.

The system engineer indicated that troubleshooting to correct the gap for the probes had been attempted during previous refueling outages but was unsuccessful.

The team also reviewed the technical basis included in the TM for alternative thrust bearing monitoring capability. In the absence of the alert and danger signals, Revision 0 of the TM credited the shaft position monitoring indication for providing reliable information on thrust bearing performance. This was based on the system engineer informally monitoring thrust bearing position during normal workdays to determine if significant shifts in shaft position occur. However, the engineer does not monitor relative thrust bearing position changes to established acceptance criteria. During this inspection NYPA performed additional reviews and concluded this basis may not be appropriate since the indicator readings were currently “off scale high” in that they exceeded the alert set point. NYPA initiated DER-00-00149 to address this concern.

Revision 1 of the TM subsequently credited the turbine and pump thrust bearing pad temperature readings as alternate monitoring instrumentation. However, the team identified that three thrust bearing pad temperature indicators for the 31 MBFP were included on the operator work around list as inoperable equipment. NYPA engineering was not aware that the status of the instrumentation credited in the TM had changed and was unavailable. NYPA initiated DER-00-00214 to address this deficiency.

The team concluded that engineering performance in this instance was weak in that the TM has existed for eight years, the alternate indications credited for the TM were not included in the quarterly TM report, the alternate indications were not reassessed for changing equipment conditions and there was no existing plan or schedule for correcting the problems such that the TM could be removed.

c. Conclusion

The control and installation of temporary modifications installed on safety systems was satisfactory. However, the number of installed temporary modifications exceeded the station goal and the temporary modification that disables the main boiler feed pump (MBFP) thrust bearing position instrumentation alarm and trip signals was not properly controlled and no plans or schedules were established to resolve the longstanding issue with a risk significant component.

E2.3 Operability Evaluations

a. Inspection Scope (37550)

The team reviewed a sample of open engineering evaluations performed to provide a technical bases for establishing that degraded or non-conforming conditions did not prevent the affected system, structure or component from performing its design function.

b. Observations and Findings

Operability evaluations are performed in accordance with station administrative procedure AP-8.4, "Determining Operability of Systems, Structures and Components." The team found that the procedure provided appropriate guidance for the performance of operability evaluations and that the evaluations reviewed by the team generally provided good bases for the operability conclusions. However, one example was noted where the initial evaluation was not comprehensive.

Operability determination (OD) 99-063 was performed on December 11, 1999, to assess the impact of station service transformer (SST) cooling fans that were found to be rotating backwards. The SSTs provide the preferred source of power (offsite power) to the 480 volt safety busses. The team noted that the initial OD was weak in that it did not provide any technical basis to support transformer operability, but simply stated the transformers were not safety-related components and that the emergency diesel generators (EDGs) could power the buses if the transformer failed. Although the initial evaluation was weak, the team noted that additional acceptable bases for operability were provided by electrical engineering on December 13, 1999, in the associated DER response report. The OD was subsequently revised on January 14, 2000, to include this information.

c. Conclusion

The team concluded the operability evaluations provided a good bases to support component and system operability. However, the initial evaluation of a condition where station service transformer cooling fans were found to be spinning backwards was inadequate.

E2.4 Engineering Resolution of Issues

a. Inspection Scope (37550)

The team reviewed a number of technical issues to assess the effectiveness of the engineering departments in resolving issues. The examples chosen for review involved systems which are risk significant.

b. Observations and Findings

Service Water System Flow Rates

Service water system flow balance test ENG-281B was last performed in August 1997 during refueling outage 9. The test results for service water (SW) flows through the containment fan cooler units (FCUs) 34 and 35 were unsatisfactory in that the measured flows were below the 1450 GPM test acceptance criteria. For example, measured SW flow through FCU 35 during a recirculation phase lineup was 1000 GPM. DER 97-02099 was issued to resolve the problem with low FCU flows.

DER 97-02099 was closed in 1997 based on Raytheon Calculation 83990.164-F-SW-099. This calculation used the SW flow model information (Raytheon Calculation 6604.266-8-SW-021, Rev.6, August,1996) to substantiate that the control room (CR) flow indicator information was wrong as observed during ENG-281B and that adequate flows existed through all five FCUs. Based on the following observations, the team concluded that NYPA failed to enter several problems into the corrective action system and these problems were apparent even after accepting the 1997 test results and closing DER 97-02099:

(1) Based on the team's independent calculations, using ENG-281B test results and assuming that the SW flow model had zero error, FCU 35 flow indicator

inaccuracy would be least 36% as referenced to the flow model. The flow test acceptance criteria included an allowance for 2% instrument error for the CR indicators (FT/FI-1124 and 1125). However, the instruments utilize elbow tap flow devices that, by the nature of their design do not produce highly accurate flow indication. Despite this known information about the elbow tap flow indicator inaccuracy, the acceptance criteria in ENG-281B included only 2% instrument error. In the absence of a DER, NYPA had not determined if elbow flow tap devices in other plant systems had similar accuracy problems.

(2) NYPA recognized that elbow tap flow devices were generally not very accurate and these particular elbow taps were not installed to assure optimal accuracy (i.e., should be located such that pipe fittings that could cause flow disturbances were not installed for 25 upstream and 10 downstream pipe diameters).

(3) The SW flow model accuracy that NYPA assumed to resolve DER 97-02099 was not evident. The team’s calculations indicated that if the model error was greater than 10%, then the 1400 GPM design basis criteria (test acceptance criteria minus allowance for instrument accuracy) may not be met. Considering the marginal SW flows accepted for the 1997 flow balance test, the team further questioned what analytical work, if any, NYPA had performed since August 1997 to justify that FCU flow values would not be less than predicted using the SW model and ENG-281B test data.

NYPA indicated that they had a high degree of confidence in the SW hydraulic model, but they could not quantitatively set the accuracy of the model. Accordingly, NYPA issued DER-00-00206 to resolve the SW hydraulic model accuracy question and determine if other elbow tap flow indicators in the plant had similar accuracy problems.

During a telephone conversation on February 24, 2000, NYPA provided additional information to address the SW hydraulic model accuracy question. The information included a summary of the 1997 ENG-281B test data and a summary of data from a similar test performed in 1989. Review of FCU service water flow test results for the injection mode indicated that the evaluated margin, using the flow model, was about 1% for the 1989 test but ranged from 14 to 17% for the 1997 test. NYPA could not explain this difference but stated that it would be addressed during the resolution of DER-00-00206 which was expected in March 2000. NYPA modified their prior statement regarding the model accuracy by indicating that the model error was expected to be no more than 5% and probably about 3%. The inspectors considered this position to be reasonable and recognized that this information would be validated whenever the next SW flow balance test was performed with special instruments to accurately measure SW flow through each FCU.

10 CFR Part 50, Appendix B, Criteria XVI, “Corrective Action,” requires that measures be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to this requirement, NYPA failed to identify and correct adverse conditions observed during the service water flow balance testing. These issues have been entered into the corrective action program as DER-00-00206. This violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy. **(NCV 50-286/99-11-01)**

Service Water System Fouling

NYPA issued DER-98-02160 to identify a through wall leak in a SW return line from the 32 FCU outside containment. The leak was located at one of the welds of the 90 degree cement-lined elbow used for flow indicator FI-1122. During the elbow replacement in the last refueling outage, contractor workers found a small amount of dead mussels. The contract workers failed to report the presence of the mussels as required by the maintenance work package. However, the finding was later reported by a NYPA engineer and documented in DER-99-02144. The team verified that the small quantity of dead mussels was not a significant problem and that NYPA was adequately following this occurrence as part of the SW system chlorination program.

The team also noted that DER-99-02144 and two prior DERs, 99-00565 and 99-01341, had identified concerns with plugging in the sensing lines and resultant erratic operation of flow indicators FI-1121, 1122, 1123, 1124, and 1125. Further questioning by the team regarding NYPA’s actions associated with these DERs indicated two additional examples of inadequate corrective action. **(NCV 50-286/99-11-01)**

- NYPA’s extent-of-condition reviews performed regarding the 3 DERs were narrowly focused in that they were confined to the FCU SW flow indicators. Other SW instrument and small lines, such as those associated with emergency diesel generator cooling which are risk significant, were not part of the extent-of-condition reviews.

- NYPA had not implemented formal controls (i.e., procedures) to periodically blow down SW system instrument sensing lines to prevent or monitor for silt buildup that could plug instrument lines and potentially effect instrument operability. This issue had been identified in NRC Information Notice 94-03, “Deficiencies Identified during Service Water System Operational Performance Inspections.” NYPA had recently issued 3PT-R185, “IP3 Service Water System Piping and Valve Flush Procedure”, to blow down piping dead legs. However, this procedure did not include instrument lines. NYPA issued DER-00-00218 to address this concern.

<u>RHR Flow Meter Recalibration</u>

To resolve the issue (previously discussed in Section 1.1 of this report) regarding upscale readings on RHR flow indicators FI-638 and FI-640 at no flow conditions (DER 99-01204), NYPA developed calculation IP3-CALC-RHR-03124, Revision 0, to provide differential pressure versus flow inputs for the calibration of the flow transmitters. On September 29, 1999, these values were incorporated into procedure 3PC-R8, "Residual Heat Flow Calibration," by the issuance of Revision 18 to the procedure.

Subsequent to issuing Revision 18 of the calibration procedure, engineering personnel decided to utilize the original calibration values determined during startup testing and change the instrument scales on the main control board to resolve the issue. (Refer to section E1.1 for additional details.) The desired calibration values were provided by engineering in Engineering Memo IP-DEE-99-138MC dated October 8, 1999.

On October 8, 1999, NYPA calibrated FT-638 and FT-640 flow transmitters using work order 98-01168-00 and marked up pages from procedure 3PC-R8, Revision 17, even though Revision 18 had been issued. The team questioned why the most current revision of the procedure was not updated and then utilized to calibrate the transmitters. NYPA indicated that due to schedule considerations the calibrations were performed as an "at risk activity" defined and controlled by procedure SPO-SD-07, Revision 0, "At Risk Work Activities."

Section 2.2 of the procedure requires that the appropriate engineering documentation be completed in parallel with performing the work and issued prior to operations personnel considering the affected system or component operable. Part I of the procedure's "At Risk Form" is used to identify and document the engineering document that requires issuance prior to close out the work activity. Part II of the form is to be completed by the cognizant engineering personnel when the required documentation is issued. SPO-SD-07 also requires that the work request for the "at risk activity" be modified to instruct operations personnel to declare the affected component or system operable after the appropriate engineering document is issued.

The team reviewed the "At Risk Form" attached to work request 98-01168-00 and noted that Part 1 of the "At Risk Form" identified a "document feedback form" as the engineering document expected to be issued in parallel with the recalibration of transmitters FT-638 and FT-640. NYPA indicated a "document feedback form" is normally an optional form completed by the worker to suggest improvements to documents or procedures. The team concluded that the engineering document that should have been specified was a revision to Procedure 3PC-R8 to implement the calibration spans actually applied to flow transmitters FT-638 and FT-640. Development and issuance of Revision 19 to the calibration procedure was in progress at the time of the inspection but was not yet complete.

10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires that "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings." Contrary to this requirement, NYPA personnel did not properly implement procedure SPO-SD-07 requirements when performing the calibration of FI-638 and FI-640 as an at risk activity. NYPA entered this issue into their corrective action program as DER-00-00280. This severity level IV violation of 10 CFR Part 50 Appendix B, Criterion V, is being treated as a non-cited violation, consistent with Section VII of the NRC Enforcement Policy. **(NCV 50-286/99-11-02).**

Flow Transmitter Commercial Grade Dedication

During the 1999 refueling outage, NYPA replaced flow transmitter FT-435 in the reactor coolant system (RCS). The replacement flow transmitter was procured as a commercial grade component and dedicated by NYPA prior to being installed as a safety related component. Subsequent to installation the transmitter failed when it developed a leak as a result of inadequacies in the commercial grade dedication effort. The failure to properly dedicate the transmitter was identified as non-cited violation (NCV) 50-286/99-08-03 in NRC integrated inspection report 50-286/99-08 and was entered into the corrective action program as DER-99-02359. The team performed a review of NYPA follow-up actions to assess the adequacy of the root cause evaluation and corrective actions for the failure.

The capability of the flow transmitter to maintain pressure boundary integrity of the RCS was identified as a "critical characteristic" by NYPA procedure SED-AD-24, "Technical Evaluation of Components and Replacement Items." In addition to providing the requirements for the identification of critical characteristics the procedure also identified inspection criteria for the acceptance of commercial grade items that will be installed in safety related applications. A substantial number of corrective action items were initiated in response to the DER and were entered into the Action and Commitment Tracking System (ACTS). The team selected ACT-99-45326 for review. This item was initiated to evaluate the adequacy of the Commercial Grade Dedication Program. The team's review focused on the requirements of the technical evaluation of components and replacement items (SED-AD-24), commercial grade dedication package TE-99-00635, and commercial grade dedication evaluation NYPA-99-0189.

The review of the established requirements of the commercial grade dedication program revealed that there are three methods specified in SED-AD-24 that can be used to dedicate a commercial grade item for use in a safety related application. The method used to dedicate the two flow transmitters procured was "Method 2" which permits the acceptance of a commercial item based on the survey and approval of a documented commercial QA program or an undocumented program capable of being audited. This method permits the acceptance of an item for which pressure boundary integrity is a critical characteristic without the performance of a pressure test. Methods one and three are explicit in the requirement for a pressure test in this type of application.

The performance of a "Mini Commercial Grade Item Survey" by NYPA on May 23, 1997, was used to support the use of "Method 2" for the transmitter acceptance. The team noted that the date of manufacture of the transmitters was not clear. However, documentation provided by the Foxboro Company to the intermediate buyer (Indiana Michigan Power Co.) indicated a hydrostatic test was successfully performed on the flow transmitters on December 4, 1989. Thus the commercial production and testing of the transmitters were performed approximately eight years prior to the performance of the commercial grade survey by NYPA. The team also noted that following the failure of the first replacement flow transmitter, NYPA revised the commercial grade dedication package to incorporate the requirement of a pressure test of the second transmitter.

The team concluded that the cause analysis performed in response to ACTS 99-45326 was lacking in depth and failed to identify the application of an undefined level of survey (Mini CGI Survey) performed in 1997 and the subsequent application of these survey results to components manufactured and hydrostatically tested eight years prior to the survey. The team concluded this activity to be a weakness in the cause analysis or "root cause" determination of the performance of the commercial grade dedication process.

Pipe Wall Thinning Analysis

The team reviewed a sample of design calculations associated with the determination of the acceptability of remaining wall thickness of various system piping segments discovered to have wall loss as a result of normal operation. A review of calculation IP3-CALC-CVCS-02212, Rev. 1 revealed that the base material design basis, calculation sheet and the text portion of the calculation narrative refer to the material standard as ASTM A 106. In addition, the design verification checklist indicates that the applicable codes and standards are correctly listed. The appropriate material standard for this system application is ASTM A 376. The team review determined that the technical adequacy of the calculation was not jeopardized since both standards invoke the same tolerance on wall thickness. However, the consistent reference to the ASTM A 106 standard adds confusion to the basis of the calculation. NYPA initiated DER-00-00195 to address this issue and, subsequently revised the calculation to clarify the design basis used in the analysis.

Station Auxiliary Transformer Tap Changer Failure

The team reviewed NYPA's resolution of DER-99-02326 which documented a failure of the station auxiliary transformer tap changer. The automatic operation of the tap changer is an important feature that is used to maintain appropriate voltage levels on the electrical busses. The proper operation of the tap changer is especially important following a plant trip, transient or accident to maintain the busses energized from offsite power during a time when significant voltage fluctuations could occur. The team noted that the tap changer failure occurred following the performance of preventive maintenance (PM). However, the issue was treated as simply a random equipment failure. Although the tap changer was promptly repaired, no root cause evaluation was performed to assess other potential issues such as adequacy of the PM scope. The team subsequently found that the failed component, a control relay, was not included within the scope of any PMs. The team concluded that although the tap changer was not classified as a safety-related component, the resolution of the problem was narrowly focused considering the importance of the component from a risk perspective.

Power Operated Relief Valve Operation

The team reviewed safety evaluation NSE 94-3-394, Revision 1, "PORV Nitrogen Supply From SI Accumulators," dated August 24, 1999. This safety evaluation reviewed changes to procedures for the use of the safety injection accumulators as a source of nitrogen to operate the PORVs when they are used to provide cold over-pressure protection for the reactor coolant system. The team noted that the safety evaluation indicated that the calibration procedure for the pressure sensing instrumentation loop which actuates the PORVs permitted the as-found value of the reset to be between 0.0 to 7.5 psi below the open set point. NYPA evaluated the effect of a 0.0 psi difference between the set point and reset point for this application and found it to be acceptable. The team did not identify any problems with this evaluation but noted that, in other applications, a zero difference between a set point and reset point may introduce operational problems or may be indicative of equipment degradation. NYPA acknowledged this concern and initiated DER 00-00275 to further evaluate this issue.

Safety Injection Pump Seal Cooling Piping

During the review of documents associated with the installation of new heat exchangers (DC-96-3-352-SI) for seal cooling water of the safety injection pumps, the team noted that the system engineer had initiated DER 00-00074 as a result of finding discoloration, rusting and leakage on pump 32 seal cooler piping. NYPA declared the pump inoperable and replaced the affected piping using work request 00-00005-00.

The team reviewed NYPA's root cause analysis which determined that the incorrect materials had been installed in refueling outage nine (RO-9) in 1997, during work intended to eliminate leaks at the mechanical joints. The error in material installation did not appear to be a result of engineering errors but of inadequate control of maintenance. During the team's review of this package, it was noted:

- The correct material (stainless steel) was specified in the work package; however, the material installed was clearly recorded as carbon steel by the installer.

- The error was not detected during two subsequent reviews of the package for closure and the work was indicated by the reviewer to be completed satisfactorily.

- The team noted that two final reviews of the package for closure were performed by the same individual who was in the employ of the contract organization that performed the piping installation. There was no indication of any NYPA personnel involvement in the review and approval of the work.

The team concluded that the installation of the incorrect materials was the result of poor work practices by contract workers and not a result of engineering deficiencies. NYPA previously recognized the need to improve control of contractor work and implemented corrective actions in this area.

Emergency Diesel Generator Gages

The team observed that during the inspection a modification was being installed that replaced the 33 EDG crankcase vacuum pressure gage with a manometer. The modification was performed to resolve a long standing problem (since 1996 time frame) with gage failures caused by engine vibration. Although the gages are not directly required to support operability of the EDGs, based on their importance for monitoring engine performance and for identifying potential degradation, the team considered the lengthy time required to resolve this issue (Design Change DC-96-3-387) to be an example of weak engineering performance.

c. Conclusions

The team concluded that engineering resolution of issues was acceptable. However, an NCV was identified regarding implementation of the corrective action program. Several examples were identified where issues were not properly entered into the corrective action program, where root cause evaluations and corrective actions were narrowly focused, and where corrective actions were not timely. (Also refer to Section E3.1) Additionally, an NCV was identified for the failure to properly implement the procedural requirements for performing “at risk” work during instrument calibrations.

E3 Engineering Procedures and Documentation

E3.1 Engineering Maintenance of Design Basis

a. Inspection Scope (37550)

The team reviewed the effectiveness of NYPA in implementing configuration management controls to ensure that the design-basis documentation was consistent with regulatory requirements, commitments, and the as-built facility.

b. Observations and Findings

The team found that engineering was effective in maintaining the design basis documentation. However, the team identified a few discrepancies as noted below.

Plant Equipment Data Base Errors

The team reviewed actions taken by NYPA to resolve DER-99-02638 which was initiated on November 23, 1999, and documented that a work package being used to set up a spare circuit breaker contained incorrect settings for the over-current trip device (Amptector). The spare circuit breaker was to be set up and then installed and used as the output circuit breaker for the 31 EDG. The error in the work package was a result of a previous problem with the maintenance of Amptector setting data in the Plant Equipment Data Base (PEDB). The team found the corrective actions for DER-99-02638 to be appropriate. However, the team also noted that when engineering discovered errors in the PEDB in April, 1999, they did not initiate a DER at that time to enter the issue into the corrective action program. The team found that the failure to initiate a DER at that time was an additional example of a violation of 10 CFR Part 50, Appendix B Criteria XVI, " Corrective Actions." (Refer to Section E2.4 for other examples.) This issue has been entered into the corrective action program as DER-00-00215. **(NCV 50-286/99-11-01)**

FSAR Error

During a review of safety evaluation NSE 94-3-394, Revision 1, "PORV Nitrogen Supply From SI Accumulators," dated August 24, 1999, the team identified an error with the associated section of the Final Safety Analysis Report. The FSAR initially reflected the need to have sufficient nitrogen available for 200 cycles of the PORVs. However, subsequent analysis by engineering determined that up to 400 cycles could be required within a ten minute period to mitigate an inadvertent safety injection pump start. As a result of that analyses, the FSAR was changed to delete the reference to 200 cycles of operation. Some time later the reference to 200 operating cycles was inadvertently reintroduced in the FSAR. NYPA initiated DER 00-00216 to document and resolve this issue.

AFW System Checkoff List Valve Positions

As discussed in Section E1.1, the checkoff list for two throttle valves lacked detail necessary to provide for positive controls during the performance of valve lineups.

c. Conclusions

NYPA was effective in maintaining design bases documentation. Some minor discrepancies were identified and in one case NYPA failed to initiate a DER when errors in the PEDB were identified.

E3.2 10 CFR 50.59 Safety Evaluation Program

a. Inspection Scope (37001)

The inspection team reviewed the procedures and controls established by NYPA to fulfill the requirements of 10 CFR 50.59, "Changes, Tests, and Experiments". The team also evaluated the 10 CFR 50.59 training and qualification program and reviewed a sample of the 50.59 safety evaluations to assess the implementation of the 50.59 safety evaluation program.

b. Observations and Findings

The Modification Control Manual, “MCM4 Revision 9, Nuclear Safety and Environmental Impact Screens and Nuclear Safety Evaluations,” provided the primary information for implementation of 10 CFR 50.59 nuclear safety and environmental impact (NSEI) screens and nuclear safety evaluations (NSEs). Upon review of MCM4 Rev. 9, the team found that it provided appropriate guidance for implementing the requirements of 10 CFR 50.59.

The team reviewed the training requirements contained in AP-2.1 “Qualification Matrix,” and the information contained in the “10 CFR 50.59 Nuclear Safety Evaluations” lesson plan. Both the matrix and the lesson plan included appropriate controls to ensure that personnel were properly trained and qualified. Prior to qualification, all trainees were required to perform a 50.59 review per MCM4 and present it to the Plant Operations Review Committee (PORC). This presentation provided for the assessment of the effectiveness of the training program. The training records were properly documented in AP-2.1.

In general, NYPA personnel appropriately reviewed plant modifications and procedural changes for 10 CFR 50.59 applicability and performed safety evaluations when required. The NSEI screens and NSEs were of good quality and the conclusions were appropriate.

c. Conclusion

NYPA has successfully established controls and procedures for implementing the requirements of 10 CFR 50.59. Training and qualification of personnel has been established and properly tracked. Nuclear safety and environmental impact screens and nuclear safety evaluations were performed when required, and the overall quality of the work was good.

E7 Quality Assurance in Engineering Activities

E7.1 Self-Assessments and Independent Safety Engineering Group (ISEG) Evaluations

a. Inspection Scope (37550)

The team reviewed several engineering self-assessments and ISEG reports to assess the quality of assessments and the adequacy of associated corrective actions assigned to engineering.

b. Observations and Findings

The team found the quality of engineering self-assessments to be mixed. For example, engineering assessment PEP-RAP-99-157 was performed to evaluate if there were sufficient engineering resources dedicated to implement the erosion-corrosion program. This evaluation focused primarily on benchmarking NYPA resources against other plants and did not assess the effectiveness of the NYPA programs. In contrast to this assessment, self-assessment KM99-08 was performed in June 1999 to evaluate the Plant Equipment Data Base and associated activities. This assessment was very thorough and identified a number of deficiencies with the maintenance of the data base and provided a number of recommendations for improving the program. DER 99-1486 was initiated to address the specific deficiencies and ACTS item 99-43394 was initiated to track the resolution of the recommendations.

The team also interviewed a member of the ISEG and reviewed a sample of quarterly ISEG reports. The team found that the ISEG was involved in a wide range of plant activities that covered many of the various plant department functions. Based on a review of the ISEG reports, the team found that the ISEG consistently provided good findings in areas important to safe plant operation. Identified issues were appropriately entered into the corrective action program.

c. Conclusion

The quality of engineering self-assessments were mixed. The ISEG consistently provided good findings in a broad range of activities that impact safe plant operation and these issues were appropriately addressed within the corrective action program.

E8 Miscellaneous Engineering Issues

E8.1 Engineering Work Backlog

a. Scope (37550)

The team reviewed NYPA’s management of the engineering work backlog and the effectiveness of backlog reduction efforts.

b. Observations and Findings

NYPA has made sustained progress since 1997 in decreasing the various engineering work backlogs that include corrective maintenance work on engineering hold, preventive work on engineering hold, engineering evaluations, modifications, drawing revisions and corrective action items. The backlog reduction was accomplished, in part, by the use of contractors and by focusing on the correction of many hardware issues that frequently resulted in entry into Technical Specification (TS) limiting conditions of operation (LCOs), resulting in a significant level of reactive support for emergent issues. Improved planning methods have also been implemented that include a detailed workload for each engineer.

NYPA recognized the need to sustain this level of effort in reducing backlogs while also improving engineering’s performance on the timely resolution of DERs. Also, as the backlogs are reduced, more aggressive goals have been established.

The team identified one weakness in the management of the work backlog in that NYPA has not established a mechanism to systematically rank items according to risk when prioritizing work in the engineering backlog.

c. Conclusions

NYPA has demonstrated sustained progress since 1997 in reducing the number of items in the engineering work backlog.

V. Management Meetings

X1 Exit Meeting

Meetings were held periodically with NYPA management during this inspection to discuss inspection observations and findings. A summary of preliminary findings was also discussed at an exit meeting on February 3, 2000, and during a final telephone exit on February 9, 2000.

PARTIAL LIST OF PERSONS CONTACTED

NYPA

M. Albright, ISEG
R. Barrett, Site Executive Officer
M. Bengis, Configuration Engineer
G. Bijoor, System Engineer
J. Boufford, System Engineer
F. Dacimo, Plant Manager
J. Comiotes, General Manager-Operations
J. DeRoy, Director, IP3 Engineering
C. Lambert, Supervisor - PEDB
S. Munos, Assistant Manger - Systems Engineering
D. Pennino, System Engineer
S. Petrosi, Manager - Design and Analysis
K. Peters, Manager - Licensing
R. Robenstein, Operations EOP Coordinator
E. Rodriguez, System Engineer
A. Vai, Supervisor - Electrical Design

INSPECTION PROCEDURES USED

IP 37550 Engineering
IP 37001 10 CFR 50.59 Safety Evaluation Program

ITEMS OPENED, CLOSED AND DISCUSSED

Opened/Closed

NCV 99-11-01	Failure to implement adequate corrective actions as required by 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Actions”
NCV 99-11-02	Failure to implement procedure requirements for at risk work on RHR instrument calibrations as required by 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings”

LIST OF ACRONYMS USED

AFW	Auxiliary Feedwater
ACTS	Action Commitment Tracking System
CFR	Code of Federal Regulations
COL	Checkoff List
CR	Control Room
DC	Design Change
DER	Deviation Event Report
ECN	Engineering Change Notice
EDG	Emergency Diesel Generator
EQ	Environmentally Qualified
ESF	Engineered Safety Feature
FCU	Fan Cooler Unit
FI	Flow Indicator
FSAR	Final Safety Analysis Report
FT	Flow Transmitter
GPM	Gallons Per Minute
I&C	Instrument and Controls
ISEG	Independent Safety Engineering Group
LCO	Limiting Condition for Operation
MBFP	Main Boiler Feed Pump
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
NSE	Nuclear Safety Evaluation
NYPA	New York Power Authority
OD	Operability Determination
PDR	Public Document Room
PEDB	Plant Equipment Data Base
PID	Problem Identification Tag
PM	Preventive Maintenance
PORV	Power Operated Relief Valve
PSI	Pounds per Square Inch
QA	Quality Assurance
RO-9	Refueling Outage 9
RCS	Reactor Coolant System
RHR	Residual Heat Removal

SI	Safety Injection
SST	Station Service Transformer
SW	Service Water
TM	Temporary Modification
TS	Technical Specification
WR	Work Request