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February 6, 1989

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Nuclear Power Station Unit 2
Report on Inspection of Stainless
Steel Piping In Accordance with
Generic Letter 88-01
NRC Docket No. 50-237

Dear Mr. Murley:

We are submitting this report which describes activities performed during the Dresden Unit 2 Fall 1988 (D2R11) outage related to the ultrasonic inspection, stress improvement, and flaw disposition of welds governed by Generic Letter 88-01 and NUREG-0313, Revision 2.

Generic Letter 88-01 applies to a total population of 276 welds at Dresden Unit 2. Of those, 228 are considered to be susceptible to IGSCC (non-Category A). A total of 192 welds were ultrasonically inspected this outage including 190 (83%) of the 228 susceptible welds. 104 (46%) of the 228 susceptible welds were mechanically stress improved (MSIP) this outage. All welds mechanically stress improved were inspected after stress improvement.

Nineteen new flawed welds were identified this outage. Three welds with unrepaired circumferential indication reported during the previous outage were reexamined this outage. All of the circumferential flaws were reported as unchanged. However, two of the three welds were reported as containing new axial indications. Another unrepaired weld (PS2/201-1) reported to have a circumferential crack in 1984, but evaluated as geometry in 1986, was reexamined this outage with automated examination methods (GE SMART System) and confirmed to be geometry.

New weld overlay repairs were applied to 21 welds this outage. Also, three "leak barrier" weld overlays applied during a previous outage were built up to standard thickness, surface finished and baseline UT examined this outage. Due to the large scope of weld overlay activities this outage, two layer leak barrier weld overlays will be applied as a temporary fix over

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several welds with axial indications only. These will be built up to standard thickness, surface finished, and examined during the next outage. Also, some overlays applied at standard thickness this outage will not be surface finished and examined until the next outage. As a minimum, all weld overlays applied this outage will be examined with liquid penetrant and a bonding UT.

At the end of this outage, Dresden Unit 2 will contain a total of 30 weld overlays. One weld (PD1A-D14) contains a 1" x 10% circumferential flaw and has been evaluated and determined to be acceptable for continued operation as is. The unit has completed three cycles with Hydrogen Water Chemistry (HWC). An evaluation of the effects of HWC at Dresden Unit 2 will be conducted.

The following attachments provide detailed information:

1. ATTACHMENT A, "Description of Generic Letter 88-01 Augmented Inspections."

   This attachment described the scope of the weld inspections performed during the current outage. This attachment contains:

   - Table A-1, "Generic Letter 88-01 Augmented Inspection Summary Matrix." This matrix summarizes the scope of the inspections and demonstrates compliance to the NRC approved sampling plan submitted by Commonwealth Edison Company.

   - Table A-2, "Generic Letter 88-01 Augmented Inspection Detailed Scope." This table provides an itemization of all welds inspected by system, pipe diameter, and NUREG Category. This table also indicates which welds have been stress improved.

2. ATTACHMENT B, "Results of Generic Letter 88-01 Augmented Inspections."

   This attachment describes the results of the UT examinations performed during the current outage in accordance with Generic Letter 88-01. This attachment contains:

   - Table B-1, "1988 Flawed Weld UT History". This table compares current outage UT results to previous UT results for all flawed welds at Dresden Unit 2.

   - Table B-2, "1988 Weld Overlay Reexamination Results." This table provides a summary of the UT results for previously applied weld overlays that were reexamined this outage.

3. ATTACHMENT C, "Disposition of Flawed Weld Indications."

   This attachment describes how current and previously noted IGSCC flaws at Dresden Unit 2 have been dispositioned. This attachment contains:

- Table C-1, "1988 Flaw Type and Repair Description." This table lists previously unrepaired welds identified as flawed during the current outage, describes the type of weld overlay repair (if any), the type of inspection performed this outage, and the NUREG 0313 Category at the end of this outage.

- Table C-2, "Generic Letter 88-01 1988 Flawed Weld Repair Status Summary." This table lists all known flawed welds at Dresden Unit 2, describes when the flaw was first identified with a repair history.

4. ATTACHMENT D, "Description of Stress Improvement Activities."

   This attachment describes the scope of the stress improvement activities performed During the D2R11 outage.

5. ATTACHMENT E, "Structural Integrity Associates, Inc. Report No. SIR-89-004, Volume 1, Revision 0, "Dresden Nuclear Power Station Unit 2, Flaw Evaluation and Repair Design Report, Fall 1988 Refueling Outage."

   This report documents the disposition and repair of IGSCC indications observed during the augmented inspections. All flaw evaluations and weld overlay repair designs were performed by Structural Integrity Associates, Inc. in accordance with NUREG-0313, Revision 2.

Weld overlay repairs are still in progress. Volume 2 of the Design Report will be submitted within thirty days after the completion of the refuel outage and will include as-built weld overlay dimensions and the disposition of any flaw indications in weld overlays. The results of a piping system skrinkage stress analysis to evaluate the shrinkage induced from weld overlay repairs will also be included.

Please contact this office should further information be required.

Very truly yours,

J. A. Silady
Nuclear Licensing Administrator

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Attachments (5)

cc: A.B. Davis - Regional Administrator, RIII
B.L. Siegel - Project Manager, NRR
S.G. DuPont - Senior Resident Inspector, Dresden

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February 2, 1989

Dr. Thomas E. Murley, Director
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Washington, DC 20555

Subject: Dresden Nuclear Power Station Unit 2
"Systematic Evaluation Program IPSAR
Topic VII-1.A; Section 4.24.I Isolation
of the Reactor Protection System (RPS)
from Non-Class 1E Equipment"
NRC Docket No. 50-237

References (a): Letter from I.M. Johnson to H.R. Denton
dated January 9, 1987

(b): Letter from D.R. Muller to L.D. Butterfield, Jr.
dated November 20, 1987

Dear Dr. Murley:

The concern raised in Section 4.24.1 of SEP Topic VII-1-A pertains to the electrical isolation between the Reactor Protection System (RPS) and the non-Class 1E control room process recorders used for monitoring that system. Electrical isolation will prevent common-mode electrical faults in the control room process recorders from affecting the flux monitoring system.

As stated in the Reference (a) letter, Class 1E signal isolation devices are to be installed at the inputs of each control room recorder that monitors the RPS. Reference (a) stated that this modification was scheduled for the Fall of 1988 and the modification (No. M12-2(3)-87-043) was completed on Unit 2 in December of 1988. Since this modification is outage related, the same modification is scheduled for Unit 3 during the Fall of 1989.

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Reference (b) requested information and the test reports to facilitate Staff review of the isolation devices selected for the modification. Since the Unit 2 modification is complete and the Unit 3 isolation devices will be identical, the requested information is being submitted by this letter (see Attachment 1 and associated Addendums A and B).

Please address any questions you may have regarding this matter to this office.

Very truly yours,

I. M. Johnson
Nuclear Licensing Administrator

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Attachments 1: NRC Criteria regarding RPS Isolation
Response to Request of Information

2: Maximum Credible Fault Testing Moore Industries
Signal Isolators for Dresden Station

3: Equipment Qualification Report Moore Industries
Signal Isolators for Dresden Station

cc: D.R. Muller - NRR, Director (w/o Att.)
B.L. Siegel - NRR, Project Manager
S.G. DuPont - Dresden Senior Resident Inspector (w/o Att.)
A.B. Davis- Regional Administrator, RIII (w/o Att.)

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ATTACHMENT 1

NRC CRITERIA REGARDING RPS ISOLATION

RESPONSE TO REQUEST OF INFORMATION

ADDENDUM A

MAXIMUM CREDIBLE FAULT TESTING

MOORE INDUSTRIES SIGNAL ISOLATORS

FOR DRESDEN STATION

ADDENDUM B

EQUIPMENT QUALIFICATION REPORT

MOORE INDUSTRIES SIGNAL ISOLATORS

FOR DRESDEN STATION

Attachment 1
Mod. M12-2(3)-87-43
Project No. 7927-39

NRC Criteria Regarding RPS Isolation

NRC Criteria

A. For the type of device used to accomplish electrical isolation, describe the specific testing performed to demonstrate that the device is acceptable for its application(s). This description should include elementary diagrams which are necessary to indicate the test configuration and how the maximum credible faults were applied to the devices.

Response

The device has been functionally tested to show that it operates correctly as a signal converter (a certain input signal produces a corresponding output signal). The functional test and a hi-pot test are normally performed by the supplier. A special test was performed which involves maximum credible and other types of faults. These tests are described below:

The test was performed under the following conditions:

1. 1 Vdc (maximum span) was applied to the input terminals for all test steps.

2. The isolator power feed of 24 Vdc was applied the first time through the test procedure and no power applied the second time through.

3. Recording devices capable of at least one millisecond resolution were placed across the input terminals, across the power supply terminals and in series with an output leg (for fault current monitoring).

The test was broken into the following sections:

1. Output short circuit ([+] lead to [-] lead)

2. Grounded circuit ([+] output lead to chassis ground)

3. Hot voltage injection (voltage across [+] output lead to chassis ground)

4. Reverse voltage injection (voltage across [+] output lead to [-] output lead)

Refer to Addendum "A" for Nutherm maximum credible fault test report.

B. Data to verify that the maximum credible faults applied during the test were the maximum voltage/current to which the device could be exposed, and define how the maximum voltage/current was determine.

Response

The existing power feeds to three recorders are from the 120 Vac essential service bus with a 50 amp circuit breaker in the 902(3)-49 distribution panel. The two remaining recorders are powered from the 120 Vac instrument bus with a 20 amp circuit breaker in the 902(3)-50 distribution panel. In addition, each power feed for the recorders contains a 10 amp fuse in the main control board 902(3)-5 where the isolators are located. The 24 Vdc power to the isolators contains a 5 amp fuse at the isolator mountings. No other circuit breakers or fuses exist in the individual feeds to the recorders. Also located in this main control board panel is 125 Vdc control power for pump and valve operation. The largest fuses used in this application are 35 amps. Therefore, the dc power in the cabinet will not produce the maximum fault. It is assumed, based on documented tests on similar equipment, that the output side of the isolator will open circuit before activating a 20 or 30 amp circuit breaker. Therefore, a maximum credible fault of 120 Vac at 50 amps will be assumed even though a lower value would be appropriate. Actual values recorded during the testing were 123.5 Vac at 41.7 amps. A test at 287.5 Vac at 14.7 amps was added, as an additional test.

C. Data to verify that the maximum credible fault was applied to the output of the device in the transverse mode (between signal and return) and other faults were considered (i.e., open and short circuits).

Response

Nutherm Test Report CWE-3212, Maximum Credible Fault Testing Moore Industries Signal Isolator Model No. SCT/0-1V/0-1V/24VDC[STD] summarizes the testing of the isolators as follows:

The Moore Industries isolator, Model SCT/0-1V/0-1V/24VDC[STD], was subjected to 12 separate maximum credible fault tests per Nutherm Test Procedure 11.3.91, Revision 0, Test Change C-001 and Test Exception E-001. The results of the 12 tests indicate that the effect of the fault on the outputs is not transmitted to the input terminals. The fault tests did produce an increase in the noise signal on the source terminals, but did not effect the source supply. The overall performance of the unit was found to be acceptable.

These tests were conducted as indicated in the response to Question A above with the maximum credible fault sources as indicated in the response to Question B above.

The output stage of the units subjected to the high voltages (124 and 287 Vac) failed but the isolation between input and output was maintained and there was no change recorded in the input signal.

D. Define the pass/fail acceptance criteria for each type of device.

Response

During and after an application of a fault to the output of an isolator, the device shall maintain isolation by not propagating the fault to either the input or the power feed. The device does not necessarily have to function as a signal converter following the test. (Refer to Addendum "A".)

E. Provide a commitment that the isolation devices comply with the environmental qualifications (10CFR50.49) and with the seismic qualifications which were the basis for plant licensing.

Response

The isolators are located in the main control room, which is considered a mild environment; therefore, these devices are not required to comply with 10CFR50.49. Isolators were purchased to meet the seismic requirements for the mounting and location in the plant. The isolators underwent seismic testing for SSE and OBE conditions and performance of the units was acceptable per Nutherm Test Report CWE-3212R, Revision 0 (refer to Addendum "B").

F. Provide a description of the measures taken to protect the safety systems from electrical interference (i.e., Electrostatic Coupling, EMI, Common Mode and Crosstalk) that may be generated by the SPDS.

Response

The device will be located in a main control board panel away from many potential electrical interference noise sources. Signal cabling will be routed away from power cabling. Shielded instrumentation cabling will be utilized for analog signals. RFI should not be a concern since two-way radio transmitters are not allowed in the main control room.

G. Provide information to verify that the Class 1E isolator is powered from a Class 1E source.

Response

The isolators are powered from the same 48/24 Vdc supply that powers the neutron monitors. The Moore Industries isolator is designed such that the power feed is isolated from the input and output circuitry. The testing confirmed that there is no impact upon the input signal upon loss of power to the isolator.