U. S. NUCLEAR REGULATORY COMMISSION
REGION I

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License Nos.	DPR-66 NPF-73
Licensee:	Duquesne Light Company One Oxford Center 301 Grant Street Pittsburgh, PA 15279
Facility:	Beaver Valley Power Station, Units 1 and 2
Location:	Shippingport, Pennsylvania
Inspection Period:	August 2 - September 6, 1994
Inspectors:	Peter P. Sena, Acting Senior Resident Inspector Scot A. Greenlee, Resident Inspector G. Edison, NRR, Project Manager

Approved by: W. J. Lazarus 9/22/94
W. J. Lazarus, Chief — Date
Reactor Projects Section 3B

Inspection Summary

This inspection report documents the safety inspections conducted during day and backshift hours of station activities in the areas of: plant operations; maintenance and surveillance; engineering; plant support; and safety assessment/quality verification.

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EXECUTIVE SUMMARY

Beaver Valley Power Station
Report Nos. 50-334/94-19 & 50-412/94-20

Plant Operations

Due to recent staffing changes, Unit 2 has only five qualified Nuclear Shift Supervisors available to stand watch on a regular basis. Long working hours for these individuals is not uncommon, even during non-outage periods. The licensee has initiated short-term actions to address this issue. A long-term senior reactor operator staffing plan is under consideration.

Maintenance

Quality Services activities involving independent oversight of maintenance were found to be of inconsistent quality in the depth of inspections and final observations.

Extensive river water system maintenance was well supervised and, overall, adequately planned; however, an oversight in maintenance planning led maintenance personnel to try to install the wrong gasket material in the system. No significant deficiencies were noted during a post-maintenance test review. The licensee identified that a Technical Specification violation occurred when they changed operating modes with an inoperable containment isolation valve. The valve failed an in-service test, but the failure was not recognized by operations personnel. The violation is not being cited because the criteria of Section VII.B of the Enforcement Policy were met. Vibration analysis information proved to be a valuable diagnostic tool in identifying the source of excessive fan vibration.

Engineering

Enforcement discretion was granted to allow continued Unit 2 plant operation with a recirculation spray pump that failed to satisfy the minimum flow requirements. This resulted from the identification of a calibration mismatch between the flow transmitter and flow element. Applying this mismatch resulted in the invalidation of the as found surveillance test data. The licensee was able to demonstrate that the pump, with the corrected flow rate, was still capable of satisfying its design basis requirements in maintaining subatmospheric conditions. This violation was not cited due to its minor safety significance and identification by the licensee.

Corrective actions to address steam driven auxiliary feed water pump oscillations and component cooling water expansion joint liner failures were thoroughly developed and proper to preclude recurrence. Especially noteworthy was the aggressive pursuit of corrective actions by the AFW system engineer. A review of the 50.59 process found that proper procedures are in place for effective control of plant modifications.

(EXECUTIVE SUMMARY CONTINUED)

Plant Support

Health physics and security programs continue to be effectively implemented. A thorough evaluation of a minor unplanned gaseous waste release demonstrated that the offsite air doses were less than 1 percent of the technical specification limit and did not impact public health or safety.

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DETAILS

1.0 MAJOR FACILITY ACTIVITIES

Unit 1 was in Mode 2 at the start of the period. The unit was synchronized to the grid on August 2, but did not reach 100 percent power until August 7, following repair of the 'B' main feed water pump. Unit 2 operated at 100 percent power for the duration of the period.

2.0 PLANT OPERATIONS (71707)

2.1 Operational Safety Verification

Using applicable drawings and check-off lists, the inspectors independently verified safety system operability by performing control panel and field walkdowns of the following systems: fuel pool cooling, quench spray chemical injection, auxiliary feed water, and quench spray. These systems were properly aligned. 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 of the following plant areas:

- Control Room
- Auxiliary Buildings
- Switchgear Areas
- Access Control Points
- Protected Areas
- Spent Fuel Buildings
- Diesel Generator Buildings
- Safeguards Areas
- Service Buildings
- Turbine 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 inspectors 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. Inspectors' 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 inspectors also examined the condition of various fire protection, meteorological, and seismic monitoring systems.

2.2 Senior Reactor Operator Overtime

The inspectors reviewed the completed shift schedules for the Unit 2 Nuclear Shift Supervisors (NSS) for the months of July and August. The technical specifications limits for working hours have been satisfied over this period. However, 60 hours on shift (over a 7- day period) and 24 hours on shift (over a 48-hour period) were not uncommon. This is due, in part, to recent organizational changes resulting in only five qualified NSSs being available to stand watch in this capacity. When two NSSs were on "off days" at the same time, back to back to back 12 hour shifts were assigned to two of the remaining NSSs. Licensee management has initiated action to address the minimal staffing levels by selecting three shift foreman for NSS training and qualification. The intent of these upgrades is to allow these individuals to serve as Nuclear Shift Supervisors in order to fill unforeseen schedule vacancies and during refueling outage periods. Possible permanent upgrade to this position will be under evaluation by licensee management. If this were to occur, permanent replacements for the shift foremen would also have to be identified and trained. Currently, only one individual for Unit 2 is enrolled in a senior reactor operator licensing class. No qualification date for this individual has yet been established. The licensee's short-term actions to correct this situation appear to be appropriate.

3.0 MAINTENANCE (40500, 62703, 61726, 71707)

3.1 Maintenance Observations

The inspectors 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; radiological and fire prevention controls were adequate and implemented; QC hold points were established where required and observed; and equipment was properly tested and returned to service.

The maintenance work requests (MWRs) listed below were observed and reviewed. Unless otherwise indicated, the activities observed and reviewed were properly conducted without any notable deficiencies.

MWR 033561 Remove and Reinstall RW-189 for Inspection (see Section 3.1.1)

MWR 029134 Replace the 1B Component Cooling Water Heat Exchanger Outlet Expansion Joint (see Section 3.1.1)

MWR 033508 Install Vanstone Liner Downstream of the 1B Component Cooling Water Heat Exchanger (see Section 3.1.1)

MWR 025744 Inspect 2CCP-EMJ214C (see Section 4.4)

MWR 029228 SLCRS Fan VS-F-4A Troubleshooting

Excessive vibration of supplemental leak collection fan VA-F-4A was identified by the licensee. Vibration analysis indicated that the motor outboard bearing had increased from 0.12 inches per second to 0.5 inches per second. The vibration levels were restored to within the operability limit of 0.45 inches per second by torquing the pedestal bolts. Additional vibration analysis was conducted to evaluate the need for further corrective action. Analysis of the frequency spectrum indicated that the pedestal is not securely anchored to the floor. The licensee is investigating whether the pedestal should be removed and all anchors checked. This action is currently under evaluation by maintenance engineering. Overall, the vibration analysis proved to be an excellent diagnostic tool to further pinpoint the source of the excessive vibration and restore the fan to operable status.

MWR 033309 Charging Pump CH-P-1B Disassembly and Inspection

On July 29, 1994, the Unit 1 charging pump (CH-P-1B) experienced a transient in which discharge pressure dropped from 2500 psig down to 2000 psig. Severe vibration and loud noise were reported coming from the pump cubicle. Operators started a second charging pump and secured the 'B' pump. The 'B' pump had been running for 4 days without any noticeable complications prior to the transient. Disassembly of the pump by maintenance personnel revealed that the rotating assembly was 15 mils out of round and the outboard mechanical seal was damaged. It is suspected that the rotating assembly internals may be damaged. The licensee has subsequently shipped the pump to a Westinghouse facility for repairs. A new rotating assembly will be used, and the damaged rotating element will be disassembled in order to determine the root cause of the pump failure.

3.1.1 River Water Piping Maintenance on the Outlet of the Component Cooling Water Heat Exchangers

NRC Inspection Report 50-334/94-17 discussed a pinhole leak in the Unit 1 river water piping downstream of the 'C' component cooling water heat exchanger. The cause of the degradation was determined to be erosion from throttling of the heat exchanger outlet isolation valve. Some degradation was also detected on the outlet of the 'B' heat exchanger. The licensee has postulated that the rapid erosion of these headers may be due, in part, to the curvature of the outlet isolation valve disks. Consequently, the licensee reversed the orientation of the 'B' heat exchanger outlet isolation valve to evaluate the valve throttling and erosion characteristics with the concave section of the disk away from the direction of flow. To reduce degradation rate on the outlet of the 'B' and 'C' heat exchangers, the licensee: (1) installed inconel liners inside of the degraded sections of pipe; and (2) rotated the outlet isolation valves approximately 20 degrees so that throttled flow will be directed toward a different section of the outlet piping. During this maintenance, the licensee also replaced the 'B' heat exchanger outlet expansion joint, which was scheduled for replacement during the next refueling outage.

The inspectors observed selected portions of the river water system maintenance, reviewed the associated maintenance work requests, and reviewed the safety evaluation for the liner installation.

The inspectors determined that the work was well supervised and, overall, adequately planned with the exception that the safety evaluation specified the use of red rubber gaskets above and below the liner flanges to reduce the chance of galvanic corrosion; however, the maintenance personnel were going to install paper gaskets. This was an oversight during the maintenance planning process, and was remedied when it was pointed out by the inspectors. All of the river water joints were put together with red rubber gaskets, a configuration which was not supported by the river water isometric diagrams, or the site plant installation process standards (PIPS). The maintenance engineer on the job was able to produce an engineering memorandum which supported the use of red rubber, but the memorandum had not been translated to any maintenance or installation diagrams/procedures. The licensee is evaluating the need to revise these procedures. The MWR for the expansion joint replacement specified tie-rod nut torques which were not traceable to any maintenance or installation diagrams/procedures. The maintenance engineer was able to trace the specification back to the design change package which originally installed the tie-rods on the expansion joints.

The Maintenance Department Manager indicated that their maintenance self-assessment had also identified a weakness in the documentation of torque requirements, and they are working on a torque document which should include the tie-rod nuts.

3.1.2 Unit 1 Post-Maintenance Testing

The inspectors reviewed 17 Unit 1 maintenance work requests (MWRs), associated with safety related systems, for adequacy of post-maintenance testing. The MWRs were selected from a list of 441 MWRs authorized to work between June 1 and July 4, 1994. The focus of the review was to determine if the post-maintenance testing was timely, met Technical Specification requirements, and adequately demonstrated equipment operability. The inspectors concluded that the requirements for post-maintenance testing were met in all cases. Some minor documentation errors were noted, and were discussed with appropriate licensee personnel.

3.1.3 Unit 1 Auxiliary Feed Water (AFW) Pressure Switch Calibrations

During a routine walkdown of the Unit 1 AFW system, the inspectors noted that some of the pressure switches on the discharge of the AFW pumps had not been calibrated since the 1980s. The calibration sticker on one of the switches was dated 1982 (this calibration date was verified by review of the calibration records). The pressure switches sense when an AFW pump has started, and then generate a signal to close the steam generator blowdown isolation valves. The inspectors asked the licensee if closure of the blowdown isolation valves following the start of an AFW pump is a necessary safety function, and, if so, could they justify the calibration interval on the pressure switches. The licensee has not determined if the closure signal serves a safety function. The intent of the function is to conserve auxiliary feed water inventory in the event of a loss of offsite power. To resolve any immediate safety implications, the licensee calibrated all the pressure switches. None of the as found conditions would have prevented the switches from performing their intended function. The licensee is continuing to evaluate the function of the switches, and will set calibration requirements based on the results of the evaluation.

3.2 Surveillance Observations

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 operational surveillance tests (OSTs) and maintenance surveillance procedures (MSPs) listed below were observed and reviewed. Unless otherwise indicated, the activities observed and reviewed were properly conducted.

1OST-36.7 Offsite to Onsite Power Distribution System Breaker Alignment Verification

2OST-7.4 Centrifugal Charging Pump Test (2CHS*P21A)

2OST-21.1 MSIV Stroke Testing

2OST-36.1 Emergency Diesel Generator 2-1 Test

2MSP-6.14-I Pressurizer Pressure Loop Protection Channel III Test (2RCS-P457)

3.3 Quality Services Unit (QSU) Oversight of Maintenance Activities

The inspectors performed a review and assessment of the licensee's independent oversight groups with an emphasis on the oversight of maintenance programs and activities. These groups include the Quality Services Audit and Surveillance Department and the Quality Services Inspection and Examination Department (QSIE). The inspectors reviewed the audits, assessments, surveillances and inspections completed by the Quality Services Unit over the previous 12 months in order to assess program effectiveness.

The Quality Services Surveillance Program involves the observation of designated activities for the purpose of evaluating performance of personnel and procedures which control those activities. Specific factors for selecting activities to be surveilled include: relative importance to safety; industry experience; and trends from previous observation. The inspectors reviewed the 1994 maintenance surveillances. In general, safety significant activities were being observed by QSU personnel. A recent emphasis on motor-operated valve testing was evident. Surveillance results and findings were of mixed quality. For example, surveillance of river water piping non-destructive examination observed one of the most important aspects of the examination (i.e., the calibration of the ultrasonic test instrument). Other surveillances of river water piping examinations focused on the relatively unimportant pipe cleaning in preparation for the exam. In another example, the cause of discrepancies between initial and final motor current data during MOVATs testing was not properly followed-up.

The inspector also interviewed numerous working level maintenance personnel, such as mechanics, electricians, and technicians, including first line supervisors and maintenance engineers, for their feedback on these surveillances. All personnel interviewed were familiar with the surveillance program, as each has had their work monitored. However, the inspector noted that the surveillance personnel had a limited knowledge of the basics of the activities being observed. An auditor exchange program with other utilities is in place where technical expertise and quality assurance insights are shared during audits and assessments. Currently, a component engineering manager from Florida Power and Light Company is part of the motor operated valve assessment program.

The Quality Services Inspection Program consists of receipt inspections, vendor inspections, and maintenance inspections. The inspectors specifically reviewed the quality control (QC) maintenance inspections and any identified non-conforming conditions. Deficiency reports were properly dispositioned and followed-up. The inspectors also reviewed the "deficiencies immediately corrected" (DICs) reports over the last 8 months. DICs are defined as those deficiencies that required QC intervention at the job site to correct. The QSIE department has identified a negative trend on the percentage of deficiencies immediately corrected since December 1993. The identified deficiencies are related to work control and conduct of maintenance. These findings indicate to the inspector that QC personnel are being appropriately critical of the observed activities. The inspectors also reviewed the quarterly maintenance work practice assessments by QSIE. QC inspectors assess each work activity in the areas of maintenance supervision, job briefings, radiological practices, personnel professionalism, and competency by assigning a grade 1 through 10. The inspectors recognize that these assessments are highly subjective, but did note some inconsistency between the work practice quarterly report showed improving performance and the deficiencies immediately corrected report showed declining performance. The Quality Control manager had also previously identified the divergent trends between these two reports and has taken action to reduce what he believes are inflated grades of the work practice assessments.

Quality Services assessments have been performed since 1993 on a variety of subjects within the maintenance unit. These assessments allow for an in-depth examination of a particular concern in the period between the annual audit. The inspector has noted increased QSU attention on maintenance activities via this assessment process. Good assessments of on-line leak repairs, the maintenance procedure validation process, and root cause analysis issues were noted. The leak repair assessment was topical, as it included a review of industry experience and observations of six on-line leak repairs. The inspector found this report to be concise and to contain valid recommendations. The inspectors also reviewed the rod position indication (RPI) maintenance history assessment. This report compiled a listing of maintenance work requests in an attempt to identify any recurrent trends with a particular rod. The inspectors agree with the fact that no individual rod position indication has had an increased failure rate, but a RPI failure history had already been completed by the operations department. The QSU organization was unaware that this failure history had already been documented. Additionally, the listing compiled by QSU was not complete as over one dozen maintenance work requests were identified as missing from the data base. The inspector also questioned members of the maintenance staff on their viewpoints of these assessments, but noted that in three instances, the responsible individuals had not received copies of the assessments. This includes, for example, the system expert on rod position indication who had not been questioned about system performance nor received the completed assessment.

The inspectors reviewed the 1993 maintenance audit (BV-C-93-07) and attended the licensee's exit for the 1994 maintenance audit (BV-C-94-07). The 1993 audit contained good findings which were well supported and documented. Identified deficiencies in the area of infrared thermography were particularly well developed. The inspectors did not consider the 1994 maintenance audit to be aggressive or thorough. In particular, part of the 1994 audit was to evaluate programs and activities in the area of solenoid operated valves (SOVs). The audit team only commented that the maintenance unit is working to develop a program for SOVs; however, no SOV program is under development. Instead, a SOV task force had been chartered in late 1993 to examine SOV failures and recommend corrective actions. This task force has essentially completed its reviews and recommendations for corrective actions for implementation during the upcoming refueling outage. The QSU audit of SOVs appeared to be superficial as the audit team did not examine the task force actions, interview the task force chairman, evaluate the adequacy of the SOV corrective maintenance procedures or evaluate application of industry experience. The maintenance audit was also tasked with evaluating the negative DIC trend report. The audit only reiterated the QSIE report and did not assess the validity of the trend. Based on the inspectors interview with QC personnel, the reporting threshold for DICs has been lowered, thus more deficiencies are now being documented. The inspectors concluded that the negative trend does not conclusively indicate a decline in job performance. Also, feedback to the inspectors from maintenance personnel indicated that the QSU observations from the 1994 audit, for the most part, did not tell them anything that had not already been identified for which corrective action had been initiated.

Overall, the inspectors noted that the Quality Services Unit has a proper combination of activities in place to monitor the effectiveness of maintenance activities. The recent implementation of assessments has provided positive results and shows potential to provide continuing insights to maintenance activities; however, the quality of the audits and surveillances were found to be inconsistent. This mixed quality has resulted in the Quality Services failure to establish an appropriate level of credibility in its observations as perceived throughout the line organization. The use of external individuals to validate and support the assessments is a positive initiative to improve the quality of inspection activities.

4.0 ENGINEERING (71707, 37551, 92700, 92903)

4.1 Review of Written Reports

The inspectors reviewed Licensee Event Reports (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 inspectors determined whether further information was required from the licensee, whether generic implications were indicated, and whether the event warranted further onsite follow-up. The following LERs were reviewed:

Unit 1:

94-02 "Inoperable Diesel Generator Due to Inadequate Electrical Separation in Control Circuit"

94-05 "Main Transformer Bushing Failure Results in Electrical Grid Disturbance and Dual Unit Reactor Trips"

This event was reviewed in NRC Inspection Report 50-334/94-14. The inspectors had no further comments or questions.

94-06 "Operational Mode Change With An Inoperable Containment isolation Valve"

This LER described an event that occurred on May 18, 1994, when Unit 1 entered Mode 4 (from Mode 5) with an inoperable containment isolation valve (TV-1CC-111D1). TV-1CC-111D1 is an inside containment isolation valve for component cooling water to the control rod drive mechanism cooling coils. The valve was stroke time tested on May 13, and had exceeded its limiting stroke time as specified by Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The operator who performed the timing test and the personnel who reviewed the test did not recognize that the ASME stroke time limit had been exceeded. The valve was within the stroke time limit specified in Section 6 of the Technical Specifications. The licensee stated that the out-of-specification result was not recognized because the personnel involved were scanning the test data, and incorrectly utilized the less limiting Technical Specification requirements as the overall acceptance criteria.

The error was identified by the licensee on June 23, 1994, after the valve was stroke tested again on June 8. The valve failed the June 8 test, and a subsequent historical data review identified the May 18 failure. Unit 1 was in Mode 5 when the error was identified, and the valve timing problem was corrected prior to the next plant entry into Mode 4. The licensee counseled the personnel involved with the error, and plans to present the event during operator retaining.

Entry into Mode 4 from Mode 5 with an inoperable containment isolation valve is a violation of Technical Specifications. This violation will not be cited in accordance with Section VII.B of the Enforcement Policy. Specifically, the violation was of minor safety significance (the valve was not significantly degraded, the stroke time was less than the Technical Specification limit, and the associated outside containment isolation valve was fully operable), was licensee identified, was not willful, and could not have been reasonably prevented by previous corrective actions.

94-07 "Engineered Safety Feature Actuation-Automatic Start of WR-P-1B"

94-08 "Reactor Trip Resulting from Main Transformer Fire Protection System Actuation"

This event was reviewed in NRC Inspection Report 50-334/94-17. The inspectors had no further comments or questions.

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 found to be of high quality with good documentation of event analyses, root-cause determinations, and corrective actions. These event reports are closed based on in-office review of the event report and onsite inspections.

4.2 10 CFR 50.59 Process Audit

The inspectors reviewed the licensee's procedures for controlling modifications at both units, the training records related to training of the staff in the requirements of 10 CFR 50.59, logs of setpoint changes and temporary modifications, and several modification packages including the associated safety evaluations.

The licensee's station modifications are organized into three categories: design changes; design equivalent changes; and administrative changes. Design changes include major modifications, minor modifications, setpoint changes, temporary modifications and computer system changes. Design equivalent changes are intended to include changes to structures, systems or components for which design requirements remain unchanged. Administrative changes include Updated Final Safety Analysis Report (UFSAR) updates, Technical specification (TS) changes, and other changes to documents such as operating procedures, valve lists, or administrative changes to drawings. All of these changes are controlled with approved procedures. Procedures NGAP 7.8, (Station Modification Control) and NEAP 2.13, (Technical Evaluation Reports), were revised in the past year to expand and focus the guidance for Design Equivalent Changes. This was an upgrade to a previously identified weakness during the 10 CFR 50.59 audit in August 1993.

The licensee's 10 CFR 50.59 training program includes an initial qualification course, and a requalification course which is required to be taken every 2 years to remain qualified to prepare or review safety evaluations. Members of the engineering assurance group, which perform most of the 10 CFR 50.59 evaluations for major modifications, were current in their training. There was some confusion regarding whether the requalification training requirements were intended to apply to all managers with responsibilities in this area. The licensee is re-evaluating guidance in this area.

The inspectors noted that logs are maintained in the control room for setpoint changes and for temporary modifications (TMODs), including jumper connections and lifted leads. A temporary modification must exist for more than 7 days to be labeled a TMOD. Otherwise, it is tracked in a Tag Index Log Book. These logs were reviewed and found to be updated on a quarterly basis and temporary modifications are reasonably low in number. The inspectors reviewed one temporary operating procedure change, two design change packages, and one miscellaneous change (to revise AFW pump capacity in the FSAR). No deficiencies were identified.

Overall, the inspectors found that proper procedures are in place for effective control of plant modifications. Based on the inspector's sampling, no significant deficiencies were identified in the 10 CFR 50.59 process.

4.3. Follow-up on Governor Valve Hunting on the Unit 2 Steam Driven Auxiliary Feed Water Pump (Problem Report 2-93-164)

In late November and early December 1993, the licensee experienced unacceptable oscillations of the governor for the Unit 2 steam driven auxiliary feed water (AFW) pump. This problem was initially reviewed in NRC Inspection Report 50-412/93-30. During this inspection period, the inspectors reviewed the licensee's follow-up actions for this event. Specifically, the inspector's reviewed the licensee's problem evaluations, discussed the problem evaluations with responsible personnel, and evaluated corrective actions.

The primary problem evaluation was done by the AFW system engineer. The analysis was very thorough, and concluded that the cause of the oscillations was a combination of two factors: governor valve binding caused by corrosion on the valve stem, and weak governor valve buffer springs. As explained in NRC Inspection Report 50-412/93-30, these problems were immediately corrected. The longer term actions involved determining why the weak springs were installed, why the governor valve stem corroded, and if the problems were also applicable to Unit 1.

The licensee found that governors with weak buffer springs were delivered from the vendor as an equivalent part, without communication of the internal changes. This was viewed by the licensee as a programmatic weakness in their procurement process. As a result, they changed their procurement procedures to require vendors to supply documentation of any changes in an item as compared to the original equipment. Additionally, the documentation from the vendor is required to include a review of how the changes affect the operation of the equipment as well as the probable failure modes and characteristics.

The licensee believes that the valve stem corrosion was a result of galvanic corrosion, in the presence of condensate, between the packing and the stem. During the last refueling outage, a design change to the steam drains system should have improved condensate removal from the Unit 2 AFW system steam piping. The licensee plans to verify these assertions by inspection of the governor valve stem during the next two refueling outages.

The licensee is still evaluating the Unit 1 governor. The Unit 1 governor has the weaker buffer springs, but also has a different control circuit. Changing to the stronger buffer springs at Unit 1 could produce unacceptable speed overshoot during a fast start of the turbine. Unit 1 also has condensate in the vicinity of the governor valve stem which makes it more susceptible to corrosion. In order to ensure that these two conditions do not lead to unacceptable governor oscillations, the licensee is using a strip chart recorder to monitor for oscillations during the quarterly pump surveillance tests. The Unit 1 governor valve stem will be inspected for corrosion during the next two refueling outages. Long-term actions to address the weaker buffer springs are still under evaluation, but may involve changing to the type of governor used at Unit 2 (so the stronger springs can be used).

Overall, the inspectors concluded that the actions to address steam driven AFW pump oscillations were thoroughly researched, technically sound, and focused on safety. Of particular note were the aggressive pursuit of corrective actions by the AFW system engineer, and the self-assessment by procurement personnel.

4.4 Unit 2 Recirculation Spray Pump Enforcement Discretion

On August 15, 1994, the licensee requested the NRC to exercise enforcement discretion associated with the technical specification actions for an inoperable recirculation spray (RS) pump. Technical Specification 3.6.2.2 requires that with one containment recirculation spray subsystem inoperable, the subsystem must be restored to operable status within 72 hours, or the plant must be in hot standby in the next 6 hours. Technical Specification 4.6.2.2.d specifies that each RS pump develop a differential pressure of ≥112 psid at a recirculation flow of ≥3500gpm. On August 12, the 'A' recirculation spray pump was declared inoperable due to its failure to meet the minimum operating point criteria. Pump testing cannot be accomplished without entering cold shutdown conditions.

The nuclear engineering department identified a calibration mismatch between the recirculation spray flow transmitter (2RSS-FT-157A) and flow element during a review of pump performance data. The transmitter had been calibrated prior to initial plant start-up to a range of 4000 gpm at a water column differential of 100 inches. Engineering determined that the flow venturi had been manufactured such that a 100-inch water column differential corresponded to a flow rate of 3850 gpm. This calibration mismatch was applied to the pump surveillance test results from the previous refueling outage and resulted in a corrected flow rate of 3388 gpm. This calibration mismatch also applied to the remaining three RS pumps; however, performance for these pumps remained above the minimum operating point.

As a safety basis for the enforcement discretion request, a reanalysis of containment conditions following a design basis accident was performed using the as corrected pump performance data. The calculation was performed based on the actual 28 tubes plugged in the "A" recirculation spray heat exchanger with a design basis river water temperature of 89° F. A subatmospheric peak of -0.02 psig (acceptance criteria <0.0 psig) and a depressurization time of 3460 seconds (acceptance criteria <3600 seconds) was computed. Thus the 'A'

RS pump would have fulfilled its design basis requirements if called upon. An additional reanalysis was completed using reduced recirculation pump flow rate of 3285 gpm. The use of this additional flow margin resulted in a two degree decrease in the river water temperature requirement (87° F) to maintain subatmospheric conditions following a DBA. Additional margin exists in that the actual river water flow through the RSHXs are greater than that assumed in the containment analysis by 500 gpm. Also, actual river water temperature was 75° F and trending down. As a compensatory measure, the 'A' RS pump will be declared inoperable if river water temperature exceeds 87° F. The peak river water temperature experienced thus far for 1994 was 83° F. The inspectors reviewed these analyses and the NRC concluded that the 'A' RS pump is capable of performing its intended safety function. The decision by the NRC to exercise discretion not to enforce compliance with Technical Specification 3.6.2.2 was verbally granted on August 15. The licensee will take action to return the pump to the required condition to satisfy the 3500 gpm flow criteria during the next refueling outage or unscheduled shutdown of greater than 30 days.

The inspectors performed a review of the calibration data for the recirculation flow venturi in order to determine the cause of the mismatch. The venturi flow nozzle purchase specification (dated September 15, 1980) specified to the vendor a 4000 gpm flow rate at maximum differential pressure. The certified calibration report provided by the vendor contained only raw test data and did not specify the actual calibration range. The certified calibration report did not contain any statements that the flow element calibration range varied, non-conservatively, from the purchase order. In order to determine the actual calibration range of the flow element, the discharge coefficient from the certified test data must be used to calculate actual flow rate corresponding to 100 inches water column differential (3850 gpm).

Overall, the licensee's actions were appropriate in demonstrating the operability of the recirculation spray pump and pursuing enforcement discretion. The identification by the responsible engineer of this calibration error is commendable. A review of inservice testing data for the 'A' RS pump, applying the correction factor, indicates that the pump was not in compliance with the technical specification surveillance requirement since completion of the third refueling outage in May 1992 (corrected flow: 3395 gpm). A review of river water temperature since this period indicated that a peak temperature of 87° F has never been achieved; therefore, the 'A' RS pump was capable of performing its intended safety function throughout this period. Thus the safety significance of the calibration mismatch is minimal. The failure to satisfy the Technical Specification 3.6.2.2 will not be cited as a violation in accordance with the requirements of Section VII.B of the Enforcement Policy.

4.4 Component Cooling Water Expansion Joint Liners

During an internal inspection of the component cooling water (CCP) pump suction expansion joints, the licensee identified a failed liner. The expansion joint liner for the 'A' CCP pump was found with a 360 degree crack between the liner tube and supporting flange. The tube and flange were completely separated from each other. This inspection was initiated due to possible galvanic corrosion concerns which were previously identified on the service water expansion joint. Subsequent inspection of the 'B' CCP pump suction expansion joint revealed cracking. No degradation was identified on the 'C' CCP pump suction expansion joint. These components are stainless steel "vanstone liners" manufactured by the Pathway Corporation. The materials engineering group has completed an analysis and concluded that fatigue failure had initiated in the welds of the centering lugs. As corrective action, a new style liner was inserted into the expansion joints. These liners have a "centering hump" expanded into the liner vice the previous design which used three lugs welded to the liner tube. Thus the heat affected zones where the cracks initiated are eliminated. No other vanstone liners with centering lugs are installed in either unit. The inspectors reviewed the design equivalent change evaluation and concluded that the licensee's corrective actions are adequate to preclude recurrence of these liner failures.

5.0 PLANT SUPPORT (71707)

5.1 Radiological Controls

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. Licensee personnel were observed to be properly implementing the radiological protection program.

5.1.1 Unplanned Gaseous Waste Release

The inspectors reviewed the licensee's quantification of the unplanned radioactive gaseous release which occurred on August 18. A 10 psig pressure drop was experienced on the Unit 1 gaseous waste surge tank. This tank is downstream of the gas waste charcoal beds which provide for xenon and krypton holdup and iodine absorption. The gaseous waste surge tank contained only xenon and krypton noble gases. Approximately 88 cubic feet (0.0559 curies) of gas was released via the primary auxiliary building ventilation system. During this release, the auxiliary building ventilation monitor (RM-VS-102B) alarmed but did not reach the high-high alarm. The high alarm setpoint is at 10 percent of the technical specification noble gas dose rate limit. The high-high alarm is set at 30 percent of the technical specification limit and functions to divert the exhaust effluent through a pre-filter/charcoal/HEPA filter complex before atmospheric discharge. The offsite gamma (1.68 E-6 mrad) and beta (2.47 E-8 mrad) air dose were determined to be less than 1 percent of the technical specification limit. Thus, this release did not adversely affect public health and safety.

The inspectors also reviewed the root cause of the leak. Maintenance personnel identified that the gaseous waste compressor suction line/flange was not properly aligned following compressor overhaul. The inspectors also noted that the magnitude of the leak could have been lessened if operations personnel had tested the piping joints for leakage upon system repressurization. In this instance, the leak continued for about 2 minutes as the operator who was restoring the system alignment thought the hissing he heard was the system pressurizing vice an actual leak. The inspectors were informed that a review of future post-maintenance testing requirements for the gaseous waste system will be conducted.

5.2 Security

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 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. Licensee personnel were observed to be properly implementing and following the Physical Security Plan.

5.3 Housekeeping

Plant housekeeping controls were monitored, including control and storage of flammable material and other potential safety hazards. The inspectors conducted detailed walkdowns of accessible areas of both Unit 1 and Unit 2. Housekeeping at both units was acceptable.

6.0 ADMINISTRATIVE

6.1 Preliminary Inspection Findings Exit

At periodic intervals during this inspection, meetings were held with senior plant management to discuss licensee activities and inspector areas of concern. Following conclusion of the report period, the resident inspector staff conducted an exit meeting on September 9, 1994, with Beaver Valley management summarizing inspection activity and findings for this period.

6.2 Attendance at Exit Meetings Conducted by Region-Based Inspectors

During this inspection period, the following region-based inspections were completed:

Dates	Subject	Inspection Report No.	Reporting Inspector
8/01-05/94	Low-Level Storage & Transfer	334/94-18; 412/94-16	J. Nick
8/15-19/94	Unit 2 Requalification Exams	412/94-19	Stewart; Bissett

6.3 NRC Staff Activities

Inspections were conducted on both normal and backshift hours: 14.7 hours of direct inspection were conducted on backshift; 11.2 hours were conducted on deep backshift. The times of backshift hours were adjusted weekly to assure randomness.

W. Lazarus, Chief, Section 3B, Region I, visited the site on August 3 and 4, 1994 for discussion with the inspectors, a plant tour, and to attend the exit meeting for NRC Inspection Report 94-17/17.

G. Kelly, Chief, Systems Section, Region I, visited the site on August 5, 1994, for discussions with the inspectors and to attend the licensee's Service Water Operational Performance Inspection exit.

6.4 Beaver Valley Management Changes

Mr. James Cross has been appointed the Vice President of the Nuclear Group for Duquesne Light Company and Senior Vice President and Chief Nuclear Officer for the Nuclear Power Division. He will have responsibility for all nuclear operations for the company. He replaces Mr. John Sieber who retired from the company in July 1994. Mr. Cross assumed his duties on September 5, 1994.

Mr. Fred Schuster, formerly the Unit 2 Operations Manager, has been appointed as the Manager of the Maintenance Engineering and Assessment Department. Mr. Brian Tuite, formerly a Unit 2 Nuclear Shift Supervisor, has been selected to become the new Operations Manager.