

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-454/90024(DRP); 50-455/90024(DRP)

Docket Nos. 50-454; 50-455

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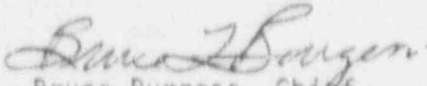
Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: November 15, 1990 through January 2, 1991

Inspectors: W. J. Kropp
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Approved By: 
Bruce Burgess, Chief
Reactor Projects Section 1A


Date

Inspection Summary

Inspection from November 15, 1990 through January 2, 1991 (Report Nos. 50-454/90024(DRP); 50-455/90024(DRP))

Areas Inspected: Routine, unannounced safety inspection by the resident inspectors of operational safety, engineered safety feature systems, onsite event follow-up, current material condition, radiological controls, security, verification of containment integrity, reactor startup, regional request, LER follow-up, document control program, lithium in calcium based MOV grease, check valve preventive maintenance program, surveillance activities, non-technical specification surveillances, balance of plant, calibration and engineering and technical support.

Results: Of the eighteen areas inspected, no violations were identified. Three Unresolved Items that pertained to the assessment/evaluation of degraded equipment (paragraph 2.b); review of modifications installed during the last Unit 1 refueling outage (paragraph 4.a); and the performance of non-Technical Specification surveillances (paragraph 5.d) were identified. Also, four Open Items were identified that pertained to repeat back of directions (paragraph 2.c); 2 - 5% lithium in calcium based MOV grease (paragraph 5.a); the use of PRA and Priority Levels in the selection of check valves for

inspection (paragraph 6) and water in the oil for the 1A CV pump gear unit (paragraph 6). The following is a summary of the licensee's performance during this inspection period:

Plant Operations

The licensee's overall performance in this area was considered good during this inspection period. The operators' action to the steam leak on Unit 2 on December 20, 1990, was considered very responsive to changing plant conditions. Shift Briefings and plan-of-the-day meetings continue to be good. The inspector considered the material condition of Unit 2 after the recent completed refueling outage as very good. Unit 1 material condition was also considered good with management attention needed for housekeeping in areas not routinely traveled by station personnel. Two other areas for management attention were identified by the inspector that pertained to completeness of control room logs/shift turnover sheets and control room communications (consistent repeat back of directions). The inspector also identified a concern with the evaluation and assessment of degraded equipment.

Safety Assessment/Quality Verification

The licensee's overall performance in this area was considered good. The inspector identified a concern with the corrective action for one LER that was identified as a Unresolved Item. During a previous inspection period, documented in Inspection Report 50-454/90021; 50-455/90019 (August 12 - October 2, 1990), the inspector identified a concern with the increased number of personnel errors. The inspector has since noted a reduction in the number of personnel errors that have caused events. This area will continue to be monitored by the inspector. However, management's involvement and subsequent actions appeared to have been effective.

Maintenance and Surveillance

The licensee's performance in this area continues to be good during this inspection period. The licensee's identification and subsequent investigation into the MOV grease that was identified with 2 - 5% lithium was considered good. Also, the implementation of the station's check valve preventive maintenance program appeared effective. However, the licensee's performance during a non-Technical Specification surveillance for a necessary support system for the Auxiliary Feedwater System was not a level commensurate with past surveillances.

Engineering and Technical Support

The licensee's overall performance in this area was considered good during this inspection period. The technical support for the issue of lithium in the calcium based MOV grease was considered good. The system engineer's involvement with the station's check valve preventive maintenance was also considered good, especially the timely diagnostic testing performed on the Essential Service Water pump discharge check valves when a similar valve at the Braidwood Station was found degraded. However, the interface between the system engineer for the Chemical and Volume Control (CV) system and the fuel handlers was considered ineffective when water was visually observed in the gear unit oil for the 1A CV pump.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

- *R. Pleniewicz, Station Manager
- *K. Schwartz, Production Superintendent
- *R. Ward, Technical Superintendent
- *J. Kudalis, Service Director
- *D. Brindle, Regulatory Assurance Supervisor
- *T. Didier, Operating Engineer, Unit 1
- T. Gierich, Assistant Superintendent, Work Planning
- T. Higgins, Assistant Superintendent, Operating
- J. Schrock, Operating Engineer, Administrative
- *M. Snow, Operating Engineer, Unit 0
- D. Prisby, Quality Control Supervisor, Quality Control
- D. St. Clair, Project Manager, ENC
- *P. Johnson, Technical Staff Supervisor
- *T. Tulon, Assistant Superintendent, Maintenance
- D. Winchester, Quality Assurance Superintendent
- M. Rauckhorst, PWR Projects Principal Engineer
- W. Kouba, Operating Engineer, Unit 2
- *E. Zittle, Regulatory Assurance Staff

*Denotes those attending the exit interview conducted on January 2, 1991, and at other times throughout the inspection period.

The inspectors also had discussions with other licensee employees, including members of the technical and engineering staffs, reactor and auxiliary operators, shift engineers and foremen, and electrical, mechanical and instrument maintenance personnel, and contract security personnel.

2. Plant Operations

Unit 1 operated at power levels up to 100% until December 3 when the unit tripped on lo-lo level in the "D" steam generator. The trip is discussed in further detail in paragraph 2.c of this report. The unit was returned to service on December 4, 1990, and has since operated up to 100% power in the load following mode.

Unit 2 was returned to service from a 81 day refueling outage at 1:37 p.m. (CST) on November 21, 1990, and operated in the load following mode up to 100% power until December 20, 1990, when the unit was manually tripped due to a steam leak in the steam tunnel. For further details see paragraph 2.c. The unit was returned to service on December 21, 1990, and has operated in the load following mode up to 100% power.

a. Operational Safety (71707)

During the inspection period, the inspectors verified that the facility was being operated in conformance with the licenses and regulatory requirements and the licensee's management responsibilities were effectively carried out for safe operation.

Verification was based on routine direct observation of activities and equipment performance, tours of the facility, interviews and discussions with licensee personnel, independent verification of safety system status and limiting conditions for operation action requirements (LCOARs), corrective action, and review of facility records.

On a sampling basis the inspectors verified proper control room staffing and access, operator behavior, and coordination of plant activities with ongoing control room operations; verified operator adherence with the latest revisions of procedures for ongoing activities; verified operation as required by Technical Specifications (TS); including compliance with LCOARs, with emphasis on engineered safety features (ESF) and ESF electrical alignment and valve positions; monitored instrumentation recorder traces and duplicate channels for abnormalities; verified status of various lit annunciators for operator understanding, off-normal condition, and compensatory actions; examined nuclear instrumentation (NI) and other protection channels for proper operability; reviewed radiation monitors and stack monitors for abnormal conditions; verified that onsite and offsite power was available as required; observed the frequency of plant/control room visits by the station manager, superintendents, assistant operations superintendent, and other managers; and observed the Safety Parameter Display System (SPDS) for operability. No problems were noted.

b. Engineered Safety Feature (ESF) Systems (71710)

During the inspection, the inspector selected accessible portions of Train "B" of the Unit 2 Auxiliary Feedwater (AFW) system to verify status. Consideration was given to the plant mode, applicable Technical Specifications (TS), Limiting Conditions for Operation Action Requirements (LCOARs), and other applicable requirements.

Various observations, where applicable, were made of hangers and supports; housekeeping; whether freeze protection, if required, was installed and operational; valve position and conditions; potential ignition sources; major component labeling, lubrication, cooling, etc.; whether instrumentation was properly installed and functioning and significant process parameter values were consistent with expected values; whether instrumentation was calibrated; whether necessary support systems were operational; and whether locally and remotely indicated breaker and valve positions agreed. The inspector identified one concern with the starting circuit of the diesel driven 2B AFW pump. During the walkdown, the inspector noted that the battery selector switch on the 2B AFW pump had a

Out-Of-Service (OOS) tag (90-2-4318). The inspector reviewed the OOS that required the battery selector switch to be placed in the "B" position (battery bank B selected to start the 2B AFW pump) and determined the OOS was placed during Shift 3 (3:00 - 11:00 p.m.) on November 21, 1990. The reason for the OOS was a low cell voltage on cell #13 on battery bank "A" that was identified during a non-TS surveillance, 2BHS AF-1, "Auxiliary Feedwater Diesel Nickel Cadmium Battery Quarterly Surveillance," completed at 5:30 p.m. on November 21, 1990. The inspector reviewed the recent TS and non-TS surveillances performed on the 2B AFW pump with the results documented in paragraph 5.d of this report. The inspector did identify the following concerns in the operations area:

- * Neither the Shift Engineer (SE) or the Unit 2 logs had an entry for the low cell voltage on the 2B AFW pump battery bank "A".
- * Neither the Shift Engineer, SCRE or Unit 2 Turnover Sheets on November 21, 1990, identified a low cell voltage on the 2B AFW bank "A" battery. The Shift Foreman Turnover Sheet did identify a low cell voltage. There also was an entry in the Degraded Equipment Log (DEL) for Unit 2 that identified a low cell voltage for battery bank "A".
- * Discussions with licensee's management and a review of the DEL determined that the station's staff was aware of the low cell voltage on the 2B AFW pump battery bank "A" on the morning of November 21, 1990. The surveillance, 2HS-AF-1 was started on the morning of November 21, 1990, but was exited when the personnel performing the surveillance ascertain early in the surveillance that cell #13 in battery bank "A" would be below the acceptance criteria of 1.30 Vdc. The personnel discarded the original surveillance cover sheet and when the surveillance was reinitiated at approximately 3:30 p.m. on November 21, 1990, a new surveillance cover sheet was utilized. The inspector could not clearly establish based on record reviews when battery bank "B" was selected to start the 2B AFW pump. The only records that indicated a degraded condition of battery bank "A" were the DEL and the Shift Foreman's Turnover Sheet. The November 21, 1990 Shift Foreman's Turnover Sheet did identify that the "A" battery bank for the 2B AFW pump had a bad cell and the battery selector switch was OOS in the "B" position. The turnover sheet had a recorded time of 9:11 p.m. for the turnover.

The inspector was concerned with the completeness of the Unit 2 control room log, shift turnover sheets, and the surveillance packages (2HS-AF-1) that pertained to the degraded "A" battery for the 2B AFW pump. Since battery "A" was selected to start the 2B AFW pump and was a necessary support system to maintain operability of the 2B AFW pump, the records should have either identified that the licensee had entered the required Limiting Condition (LCO) for Operation for the 2B AFW pump when cell #13 on battery "A" was found to have a low cell voltage or the battery selector switch was immediately placed in the battery bank "B" position.

The following previous inspection reports have identified concerns with degraded equipment:

<u>Inspection Report</u>	<u>Item</u>
454/89017; 455/89019	Evaluation of degraded AFW batteries was inadequate.
454/89021; 455/89024	Lithium found in MOV grease not identified on Deviation Report and contributed to the lack of a timely review by cognizant operating and technical staff personnel.
454/90010; 455/90009	* Cracked rotor for MOV scrapped prior to inspection by technical staff personnel. * Degraded Battery 111 not effectively evaluated.

Even though none of the degraded equipment have affected the operability of systems identified in the station's Technical Specification, based on the issues identified above with degraded equipment, and the failure to notify the system engineer of water in the gear unit oil for the 1A CV pump (see paragraph 6 of this report), the inspector considers the assessment and evaluation of degraded equipment as an Unresolved Item (455/90024-01).

c. Onsite Event Follow-up (93702)

- (1) On December 3, 1990, Unit 1 tripped from 98% reactor power as a result of a low low level in the 1D steam generator due to an isolation of main feedwater. At the time of the trip a solid state protection system (SSPS) surveillance was being performed on Train "A". A feedwater isolation occurred as a test switch was placed in "normal" with a feedwater isolation signal still present. The inspector observed control room activities within minutes following the reactor trip. The inspector considered the operator's actions following the trip as good except that communications between the control room operators and the in plant personnel could have been better in the area of "repeat back" of directions. BAP 300-1, Revision 8, "Conduct of Operations," requires repeat back for 100% of all orders given by radio, page, telephone, sound powered phones or face to face that involve operation of plant equipment. The failure to consistently execute repeat backs during plant communications as required by BAP 300-1 is considered an open item (454/90024-01(DRP)). The inspector also reviewed the Sequential Event Recorder printout to verify plant equipment operated as expected. No problems were noted. The inspector will review the LER issued for the reactor trip for proper root cause and corrective action.

(2) On December 20, 1990, at 4:08 a.m., a manual reactor trip for Unit 2 was initiated due to a steam leak in the steam tunnel. At approximately 4:00 a.m., a security guard noticed steam in the Unit 2 steam tunnel and notified the control room. The Shift Engineer dispatched the Shift Foreman to investigate. By the time the Shift Foreman arrived at the scene the steam leak was worse and the control room was notified. The Unit was then manually tripped at 4:08 a.m. and when the subsequent main feedwater isolation did not isolate the leak, a manual main steamline isolation was initiated. The main steamline isolation resulted in isolating the steam leak. Subsequent inspection by the licensee determined that a weld on a sampling line connection on the "C" steam generator failed resulting in a 1 1/4 inch hole. The inspector will review the applicable LER for proper root cause and corrective action. The inspector considered the operators' action to the event as very responsive.

d. Current Material Condition (71707)

The inspectors performed general plant as well as selected system and component walkdowns to assess the general and specific material condition of the plant, to verify that Nuclear Work Requests (NWRs) had been initiated for identified equipment problems, and to evaluate housekeeping. Walkdowns included an assessment of the buildings, components, and systems for proper identification and tagging, accessibility, fire and security door integrity, scaffolding, radiological controls, and any unusual conditions. Unusual conditions included but were not limited to water, oil, or other liquids on the floor or equipment; indications of leakage through ceiling, walls or floors; loose insulation; corrosion; excessive noise; unusual temperatures; and abnormal ventilation and lighting.

The material condition of Unit 1 was considered good with the licensee continuing to pursue steps to reduce the number of leaks on the balance of plant equipment on the secondary side of the power plant. The inspector considered the material condition of Unit 2 after the recent completed refueling outage as very good. The number of equipment problems on Unit 2 after return to service from the refueling outage were few and less than the number of equipment problems Unit 1 encountered when Unit 1 was returned to service after the January - March, 1990 refueling outage. The housekeeping was overall considered good except in three areas. The inspector toured Unit 1 (area 5) and Unit 2 (area 7) penetration area in the Auxiliary Building, 364' elevation, early in the inspection period and considered the housekeeping as not commensurate with other areas of the plant. Also, the housekeeping in the 1A Containment Spray pump room was noted by the inspector as not commensurate with other areas of the plant. Late in the inspection period, housekeeping in the areas improved to a level commensurate with the rest of the plant.

e. Radiological Controls (71707)

The inspectors verified that personnel were following health physics procedures for dosimetry, protective clothing, frisking, posting, etc. and randomly examined radiation protection instrumentation for use, operability, and calibration.

f. Security (81064)

Each week during routine activities or tours, the inspectors monitored the licensee's security program to ensure that observed actions were being implemented according to the approved security plan. The inspectors noted that persons within the protected area displayed proper photo-identification badges and those individuals requiring escorts were properly escorted. The inspectors also verified that checked vital areas were locked and alarmed. Additionally, the inspectors also verified that observed personnel and packages entering the protected area were searched by appropriate equipment or by hand.

g. Verification of Containment Integrity (61715)

The inspectors performed a walkdown of Unit 2 containment, after entering Mode 4. The walkdown of containment after entering Mode 4 was conducted with plant management. The inspectors verified the correct position for eight containment isolation valves. During the tour of containment boundary outside the containment, the inspectors selected several mechanical barriers and verified that the barriers were in place to maintain containment integrity. Portions of the procedure 2BOS G.1.1.a-2, Revision 52, "Primary Containment Integrity Verification of Inside Containment Isolation Devices," was utilized by the inspectors to verify containment integrity.

h. Reactor Startup (71707)

On December 4, 1990, the licensee commenced a Unit 1 reactor startup at 7:09 p.m. following a unit trip on December 3, 1990. The inspector was in the control room to monitor the startup. The startup was performed in a professional manner with good communications between shift personnel and the technical staff nuclear engineers. The Estimated Critical Condition of Control Bank "D" at 100 steps was accurate, with actual criticality achieved at 103 steps on Control Bank "D".

During the subsequent power increase, the reactor experienced a flux re-distribution during the early morning hours on December 5, 1990. The re-distribution occurred when the licensed reactor operator inserted Control Bank "D" deep into the core in an attempt to control Delta flux (I). As a result, the reactor flux was pushed to the bottom of the core by the excessive rod insertion, resulting in re-distribution of some of the flux to the top of the core. Although the Axial Flux Distribution Limits were exceeded, no additional Power

Distribution Limits were exceeded during the event. The licensee issued a Daily Order to the reactor operators for guidance in the control of Delta I.

No violations or deviations were identified.

3. Regional Request (92701)

The inspector was requested to ascertain if nitrogen could be used as a backup to instrument air (IA) and then IA subsequently used as breathing air. The inspector determined through discussions with the licensee that IA was not used for breathing air. The licensee could use service air (SA) as a source of breathing air, however, to use nitrogen as a backup to SA would require a temporary alteration to the piping.

4. Safety Assessment/Quality Verification (40500, 90712, 92700)

a. Licensee Event Report (LER) Follow-up (90712, 92700)

Through direct observations, discussions with licensee personnel, and review of records, the following event reports were reviewed to determine that reportability requirements were fulfilled, that immediate corrective action was accomplished, and that corrective action to prevent recurrence had been or would be accomplished in accordance with Technical Specifications (TS):

(Closed) 454/90013-LL: Both Essential Service Pump Makeup Pumps were inoperable for seven minutes when the wrong fuses were pulled at the Remote Shutdown Panel (RSP). The root cause was cognitive personnel error with inadequate/poor labels on the RSP as a contributing factor.

(Closed) 455/90008-LL: Fuel Assembly was dropped during reconstitution activities. The cause was determined to be procedural inadequacy. The licensee revised the procedure used in fuel reconstitution and conducted the necessary training.

(Closed) 455/90009-LL: While the 2A Steam Generator (SG) was in the process of draining for chemistry control a blowdown isolation occurred at the low-low level setpoint. The root cause was identified by the licensee as a procedural inadequacy. BAP 1610-8 Revision 4, "Processing Byron Plant Modifications," required only the Technical Staff engineer cognizant of the modification to indicate any station procedures requiring revision in Part C of BAP-1610-8TI, "Station Checklist." The procedure BAP 1610-8, did not require a review of modification related station procedures by Operations or the Maintenance Departments. As a result, Operating procedure BOP FW-48, "Draining the Main Feedwater System - Unit 2," was not revised to include the new interlock installed by modification, M6-2-89-035, that resulted in isolation of the Steam Generator blowdown lines with a low-low level in a Steam Generator. Part of the licensee's corrective action included a review of other modifications completed during the Unit 2 outage (September -

November, 1990) by the Operating, Training, and Technical staffs during the Mode 4 On-Site Review to identify any other instances of procedures that were not revised. The inspector was concerned that the corrective action had not included a review of modifications performed during the last Unit 1 outage (January - March, 1990) to ensure the necessary procedures were revised since the root cause of the event described in this LER was an inadequate procedure. A previous LER, 454/90010, that documented an automatic start of the 1A AFW pump, was partly attributed to inadequacy of information provided to Operations personnel for changes to the plant design due to modifications. The matter of reviewing modifications performed during the last Unit 1 refueling outage to ensure necessary procedure revisions is considered an Unresolved Item pending further review by the NRC (455/90024-02(DRP)).

In addition to the LERs, the inspector reviewed the licensee's Deviation Reports (DVRs) generated during the inspection period. This was done in an effort to monitor the conditions related to plant or personnel performance, potential trends, etc. DVRs were also reviewed to ensure that they were generated appropriately and dispositioned in a manner consistent with the applicable procedures and the QA manual.

b. Document Control Program (39702)

Procedure BAP 1340-3, Revision 15, "Station Design Change Control," required that all affected Control Room Critical Drawings were to be edited to the as-built condition, approved, and in place prior to the modification being released. For Non-Critical Drawings, a time requirement for revision and issuance of drawings did not exist. The licensee stated that the entire process of initiating a DCR to update a drawing was typically accomplished in 6 months. Obsolete drawings were controlled in the same manner as a drawing change and discrepancies found between as-built and the as-constructed facility were handled as design changes in accordance with BAP 1340-3.

The inspector reviewed the master indexes to verify that the indexes were maintained and indicated the current revision for drawings, technical specifications, FSAR and procedures. The inspector verified that documents were issued in accordance with BAP 1340-5, Revision 10, "Issuance of Documents that are controlled, and distributed in accordance with BAP 1340-7, Revision 5, "Distribution of Documents to be Controlled." The inspector also verified that drawings were also issued and distributed in accordance with BAP 1340-3. The inspector verified that the following drawings and documents in the control room and tech staff were of the same revision as the master copy:

- * M-42, Sheet 4
- * M-60, Sheet 2
- * M-64, Sheet 7
- * M-129, Sheet 10
- * M-139, Sheet 2

- * BAP 1610-8
- * 1RGP 100-2
- * 1BOP CS-3
- * 2BCA 1.1
- * Technical Specification (TS) page 3/4 3-1
- * TS page 3/4 5-1
- * FSAR page 1.7-20

No violations or deviations were identified.

5. Maintenance/Surveillance (62703 & 61726)

a. Lithium in Calcium Based MOV Greases

The licensee identified six Unit 1 motor operated valves (MOV) that had quantities of lithium in the calcium based greases in the MOVs main gear case. The fraction of lithium ranged from less than 5% to 27%. The six MOVs that had lithium in the MOV grease were 1CV112B, 1CV112E, 1CS009A, 1SI8809B, 1SI8801B and 1SI8808C. The licensee performed an engineering review and justification to continue operation of Unit 1 with the lithium in the greases for the six MOVs. The licensee's Nuclear Engineering Department (NED) determined that the presence of lithium in the percentages found would not impair the valve lubrication nor impact the capability of the valves to perform the intended safety function. The NED determination was based on the commitment that the present lubrication in the six MOVs would be removed no later than the next Unit 1 refueling outage (September 1991). Also, the licensee identified 9 Unit 1 and 33 Unit 2 MOVs with 2 - 5% mixture of lithium in calcium based grease. Based on previous test results, the licensee deemed the 2 - 5% of lithium in the grease as acceptable. The matter of the 2 - 5% lithium in calcium based grease is considered an Open Item pending further NRC review (4E4/90024-03)(DRP).

b. Check Valve Preventive Maintenance Program (73756)

The inspector reviewed the licensee's program for Preventive Maintenance (PM) on check valves that were not included in the ASME Section XI, valve inservice test program. The purpose of the review was to evaluate the licensee's program to identify any early indication of programmatic weaknesses, poor test and maintenance histories, and a general assessment of the check valve operability and reliability program. To accomplish this purpose the inspector:

- * reviewed the check valve program as described in; 1) Corporate Directive, NOD-TS.9, Revision 0, "Check Valve Program Directive"; Appendix F of NOD-TS.9, "Check Valve Study by Sargent & Lundy Engineers (S&L)"; procedure 1BVP 200-21, Revision 2, "Check Valve Preventive Maintenance Program"; and procedure 1BVS XII-8, Revision 1, "Check Valve Inspections."

- * identified check valves in the Unit 1 Auxiliary Feedwater (AFW) system and supporting systems to verify inclusion in the check valve program by reviewing applicable Piping & Instrumentation Drawings (P&ID). Reviewed the technical basis for those valves not included in the program.
- * reviewed the results of the check valve inspections performed to date and assessed the effectiveness of the scheduling of the inspections.

Based on the above reviews, the inspector had the following observations:

(1) Check Valve Program

Check valves included in PM program were assigned Priority Levels (1 through 5) based on flow stability and system severity (historical failure rate). Check valves assigned Priority Level 1 had the highest probability of failures with valves assigned Level 5 having the lowest. The purpose of prioritizing the check valves was to ensure that maintenance activities were properly focused. Station procedure, 1BVP 200-21, identifies eight criteria for selecting check valves assigned Priority Level 1 & 2 for disassembly and inspection. The criteria include: 1) valves that emit noise; 2) operating hours and usage; 3) proximity to sources of turbulence; 4) maintenance history; 5) NPRDS data; 6) significance to plant safety and/or plant operations 7) operating conditions and 8) ability to isolate. The inspector was concerned with the criteria utilized to select the check valves for disassembly and inspection. Even though the preceding criteria were valuable inputs for the selection process, the procedure, 1BVP 200-21, did not emphasize the importance of check valves assigned a Priority Level 1 versus a Level 2. Procedure, BVP 200-21, did not identify each valve by Priority Level but classified the valves into three categories, Level 1 & 2, Level 3 & 4 and Level 5. These categories were based on maintenance activity rather than increase probability of check valve failure which was the intent of Priority Levels 1 through 5. Also, procedure BVP 200-21 did not consider the role of Maintenance Memo 400-01. Maintenance Memo 400-01 identified the systems that, by probabilistic risk assessment, increase the margin of core meltdown and/or offsite release. The Essential Service Water (SX) system was one of those systems. The check valve program identified 16 (4-Unit 1, 6-Unit 2 and 6-Unit 0) SX valves as Priority Level 1 and two of these valves 1(2)SX174 have been inspected since the initiation of the program during the January - March, 1990 refueling outage for Unit 1 and the September - November, 1990 refueling outage for Unit 2. Two of the Unit 2 SX valves not inspected during the Unit 2 refueling outage were 2SX002A and 2SX002B, the discharge check valves for the SX pump. In August, 1990, the licensee during a ASME surveillance test on the 1A SX pump at Braidwood

identified that the 1A SX pump discharge check valve (1SX002A) failed to seat. Inspection of the valve found that failure of the hinge supports caused the valve disc to bind. The failure mode was preliminary identified as valve "flutter". The licensee's staff at Byron performed diagnostic testing (acoustic) on valves 1SX002A; 1SX002B, 2SX002A and 2SX002B in early October, 1990 by a contractor. The contractor's evaluation concluded that after analyzing the acoustic signatures from all four check valves, each valve was indicating some type of looseness or, possibly, valve degradation but operability of the valves was not challenged. However, an accurate assessment could not be made without a comparative analysis of a newer valve. The comparative analysis was recently performed on a new valve at the licensee's Braidwood facility. However, the results have not yet been analyzed by the licensee's corporate staff. Results of the analysis will be the basis of the licensee's approach for the PM program for the SX pumps discharge check valves. The diagnostic tests of the check valves were performed instead of disassembly and inspection due to the difficulty in isolating the valves.

(2) Auxiliary Feedwater System

The inspector reviewed the applicable P&IDs for the Unit 1 AFW systems and supporting systems and identified the following check valves:

<u>Valve</u>	<u>Description</u>	<u>BVP 200-21</u>	<u>S&L Study</u>
1AF003A(B)	Pump discharge (upstream of 1AF004A(B))	Yes (Level 1&2)	Yes (Level 2)
1AF014A-G	Check Valves to SG	Yes (Level 3&4)	Yes (Level 3)
1AF026A(B)	Mini-Flow line to SX	No	No
1AF029A(B)	Pump discharge (downstream of 1AF004A(B))	Yes (Level 3&4)	Yes (Level 3)
1CD220	Mini-flow line to Condensate Storage Tank	Yes (Level 1&2)	Yes (Level 2)
1SX174	Discharge of engine cooling pump (1BAFW)	Yes (Level 1&2)	Yes (Level 1)
1SX194	Mini-flow to SX (common to both AFW pumps)	Yes (Level 1&2)	Yes (Level 2)

The licensee has appeared to identify all the check valves in the AFW system and supporting systems for inclusion in the check valve program. The check valves, 1AF026A(B), in the AFW pumps mini-flow line to SX were not included in the check valve program since the valves were in a 2" line. The S&L check valve study concluded that a majority of check valves 2" and under could be excluded from the check valve program.

(3) Review of Results of Check Valve Inspections

The inspector reviewed the documented results of the check valve inspections performed during the Unit 1 refueling outage of January - March, 1990, and the Unit 2 refueling outage of September - November, 1990. The results were properly documented and assessed.

In conclusion, the inspector ascertained that the check valve program was adequately implemented within the established controls. However, the inspector did have a concern that procedure 1BVP 200-21, did not require consideration of PRA or Priority Level when selecting the sample of check valves to be disassembled and inspected. This issue is further discussed in paragraph 6 of this report. The inspector considered the licensee's diagnostic inspection of all the SX discharge check valves for the Unit 1 and Unit 2 SX pumps, as a result of problems noted at the licensee's Braidwood facility, as timely and thorough by the system engineer.

c. Surveillance Activities (61726)

The inspectors observed or reviewed surveillance tests required by technical specifications during the inspection period and verified that tests were performed in accordance with adequate procedures, test instrumentation was calibrated, limiting conditions for operation were met, removal and restoration of the affected components were accomplished, results conformed with technical specifications and procedure requirements and were reviewed by personnel other than the individual directing the test, and any deficiencies identified during the tests were properly reviewed and resolved by appropriate management personnel.

The inspectors witnessed portions of the following activities:

- 2 BOS 3.2.1 - 802, "ESFAS Instrumentation Slave Relay Surveillance (Train A Automatic Safety Injection - K604)"
- 2 BVS 0.5 - 2CS.1, "Containment Spray Valve Stroked Test"
- 2 BVS 7.1.2.1.A-2, "Diesel Driven Auxiliary Feedwater Pump Monthly Surveillance"
- 2 BVS 7.1.2.3.C-1, "Auxiliary Feedwater Diesel Prime Motor Inspection"

No violations or deviations were identified.

d. Non-Technical Specification (TS) Surveillances

On November 21, 1990, the licensee's electrical maintenance department performed a non-TS quarterly surveillance on the 2B Auxiliary Feedwater (AFW) pump's nickel cadmium batteries (Battery A and B). The surveillance was performed in accordance with procedure, 2BHS AF1, Revision 2, "Auxiliary Feedwater Diesel Nickel Cadmium Battery Quarterly Surveillance." One of the attributes verified for acceptability was individual cell voltages. The procedure identified the acceptance criteria for cell voltage as equal to or greater than 1.30 Vdc. During the surveillance voltage for cell #13 in battery bank 2AF01EAB had a voltage of .46 Vdc. The inspector reviewed the surveillance package and identified the following concerns:

- * Step F.29, Abnormal conditions/discrepancies, was noted as "none" even though cell #13 in battery 2AF01EAB was below the acceptance criteria.
- * The surveillance package cover sheet had the signature of a Senior Reactor Operator (SRO) for concurrence as required by procedure BAP 1400-11, Revision 2, "Non-Technical Specification Data Package Cover Sheet Completion and Use," when there were unsatisfactory results. However, procedure BAP 1400-11 was not clear if the SRO concurrence signature meant a review of operability or that the SRO agreed the results were unacceptable.
- * As previously discussed in paragraph 2.b of this inspection report, surveillance 2BHS-AF1 was commenced on the morning of November 21, 1990, and exited when personnel noted that cell #13 on battery "A" would be below the acceptance criteria of 1.30 Vdc. When the surveillance was recommenced at approximately 3:30 p.m. on November 21, 1990, a new surveillance cover sheet was utilized with the original cover sheet discarded. Also, the procedure required the battery selector switch to be placed in the "as-found" position at the conclusion of the surveillance. Since OOS 90-2-4318 had not yet been hung to require the battery selector switch to be in the battery "B" position, personnel that performed the surveillance placed the battery selector switch in the battery "A" position at the conclusion of the surveillance. Surveillance procedure 2BHS-AF1 did not require the selection of a battery that passed the acceptance criteria when the other battery was below the acceptance criteria.

In conclusion, the inspector considered the performance of non-TS surveillance 2BHS-AF1, that was to verify operability of a necessary support function for the 2B AFW pump, as an Unresolved Item pending further review by the licensee and the NRC (455/90024-03(DRP)).

e. Calibration (56700)

The inspector reviewed the licensee's records to verify that instrumentation in the plant were calibrated and/or functionally tested in accordance with specified intervals. The following areas were reviewed:

- * 50% of the channel functional tests and calibrations were reviewed for instrumentation in the reactor protection and emergency core cooling activation systems to ensure the instrumentation was calibrated and tested at intervals specified in the technical specifications. The review indicated that technical specifications were satisfied.
- * 20% of the calibrations were reviewed for instrumentation in the reactor control, plant auxiliary, reactor coolant, emergency core cooling, containment, and electrical distribution systems to ensure the instrumentation was calibrated at intervals specified in the technical specifications. The review indicated that technical specifications were satisfied.
- * Calibration requirements and actual calibration intervals were reviewed for four instruments used for technical specification measurements. All four instruments reviewed had a specified calibration frequency of 18 months, and the calibration intervals were satisfied.

f. Balance of Plant Inspection (71500)

The inspectors performed an inspection of the balance of plant piping to identify steam leaks and other general areas of concern. The following conditions were identified:

- * Although the inspectors identified several steam leaks, the quantity and size of the leaks were not excessive. Operations and maintenance personnel indicated that identified steam leaks were documented on an NWR and routed to the maintenance department. The maintenance department periodically contracts Ferminite for temporary repairs, based on urgency and quantity of work. The NWR would not be closed until plant conditions allowed a permanent repair.
- * The inspectors identified a bent indication needle in pressure gauge 2PICD014 located near the 2B Condensate Pump. With a bent needle, the accuracy of the periodic calibration may be questionable. The licensee has issued a NWR.

The inspectors reviewed LERs issued over the past 2 years to determine if BOP problems have been prevalent. Based on the LER review, the inspectors determined that BOP equipment failures were not prevalent at the Byron Station and have not resulted in excessive challenges to the NSSS systems.

6. Engineering & Technical Support (37700)

The inspector assessed the system engineer's involvement in two areas during this inspection period. The first area pertained to the station's check valve program as described in paragraph 5.b of this report. The check valve program has been recently reassigned to a system engineer with the system engineer previously assigned the responsibility of the check valve program as the backup. The inspector concluded that the system engineers involved in the corporate check valve program had effectively implemented the requirements of the corporate check valve program described in directive NOD-TS.9. However, NOD TS.9 did not require the use of probability risk assessment as a criteria for the selection of check valves for inspection. Also, NOD-TS.9 allowed the combining of Priority Level 1 and 2 valves prior to creating valve categories since the required maintenance action (disassemble and inspect) was the same. Based on the guidance in NOD-TS.9, the station's system engineer combined Priority Level 1 and 2 check valves into one category and therefore, eliminated the Priority Levels as a criteria for the selection of valves to be inspected in future refueling outages. The combining of Priority Levels resulted in losing the effect of the importance of the different Priority Levels as established in the S&L check valve study with Priority Level 1 being check valves with the highest probability of degradation due to flow stability and system severity (historical failure rate). The use of PRA and Priority Levels 1 - 5 is considered an Open Item pending further review by the licensee and the NRC (454/90024-03; 455/90024-04).

The other area of system engineer involvement assessed by the inspector pertained to an oil sample from the 1A Chemical and Volume Control (CV) pump. On December 6, 1990, an oil sample from the 1A CV pump's gear unit was obtained prior to the scheduled oil change. The sample was visually inspected and determined to be "borderline" based on water in the oil. In accordance with procedure BAP 370-2, Revision 2, "Station Sampling Program," a copy of the oil sample program log that record borderline visual inspection results shall be sent to the cognizant system engineer. A copy of the log was not sent to the system engineer. At the time of the sample on December 6, 1990, the Station Lubrication Coordinator was offsite. The Lubrication Coordinator returned to the site on December 12, 1990, and initiated a Sample Variation Report (SVR). In accordance with BAP 370-2, a SVR was utilized to record unsatisfactory results of oil samples. The SVR was routed to the Shift Engineer (SE).

On December 12, 1990, at 10:13 a.m., the SE reviewed the SVR and initiated a NWR (B81366) to change the oil. The SVR was then routed in accordance with BAP 370-2, to the Unit 1 Operating Engineer (OE). The OE reviewed the SVR on December 13, 1990, and routed the SVR to the cognizant system engineer. Also, at approximately 10:00 a.m. on December 13, 1990, the 1A CV pump control switch on the main control board was caution tagged to operate only if necessary due to potential water in the oil. However, the control switch at the Remote Shutdown Panel was not caution tagged. Even though the oil sampled was determined acceptable for further use by the licensee's System Materials Analysis Department, the inspector was concerned with the lack of timely notification to the system engineer of

possible hardware problems on an emergency core cooling system (ECCS) pump. After the December 6, 1990 oil change, the licensee ran the 1A CV pump for approximately 24 hours, sampled the gear unit oil and determined there was no water in the oil. The caution tag has been removed from the 1A CV pump. Since the licensee has not determined the source of the water in the oil sample prior to the December 6, 1990 oil change, this matter is considered an Open Item (454/90024-04).

No violations or deviations were identified.

7. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed by the inspector and which involve some action on the part of the NRC or licensee or both. Open Items disclosed during the inspection are discussed in paragraphs 2.c, 5.a and 6.

8. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. Unresolved items disclosed during the inspection are discussed in paragraphs 2.b, 4.a and 5.d.

9. Meetings and Other Activities

a. Management Meetings (30702)

On December 20, 1990, Mr. Richard J. Barrett, Director, Project Directorate III-2, NRR toured the Byron plant and met with licensee management to discuss plant performance and plant material condition.

b. Exit Interview (30703)

The inspectors met with the licensee representatives denoted in paragraph 1 during the inspection and at the conclusion of the inspection on January 2, 1991. The inspectors summarized the scope and results of the inspection and discussed the likely content of this inspection report. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.