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November 8, 1982

Docket Nos. 50-277
50-278

Mr. John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Peach Bottom Underfrequency Protection of the Reactor Protection System (RPS) M-G Sets

Dear Mr. Stolz:

In a letter to you, dated May 21, 1982, we committed to conduct tests at Peach Bottom to determine the minimum frequency level that the output of the M-G set, with loss of power, would reach after six seconds, and also to determine any effects experienced on selected RPS components when operated at this minimum frequency. These tests have been completed and the results have been analyzed.

Tests were conducted at Peach Bottom to determine the minimum frequency that the RPS M-G set output would reach following loss of power and a six second time delay. The test was performed by interrupting power to the emergency 4KV bus, allowing the M-G set to coast down. It was found that the lowest frequency reached was 54.4 Hz during a 7 1/2 to 11 second time period, depending upon load on the 4kV bus.

Bench tests were conducted on an HFA relay, a scram contactor, and a scram solenoid valve. The tests simulated the M-G set output by maintaining voltage and reducing frequency gradually to 53 Hz during 11 second and 15 second intervals. As the frequency was lowered, the accompanying increases in coil current were measured and changes in coil temperature were

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monitored with a thermocouple. The components were tested twenty times with this procedure.

It was found that the temperature of the HFA relay and scram contactor coils increased an average of 0.1 degrees F, or less than 0.1%, for each test. The temperature of the scram solenoid valve coil increased an average of 0.8 degrees F, or less than 0.5%, for each test. The coil currents increased when the frequency was lowered. The components were examined when the voltage was removed and reapplied during and after the tests. The components functioned correctly for each event.

The test conditions that were used were more severe than those expected in the plant. Since the tested components operated correctly under repeated bench tests, it can be concluded that they will operate correctly with a six second time delay setting for initiation of underfrequency tripping. In addition, the heat rise of the coils during underfrequency conditions was so small that it will not affect performance of the components during a single event or promote degradation of the coils after repeated events. The tests have demonstrated that the six second time delay before initiation of underfrequency tripping will not adversely affect the performance of these RPS components.

An attachment to this letter describes in more detail the testing procedure used, the components tested, and the data obtained.

If you have any questions or require additional information, please do not hesitate to call.

Very truly yours,

Attachment

cc: Site Inspector

ATTACHMENT

RPS Underfrequency Tests

This summarizes tests for RPS M-G set response after loss of power. RPS M-G set was deenergized by tripping supply to 4KV bus.

Test #1 - Only Load Center load on 4KV bus
Test #2 - Load Center & Motor load on 4KV bus

Test #1			Test #2		
Voltage	Freq.	Time	Voltage	Freq.	Time
115	59.8Hz.	0 Sec.	115	59.8Hz.	0 Sec.
115	59	1.0	115	59	0.2
115	58	3.3	115	58	0.4
115	57	5.5	115	57	1.7
115	56	7.8	115	56	3.9
115	55	10.0	115	55	6.2
115	54.4	11.5	115	54.6	7.7

The following components were bench tested to determine response to a drop in frequency.

HFA Relay - Model 12HFA51A49F
Scram Contactor - Model CR105D1 Series A
Scram Solenoid Valve - Model HVA 904052A

The following procedure was used:

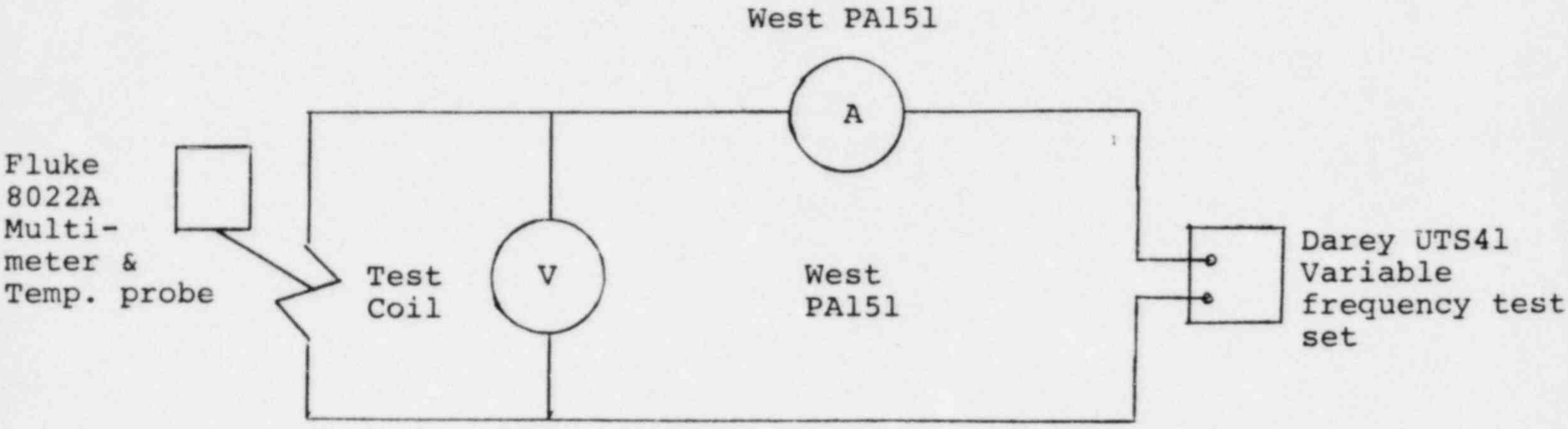
1. Connect components to 120 Vac, 60 Hz test source and monitor voltage, frequency, current, and coil temperatures of each component. Allow coil temperatures to stabilize under these conditions.

2. Maintain voltage at 120 Vac and gradually reduce frequency to 53.0 Hz during 11 seconds. Record any change in current and temperature for this time interval, and restore frequency to 60 Hz. Verify that components drop-out when de-energized.

3. If changes in current were noted, allow coils to stabilize for several minutes. Repeat test 10 times.

4. Repeat Tests 2 & 3 for a 15 second interval and 53.0 Hz.

The following testing arrangement was used:



The following results were obtained:

HFA Relay

Current at 60 Hz - 0.28A.
Current at 53 Hz - 0.35A.
Ave. Temp. of Coil - 153.8 degrees F Test 1 - 10
Ave. Change in Temp. - 0.09 degrees F Test 1 - 10
Ave. Temp. of Coil - 173.2 degrees F Tests 11 - 20
Ave. Change in Temp. - 0.11 degrees F Tests 11 - 20

Scram Contactor

Current at 60 Hz - 0.46A.
Current at 53 Hz - 0.57A.
Ave. Temp. of Coil - 158.8 degrees F Tests 1 - 10
Ave. Change in Temp. - 0.1 degrees F Tests 1 - 10
Ave. Temp. of Coil - 159.0 degrees F Tests 11 - 20
Ave. Change in Temp. - 0.16 degrees F Tests 11 - 20

Solenoid Valve

Current at 60 Hz - 0.25A.
Current at 53 Hz - 0.33A.
Ave. Temp. of Coil - 182.7 degrees F Tests 1 - 10
Ave. Change in Temp. - 0.86 degrees F Tests 1 - 10
Ave. Temp. of Coil - 181.8 degrees F Tests 11 - 20
Ave. Change in Temp. - 0.84 degrees F Tests 11 - 20