

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

Region I

Report No. 50-334/78-33

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 and Pittsburgh, Pennsylvania

Inspection conducted: November 14-17, 1978

Inspectors: William J. Raymond  
W. J. Raymond, Reactor Inspector

12/11/78  
date signed

D. A. Beckman  
D. A. Beckman, Reactor Inspector

12/11/78  
date signed

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Approved by: R. R. Keinig  
R. R. Keinig, Chief, Reactor Projects  
Section No. 1, RO&NS Branch

12-11-78  
date signed

Inspection Summary:

Inspection on November 14-17, 1978 (Report No. 50-334/78-33)

Areas Inspected: Routine, unannounced inspection by a regional based inspector of plant operations, including: logs, records, and plant status; in office review of licensee event reports (LERs); observation of a guard training drill; onsite LER followup; followup of licensee actions on IE circulars; status of previous outstanding items; and, followup on previous outage items, including qualification of stem mounted switches, RCP underfrequency trips, diesel generator field flash failure, out of synchronization relay operation, and SI system piping supports. The inspection involved 67 inspector-hours on site by two NRC regional based inspectors.

Results: No items of noncompliance were identified.

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## DETAILS

### 1. Persons Contacted

- \*Mr. G. Beatty, QA Engineer
- Mr. J. Carey, Technical Assistant - Nuclear
- Mr. D. Crouch, Shift Supervisor
- \*Mr. W. Glidden, QA Engineer
- Mr. K. Grada, Shift Supervisor
- Mr. M. Haddad, Engineer
- \*Mr. J. Hrivnak, Station QA
- \*Mr. E. Kurtz, Senior QA Engineer
- Mr. S. Lacey, Shift Supervisor
- \*Mr. F. Lipchick, Station QA
- Mr. J. Maidl, Mechanical Engineer
- Sgt. R. McClure, Guard Sergeant
- Mr. R. McMichael, Engineer
- \*Mr. L. Schad, Operations Supervisor
- Mr. T. Slavic, Maintenance Engineer
- Mr. J. Turner, Shift Supervisor
- \*Mr. J. Wenkhous, Reactor Control Chemist
- \*Mr. H. Williams, Chief Engineer
- \*Mr. R. Woodling, Senior Engineer

The inspectors also interviewed other licensee representatives during the inspection, including members of the operations, maintenance, guard, stores, and general office staff.

\* denotes those present at the exit interview.

### 2. Licensee Action on Previous Inspection Findings

(Open) Unresolved Item (334/77-20-07): Snubber Technical Specifications. NRC Region I Inspection Report No. 50-334/78-13 documents the licensee's commitment to revise the existing snubber Technical Specifications to provide a complete list of plant system snubbers that are a part of the periodic inspection program requirements. The original target date for submittal of a Technical Specification Change Request (TSCR) was November 1978. Due to delays attributable to the current outage, the licensee has postponed submittal of the TSCR until January 31, 1979. The inspector had no further comments

on this item at this time. The inspector noted that several other, interrelated snubber items were still outstanding and were being actively pursued by the licensee. The inspector suggested that the licensee coordinate his efforts on these items (77-18-06, 77-20-11, 77-30-02, 77-30-04, 78-13-02, 78-13-03, 78-13-04) to provide for a timely resolution. The licensee noted the inspector's comments. This item remains unresolved pending completion of the licensee's actions in this area.

(Open) Unresolved Item (334/78-24-01): No. 2 Diesel Generator Field Flash Failure. Corrective actions planned and/or taken to date by the licensee in regard to the failure of the No. 2 Diesel Generator to flash a field on July 28, 1978, were reviewed and found to be acceptable. These actions are described in detail paragraph 7 of this report. In that certain actions remain to be completed prior to plant startup from the current outage, this item remains unresolved pending subsequent review by the NRC.

(Open) Inspector Followup Item (334/78-24-03): Out of Sequence Relay Operation. Licensee actions and plans in this area to date were reviewed and found acceptable, as detailed in paragraph 7 of this report. This item remains open pending further NRC:RI review of changes in the out of sequence relay operation.

(Closed) Inspector Followup Item (334/78-24-04): RCP Underfrequency Relay Trips. The inspector reviewed licensee data which showed that an actual underfrequency condition existed on the 4160V buses at the time of the main transformer failure. This condition resulted in proper operation of the reactor coolant pump (RCP) underfrequency relays and a subsequent trip. Additional details are provided in paragraph 7 of this report. The inspector had no further comments on this item.

(Closed) Unresolved Item (334/78-23-03): Qualified Stem Mounted Limit Switches (SMLS). The licensee's corrective actions to replace NAMCO Model 2400 SMLS were reviewed and found acceptable, in regard to switches that provided a "latch-in" capability as part of the valve control circuitry. Additional details are found in paragraph 7 of this report.

(Open) Unresolved Item (334/78-30-01): Errors in SI System Pipe Support Analysis. Discussions with licensee personnel indicated that subsequent review by the licensee's A/E has shown that no pipe support inadequacies exist and thus, the original report to the NRC (LER 78-53) was in error. However, additional details were not available for further discussion during this inspection. The inspector stated that clarifying information and resolution of the SI system piping/structural integrity must be presented for NRC:RI review prior to plant startup from the current outage. The licensee acknowledged the inspector's remark and stated that a detailed explanation of the circumstances of this event as previously reported would be documented in a letter to NRC:Region I by December 1, 1978. This item remains unresolved pending subsequent review of the licensee's actions in this area.

### 3. Review of Plant Operations

#### a. Shift Logs and Operating Records

The following logs and records were reviewed for the periods indicated.

- G1-1, S1-1 to S1-9, L1-1 to L1-5, and L5-13 and -14 for the period of October 16 to November 5, 1978.
- Temporary Operating Procedures 78-35 through 78-48 covering the period from September 20, 1978, to November 10, 1978.
- Jumper and Bypass log entries for the period from August 4, 1978 (#2021), to November 15, 1978 (#2074).
- Clearance log for the period September 15, 1978, to November 15, 1978.
- Plant Incident Reports IRI 78-61 (April 26, 1978) through IRI 78-67 (May 31, 1978).

The logs and records were reviewed to verify that:

- log sheet entries are filled out and initialed;
- log entries involving abnormal conditions are sufficiently detailed;

- log book reviews are being conducted by the plant staff;
- operating orders and temporary procedures do not conflict with the Technical Specifications; and,
- jumper log entries do not conflict with the Technical Specifications.

Acceptance criteria for the above review included inspector judgement, the requirements of applicable Technical Specifications, and the following procedures:

- BVPS OM Chapter 48, Conduct of Operations;
- OM 1.48.3, Section H, Temporary Procedures;
- OM 1.48.5, Section D, Jumpers and Lifted Leads;
- OM 1.48.6, Clearance Procedures;
- OM 1.48.8, Records; and,
- OM 1.48.9, Rules of Practice.

No items of noncompliance were identified and, except as noted below, the inspectors had no further questions on facility records.

- (1) No discrepancies were identified with regard to the function of installed jumpers or lifted leads but the inspector noted a set of lifted lead log entries (Nos. 2038-41 and 2038-45) which appeared never to have been completed. Further investigation revealed that the lifted lead tags in question were issued for two maintenance items which did not require them (equipment tagged out and removed via MWR's and the licensee's normal clearance tagging procedures). While the lifted lead tags had been placed, they were redundant and unnecessary. This item was brought to the attention of the shift supervisor who initiated corrective action to have the tags removed and the log entries cleared.

- (2) During review of the various shift logs, the inspector noted that the log sheet specifications for maximum and minimum acceptable values of logged parameters were based on normal power operations. During the period for which the logs were reviewed, the plant had been maintained in a cold shutdown (Mode 5) condition. The logs reviewed indicated some confusion on the part of the operators as to what parameters were beyond their maximum or minimum limits for the existing plant conditions. This matter was discussed with the Operating Supervisor who stated that the matter would be reviewed to determine if the subject logs required revision. This item will be followed during future inspections.

b. Plant Tour

Inspection tours of the following plant areas were conducted at various times during this inspection: Auxiliary Building; Control Room; Switchgear Rooms; Safeguard and Auxiliary Feedwater Pump Areas; Cable Tunnels; and, Containment. The following determinations/observations were made.

- Control room and local monitoring instrumentation were reviewed to verify that instrumentation and systems required to support mode 5 operation were in conformance with Technical Specifications LCO requirements. This review included the radiation monitoring instrumentation, nuclear instrumentation, RWST, BAST, emergency boration system lineups, diesel generator lineup, offsite power system lineup, and residual heat removal system lineup.
- Radiation controls established by the licensee, including posting of radiation areas, the condition of step-off pads, and the disposal of protective clothing were observed. Several radiation work permits used for entry into radiation areas were reviewed.
- Plant housekeeping conditions including general cleanliness conditions and storage of materials to prevent fire hazards were observed.

- Systems and equipment in all areas toured were observed for the existence of fluid leaks and abnormal piping vibrations.
- Mechanical snubbers and hangers installed on the Quench Spray, Service Water, Recirculation Spray, Safety Injection, and Auxiliary Feedwater system piping were observed for proper settings and conditions.
- Selected system lineups on the Charging and Safety Injection Systems were observed for proper positioning. The following were reviewed: Supply Breakers for MOV-SI-867A-D; positions of CH-25, 26, 27, 28, 29; CH-7 and CH-9.
- The control board was reviewed for annunciators that normally should not be lighted during the existing plant conditions. The reasons for existing annunciators were described by a plant operator.
- The licensee's policy and practices regarding plant tours were reviewed and no changes from previous practices were noted.
- Control room manning was observed on several occasions during the inspection.

Acceptance criteria for the above items included inspector judgement, and the requirements of the Technical Specifications, 10 CFR 50.54(k), and the following procedures:

- BVPS Unit 1, Systems Valve Lists, and Markups;
- OM 1.48.5, Safety Related Systems Valves and Equipment;
- MM Chapter 1, Section J, Housekeeping;
- MM Chapter 1, Section H, Cleaning and Maintenance Cleaning; and,
- SAD-25, Housekeeping and Cleanliness Procedure.

Except as noted below, the inspector had no further comments in this area. No items of noncompliance were identified.

- (1) During the inspectors' tour on the 1600-2400 shift on November 16, 1978, the shift crew was filling and venting portions of the safety injection and charging system piping in preparation for a Type A Containment Integrated Leak Rate Test. During this fill evolution, water was inadvertently released to the Primary Auxiliary Building Pipe Tunnel Area (722' elevation) from the RWST via the piping being filled. The water, contained entirely within the PAB Controlled Area, contaminated the floor within the area to levels of approximately 150,000 pCi/100 cm<sup>2</sup>.

Upon further review by the inspector, it was determined that the fill evolutions were being conducted in accordance with various Type C Containment Penetration Test Procedures (OST 1.47 series). The spill was apparently caused by two vent and drain lines which had been properly opened and tagged for ongoing maintenance in a run of charging piping but were not known by the operators to be open. No procedural violations were identified. No personnel contamination occurred and no radioactivity was released to unrestricted areas. Decontamination operations for reduction of fixed contamination levels were continuing at the end of this inspection.

This matter was discussed with the Operating Supervisor who took action to caution shift crews to review fully the status of all systems and equipment for conflicting tagouts, etc., prior to commencing evolutions such as those described above. The inspector had no further questions on this matter.

- (2) During their tour of the Primary Auxiliary Building and adjacent areas, the inspectors noted several spaces in which general housekeeping conditions warranted additional attention by the licensee. These conditions, noted in the PAB 768' Level; Steam Generator Blowdown Tank Area; Main Steam and Feed Piping Penetration Area; and the PAB 752' Level, were identified to the licensee's housekeeping coordinator who initiated corrective action.

- (3) At approximately 2030 hours on November 16, 1978, the inspectors noted that the Volume Control Tank (VCT) Cubicle was posted as a high radiation area and that the door to the cubicle was closed but not locked. Confirmatory measurements were taken with a Cutie Pie survey instrument, Model No. 740-G, Serial No. 103, and indicated that radiation levels near the VCT were as follows:

- within six inches of the side of the tank  $\approx$  200 mr/hr;
- within eighteen inches of the bottom of the tank < 1000 mr/hr; and,
- within six inches of the bottom of the tank < 1200 mr/hr.

The above radiation levels were reviewed in regard to controls required by Technical Specification 6.12 and were further discussed with licensee management at the exit interview on November 17, 1978. No items of noncompliance were identified.

#### 4. In Office Review of Licensee Event Reports (LER's)

The inspector reviewed LER's received in the NRC:I office to verify that 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 involved, and whether the event warranted onsite followup. The following LER's were reviewed:

- \*-- LER 78-02/3L, No. 4 Inverter Failure and Inadvertent Safety Injection;
- \*-- LER 78-04/3L, Diesel Generator No. 2 Output Breaker Close Failure;
- \*-- LER 78-11/99, Inadvertent Safety Injection;

\* denotes those LERs chosen for onsite followup.

- \*-- LER 78-36/1T, Inoperable Charging Pumps During Power Operations;
- \*-- LER 78-37/1T, Both Diesel Generators Inoperable in Mode 5;
- \*-- LER 78-38/3L, Containment Sump Pump Coupling Failure;
- \*-- LER 78-40/99, Peak Shock Annunciator Alarm Inoperable;
- \*-- LER 78-42/3L, Intake Bay Silt Buildup; and,
- LER 78-56/3L, Technical Specification Surveillance Not Completed with VS 101 Inoperable.

#### 5. On Site Licensee Event Followup

For those LER's selected for onsite followup (denoted in paragraph 4), the inspector verified that reporting requirements of the Technical Specifications and Procedures SAD 14 and 23 had been met, that appropriate corrective action had been taken, that the event was reviewed by the licensee as required by the Technical Specifications and Procedure SAD 21, and that continued operation of the facility was conducted in accordance with Technical Specification limits. The following Incident Reports (IRI) were also reviewed: IRI 78-2, 78-4, 78-12, 78-57, 78-70, 78-66, and 78-68.

The inspector's findings regarding these licensee events were acceptable, unless otherwise noted below.

- a. LER 78-02 The inspector reviewed the causes, the plant response, and the licensee's corrective actions taken for the plant trip from full power and inadvertent safety injection on January 2, 1978. The inspector had no further comments on the RCS response during this transient. The inspector noted from a draft copy of IRI 78-2, that other significant information provided in the Incident Report was not contained in the LER. The B Main Steam Isolation Valve (MSIV), TV-MS-101B, closed during the safeguards actuation, was damaged and required subsequent repair. The inspector stated that an update to LER 78-02 should be submitted to describe the damage and repair to the B MSIV and to explain the sequence of events leading to closure of one of

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\* denotes those LERs chosen for onsite followup.

three MSIVs. The licensee acknowledged the inspector's comments and stated that an update report would be submitted by December 18, 1978. This item is unresolved pending completion of the licensee's actions in this area and subsequent review by the NRC:RI (50-334/78-33-01).

- b. LER 78-24 The following materials were reviewed with reference to licensee actions taken to correct silt buildup in the intake structure: meeting minutes for OSC-37-78, which documents the licensee's review of IEC 78-13; Incident Report IRI 78-78; OMCN 78-142 issued on July 21, 1978, for emergency procedure E-12, Dam Failure; and, A/E memorandum EM-103 dated September 27, 1978. The licensee identified the presence of silting conditions in the intake bays during a previous plant outage. Silt levels in the bays were reduced at that time. Procedure E-12 was revised to specify the operator actions required to preclude a loss of the river water pumps in the event of a downstream dam break. The licensee plans to implement a quarterly inspection program (using divers) of the intake bays to detect silt buildup. The OST to implement this program has yet to be written. Silt levels in the intake bays were inspected within the last month and were found low; the bays will be inspected again prior to the end of this year. The inspector stated that this item would be unresolved pending implementation of the licensee's surveillance program and subsequent review by the NRC:RI (50-334/78-33-02).

#### 6. IE Circular Followup

The IE Circulars listed below were reviewed on site.

- IEC 78-02, "Proper Lubricating Oil for Terry Turbines."
- IEC 78-04, "Installation Errors That Could Prevent Closing of Fire Doors."
- IEC 78-05, "Inadvertent Safety Injection During Cooldown."
- IEC 78-06, "Potential Common Mode Flooding of ECCS Equipment Rooms at BWR Facilities."

-- IEC 78-07, "Damaged Components on a Bergen-Patterson Series 25000 Hydraulic Test Stand"

\*-- IEC 78-13, "Inoperability of Multiple Service Water Pumps"

Licensee followup actions on the Circulars were reviewed to verify that:

- Circulars were formally reviewed for applicability by appropriate onsite management;
- Reviews were concluded within an appropriate time frame;
- Licensee responses to NRC, where appropriate, were accurate and supported by facility records and/or physical installation; and,
- Planned or completed corrective actions were appropriate to correct identified problems.

The review included discussions with licensee personnel and examination of plant systems and the following facility records:

- The minutes for OSC Meeting Nos. 25-78, 33-78, 36-78, and 37-78; and,
- Station Memoranda Nos. BVPS:LGS:21 (IEC 78-05); BVPS:LGS:24 (IEC 78-06); and, BVPS:JRB:61 (IEC 78-07).

\*Note: See Paragraph 5 of this report for additional discussion of this item.

No items of noncompliance were identified.

## 7. Outage Followup Items

The following areas were reviewed to determine the completion status of licensee evaluations, investigations, and/or corrective actions.

### a. Replacement of Stem Mounted Limit Switches

The inspector reviewed licensee records and a sampling of the work completed to replace nonqualified stem mounted limit switches on motor operated and air operated valves inside of containment, identified in Inspection Report No. 50-334/78-23, and the licensee's response to IEB 78-04. The following information was reviewed:

- Purchase Requisition 6648, dated April 4, 1978 for 80 switches; NAMCO EA180-11302 and EA 740-20000
- NAMCO Controls letter dated March 13, 1978 with specifications for EA 180 and EA 740 qualifications to IEEE-344-1975, IEEE-323-1974, and IEEE-382-1972
- Procurement Quality Documentation for PR 310726
- Maintenance Work Requests (MWRs) 786848-786850 and 787751-787781
- NSQC General Inspection Report dated October 10, 1978
- Test Plan, dated August 31, 1977, Qualification of Series EA 180 and EA740 switches for Class IE Use in Nuclear Power Plants In Compliance with IEEE Standard 382-1972
- Receipt Inspection Report No. 03649, September 30, 1978
- NSQC Receipt Inspection Form 310726, September 30, 1978
- NAMCO Certificates of Compliance for C007748 for 80 EA 180-11302 switches. lot no. 02352, and 8 EA 740-20000 switches, lot no. 04207, dated August 30, 1978

At the time of this inspection, work was still in progress to replace the SMLS in accordance with the above referenced MWRs. The inspector noted that after subsequent examination, the licensee found no limit switch on MOV-SI-890C. The inspector had no further comments on the licensee's plans to replace SMLS providing latch-in capability on safety related valves and unresolved item 50-344/78-23-03 is considered resolved.

The inspector questioned whether the licensee's review of this area had considered the use of nonqualified SMLS in air operated valves (AOVs) which provide position indication in the control room and which are important for monitoring post accident system status. The licensee stated that further review would be required to make the above determination. In a telephone conversation on November 11, 1978, the licensee stated that an evaluation would be completed by the end of the present outage (now scheduled for December 8, 1978) to determine whether SMLS are used in the referenced configuration and that action would be taken to either replace the existing switches with qualified ones, or justify, on a valve by valve basis, why continued operation with existing switches would be satisfactory. The inspector stated that this item was unresolved pending subsequent NRC review of the licensee's evaluation and actions (50-334/78-33-03).

b. RCP Underfrequency Relay Trip

The inspector interviewed licensee personnel, reviewed traces from the Station Sangamo 32 channel oscillograph (fault recorder) and reviewed EM 10167, dated October 30, 1978, to determine the findings in regard to the tripping of all three reactor coolant pumps (RCPs) on underfrequency coincident with the main transformer fault on July 28, 1978. The licensee has concluded that, between the inception of the fault and the completion of the 4160V bus fast transfer, the 4160V bus frequency fell below the 58.2 Hz relay setpoint for six cycles. Since the relays are set for a six cycle time delay, the resultant trip was the correct operation of the relays.

The 4160V bus underfrequency was caused by a reduction in generator frequency upon fault inception (purportedly attributable to the arcing ground fault causing a breaking effect on the generator) followed by a further reduction during the six cycle "dead time" of the fast transfer.

Prior to the start of the fast transfer, generator frequency fell to about 57.9 Hz. During the fast transfer dead time, the 4160V motors remained connected to their buses, acted like generators, and produced a terminal voltage at a frequency proportional to their speed. Since the speed of induction motors is always less than synchronous speed, the frequency produced by them during the six cycle dead time was less than the frequency of the original supply. Through this series of events, the 4160V bus frequency fell to about 57 Hz before reconnection to the alternate supply. The bus dead time was just over six cycles.

In that the RCP underfrequency relays operated properly during this event, no further corrective action is planned by the licensee. The inspector had no further questions on this item.

c. Out of Sequence Relay Operation

The inspector interviewed licensee personnel and reviewed generator protection elementary diagrams 11700-RE-21BG and 11700-RE-21BN to determine the status of licensee findings in regard to out-of-sequence relay protection.

The following represents the preliminary findings made by the licensee during the evaluations.

Out of step relays 21-101 and 21-1101 sense the main generator terminal voltage and current and are used to apply 250VDC via separate pairs, No. 1 and 2, to trip breakers OCB84, 88, and 97 and PCBs 334, 336, 355, 344, 346, and 366 using trip coils No. 1 and 2. The protection removes the 345KV switchyard from the DLC system, leaving only two small block loads off the 138KV switchyard. The original intent and design of this protection scheme was to isolate the BV and Shippingport switchyards with a small "island of load" during a major system upset (e.g., a NE blackout situation), to maintain generation within the "island of load" and allow for a rapid recovery of the distribution system. Inherent to this bus shedding scheme was the assumption that BV would remain online to supply its own house loads and the island loads.

During the sequence of events following fault inception in the main transformer, several main generator and transformer protection trips acted immediately to trip the generator and open the generator tie breakers (PCBs 331, 341) to the 345KV switchyard. The momentum of main generator and decaying field voltage produced generator neutral currents for approximately 6 minutes to feed the fault. Oscillograph recordings of voltages and currents show a fault involving A phase to B phase to ground with substantial arcing, as indicated by changes in both magnitude and phase angle of voltages and currents. It is postulated that the generator essentially became a high resistance grounded source to an arcing fault. It was during these conditions, 15 seconds after fault inception and after the BV unit had been separated from the system, that the out-of-synchronization relay (type SDB4-2) was "fooled" into considering that a legitimate trip condition existed, when, in fact, the relay was exposed to a pseudo swing condition due to the nature of the fault. The out-of-synchronization relay protection operated correctly to provide the isolation described above. However, this left the Shippingport Power Station as the only supply to carry its own station service, the BV station service and the small block loads, all of which are above the Shippingport load capabilities. The licensee has concluded that the bus shedding protection provided by the out-of-synchronization relays was improper in the situation where the BV generation capability is also lost.

The bus shedding scheme from the out-of-synchronization relays was a backup protection scheme and has been removed. Other protection trips (overall differential and main transformer sudden pressure) will still provide primary protection for

the main generator and transformer. The out-of-synchronization relays will still be used to provide backup generator protection, by providing trips to the main output breakers, the exciter field breakers and the unit station service transformer 4160V bus supply breakers.

The inspector had no further comments on the licensee's actions in this area at this time. However, this item will remain open pending subsequent review of the licensee's final evaluations and actions by NRC:RI.

d. Diesel Generator Field Flash Failures

After extensive investigations, the licensee has identified faulty components used in the diesel generator starting control circuitry. (Reference: drawing 8700-RE-21BZ). The first problem was identified as faulty capacitors in the redundant speed sensing circuits, which provides for SSPI relay pickup off the VS relay; this is the 870 rpm interlock on output breaker closure. Four CA2 capacitors were found to be faulty: three of the four capacitors were found with low capacitance; the fourth CA2 was found to be wired in a reversed (polarity) direction in the speed sensing circuit. These capacitors have been changed out and wiring errors corrected. The second (and more significant) problem identified by the licensee was a field flash cut out (FFCO) relay, Westinghouse type SV1, which sticks intermittently. The function of this relay in the fast start circuitry is as follows.

The main battery banks are used to flash the diesel generator field upon a fast start signal, until generator speed has increased sufficiently to provide self-excitation. On a fast start sequence, battery voltage is applied immediately to the generator field and maintained until the generator field is approximately 75% of nominal, or 90V out of 120VAC (as measured at the PT output). Under a normal sequence, when 90V is reached, the FFCO relay operates to open contacts in the FFC (field flash coil) to remove the battery banks, and in a series alarm circuit with time relay coil 40T. If 90V is not reached during the start sequence and a second timing circuit times out (52V), 40T operates to provide alarms and inhibit completion of the start/load sequence. When the generator is shutdown following a run, the FFCO relay will drop out at 60V to establish contact alignment required for the next diesel generator start.

During bench testing of the FFCO relay, the licensee found that the relay stuck intermittently in the "picked up" position, i.e., in the condition that inhibits application of the battery banks to the generator field. The licensee has postulated that the FFCO relay stuck in the "picked up" position after a diesel generator run previous to July 28, 1978 and thus, caused the field flash failure on the No. 2 diesel at the time of the station blackout.

Licensee plans/actions to correct this problem as follows:

- DLC engineering has been requested to provide recommendations for a suitable replacement for the type SV1 relays presently in use, particularly, a relay not subject to the intermittent sticking problem. This action will be part of a long term fix to obtain a QA acceptable replacement.
- The site will replace the existing installed relays prior to startup if a suitable replacement can be located on site from either stores or other non-safety related system applications, after demonstrating satisfactory relay operation from bench testing.
- A test circuit has been installed in the diesel start control circuitry to allow periodic monitoring of the FFCO relay contact status to ensure the relay is not left in the "picked up" position after a diesel run.
- OMCN 78-206 was issued for OST 1.36.2 on October 30, 1978 to provide operator instructions for monitoring the FFCO relay contact status and for use of the output breaker monitoring test stand. A similar revision will be made to OST 1.36.1 prior to plant startup. The above requirements were also incorporated in OM chapter 1.36.4 via OMCN 78-20-7, dated October 30, 1978.
- Consideration is still being given to providing remote generator field flash capability from a control to be installed on the main control room benchboard.

The inspector has no further questions on licensee actions taken up to this time but stated that this item would remain unresolved pending subsequent NRC:RI review of the licensee's final investigation results and corrective actions.

e. LER 78-43 Update

The licensee stated that a supplementary report to LER 78-43 would be submitted by December 31, 1978 to formally document his findings and corrective actions for all areas investigated as a result of the main transformer failure. This item is unresolved pending receipt and subsequent NRC:RI review of the update report (50-334/78-33-04).

8. Guard Training Drill

The inspector observed a guard training drill conducted between 8-10 p.m. on November 14, 1978. The drill was conducted unannounced to observe the guard complement response. The post drill debriefing and critique was also observed, during which time notification procedures, communications, use of portable communication devices and overall team response were discussed.

No items of noncompliance were observed.

9. Unresolved Items

Unresolved items are those items for which further information is required to determine whether the items are acceptable or items of noncompliance. Unresolved items are contained in paragraphs 5 and 7 of this report.

10. Exit Interview

A management meeting was held with licensee personnel (denoted in paragraph 1) at the conclusion of the inspection on November 17, 1978. The purpose, scope, and findings of the inspection were discussed as they appear in the details of this report. The licensee acknowledged the transfer of lead responsibility for NRC:Region I Inspection and Enforcement activities at BVPS1 from Mr. W. Raymond to Mr. D. Beckman. The licensee noted the inspectors' comments in regard to satisfactory resolution of questions on SI system pipe supports prior to plant startup from the present outage.