EIS IDENT: RHR SYS

NUCLEAR ENERGY
BUSINESS OPERATIONS

GENERAL ELECTRIC

23A1900AA SH NO. 1
REV 2

REVISION STATUS SHEET SYS. 9

DOCUMENT TITLE RESIDUAL HEAT REMOVAL SYSTEM

LEGEND OR DESCRIPTION OF GROUPS

TYPE DESIGN SPEC DATA SHEET

FMF

THE SUPPLY SYSTEM IS RESPONSIBLE FOR DESIGN CHANGE CONTROL OF THIS DOCUMENT

MPL ITEM NO. E12-4010

REVISIONS | C

Rev. No.	Revision	Date	Dwn.	Chkd.	Apvd. S.S. Engr.
0	Document Control Transfer Per PWA 3608KK DMC-2429				
2	PER TASK 5970: FDI-131-0	12 28 83		DB	1/18
1	Dwg. Transferred To Supply System Control As Per Work Order 4300 EMR-B3-1866	10 25 83	BAM		F.J.M. 18 NOV 83

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BURNS AND ROE

Burns & Roe Is Responsible Only For That Information It Has Added To This Drawing In Accordance With Supply System Direction By The Above Revisions.

BURNS & ROE FILE NO. 2-17-0500

SUPPLY SYSTEM	CVI Number	CVI Sheet	Rev.	Dwg. Sheet
	02-02E12-03	6	2	—

PRINTS TO				
PR				
682A				
754MR				

MADE BY	APPROVALS	DEPT	LOCATION
M MONTOYA 9-12-83	JK SAWABE RW Howard for	NED	SAN JOSE
CHKD BY M TOBECK 9-12-83	ISSUED FM IKEMOTO SEP 26 1983	CONT ON SHEET 2	SH NO. 1

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NEO 807A (REV. 10/81)

TABLE 1 (Continued)

FUNCTION	INSTRUMENT	RANGE (1)	ACCURACY (2)	CALIBRATION (3)	DRIFT (4)	NTSP (5)	TSL (6)	ANALYTICAL LIMIT (7)
Differential Pressure Indicating Switch, Minimum Flow Valve	E12-N010	0-1500 gpm[b]	80 gpm[b]	20 gpm[b]	150 gpm[b]	800 gpm[b]	650 gpm[b] 950 gpm[b]	550 gpm[b],[c] 1050 gpm[b],[c]
Flow Element, Head Spray Line	E12-N012	0-1000 gpm	20 gpm	-	-	-	-	-
Flow Transmitter, Head Spray Line	E12-N013	0-1000 gpm	See R607	-	-	-	-	-
Flow Element, Main Process Line	E12-N014	0-10,000 gpm	100 gpm	-	-	-	-	-
Flow Transmitter, Main Process Line	E12-N015	0-10,000 gpm	See R603	-	-	-	-	-
Pressure Switch, Pump Discharge (ADS Interlock)	E12-N016	10-240 psig	6 psi	2 psi	10 psi	125 psig	115 psig 135 psig	100 psig 150 psig
Pressure Switch, Shutdown Cooling Suction (Alarm High)	E12-N018	20-260 psig	6 psi	2 psi	10 psi	200 psig[a]	-	220[a]

(a) Specific value must account for elevation differences between instrument tap and low point on system (elevation head due to water (column); by AE.

(b) Pressure corresponding to the specified flow rates.

(c) A flow rate greater than the smaller of the two values specified is required for adequate pump cooling. A flow rate less than the largest flow rate specified is required to assure acceptably high system discharge pressure for initiation of core cooling.

TABLE 1 (Continued)

FUNCTION	INSTRUMENT	RANGE (1)	ACCURACY (2)	CALIBRATION (3)	DRIFT (4)	NTSP (5)	TSL (6)	ANALYTICAL LIMIT (7)
Pressure Switch, Pump Discharge (ADS Interlock)	E12-N019	10-240 psig	6 psi	2 psi	10 psi	125 psig	115 psig 135 psig	100 psig 150 psig
Pressure Indicating Switch, Main Process Line (Alarm High)	E12-N022	0-500 psig	6 psi	2 psi	10 psi		-	500 psig
Conductivity Element, Discharge to Radiation Waste	E12-N025	0-25 μmho/cm	See R006	-	-	-	-	-
Pressure Transmitter, Steam Inlet to Heat Exchanger	E12-N026	0-600 psig	See R606	-	-	-	-	-
Temperature Element, Main Process Line	E12-N027	40-500°F	See R601	-	-	-	-	-
Pressure Transmitter, Heat Exchanger Condensate Discharge	E12-N028	0-100 psig	See R605	-	-	-	-	-
Differential Pressure Indicating Switch Break Detection	E12-N029	-5/0/+5 psid	0.2 psi	0.12 psi	0.3 psi	Change of 0.5 psid (d)	0.8 psid (d)	1.1 psid
Conductivity Indicating Transmitting Switch, Heat Exchanger Shell Side Outlet (Alarm High)	E12-N030	0-10 μmho/cm	1.0 μmho/cm See R611	-	-	Field	-	-

(a) Specific value must account for elevation differences between instrument tap and low point on system (elevation head due to water (column); by AE.

(d) Change is in the direction that causes the broken line pressure to decrease.

TABLE 1 (Continued)

FUNCTION	INSTRUMENT	RANGE (1)	ACCURACY (2)	CALIBRATION (3)	DRIFT (4)	NTSP (5)	TSL (6)	ANALYTICAL LIMIT (7)
Temperature Element, Discharge to Radiation Waste	E12-N031	40-500°F	See R601	-	-	-	-	-
Pressure Switch, Reactor Steam (F087 Interlock)	E12-N032	200-1200 psig	12 psig	4 psig	20 psig	465 psig[a]	485 psig[a]	500 psig[a]
Pressure Switch, Reactor Steam (F087 Interlock)	E12-N033	200-1200 psig	12 psig	4 psig	20 psig	465 psig[a]	485 psig[a]	500 psig[a]
Pressure Transmitter, Pump Discharge (TDAS)	E12-N037	(e)	(e)	(e)	(e)	(e)	(e)	(e)
Pressure Indicator, Downstream of LPCI Mode Injection Valve	E12-N038	0-1000 psig	20 psi	-	-	-	-	-
Pressure Indicator, Pump Suction	E12-R002	-10 to 250 psig	2 psi	-	-	-	-	-
Conductivity Indicator, Discharge to Radiation Waste	E12-R006	0-25 μmho/cm	1.0 μmho/cm	-	-	-	-	-
Temperature Recorder Switch, Water Temperature	E12-R601	40-500°F	10°F	3°F	10°F	420°F(N004) 140°F(N005)		

(a) Specific value must account for elevation differences between instrument tap and low point on system (elevation head due to water column); by AE.

(e) The Transient Data Acquisition System (TDAS) supplied by Others. The instrument setpoints (Range, Accuracy, Calibration Error, Allowable Drift, Nominal Trip Setpoint, Allowable Value and Analytical Limit) for the instrument loop containing pressure transmitter MPL E12-N037 provided by Others.

NOTES:

1. Scale Range- The minimum required range of the measured variable or process to which the process sensing instrument and/or trip devices are to be calibrated. 2

2. Instrument Accuracy - The quality of freedom from error of the complete instrument channel from the sensor input through the trip device output including the combined conformity, hysteresis, and repeatability errors. The value specified is the maximum value for two standard deviations ($2\sigma_a$) of the probability distribution of instrument accuracy.

3. Calibration Accuracy - The quality of freedom from error to which the trip setpoint is calibrated with respect to the true desired setting, including both calibration instrumentation accuracies and calibration procedure allowances. When associated with the calibration instruments, this term is sometimes referred to as "Resolution." The value specified is the maximum value for two standard deviations ($2\sigma_c$) of the probability distribution of calibration accuracy.

4. Instrument Drift - The change in the value of the process variable, at which the trip action will actually occur, between the time the nominal trip setpoint is calibrated and a subsequent surveillance test, due to all causes, as measured in terms of the instrumentation indicator scale. The value of the process variable at which the trip action will actually occur at the time of calibration is taken to be the intended nominal trip set point value. The value specified is the maximum value for two standard deviations ($2\sigma_d$) of the probability distribution of instrument drift.

5. Nominal Trip Set Points (NTSP) - The intended calibration point at which a trip action is set to operate, commonly the center of an acceptable range of trip operation.

6. Technical Specification Limit (TSL) - The limit prescribed as license condition on an important process variable.

7. Analytical Limit - The value of the sensed process variable established as part of the safety analysis, prior to which a desired action is to be initiated to prevent the process variable from reaching the associated design safety limit.

8. The combined instrument channel accuracy in this loop (temperature elements, controller, transmitter, indicator, converter, switch power supplies and ATWAS; as applicable) shall not exceed this value.

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CM NO	CM SHT	REV	DWG SHT

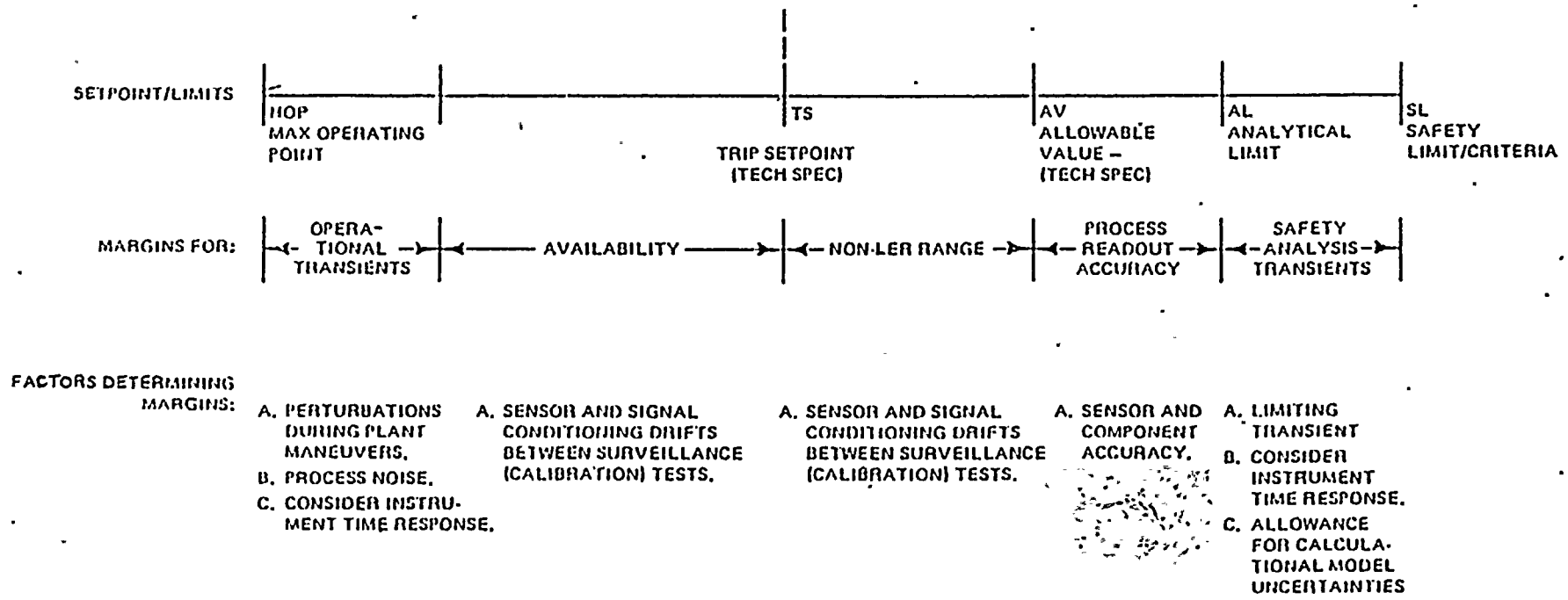
NOTES: (continued)

9. The combined channel calibration accuracy in this loop (temperature elements, controller, transmitter, indicator, converter, switch power supplies and ATWAS; as applicable) shall not exceed this value.

10. The combined channel drift in this loop (temperature elements, controller, transmitter, indicator, converter, switch power supplies and ATWAS; as applicable) shall not exceed this value.

EXHIBIT . I

INSTRUMENT SETPOINT SPECIFICATION BASIS



BURNS AND ROE, INC. EXHIBIT II
Headquarters Office–Oradell, N.J.

W.O. No. _____ Date _____ Book No. _____ Page No. _____
Drawing No. _____ Calc. No. _____ Sheet _____ Cont. on Sheet _____
By _____ Checked _____ Approved _____
Title SETPOINT DATA SHEET

1. INSTRUMENT NO. SW-TS-1B SWITCH NO. 2A CIRCUIT NO. NA NO/(NC) CONTACT
MFG/MODEL GEPL/368X481 (BAILEY 745) INST. RANGE _____

2. FUNCTION SPRAY POND "B" HIGH WATER TEMP. ALARM

A) (TECH. SPEC.) OR PROTECTIVE LIMIT (YES)/NO) IF YES, GO TO STEP 3.

B) PROCESS FUNCTION, (ALARM) OR INDICATION (YES)/NO IF YES, COMPLETE STEPS 7, 12 &13.

C) OTHER _____ (YES/(NO)) IF YES, JUSTIFY METHODOLOGY IN REMARKS (STEP 13).

3. ALLOWABLE VALUE _____ (TECH SPEC ONLY) TRIP SETPOINT _____

REFERENCE _____ SEE INSTRUCTION. IF NO ACCEPTABLE REFERENCE COMPLETE STEPS 4-13. OTHERWISE GO TO STEP 13.

4. PROCESS READOUT ACCURACY

COMPONENT	MFG/MODEL	ACCURACY (%)		CALIBRATED RANGE		INSTRUMENT ACCURACY	REFERENCE
SW-TE-1B	HYCAL/RTS 32A10DC3	±.2Ω=±1°F	X	NA	=	1°F	HYCAL PD-311.1 B&R FILE 218-01-794
SW-TS-1B	BAILEY/745	1.2%	X	150°F	=	1.8°F	BAILEY 745 CATALOG
MULTIPLEXOR	IC ENG'K	.5%	X	150°F	=	.7°F	IC ENG'K TM 119-00
TOTAL LOOP ACCURACY						3.5°F	

5. INSTRUMENT DRIFT ALLOWANCE 1% (150°) = 1.5°F ALLOWANCE ONLY

6. RESET DEADBAND .02-.2 VDC BAILEY 745 CATALOG

7. NORMAL OPERATING POINT/RANGE <77°F TECH SPEC. 3.7.1.

8. O MAXIMUM/O MINIMUM OPERATING POINT (VALUE TOWARD LIMITING CONDITION) NA —

9. ANALYTICAL LIMIT (AL) 77 °F TECH SPEC. 3.7.1.

10. ALLOWABLE VALUE (AV) (STEP 9±STEP 4) 73.5°F SEE INSTRUC

11. TRIP SETPOINT LIMIT (STEP 10±STEP 5) 72°F SEE INSTRUC

12. TRIP SETPOINT REFERENCE STEPS 4-11 72°F SEE INSTRUCT

13. CONCLUSIONS: TRIP SETPOINT 72°F. (PROCESS UNITS) ON: INCREASE/~~DECREA~~

TRIP SETPOINT 2.92 VDC (INSTRUMENT UNITS)

ALLOWABLE VALUE 73.5°F

REMARKS:

LOW TEMP— FOLLOWING PAGE

EXHIBIT III

BURNS AND ROE, INC

Headquarters Office–Oradell, N.J.

W.O. No. _____ Date _____ Book No. _____ Page No. _____

Drawing No. _____ Calc. No. _____ Sheet _____ Cont. on Sheet _____

By _____ Checked _____ Approved _____

Title INSTRUCTION

STEP 1. Complete all required information. If not applicable, mark NA.

STEP 2. Explain the function of the switch. Complete one of the following.

A) Identify if a Technical Specification applies or if the switch fuction is a protective limit. A protective limit is one which results in equipment damage or an unsafe condition if exceeded. A tech. spec. or protective limit can also be in the form of a process function, alarm or indication, however, this step must be complied with.

B) Identify setpoints which are to control process functions, alarm that a condition exists or provide an indication. Instruments in this catagory are operator aids and are not tech. spec. or protective limit.

C) Identify and explain any additional catagories of instruments and select appropriate calculation method.

STEP 3. Enter allowable values (tech. spec. only) and trip setpoints as defined in definitions. Reference their respective engineering documents (e.g. drawing, calculation, vendor information). If this data is unavailable, STEPS 4-13 must be used to derive these values.

STEPS 4-9. Enter the required information and references. See Definitions.

STEP 10. Calculate the Allowable Value (AV). If a minimum limit (STEP 8) then, AV=STEP 9+STEP 4, if a maximum limit, AV=STEP 9-STEP 4.

STEP 11. Calculate the Trip Setpoint Limit. This value as calculated is as close as the setpoint can be to (AL). This value can be the actual setpoint or it may be established using the guidelines in STEP 12.

STEP 12. Setpoints must be established to perform the required function yet minimize inadvertent tripping due to operational transients. The following guidelines should apply or an improper instrument may be applied.

STEP 8 (MAX) + STEP 4 + STEP 6 < TRIP SETPOINT, OR

STEP 8 (MIN) + STEP 4 - STEP 6 > TRIP SETPOINT

If STEP 2B, or possibly 2C, is used, reference the source of or method used to determine the setpoint. Continue in Remarks section if necessary.

STEP 13. Enter the Trip Setpoint, both in process and instrument units, the Allowable Value (Tech. Spec. only), and note any Remarks which may be helpful in understanding how this calculation was completed.

EXHIBIT IV

BURNS AND ROE, INC.
Headquarters Office—Oradell, N.J.

W.O. No. _____ Date _____ Book No. _____ Page No. _____
Drawing No. _____ Calc. No. _____ Sheet _____ Cont. on Sheet _____
By _____ Checked _____ Approved _____
Title DEFINITIONS

1) Accuracy: Manufacturers rated accuracy in percent full scale.

2) Accuracy, Total Loop: The sum of the instrument accuracies or, if desired, the square root of the sum of the squares of the instrument accuracies.

3) Analytical Limit (A.L.): The value of the sensed process variable prior to which a desired action is to be initiated to prevent the process variable from reaching the associated design/safety limit.

4) Allowable Value: Analytical Limit minus Total Loop Accuracy.

5) Instrument Drift - Estimated change in instrument setpoint between calibrations.

6) Maximum Operating Point - Normal plant process operating point plus normal operating transients.

7) Minimum Operating Point - Normal plant process operating point minus normal operating transients.

8) NO/NC Contact - Normally Open/Normally Closed contact used for switch function.

9) Reset Deadband - Contact deadband between trip setpoint and contact reset (return to normal).

10) Switch No. & Circuit No. - Identifies the switch and circuit within the instrument as identified by the instrument manufacturer.

11) Trip Setpoint Limit - This value is as close to the Analytical Limit as the instrument can initially be set.