

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-334/90-03
50-412/90-03

Docket No. 5 -334/50-412

License No. P-66/NPF-73

Licensee: Duquesne Light Company
Post Office Box 4
Shippingport, PA 15077

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

Inspection At: Shippingport, PA.

Inspection Conducted: January 22 to January 26, 1990

Inspector: C. J. Anderson for 2/28/90
A. L. Della Greca, Reactor Engineer, PSS, EB date

Approved by: C. J. Anderson 2/28/90
C. J. Anderson, Chief, Plant Systems Section date

Inspection Summary: Inspection on January 22-26, 1990 (Inspection
Report Nos. 50-334/90-03 & 50-412/90-03

Areas Inspected: Announced inspection by region personnel to review the status of two previously identified open items and to determine the adequacy of the licensee's corrective actions.

Results: The inspector determined that the licensee adequately addressed the previous open item regarding inadvertent safety injection actuation signals. Corrective actions concerning the problems experienced with aluminum cables (Unresolved Item Nos. 50-334/88-23-01) are inadequate and require further management attention. Therefore, they will be reviewed during a future NRC inspection.

No new violations were identified during this inspection.

DETAILS

1.0 Persons Contacted

1.1 Duquesne Light Company

	D. F. Butor	Maintenance Supervisor, Unit 2
	J. J. Giocondi	Quality Control Coordinator
	C. R. Haney	Training Supervisor
*	S. M. Hovaneck	Senior Engineer
*	W. S. Lacey	General Manager-Nuclear Operations Svcs.
*	F. J. Lipchick	Senior Licensing Supervisor
*	T. P. Noonan	General Manager Nuclear Operations
	K. Ostrowski	Operations Assessments Manager
*	M. Pavlick	Director Q. S. Audits/Surveillance
	C. D. Schmitt	Engineering Supervisor
*	B. Sepelate	Licensing Engineer
	T. A. Slavic	Supervising Engineer - I&C
*	R. J. Snowden	Quality Control Coordinator
	D. Szuck	Senior Licensing Engineer
	D. J. Wright	Quality Control Inspector

1.2 U.S. Nuclear Regulatory Commission

* P. R. Wilson Senior Resident Inspector

* Denotes personnel present at the exit meeting of January 26, 1990.

2.0 Purpose

The purpose of the inspection was to review the status of previously identified items and to determine the adequacy of the licensee's corrective actions in resolving each issue.

3.0 Status of Previously Identified Items

3.1 (Closed) Unresolved Item No. 50-412/87-47-01 pertaining to the inadvertent Safety Injection (SI) actuation signals.

In June 1987, during the performance of preoperational test No. PO-2.21A.03 (Main Steam Isolation and Bypass Isolation Valve Operability Test), a low pressurizer pressure SI actuation signal was inadvertently generated. The actuation signal caused the automatic start of diesel generator No. 2 and the cycling of containment isolation valves, Phase A, to their appropriate ESF position. However, no water injection into the reactor coolant system resulted, since the control switches for the SI pumps were, at the time, in the Pull-To-Lock position. A similar

occurrence was experienced later while returning train B of the solid state protection system (SSPS) to its "Normal" position after preoperational testing at the emergency shutdown panel.

Evaluation of the occurrences by the licensee revealed that the switches in question use break-before-make contacts. Therefore, rotation of the control switch from one position to another, as in the case of the preoperational tests conducted, can and did result in an automatic reset of the SI block/reset signal. The licensee also determined that the circuitry operated according to current design requirements. In order to avoid unnecessary SI actuation signals, the licensee committed to further evaluate the circuits involved and to revise them, if required. In addition, the licensee committed to review all circuits and evaluate the effects of their deenergization while transferring the plant's control from the main control board to the alternate and emergency shutdown panels and viceversa.

The licensee's further evaluation determined that, in general, all systems which include solenoid and air operated valves are subject to temporary misalignment during the control transfer operation. This evaluation also showed that the only circuits with potentially significant actuations are those involving the steam admission valves (2MSS*SOV105A through F) to the steam driven feedwater pumps. However, the licensee considered it inappropriate to modify any of the circuits involved, since the transfer of controls to a new panel could also result in the transfer of faults if make-before-break contacts are used. Therefore, the licensee addressed the problem administratively. For this purpose, the licensee revised the applicable portions of procedure No. AOP-2.33.1 to include appropriate caution statements.

The inspector had no further questions regarding this issue. This item is closed.

3.2 (Open) Unresolved Items No. 50-334/88-23-01 regarding the use of aluminum cables in Class IE circuits.

On August 17, 1988, the licensee responded to several alarms involving exhaust fan VS-F-4A. An inspection of the equipment revealed that the alarms were the result of burning of the motor/cable terminations. The licensee's corrective actions included the replacement of 30 to 40 feet of aluminum cable with equivalent copper cable. Two weeks after the event, during a preventive maintenance inspection, the licensee discovered that the terminations of the redundant fan, VS-F-4B, also were damaged by galvanic corrosion resulting from the use of copper terminals with aluminum cables. In this case, the licensee replaced the copper connectors with aluminum ones. The corrective actions for both fans were regarded to be interim measures while the licensee

completed review of the issue and considered an alternate resolution. Because of a generic concern regarding appropriateness of use, installation and maintenance of aluminum cables with Class IE equipment of both units, the licensee was requested to address the issue formally, in writing.

In a letter dated November 9, 1988, the licensee responded that: (1) with proper terminating procedures, aluminum cables pose no safety or unreliability concerns and are acceptable for continued use at the Beaver Valley Station; (2) the original installation specifications do include adequate instructions for handling and installing aluminum cables; (3) an infrared inspection sample of all Unit 1, train A aluminum wire connections (except for those smaller than #1 wire) at power source and at equipment terminations had uncovered no problems; (4) infrared inspection of Unit 1, train B aluminum cables was scheduled to be completed by the end of 1989 (yet to be performed at the time of this inspection); (5) infrared inspection of Unit 2 aluminum cables was scheduled for January 1992; (6) preventive maintenance procedures for Unit 1 and 2 would be revised to include visual inspection of motor lead box and power source connections for warning signs of cable connection breakdown.

Although the licensee's program adequately addresses the NRC concerns regarding the use of aluminum cables in Class IE applications, it lacks a root cause analysis of the August 1988 events. This analysis is important since redundant equipment was affected by a common cause. In addition, during this review, the inspector determined that fan VS-F-4B was involved in a similar occurrence in October 1982, as described in maintenance Work Request No. 822521. This document states that the motor connections were burned, the lugs were replaced, and that approximately 30" of burned insulation had to be removed.

The inspector agrees with the licensee's statement that, if proper terminating procedure are used, aluminum cables pose no safety or unreliability concern. However, the licensee did not establish that the original installation specifications (BVS-417, BVS-30000 and 2BVS-931) were used in all cases. Each of these specifications clearly requires the use of Burndy type YA-A compression lugs. Yet, drawing 8700-RE-28B (Termination and Splicing Details for 600V and Below) failed to identify this requirement. Instead, it listed only YA lugs for copper cables. This drawing is invoked in Plant Installation Process Standard for Electrical Terminations (PIPS E13.3, dated 2/23/89), in Inspection Procedure for Cable Testing and Termination (IP No. E-04, Rev. 2, dated 3/26/87, and in Corrective Maintenance Procedure (No. 1/2-75-600V MOTOR-TERM-2E), which currently has a draft status. Nonetheless, proper terminals were used to correct the corrosion problems of fan VS-F-4B, as determined from EM No. 63927 (MWR No. 883269). The licensee apparently recognized the existence of problems with maintenance procedures since, in its 12/1/88 response to the above

memorandum, it stated: "To prevent a reoccurrence of incorrect terminating hardware on aluminum cables, Maintenance procedures for cable terminations should be reviewed to ensure that only lugs approved for aluminum wire are used, should lug replacements be necessary." Drawing No. 8700-RE-28B, Rev. 6, is dated 4/27/89.

In view of the above, the aluminum cables issue can only be closed after the licensee has performed an adequate root cause analysis addressing all failures and maintenance work requests which involved galvanic corrosion of copper/aluminum terminations. As described in Paragraph 16 of specifications BVS-417 and BVS-3000, "aluminum oxide...forms on each strand almost instantly upon contact with air." Adequacy of corrective actions, including the infrared inspection and the routine preventive maintenance proposed by the licensee, can only be evaluated on the basis of such analysis. Regarding infrared inspection, the licensee should address its effectiveness in determining the current status of the terminations and justify the exclusion of smaller cables (less than #1 AWG) from this inspection.

4.0 Plant Walkdown

A plant walkdown was performed to determine the status of typical terminations involving aluminum cables. For this purpose the inspector reviewed cable terminations at one load center section (2C5-SA-C-1B), at one motor control center incoming section (2C3-MCC-1-5), and at one motor (SA-C-1B). The tape at the motor's phase A termination was also removed. All terminations inspected were found to be in good condition and to use Burndy lugs type YA-A for aluminum cables.

5.0 Unresolved Items

Unresolved Items are matters about which additional information is necessary in order to determine whether they are acceptable or they constitute a violation. One unresolved item is discussed in details under Section 3.2.

6.0 Exit Meeting

At the conclusion of the inspection, on January 26, 1990, the inspector met with the licensee's personnel denoted in Section 1.0 of this report. At that time, the scope of the inspection and the inspection results were summarized. At no time, during the inspection, was written material given to the licensee.