U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos.	50-334/90-22 50-412/90-22	License:	DPR-66 NPF-73

Licensee: Duquesne Light Company
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301 Grant Street
Pittsburgh, PA 15279

Facility Name: Beaver Valley Power Station, Units 1 and 2

Location: Shippingport, Pennsylvania

Dates: October 20 - November 30, 1990

Inspectors: J. E. Beall, Senior Resident Inspector
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Approved by: S Stewart for
William Rul[illegible]d, Chief, Reactor Projects Section No. 4B — 12/27/90 Date

Inspection Summary

This inspection report documents routine and reactive inspections during day and backshift hours of station activities including: plant operations; radiological protection; surveillance and maintenance; emergency preparedness; security; engineering and technical support; and safety assessment/quality verification.

Results

One non-cited violation was identified concerning the failure to follow a procedure which resulted in an automatic Unit 2 main feedwater isolation (Detail 2.3.6). Weaknesses in the control of activities by shift supervision resulted in the automatic opening of the Unit 2 reactor trip breakers (Detail 2.3.5). Improvements were observed in housekeeping and control of activities in radiological controlled areas (Detail 3). The licensee's response to the identification of a design deficiency in the Unit 2 emergency diesel generator room ventilation supply fan start circuitry was good (Detail 7.2). The licensee's control of Unit 2 outage activities demonstrated a strong safety perspective (Detail 8.2). Significant improvements in the licensee's control and evaluation of temporary modifications were observed (Detail 8.3). A strong safety perspective was demonstrated during testing of the Unit 2 turbine driven auxiliary feedwater pump (Detail 8.4). Seven previously identified NRC items were reviewed and closed.

EXECUTIVE SUMMARY FOR INSPECTION REPORT

50-334/90-22 AND 50-412/90-22

Plant Operations Seven operational events were reviewed. A non-cited violation was identified concerning the failure to equalize pressure across a Unit 2 main steam isolation valve as required before opening the valve during a test in hot shutdown. This resulted in an automatic feedwater isolation. A weakness in the control of activities by shift supervision was identified concerning the performance of two incompatible activities simultaneously which resulted in the automatic opening of the Unit 2 reactor trip breakers during startup from the refueling outage. All the events reviewed for both units were found to be of minimal safety significance.

Radiological Protection Unit 2 housekeeping in radiological areas was observed to be very good during the outage. Significant improvements in the control of work in progress in the Unit 2 Containment were observed. Worker radiation exposures were kept low despite increases in the length of the outage.

Surveillance and Maintenance Both surveillance testing and maintenance activities were observed. There were no noteworthy observations.

Emergency Preparedness Routine review of this area identified no noteworthy observations.

Security Routine review of this area identified no noteworthy observations.

Engineering and Technical Support Licensee actions concerning the identification of a design deficiency of the Unit 2 emergency diesel generator room ventilation supply fans that prevented the fans from starting automatically in event of an emergency start signal were reviewed. The licensee's actions were found to be good. The inspector reviewed licensee resolution of design concerns in the 4 KV bus transfer logic. The licensee's review and disposition of this concern was adequate.

Safety Assessment/Quality Verification The licensee's control of Unit 2 refueling outage activities was reviewed. The inspector found that outage activities were well controlled and that a strong safety perspective was demonstrated throughout the outage. The inspector reviewed programmatic changes to the licensee's control and evaluation of temporary modifications and found that significant improvements had been made. Licensee actions associated with the testing of Unit 2 turbine driven auxiliary feedwater pump were reviewed. A good safety perspective was demonstrated throughout the pump testing, including the pursuit of a temporary waiver of compliance.

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DETAILS

1. Summary of Facility Activities

At the beginning of the inspection period, Unit 1 was operating at full power and Unit 2 was in Cold Shutdown (Mode 5) for the second refueling outage. Unit 1 remained at full power throughout the period. During the period, Unit 2 completed the outage and returned to power operation on November 21. Unit 2 was operating at full power at the end of the period.

2. Plant Operations (IP 71707, 71710, 93702, 71711)

2.1 Operational Safety Verification

The inspectors observed plant operation and verified that the plant was operated safely and in accordance with licensee procedures and regulatory requirements. Regular tours were conducted on the following plant areas:

- -- Control Room
- -- Auxiliary Buildings
- -- Switchgear Areas
- -- Access Control Points
- -- Protected Area Fence Line
- -- Spent Fuel Building
- -- Turbine Building
- -- Safeguard Areas
- -- Service Buildings
- -- Diesel Generator Buildings
- -- Intake Structure
- -- Yard Areas
- -- Containment Penetration Areas

During the course of the inspection, discussions were conducted with operators concerning knowledge of recent changes to procedures, facility configuration and plant conditions. The inspector verified adherence to approved procedures for ongoing activities observed. Shift turnovers were witnessed and staffing requirements confirmed. The inspectors found that control room access was properly controlled and a professional atmosphere was maintained. Inspector comments or questions resulting from these reviews were resolved by licensee personnel.

Control room instruments and plant computer indications were observed for correlation between channels and for conformance with Technical Specification (TS) requirements. Operability of engineered safety features, other safety related systems and onsite and offsite power sources were verified. The inspectors observed various alarm conditions and confirmed that operator response was in accordance with plant operating procedures. Compliance with TS and implementation of appropriate action statements for equipment out of service was inspected. Logs and records were reviewed to determine if entries were accurate and identified equipment status or deficiencies. These records included operating logs, turnover sheets, system safety tags, and the jumper and lifted lead book. The inspector also examined the condition of various fire protection, meteorological, and seismic monitoring systems.

Plant housekeeping controls were monitored, including control and storage of flammable material and other potential safety hazards. The inspector conducted detailed walkdowns of accessible areas, including normally locked high radiation areas, of both Unit 1 and Unit 2. Housekeeping at both units was very good.

2.2 Engineered Safety Features System Walkdown

The operability of selected engineered safety feature systems was verified by performing detailed walkdowns of the accessible portions of the systems. The inspectors confirmed that system components were in the required alignments, instrumentation was valved-in with appropriate calibration dates, as-built prints reflected the as-installed systems and the overall conditions observed were satisfactory. The systems inspected during this period include the Emergency Diesel Generators, Safety Injection Auxiliary Feed and Recirculation Spray systems. The inspector conducted detailed independent valve and breaker alignment checks of the safety-related portion of the Unit 1 River Water system and the Unit 2 Low Head Safety Injection system. No concerns were identified.

2.3 Followup of Events Occurring During the Inspection Period

During the inspection period, the inspectors provided onsite coverage and followup of unplanned events. Plant parameters, performance of safety systems, and licensee actions were reviewed. The inspectors confirmed that the required notifications were made to NRC. The following events were reviewed:

2.3.1 Unit 1 Safety Injection Recirculation Line Isolations

On October 24, 1990, while Unit 1 was operating at 100 percent power, one of the two in series normally open recirculation line isolation valves (MOV-SI-885B) for the train "B" low head safety injection (SI) pump unexpectedly closed during surveillance testing. The valve that closed was designed as an Engineered Safety Feature (ESF) that was required to automatically close on low Refueling Water Storage Tank (RWST) water level upon the initiation of the recirculation phase of a safety injection. The recirculation line for each SI pump is provided for pump protection during the injection phase for less than large break LOCAs. For the valve to automatically close, two in series pairs of relay contacts must close. One pair of contacts closes when relay KG42B is actuated on a SI signal and the other pair of contacts closes when relay KG41B is actuated on low RWST water level.

At the time of the event, the operators were performing the Main Feedwater and SI Transfer Relay KG42B portion of the Operating Surveillance Test (OST) 1.1.12, "Safeguards Protection System Train B.

Test." For this portion of the test, the SI pump recirculation valves were to be prevented (blocked) from closing by the normally open contacts of relay KG41B. However, when relay KG42B was actuated as part of the OST, MOV-SI-885B closed. The licensee subsequently found that the contact pair associated with KG41B had failed closed. The KG42B relay was reset and the valve was reopened. The valve was then de-energized in the open position.

The valve and train "B" low head injection pump were declared inoperable and the appropriate Technical Specification (TS) action statement was entered. The action statement for the ESF Actuation System instrumentation was also entered. The TS action statements permitted continued power operation for 72 and 48 hours respectively. Approximately 23 hours later, the affected KG41B contact pair was replaced with a qualified spare, the valve was re-energized, and the TS action statements were exited.

The licensee performed a detailed root cause failure analysis of the failed contact pair; however, a root cause could not be determined. The licensee concluded that the contact pair probably failed closed during the last performance of the OST on September 21, 1990.

The inspector found that the licensee took all appropriate actions. The licensee demonstrated a good safety perspective by leaving the valve de-energized in the open position which ensured SI pump protection during the injection phase of an SI. The valve could have been manually shut if required. The inspector had no further questions.

2.3.2 Unit 2 Inadvertent Emergency Diesel Generator Start

On October 26, 1990, the Unit 2 Emergency Diesel Generator (2EGS*EG2-1) unexpectedly started during the performance of Operating Surveillance Test (OST) 2.36.15, "4 KV and 480 V Emergency Bus Undervoltage Test." At the time of the event, Unit 2 was in Cold Shutdown (Mode 5).

The purpose of the OST was to verify the operability of emergency electrical bus undervoltage (UV) relays. To prevent inadvertent automatic starting of the emergency diesel generators (EDG), the OST required the operator to block and test the UV relay by use of an installed test switch. The test switch is designed such that when the associated UV relay's output signal is blocked, a test signal is generated to verify the relay actuates. When the test switch is subsequently momentarily placed in the "reset" position, the relay resets and then its output is unblocked.

When the channel functional test of the Diesel Start Undervoltage Relay 27-VE2200 was reset, the EDG automatically started. After the control room operators verified that no actual undervoltage condition existed, the EDG was secured.

Licensee investigation of the event found that the operators resetting the relay did not hold the test switch in the "reset" position long enough for the UV relay to reset before the switch spring returned to its "normal" position. This resulted in unblocking the UV relay output signal while the actuation signal was still present and the EDG automatically started as designed.

As a result of this event, the licensee identified a design deficiency with the EDG's associated ventilation supply fan (see Detail 7.1).

To prevent recurrence, the licensee added a caution statement to the OST to require operators to maintain the relay test switches in the "reset" position for five seconds before allowing the switch to spring return to the normal position. The licensee had also initiated an engineering review of the UV test circuit to determine if a design change was required.

The inspector reviewed the event. The operators responded in accordance with procedures and all required NRC notifications were made. The inspector concurred with the licensee's assessment that the root cause of the event was due to procedural guidance weaknesses and that the licensee's corrective action were adequate to prevent recurrence. The inspector had no further questions.

2.3.3 Unit 1 Automatic Ventilation Realignment

On October 27, 1990, while Unit 1 was operating at 100 percent power, the Supplementary Leak Collection and Release (SLCR) system realigned to its main filter banks in response to a spike on Unit 1 train "A" auxiliary building ventilation exhaust radiation monitor (RM-US-102A). The event was an Engineered Safety Feature actuation.

The purpose of the SLCR system is to ensure that radioactive leakage from the containment following a design basis accident or radioactive release due to a fuel handling accident, radioactive material released in the waste gas storage area, or containment contiguous areas, is collected and filtered for iodine removal prior to discharge to the outside environment. During normal operation, SLCR system exhaust system does not go through the main filter banks. Receipt of a high-high radiation alarm from either of two auxiliary building ventilation exhaust radiation monitors aligns the SLCR system to the main filter bank and isolates the normal building ventilation.

Control room operators responded to the event in accordance with procedures. Radiation surveys were performed in the auxiliary building and no unusual activity was detected. Area continuous air monitors indicated no airborne activity increases. RM-VS-102A was monitored for a 24 hour period; however, no additional spikes were observed. The SLCR system was subsequently aligned to its normal configuration. No cause of the spike could be determined.

The inspector reviewed the event and found that the SLCR system realigned as designed. In addition, operator actions were prompt and correct. There were no radioactive releases. This event was of minor safety significance.

2.3.4 Partial Loss of Unit 2 Offsite Power

A brief, partial loss of offsite power to Unit 2 occurred on November 5, 1990. A local electrical storm caused a fault to be sensed in the 138 KV power source causing de-energization of the 2A System Station Service Transformer (SSST 2A). The power loss was short (about 19 seconds), and the 2-1 diesel generator automatically started and supplied power for safety related loads. Unit 2 was in Cold Shutdown (Mode 5) throughout the event and all systems responded as designed. Offsite power was restored to station loads and the 2-1 diesel generator was secured after approximately one hour. The NRC was notified as required per 10 CFR 50.72.

The inspector reviewed the event and found the safety significance to be minimal and the operator response to be good. The 4 KV buses are powered from onsite (the main generator) during power operations and the offsite sources are normally used during outages. One of the independent sources of power remained in use throughout the event and the one affected safety bus was restored as designed by the dedicated diesel generator.

2.3.5 Unit 2 Scram Breakers Automatically Open During Testing

On November 12, 1990, Unit 2 was in Hot Shutdown (Mode 4) and start-up activities were in progress. Two such activities were operating manual procedure 2.1.4.B, "Reactor Rod Drive Control System Startup," and Unit 2 Beaver Valley Test 1.3.1, "Narrow Range RTD Cross-Calibrations." Both procedures required the scram breakers to be open as one of the initial conditions. Step 12 of the rod drive startup procedure required the scram breakers to be closed. Shortly after the scram breakers were closed, the breakers automatically tripped open as designed when technicians

performing the RTD cross-calibration procedure tripped enough Solid State Protection System bistables to insert a reactor trip signal. The licensee made the appropriate NRC event report and suspended performance of both procedures until reviewing of the event was complete.

The inspector reviewed the event and found it to be of minimal safety significance as the unit was shut down and no rod motion occurred. The inspector found ineffective communication and control by licensed shift supervision since incompatible procedures were allowed to proceed simultaneously. Long-term corrective actions were not fully developed at the close of the inspection, but will be evaluated as part of routine review of the Licensee Event Report for the actuation.

2.3.6 Unit 2 Feedwater Isolation

On November 13, 1990, and again on November 14, 1990, the Unit 2 Feedwater System automatically isolated on high steam generator level. The first isolation occurred while in Hot Shutdown (Mode 4) and the second while in Hot Standby (Mode 3).

The first event occurred during the performance of Operating Surveillance Test (OST) 2.21.1, "Main Steam Isolation Valve (MSS*AOV101A) Partial Closure Test." At the start of the event, the "A" steam generator (SG) water level was approximately 34 percent and the main steam header was depressurized with all main steam isolation valves shut. SG pressure was approximately 40 psig. One of the initial conditions of the OST required the "A" main steam isolation valve (MSIV) to be fully open. To meet the required initial condition, the control room operator performing the OST opened the MSIV without first equalizing pressure across the valve. This caused an indicated steam flow increase from zero to 550,000 lbm/hr, causing rapid SG swell. All three narrow range SG water level indicators went off scale high generating a feedwater isolation signal. The main feedwater line containment isolation valves automatically shut as designed. The operators reset the feedwater isolation signal after the "A" SG water level returned to normal and then reopened the containment isolation valves. The licensee inspected the Main Steam System piping and no damage was found. The NRC was notified as required per 10 CFR 50.72.

The cause of the event was operator error. The operator failed to first equalize pressure across the MSIV, as required by Operating Manual (OM) section 2.21.4.A, "Main Steam Startup to Normal Operation," before opening the MSIV.

To prevent recurrence, the licensee has counselled the operator involved. In addition, the licensee plans to cover this event in licensed operator training and revise the OST to include the appropriate reference.

The inspector reviewed the event and concluded that the operator's failure to open the MSIV in accordance with OM 2.24.4.A was an isolated event and was of minor safety significance (Severity Level V). The licensee reported the event to the NRC as required. The licensee's planned corrective actions were found to be adequate. In addition, no past similar occurrences were identified. Therefore, the failure to follow OM 2.24.4.A is a Violation but is not being cited because the criteria specified in Section V.G of the Enforcement Policy were met (NRV 50-412/90-22-01).

The second feedwater isolation occurred while a primary plant heatup was being performed as part of a Reactor Coolant System (RCS) loop temperature instrumentation calibration check test. The test required SG levels to be raised above normal to 56 percent. When RCS temperature was within five degrees of the test's target temperature, a control room operator began to open the main condenser steam dumps to decrease the RCS heatup rate. The steam dumps opened greater than expected and the water level in all three steam generators swelled above 75 percent, generating a feedwater isolation signal. The main feedwater containment isolation valves automatically shut as designed. After SG level was restored to normal, the feedwater isolation signal was reset and the feedwater containment isolation valves were reopened. The licensee reported the event to the NRC per 10 CFR 50.72.

Subsequent investigation by the licensee found that the main condenser steam dumps had not operated properly. The steam dump control system was in the Steam Pressure mode and, while in this mode, the steam dump valves were designed to open or close sequentially. However, the licensee discovered that three steam dumps opened simultaneously. This resulted in a higher than expected steam flow and SG swell. The steam dump controller was recalibrated and proper steam dump operation was verified.

The inspector found that licensee's response to the event was prompt and correct. The isolation of the main feedwater lines while in Mode 3 with no decay heat present was of minor safety significance.

3. Radiological Controls (IP 71707)

Posting and control of radiation and high radiation areas were inspected. Radiation Work Permit compliance and use of personnel monitoring devices were checked. Conditions of step-off pads, disposal of protective clothing, radiation control job coverage, area monitor operability and calibration (portable and permanent) and personnel frisking were observed on a sampling basis.

During this inspection period, the licensee completed the second Unit 2 refueling outage. Previous inspection reports (e.g., 50-334/89-22; 50-412/89-21) had noted a decline in housekeeping during refueling outages, but housekeeping remained very good throughout the most recent outage. Work areas were well maintained and there was a minimum of loose tools, cloths and parts, especially within radiological boundaries. Walkdowns of the Unit 2 containment indicated that significant improvements had been made in work control. Worker dose was also kept low despite increases in the length of the outage and the scope of work in radiation areas (see also Inspection Report 50-334/90-26; 50-412/90-26).

4. Maintenance and Surveillance (IP 61726, 62703, 71707)

4.1. Maintenance Observation

The inspector reviewed selected maintenance activities to assure that:

- The activity did not violate Technical Specification Limiting Conditions for Operation and that redundant components were operable;
- required approvals and releases had been obtained prior to commencing work;
- procedures used for the task were adequate and work was within the skills of the trade;
- activities were accomplished by qualified personnel;
- where necessary, radiological and fire preventive controls were adequate and implemented;
- QC hold points were established where required and observed;
- equipment was properly tested and returned to service.

Maintenance activities reviewed included:

MWR 901329	Repair Suction Flange Leak on Quench Spray Pump 1QS-P1B
MWR 901010	Calibrate Low Water Pressure Alarm Switch 2PS-EE309
MWR 907272	Repair/Replace Unit 2 Turbine Driven Auxiliary Feedwater Pump 2FWE*P23 Governor
MWR 907384	Repair Recirculation Spray Pump 2RSS*P21D Seal

There were no notable observations.

4.2 Surveillance Observation

The inspectors witnessed/reviewed selected surveillance tests to determine whether properly approved procedures were in use, details were adequate, test instrumentation was properly calibrated and used, Technical Specifications were satisfied, testing was performed by qualified personnel and test results satisfied acceptance criteria or were properly dispositioned. The following surveillance testing activities were reviewed:

Unit 1

OST 1.2.1	Nuclear Power Range Channel Functional Test
OST 1.24.3	Motor Driven Auxiliary Feed Pump Test (1FW-P-3B)

Unit 2

OST 2.21.7	Main Steam Trip Valves (2MSS*HYV101A, B and C) Full Stroke Test
OST 2.24.4	Steam Turbine Driven Auxiliary Feed Pump (2FWEP22) Test
OST 2.36.1	Emergency Diesel Generator (2EGS*EG2-1) Monthly Test
2BVT 2.2.1	Initial Approach to Criticality After Refueling

2BVT 2.2.2 Core Design Check Test

There were no notable observations.

5. Emergency Preparedness (IP 71707)

The resident inspectors had no noteworthy findings during this inspection in this area.

6. Security (IP 71707)

Implementation of the Physical Security Plan was observed in various plant areas with regard to the following:

-- Protected Area and Vital Area barriers were well maintained and not compromised;

-- Isolation zones were clear;

-- Personnel and vehicles entering and packages being delivered to the Protected Area were properly searched and access control was in accordance with approved licensee procedures;

-- Persons granted access to the site were badged to indicate whether they have unescorted access or escorted authorization;

-- Security access controls to Vital Areas were maintained and that persons in Vital Areas were authorized;

-- Security posts were adequately staffed and equipped, security personnel were alert and knowledgeable regarding position requirements, and that written procedures were available; and

-- Adequate illumination was maintained.

There were no noteworthy observations.

7. Engineering and Technical Support (IP 37700, 37828, 71707)

7.1 Unit 2 Emergency Diesel Generator Ventilation Supply Fan Circuit Deficiency

On October 26, 1990, during an inadvertent start of a Unit 2 emergency diesel generator (EDG), the licensee discovered a design deficiency in the EDG ventilation supply fan start circuitry. The EDG had been started as a result of an undervoltage (UV) signal (see Detail 2.3.2); however, the EDG ventilation fan failed to start. The fan was designed to maintain the EDG room within its desired temperature during EDG operation.

Subsequent testing and engineering evaluation determined that both Unit 2 EDG ventilation supply fans would not start after a UV or safety injection (SI) signal. The fans start circuitry was designed to receive start signals from either a test circuit or emergency diesel start (UV and SI) circuits. However, the licensee found that the start signal to the fans from the emergency diesel start circuit cleared as soon as the EDG successfully started. The fan start signal from the test circuit locked in, and therefore the fans continued to run after the EDG successfully started during testing. The local manual starting of was verified to be operable. The licensee reported this condition to the NRC per 10 CFR 50.72 and 50.73.

Testing determined that EDG room temperatures would not exceed normal values after an hour of EDG operation. The control room annunciators include an alarm on high EDG room temperature which initiates well below the environmental limit. The alarm response includes starting the ventilation fans for the affected space. The operator could then manually start the fan from the control room. As an interim corrective action, placards were placed on the main control room EDG control panels to alert the operator to manually start the supply fans following an automatic EDG start.

The EDG ventilation supply fans' starting circuitry was modified and proper operation was verified for all EDG start signals.

The inspector questioned whether the above deficiency should have been detected during Unit 2 pre-operation testing. The licensee conducted a review of the associated preoperational tests and found that the fan start from the emergency start circuit during preoperational testing was not verified.

The inspector concluded that the supply fans were only required for long term environmental concerns. The licensee interim corrective actions were adequate. The licensee's Nuclear Engineering Department's response to the event was good. The inspector had no further questions.

7.2 4 KV Bus Transfer Logic

The inspector reviewed licensee activities associated with the resolution of potential 4 KV bus transfer logic design deficiencies. This concern was one of the several issues that resulted from licensee and NRC reviews of events which occurred on October 24 and November 17, 1987. The first event involved a plant challenging startup test which led to a partial loss of offsite power. The test was initiated by opening the main generator output breakers while leaving the generator field breaker shut and the generator energized supplying onsite loads. A reactor trip occurred about six seconds after test initiation. The reactor trip caused a turbine trip and, after a 30 second time delay, the trip of the generator

field breaker. The 4 KV buses attempted to transfer to the offsite power source (via two transformers) after the generator field breaker trip. Due to loss of synchronization with the grid in the interval, one of the offsite power transformers did not allow the transfer and the two affected buses remained de-energized with one diesel generator starting automatically to power safety loads.

The licensee considered changing the bus transfer logic to immediately transfer the 4 KV buses to offsite power upon a trip of the generator output breakers, but elected not to perform the modification. The licensee concluded that tripping of both main generator output breakers (as happened in the 1987 event) without a generator fault was a low probability event. The eventual trip following the test was considered by the licensee (see LER 87-32) to have resulted from an unusual feedwater system alignment which allowed only half the steam dump valves to open for the load rejection test. The modification was proposed in 1987 and developed as Design Change Package 898. Preliminary approval was received in mid-1990 and implementation was scheduled for the third refueling outage (mid-1992). The modification was cancelled in November, 1990.

The inspector reviewed the proposed modification and concluded that there was no safety or regulatory issue involved. Licensee review and disposition of the event and the proposed design change was adequate. The inspector had no further questions.

8. Safety Assessment and Quality Verification (IP 40500, 71707, 90712, 92700)

8.1 Review of Written Reports

The inspector reviewed LERs and other reports submitted to the NRC to verify that the details of the events were clearly reported, including accuracy of the description of cause and adequacy of corrective action. The inspector determined whether further information was required from the licensee, whether generic implications were indicated and whether the event warranted onsite followup. The following LERs were reviewed:

Unit 1:

LER 90-015-00	Engineered Safety Features (ESF) Actuation - Closure of Main Steam Trip Valve During Partial Stroke Testing
LER 90-016-00	ESF Actuation - Low Head Safety Injection Recirculation Valve Closed During Testing
LER 90-017-00	Radiation Monitor Alarm Causes Auxiliary Building Ventilation Realignment

Unit 2:

LER 90-016-00	Service Water System Flow Blockage Due to Buildup of Corrosion Products
LER 90-017-00	Recirculation Spray Pumps' Timer Failures
LER 90-018-00	ESF Actuation - Inadvertent Diesel Start and D/G Ventilation for Circuit Deficiency

The above LERs were reviewed with respect to the requirements of 10 CFR 50.73 and the guidance provided in NUREG 1022. Generally, the LERs were high quality with good documentation of event analyses, root cause determinations, and corrective actions.

8.2 Control of Outage Activities

During this inspection period, the licensee completed the second Unit 2 refueling outage. Major outage activities included the removal of the Reactor Coolant System resistance temperature detector (RTD) mainfold, the overhaul of the Unit 2 emergency diesel generators, eddy current testing of the Unit 2 steam generators, and main turbine generator work.

The licensee demonstrated a strong safety perspective throughout the outage. The inspectors observed the participation of senior site management in the daily outage planning meetings. Nuclear safety and quality were emphasized over outage schedule. Maintenance activities were properly supervised and well planned. The inspector observed strong participation of both Quality Assurance and Quality Control personnel during the outage.

Nuclear Engineering Department's support of the outage was good. Particularly noteworthy was the support provided for the RTD manifold removal activity. Several drain lines had to be redesigned during the activity. The required design changes had only a minor impact on the completion of the activity.

Housekeeping throughout the plant was good during the outage. Job sites were uncluttered and quickly cleaned at the completion of work. This was a notable improvement from previous outages where housekeeping was observed to be weak.

In summary, the Unit 2 outage was well controlled. A strong safety perspective was observed throughout the outage. Engineering support of outage activities was good. Housekeeping during the outage was considered a strength.

8.3 Temporary Modification Program Improvements

In November 1988, the inspector identified several weaknesses in the licensee's control and evaluation of temporary modifications including an inadequate 10 CFR 50.59 safety evaluation for a temporary modification made to a Unit 2 emergency diesel generator air dryer. The inspector had found that many 10 CFR 50.59 safety evaluations lacked sufficient information to justify stated conclusions. Some safety evaluations concluded that unreviewed safety questions did not exist because the modified system was not safety-related. It was also identified that there was no apparent time limit on the temporary modifications and that some temporary modifications had been installed at both units for several years. Another weakness identified was an inconsistency in 10 CFR 50.59 training. Licensee personnel preparing and reviewing safety evaluations for temporary modifications were not required to receive training (there were requirements for personnel involved with permanent changes) and some members of the Onsite Safety Committee which reviewed all safety evaluations had not received 10 CFR 50.59 training.

The inspector reviewed the adequacy of the licensee's corrective actions. The inspector found that the licensee had made several programmatic changes in the control of temporary modifications and in the quality of the safety evaluations prepared for those modifications. The temporary modification of the Unit 2 emergency diesel generator air dryer was removed in December, 1988.

The OSC conducted a review of all installed temporary modifications using the guidance from NSAC (Nuclear Safety Analysis Center) 125, "Guidelines for 10 CFR 50.59 Safety Evaluations." This review was completed on March 15, 1989. No unreviewed safety questions were identified.

The inspector reviewed Nuclear Group Administrative Manual (NGAM) 8.18, "10 CFR 50.59 Evaluations," which was implemented on May 7, 1990. The inspector found that this procedure provided the licensee's minimum requirements for a 10 CFR 50.59 safety evaluation and provided extensive guidance on how to prepare an evaluation. The requirements applied to both permanent and temporary modifications. The NGAM incorporated the guidance given in NSAC 125.

The inspector reviewed approximately 25 selected 10 CFR 50.59 safety evaluations prepared for temporary modifications. The inspector found that the detail and thoroughness of the analyses were generally good. Sufficient justification was generally given for stated conclusions. No unreviewed safety questions were identified.

The licensee has also significantly upgraded the site procedures controlling the use of temporary modifications. The licensee implemented NGAM 7.4, "Temporary Modifications," on March 28, 1990. NGAM 7.4 limited the use of temporary modifications and limited the allowed time that new temporary modifications could be installed. The NGAM prohibited the use of temporary modifications to circumvent the design change process for permanent plant modifications. NGAM also limited the use of a new temporary modification to 90 days or the next refueling outage if an outage was required to install the permanent modification. The inspector noted that the licensee had significantly reduced the number of temporary modifications at both units. However, there were still 28 temporary modifications that had been installed for greater than two years. The NGAM also required the documentation of all temporary modifications on the control room status prints. The inspector found that temporary modifications were reflected on these prints.

The licensee has implemented a tiered training program for 10 CFR 50.59 safety evaluations. Personnel assigned to prepare 10 CFR 50.59 evaluations were required to complete a self-study course developed from the guidance in NSAC 125. Personnel assigned to review safety evaluations were required to complete an eight hour class which included practical exercises. The inspector audited one class and found the training to be of high quality. The inspector found that all members and alternates of the OSC had received 10 CFR 50.59 training.

The licensee has made significant improvements in the control and evaluation of temporary modifications. The number of installed temporary modifications had been reduced, and the 10 CFR 50.59 safety evaluations were prepared and reviewed using the guidance provided in NSAC 125. The training provided to personnel preparing and reviewing safety evaluations was good. The inspector had no further questions.

8.4 Inoperable Unit 2 Turbine-Driven Auxiliary Feedwater Pump

During the startup from the second refueling outage, Unit 2 entered Hot Standby (Mode 3) on 1:12 a.m. on November 14, 1990. The Technical Specifications (TS 4.7.1.2.a.1.b) require that the Turbine-Driven Auxiliary Feedwater Pump (TDAFWP) be operable during Power Operations, Startup and Hot Standby (Modes 1, 2 and 3, respectively). If the TDAFWP is not operable, the licensee has 72 hours to restore operability or shut down to Mode 3 in the next six hours and be in Cold Shutdown (Mode 4) within six more hours. The purpose of the Auxiliary Feedwater system is to remove decay heat and help cool down the plant.

Since the TDAFWP requires steam, it cannot be tested following an outage prior to Mode 3. During the outage, the licensee replaced the pump rotating element. Substantial testing was then required to generate a new pump performance curve. During the testing, the TDAFWP governor was identified as having failed, requiring replacement. Insufficient time remained before Mode 4 re-entry was required to allow governor replacement and retesting.

The licensee requested and received on November 17, 1990, a temporary waiver of compliance to allow an additional 24 hours to complete governor replacement and retesting. The temporary waiver was granted verbally by Region I since there was a negligible impact on reactor safety. The waiver request and the Region's documentation of the waiver were issued on November 19, 1990. Unit 2 had been shut down in the second refueling outage for over two months so there was negligible decay heat.

Following receipt of the temporary waiver, the licensee completed governor replacement but encountered additional problems while retesting the TDAFWP. Unit 2 was cooled down and entered Mode 4 prior to expiration of the temporary waiver. After repairs were complete, Unit 2 again heated up to Mode 3, the TDAFWP was successfully tested, and plant startup continued.

The licensee demonstrated good, conservative safety perspective throughout pump testing including the pursuit of the temporary waiver of compliance. The licensee developed a clear and adequate basis for the waiver such that the plant did not have to undergo an unnecessary cooldown-heatup thermal cycle. After governor replacement, the TDAFWP passed the normal operability surveillance test but the licensee was not completely satisfied with pump performance and elected to cool down for additional repairs.

9. Status of Previous Inspection Findings (IP 71707, 90702, 92701)

The NRC Outstanding Items List was reviewed with cognizant licensee personnel. Items selected by the inspector were subsequently reviewed through discussions with licensee personnel, documentation reviews and field inspection to determine whether licensee actions specified in the Ois had been satisfactorily completed. The overall status of previously identified inspection findings was reviewed, and planned/completed licensee actions were discussed for the items reported below.

9.1 (Closed) Unresolved Item (50-412/87-64-01): Licensee to review 4 KV bus transfer logic. This item concerned potential design deficiencies in the 4 KV bus transfer logic. This item is reviewed in Detail 7.2.

9.2 (Closed) Unresolved Item (50-334/89-04-01; 50-412/89-04-01): No procedure or controls concerning outdoor staging or storage of flammable liquids. This item concerned the absence of procedures or controls implementing the licensee's commitment to NFPA 30, "Flammable and Combustible Liquids Code." The inspector had identified that 20 barrels of oil had been staged against a safety related structure without any review of the possible impact on safety or fire protection.

The licensee revised the controlling site administrative procedure on fire protection to document the commitment to NFPA 30 and assign site responsibilities for compliance. The applicable construction and maintenance group procedures were also revised to enhance control of flammable and combustible liquids.

The inspector reviewed the revised procedures and found the changes appropriate and comprehensive. The inspector noted that the procedure changes were not limited to the outdoor storage concern previously identified, but included additional cautions and requirements for storage of flammable and combustible liquids. Followup inspections did not identify any weaknesses in the control of such materials; this item is closed.

9.3 (Closed) Deviation (50-412/90-12-01): Lack of procedural controls to ensure reactor cavity fuel transfer canal drain line flange would be removed during reactor power operation. On June 22, 1990, while Unit 2 was operating at 85 percent power, the licensee found the reactor cavity fuel transfer canal drain line flange installed. The licensee did not have any procedural requirements in place to remove the flange after the reactor cavity was drained, contrary to a Unit 2 FSAR commitment to have such procedures.

The inspector reviewed the licensee's corrective actions. Procedural steps had been added to the Unit 2 transfer canal draining procedure to require the removal of the flange. In addition, steps were added to the containment closeout procedure to verify the drain flange is removed prior to reactor power operation. The flange was verified removed on November 6, 1990, prior to the Unit 2 startup from the second refueling outage.

The licensee performed a detailed analysis which concluded that, with the flange installed, there was only a small reduction (at most 3.2 percent) in the net positive suction head of the Recirculation Spray System pumps and that the small reduction of margin would not have rendered the pump inoperable.

The inspector had no further questions.

9.4 (Closed) Violation (50-334/88-28-02; 50-412/88-22-02): Weaknesses in the licensee's program for temporary modifications. This item identified several weaknesses in the licensee's control and evaluation of temporary modifications, including an inadequate 10 CFR 50.59 safety evaluation for a temporary modification made to a Unit 2 emergency diesel generator air dryer. This review is documented in Detail 8.3.

9.5 (Closed) Unresolved Item (50-334/88-08-02): Vibration monitoring program for Unit 1 low head safety injection (SI) pumps provided inconsistent readings. The item concerned the lack of consistency of SI pump vibration readings taken during routine surveillance testing. This item was previously reviewed in NRC Inspection Report 50-334/89-04; 50-412/89-04. This item remained open pending the licensee's evaluation of the feasibility of permanently installed vibration monitoring instrumentation. The licensee has approved a design change (DCP 1532) to install permanent instrumentation. This enhancement is scheduled to be completed on January 31, 1991. The inspector will review vibration data obtained using the permanent instrumentation during routine surveillance inspection. The inspector had no further questions.

9.6 (Closed) Violation (50-412/89-13-01): Reactor trip resulted from failure to follow Maintenance Surveillance Procedure (MSP) 26.01-I, "2MSS-P446 First Stage Pressure Protection Channel III Test," as written. This item was previously reviewed in NRC Inspection Report 50-334/90-12; 50-412/90-12 and remained open pending the completion of a revision to the MSP specifying the mode dependency of the procedure. The revision to the MSP was implemented on November 1, 1990. The inspector found that the initial conditions for performance of the MSP were clearly delineated. The inspector had no further questions.

9.7 (Closed) Unresolved Item (50-334/88-31-01): Programmatic inconsistencies in procurement and classification of commercially procured components. This item involved the installation of an incorrect gasket on a Unit 1 steam generator manway. The gasket error was identified when it leaked and required Unit 1 to cool down for gasket replacement.

The inspector reviewed the licensee's corrective actions and noted that all similar installed gaskets had been replaced and those found in stock had been purged. The stock database was upgraded to include critical component characteristics where possible or sole-sourced to vendors where proprietary considerations made that not feasible. Other items from the same supplier were reviewed. Some additional problems were identified and further orders were placed on hold pending resolution of these concerns. The inspector found the licensee's corrective actions to be very good since the results of the review were incorporated in the licensee's program for commercial grade part dedication. This program was reviewed during the Maintenance Team Inspection (50-334/89-80; 50-412/89-80) and no deficiencies were identified. This item is closed.

10. Exit Meetings

10.1 Preliminary Inspection Findings Exit

Meetings were held with senior facility management throughout the inspection to discuss the inspection scope and findings. A summary of the findings was discussed with the licensee at the conclusion of the report period on December 3, 1990.

10.2 Attendance at Exit Meetings Conducted by Region-Based Inspectors

Dates	Subject	Inspection Report No.	Reporting Inspector
11/26/90 to 1130/90	Engineering	50-334/90-25; 50-412/90-25	Woodard
11/26/90 to 11/30/90	Radiological Controls	50-334/90-26; 50-412/90-26	O'Connell
11/27/90 to 11/30/90	Emergency Planning	50-334/90-27; 50-412/90-27	Fox