

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/89021(DRP); 50-455/89024(DRP)

Docket Nos. 50-454; 50-455

Licenses No. NPF-37; NPF-66

Licensee: Commonwealth Edison Company  
Post Office Box 767  
Chicago, IL 60690

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: November 18 through December 30, 1989

Inspectors: W. J. Kropp  
R. N. Sutphin  
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Approved By: Brent Clayton, Chief  
Reactor Projects Section 1A

Date \_\_\_\_\_

Inspection Summary

Inspection from November 18 through December 30, 1989 (Reports No. 50-454/89021 (DRP); 50-455/89024(DRP))

Areas Inspected: Routine, unannounced safety inspection by the resident inspectors of actions on previous inspection findings, operational safety, reactor startup, onsite event follow-up, degraded/nonconforming equipment, current material condition, radiation protection controls, maintenance activities, surveillances, cold weather preparation, engineering/technical support, security, and TI 2515/104.

Results: No repetitive concerns were identified that indicated potential weaknesses during the inspection. The licensee continued to be aggressive in the resolution of technical issues identified during plant operations. However, the licensee management needs to re-emphasize the importance of adequate reviews of design/technical information furnished by offsite engineering organizations. There have been two recent examples where technical information furnished by offsite engineering organizations was either incomplete or inadequate. The licensee's performance in maintenance/surveillance continues to be good with few problems noted. However, housekeeping during this inspection period deteriorated from the status noted in other inspections. Increased management attention is needed prior to the scheduled Unit 1 refuel outage from January to March 1990, to ensure the plant enters the outage in the best possible housekeeping condition. One violation was issued in the area of maintenance, as a result of an unresolved item in this area, that pertained to mixed greases in environmentally qualified Limitorque motor operated valves, being upgraded to a violation. Since, the licensee had taken action to correct and prevent recurrence of the violation, no response was required.

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## DETAILS

### 1. Persons Contacted

#### Commonwealth Edison Company (CECo)

- \*R. Pleniewicz, Station Manager
- \*R. Ward, Technical Superintendent
- \*J. Kudalis, Service Director
  - D. Brindle, Operating Engineer, Administration
  - T. Didier, Operating Engineer, Unit 0
  - T. Gierich, Operating Engineer, Unit 2
  - T. Higgins, Assistant Superintendent, Operating
  - J. Schrock, Operating Engineer, Unit 1
- \*K. Schwartz, Production Superintendent
  - D. St. Clair, Assistant Superintendent, Work Planning
- \*T. Tulon, Assistant Superintendent, Maintenance
- \*D. Winchester, Quality Assurance Superintendent
- \*D. Wozniak, ENC Project Manager
- \*E. Zittle, Regulatory Assurance Staff

\*Denotes those attending the exit interview conducted on January 2, 1990.

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. Action on Previous Inspection Findings (92701 & 92702)

- a. (Closed) Open Item (454/89017-03(DRP); 455/89019-03(DRP)): Inconsistencies have been noted by the inspectors that warrant evaluation of the licensee's process for assessing degraded/nonconforming equipment. Further discussion is included in Section 3.d of this report.
- b. (Closed) Unresolved Item (454/89017-04(DRP); 455/890019-04(DRP)): Improper grease in Limatorque gearcase operators for motor operated valves (MOV) used in environmentally qualified (EQ) applications. (This unresolved item was originally identified in Inspection Reports 454/89017; 455/89019 as item 454/89017-01; 455/89019-01). Closure of this item was based on the issuance of a violation and is further discussed in Section 4.b of this report.
- c. (Closed) Open Item (454/89019-01(DRP); 455/89021-01(DRP)): Feedwater check valves failing open due to binding. Further discussion is included in Section 5.b of this report.

### 3. Plant Operations

Unit 1 operated at power levels up to 100% for the entire report period. Presently, Unit 1 is in coastdown in preparation for a refueling outage scheduled to begin on January 5, 1990.

Unit 2 commenced startup on November 21, 1989, from a forced outage and has operated at power levels up to 100% for the remainder of the report period.

#### 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 daily 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. Reactor Startup (71707)

On November 13, 1989, Unit 2 was shut down due to a steam leak at the inlet flange of pressurizer safety valve, 2RY8010C. On November 20, 1989, after completion of repairs, the licensee commenced a Unit 2 reactor startup. The startup was aborted when control room personnel noted that the estimated critical position (ECP) for the control rods appeared to be in error. The ECP had been calculated, in accordance with procedure BGP 100-7T3, at 52

steps on control bank "D" with a boron concentration of 747 ppm. The administrative tolerance level for the ECP was plus or minus 500 pcm for the final critical rod position. Therefore, the lower limit of the administrative tolerance level was 220 steps on control bank "C" and the upper limit was calculated at 140 steps on control bank "D".

With shutdown bank rods fully withdrawn and the source range at 407 counts per second (cps), the Reactor Operator (RO) withdrew control bank "A" to 115 steps and the station's nuclear engineers obtained Inverse Count Rate Ratio (ICRR) data. Control bank "A" was next stopped at 228 steps (control bank "B" at 113 steps) to check for criticality and to obtain ICRR data. The next hold point was either the rod insertion limit (RIL), (control bank "B" at 162 steps and control bank "C" at 47 steps), or the 8 fold count rate (3256 cps). Due to the time delay involved with the source range scaler timer and the extremely high differential rod worth of control bank "C" at 40 steps, the rods were withdrawn to the RIL, several steps past the rod position that would have provided the 8 fold count rate. The RO checked for criticality at the RIL. The source range counts were 4600 cps. At this point in the startup, the Shift Control Room Engineer (SCRE) instructed the RO to insert control bank "C" to the 8 fold count rate which was determined to be 38 steps (3170 cps). The station's nuclear engineers determined from both the ICRR and 8 fold plots that predicted criticality would have occurred between 50 to 55 steps on control bank "C". Therefore, criticality had not been achieved. However, due to the considerable differences between the conditions observed and those predicted (plus 900 pcm) and with the projected criticality close to RIL, the SCRE decided to re-insert all control rods and borate.

Further review of data by the station's nuclear engineers determined that the power history used to determine the ECP did not properly reflect the last known steady state operation. However, even with the correct steady state power history, the revised ECP still indicated a difference of approximately 480 pcm from the critical position based on the 8 fold prediction. The station's nuclear engineers requested assistance from corporate's Nuclear Fuel Services (NFS). NFS indicated that the 480 pcm difference could have possibly been caused by previous reduced power operation that resulted in a large distortion in the axial power shape from that assumed in the core design process. The anomalous power shape would not have been evident during power operation. However, at power levels below the point of adding nuclear heat, the asymmetry could cause a delta flux up to 50%. Since the worth of control rods was proportioned to the square of the local flux, a small change in the axial power shape could greatly influence the shape of the differential rod worth curves. The NFS's position on the possible cause of the 480 pcm error was preliminary and a final position will be issued later. Therefore, until the licensee and the NRC have reviewed the final position on the source of the 480 pcm difference, this matter is considered an open item (455/89024-01(DRP)).

The inspectors did not consider the initial startup activities, observed on November 20, 1989 on Unit 2, as representative of Byron Station's past performance during reactor startups. This was communicated to the licensee. As a result, the licensee established additional administrative controls to be in place prior to another startup attempt on Unit 2. These conditions were:

- Establish a new temporary administrative limit of plus or minus 750 pcm. (The new limit was within the Technical Specification limit of 1000 pcm.) If the limit was exceeded the startup would be aborted.
- Hold points were to be established at least every 50 steps before the 8 fold count rate was reached and every 10 steps thereafter to obtain ICRR data until criticality was achieved.
- An operator aid was to be utilized by the Nuclear Station Operator (NSO) manipulating the controls and an NSO was to be stationed at the source range panels. The operator aid was to identify the predicted critical rod position, the plus or minus 750 pcm rod position limits, and the 8 fold count rate.
- Establish a new ECP (calculation) based on conditions other than the previously used reactor conditions at shutdown (e.g. last steady state power conditions).
- Conduct a control room briefing between the Operating Engineer, Nuclear Engineer and operating shift prior to pulling control rods.

On November 21, 1989, at 7:23 p.m., a second Unit 2 startup was commenced with the above administrative controls in place. The resident inspectors were in the control room to monitor the licensee's activities. The ECP was calculated as 150 steps on control bank "D". The boron concentration at startup was 839 ppm. At 8:35 p.m. the reactor achieved criticality at 50 steps on control bank "D". The difference between the ECP (150 steps) versus the actual rod position at criticality (50 steps) was approximately the 480 pcm difference that was identified during the initial startup aborted on November 20, 1989. The resident inspectors concluded that the additional controls established resulted in an approach to criticality that was commensurate with good operating practices.

c. Onsite Event Follow-up (93702)

- (1) On December 12, 1989, at 11:42 a.m. an attempt to start the Unit 1B Condensate/Condensate Booster (CD/CB) pump for a return to service after maintenance activities resulted in a fire in the pump motor. The station's fire brigade was

activated and dispatched to the pump room to extinguish the fire. An Unusual Event (UE) was declared at 11:58 a.m., when the Shift Engineer ascertained that the fire was not completely extinguished. The licensee's GSEP program required a UE to be declared when a fire can not be extinguished within 10 minutes of the arrival of the station's fire brigade at the scene of the fire. At 12:07 p.m., the supervisor at the fire scene informed the Unit 1 NSO that the fire was stable and only smoke was observed coming from the pump motor. At the time of the fire, Unit 1 was in Mode 1 at 94% power.

While isolating electrical power to the CD/CB pump motor, a breaker for the auxiliary oil pressure switch for the running 1A CD/CB pump was opened by mistake. As a result, the 1A CD/CB pump tripped off on low lube oil pressure. The operators initiated immediate corrective action and entered abnormal procedure, 1BOA SEC-1, "Condensate/Feedwater Malfunction." The control room personnel response was timely and effective and a Unit 1 reactor trip was avoided. The fire was declared out at 12:35 p.m. and the UE was terminated. The licensee has not completed the investigation into the cause of the fire or the subsequent inadvertent trip of the 1A CD/CB pump. Preliminary investigation by the licensee revealed that the cooling fan mounting for the pump motor had only one bolt out of six. The licensee suspects that the cooling fan or fan bolts could have become loose and damaged insulation on the motor windings. The resident inspectors will monitor the licensee's root cause analysis via the Licensee Event Report/Deviation Report (LER/DVR) process. The inspectors concluded that the licensee's fire brigade response was quick and effective. The licensee plans to convene a team to assess the activities associated with the fire for possible lessons learned.

- (2) On November 14, 1989, while attempting to place the 2B Residual Heat Removal (RHR) pump in the shutdown cooling mode, the NSO observed the motor amperage (amps) fluctuating in the "red zone" of the amp meter (56-70 amps) and tripped the pump. The licensee initiated an investigation and determined that the 2B RHR pump sustained bearing and impeller damage and required repair. The licensee's root cause investigation has focused on two possible causes, either foreign material or air in the suction piping caused the pump damage. The licensee has written but has not yet closed the DVR that pertains to the event. The licensee considers air in the 2B RHR suction pipe to the reactor hot legs as the most probable cause. This was based on the damage observed when the 2B RHR pump was disassembled for repair. Also, the 2B RHR pump was taken out-of-service in August 1989 to replace bearings when Unit 2 was in Mode 1. This maintenance activity required the 2B RHR system to be drained prior to initiating maintenance work, and filled and vented

after maintenance activities were completed. Even though station operating procedures for filling and venting the RHR systems were applicable for Mode 1, the licensee has preliminarily concluded that the fill and vent process was not totally effective. The resident inspectors will review the DVR (6-2-89-081) that documents this event, for the licensee's final conclusions.

The 2B RHR pump would have initially performed if called upon for a safety injection since the piping that was suspected of air entrainment was only associated with the shutdown cooling mode and hot leg recirculation which occurs several days after a loss of coolant accident. Prior to the amp fluctuations, the NSO had the 2B RHR pump on recirculation with no problems noted. Only after opening the suction valves, 2SI002A(B), from the reactor hot legs, did the anomaly with the amps occur.

The inspectors reviewed the activities and documentation associated with this event and did not identify any possible causes other than the potential causes identified by the licensee. However, the inspectors did identify that the Unit 2 control room log was not complete for the time period of August 5-7, 1989, when the 2B RHR pump was OOS for bearing replacement. The log did not identify when some of the filling and venting activities (BOP-RH4) occurred such as, the starting and stopping of the 2B RHR pump. However, the shift engineer's log did identify some of the activities. The resident inspectors have not identified previous problems with the control room logs. This area will be closely monitored in future inspections. Discussions with the plant manager determined that the station was currently reviewing the requirements for the control room and shift engineer logs for possible improvement in content.

d. Degraded/Nonconforming Equipment

In a letter to NRC Region III, dated December 14, 1989, the licensee identified the actions that had been taken to effectively assess degraded equipment in a timely manner. The licensee stated that the operating engineers and at least one Assistant Technical Staff Supervisor shall have meetings to discuss safety significant off-normal equipment, or operations, on an as needed basis. Nuclear Work Requests (NWRs) that have been written for degraded equipment, unusual out-of-service configurations or abnormal valve lineup were examples of off-normal conditions identified by the licensee. The purpose of the meetings is to accomplish a timely review of off-normal items whose existence may cause an operability concern. Based on these discussions, the licensee stated further review and/or actions may be implemented as required using existing programs. The inspectors have reviewed the licensee's response and considers the process described in the response as an acceptable method for assessing degraded/nonconforming equipment. The resident

inspectors considers this area of plant operations, assessing degraded equipment for operability, as one of the key factors for successful safe plant operations; therefore, the effectiveness of this method will be closely monitored in future inspections.

e. Current Material Conditions (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 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. Results were as follows:

- (1) Material condition of the diesel driven fire pump was improved by the licensee. The material condition of the pump was identified as needing improvement in Inspection Report 454/89017; 455/89019.
- (2) Scaffolds were noted in several areas with the scaffold tags expired.
- (3) General housekeeping has deteriorated and increased management attention is required. During tours of the plant, the inspectors have noted ladders stored behind switchgears, areas without lighting, and bolts not properly stored or identified prior to installation.
- (4) Inspectors did not identify any significant material deficiencies and the hardware material condition of the plant was considered above average for this report period.

f. Radiation Protection Controls

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.

The licensee continues to be aggressive in the resolution of technical issues identified during plant operations. The licensee's performance in plant operations during this inspection period was acceptable. However, increased management attention is required in the area of housekeeping, especially since Unit 1 will be in a 59 day refueling outage commencing on January 5, 1990.



4. Maintenance/Surveillance (62703 & 61726)

a. Maintenance Activities (62703)

Station maintenance activities affecting the safety-related and associated systems and components listed below were observed or reviewed to ascertain that activities were conducted in accordance with approved procedures, regulatory guides and industry codes or standards, and in conformance with Technical Specifications.

The following items were considered during the review: that limiting conditions for operation were met while components or systems were removed from and restored to service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; radiological controls were implemented; and fire prevention controls were implemented. Work requests were reviewed to determine the status of outstanding jobs and to assure that priority was assigned to safety-related equipment maintenance that could affect system performance.

Portions of the following maintenance activities were observed and/or reviewed:

- NWR B 67612 - Repair pipe cap.
- NWR B 68853 - Disassemble the 2B RHR pump and motor.
- NWR B 68996 - Inspect the 2B RHR pump and motor.
- NWR B 69530 - Add time delay to 1A Essential Service Water Pump circuitry.
- NWR B 72342 - Repair leak in 1C Feedwater pump recirculation line.
- NWR B 72344 - Change grease in coupling on Unit 2 diesel driven AFW pump.

The inspectors periodically monitored the licensee's work in progress and verified the work was performed in accordance with proper procedures, and approved work packages, that 10 CFR 50.59 and other applicable drawing updates were made and/or planned, and that operator training was conducted in a reasonable period of time.

The inspectors reviewed the licensee's maintenance activities associated with the forced outage of November 13-21, 1989. The forced outage had been caused by a steam leak on the inlet flange to pressurizer safety valve 2RY-8010C. During this eight day outage, the maintenance department completed 83 NWRs that included five main control board distractions. The licensee had recently initiated a Pre-authorized Work (PAW) program. The program consisted of NWRs that had already been approved by appropriate station personnel and were immediately available for the Shift Engineer to initiate the

work in case of a forced outage. During the Unit 2 eight day forced outage all identified Unit 2 PAW NWRs were completed (17 NWRs). The PAW program was different than other forced outage lists since the NWRs had already been approved. In the past, the licensee determined that NWRs on a forced outage list were useful in the identification of priority work, however, the process of obtaining authorization for work was hindering the commencement of work, in a timely manner, and little work was accomplished early in a forced outage.

b. Mixed and Wrong Greases in Limitorque Operations

Based on the September 8, 1989, System Materials Analysis Department (SMAD) test results, the licensee had initiated action to sample greases in all EQ MOVs that had a history of maintenance since the gearcase grease was originally tested by SMAD in the 1984-1985 time frame. The number of MOVs in this category were 37 for Unit 1, of which 11 were inside containment; and 45 in Unit 2, of which 8 were inside containment. Except for four MOVs in Unit 1 containment; all EQ MOVs that were in the suspect category have been sampled. The four MOVs in the Unit 1 containment will be sampled during the Unit 1 refuel outage that is scheduled to commence on January 5, 1990. The following is a summary of the mixed grease issue:

- (1) SMAD report, M-5825-88, dated January 6, 1989, reported on results of grease samples submitted for analysis on November 25, 1988. One MOV (1SI8804B) was identified with mixed grease (20:1 ratio) and MOV (2SI8814) had the wrong grease (lithium based versus calcium based). The SMAD report was not distributed to the station's EQ coordinator and a Deviation Report was not issued as a result of these two unsatisfactory test results. Valve actuators for valves 1SI8814 and 2SI8804B were disassembled and re-greased on February 8, 1989 and July 28, 1989, respectively.
- (2) In August 1989, the resident inspectors questioned the overall EQ implications of the SMAD test results on MOVs 1SI8804B and 2SI8814. The licensee verified that the SMAD test results reported on in report M-5825-88 had not been distributed to and evaluated by the appropriate station personnel. Also, based on these test results, and the fact that the grease could not be re-sampled for verification of original test sample results, (grease had already been changed for 1SI8804B and 2SI8814), the licensee decided to obtain grease samples from an additional 18 EQ MOVs.
- (3) SMAD report M-494-89, dated September 8, 1989, identified that one of the additional 18 MOVs sampled had the wrong grease. Based on this SMAD test result and the other January 1989 test results, the licensee decided to sample the grease in all EQ MOVs that were subjected to maintenance activities subsequent to the SMAD grease tests conducted in the 1984-1985 time frame.
- (4) Subsequent SMAD test reports M-5038-89 and M-5039-89 identified valves 1CV112C, 1CV8100 and 1CV8355A with heavy mixed greases. On November 13, 1989, the licensee performed an On-Site Review

for justification for continued operation (JCO) for the valves. The JCO is further discussed in Section 5 of this report.

Even though the licensee conducted an extensive sampling program to ascertain the status of the type of grease in suspect EQ MOVs, there was a failure to originally establish adequate measures to ensure grease discrepancies with EQ MOVs were identified on DVRs. The lack of the identification of grease discrepancies on DVRs also contributed to the lack of a timely review by cognizant operating and technical staff personnel for operability of valves 1S18804B and 2S18814. The lack of adequate measures to identify discrepant grease samples is a violation of 10 CFR 50, Appendix B, Criterion XVI. (454/89021-01(DRP); 455/89024-02(DRP)). Other examples of failure to have adequate measures for identification of discrepancies has not been previously identified by the resident inspectors. Therefore, the violation described appears to be an isolated occurrence. This area will continue to be monitored by the resident inspectors.

Corrective actions initiated by the licensee in response to this event include the following:

- licensee initiated the necessary NWRs to ensure the MOVs with mixed or wrong greases were changed to the correct grease.
- Procedures BFP FP-28, "Inspection of Limitorque Main Gear Case Lubrication, BAP 370-2, "Station Sampling Program and BAP 370-2T2, "Sample Variation Report" have been revised to require the Fuel Handling Department to notify the Shift Engineer of any potential discrepancies identified during sampling. BAP 370-2T2 will be processed through the Shift Engineer and Operating Engineer. This process would provide opportunity for appropriate station personnel to review the discrepancy for possible impact on MOV operability, consistent with the licensee's response to open item 454/89017-03; 455/89019-03 described in Section 3.d of this report.
- SMAD was contacted to request a revision to the distribution of test results to include the station's EQ Coordinator.
- Station personnel performed an extensive review of SMAD analysis reports, completed work history and NWR records and identified suspect EQ MOVs. These suspect EQ MOVs had the gearcase grease sampled and analysed to verify that proper grease was used.

c. Surveillance (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, that test instrumentation was calibrated, that limiting conditions

for operation were met, that removal and restoration of the affected components were accomplished, that results conformed with Technical Specifications and procedure requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the tests were properly reviewed and resolved by appropriate management personnel.

The inspectors witnessed or reviewed portions of the following activities:

0 BOS XFT-A1,	"Cold Weather Preparation"
1 BOS 2.4.1 a-1,	"Quadrant Power Tilt Ratio Calculation."
1 BOS 3.1.1-2,	"Calorimetric Calculation Daily Surveillance."
1 BOS 3.1.1-21,	"Train B Solid State Protection System Bi-Monthly Surveillance."
1 BOS 8.1.1.2 a-1,	"Unit 1 - 1A Diesel Generator Operability Monthly."
1 BVS 3.1.1-4,	"Incore-Excore Axial Flux Comparison Monthly Surveillance."
1 BVS 3.3.2-1,	"Moveable Incore Detectors Operability Check."
2 BOS 5.2.b-1,	"ECCS Venting and Valve Alignment Monthly Surveillance."
2 BOS 7.3.2. a-1,	"Component Cooling Water Pump Operability Monthly Surveillance."
2 BOS 8.1.1.2. a-2,	"Unit Two - 2B Diesel Generator Operability Monthly (Staggered) and Semi-Annual (Staggered) Surveillance."
2 BVS 0.5-2.A.F.1-1,	"Auxiliary Feedwater Valve Indication/Stroke Test (Train A)."
2 BVS 4.6.2.2-1,	"Reactor Coolant System Pressure Isolation Valve Leakage and Cold Leg Injection Isolation Valve Surveillance."

During the inspection period documented in Inspection Report 454/89014; 455/89016, the inspectors identified several concerns in the licensee's surveillance program. The inspectors reviewed the status of these concerns with the following results:

- \* Monthly surveillance tests for diesel generators (DGs) now verify the capability of each fuel oil transfer pump to supply the DG day tank when the DGs were fully loaded.
- \* The inspectors have not identified any further instances where the licensee has improved the status of degraded subsystems immediately prior to a surveillance.
- \* The inspectors reviewed surveillance procedure, 1BOS 3.3.5-1, "Remote Shutdown Instrumentation Monthly Surveillance", and determined that channel checks were accomplished, documented and appeared effective.

d. Cold Weather Preparations (71714)

The inspectors reviewed the licensee's preparations for cold weather. The licensee has a surveillance, OBOS XFT-A1, Revision 4, "Freezing Temperature Equipment Protection", that was performed between September 28 and November 6, 1989. The surveillance verified that normal cold weather precautions were in place. Some of systems/components verified for proper cold weather precautions included: Circulating Water Pump House, Reactor Water Storage Tanks, Condensate Storage Tanks, Essential Service Cooling Tower Valve Rooms, and the Security Diesel. Verification activities included thermostat settings, energization of heat trace, heater power energized and anti-freeze in heaters. No problems were noted.

One violation was identified.

5. Engineering & Technical Support (37700)

a. Justification for Continued Operation

On November 13, 1989, the licensee identified three EQ valves, (1CV112C, 1CV8100 and 1CV8355A) with mixed greases. Since the mixed greases were contrary to the EQ requirements identified for Limitorque MOVs, the licensee performed a justification for continued operation (JCO) on November 13, 1989. The JCO was written by the licensee's corporate PWR Systems Design Group and an On-Site Review (OSR), 89-259, was performed by station personnel. The inspectors reviewed OSR 89-259 and determined that the justification utilized was inadequate. The JCO had referenced a licensee letter to NRR (S. C. Hunsader to T. E. Murley) submitted on August 26, 1988, that stated technical reasons for the acceptance of EQ MOVs with mixed greases. On October 6, 1988, a letter from NRR to the licensee (S. P. Sands to H. E. Bliss) stated that the NRC staff concluded there was insufficient information contained in the licensee's August 28, 1988 letter. Since OSR 89-259 did not contain other justifications that could have been utilized by the licensee, such as redundant isolation capabilities, the inspectors considered the JCO inadequate. On November 17, 1989, the licensee performed OSR, 89-268, to document another JCO for valves 1CV112C, 1CV8100 and 1CV8355A. The inspectors reviewed OSR 89-268 and determined that attachment B adequately addressed JCOs for the three valves with mixed greases. The licensee committed to change out the grease prior to the Unit 1 startup from the refueling outage scheduled to commence January 5, 1990.

The inspectors also identified in Inspection Report 455/89017; 455/89019 a problem with a design calculation from an offsite engineering organization that was utilized to assess operability of one of the Unit 1 diesel auxiliary feedwater pump nickel cadmium batteries. Based on the inadequate JCO for the MOVs with mixed greases and the inadequate design calculation just discussed, licensee's management needs to re-emphasize the importance of adequate

reviews of design/technical information furnished by offsite engineering organizations prior to use in JCOs or On-Site reviews.

b. Binding of Feedwater Checkvalves

During the Unit 2 November 13-21 forced outage, boroscope inspections of the disc portion of feedwater (FW) check valves 2FW079 A, B, C, and D were performed. The inspection was performed after all four valves were recently found in the stuck open position at the Braidwood Station. The inspection determined that feedwater check valve 2FW079B was stuck in the partially open position and the valve was subsequently repaired prior to startup from the forced outage.

The 2FW079 valves incorporate a dash-pot assembly design to prevent the valve from slamming shut on reverse flow. A review of the valve design disclosed that the manganese bronze guide bushing for the stainless steel piston rod, a component of the dash-pot assembly, may prevent the valve from operating due to thermal expansion. Apparently, different coefficients of thermal expansion between the piston rod, bushing, and the valve bonnet, result in deformation of the guide bushing. Creep properties of the bushing material at the valve's operating temperature (440 degrees F), resulted in stress relieving the bushing at the deformed dimensions. Subsequent cooling results in the bushing to piston rod effective clearance becoming negative. This causes an interference fit at low position. Reheating of the valve allows the bushing to expand, thus releasing the bound piston rod.

A review of the valve manufacturer's tolerances indicated that a potentially unfavorable "stacking" of tolerances between the bonnet, bushing, and piston rod, coupled with the difference in material properties, would cause the bushing to bind the piston rod. Laboratory measurements of the parts from one of the failed valves at Braidwood, supported this failure scenario. If the original tolerances are not "stacked" unfavorably, adequate clearance over the range of operating temperatures would permit normal valve operation. The valves that were found in the closed position upon cool-down (2FW079 A, C, and D) were considered operable.

A review of dimension tolerances and valve operating temperatures indicated that a valve manufactured with unfavorable "stacked" tolerances would only be subjected to sticking during low power (0-20%) operation. As a result, Station Special Operating Orders were issued to cover low power operations. These orders include the close monitoring of FW temperatures and expeditiously moving through FW temperatures below 250 degrees F. Additionally the licensee has committed to inspect all FW079 check valves, and establish optimum clearances, where appropriate, during the next outage of sufficient duration.

No violation or deviations were identified.

6. Security (81064)

The inspectors, by sampling, verified that persons in the protected area (PA) displayed proper badges and had escorts if required; vital areas were kept locked and alarmed, or guards posted if required; and personnel and packages entering the PA received proper search and/or monitoring.

7. TI 2515/104

(Closed) Temporary Instruction (TI) 2515/104: Inspection of initial training for fitness for duty (FFD). On December 20, 1989 the inspector attended FFD training sessions for general employees, supervisors, and personnel that could perform escort duties. Some of the subjects addressed in the training sessions were:

a. General Employees

- (1) methods utilized to implement 10 CFR 26
- (2) hazards associated with the abuse of drugs and misuse of alcohol.
- (3) the effect of prescription drugs and over-the-counter drugs on job performance.
- (4) the consequences from lack of adherence to the policy.

b. Supervisors

- (1) same material as the general employees
- (2) responsibilities as supervisors
- (3) role of other personnel such as the Medical Review Officer.
- (4) techniques for recognizing drugs.
- (5) behavioral observation techniques

The training sessions lasted approximately three hours. The presentation media utilized included slides, videos, and lectures. The medical staff was present to assist in the answering of any questions.

8. 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. An Open Item disclosed during the inspection is discussed in Paragraph 3.b.

9. Exit Meeting (30703)

The inspectors met with the licensee representatives denoted in paragraph 1 during the inspection period on January 2, 1990. 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.