

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION I

Report No. 50-334/79-30

Docket No. 50-334

License No. DPR-66 Priority -- Category C

Licensee: Duquesne Light Company

435 Sixth Avenue

Pittsburgh, Pennsylvania 15219

Facility Name: Beaver Valley Power Station, Unit 1

Inspection At: Shippingport, Pennsylvania

Inspection Conducted: November 27-December 8, 1979

Inspectors: *D. A. Beckman*
D. A. Beckman, Resident Reactor Inspector

1/08/80
date

date

date

Approved by: *E. C. McCabe, Jr.*
E. C. McCabe, Jr., Chief, Reactor Projects
Section No. 2, RO&NS Branch

1/8/80
date

Inspection Summary:

Inspection on November 27 to December 8, 1979 (Special Report No. 50-334/79-30)

Area Inspected: Special inspection to investigate the circumstances surrounding the November 27, 1979 event involving isolation of the High Head Safety Injection Pump suction from the refueling water storage tank. The inspection involved 22.5 hours by the resident inspector.

Results: One item of noncompliance (Violation - both independent ECCS subsystems inoperable).

DETAILS

1. Persons Contacted

R. Campbell, Nuclear Control Operator
D. Crouch, Shift Supervisor
K. Grada, Shift Supervisor
A. Hartner, Shift Operating Foreman
E. Kurtz, Senior Quality Assurance Engineer
L. Schad, Operations Supervisor
J. Swartzwelder, Nuclear Control Operator
J. Vassello, Training Coordinator
J. Werling, Station Superintendent
H. Williams, Chief Engineer

2. High Head Safety Injection Suction Flow Path Inoperable

On November 27, 1979, from approximately 8:30 a.m. to 10:30 a.m. maintenance activities rendered both Emergency Core Cooling System (ECCS) subsystems inoperable in that, (a) refueling water storage tank isolation valve MOV-CH-115D was removed from service for corrective maintenance and was incapable of automatic opening in response to a safety injection signal, and (b) refueling water storage tank isolation valve MOV-CH-115B, in the redundant subsystem, was closed, had no emergency power available, and thus was incapable of automatic opening in response to a safety injection signal if there had been a condition of loss of offsite power.

During this time the facility was in operation at approximately 30% of rated power. This matter is the subject of a "Notice of Violation and Proposed Imposition Of Civil Penalty" and an "Order Modifying License" which were issued to the facility by the Director, OIE, on December 5, 1979.

During the period of November 27, thru December 8, 1979 the Resident Inspector performed a review of the circumstances surrounding this event.

a. Background Information

Valves MOV-CH-115B and MOV-CH-115D are redundant parallel valves which are normally shut to isolate the refueling water storage tank (RWST) from the suction of the charging pump when the pumps are operated in the normal chemical and volume control system mode. These valves are designed to open automatically on a safety injection initiation signal thereby aligning the RWST to the suction of the charging pumps for operation in the high head safety injection (HHSI) mode. MOV-CH-115B is powered from MCC1-E3 and is supplied by No. 1 emergency diesel generator (EDG)

during the loss of offsite power; MOV-CH-115D is similarly powered from MCC1-E4 via No. 2 EDG during the loss of offsite power. During the recirculation phase of a loss of coolant accident, these valves are required to be remotely closed by the operator to isolate the RWST from the HHSI pump's suction lines. During this phase of post accident operation the HHSI pumps are provided a suction source from the containment sump via the low head safety injection pumps.

b. Discussion of Event

At about 6:40 a.m. on November 27, 1979, the number one emergency diesel generator was removed from service for performance of preventive maintenance procedure No. 1-36SS-1E9-1E, number one auxiliary diesel generator breaker inspection. Number two emergency diesel generator had been run to verify its operability prior to removing number one EDG from service. Equipment clearance number 423248 was approved by the 000-0800 Shift Supervisor to accomplish the number one diesel generator maintenance. This action removed the source of emergency power for MOV-CH-115B from service rendering the valve inoperable in accordance with Technical Specifications 1.6 and 3.5.2.

As a result of performing Operating Surveillance Test number 1.11.7, ECCS Flow Path Verification on November 25, 1979, the licensee had determined that a MOV-CH-115D would open normally but would not consistently shut when operated from the main control board. Maintenance work request No. 92044 was written on November 25, to initiate repair of the valve. Review of valve operability during the period November 25-28, 1979 is further discussed in report 50-334/79-24.

At 8:30 a.m. on November 27, the 0800 to 1600 Shift Supervisor approved equipment clearance number 423250 authorizing valve MOV-CH-115D to be removed from service for repairs in accordance with the maintenance work request. Switching Order No. 205818 was issued for the placement of the safety tags and the de-energization of the valve operator. The switching order was checked by the NRC Licensed Nuclear Control Operator and was authorized by the NRC Licensed Shift Operating Foreman. The performance of the licensed personnel involved is further discussed in Paragraph c below. The safety tags were posted on the valve main control board hand switch and line starter at approximately 8:50 a.m.

At approximately 10:15 a.m. the nuclear control operator and a second licensed individual were reviewing plant status with respect to the several safety related equipment clearances which were in effect and identified the inoperability of the RWST-HHSI suction flow path.

The matter was immediately reported to the Shift Supervisor who directed that MOV-CH-115D be opened and de-energized to insure the availability of a HHSI flow path while the number 1 EDG remained out of service. The valve was placed in this condition at 10:29 a.m. and facility

management was notified of the occurrence. Number 1 EDG was returned to service at about 1:20 p.m. Following initial facility management review of the occurrence, the Station Superintendent informed the Resident Inspector of the circumstances at about 3:45 p.m. on November 27.

Operation of the facility with both ECCS HHSI subsystems inoperable is contrary to Technical Specification (TS) 3.5.2 and is considered to constitute an item of noncompliance as discussed in the NRC letter of December 5, 1979 described previously.

c. Review of Apparent Cause and Licensed Operator Performance

References:

- (1) Beaver Valley Power Station Operating Manual, Section 1.48.6, Clearance Procedures, Revision 9;
- (2) Beaver Valley Power Station Operating Manual, Section 1.48.7, Coordination Procedures, Revision 7, including Operating Manual Change Notice No. 79-137 dated October 8, 1979;
- (3) Special Operating Order No. 79-2, Clearance Procedure, Issued April 25, 1979; and,
- (4) Beaver Valley Power Station FSAR, Section 12.2.2, Licensed Operator Retraining.

The apparent cause of this event is operator error with administrative work load providing a contribution to its occurrence. The operator's failure to recognize and prevent the circumstances which led to the inoperability of both ECCS subsystems, coincident with a loss of off-site power, constitutes a violation level item of noncompliance (50-334/79-30-01). This item is discussed in the paragraph that follow.

The inspector reviewed this event with respect to implementation of the references above, the performance and training of the individuals involved, and the apparent contribution of work load to the occurrence. As part of this effort the inspector interviewed involved personnel and reviewed the following documents:

- Equipment Clearance No. 423248, No. 1 EDG Breaker, 1-E9, issued November 27, 1979;
- Switching Order No. 205817, No. 1 EDG Breaker, 1-E9, issued November 27, 1979;
- Equipment Clearance No. 423250, MOV-CH-115D, issued November 27, 1979

- Switching Order No. 205818, MOV-CH-115D, issued November 27, 1979
- Maintenance Work Request No. 92044, troubleshoot and repair MOV-CH-115D, issued November 25, 1979
- Shift Supervisor's Operating Reports Nos. 5-1-1, 5-1-2, 5-1-3 Log for November 27, 1979
- Nuclear Control Operator Log Nos. 5-1-4, 5-1-5, 5-1-6 for November 27, 1979
- Shift Operating Foreman Log for November 27, 1979
- Clearance Operator Log for November 27, 1979

Reference (1) provides procedures for issuance of safety tags and isolation of equipment for personnel and equipment safety during maintenance activities. The inspector identified no items of noncompliance with respect to the implementation of this procedure for the equipment clearances listed above.

The inspector noted that the Equipment Clearance and Switching Order forms reviewed had been processed with certain nonessential information such as personnel titles and dates omitted. This matter was brought to the attention of the Station Operating Supervisor on December 6, 1979, for further corrective action.

Reference (2) provides procedures for the coordination of maintenance activities with plant operation, and identifies the methods for release of station equipment for maintenance. Reference (2) also requires that a visual verification of redundant engineered safety feature (ESF) subsystem alignment and operability be performed by the operators before releasing ESF equipment for maintenance. Reference (3) defines the responsibilities of the Shift Supervisor, Shift Operating Foreman and Nuclear Control Operator with respect to their approval/review signatures on equipment clearance and switching order forms. Collectively, references (2) and (3) stipulate that the operators must at least visually verify that redundant ESF systems are available prior to maintenance release and that signatures of the above noted parties signify that removal of ESF equipment from service will not violate applicable Technical Specifications limiting conditions of operation (LCO).

Inspector interviews with on-shift personnel including the Shift Supervisor and Nuclear Control Operator (NCO) established that the visual verification of reference (2) had been accomplished and the significance of checks were understood. These interviews indicated

that the operators apparently did not recognize the significance of the number one EDG inoperability with regard to the operability of MOV-CH-115B for loss of offsite power conditions. Reference (2) does not specifically require (or guide the operator toward) verification of indirect contributors to operability such as emergency power supplies, but provides for only a check of first level indications of operability. Reference (2) does require that the accomplishment of such visual checks be documented on the applicable maintenance procedure form, Maintenance Work Requests, or Clearance forms. The inspector was unable to locate the documentation of performance of the visual check. The interviews established that the Equipment Clearance and Switching Order issued to remove the MOV-CH-115D from service were processed without the signature parties fully recognizing the significance of the activity.

Discussions with the Shift Supervisor on November 27-28 and on December 3-7, 1979, indicate that several other activities were in progress during the preparation and review of the above documents and which appeared to have contributed to the errors made. Up to and including the date of the event the Shift Supervisor was responsible for granting the site access security authorizations via telephone to visitors and vehicles prior to the morning arrival of the Plant Superintendent or Office Manager (who are the other parties authorized to grant site access). On November 27, the Shift Supervisor was unusually busy with these telephone communications in that unusually large numbers of personnel were arriving onsite in preparation for the refueling outage which started on November 30. Additionally during this time the Shift Supervisor was preparing a plant status summary for the routine morning planning meeting scheduled for 8:30 a.m., and was briefing his management regarding plant activities. These additional activities appeared to have contributed to the Shift Supervisor's failing to adequately review the MOV-CH-115D equipment clearance and thereby recognize its significance prior to approving it.

Between 8:30 and 8:50 a.m. on November 27, the Shift Operating Foreman (SOF) and the Nuclear Control Operator checked and approved the switching order for MOV-CH-115D. During this time period the plant sustained a high steam generator level which, if uncorrected, would have resulted in a reactor trip. The steam generator level transient was apparently induced by a feedwater control system perturbation caused by in progress instrument maintenance. Discussion with the involved personnel indicates that this transient may have contributed to the oversight by the NCO and SOR in that it significantly diverted their attention from processing the switching order.

During the 8:30 a.m. to 8:50 a.m. period, the Shift Supervisor had left the control room to attend the morning planning meeting. During his absence, the SOF assumed the Shift Supervisor's duties, significantly adding to the SOF workload.

As part of the immediate corrective action for this event, the licensee has relieved the on duty Shift Supervisors of all duties associated with granting site access authorization. Although the Shift Supervisors will retain this authority for backshift and off-normal needs, routine processing of the authorizations will be performed by other offshift personnel. The inspector was informed that the decision to relieve the Shift Supervisors of these duties had been made by the Station Superintendent prior to the date of this incident but that implementation had not been effected by November 27, 1979. At the close of this inspection the licensee was considering the other actions necessary to prevent recurrence, had established a task force to coordinate these activities, and was considering disciplinary action for the licensed personnel involved. These matters will receive additional NRC review in conjunction with the licensee's response to the item of noncompliance and order to modify license forwarded to the licensee on December 5, 1979.

In conjunction with review of licensed operator performance, the inspector reviewed participation of the Shift Supervisor, Shift Operating Foreman, and Nuclear Control Operator in the Licensed Operator Requalification Program in accordance with reference (4). Discussions were held with the facility's training coordinator and the individuals records of participation were reviewed. The individuals appeared to be satisfactorily completing the requirements for the requalification program, are current with ongoing requirements for lecture attendance and self-study, and have each received supervisory evaluation indicating generally commendable performance. The records reviewed included:

- Results of the two most recent annual examinations;
- Documentation of lecture attendance and the results of post lecture examinations;
- Results of Supervisory evaluations pursuant to 10 CFR 55, Appendix A, Paragraph 4.c; and,
- Records of completed self-study/review assignments.

The inspector also confirmed that the individuals had received instruction during the previous requalification cycle in the area of administrative controls for the control of systems status, locking and tagging. The inspector was unable to confirm through documentation that specific discussion of the administrative procedure aspects involved in this event was conducted. Results of interviews with personnel indicate that classroom discussion occasionally included these subjects.

With regard to the individuals performance in the licensed operator requalification training program, no items of noncompliance were identified.

d. Review of Equipment Control Procedures

References (1), (2) and (3) cited in paragraph c were reviewed with respect to the requirements of Regulatory Guide 1.33, Quality Assurance Requirements (operation), 1972, and ANSI N18.7-1972, Administrative Controls for Nuclear Power Plants, Section 5.1.3, 5.1.4, and 5.1.5. The inspector identified no items of noncompliance with regard to this review. The inspector had the following comments on the subject procedures:

- The guidance to the operator in regard to control of plant status during implementation of equipment control procedures is fragmented among the several existing procedures. Although the procedures define the operator's responsibilities for insuring that plant status is maintained within the limits of TS LCO, no guidance is provided for the depth of reviews to be conducted to insure that the inconspicuous defects such as emergency power system unavailability is considered each time a safety related item is removed from service.
- Reference (2), describes the general considerations to be made prior to removing safety-related equipment from service, including the performance of a visual check of redundant instrumentation, valve, breakers, etc. This procedure does not specifically consider such effects as are discussed above. In the case of this event, the operators apparently completed the check as required by this procedure with no consideration or recognition of the condition of the redundant equipment's emergency power supply status.
- The referenced documents are located in a voluminous Operating Manual and do not appear to receive routine consultation by the operators in the performance of the equipment control activities. This is due in part to the simplicity of the procedures and the operators familiarity with them. The procedures do not appear to provide the specific guidance necessary nor the routine mechanism (checklist, etc.) to ensure that the implementing personnel consider all aspects of the activity.

3. Exit Interview

The comments detailed in this report were discussed with the Station Superintendent at an interview conducted on December 6, and December 14, 1979.