Omaha Public Power District
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402/536-4000

February 14, 1985
LIC-85-003

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

References: (1) Docket No. 50-285
(2) Letter OPPD (R. L. Andrews) to NRC (Mr. Harold R. Denton) dated July 3, 1984

Dear Mr. Denton:

Environmental Qualification of Safety Related
Electrical Equipment at Fort Calhoun Station
Request for Extension

In Reference 2, the Omaha Public Power District, holder of Facility Operating License DPR-40, requested an extension of the schedular requirements of 10 CFR 50.49 for safety-related electrical penetration subassemblies at Fort Calhoun Station. This request included a Justification for Continued Operation (JCO).

Reference 2 identified four (4) categories of electrical penetration subassemblies. Those categories are: (1) those penetration subassemblies which are currently under administrative control; (2) those penetration subassemblies which do not perform an accident mitigation function after a LB-LOCA; (3) those penetration subassemblies which were modified prior to returning to power operation; and (4) those penetration subassemblies which would complete their post-accident function prior to experiencing environmental stresses sufficient to induce failure.

Since submittal of Reference 2, our review of Categories (3) and (4) has been completed and the District believes qualification has been established. An extension for Categories (3) and (4) is no longer required and the request is hereby withdrawn. The District's basis for establishing qualification and/or

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justification for continued operation of each category of penetration subassembly is included in Attachment A. Attachment A is a revised and more detailed version of the Technical Discussion which accompanied Reference 2. For the reasons detailed in Attachment A, the time extension until November 30, 1985 requested in Reference 2 is still required for Categories (1) and (2). Separate JCOs for these two categories have been prepared at the request of your staff and can be found in Attachments B and C, respectively.

Sincerely,

R. L. Andrews
Division Manager
Nuclear Production

RLA/DJM/dao

Attachments

cc: LeBoeuf, Lamb, Leiby & MacRae
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Mr. E. G. Tourigny, NRC Project Manager
Mr. L. A. Yandell, NRC Senior Resident Inspector

Attachment A

Technical Discussion
of
Environmental Qualification Testing of
Electrical Penetrations

The Fort Calhoun Station containment electrical penetration system provides a dual function of transmitting electric power and instrument signals via insulated conductors, and at the same time sealing the conductors to provide containment integrity (refer to Fort Calhoun Station Unit No. 1 USAR Section 5.9.3 for a description of the penetrations). This function is accomplished by the use of subassemblies which are inserted in a penetration canister. Each subassembly is made up of a stainless steel tube (sheath) through which a lead wire, or wires (depending on the type) are run and sealed at both ends. The penetration system subassembly types are multiconductor low voltage (600V), single conductor low voltage, medium voltage (4160V), coaxial, triaxial, and thermocouple lead wires. The subassemblies under discussion are the multi-conductor low voltage (120V and 480V single and three phase power, A.C. control, D.C. control, and instrumentation) and/or thermocouple configurations. These particular multiconductor penetrations use FEP teflon as the lead wire insulation, and TFE teflon as the seal material in the subassembly.

Because the DOR Guidelines for electrical equipment qualification recommended type testing of equipment containing materials which are susceptible to radiation damage, the District conducted an environmental qualification test of the low voltage multiconductor penetration subassembly constructed using teflon. The sequential test procedure used IEEE 317-1976 and IEEE 323-1974 as a guide. Plant specific parameters were used to envelope the sequentially applied environmental stress parameters (aging, short circuit and short time overload, seismic, radiation, and MSLB/LOCA, short circuit).

During the LOCA testing (following irradiation) the teflon lead wire insulation became brittle and cracked. The penetrations were no longer able to perform their required electrical function.

Based on subsequent engineering evaluation and testing, the failure mechanism for the penetrations has been determined. The penetration FEP teflon lead wire insulation is weakened (the teflon chemical chain is broken) by radiation. After irradiation to the 720 hour (long term operation) total integrated dose, the heatup and subsequent cooldown of the penetrations resulted in a mechanical stress which, during cooldown, caused the lead wire insulation to crack resulting in electrical failure. This was confirmed when the failure was duplicated by the heatup and cooldown of lead wires without the presence of steam, pressure or spray.

The District has reviewed the electrical equipment in the containment which must function after a design basis accident and has determined four classifications of equipment:

1. Equipment which can be administratively controlled.

2. Equipment not required to function in the event of a Large Break LOCA (LBLOCA). The equipment must function during either a Main Steam Line Break (MSLB), a Small Break LOCA (SBLOCA) or both.

3. Equipment which is required to function during a Large Break LOCA and has been modified to ensure operation.

4. Equipment which completes its function prior to failure induced by a Large Break LOCA.

The penetration subassemblies, their respective TER number, system, function and device are tabulated in the attached Tables 1-1, 1-2, 1-3 and 1-4.

The District believes that classifications 1 and 2 can be justified for continued operation until a permanent resolution is achieved. Classification 1 is justified by use of administrative control while Classification 2 is justified by use of partial test data to support qualification.

1. Equipment which can be administratively controlled.

   The equipment listed in Table 1-1 is that equipment which will be administratively controlled. These are all air-operated control valves within containment. If failure were to occur the air would be failed to the valves.

   Additionally, any electrical shorting between the solenoid-operated valve and its position indication is not expected to cause valve repositioning. Circuit design is such that shorting would result in either loss of position indication or indication that the valve was simultaneously opened and closed.

   The fail position is the same position as the accident position. The District believes continued safe operation is justified.

   The administrative controls are currently in place as implemented by Operations Memorandum 84-06 and direct the failure of instrument air to containment in the event of improper or unreliable valve position indication. The penetration subassemblies are those listed in Table 1-1, and required a deadline extension. They will be qualified by November 30, 1985. The JCO is provided in Attachment B.

2. Equipment not required to function in the event of a Large Break LOCA (the equipment must function during either a MSLB, SBLOCA or both).

   The District first reviewed the systems discussed below to ensure that their loss would not impact the mitigation of the consequences of a LBLOCA with these results:

   Auxiliary Feedwater

   Provides no heat removal since steam generator U-tubes are emptied.

   PORV & Safety Valve Position Indication

   RCS is depressurized, no flow could be expected.

   Pressurizer Level and Pressurizer (Narrow Range)

   The pressurizer is empty and pressure is below the narrow range.

Reactor Head Vent

The RCS is depressurized with cooling out of the break.

PORV and PORV Block Valve

The RCS is depressurized, flow out of the break is so great an open PORV line will not affect safety.

Steam Generator Reactor Trip

Trip is accomplished by TMLP via low limit setpoint.

Narrow Range Sump

The sump is flooded above these transmitters yielding no useful information.

To determine that safe continued operation can be justified with the requirement that the penetrations function during and following a SBLOCA and/or MSLB, the District reviewed the expected radiation dose, and known teflon material performance. The first step was to determine whether the SBLOCA or MSLB should be used as the limiting case for radiation dose. The second step was to determine the expected dose level. The final step was to evaluate the performance of FEP teflon lead wires when subjected to the expected radiation dose.

To determine the limiting case, the District reviewed USAR Sections 14.12 - MSLB and 14.15 - LOCA (including Small Break LOCA). The District concluded that the SBLOCA would be the most limiting case. The electrical penetrations are shielded from the RCS by the biological shield and MSLB calculations indicate total RCS leakage of 491 lbm from the primary to the secondary. This is equal to the amount of RCS leakage expected in the containment atmosphere while the SBLOCA calculations indicate a 8,500 lbm/sec RCS flow into the containment. The limiting case is, therefore, considered to be the SBLOCA.

The District then evaluated the expected SBLOCA dose. Since computer programs to quantitatively determine dose are not readily available, the District compared the fuel clad oxidation indicated in USAR Section 14.15 with the assumption used in the NUREG-0588 source term discussion. This comparison showed a peak clad oxidation of <2.10% versus 10% to 80% fuel damage indicated in NUREG-0588. The District judges that the total integrated dose would be reduced from the dose calculated using the NUREG-0588 source term by a factor of at least 10 which is equivalent to a TID of approximately 1.36×10^6R for 720 hours.

A review of FEP teflon performance made using EPRI Report NP-2129 indicates acceptable material performance for this projected TID.

Background radiation dose until November 30, 1985, is expected to be less than 1% of the qualification dose and is not considered to be a significant factor.

It should be noted that this is believed to be conservative since failure requires an accumulated radiation dose followed by a temperature

transient. Since the temperature transient begins with a TID of 0 (normal background TID is not significant) and is reduced to near ambient within the first hours of the accident, the necessary failure parameters are not believed to exist.

The District believes this justified and continues to justify safe continued operation. A deadline extension is required for those penetrations listed in Table 1-2. The JCO is provided in Attachment C.

The District considers Classifications 3 and 4 to be qualified under 10 CFR 50.49 and the DOR Guidelines (applicable to the Fort Calhoun Station). The following discussion is to provide a brief outline of the basis by which the District judges Classifications 3 and 4 to be qualified.

3. Equipment which is required to function in the event of a Large Break LOCA and has been modified to insure operation.

   The District determined that qualification could be established only by insuring that teflon insulation did not act as the primary insulation for the lead wires exposed to the containment atmosphere. To accomplish this the lead wires were sleeved with LBLOCA qualified Raychem heat shrink and the applicable wires at the sleeve to feedthrough seal interface were coated with RTV (LBLOCA qualified) between the stainless steel sheath and the Raychem sleeve.

   The District believes that the only area requiring review in this design was the RTV-teflon seal-teflon lead wire interface. It is the District's belief that since both the RTV and sleeving are LBLOCA qualified and that the application of each is correct as indicated by the manufacturer, the equipment can be considered qualified.

   All conductors of a subassembly were not sleeved. The District, therefore, reviewed the potential for moisture leakage down the unsleeved conductors and across the seal face to the teflon sleeve conductors causing either a short or a ground. The District believes this is not an area of concern. The District believes that the potential leakage path is very small, and that there will be no differential pressure present to force moisture into the interface. This is aided by the physical separation at the seal face which increases any potential tracking path distance.

   A time extension of the deadline for the equipment covered in Table 1-3 is not necessary and is not requested.

4. Equipment which completes its function prior to a failure induced by a LBLOCA.

   Qualification of the items listed in Table 1-4 is determined by the failure mechanism. A radiation dose must accumulate sufficiently to damage the teflon and must be followed by a temperature transient. Testing with a 720 hour total dose indicated failure after 32 hours using the District's test profile. Equipment in this category must complete its function 31.45 seconds into a LBLOCA. The District believes this margin coupled with the actual time to achieve a damaging dose is adequate to prove qualification.

The District has conducted a survey of background dose to the assemblies inside containment. The 40 year background dose is expected to just reach the threshold of the TFE seal and is expected to be well below the FEP insulation threshold. No problem should be encountered.

A time extension deadline for the equipment covered in Table 1-4 is not necessary and is not requested.

Attachment B

Justification for Continued Operation
Equipment Which Can Be Administratively Controlled

10 CFR 50.49(i) provides guidance concerning those items which should be considered in development of a justification for continued operation until that time when equipment qualification can be established. The justification should include consideration of the following items:

(1) Accomplishing the safety function by some designated alternative if the principal equipment has not been demonstrated to be fully qualified:

District's Position

The District is not justifying continued operation under this section.

(2) The validity of partial test data in support of the original qualification:

District's Position:

The District is not justifying continued operation under this section.

(3) Limited use of administrative controls over equipment that has not been demonstrated to be fully qualified:

District's Position:

Administrative controls were established for the equipment listed in Table 1-1 where the failure of electrical equipment has the potential for providing the operator with misleading information. It is expected that solenoid-operated valves will fail in their accident positions. For any indication to the contrary, the operators are instructed to fail the instrument air to containment, thus ensuring the valve is positioned in its accident position.

See the Technical Discussion.

(4) Completion of the safety function prior to exposure to the accident environment resulting from a design basis event and ensuring that the subsequent failure of the equipment does not degrade any safety function or mislead the operator:

District's Position:

The District is not justifying continued operation under this section.

(5) No significant degradation of any safety function or misleading information to the operator as a result of failure of equipment under the accident environment resulting from a design basis event:

District's Position:

The District believes that there will be no degradation in the safety function. The administrative controls ensure that the safety functions are accomplished.

There is no expected problem with misleading information. The administrative controls point out the potential problem and provide definitive action to be taken so that exact equipment status is assured.

Attachment C

Justification for Continued Operation
Penetrations Not Required To Function For Large Break LOCA
(Qualified for Small Break LOCA and Main Steam Line Break)

10 CFR 50.49(i) provides guidance concerning those items which should be considered in development of a justification for continued operation until that time when equipment qualification can be established. The justification should include consideration of the following items:

(1) Accomplishing the safety function by some designated alternative if the principal equipment has not been demonstrated to be fully qualified:

District's Position

The District is not justifying continued operation under this section.

(2) The validity of partial test data in support of the original qualification:

District's Position:

The District has partial test data in which it can be demonstrated that the penetration subassemblies listed in Table 1-2 will remain functional for a LOCA event excluding radiation exposure. Other test data indicates that the penetration subassemblies are not degraded by aging. The District used judgement to establish the expected radiation dose for the SBLOCA and MSLB. By analysis the District judged that the expected dose was sufficiently low to not degrade the teflon to a degree which would induce failure. The analysis is based on known characteristics of teflon. See the Technical Discussion for further detail regarding the radiation analysis.

(3) Limited use of administrative controls over equipment that has not been demonstrated to be fully qualified:

District's Position:

The District is not justifying continued operation under this section.

(4) Completion of the safety function prior to exposure to the accident environment resulting from a design basis event and ensuring that the subsequent failure of the equipment does not degrade any safety function or mislead the operator:

District's Position:

The District is not justifying continued operation under this section.

(5) No significant degradation of any safety function or misleading information to the operator as a result of failure of equipment under the accident environment resulting from a design basis event:

District's Position:

Since the equipment does not mitigate the consequences of a LBLOCA, no degradation of a safety function is expected. The equipment is expected

to fulfill its safety function under those accident conditions for which it is required to operate.

Since the equipment does not have to function during a LBLOCA, information provided will not mislead the operator, nor detract from the information and functions provided in the emergency procedures.

Table 1-1

Equipment Administratively Controlled

Penetration I.D. No.	TER No.	System	Function	Device(s) Fed
C9-17	99	CVCS Cont. Isolation	Control	TCV-202
C9-1	99	CVCS Cont. Isolation	Control	HCV-241
C9-10	99	CCW Cont. Isolation	Control	HCV-425A
C9-10	99	CCW Cont. Isolation	Control	HCV-425C
C9-10	99	CCW Cont. Isolation	Control	HCV-438A
C9-11	99	CCW Cont. Isolation	Control	HCV-438C
C9-11	99	CCW Cont. Isolation	Control	HCV-467A
C9-11	99	CCW Cont. Isolation	Control	HCV-467C
C9-7	99	Cont. Cooling & Air Filter Unit Dampers	Control	HCV-724A
C9-7	99	Cont. Cooling & Air Filter Unit Dampers	Control	HCV-724B
B2-6	99	Cont. Cooling & Air Filter Unit Dampers	Control	HCV-725A
B2-6	99	Cont. Cooling & Air Filter Unit Dampers	Control	HCV-725B
C9-7	99	Cont. Purge Isolation	Control	PCV-742A
C9-8	99	Cont. Purge Isolation	Control	PCV-742C
C9-8	99	Cont. Rad. Monitor Iso.	Control	PCV-742E
C9-8	99	Cont. Rad. Monitor Iso.	Control	PCV-742G
C9-17	99	Cont. Vent. Isolation	Control	HCV-746A
C9-17	99	H_2 Purge Isolation	Control	HCV-881
C9-18	99	H_2 Purge Isolation	Control	HCV-882
C9-18	99	H_2 Purge Sample Iso.	Control	HCV-883A
C9-18	99	H_2 Purge Sample Iso.	Control	HCV-884A
B2-9	99	N_2 Isolation	Control	HCV-2603B
B2-9	99	N_2 Isolation	Control	HCV-2604B
C9-9	99	Sample Isolation	Control	HCV-2504A
C9-9	99	Sample Isolation	Control	HCV-2506A
C9-9	99	Sample Isolation	Control	HCV-2507A
C9-12	99	SG Blowdown Isolation	Control	HCV-1387A
C9-13	99	SG Blowdown Isolation	Control	HCV-1388A

Table 1-2

Equipment Not Required to Function in the Event of a Large Break LOCA

Penetration I.D. No.	TER No.	System	Function	Device(s) Fed
A11-7	99	Auxiliary Feedwater	Instrumentation	A/LT-911 A/LT-912 A/PT-913
A11-8	99	Auxiliary Feedwater	Instrumentation	A/PT-914
A4-8	99	Auxiliary Feedwater	Instrumentation	B/LT-911 B/LT-912 B/PT-913
A4-9	99	Auxiliary Feedwater	Instrumentation	B/PT-914
D5-7	99	Auxiliary Feedwater	Instrumentation	C/LT-911 C/LT-912 C/PT-913
D5-8	99	Auxiliary Feedwater	Instrumentation	C/PT-914
D10-5	99	Auxiliary Feedwater	Instrumentation	D/LT-911 D/PT-913
D10-6	99	Auxiliary Feedwater	Instrumentation	D/LT-912 D/PT-914
C9-13	99	Auxiliary Feedwater	Instrumentation	HCV-1107A
C9-16	99	Auxiliary Feedwater	Instrumentation	HCV-1108A
D5-6	99	PORV & Safety Position	Instrumentation	YM-102-1 YM-141
A4-8	99	PORV & Safety Position	Instrumentation	YM-102-2 YM-142
B5-1	99	Press. Level & Press.	Instrumentation	PT-103X LT-101X
B5-2	99	Press. Level & Press.	Instrumentation	PT-103Y LT-101Y
E2-9	99	Reactor Head Vent	Control	HCV-176 HCV-178
E2-10	99	Reactor Head Vent	Control	HCV-181
E9-7	99	Reactor Head Vent	Control	HCV-177
E9-8	99	Reactor Head Vent	Control	HCV-179
E9-9	99	Reactor Head Vent	Control	HCV-180
E1-3	99	PORV & PORV Block Valve	Power	PCV-102-1 HCV-150

Penetration I.D. No.	TER No.	System	Function	Device(s) Fed
E2-8	99	PORV Block Valve	Control	HCV-150
E2-7	99	PORV	Control	PCV-102-1
B1-3	99	PORV & PORV Block Valve	Power	PCV-102-2 HCV-151
B2-10	99	PORV & PORV Block Valve	Control	PCV-102-2 HCV-151
A11-4	99	S/G Reactor Trip	Instrumentation	A/LT-901 A/PT-902 A/LT-904 A/PT-905
A4-3	99	S/G Reactor Trip	Instrumentation	B/LT-901 B/PT-902
A4-4	99	S/G Reactor Trip	Instrumentation	B/LT-904 B/PT-905
D5-3	99	S/G Reactor Trip	Instrumentation	C/LT-901 C/PT-902
D5-4	99	S/G Reactor Trip	Instrumentation	D/LT-901 D/PT-902
D10-3	99	S/G Reactor Trip	Instrumentation	D/LT-901 D/PT-902
D10-4	99	S/G Reactor Trip	Instrumentation	D/LT-904 D/PT-905
D5-7	99	Narrow Range Cont. Sump	Instrumentation	LT-599
D10-5	99	Narrow Range Cont. Sump	Instrumentation	LT-600

Table 1-3

Penetrations Modified

Penetration I.D. No.	TER No.	System	Function	Device(s) Fed
C9-1	99	Long Term Core Cooling	Control	HCV-238
B2-1	99	Long Term Core Cooling	Control	HCV-239
C9-1	99	Long Term Core Cooling	Control	HCV-240
E9-7/8	99	Long Term Core Cooling	Control	HCV-247
E2-6/7	99	Long Term Core Cooling	Control	HCV-248
E9-9	99	Long Term Core Cooling	Control	HCV-249
B2-1	99	H_2 Sampling	Control	HCV-820B
C9-5	99	H_2 Sampling	Control	HCV-820C
C9-5	99	H_2 Sampling	Control	HCV-820D
C9-5	99	H_2 Sampling	Control	HCV-820E
C9-14	99	H_2 Sampling	Control	HCV-820F
C9-19	99	H_2 Sampling	Control	HCV-820G
C9-19	99	H_2 Sampling	Control	HCV-820H
B2-7	99	H_2 Sampling	Control	HCV-821B
C9-16	99	Charcoal Filter Spray	Control	HCV-864
B2-9	99	Charcoal Filter Spray	Control	HCV-865
B2-11	99	H_2 Sampling	Control	HCV-883C
B2-11	99	H_2 Sampling	Control	HCV-883D
B2-11	99	H_2 Sampling	Control	HCV-883E
B2-11	99	H_2 Sampling	Control	HCV-883F
B2-11	99	H_2 Sampling	Control	HCV-883G
B2-11	99	H_2 Sampling	Control	HCV-883H
A4-5	99	Wide Range RCS Pressure	Instrumentation	PT-105
D5-6	99	Wide Range RCS Pressure	Instrumentation	PT-115
A4-5	99	HPSI Flow	Instrumentation	FT-313
A11-3	99	HPSI Flow	Instrumentation	FT-316
D5-2	99	HPSI Flow	Instrumentation	FT-319
D10-4	99	HPSI Flow	Instrumentation	FT-322
A11-5	99	LPSI Flow	Instrumentation	FT-328
A4-5	99	LPSI Flow	Instrumentation	FT-330
D5-5	99	LPSI Flow	Instrumentation	FT-332
D10-1	99	LPSI Flow	Instrumentation	FT-334
C6-1	99	HPSI Loop Injection	480V Power	HCV-311
C9-2	99	HPSI Loop Injection	Control	
C9-15	99	HPSI Loop Injection	Space Heater Power	
E6-1	99	HPSI Loop Injection	480V Power	HCV-312
E9-1	99	HPSI Loop Injection	Control	
E9-6	99	HPSI Loop Injection	Space Heater Power	
E1-2	99	HPSI Loop Injection	480V Power	HCV-314
E2-2	99	HPSI Loop Injection	Control	
E2-6	99	HPSI Loop Injection	Space Heater Power	
B1-2	99	HPSI Loop Injection	480V Power	HCV-315
B2-3	99	HPSI Loop Injection	Control	
B2-8	99	HPSI Loop Injection	Space Heater Power	
E1-1	99	HPSI Loop Injection	480V Power	HCV-317
E2-1	99	HPSI Loop Injection	Control	
E2-6	99	HPSI Loop Injection	Space Heater Power	

Penetration I.D. No.	TER No.	System	Function	Device(s) Fed
B1-1	99	HPSI Loop Injection	480V Power	HCV-318
B2-2	99	HPSI Loop Injection	Control	
B2-8	99	HPSI Loop Injection	Space Heater Power	
C6-2	99	HPSI Loop Injection	480V Power	HCV-320
C9-3	99	HPSI Loop Injection	Control	
C9-5	99	HPSI Loop Injection	Space Heater Power	
E6-2	99	HPSI Loop Injection	480V Power	HCV-321
E9-2	99	HPSI Loop Injection	Control	
E9-6	99	HPSI Loop Injection	Space Heater Power	
C6-2	99	LPSI Loop Injection	480V Power	HCV-327
C9-4	99	LPSI Loop Injection	Control	
C9-14	99	LPSI Loop Injection	Space Heater Power	
B1-2	99	LPSI Loop Injection	480V Power	HCV-329
B2-4	99	LPSI Loop Injection	Control	
B2-8	99	LPSI Loop Injection	Space Heater Power	
E1-2	99	LPSI Loop Injection	480V Power	HCV-331
E2-3	99	LPSI Loop Injection	Control	
E2-6	99	LPSI Loop Injection	Space Heater Power	
E6-2	99	LPSI Loop Injection	480V Power	HCV-333
E9-3	99	LPSI Loop Injection	Control	
E9-6	99	LPSI Loop Injection	Space Heater Power	
D5-7	99	Wide Range Cont. Sump	Instrumentation	LT-387
D10-5	99	Wide Range Cont. Sump	Instrumentation	LT-388
C8-8	99	Waste Disposal	Control	HCV-545

Table 1-4

Complete Function Prior to Failure
Caused by Large Break LOCA

Penetration I.D. No.	TER No.	System	Function	Device(s) Fed
A11-2	99	Pressurizer Pressure Reactor Trip - ESF Initiation	Instrumentation	A/PT-102
A4-2	99	Pressurizer Pressure Reactor Trip - ESF Initiation	Instrumentation	B/PT-102
D5-4	99	Pressurizer Pressure Reactor Trip - ESF Initiation	Instrumentation	C/PT-102
D10-4	99	Pressurizer Pressure Reactor Trip - ESF Initiation	Instrumentation	D/PT-102
C9-5	99	SI Tank Drain & Fill	Control	HCV-2916
E2-7	99	SI Tank Drain & Fill	Control	HCV-2956
B2-6	99	SI Tank Drain & Fill	Control	HCV-2936
E9-7	99	SI Tank Drain & Fill	Control	HCV-2976
E2-5	99	SI Check Leakoff	Control	PCV-2949
B2-1	99	SI Check Leakoff	Control	PCV-2929
C9-14	99	SI Check Leakoff	Control	PCV-2909
E9-5	99	SI Check Leakoff	Control	PCV-2969
B1-1	99	SI Tank Isolation	Power	HCV-2934
B2-5	99	SI Tank Isolation	Control	HCV-2934
E1-1	99	SI Tank Isolation	Power	HCV-2954
E2-4	99	SI Tank Isolation	Control	HCV-2954
E6-1	99	SI Tank Isolation	Power	HCV-2974
E9-4	99	SI Tank Isolation	Control	HCV-2974
C6-1	99	SI Tank Isolation	Power	HCV-2914
C9-6	99	SI Tank Isolation	Control	HCV-2914
C7-6	99	Containment Isolation	Power	HCV-348
C8-2	99	Containment Isolation	Control	HCV-348