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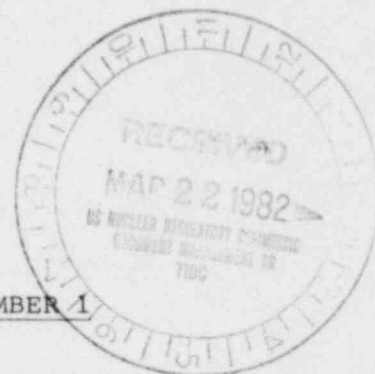
(412) 456-6000

United States Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

2DLC 4514

ATTENTION: Mr. R. Haynes
Administrator

SUBJECT: BEAVER VALLEY POWER STATION - UNIT NO. 2
DOCKET NO. 50-412
DEFECTIVE BROWN BOVERI OVERCURRENT RELAYS
SIGNIFICANT DEFICIENCY 82-01, INTERIM REPORT NUMBER 1



Gentlemen:

This letter is Interim Report Number 1 concerning Significant Deficiency 82-01.

On January 28, 1982, Mr. J. Thomas of your office was notified by telephone of a potential significant deficiency in overcurrent relays manufactured by Brown Boveri Electric, Inc. and provided for Beaver Valley Unit No. 2. This was determined to be reportable in that, had it remained uncorrected, it could have adversely affected safe operation of the plant and it represents a significant deviation from performance specifications. The attached report provides a more detailed description of the problem. Duquesne Light Company will notify Region I when the corrective action is complete. This is expected to occur by August 27, 1982.

DUQUESNE LIGHT COMPANY

BY

E. J. Woolever
E. J. WOOLEVER
VICE PRESIDENT

ATTACHMENT

cc: NRC Document Control Desk

Ms. E. Doolittle, Project Manager

Mr. G. Walton, Resident Inspector

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INTERIM REPORT NUMBER 1
ON SIGNIFICANT DEFICIENCY 82-01,
DEFECTIVE BROWN BOVERI OVERCURRENT RELAYS
AT BEAVER VALLEY POWER STATION - UNIT NO. 2

1.0 SUMMARY

Solid state overcurrent relays (Type ITE-50H and ITE-50D) manufactured by Brown Boveri Electric, Inc. (BBE) may malfunction by failing to drop out upon a reduction in current. These relays are designed to pick up when a preset value is exceeded and to drop out when the current falls to a value of approximately 98 percent of the preset value. Failure to drop out might inhibit the operation of a safety-related circuit.

2.0 DESCRIPTION OF DEFICIENCY

Solid state overcurrent relays (Type ITE-50H and ITE-50D) produced by BBE from 1976 through October 1980 may malfunction. These relays are designed as "high-dropout" units. This means that they should be self-resetting when the current drops slightly below the pickup setting. BBE published data states that the contacts should drop out when the input current to the relay falls below 98 percent of the pickup setting.

The nature of the potential problem is that the relay may not drop out upon the reduction in current. This is due to an integrated circuit designated as U4 on the drawout printed circuit board of the relay. The integrated circuit is manufactured in two versions designated as the "A" chip and the "B" chip. These may be identified by the numbers 4047A or 4047B printed on the chip body. Only the relays manufactured with the "A" chip are susceptible to the problem described above. However, testing has shown that not all of the "A" chips experience this failure.

The potentially defective relays are component parts of the 4KV switchgear and diesel generator relay panels. As of this date, only the 4KV switchgear has been delivered to the plant.

3.0 ANALYSIS OF SAFETY IMPLICATIONS

- A. BVPS-2 uses the ITE-50D relays in safety-related circuits. These relays are component parts of the 4KV switchgear units.

A.1 4kV - 480V Feeder

Each redundant 4KV feeder to the redundant 480V emergency unit substations includes an ITE-50D to trip the 4KV breaker on overcurrent. All of the ITE-50D relays supplied to BVPS-2 contain the potentially defective "A" chips.

CASE 1

The 50D includes an internal timer to permit coordination of its trip function with the downstream breaker protection. During normal operation, the 50D would be energized for a fault on the secondary of

the 480V unit substation. However, if the fault were cleared by a secondary device, the 50D would drop out prior to operation of its internal timer and the subsequent energizing of its trip output relay. This sequence would allow the isolation of the faulted circuit while maintaining power to the remaining 480V substation loads.

The chip furnished with the BV-2 ITE-50D relays may disable this function and would thus cause the loss of the entire 480V load center under the above circumstances. Since the relays are used on redundant 4KV feeders, loss of redundant emergency unit substations is possible and safe plant operation is jeopardized.

CASE 2

In the event of a safety injection signal (SIS), selected loads on both safety systems (4160V and 480V) receive simultaneous start signals. The pickup current setting on the 4KV feeder breaker relay discussed above includes the inrush range of the combined starting load for the associated emergency system. As a result, it is possible that a simultaneous malfunction of both relays could occur which would initiate a trip to both emergency 480V substation breakers after their internal timers have timed-out and would jeopardize plant safety.

A.2 4KV-4KV Feeder

Each incoming supply from the normal 4KV buses to the redundant 4KV emergency buses also includes ITE-50D relays. These relays will sense faults on the normal bus when the emergency diesel generator is in the exercise mode. (In an accident condition, the diesel is separated from the normal bus).

In the event that the 50D relays misoperate, as described above, and initiate separation of the emergency 4KV bus from its normal source of power, its safety function will not be impaired. Upon loss of normal power to the emergency bus, all required emergency loads would be step-loaded on the diesel.

- B. BVPS-2 also uses the ITE-50D relays in the diesel generator protection relay circuits. Should these malfunction in a similar manner to the faults discussed above (A.1), the diesel generator output breaker would trip. This trip could jeopardize plant safety with the loss of diesel provided power.

4.0 IMMEDIATE ACTION TAKEN

When BBE notified the Architect/Engineer identifying the potential problem with the overcurrent relays, two actions were immediately initiated:

- A. the overcurrent relays which BVPS-2 had received from BBE were disassembled to determine if they did in fact contain the integrated circuits which had been identified as being potentially defective, and
- B. an evaluation of the potential impact on the safe operation of the plant in the event of a malfunction of the subject relays was begun.

When the evaluation indicated that the relays could have impact on plant safety, the Nuclear Regulatory Commission was notified.

5.0 CORRECTIVE ACTION TO REMEDY DEFICIENCY

- A. The defective relays have been removed from the emergency 4KV switchgear and returned to BBE for repair.
- B. System Controls Corporation, the fabricator of the diesel generator protective relay circuits, has been notified of the problem with the relays. These relays have also been returned to BBE for repair.