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United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Frank J. Miraglia, Chief
Licensing Branch No. 3
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) PSNH Letter, dated March 12, 1982, "Response to 430 Series RAIs; (Power Systems Branch)," J. DeVincentis to F. J. Miraglia

Subject: Revision 1 to 430.62; (Power Systems Branch)

Dear Sir:

We have attached Revision 1 to the subject RAI.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. DeVincentis
Project Manager

Attachment

B001
S 1/1

430.62 Identify all electrical equipment, both safety and non-safety, that may become submerged as a result of a LOCA. For all such equipment that is not qualified for service in such an environment provide an analysis to determine the following:

1. The safety significance of the failure of this electrical equipment (e.g. spurious actuation or loss of actuation function) as a result of flooding.

2. The effects on Class 1E electrical power sources serving this equipment as a result of such submergence; and

3. Any proposed design changes resulting from this analysis.

RESPONSE: All electrical equipment that may become submerged as a result of a LOCA is listed in Table 430.62-1.

Revision 1 4/9/82

TABLE 430.62-1

EQUIPMENT LOCATED IN THE CONTAINMENT

BELOW THE FLOOD LEVEL OF (-) 20'-8"

VALVE LIST

| TAG | V-VITAL NV - NON-VITAL | COMPONENT | APPLICATION |
|---|---|---|---|
| CS-V-59 | NV | Solenoid & Limit Switch | RCP LD Seal Water Return |
| CS-V-145 | NV | Solenoid & Limit Switch | Letdown HX-E-2 to HX-E8 |
| CS-V-170 | NV | Solenoid & Limit Switch | Letdown HX-E-3 to RCDT |
| CS-V-175 | NV | Solenoid & Limit Switch | Excess Letdown Line |
| CS-V-176 | NV | Limit Switch | Excess Letdown Line |
| CS-V-177 | NV | Limit Switch | HX-E2 to Cold Leg 4 |
| CS-V-180 | NV | Solenoid & Limit Switch | HX-E2 to Cold Leg 1 |
| CS-V-185 | NV | Solenoid & Limit Switch | HX-E2 to Pressurizer |
| CS-V-168 | NV | Motor Operator | RCP Seal Water Isolation |
| NG-V-17 | NV | Solenoid & Limit Switch | Accumulator 9A Ni Line |
| NG-V-19 | NV | Limit Switch | Accumulator 9B Ni Line |
| NG-V-21 | NV | Solenoid & Limit Switch | Accumulator 9C Ni Line |
| NG-V-23 | NV | Limit Switch | Accumulator 9D Ni Line |
| RC-LCV-459 | NV | Solenoid & Limit Switch | Letdown Isolation Valve |
| RC-LCV-460 | NV | Solenoid & Limit Switch | Letdown Isolation Valve |
| RC-LCV-81 | NV | Solenoid & Limit Switch | RC Loop 3 Letdown to HX-E2 |
| RMW-V-28 | NV | Solenoid | RMW-TK 12 to RC TK 11 |
| RMW-V-180 | NV | Solenoid | RC-P-1B Seal Pressurizer Equalizing Valve |
| RMW-V-181 | NV | Solenoid | RC-P-1A Seal Pressurizer Equalizing Valve |
| RH-V-27 | V | Solenoid & Limit Switch | HX-E-9B Header Test |
| RH-V-28 | V | Solenoid & Limit Switch | HX-E-9A Header Test |
| RH-V-49 | V | Solenoid & Limit Switch | HX-E-9A Injection Test |
| RH-V-54 | NV | Solenoid & Limit Switch | SI-P-6A Discharge Test |
| RH-V-55 | NV | Limit Switch | SI-P-6B Discharge Test |
| SI-V-03 | V | Stem Mounted Limit Switch | Accumulator Iso. Valve Stem Limit Switch |
| SI-V-04 | NV | Limit Switch | Accum. Test Valve |
| SI-V-15 | NV | Solenoid & Limit Switch | Accum. Fill Valve |
| SI-V-17 | V | Stem Mounted Limit Switch | Accum. Iso. Valve Stem Limit Switch |
| SI-V-18 | NV | Solenoid & Limit Switch | Accum. Test Valve |
| SI-V-23 | NV | Solenoid & Limit Switch | Accum. Fill Valve |
| SI-V-32 | V | Stem Mounted Limit Switch | Accum. Iso. Valve Stem Limit Switch |

TABLE 430.62.1 (Continued)

VALVE LIST

| TAG | V-VITAL NV - NON-VITAL | COMPONENT | APPLICATION |
|---|---|---|---|
| SI-V-33 | NV | Solenoid & Limit Switch | Accum. Test Valve |
| SI-V-38 | NV | Limit Switch | Accum. Fill Valve |
| SI-V-47 | V | Stem Mounted Limit Switch | Accum. Iso Valve - Stem Limit Switch |
| SI-V-48 | NV | Solenoid & Limit Switch | Accum Test Valve |
| SI-V-53 | NV | Solenoid & Limit Switch | Accum Fill Valve |
| SI-V-131 | V | Limit Switch | SI - Cold Leg Test |
| SI-V-132 | NV | Limit Switch | SI - Hot Leg 3 Test |
| SI-V-133 | NV | Limit Switch | SI - Hot Leg 2 Test |
| SI-V-134 | V | Solenoid & Limit Switch | SI - Hot Leg Test |
| SI-V-158 | V | Solenoid | Charging Pump Test |
| SI-V-160 | V | Limit Switch | SI Pump - Test Line Iso. Valve |
| WLD-FV-1403 | NV | Solenoid & Limit Switch | RCDT Transfer Valve |

TABLE 430.62.1 (Continued)

INSTRUMENTATION LIST

SAFETY-RELATED INSTRUMENTS

| TAG | DESCRIPTION | ACTION |
|---|---|---|
| NI-NE-41 A/B | Power Range Neutron Detectors | Not required post-LOCA |
| NI-NE-42 A/B | Power Range Neutron Detectors | Not required post-LOCA |
| NI-NE-43 A/B | Power Range Neutron Detectors | Not required post-LOCA |
| NI-NE-44 A/B | Power Range Neutron Detectors | Not required post-LOCA |
| RM-RM-6535A | Manipulator Crane Radiation Monitor | Not required post-LOCA |
| RM-RM-6535B | Manipulator Crane Radiation Monitor | Not required post-LOCA |
| RC-FT- 414, 415, 416 | RC System Loop 1 - Flow | Will be raised above the flood level |
| 424, 425, 426 | RC System Loop 2 - Flow | Will be raised above the flood level |
| 434, 435, 436 | RC System Loop 3 - Flow | Will be raised above the flood level |
| 444, 445, 446 | RC System Loop 4 - Flow | Will be raised above the flood level |

TABLE 430.62-1 (Continued)

NON-VITAL INSTRUMENTS

| TAG | DESCRIPTION |
|---|---|
| CAH-TE-5640 - 5647 | NI Detector Wall Temp. |
| CAS-AE-8815 | Hydrogen Analyzers in RC TK 55 Area |
| CAS-AE-8816 | Hydrogen Analyzers in RC CS-E-3 Area |
| CAS-AE-8817 | Hydrogen Analyzers in Cntmnt. Valve Rm. |
| CAS-AE-8818 | Hydrogen Analyzers in CS-E-2 Area |
| COP-PT-1787 | Excess Letdown HX, CS-E-3 Outlet Pres. |
| CS-PT-124 | Regenerative HX, CS-E-2 Charging Line Temp. |
| CS-TE-126 | RCP Low Range Leakage Flow |
| CS-FT-154 - 157 | RCP Seal Flow |
| CS-FIS-191 - 194 | |
| LD-LT-8333 | Sump B Level |
| RC-LT-9405 | Press. Relief Tank Level |
| RM-RX-6578 - 6581 | Radiation Monitor |
| SF-LT-2629 | Refueling Canal Level |
| SM-XS, XT-6701 | Seismic Monitor |
| SM-XS, ST-6709 | Seismic Monitor |
| WLD-LT-1403 | RCDT, TK 55 - Level |
| WLD-TE-1403 | RCDT, TK 55 - Temp. |
| WLD-FT-1406 | RCDT, TK 55 - Flow |
| WLD-FT-1411 | RCDT, EX E-43 Inlet Temp. |
| WLD-TE-1413 | RCDT, EX E-43 Outlet Temp. |
| WLD-PT-1412 | RCDT, EX E-43 Pump P33 A/B Discharge Pres. |
| WLD-PT-1420 | RCDT, EX E-43 Pump P33 A/B Section Pres. |
| WLD-LSH-6266 | Containment Drains Sump A Level |
| WLD-LSH-6267 | Containment Drains Sump B Level |

TABLE 430.62-1 (Continued)

MISC. NON-VITAL EQUIPMENT

PUMPS

| TAG | DESCRIPTION |
|---|---|
| RC-P-271 | Pressurizer Relief Tank, TK 11, Recirc. Pump |
| SF-P-272 | Refueling Canal Drain Pump |
| WLD-P-5A, 5B | Containment Sump A Pumps |
| WLD-P-5C, 5D | Containment Sump B Pumps |
| WLD-P-33A, 33B | RCDT, TK 55, Pumps |

INSTRUMENT RACKS

Individual instruments located on these racks have been identified above.

CONTROL PANELS

| TAG | DESCRIPTION |
|---|---|
| WLD-CP-280 | Containment Sump A - Control Panel |
| WLD-CP-281 | Containment Sump B - Control Panel |

LIGHTING

| TAG | DESCRIPTION |
|---|---|
| ED-X-16F | Transformer Supply for Panel L17 |
| ED-X-16A | Transformer Supply for Panels PP-8B and EL 13 |
| ED-X-16J | Transformer Supply for Panel L41 |
| Panel L41 | Lighting Panel |

TERMINAL BOXES

| TAG | DESCRIPTION |
|---|---|
| X45 | Pressurizer Heater Backup Group C |
| X46 | Pressurizer Heater Backup Group D |

1. The following analysis discusses the safety significance of the failure as a result of flooding of the electrical equipment listed in Table 430.62-1. The analysis concludes that there is no spurious actuation or loss of safety function as a result of flooding.

A. Valves - Safety-Related

(1) Stem-mounted Limit Switches for SI Accumulator Valves

Stem-mounted limit switches only provide an alternate valve position indication. Failure of these switches could cause loss of the alternate valve position indication circuits but would not affect valve operation.

(2) RCP Seal Water Isolation Valve, CS-V-168

This motor-operated valve is driven closed upon a containment isolation signal, therefore, this valve would fail in its safe position. Motor-operated valves are powered from individual circuits of a motor control center so failure of this circuit would not affect the remaining loads on the motor control center. Failure of the limit switch internal to the operator could effect the valve position indication at the control switch on the MCB and also the post-accident monitor (PAM) light indication of this valve.

This circuit will be modified by adding an interposing relay to the circuit of CS-V-168 . The relay will be located in the control building and will prevent loss of the remaining PAM monitor circuits upon flooding of the valve.

(3) SI Pump Cold and Hot Leg Test Line Isolation Valves SI-V-131, and SI-V-160 and Charging Pump Test Line Isolation Valve, SI-V-158

These Train B air-operated valves are closed on a containment isolation signal.

Failure of this circuit will also cause loss of power to two other safety-related valves, SI-V-174 and SI-V-70, which are powered from the same circuit. These valves are already closed on safety injection or containment isolation signals, therefore loss of power results only in loss of valve position indication at the MCB control switches. The limit switches for valves SI-V-131, V-158 & V-160 are also used in the Train B PAM monitor light circuits, and this circuit may also be lost.

These circuits will be modified by adding interposing relays to the circuits of SI-V-131, SI-V-158 and SI-V-160. The relays will be located in the control building and will prevent loss of the remaining Train B PAM monitor circuits upon flooding of the above valves.

(4) SI Hot Leg Test Line Isolation Valves, SI-V-134

This valve is a normally closed test valve that also receives a containment isolation signal to ensure that it is closed. Valve SI-V-134 is a train A valve, and failure of this circuit will cause loss of power to four other safety-related valves, SI-V-165 & V-173 (already closed on safety injection) and SI-V-62 & V-157 (already closed on containment isolation). Valve position indication at their respective MCB control switches will be lost.

Limit switch contacts for SI-V-134 are also used in the PAM monitor light circuits. An interposing relay will be added to SI-V-134 circuit to prevent loss of the remaining PAM monitor circuits upon flooding of SI-V-134.

(5) RHR Test Valves RH-V-27 and RH-V-49

These valves are normally closed Train A test valves that receive a containment isolation signal. The open contact of the containment isolation signal isolates the solenoids. If the containment isolation signal is reset, the circuit for RH-V-27 and V-49 could fail. This circuit failure would also cause loss of power to safety related valve RH-V-16, and solenoids for FY-618-1 and HCV-606. Valve RH-V-16 is already closed on containment isolation. Loss of power to FY 618-1 and HCV-606 solenoids will result in full flow of the RH system A loop through the RHR heat exchanger E-9A and the closing of the bypass line. Valve Position indication for these valves at the MCB control switches RH-V-27 and V-49 will be lost.

Limit switch contacts for RH-V-27 and RH-V-49 are also used in PAM monitor light circuits. Interposing relays will be added to these valve circuits to prevent loss of the remaining PAM monitor circuits upon flooding of the above valves.

(6) RHR Test Valve RH-V-28

Valve RH-V-28 is a normally closed Train B test valve that also receives a containment isolation signal. The open contact of the containment isolation signal isolates the solenoid. This valve

is similar to RH-V-27 (above) and failure of this circuit wou'd result in loss of power to safety-related valve RH-V-17 and solenoids for FY-619-1 and HCV-607. This will result in full flow through RHR heat exchanger E-9B. Valve position indication for these valves at the MCB control switches will be lost.

Limit switch contacts for RH-V-28 are also used in PAM monitor light circuits. An interposing relay will be added to this valve circuit to prevent loss of the remaining PAM monitor circuits upon flooding of the above valve.

B. Valves - Non-Safety

Non-safety-related, air-operated valves that may be submerged following LOCA, are listed in Table 430.62-1. Failure of the stem-mounted limit switch or pilot solenoid will cause the entire valve circuit to lose power with the results that all non-safety-related valves on that particular circuit will de-energize to their fail safe position. Valve position indication will also be lost.

Those valves not submerged, which may be affected by flooded solenoids or limit switches are indicated on the attached table 430-62.2.

C. Instrumentation

All safety related instrumentation, with the exception of the excore neutron detectors and maniulator crane radiation monitors is located or will be relocated above the flood level. The excore neutron detectors and manipulator crane radiation monitors are not required following a LOCA.

Non-safety related instrumentation located below the flood level may fail and give misleading information. None of this instrumentation is required following a LOCA.

D. Miscellaneous Non-Safety-Related Equipment

(1) Pumps

Those pump motors that may become submerged and fail are either protected by redundant Class 1E breakers or are de-energized during normal plant operation. Failure of the particular circuit will not affect other circuits. These non-safety-related motors are not required following a LOCA.

(2) Control Panels

The sump pump control panels are not required following a LOCA.

(3) Lighting

The lighting system inside containment is normally off. Control of the system is at control stations located outside the personal air lock. Failure of lighting equipment due to flooding will not affect other circuits.

(4) Pressurizer Heater Terminal Boxes

Flooding of the terminal boxes for pressurizer heater backup groups C & D, will cause de-energization of these heaters. Pressurizer heater backup groups A & B will not be affected because their terminal boxes are above the flood level. Backup groups A & B are fed from the diesel generators.

2. The following analysis discusses the effect on the Class 1E electrical power sources as a result of equipment submergence and concludes that there is no effect on the Class 1E electrical power sources as a result of equipment submergence.

A. Safety-Related Valves

Only the circuits powering those valves which may become submerged will be lost from the Class 1E power distribution system. Other Class 1E circuits will not be affected.

B. Non-Safety-Related Valves

Non-safety related valves that may be submerged are powered from the non-Class 1E power system. Failure of these circuits will not affect any Class 1E power supply.

C. Instrumentation

Safety-related and non-safety-related instruments are powered through separate instrumentation panels. These panels are powered from separate distribution circuits. Internal low voltage power supplies further isolate the individual circuits from the distribution system. Therefore, the Class 1E power sources will not be affected by submergence of any instrumentation.

D. Miscellaneous

(1) Pumps

The non-vital pumps that may be submerged are powered from the non-Class 1E power system. Failure of these motor circuits will not affect the Class 1E sources.

(2) Control Panels

The control panels for the containment sump pumps are powered from non-Class 1E sources and their failure will not affect the Class 1E system.

(3) Lighting System

The lighting system inside the containment is normally de-energized during plant operation; therefore, the Class 1E power sources will not be affected.

(4) Pressurizer Heater Terminal Boxes

Backup heater groups C and D are not powered from the Class 1E power system and their failure will not affect the Class 1E system.

3. Proposed Design Changes

A. Safety-Related Valves

As discussed in Item 1, interposing relays will be added to certain valve circuits to electrically isolate the valve PAM monitor light circuit from the valve limit switch circuit. This modification prevents submergence of the valve limit switch from tripping the entire PAM monitor light circuit. No additional changes are proposed.

B. Non-Safety-Related Valves

No design changes are proposed.

C. Instrumentation

Safety-related reactor coolant flow transmitters will be raised above the flood level.

No additional design changes are proposed.

D. Miscellaneous Equipment

No design changes are proposed.

TABLE 430.62-2

NON-SAFETY-RELATED VALVES ON THE SAME CIRCUIT
AS SUBMERGED NON-SAFETY-RELATED VALVES

CHEMICAL AND VOLUME CONTROL SYSTEM

| | | |
|---|---|---|
| E89/7 | CS System A Train Non-Vital Control | |
| | RC-P-1A Seal Water Ret Iso Valve | I-V-10 |
| | RC-P-1B Seal Water Ret Iso Valve | I-V-28 |
| | RC-P-1C Seal Water Ret Iso Valve | I-V-44 |
| | RC-P-ID Seal Water Ret Iso Valve | I-V-59* |
| | HX-E2 to Cold Leg 4 Valve | I-V-177* |
| | HX-E2 to Przr. Iso Valve | I-V-185* |
| E97/11 | CS System A Train Non-Vital Control | |
| | LTDN HX E-2 To E-8 Iso Valve | I-V-145* |
| | Demin 3E Isolation Valve | I-V-256 |
| | Boric Acid Inj to Blender Valve | I-FCV-110A |
| | Blender to Chg PP Suction | I-FCV-110B |
| | BA Blender MM-1 to RMW Isp Valve | I-FCV-111A |
| | BA Blender to VC TK Iso Valve | I-FCV-111B |
| | CVCS TK-1 Outlet Iso Valve | I-LCV-112A |
| | CVCS TK-1 Outlet Iso Valve | I-LV-112A |
| | LTDN HX E-4 to E-1 Iso Valve | I-TCV-129 |
| E95/4 | CS System B Train Non-Vital Control | |
| | LTDN HX E-3 to RCDT 150 Valve | I-V-170* |
| | Excess LTDN Line Iso Valve | I-V-176* |
| | Boron Meter Iso Valve | I-V-478 |
| | CS-DM-1 to Boron Conc Meas Sys Iso Valve | I-V-541 |
| | Boron Conc Meas Sys Bypass Iso Valve | I-V-543 |

REACTOR COOLANT SYSTEM

| | | |
|---|---|---|
| E89/1 | RC System A Train Non-Vital Control | |
| | Reactor Vessel Flange Leak-Off Drain Valve | I-V-147 |
| | Letdown Isolation Valve | I-LCV-459* |
| | Letdown Isolation Valve | I-LCV-460* |
| | Przr. Press. Spray Valve, | I-PC-455A |
| | | I-PC-455B |

REACTOR MAKEUP WATER SYSTEM

| | | |
|---|---|---|
| E89/8 | RMW System A Train Non Vital Control | |
| | RC-P-1D Seal Pressure Equalizing Valve | I-LCV-178 |
| | RC-P-1C Seal Pressure Equalizing Valve | I-LCV-179 |
| | RC-P-1B Seal Pressure Equalizing Valve | I-LCV-180* |
| | RC-P-1A Seal Pressure Equalizing Valve | I-LCV-181 |

TABLE 430.62-2

NON-SAFETY-RELATED VALVES ON THE SAME CIRCUIT
AS SUBMERGED NON-SAFETY-RELATED VALVES
(Continued)

SAFETY INJECTION SYSTEM

| | | |
|---|---|---|
| E89/4 | SI System Non-Vital A Train Control | |
| | Accum TK-9A Test Line Iso Valve | I-V-4* |
| | Accum TK-9A Fill Line Iso Valve | I-V-15* |
| | Accum TK-9B Test Line Iso Valve | I-V-18* |
| | Accum TK-9C Test Line Iso Valve | I-V-33* |
| | Accum TK-9C Fill Line Iso Valve | I-V-38* |
| | Accum TK-9D Test Line Iso Valve | I-V-48* |
| | SI Pumps Hot Leg-3 Test Line Iso Valve | I-V-132* |
| | SI Pumps Hot Leg-2 Test Line Iso Valve | I-V-133* |
| | Chg Pump Test Line Iso Valve | I-V-159 |

WASTE LIQUID DRAIN SYSTEM

| | | |
|---|---|---|
| E25/23 | RC Drain Tank Valves | |
| | Drain Valve | I-V-53 |
| | Recirc Valve | I-V-87 |
| | Transfer Valve | I-FV-1403 |

* - SUBMERGED VALVES