

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-334/86-24

Docket No. 50-334

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

Facility Name: Beaver Valley Power Station, Unit 1

Location: Shippingport, Pennsylvania

Dates: October 1 - 27, 1986

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11/7/86
date

Inspection Summary: Inspection No. 50-334/86-24 on October 1 - 27, 1986.

Areas Inspected: Routine inspections by the resident inspectors (119 hours) of licensee actions on previous inspection findings, plant operations, housekeeping, fire protection, radiological controls, physical security, surveillance testing, EDG air intake dampers, Auxiliary River Water System, GE Type AK-F-2-25 Breakers, and LER reviews.

Results: No violations were identified. Followup on the manual reactor shutdown due to an unisolable 3/4" feedwater line sockolet weld leak is discussed in detail 4.b.2.

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DETAILS

1. Persons Contacted

During the report period, interviews and discussions were conducted with members of licensee management and staff as necessary to support inspection activities.

2. Plant Status

The plant operated at full power throughout this inspection period until a manual shutdown on October 27, 1986, due to a leaking weld on a 3/4" high point vent line to the C feedwater control valve bypass line. A significant organizational change occurred when the previous security contractor, Burns Security International, was replaced by Security Bureau, Inc. A large portion of the guard force was replaced during the transition, which was observed by a Regional Security Specialist.

3. Followup on Outstanding Items

The NRC Outstanding Items (OI) 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 were reviewed, and planned and completed licensee actions were discussed for those items reported below:

(Closed) Unresolved Item (86-20-01): Review licensee action to modify and clarify SSPS surveillance procedures. The licensee has modified the surveillance procedures for the Solid State Protection System (SSPS) to separate the procedural steps that demonstrate the operability of the reactor trip and bypass breakers from the procedural steps which check the logic portion of the SSPS. The "A" Train procedures are MSP 1.04 "Solid State Protection System Train A Bi-Monthly Test" and MSP 1.04A "Reactor Trip Breaker A Bi-Monthly Test." The inspector witnessed the satisfactory performance of MSP 1.04A on October 3, 1986 and MSP 1.04 on October 6, 1986. The revised procedures were acceptable. Also, to serve as an operator aid, a permanent tag was placed on the Bypass Breaker A front panel stating "This breaker used for MSP 1.04 and 1.04A." A similar tag is mounted adjacent to the shunt trip panel for Reactor Trip Breaker A. Similar tags are in place to serve as operator aids for testing the "B" Train components per MSP 1.05 and 1.05A. The inspector found these corrective measures to be acceptable. This item is closed.

(Closed) Violation (82-05-01): Inadequate design controls in design specification, interface and verification programs. This item was last looked at in Inspection Report 334/84-01 and left open pending resolution of various unresolved items identified by the EDS Nuclear, Inc. audit of the design change program. The inspector reviewed the final summation of those concerns and proposed resolution in an NECU Memo (ND1NED:0761) dated May 30, 1986.

This memo summarized the station's actions with regard to post-accident shielding design reviews, fire hazard analysis for Appendix R and physical separation of instrumentation to Reg Guide 1.75 requirements for design change packages related to containment hydrogen monitoring, containment wide range pressure, and containment sump level instrumentation. The Beaver Valley Plant shielding design review was inspected by Region 1 Specialists in Inspection Report 334/82-24 and found satisfactory. The Appendix R Fire Protection issue was addressed in NRC Inspection Report 334/85-25. With regard to meeting the electrical separation criteria of Reg Guide 1.75, the memo noted that BV-1 was designed prior to its issuance resulting in installation of components that comply with IEEE Standard 279-1971 and IEEE Standard 308-1971. This has resulted in instrumentation systems which have redundant circuits routed in train/channel separated raceways from sensors to display thereby meeting the intent of the NUREG 0737 design criteria. The inspector had no further concerns and this item is closed.

(Closed) IFI (85-19-06): The Radcon Operations Center (ROC) does not contain adequate space. Since this item was initially opened, the ROC was modified. The adjacent first aid room was relocated and the intervening wall removed to nearly double the available floor space. The adequacy of the ROC was demonstrated during several mini-drills that occurred during September, 1986. This item is closed.

(Closed) Unresolved Item (86-18-02): Review actions to ensure that the plant is not placed outside of its design basis by the use of jumpers, lifted leads or unanalyzed bypasses to RPS & ESF instrumentation. The licensee committed to developing a station administrative procedure as part of a long term corrective action to strengthen the design change and modification systems. SAP 36, Temporary Modifications, was issued on September 30, 1986. It addressed the administrative guidelines for modifications, the control approval process and installation of temporary modifications used in modifying or troubleshooting plant systems. These controls include the use of temporary jumpers, lifted leads, bypasses, blocks, temporary setpoint changes and temporary gauges. The inspector determined that the review and approval process was commensurate to that for a design change review. No concerns were identified and this item is closed.

(Closed) Unresolved Item (85-27-04): Review of revision and implementation of cold weather log. Previously, the licensee performed the cold weather log (OM Chapter 1.54.3) during October to protect safety related process, instrument and sample lines from freezing. However, in many instances during the winter months, cold weather protection for plant equipment became degraded and resulted in frequent freezing. The licensee has developed four procedures which are designed to place freeze protection in service and identify and correct protection degradation for the duration of the winter. During October, OST 1.45.11, Cold Weather Protection Verification, will be performed to verify that cold weather protection measures are installed and operable or a MWR is written for necessary repairs. Provisions have been added to OM Chapter 1.54.3 L3-1-1, Primary Auxiliary Building Log, to initiate the performance of the cold weather log if the outside ambient temperature during the midnight

shift drops below 35 °F. OM Chapter 1.54.3 L10-1, Cold Weather Log, has been created for daily performance during the winter to verify the operability of the cold weather protection equipment by verification that no heat trace panel annunciators are alarmed. If during performance of L10-1 an alarmed annunciator is identified, troubleshooting will be conducted per the revised OM Chapter 1.45.4.A.E, Troubleshooting Heat Trace Alarms. Finally, in April, OST 1.45.12, Removal of Cold Weather Protection Measures, will be performed to remove or de-energize equipment put in service by OST 1.45.11. The inspector reviewed these four procedures and found no inadequacies.

(Closed) Violation (86-11-02): This item was previously discussed in NRC Inspection Report 334/86-21 and remained open pending issuance of the updated Nuclear Engineering and Construction Unit Management Procedure 2.7, Engineering Specifications. The update was intended to clearly establish minimum requirements for DCP test specifications. The inspector reviewed the revised NECUMP 2.7 which was issued on October 1, 1986, and found the changes related to test specifications adequate.

(Closed) Violation (86-08-04): Failure to adhere to Station Administrative Procedure 3D, The Maintenance Work Request. During reviews of MWRs relating to the Chemical and Volume Control and Safety Injection Systems, the inspectors had identified several examples of incomplete MWR forms. In a letter dated July 25, 1986, the licensee detailed their plans for corrective actions. All of the MWRs which the inspectors had identified as deficient were reviewed by the Maintenance Department; none of the omissions were determined to be safety significant. Also, it was been further emphasized to all SROs that they are not to sign off as complete an MWR unless all portions of it have been completed appropriately. To prevent further improper MWR usage, all Maintenance Engineers and Foremen attended reviews of this finding and SAP 3D, conducted by the Maintenance Supervisors. The inspector found these corrective actions acceptable and had no further concerns.

(Closed) Violation (86-13-03): Failure to control NSS Key Cabinet Containing Keys to the High Radiation Area. The inspector reviewed the DLC response dated October 8, 1986. It noted that the NSS key cabinet was immediately locked and the combination dial spun, and that all Operations personnel were notified that it shall remain locked with entry into the cabinet controlled by the NSS. To prevent recurrence, the Nuclear Station Operations Supervisor made periodic spot checks and found it closed at all times. The inspector, likewise, performed similar checks with the same results. Additionally, the licensee also committed to having all Operations personnel receive additional training and TS 6.12.2, High Radiation Area, and OM 1.48.5.C, Padlock/Locking Devices Administrative Requirements, are part of their next licensed and non-licensed retraining modules. This action is currently in progress and should be completed by December 8, 1986. Additionally, the inspector verified that the Administrative Assistants had been counseled on this violation. The licensee is now in compliance with this requirement and the violation is closed.

(Closed) Unresolved Item (86-04-07): Review DLC action to validate ISI baseline data obtained by PII. The licensee had an independent contractor evaluate the examination performed on the Recirc Spray Heat Exchanger (1A) and two diesel generator coolers (EE-E-1A, B). From the sample of three safety-related heat exchangers, the eddy current data was reevaluated using strip charts and data tapes during May, 1986. No defects were found in RS-E-1A, and one tube was found degraded in EE-E-1A. Two tubes were found degraded in EE-E-1B. The licensee's ISI Department determined that the remaining results were generally overall conservative in nature and acceptable. This item is closed.

(Closed) Unresolved Item (85-24-01): Retrieve loose parts in feedwater lines and steam generators and assess impact. This item was last updated in Inspection Report 334/86-17 and left open pending NRC review of the licensee's analysis and evaluation of the downstream component operability with loose parts remaining in the system. A safety analysis was performed that validated operation through the next refueling outage. It was reviewed and approved by the plant safety committees. The inspector had no further concerns and this item is closed.

(Closed) Unresolved Item (86-04-08): Review resolution of P-10 safety questions. Westinghouse Technical Bulletin 86-06 raised a concern about the potential malfunction of RPS Permissive P-10 where one nuclear instrument power range monitor channel fails while another channel is in maintenance. This permissive allows a manual block of certain nuclear flux related trip functions when at least two of the four power range monitor channels reach a value corresponding to about 10% power. A second feature of this permissive is to automatically reinstate these trips when three out of four power range monitor channels are reduced below the 10% setpoint. To ensure that the P-10 permissive is in the proper state for plant conditions, the licensee made the following three changes:

- (1) AOP-10, Malfunction of Nuclear Instrumentation, requires that, should both source range monitor channels fail when in Modes 3, 4, or 5, the PG water from the blender to the RCS is to be isolated to prevent an uncontrolled boron dilution.
- (2) OM Chapter 52, Procedure C, Decreasing Load from 40% to Turbine Shutdown and Reactor at approximately 5% Power, was revised to verify that when power is less than 10% and the P10 interlock does not clear to reinstate the intermediate and power range low reactor trips, to either maintain power above 10% until the P-10 malfunction is repaired or immediately shut down followed by opening of the reactor trip breakers.
- (3) OM Chapter 50, Procedure D, Reactor Startup from Hot Standby to the Startup Mode (Power less than 5%), requires verification that the P-10 status light is not illuminated prior to closing the reactor trip breakers during startup.

The station has concluded that all of the Westinghouse identified concerns have been satisfactorily resolved. The inspector identified no new concerns and this item is closed.

(Closed) Unresolved Item (86-15-02): Review full power tests used to validate assumptions for increasing the steam generator tube plugging limit. This concern was identified as a result of inspector review of the draft safety evaluation provided to DLC by Westinghouse. Subsequent correspondence between the licensee and Westinghouse resulted in a safety evaluation presented to the NRC dated July 24, 1986, that stands on its own merits and requires no further testing. This item is therefore, closed.

(Open) Unresolved Item (86-20-04): Review RCS loop flow measurement calculations to determine instrument accuracy and acceptance criteria. The test was rerun using the narrow range spare RTD instrumentation. This test result indicated that Loop A and C flows were greater than Loop B flow, which contradicts the earlier test data using the wide range temperature indications. The inspector noted that using the new test data that the T-Cold readings varied by about 4 or 5 °F. This range of accuracy appears unacceptable and the licensee is actively pursuing this issue.

(Open) Unresolved Item (85-25-05): Emergency lighting insufficient or marginal in four areas. This item was opened to follow licensee actions to correct a potential weakness regarding emergency lighting units located in areas that require operator action for safe shutdown. During the Fifth Refueling Outage, licensee personnel conducted a test of the areas in question and determined that some minor modifications would be necessary to strengthen this area. Additionally, the licensee revised their exemption request for meeting some of the Appendix R, Section III.J, emergency lighting requirements, in a letter to NRR dated October 21, 1986. This item remains open pending determination of the exemption request's acceptability.

4. Plant Operations

a. General

Inspection tours of the plant areas listed below were conducted during both day and night shifts with respect to Technical Specification (TS) compliance, housekeeping and cleanliness, fire protection, radiation control, physical security and plant protection, and operational and maintenance administrative controls.

- Control Room
- Primary Auxiliary Building
- Turbine Building
- Service Building
- Main Intake Structure
- Main Steam Valve Room
- Purge Duct Room
- East/West Cable Vaults
- Emergency Diesel Generator Rooms
- Containment Building
- Penetration Areas

- Safeguards Areas
- Various Switchgear Rooms/Cable Spreading Room
- Protected Areas

Acceptance criteria for the above areas included the following:

- BVPS FSAR
- Technical Specifications (TS)
- BVPS Operating Manual (OM), Chapter 48, Conduct of Operations
- OM 1.48.5, Section D. Jumpers and Lifted Leads
- OM 1.48.6, Clearance Procedures
- OM 1.48.8, Records
- OM 1.48.9, Rules of Practice
- OM Chapter 55A, Periodic Checks, Operating Surveillance Tests
- BVPS Maintenance Manual (MM), Chapter 1, Conduct of Maintenance
- BVPS Radcon Manual (RCM)
- 10 CFR 50.54(k), Control Room Manning Requirements
- BVPS Site/Station Administrative Procedures (SAP)
- BVPS Physical Security Plan (PSP)
- Inspector Judgement

b. Operations

Inspection tours of all accessible plant areas were conducted. 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. Except where noted below, inspector comments or questions resulting from these daily reviews were acceptably resolved by licensee personnel.

- (1) On October 20, 1986, during performance of PMP 1-36SS-BKR-1E, ITE 4 KV Air Circuit Breaker Inspection, the operating charging pump (CH-P-1C) was accidentally tripped off-line. This caused a loss of charging and RCP seal injection water. The Control Room operator immediately started the standby pump (CH-P-1B) on the redundant emergency bus. Investigation revealed that during performance of the A pump breakers PMP, the electrician inadvertently operated a cell switch in the back of the cabinet. This switch provides an interlock to prevent racking two charging pumps onto the same emergency bus. A review of the PMP indicated that it did contain an appropriate caution statement. The inspector was informed that this event would be discussed with all electricians at the next safety meeting.

This event was discussed with Operations personnel to determine how they would be alerted to a similar problem should it occur to the standby pump. The plant computer has an alarm for any attempt to

simultaneously rack two charging pumps on the same ESF bus. This alarm feature functioned during the above event. This inspector identified no further concerns.

- (2) The reactor was manually shutdown from full power and the turbine taken off line at about 5:10 a.m., on October 27, 1986, due to an unisolable feedwater leak. A 3/4" vent line on the C Loop feedwater control valve bypass line was leaking at the sockolet weld. The leak appeared to be originating from multiple pinholes approximately 100 degrees circumferential. During this outage, the licensee plans on doing maintenance on both the A and C feed reg valves.

c. Plant Security/Physical Protection

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

- Protected area barriers were not degraded;
- Isolation zones were clear;
- Persons and packages were checked prior to allowing entry into the Protected Area;
- Vehicles were properly searched and vehicle access to the Protected Area was in accordance with approved procedures;
- Security access controls to Vital Areas were being maintained and that persons in Vital Areas were properly 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 lighting was maintained.

Contractor security organizations changed hands at Unit 1 on October 15, 1986. Burns International was replaced by Security Bureau Incorporated, an organization that provided industrial security services for the Unit 2 construction project. The inspectors and Region-based specialists (see NRC Inspection Report 334/86-25) monitored the transition. No problems occurred and full security services were maintained.

d. Radiation Controls

Radiation controls, including posting of radiation areas, the conditions of step-off pads, disposal of protective clothing, completion of Radiation Work Permits, compliance with the conditions of the Radiation Work Permits, personnel monitoring devices being worn, cleanliness of work

areas, radiation control job coverage, area monitor operability (portable and permanent), area monitor calibration and personnel frisking procedures were observed on a sampling basis.

No discrepancies were identified.

e. Plant Housekeeping and Fire Protection

Plant housekeeping conditions including general cleanliness conditions and control of material to prevent fire hazards were observed in various areas during plant tours. Maintenance of fire barriers, fire barrier penetrations, and verification of posted fire watches in these areas were also observed.

No discrepancies were identified.

5. Surveillance Testing

To ascertain that surveillance of safety-related systems or components is being conducted in accordance with license requirements, the inspector observed portions of selected tests to verify that:

- (1) The surveillance test procedure conforms to technical specification requirements.
- (2) Required administrative approvals and tagouts are obtained before initiating the test.
- (3) Testing is being accomplished by qualified personnel in accordance with an approved test procedure.
- (4) Required test instrumentation is calibrated.
- (5) LCOs are met.
- (6) The test data are accurate and complete. Selected test result data was independently reviewed to verify accuracy.
- (7) The test provides for independent verification of system restoration.
- (8) Test results meet technical specification requirements and test discrepancies are rectified.
- (9) The surveillance test was completed at the required frequency.
- (10) Portions of the following test were observed:

MSP 1.04A, Reactor Trip Breaker A Test, October 6, 1986.

MSP 1.04, SSPS Train A Test, October 3, 1986.

OST 1.36.1, No. 1 Emergency Diesel Generator Test, October 1, 1986.

6. Diesel Generator Room Fresh Air Intake Dampers

These dampers are the outdoor air intakes for each diesel generator room providing not only fresh air for normal ventilation but also combustion air for each diesel engine. Each outdoor air intake consists of two (2), motor-operated, 6-blade dampers designated VS-D-22-2A and 2B for Diesel Generator Room No. 1 and VS-D-22-2C and 2D for Diesel Generator Room No. 2. Also, each diesel generator room contains a ceiling mounted exhaust fan for normal ventilation requirements. The dual outdoor air intake dampers will be opened automatically upon starting either the respective exhaust fan or diesel engine.

During a daily site tour, the inspector noticed that the operation of both diesel generator room fresh air intake dampers appeared to be sluggish in that the dampers took approximately 2 minutes to fully open or close. Subsequently, the inspector reviewed the FSAR and noted that Section 8.5.2.1, Emergency Diesel Generators, included a statement that the operation of the outdoor air intake dampers is verified during periodic starting of the diesel engines to ensure that they will operate properly. The inspector reviewed OSTs 1.36.1, 1.36.2, 1.36.3, and 1.36.4, which test diesel generator operability and noted that none of these OSTs included steps to verify the operation of the outdoor air intake dampers. A subsequent physical inspection of the dampers evidenced a condition where VS-D-22-2C was inoperable due to a sheared pin on the damper blade attached to the motor operator. The inspector brought these matters to the attention of the Operations Supervisor.

The licensee established a continuous fire watch in the Diesel Generator Room No. 2 until VS-D-22-2C was repaired since the effectiveness of the CO₂ system per Tech Spec 3.7.14.3 was questionable with VS-D-22-2C partially open and inoperable. It should be noted that combustion air to the diesel engine was still available since VS-D-22-2D was operable. Damper VS-D-22-2C was repaired and retested satisfactorily on October 21, 1986. However, surveillance procedures had not yet been revised to verify proper operation of these dampers. This item will be Unresolved Item (86-24-01).

7. Auxiliary River Water System

Technical Specification 3.7.13.1 requires that at least one auxiliary river water subsystem be operable when the plant is operating in Modes 1 thru 4. If both subsystems are out-of-service, seven days is allowed for corrective action, after which plant shutdown is required. The basis for this TS is to ensure that no single event could render all the river water pumps, located in the station's intake structure, inoperable. This system will be shared between both units.

On October 17, 1986, during performance of the monthly surveillance test (OST 1.30.1B) on the B auxiliary river water pump (WR-P-1B), an operator observed steam issuing from the seal water package. The pump was shut down and seal package temperature was measured, indicating 235 °F. The preferred filtered water supply to both pumps had been out of service due to a line break under the Primary Access Facility on the Unit 2 site. Investigations found that silt from the raw river water supplied from the pump discharge, had plugged the seal line. The line was cleared and the surveillance test satisfactorily rerun.

Discussions with Operations personnel indicated that the seal line plugging problem was recurrent. The root cause appears to be silt accumulation in the pump bays. When the monthly test run is performed, the accumulated silt is stirred up for a short time period. To address this issue, the station is: (1) installing a self-cleaning filter in the seal line, and (2) repairing the filtered water line. In the interim, a temporary hose has been installed around the failed filter water line.

During excavation of the failed filter water line, an unusual amount of water accumulated in the trench. The Unit 1 and Unit 2 auxiliary river water headers run in the immediate area. To verify that the Unit 1 line was not cracked, the licensee attempted to perform a hydrostatic test. The header was to be blanked off at a flange connection located in a valve pit according to plant flow diagrams. However, no flange connection was found. An Engineering Memorandum was issued to correct the diagram error. The licensee subsequently verified that the header was intact by injecting a dye into the line. It now appears that ground water seepage was responsible for filling up the trench.

An interim repair to the filter water line has been accomplished by installing fittings at both pipe ends and connecting a fire hose as a temporary jumper. Discussions with the Plant Manager indicated that the Jumper and Lifted Lead reviews would be performed and periodic surveillances conducted to ensure the integrity of the hose. Review of the final fix to the filter water system will be tracked as Unresolved Item (86-24-02).

8. Inspection of General Electric Type AK-F-2-25 Breakers

Another facility experienced several occurrences in which General Electric Type AK-F-2-25 breakers failed to open upon demand. In each case, mechanical binding, prevented the breaker from tripping and ultimately caused the breaker's normal shunt trip coil to burn up. Through discussions with the Station's Electrical Maintenance Supervisor and review of installed plant equipment, the inspector determined that this type breaker is used in the DC control system for the various safety-related battery banks.

A review of preventive maintenance procedures indicated that the battery air circuit breakers were inspected on a 12-month frequency. Each of the six breakers in question was last inspected in June, 1986. The inspector reviewed the PMPs (1-39DC-BKR-1E), which had each breaker disassembled, cleaned, lubricated and measurements made of the contact resistance, trip shaft torque,

contact wipe tolerances and insulation resistance. Data for each of the six breakers indicated that no problem existed. These breakers are normally used for maintenance isolation purposes and no ESF function would require their opening. The inspector identified no concerns.

9. Inoffice Review of Licensee Event Reports (LERs)

The inspector reviewed LERs submitted to the NRC:RI office to verify that the details of the event were clearly reported, including the 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:

LER 86-12, Inadvertent Reactor Trip Due to Personnel Error.

LER 86-12 is discussed in detail 4.b.1 of Inspection Report 334/86-20. Final inspection is contained in detail 3 of this inspection report as followup to Unresolved Item 86-20-01.

10. Exit Interview

Meetings were held with senior facility management periodically during the course of this inspection to discuss the inspection scope and findings. A summary of inspection findings was further discussed with the licensee at the conclusion of the report period.