

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

REPORT/DOCKET NO: 50-286/95-10
LICENSEE: New York Power Authority
FACILITY: Indian Point 3 Nuclear Power Plant
LOCATION: Buchanan, New York
DATES: May 23-26, 1995
June 19, 20, 1995

INSPECTOR: Richard A. Skokowski 6 July 95
Richard A. Skokowski, Reactor Engineer
Electrical Section
Division of Reactor Safety
Date

APPROVED BY: William H. Ruland 7/25/95
William H. Ruland, Chief
Electrical Section
Division of Reactor Safety
Date

Purpose: The purpose of this inspection was to assess the adequacy of the licensee's resolution of engineering-related topics. The following items reviewed were:

- the adequacy of self-ignition temperatures of cable insulation as related to the design of fire seals (Unresolved Item 93-24-03);
- the adequacy of 10 CFR 50 Appendix R safe shutdown and ancillary procedures; and
- the adequacy of the resolution of low-voltage power panel schedule discrepancies identified in the Readiness Assessment Team Inspection (RATI) Report, 95-80.

Additionally, the Indian Point 3 (IP3) software quality assurance (SQA) program was assessed as part of a management oversight review.

Results:

- The inspector considered IP3's revision to Analysis IP3-ANA1-FP-01392 to be extensive. The staff noted different test results and test methodology used to support the Factory Mutual Research Corporation (FMRC) evaluation. Therefore, the issue pertaining to cable ignition temperatures remains unresolved and Indian Point 3 (IP3) intends to maintain the implemented fire watches until the resolution of this issue.
- The inspector concluded that the symptomatic-based instructions used at IP3 for 10 CFR 50 Appendix R safe shutdown and cold shutdown were satisfactory and provided the operators with flexibility in shutting down the plant. Additionally, the controls in place, to ensure that future revision to procedures are reviewed for impact on safe shutdown capability, were appropriate. The inspector also found that the operational specifications provided sufficient administrative controls to maintain 10 CFR 50 Appendix R equipment availability.
- The inspector considered IP3's corrective actions to address the low-voltage electrical panel concern appropriate. The inspector considered the issuance of Deviation/Event Report (DER) 95-144 to be an example of good management oversight. The DER showed that IP3 initiated much of their effort to investigate the unauthorized modification on the low-voltage electrical panels prior to the RATI.
- The inspector concluded that the SQA program was satisfactory. The program was behind the licensee's scheduled implementation. Also, the inspector found that Audit Report 95-041 provided IP3 management with a good evaluation of the SQA program, and the enhancements and actions planned in response to this audit were appropriate.

DETAILS

1.0 INTRODUCTION

The purpose of this inspection was to assess the adequacy of the Indian Point Unit 3 (IP3) resolution of engineering-related topics. The items reviewed were:

- the adequacy of self-ignition temperatures of cable insulation as related to the design of fire seals (Unresolved Item 93-24-03);
- the adequacy of 10 CFR 50 Appendix R safe shutdown and ancillary procedures; and
- the adequacy of the resolution to low-voltage power panel schedule discrepancies identified in the Readiness Assessment Team Inspection (RATI) Report 95-80.

Additionally, the Indian Point 3 software quality assurance program was assessed as part of a management oversight review.

2.0 (OPEN) CABLE IGNITION TEMPERATURES (UNRESOLVED ITEM 50-286/93-24-03) (92903)

Background

During the NRC 50-286/93-24 inspection, the inspectors opened Unresolved Item 50-286/93-24-03 pertaining to the licensee verification of cable penetration seal temperatures. By design requirement, the maximum unexposed-side temperatures need to be sufficiently below the cable ignition temperatures during a fire. In response to this concern, IP3 developed Evaluation No. IP3-ANAL-FP-01392, "FIRE SEAL ANALYSIS - Self Ignition Temperature of Cable Insulation as it Relates to the Design of Fire Seals," Revision 0, dated January 25, 1995. In this analysis, the licensee concluded that the self-ignition temperature of the cable insulation is not less than 785°F, and that this temperature was sufficiently above the 700°F maximum allowable unexposed surface temperature criterion for penetration seal designs at IP3. The licensee based this conclusion on generic cable flammability data published by Electric Power Research Institute (EPRI). During a previous NRC review of IP3-ANAL-FP-01392, Revision 0, (Inspection 50-286/95-81), the team was concerned with the licensee's use of generic cable data to adequately represent the cables installed at IP3. At the conclusion of NRC Inspection 50-286/95-81, this item was left unresolved pending the completion of the New York Power Authorities' (NYPA's) effort and subsequent NRC review. The licensee had posted fire watches in all plant areas where the penetration seals in question were located. These compensatory measures, coupled with the other elements of the licensee's fire protection program, ensured an adequate level of fire safety for plant restart.

Findings

As a result of the concerns raised during NRC Inspection 50-286/95-81, IP3 revised Evaluation No. IP3-ANAL-FP-01392. The revision did not rely on earlier EPRI/Factory Mutual Research Corporation (FMRC) analysis to bound the qualification of cables at IP3 due to: (1) uncertainty of the critical heat flux values (or critical temperatures) cited in the earlier EPRI/FMRC reports; (2) questions regarding the interpretation of the test data; and (3) insufficient test data. Instead, the revised evaluation was based on comparing recent testing, by FMRC, of approximately 300 cable samples with IP3-installed cables. IP3 concluded, in Revision 1 to IP3-ANAL-FP-01392, that the self-ignition temperatures of cables that penetrate a fire seal, are sufficiently above 700°F.

The inspector found analysis IP3-ANAL-FP-01392, Revision 1, and supporting documents, to be generally sufficient. However, the staff was concerned with the FMRC test results, which differed from the results of cable ignition temperature testing provided in NUREG/CR-5546, "An Investigation of the Effects of Thermal Aging on the Fire Damageability of Electric Cables." Additionally, the staff questioned the methodology used in the FMRC testing, particularly, the correlations between critical heat flux with critical temperature, and whether a 15-minute test adequately represents cable ignition temperatures for cables installed in a 3-hour fire barrier. Based on these concerns and questions, Unresolved Item 93-24-03 remains open pending further evaluation by the licensee and subsequent NRC review. This issue was also discussed during a June 2, 1995, telephone conversation between NRC Region I, and the IP3 Vice-President of Regulatory Affairs. During this conversation, the vice-president stated that fire watches were still maintained in all plant areas where penetration seals in question were located, and that these fire watches would remain in place until resolution of this issue.

Conclusion

The inspector considered IP3's revision to Analysis IP3-ANAL-FP-01392 to be extensive. However, the staff was concerned with conflicting test results and the test methodology used to support the FMRC evaluation. Therefore, the issue pertaining to cable ignition temperatures remains unresolved and IP3 intends to maintain the implemented fire watches until the resolution of this issue.

3.0 10 CFR 50 APPENDIX R SAFE SHUTDOWN AND ANCILLARY PROCEDURES (92903)

Background

The inspector evaluated the IP3 procedures associated with 10 CFR 50 Appendix R safe shutdown. Particularly, this evaluation focused on the procedures in place for safely shutting down the plant during fire scenarios when the control room was accessible. During this evaluation, the inspector interviewed IP3 personnel, reviewed plant procedures, assessed the plant procedure revision process to ensure future revisions are reviewed for the

impact of the revision on the capability of the plant to obtain safe shutdown, and reviewed the IP3 operation specifications pertaining to 10 CFR 50 Appendix R equipment. Reviews of other fire scenarios were documented in NRC Inspection Report 50-286/95-81.

Safe Shutdown Procedures

During the development of the off-normal operating procedures (ONOP) for plant fire, IP3 evaluated safe shutdown components and associated circuits within each of the fire areas to ensure at least one "train of components" necessary to achieve and maintain hot shutdown remain free of fire damage, and one "train" of equipment necessary to achieve and maintain cold shutdown was either free of fire damage, or capable of being repaired within the time-frame specified in the regulation. This evaluation included a review of all ancillary procedures. The general methodology for safe shutdown at IP3 was to use the guidance provided in ONOP-FP-1, "Plant Fires," Revision 7, in conjunction with applicable pre-fire plans, alarm response procedures (ARPs), plant operating procedures (POPs), system operating procedures (SOPs), ONOPs, and emergency operating procedures (EOPs), to bring the plant to cold shutdown. The inspector reviewed ONOP-FP-1 with IP3 personnel, and determined that the symptomatic-based instructions provides the operators with flexibility. If equipment cannot be operated by normal methods and controls, operators are provided with alternate methods of operation.

Procedure Review Process

The inspector discussed with the licensee the barriers in place to ensure future revision to the plant fire-related procedures, and ancillary procedures, were reviewed for impact on safe shutdown capability. Administrative Procedure (AP) 3, "IP3 Procedure Preparation and Review, and Approval," Revision 27, in the "Cross-Disciplinary Review Determination" asks if the changes to any procedure affects 10 CFR 50 Appendix R plant components, and if so, a fire protection review is then required. Additionally, the plant fire-related procedures (ONOP-FP series of procedures) all contain a requirement that, whenever the procedures are revised or a biennial review is performed, a check for 10 CFR 50 Appendix R compliance SHALL be performed. In particular, this check SHALL ensure that the 10 CFR 50 Appendix R pathway lighting is adequate, and 10 CFR 50 Appendix R requirements are met. IP3 recommended that this check be performed by the fire protection systems engineer.

The inspector considered the above controls able to ensure that future procedure revisions are reviewed for impact on safe shutdown capability.

Equipment Availability

The inspector reviewed the IP3 operational specifications pertaining to 10 CFR 50 Appendix R safe shutdown equipment. The inspector also reviewed the associated 10 CFR 50.59 Nuclear Safety Evaluation (NSE) supporting these operational specifications (NSE 95-3-100-FP). According to this NSE, these operational specifications were developed to limit the allowed outage time and

to provide surveillance requirements for specific components credited for 10 CFR 50 Appendix R use. The inspector found that these operational specifications provided sufficient administrative controls for 10 CFR 50 Appendix R equipment availability.

The inspector also discussed with IP3 personnel the issue of abnormal operating conditions and the impact on the 10 CFR 50 Appendix R safe shutdown strategy. According to the licensee, all ONOPs had an Appendix R impact review; however, the concept of abnormal operating conditions adversely impacting the 10 CFR 50 Appendix R safe shutdown strategy was not directly reviewed. The inspector reviewed selected ONOPs for abnormal operating conditions that could adversely impact the 10 CFR 50 Appendix R safety shutdown strategy. Reactor coolant pump (RCP) seal malfunctions, excessive generator hydrogen leakage, and other conditions were reviewed and discussed with the licensee. The inspector considered the licensee's approach to address RCP seal malfunctions to be within the guidance provided by the vendor. However, the inspector noted that no procedural guidance, with respect to personnel safety, was provided in the event of excessive generator hydrogen leakage.

Conclusion

The inspector concluded that the symptomatic-based instructions used at IP3 for 10 CFR 50 Appendix R safe shutdown and cold shutdown were satisfactory and provided the operators with flexibility in shutting down the plant. Additionally, the controls, in place to ensure future revision to procedures are reviewed for impact on safe shutdown capability, were appropriate. The inspector also found the operational specifications provided sufficient administrative controls for 10 CFR 50 Appendix R equipment availability.

4.0 LOW VOLTAGE POWER PANELS SCHEDULE DISCREPANCIES (92903)

Background

During the Readiness Assessment Team Inspection (RATI), Inspection Report 50-286/95-80, the team identified that the load schedule sheets, located inside dc electrical panels 31 and 32, did not match the system drawings. Furthermore, no means were established to ensure that the information provided by the load schedule sheets was accurate. The licensee issued Deviation/Event Reports (DERs) 95-0780 and 95-0964 to evaluate the team's findings and develop corrective actions.

The proper designation of the loads being supplied by the electrical circuit breakers is important to ensure configuration control of safety-related circuit breakers. During the RATI, NYPA committed to complete the following actions to address the load schedule concern:

- conduct a walkdown of all low voltage electrical panels to identify discrepancies;
- include the updated load schedule sheet in the operator aid program to assure they are controlled; and

- evaluate additional actions as necessary.

Subsequently, this issue was updated in Inspection Report 50-286/95-05. NYPA was still in the process of walking down the low voltage at the time of this inspection. However, numerous discrepancies were identified. These discrepancies included spare breakers (as identified on the controlled drawings) with energized loads connected, breaker amperage ratings different than the drawings, incorrect wire sizes for associated breaker amperage ratings, and other physical discrepancies such as missing hardware. NYPA considered the use of spare circuit breakers with unauthorized modifications. At the conclusion of NRC Inspection 50-286/95-05, all IP3-identified discrepancies were associated with nonsafety-related loads and were reviewed for impact on safety-related panels and potential coordination problems. No safety concerns were found.

Scope

During this inspection, the inspector assessed NYPA's corrective actions to date, which included the walkdown of two electric panels with the licensee, the review of technical issues associated with the identified discrepancies including a review of selected DERs, associated operability determination, and corrective actions to address the load schedule sheets discrepancies. In addition to the review of the aforementioned paperwork, the inspector also discussed these issues with various members of the licensee's staff.

Walkdowns

NYPA performed walkdowns of all the safety- and nonsafety-related electrical low voltage electrical panels located within the power block. The inspector observed the walkdown performed on two panels (distribution panels 3QAY01 and 3QAY02). Discrepancies were identified by NYPA during these walkdowns. These discrepancies were similar to the discrepancies identified in earlier walkdowns. The inspector considered the walkdowns to be thorough. NYPA intended to complete the walkdown of all power block low voltage electrical panels prior to restart. Following restart, NYPA plans to perform similar walkdowns of non-power block panels and perform load trace verifications of all low voltage electrical panels.

Technical Issues

Several DERs documented the discrepancies identified during the panel walkdowns. The inspector reviewed a selection of these DERs and the associated operability determinations and found them to be appropriate. Included in this review were DERs 95-0144 and 95-1211.

DER 95-0144, dated January 24, 1995, was initiated by the IP3 management to follow up on several low voltage circuit breaker discrepancies. This DER was initiated prior to the RATI with the purpose of determining the extent of these low voltage circuit breaker discrepancies and to determine if there were any related root causes. The action items from this DER included walkdowns of the low voltage lighting panels and drawing updates. The inspector considered the development of this DER as an example of good management oversight.

DER 95-1211, dated May 19, 1995, pertained to an unauthorized modification to dc distribution panel 31, where circuit 20 of the panel was shown on Drawing 9321-F-30083 as a 30A circuit, but a 50A circuit breaker was installed. This was the only safety-related discrepancy identified by IP3 during their walkdowns. The licensee concluded that the installed 50A circuit breaker was operable as documented in IP-DEE-95-121, "Lighting and Distribution Panel Discrepancies DER Operability Evaluation," dated May 24, 1995. The inspector had no concerns with this operability determination, including the associate coordination curves. The inspector also discussed the root cause of this discrepancy and the proposed corrective actions with the licensee. The licensee considered this discrepancy to have occurred during initial installation, or shortly thereafter. They initiated Work Request 95-02814-00 to evaluate the circuit, determine the appropriate size circuit breaker to be installed, and process any changes as necessary. The inspector also discussed with the licensee their actions to prevent recurrence of similar unauthorized safety-related modifications, which were already in-place as upgrades to the modification process.

The installed 50A circuit breaker in dc distribution panel 31, as compared to the 30 amp breaker indicated on the controlled drawings, was a violation of Appendix B, Criterion III, "Design Control." However, the violation was not cited because the criteria for discretion specified in the NRC Enforcement Policy, Section VII.B.1, was met.

Load Schedule Sheets Discrepancies

To address the load schedule sheet discrepancies, NYPA included the load schedule sheets in the operator aid program. Additionally, NYPA was in the process of performing the following actions, described in the IP3 Operations Shift Orders, dated May 25, 1995:

- updating the drawings of these distribution panels based upon information from the walkdowns;
- following the updates, these drawings were to be issued to the Operations Department as controlled Type A drawings located in the control room, at which time all panel load schedule sheets would be removed; and
- load schedule sheets were to be subsequently updated and converted to controlled Type LL drawings that are required to be updated within 24 hours of completed modifications. These new drawings were to be located in the control room and in each distribution panel.

The completion of these tasks is tracked under IP3 Action Commitment Tracking System (ACTS) No. 9473. The inspector considered NYPA's actions appropriate to address the load schedule discrepancy concern.

Conclusion

The inspector considered IP3's corrective actions to address the low voltage electrical panel concern appropriate. These actions included the walkdowns of panels, the operability determinations, the planned resolutions of the findings, and the actions to ensure that accurate and controlled drawings are available for use by the operators. The inspector considered the issuance of DER 95-144 to be an example of good management oversight. It also indicates that IP3 initiated much of their effort toward the investigation of unauthorized modification on the low voltage electrical panels prior to the RATI. No further NRC followup of this issue is required.

5.0 MANAGEMENT OVERSIGHT - SOFTWARE QUALITY ASSURANCE (92903)

To assess the quality of the IP3 management oversight, the inspector reviewed their software quality assurance (SQA) program. This assessment included an evaluation of selected procedures, software validation reviews and other related documents, as well as discussions with members of IP3 staff. After the review of the SQA program, the inspector examined applicable portions of IP3's Audit Report 95-041 regarding "WPO [White Plains Office] and IP3 Configuration Management Program," to assess the quality of audit report findings.

The IP3 SQA program was initiated in June 1994, with 2 years scheduled for full implementation. The purpose of the SQA program was to ensure the quality and integrity of software and firmware used by NYPA in applications important to the design and operation of its nuclear power plants. The guidance provided in the SQA procedures was found to be appropriate and is based on the American Society of Mechanical Engineers (ASME) Standard NQA-2 Part 2.7, "Quality Assurance Requirements of Computer Software for Nuclear Facility Applications," and NUREG/CR-4640, issued August 1987, "Handbook of Software Quality Assurance Techniques Applicable to the Nuclear Industry." In general, the inspector found the guidance provided in the procedures to be appropriate. The inspector also found the cognizant NYPA staff to be knowledgeable. However, the inspector noted some shortcomings in the program. These shortcomings were discussed with the SQA program personnel and included the following:

- lack of guidance regarding the performance of 10 CFR 50.59 reviews for digital modifications;
- lack of guidance regarding the validation and verification of the models used by the various software programs;
- lack of guidance regarding the refreshing of magnetic media; and
- lack of error reporting and user awareness of importance of the error reporting process.

The SQA program allows each department to determine how to implement the SQA program. Therefore, the inspector discussed and reviewed software validation and verification packages performed by radiological engineering, instrumentation and controls, and electrical design engineering departments and noticed inconsistencies in the implementation and understanding of requirements of the program. These inconsistencies were discussed with the SQA program personnel. They were aware of these inconsistencies and, after the completion of the implementation phases of the program, intend to focus greater resources on auditing the departments. The inspector considered the implementation of the SQA program, by radiological engineering, to be good. According to the SQA program, the applicable software/firmware used at IP3 is classified into one of three levels. The definitions of these levels are as follows:

- Level 1: Software that directly controls safety-related components or systems;
- Level 2: Software, not classified as Level 1, that performs functions which maintain plant design or support plant operation; and
- Level 3: Software which does not meet the definition of Level 1 or 2 software, but which is important to the operation or maintenance of the plant.

The SQA implementation plan required qualification documentation for all Level 1 software to be completed by June 1995, and for Level 2 software by June 1996. As of the inspector's review, IP3 has only qualified 13 of 24 Level 1 software packages used by NYPA.

Subsequent to evaluating the SQA program, the inspector reviewed applicable portions of IP3's Audit Report 95-041 to assess the quality of audit report findings. The inspector found that the audit provided IP3 management with a good evaluation of the SQA program, identifying the general concerns with the implementation of the program. These concerns were tracked by IP3 through DER 95-0456 and Quality Assurance (QA) Recommendation 979 (ACTS 6161). In response to DER 95-0456, the SQA group developed an action plan (NGDC-APL-95-141, IP3 ACTS No. 9524, Revision 0, dated June 1, 1995), which addressed the concerns identified by the audit, and some additional enhancements for technical areas not addressed by the audit report.

The inspector concluded that the SQA program was satisfactory, considering it was still in the implementation phase, and the implementation of the program was behind NYPA's schedule. Audit Report 95-041 provided IP3 management with a good evaluation of the SQA program, and the enhancements and actions planned in response to this audit were appropriate.

6.0 MANAGEMENT MEETINGS

The inspector met with licensee representatives on May 26, 1995, to inform licensee management of the scope and findings of the inspection to that date. After May 26, 1995, NRC and members of the NYPA staff held several phone calls about the cable ignition temperature concern as described in Section 2.0 of this report. These telephone conversations concluded with a conversation with Mr. John Kelly, NYPA's Vice President of Regulatory Affairs, held on June 2, 1995. On June 20, the inspector again met with licensee management to discuss the finding of the onsite inspection performed June 19 and 20, 1995. The licensee acknowledged the findings and did not indicate that any proprietary material was included within the scope of the inspection.

Attachment: Persons Contacted

ATTACHMENT 1

PERSONS CONTACTED

New York Power Authority (NYPA)

- * E. Anderson, Senior System Engineer
- L. Brewer, Procedure Writer (Georgia Barri)
- R. Burroni, Instrumentation & Controls Engineer
- * M. Carmichael, WPO QA Manager
- * J. Comiotes, Support Services General Manager
- ** V. Conlehan, Fire and Safety General Supervisor
- * R. Deasy, Appraisal and Compliance Vice President
- ** J. DeRoy, Maintenance General Manager
- * T. Dougherty, Nuclear Engineering Vice President
- ** N. Eggemeyer, Operations Manager
- ** A. Ettliger, Fire Protection Project Manager
- * M. Garofalo, Senior QA Engineer/Technical Advisor
- H. Gillmartin, Engineering Support Director
- * L. Hill, Resident Manager
- * J. Kaucher, Design Engineering Director
- * J. Kelly, Regulatory Affairs Vice President
- * T. Klein, Manager Electrical Engineering
- # R. Lauricella, Fire Protection System Engineer
- * W. Lemanski, Planning/Scheduling Manager
- * R. Noroian, QA Senior Engineer
- # D. Notley, Fire Protection Engineer (SAIC)
- D. O'Brien, Licensing Engineer
- K. Parkinson, Fire Protection Engineer (Sonalysts Inc.)
- S. Pechar, SQA Program Consultant
- * P. Peloquin, QA Manager
- ** K. Peters, Supervisor Licensing Engineering
- * D. Quinn, Radiological and Environmental Services Supervisor
- * G. Re', Radiological Engineering Supervisor
- C. Reiniger, Operations Engineer
- * S. Schdewiesner, Configuration Information Management Manager
- # T. Storey, Fire Protection Engineer (SAIC)
- * P. Towne, Configuration Information Management Technical Specialist
- * G. Tullidge, System Engineering Supervisor
- A. Vai, Design Engineering Supervisor
- J. Zach, Operation Department General Manager

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- E. Connell, Senior Fire Protection Engineer, NRR
- * T. Frye, IP-3 Resident Inspector
- # D. Lew, IP-3 Senior Resident Inspector
- G. Singh, Fire Protection Engineer, NRR

* Denotes those in attendance at the May 26, 1995, meeting.

Denotes those in attendance at the June 20, 1995, meeting.