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AUTH.NAME AUTHOR AFFILIATION
KAMMER,D.S. Tennessee Valley Authority
RECIP.NAME RECIPIENT AFFILIATION
ADENSAM,E. Licensing Branch 4

SUBJECT: Forwards response to Generic Ltr 83-28, "Required Actions Based on Generic Info of Salem ATWS Events." B&W Owners Group response adopted.

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TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

June 26, 1984

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of	)	Docket Nos. 50-438
Tennessee Valley Authority	)	50-439

Enclosed for your information and use is TVA's response to Generic Letter 83-28, "Required Actions Based on Generic Information of Salem ATWS Events" for the Bellefonte Nuclear Plant. Please note that for some items, TVA has adopted the B&W Owners Group response to this generic letter.

An extension for submittal of this information was discussed with Carl Stahle of your staff on March 30, 1984.

If you have any questions concerning this matter, please get in touch with Kashmira Mali at FTS 858-2680.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D S Kammer

D. S. Kammer
Nuclear Engineer

Sworn to and subscribed before me
this 26th day of June 1984

Paulette H. White
Notary Public
My Commission Expires 9-5-84

Enclosures (20)
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

A055
1/1

ENCLOSURE

GENERIC LETTER 83-28
REQUIRED ACTIONS BASED ON
GENERIC INFORMATION
OF SALEM ATWS EVENTS

BELLEFONTE NUCLEAR PLANT

1.1 POSTTRIP REVIEW

At the present time, the Bellefonte procedures are in the process of being prepared, reviewed, or revised. TVA believes it would be in the best interest of all parties not to respond to this section when, at the present time, we are more than three years away from fuel load. Many changes can and will occur to plant procedures during the next three years; changes which will take into account Generic Letter 83-28 and related information. TVA commits to fully respond to this section six months before fuel load.

1.2 POSTTRIP REVIEW - DATA AND INFORMATION CAPABILITY

Position

Licensees and applicants shall have or have planned a capability to record, recall, and display data and information to permit diagnosing the causes of unscheduled reactor shutdowns before restart and for ascertaining the proper functioning of safety-related equipment.

Adequate data and information shall be provided to correctly diagnose the cause of unscheduled reactor shutdowns and the proper functioning of safety-related equipment during these events using systematic safety assessment procedures (Action 1.1). The data and information shall be displayed in a form that permits ease of assimilation and analysis by persons trained in the use of systematic safety assessment procedures.

A report shall be prepared which describes and justifies the adequacy of equipment for diagnosing an unscheduled reactor shutdown. The report shall describe as a minimum:

1.2.1 Capability for assessing sequence of events (on-off indications)

1. Brief description of equipment (e.g., plant computer, dedicated computer, strip chart)
2. Parameters monitored
3. Time discrimination between events
4. Format for displaying data and information
5. Capability for retention of data and information
6. Power source(s) (e.g., Class 1E, non-Class 1E, non-interruptible)

Response

In regard to computer posttrip review capability, TVA is presently in the process of upgrading and consolidating the Bellefonte computer systems. However, at this time we do not expect this redesign to change the content, format, power supply, or basic functional operation of the posttrip review capability described for the Bailey 855/50 computer system. Our tentative schedule for completing this work is before fuel loading.

1.2.1.1 The equipment used for sequential events recording is a Technology, Incorporated, sequential event recorder model 224A. The output device (printer) is a modified Teletype Corporation model RO-33 which operates at a baud rate of 110 (10 characters per second). This system is dedicated to continuously scanning a predetermined set of parameters (defined in 1.2.1.2) and logging status changes from normal to abnormal or abnormal to normal.

1.2.1.2 The parameters monitored are listed in Table 1 (attached). The system is wired for 208 points; 168 are used.

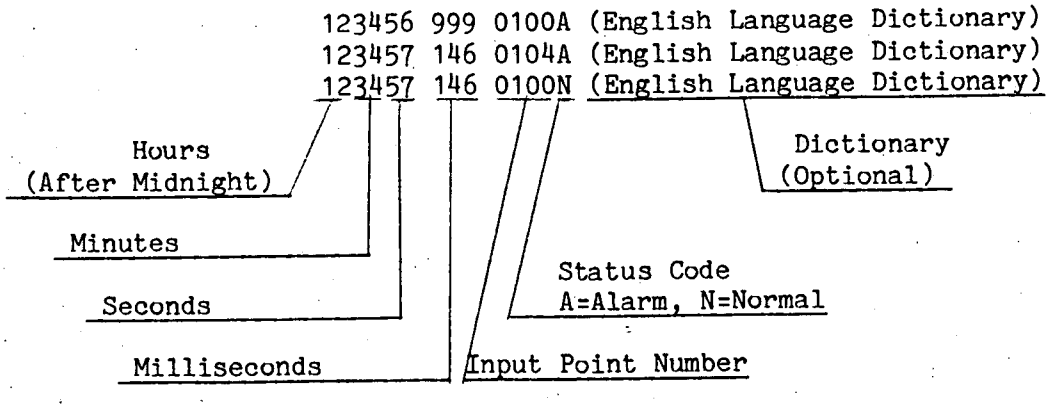
1.2.1.3 Input points are sequentially scanned at a rate of 600 kHz (1.6 microseconds per input). However, when a status change is detected, the scanner is stopped at that point for 130 microseconds while the time, input point number, and status are loaded into the sequential memory. Once this data has been written into the memory, the scanning process is continued until the next event is detected.

Event time is output to the printer with a time resolution of 1 millisecond. (See format in 1.2.1.4.)

1.2.1.4 The sequence recording format and memory full format are shown below.

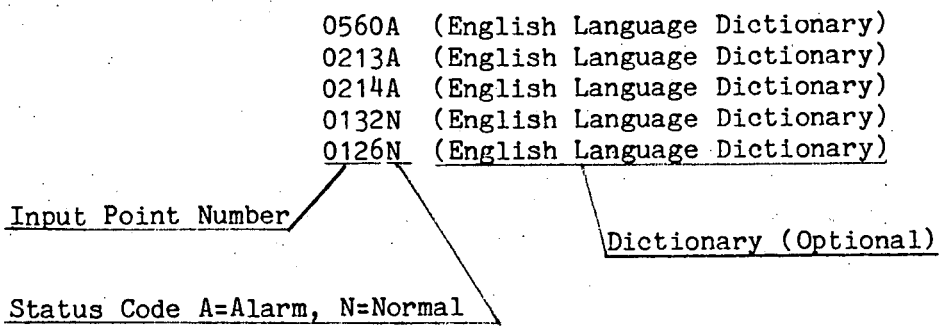
Sequence Recording Format

Sequence recording is defined as the format of those events which are stored in the sequential memory and output in the sequence of occurrence. These events are easily identified by the time tag in milliseconds.



Memory Full Format

The format is defined as those events occurring after a sequential memory full condition exists. This output format is always preceded by the sequence recording format and is only output after all events stored in the sequential memory have been output. Events output in this format are not necessarily in the order of occurrence. The status code letter indicates the event status at the time the event is output.



1.2.1.5 The sequential memory will accommodate 16 sequential events that have not yet been printed. As each sequential memory location is output, it is made available for new event data. If data is received at such a rate that the sequential memory becomes full before it can be printed, then a memory full condition exists. Events occurring after the memory full condition are stored in another memory to be output after the sequential memory has been printed out. As stated in 1.2.1.4, events printed from this memory are not necessarily in sequential order and the event status code indicates the event status at the time the event is printed. After the contents of both memories have been printed, a sequence complete signal is generated which allows the next event to be stored in the sequential memory and a new sequence of events to be enabled. A printed hard copy of the entire sequence is provided for reference.

1.2.1.6 The power source for the sequential events recording system is non-Class 1E, 120-V ac uninterruptible.

1.2.2 Capability for assessing the time history of analog variables needed to determine the cause of unscheduled reactor shutdowns and the functioning of safety-related equipment.

1. Brief description of equipment (e.g., plant computer, dedicated computer, strip charts)

2. Parameters monitored, sampling rate, and basis for selecting parameters and sampling rate

3. Duration of time history (minutes before trip and minutes after trip)

4. Format for displaying data including scale (readability) of time histories

5. Capability for retention of data, information, and physical evidence (both hardware and software)

6. Power source(s) (e.g., Class 1E, non-Class 1E, non-interruptible)

Response

The Bailey 855/50 plant process computer posttrip review function provides this capability.

The posttrip review will provide the operator with a list of the historic values for 30 minutes of the points assigned to the memory review group (see attached Table 2). The historic records are filled automatically 15 minutes following a reactor trip and are retained until canceled or printed at the the discretion of the operator. Notification is made when the data is ready by the flashing of the posttrip review status indicator light. Subsequent trips will be locked out until a printout is canceled or completed.

To reduce printing time, values are set up at 1-minute intervals from 15 minutes to 5 minutes before and after the trip and at 15-second intervals from 5 minutes before to 5 minutes after the trip.

The output device is the line printer and takes approximately 5 minutes to output. See attached Table 3 for print format.

The power supply for the plant process computer is non-Class 1E, 120-V ac uninterruptible.

1.2.3 Other data and information provided to assess the cause of unscheduled reactor shutdowns.

Response

The reactor protection system annunciators provide the operator with information which alerts him to the probable cause of the reactor trip. The operator also has strip chart recording of selected parameters for use in determining causes of reactor trips.

1.2.4 Schedule for any planned changes to existing data and information capability.

Response

TVA is considering making the following changes to the sequential events recording system identified during our human factors control room design review (CRDR). A tentative schedule is not available since these changes are still being evaluated.

1. Expansion of the sequential memory capacity.

2. Replacement of the RO-33 teletype printer with a faster printer.

3. Addition of the English language dictionary option on point descriptions.

4. Addition of priority interrupt capability for sequential logging during offline operations.

We are also considering the addition of reactor trip first-out annunciation as a result of our human factors CRDR. A tentative schedule is not available since this change is still being evaluated.

NOTES:

1. Four-digit number in "F.O. Ann" and "Reg Ann" columns indicates window used for visual annunciation (see 5GB0902-IA Series drawings).

2. Points 1-21 are "OR"ed together for indication on one window.

3. Points 22-29 are "OR"ed together for indication on one window.

4. The significant digits in the SER point number and the SER "stack" terminal number are identical.

REV NO	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	CHKD	INSP	SUBM	RECM	APPD
3	51	1-24-80	LTB	LTB	[illegible]	[illegible]	CA	—	CA	JS	[illegible]
	DELETE NOTE REF AT BOTTOM										
2	[illegible]	[illegible] 78	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	JLS	[illegible]
	ADD NOTE 4 & 1 PO'S										
1	97	9-21-78	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]
	RETYPED										

DSGN L. T. Brown
DRWN L. T. Brown
CHKD C. T. [illegible]
SUPV E. G. Redmond
INSP
ENGINEER [signature]

UNITS 1 & 2
MAIN CONTROL ROOM
SEQUENCE-OF-EVENTS
RECORDER/FIRST OUT
ANNUNCIATOR LIST

BELLEFONTE NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED [signature] RECOMMENDED [signature] APPROVED [signature]

KNOXVILLE [illegible] 5GA0901-IA-01 R3

Point No.	F.O. Ann.	Reg. Ann.	Point Description
001	4206	-	Rect. Xfmr Overtemp II
002		-	Rect. Xfmr Sudden Press II
003		-	Rect. Xfmr Overcurrent Delayed
004		-	Rect. Xfmr Cvercurrent Inst
005		-	Rotor Overcurrent
006		-	Rotor Overload
007		-	Initial Excitation Disturbed
008		-	Manual Supply Unit Failure
009		-	Synchro Voltage Failure
010		-	Man Synchro Voltage Failure
011		-	Freq Dependent Overvoltage
012	Exciter Trouble NOTE 2	-	Rotor Overvoltage
013		-	Gen Freq Supervision
014		-	Regulator Undervoltage
015		-	Veripact Defect
016		-	Exc Cooling Water Pumps Failure
017		-	Bus Bar Water Flow Failure
018		-	Header Tank Water Level < 30%
019		-	Water Inlet Temp > 48°C
020		-	Water Outlet Temp > 68°C
021		-	Rotor Earth Fault
022	4205	-	Water Temp at Stator Winding Outlet HI-HI Trip
023		-	Water Flow in Main Circuit Low
024		-	Diff Press Seal OIL-H_2 Low
025		-	Cond in Main Ckt Winding Inlet HI-HI
026	Gen Cooling NOTE 3	-	Stator Cooling Water Tank Level LO-LO
027		-	Water Press at Stator Inlet Header Low
028		-	Liquid Leakage in Terminal Box HI-HI
029		-	Cold Gas Temp HI-HI
030	4203	-	Main Gen Electrical Trouble Turbine Trip
031	4228	-	Turbine Lube Oil Press < 60%
032	4221	-	Turbine Lube Oil Press < 40%
033	4219	-	Control Air Press Trip

NOTE: See 5GB0901-IA-01 for Notes.

REV NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUEU	RECM	APPD
2	51	1-26-80	LTB	LTB	GOO	GOO	CA	-	CA	JS	[illegible]
ADD NO 2 & 3 COMMENT IN COL 2.											
1	81	9 21 78	LTB	LTB	[illegible]	[illegible]	EAR	[illegible]	-	[illegible]	JLG
CORRECTIONS TO POINTS 003, 005, 006, 014, 017 AND 022.											

DSGN L. T. Brown
DRWN L. T. Brown
CHKD C. T. Lison
SUPV E. G. Redmond

INSP

ENGINEER [signature]

UNITS 1 & 2
MAIN CONTROL ROOM

SEQUENCE-OF-EVENTS RECORDER/FIRST OUT ANNUNCIATOR LIST

BELLEFONTE NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED [signature] RECOMMENDED [signature] APPROVED [signature]

KNOXVILLE 12-14-77 E 5GA0901-IA-02 R

Point No.	F.O. Ann.	Reg. Ann.	Point Description
034	4215	-	Condenser 1 Vacuum Trip
035	4216	-	Condenser 2 Vacuum Trip
036	4220	-	Turbine Vibration Trip
037	4213	-	Turbine Shaft Posn Trip
038	4214	-	Turbine Lube Oil LVL-LO-LO
039	4217	-	Turbine Emergency System Left Tripped
040	4218	-	Turbine Emergency System Right Tripped
041	4209	-	Turbine Safety Oil Ckt Trip
042	4210	-	Turbine Fire Protection Tripped
043	4208	-	Turbine Eccentricity High Trip
044	4227	-	TT4 Trip
045	4222	-	MS A Level HI-HI Turbine Trip
046	4223	-	MS B Level HI-HI Turbine Trip
047	4204	-	Stm Gen Superheat Less Than 15° Trip
048		-	
049	4226	-	Htr Dr TK 3 Level HI-HI Turbine Trip
050	4233	-	Htr Dr TK 6 Level HI-HI Turbine Trip
051	4229	-	Htr D5 Level HI-HI Turbine Trip
052	4231	-	Htr D6 Level HI-HI Turbine Trip
053	4230	-	Htr A5 Level HI-HI Turbine Trip
054	4232	-	Htr A6 Level HI-HI Turbine Trip
055	4201	-	Reactor Trip Confirm
056	-	-	MFPT A Exhaust High Temp (26E)
057	-	-	MFPT A Vibration (39 VB/E)
058	-	-	MFP A Vibration (94TA4)
059	-	-	MFPT A Exhaust High Press (63E)
060	-	-	MFPT A Low Lube Oil Pressure (63Q)
061	-	-	MFPT A Missing Signal (12TX1 and 12TX2)
062	-	-	MFPT A Emergency Trip (5E)
063	-	-	MFPT A Overspeed (12TX1)
064	-	-	MFPT A Overspeed (12TX2)
065	-	-	MFPT A Low Feedwater Temp (94TA)
066	-	-	MFPT A Suction Valve Closed

NOTE: See 5GB0901-IA-01 for Notes.

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REV NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUCC	RECD	APPD
21		1-22-80	LTB	LTB	903	903	EA	-	EA	JS	
ADD NEW POINT TO A7											
1	81	9-21-78	LTB	LTB	-	[illegible]	A	-	[illegible]	JLS	
CORRECTIONS TO POINTS 045-047 AND 051-054.											

DSGN L. T. Brown
DRWN L. T. Brown
CHKD C. T. Lyon
SUPV E. G. Rothrock

INSP
ENGINEER

UNITS 1 & 2
MAIN CONTROL ROOM

SEQUENCE-OF-EVENTS RECORDER/FIRST OUT ANNUNCIATOR LIST

BELLEFONTE NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED | ENGINEERED | APPROVED

KNOXVILLE

5GA0901-IA-03 R2

	F.O. Ann.	Reg. Ann.	Point Description
067	-	-	MFPT A Thrust Bearing Wear (39SP)
068	-	-	MFPT A No CPB's Running
069	-	-	MFPT A St. Gen Overrun High Level
070	-	-	MFPT A Manual Trip (4TRR)
071	4202	-	MFPT A & B Trip
072	-	-	MFPT B Exhaust Temp High (26E)
073	-	-	MFPT B Vibration (39VB/E)
074	-	-	MFP B Vibration (94TB4)
075	-	-	MFPT B Exhaust Press High (63E)
076	-	-	MFPT B Low Lube Oil Press (63Q)
077	-	-	MFPT B Missing Signal (12TX1 & 12TX2)
078	-	-	MFPT B Emergency Trip (5E)
079	-	-	MFPT B Overspeed (12TX1)
080	-	-	MFPT B Overspeed (12TX2)
081	-	-	MFPT B Feedwater Temp Low (94TB)
082	-	-	MFPT B Suction Valve Closed
083	-	-	MFPT B Thrust Bearing Wear (39SP)
084	-	-	MFPT B No CPB's Running
085	-	-	MFPT B St Gen Overrun High Level
086	-	-	MFPT B Manual Trip (4TRR)
087	-	6217	RPS D High RC Press Trip
088	-	6227	RPS E High RC Press Trip
089	-	6237	RPS F High RC Press Trip
090	-	6247	RPS G High RC Press Trip
091	-	6214	RPS D Low RC Press Trip
092	-	6224	RPS E Low RC Press Trip
093	-	6234	RPS F Low RC Press Trip
094	-	6244	RPS G Low RC Press Trip
095	-	6218	RPS D High PRZR Level Trip
096	-	6228	RPS E High PRZR Level Trip
097	-	6238	RPS F High PRZR Level Trip
098	-	6248	RPS G High PRZR Level Trip
099	-	6219	RPS D Low PRZR Level Trip

NOTES: See 5GA0901-IA-01 for Notes.

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UNITS 1 & 2
MAIN CONTROL ROOM

SEQUENCE-OF-EVENTS RECORDER/FIRST OUT ANNUNCIATOR LIST

...TE NUCLEAR PLANT

REV NO	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	...	...	APPD
1	81	[illegible]	[illegible]	[illegible]		[illegible]	-	[illegible]			

CORRECTIONS TO POINTS [illegible]

DSGN L. T. Brown
DRWN L. T. Brown
CHKD C. T. Lifgen
SUPV E. G. Redmond

INSP

ENGINEER [signature]

21

	F.O. Ann.	Reg. Ann.	Point Description
100	-	6229	RPS E Low PRZR Level Trip
101	-	6239	RPS F Low PRZR Level Trip
102	-	6249	RPS G Low PRZR Level Trip
103	-	6220	RPS D High RC Outlet Temp Trip
104	-	6230	RPS E High RC Outlet Temp Trip
105	-	6240	RPS F High RC Outlet Temp Trip
106	-	6250	RPS G High RC Outlet Temp Trip
107	-	6212	RPS D Overpower Trip
108	-	6222	RPS E Overpower Trip
109	-	6232	RPS F Overpower Trip
110	-	6242	RPS G Overpower Trip
111	-	6213	RPS D Power/Flow Trip
112	-	6223	RPS E Power/Flow Trip
113	-	6233	RPS F Power/Flow Trip
114	-	6243	RPS G Power/Flow Trip
115	-	6311	RPS D Calc Prod Survl Trip
116	-	6321	RPS E Calc Prod Survl Trip
117	-	6331	RPS F Calc Prod Survl Trip
118	-	6341	RPS G Calc Prod Survl Trip
119	-	6313	RPS D Calc Module Pwr/Δ T Stup Trip
120	-	6323	RPS E Calc Module Pwr/Δ T Stup Trip
121	-	6333	RPS F Calc Module Pwr/Δ T Stup Trip
122	-	6343	RPS G Calc Module Pwr/Δ T Stup Trip
123	-	6312	RPS D Calc Module Pwr Offset Trip
124	-	6322	RPS E Calc Module Pwr Offset Trip
125	-	6332	RPS F Calc Module Pwr Offset Trip
126	-	6342	RPS G Calc Module Pwr Offset Trip
127	-	6314	RPS D Calc Module Low DNBR Trip
128	-	6324	RPS E Calc Module Low DNBR Trip
129	-	6334	RPS F Calc Module Low DNBR Trip
130	-	6344	RPS G Calc Module Low DNBR Trip
131	-	6315	RPS D Calc Module Pmp Stat Trip
1	-	6325	RPS E Calc Module Pmp Stat Trip

NOTES: See 5CA0901-IA-01 for Notes.

REV NO	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	MGMT	APPD
1	2	9-2178									

DSGN L. T. Brown
DRWN L. T. Brown
CHKD C. T. Ligon/cgg
SUPV E. G. Redmond
INSP
ENGINEER

UNITS 1&2
MAIN CONTROL ROOM
SEQUENCE-OF-EVENTS RECORDER/FIRST OUT

SAN ONOFRE NUCLEAR PLANT

TABLE 1 (CONT'd)

Point No.	F.O. Ann.	Reg. Ann.	Point Description
133	-	6335	RPS F Calc Module Pmp Stat Trip
134	-	6345	RPS G Calc Module Pmp Stat Trip
135	-	6216	RPS D High Press Shutdown Bypass Trip
136	-	6226	RPS E High Press Shutdown Bypass Trip
137	-	6236	RPS F High Press Shutdown Bypass Trip
138	-	6246	RPS G High Press Shutdown Bypass Trip
139	-	6316	RPS D Protection Channel Trip
140	-	6326	RPS E Protection Channel Trip
141	-	6336	RPS F Protection Channel Trip
142	-	6346	RPS G Protection Channel Trip
143	-	6319	RPS D Pwr Supply Fault
144	-	6329	RPS E Pwr Supply Fault
145	-	6339	RPS F Pwr Supply Fault
146	-	6349	RPS G Pwr Supply Fault
147	-	4108	ESFAS Analog A BWST Switchover Command to RB Emer Sump
148	-	4132	ESFAS Analog C BWST Switchover Command to RB Emer Sump
149	-	4120	ESFAS Analog B BWST Switchover Command to RB Emer Sump
150	-	4102	ESFAS Analog A High Pressure Injection Trip
151	-	4103	ESFAS Analog A Low Pressure Injection Trip
152	-	4104	ESFAS Analog A RB Isolation/Emergency Cooling Trip
153	-	4105	ESFAS Analog A RB Spray Pump Trip
154	-	4106	Analog A RB Spray Valve Trip
155	-	4114	ESFAS Analog B High Pressure Injection Trip
156	-	4115	ESFAS Analog B Low Pressure Injection Trip
157	-	4116	ESFAS Analog B RB Isolation/Emergency Cooling Trip
158	-	4117	ESFAS Analog B RB Spray Pump Trip
159	-	4118	ESFAS Analog B RB Spray Valve Trip
160	-	4126	ESFAS Analog C High Pressure Injection Trip
161	-	4127	ESFAS Analog C Low Pressure Injection Trip
162	-	4128	ESFAS Analog C RB Isolation/Emergency Cooling Trip
163	-	4129	ESFAS Analog C RB Spray Pump Trip
164	-	4130	ESFAS Analog C RB Spray Valve Trip

NOTE: See 5GA0901-IA-01 for notes.

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REVISED ITEM 147-164 COL of REG. ANN.

REV NO	ECN NO	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPD

DSGN L. T. Brown
DRWN L. T. Brown
CHKD C. T. Ligon
SUPV E. G. Redmond
INSP
ENGINEER

UNITS 1 & 2
MAIN CONTROL ROOM
SEQUENCE-OF-EVENTS
RECORDER/FIRST OUT
ANNUNCIATOR LIST

BELLEFONTE NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED RECOMMENDED APPROVED

KNOXVILLE 88 E 5GA0901-IA-06

R2

Point No.	Fact. Ann.	Rem. Ann.	Point Description
165	4211	-	Turb/Reactor Trip - Circuit A Tripped
166	4212	-	Turb/Reactor Trip - Circuit B Tripped
167	4224	-	Turb/Reactor Trip - Circuit C Tripped
168	4225	-	Turb/Reactor Trip - Circuit D Tripped

NOTE: See 5GA0901-1A-01 for notes.

REV NO	ECN NO	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPD
1	81	12-78	LTB	OSK	ERB	[illegible]	EDM	-	[illegible]	JCS	[illegible]

Changed Ann. Column F.O.

DSGN L. T. Brown
DRWN L. T. Brown
CHKD C. T. Ligon /SPD
SUPV E. G. Redmond /SW

INSP

ENGINEER [signature]

UNITS 1 & 2
MAIN CONTROL ROOM
SEQUENCE-OF-EVENTS
RECORDER/FIRST OUT
ANNUNCIATOR LIST

BELLEFONTE NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED [signature] RECOMMENDED [signature] APPROVED [signature]

KNOXVILLE 9-21-78 38 E 5GA0901-1A-07 R1

TABLE 2

POST-TRIP AND MEMORY REVIEW ASSIGNMENTS

Output to be arranged in the order specified below:

Item	Pt. ID No.	Description
1.	Q576	RP PWR RNG CH A NI5 LVL (PCT)
2.	Q577	RP PWR RNG CH B NI6 LVL (PCT)
3.	Q578	RP PWR RNG CH C NI7 LVL (PCT)
4.	Q579	RP PWR RNG CH D NI8 LVL (PCT)
5.	Q583	RP PWR RNG CH A NI5 IMBAL (PCT)
6.	Q584	RP PWR RNG CH B NI6 IMBAL (PCT)
7.	Q585	RP PWR RNG CH C NI7 IMBAL (PCT)
8.	Q586	RP PWR RNG CH D NI8 IMBAL (PCT)
9.	C096	CRD GRP 5 ROD POSITION (%)
10.	C097	CRD GRP 6 ROD POSITION (%)
11.	C098	CRD GRP 7 ROD POSITION (%)
12.	C099	CRD GRP 8 ROD POSITION (%)
13.	C057	CORE PRIM PWR (E09 BTU/HR)
14.	C075	CORE POWER (MWT)
15.	T326	RC LOOP A OUTLET TEMP
16.	T327	RC LOOP B OUTLET TEMP
17.	P128	RP LOOP A RC NR PRESS 1
18.	P131	RP LOOP B RC NR PRESS 2
19.	P051	ES ASA RC LOOP A WIDE RNG PRESS1
20.	P052	ES ASB RC LOOP B WIDE RNG PRESS
21.	C023	RC LOOP A HLG COMP FLOW (MPPH)
22.	C024	RC LOOP B HLG COMP FLOW (MPPH)
23.	C028	RC AVG HLG TOTAL FLOW (MPPH)
24.	C037	RC PRZR COMP LVL (INH20)
25.	T325	RC PRESSURIZER TEMP
26.	T328	RC LOOP A INLET TEMP NARROW 1
27.	T331	RC LOOP B INLET TEMP NARROW 1
28.	L065	MU TANK LVL (INH20)
29.	F073	MU LETDOWN FLOW UNCOMP (INH20)
30.	C003	RC LETDOWN FLOW (GPM)
31.	L152	SP STM GEN A FULL RNG LVL (PCT)
32.	L153	SP STM GEN B FULL RNG LVL (PCT)
33.	P154	SP GENERATOR STM PRESS A
34.	P155	SP GENERATOR STM PRESS B
35.	C026	MN FW A AVG FLOW (KPPH)
36.	C027	MN FW B AVG FLOW (KPPH)
37.	U600	COLD GAS AFTERCLR (DE-III)
38.	U602	COLD GAS AFTERCLR (NDE-IV)
39.	U604	COLD GAS AFTERCLR (DE-I)

Item	Pt. ID No.	Description
40.	U606	COLD GAS AFTERCLR (NDE-II)
41.	U608	COLD GAS AVE TEMP (NDE + DE)
42.	U609	COLD GAS AVE TEMP (NDE + DE)
43.	U620	GEN STATOR CLNG WTR OUT TEMP
44.	U621	GEN STATOR CLNG WTR IN TEMP
45.	P850	CONDENSER HIGH PRESS SIDE (INHG)
46.	P851	CONDENSER LOW PRESS SIDE (INHG)
47.	P156	SP TURBINE THROTTLE PRESS
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TABLE 3

POST TRIP REVIEW

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Etc., 30 total rows of values encompassing 10 minutes at 1-minute-intervals plus 5 minutes at 15-second intervals

REACTOR TRIP →

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Etc., 30 total rows of values encompassing 10 minutes at 1-minute intervals plus 5 minutes at 15-second intervals

REACTOR TRIP →

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Etc., 30 total rows of values encompassing 5 minutes at 15-second intervals plus 10 minutes at 1-minute intervals

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Etc., 30 total rows of values encompassing 10 minutes at 1-minute intervals plus 5 minutes at 15-second intervals

REACTOR TRIP →

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Etc., 30 total rows of values encompassing 5 minutes at 15-second intervals plus 10 minutes at 1-minute intervals

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Etc., 30 total rows of values encompassing 10 minutes at 1-minute intervals plus 5 minutes at 15-second intervals

REACTOR TRIP →

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Etc., 30 total rows of values encompassing 5 minutes at 15-second intervals plus 10 minutes at 1-minute intervals

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2-12-78

2.1 EQUIPMENT CLASSIFICATION AND VENDOR INTERFACE (REACTOR TRIP AND SYSTEM COMPONENTS)

2.2 EQUIPMENT CLASSIFICATION AND VENDOR INTERFACE (PROGRAMS FOR ALL SAFETY-RELATED COMPONENTS)

Presently, TVA identifies all components whose functioning is required to trip the reactor as safety related. These components, which include the reactor protection system, the solid state protection system, and all other components whose function is defined as safety related, are now outlined in TVA's Operational Quality Assurance manual as critical systems, structures, or components (CSSC) which is a corporate document. Each individual plant has incorporated the applicable portions of this document into their procedures. In addition, TVA's corporate procedures require all maintenance or modification activities to be documented before performing the work. This documentation is then reviewed by the appropriate plant organizations to ensure that it is properly identified as CSSC or non-CSSC and to ensure that the applicable procedures and quality requirements for the identified work will be adhered to. Furthermore, TVA requires that all procnrement documents be identified as pertaining to CSSC or non-CSSC equipment. These procurement documents are reviewed by plant organizations or central office organizations (depending on their point of origination) to ensure they are properly identified and contain the appropriate and required quality controls and specifications. Depending on the quality grouping, as outlined in Office procedures that the procurement documents come under, many of them are also reviewed by other organizations to further ensure that they meet all requirements.

In view of the present procedures pertaining to safety-related equipment identification and information handling systems used to control safety-related activities, we believe TVA is in compliance with the NRC staff's position.

TVA's vendor interface program is presently in the process of being implemented for Bellefonte. When it is operational it will be centered around the Operating Experience Review (OER) Program which was developed to ensure that vendor and other related information would be handled from a systematic approach to continually inform the plants and other cognizant organizations of revisions, modifications, or deficiencies in plant equipment or procedures. The vendor interface program hinges around the original nuclear steam supply system (NSSS) supplier who supplied all reactor trip system components. Any information supplied by the NSSS vendor to the corporate office will be acknowledged upon receipt and forwarded to the OER organization and entered in

the system. This information will then be forwarded to the cognizant organizations and plants for review, comments, recommendation, or incorporation into plant activities.

The review, comments or recommendations will be documented and returned to the operating experience review group (OERG) normally within 30 days as presently required by the procedures. Any recommendations will be forwarded to the plant for incorporation in plant activities or resolution. This information will be tracked and documented by the OERG during the entire process until it has been incorporated or resolved. This documentation is then stored for the life of the plant for further reference.

Conclusion

As previously stated, we believe that TVA's programs properly identify the reactor trip system and related components as safety related. We also believe that TVA adequately controls activities such as maintenance, modification, and procurement on reactor trip system components. TVA's OER program will establish a comprehensive vendor interface program and ensure that vendor activities are reviewed and incorporated as necessary for the reactor trip system. In conclusion, we believe TVA's program is or will be before fuel load in compliance with NRC's position and recommendations as stated in Generic Letter 83-28.

2.2.1.1 See above

2.2.1.2 See above

2.2.1.3 A description of the process by which station personnel use this information handling system to determine that an activity is safety related and what procednres for maintenance, surveillance, parts replacement, and other activities defined in the introduction of 10 CFR 50, B, apply to safety-related components.

Response

Plant activities that could affect equipment on the CSSC list are prescribed by instructions appropriate to the circumstances. These instructions are prepared, reviewed, and approved in accordance with Section 6.0 of the plant's technical specifications and the plant QA program.

2.2.1.4 A description of the management controls utilized to verify that the procedures for preparation, validation, and rontine utilization of the information handling system have been followed.

Response

After licensing, the in-plant Quality Engineering Section routinely and independently verifies that the plant instructions appropriately utilize the CSSC list and meet the plant's QA requirements.

TVA's Quality Assurance organization performs audits of the central office activities and plant activities to verify that the QA requirements are met.

2.2.1.5 A demonstration that appropriate design verification and qualification testing is specified for procurement of safety-related components. The specifications shall include qualification testing for expected safety service conditions and provide support for the licensees' receipt of testing documentation to support the limits of life recommended by the supplier.

Response

TVA follows a number of steps to assure that appropriate qualification testing requirements are specified and that the eqnipment tests demonstrate adherence to these specifications.

These steps essentially are as follows:

1. The appropriate service, seismic, and environmental conditions as defined by design criteria documents are placed into a procurement request.

2. The procurement requests are independently reviewed.

3. A procurement specification is prepared incorporating standard specifications where applicable for Quality Assurance, seismic testing requirements, performance testing requirements, and environmental testing requirements. Standard specifications cover the three possible levels of qualification requirements which are:

   a. Full Quality Assurance (ASME Section III, ANSI N45.2, and/or Class 1E, as applicable).

   b. Seismic Category 1(L)

   c. Non-Class 1E important to safety

4. Procurement specifications are independently reviewed.

5. Test reports are reviewed by cognizant engineers, and the results are documented.

6. The results of the test report review are independently reviewed before placement in TVA's contract files.

7. Any discrepancies discovered in the reports are documented and resolved with the vendor. If a report resubmittal is required, steps 6 and 7 are repeated.

2.2.1.6 Licensees and applicants need only to submit for staff review the equipment classification program for safety-related components. Although not required to be submitted for staff review, your equipment classification program should also include the broader class of structures, systems, and components important to safety required by GDC-1 (defined in 10 CFR Part 50, Appendix A, 'General Design Criteria, Introduction').

Response

The Bellefonte (BLN) equipment classification program for safety-related components during the design process is a collection of design criteria diagrams and design criteria documents. Structures, systems, and components are identified as safety-related on these diagrams and in these documents if they perform either a primary or a secondary safety function.

A primary safety function is that function of a structure, system, or component which is necessary to assure:

(1) Integrity of the reactor coolant pressure boundary

(2) Capability to shut down the reactor and maintain it in a safe shutdown condition, or

(3) Capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures to a significant fraction of the guideline exposures of 10 CFR 100. Also included are supporting and auxiliary systems which must function to provide such assurance. All electrical equipment that performs a primary safety function is identified as Class 1E.

A secondary safety function is that function of a portion of astructure, system, or component which must either:

(1) Retain limited structural integrity because its failure could jeopardize to an unacceptable extent the achievement of a primary safety function or because it forms an interface between Seismic Category I and non-Seismic Category I plant features or

(2) Perform a mechanical motion which is not required in the performance of a primary safety function but whose failure to act or unwanted action could jeopardize to an unacceptable extent the achievement of a primary safety function.

In addition to this documented identification of safety-related components, a separate but related program during the design process identifies a slightly larger collection of components; those that require either full or limited quality assurance. This program develops an actual list of structures and hardware requiring quality assurance. The list includes all safety-related structures and components and also those components not defined as safety-related but which still require limited quality assurance. These latter components include those in the fire protectiou, radwaste, and security systems. An item requiring limited quality assurance but not included on this hardware list is the software for the Safety Parameter Display System.

2.2.2 For vendor interface, . . . safety-related equipment is provided.

Response

TVA is actively participating in the NUTAC associated with NRC Generic Letter 83-28, Section 2.2.2. Upon receipt of the NUTAC recommendations, TVA will evaluate and provide a plan for implementation in a timely fashion.

3.1 POSTMAINTENANCE TESTING (REACTOR TRIP SYSTEM COMPONENTS)

Position

The following actions are applicable to postmaintenance testing:

3.1.1 Licensees and applicants shall submit the results of their review of test and maintenance procedures and technical specifications to ensure that postmaintenance operability testing of safety-related components in the reactor trip system is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.

Response

Bellefonte Standard Practice BLM 1.0, "Maintenance and Repair Program," requires maintenance of critical systems, structures, and components (CSSC) equipment to be conducted through use of the maintenance request (MR), form TVA 6436. As explained in the response to item 2.1, reactor trip system (RTS) components will be classified as CSSC. The CSSC list will be contained in Bellefonte Standard Practice BLG 1.0, "CSSC List."

Bellefonte Standard Practice BLM 10.1, "Preparation of Maintenance Requests," defines the methods and responsibilities for preparing MRs. Basically, an MR is initiated by the person who identifies the need for maintenance for approval by his supervisor or designated representative. The designated MR planner for the appropriate maintenance area (mechanical, electrical, or instrument) completes the areas detailing work to be performed. The MR planner will determine if the maintenance involves CSSC equipment by referring to BLG 1.0. If it is CSSC equipment, the MR planner will also define any QA inspection requirements and postmaintenance test requirements.

If it is CSSC equipment, before the performance of any work the responsible maintenance supervisor or designated representative must review the MR, including postmaintenance test requirements, and initial the MR. The MR is then reviewed by the QA section to ensure, among other things, that proper post-maintenance testing is specified. The QA supervisor or his designated representative also signs the MR. Upon completion of the work, the MR will again be reviewed and signed by the responsible maintenance section, QA staff, and Operations Section verifying that the postmaintenance test was performed and the equipment is ready for return to service.

Emergency maintenance may initially be orally communicated to appropriate maintenance personnel (per BLM 10.2); however, an MR must still be initiated and expeditiously routed to the maintenance section. The responsible section supervisor aud QA reviews may be performed after the fact.

Based npon our review, Bellefonte's program does require postmaintenance testing, and the procedures for this testing require operability before the RTS can be returned to service.

3.1.2 Licensees and applicants shall submit the results of their their check of vendor aud engineering recommendations to ensnre that any appropriate test guidance is included in the test and maintenance procedures or the technical specifications, where required.

Response

TVA's Division of Nuclear Power operating experience review program outlined in response to item 2.1 will ensure that appropriate test guidance is included in the test and maintenance procedures or the technical specifications, where required, concerning future vendor and engineering recommendations.

TVA is participating in a Babcock and Wilcox (B&W) Owners' Group activity which will identify and update vendor information on B&W-supplied RTS components. This activity is not yet complete; however, appropriate review and implementation of this information will be initiated when the information is available.

Our operating experience review program and pending B&W Owners' Group activity will ensure that appropriate test guidance is included in the test and maintenance procedures or technical specifications, where required, concerning vendor and engineering recommendations.

3.1.3 Licensees and applicants shall identify, if applicable, any postmaintenance test requirements in existing techuical specifications which can be demonstrated to degrade rather than enhance safety. Appropriate changes to these test requirements, with supporting justification, shall be submitted for staff approval. (Note that action 4.5 discusses online functional testing.

Response

At this time, we cannot identify any postmaintenance testing requirement which degrades rather than enhances safety. However, the B&W Owners' Group program outlined in response to item 4.5.3 is intended to evaluate current testiug programs to ensure that desired RTS reliability is being achieved or that necessary improvements are identified.

Our future technical specification change submittals will consider the results of this program.

3.2 Postmaintenance Testing (All Other Safety-Related Components)

3.2.1 Licensees and applicants shall submit a report documenting the extending of test and maintenance procedures and review of technical specifications to ensure that postmaintenance operability testing of all safety-related equipment is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.

Response

The Division of Nuclear Power's Operational Quality Assurance Manual (OQAM) requires that maintenance instructions shall contain measures to cover the following.

"Upon completion of maintenance on any item of the CSSC list and before release for service, appropriate testing shall be performed to verify operational acceptability. Functional tests or industrial standard tests may be used for this purpose."

The OQAM also requires review of the maintenance request (MR) by the responsible section and the Field Quality Engineering (QE) Section before performance of maintenance on CSSC equipment. Standardized guidelines which include the following are provided for preparation/review of MRs.

1. Specify appropriate postmaintenance testing and, where applicable, reference the proper plant instruction.

2. Consider compliance with plant technical specifications. Specifically:

   a. Will removal of equipment from service for this maintenance violate any limiting conditions for operations?

   b. Are adequate postmaintenance tests (SIs) specified to ensure the equipment's readiness for operation?

3. Provide for return of equipment to normal status as required.

   The MR requires that the section responsible for the performance of the postmaintenance test and also the operations section shall sign to concur that the postmaintenance test was performed and the equipment is ready for return to service.

Based upon our review, NUC PR's program does require post-maintenance testing to demonstrate operability before safety-related components are returned to service. These requirements are implemented at each plant through plant specific instructions.

Standard Practice BLM1, "Maintenance and Repair Program," implements the OQAM by providing for postmaintenance testing. In addition, Standard Practice BLM10.1, "Initialing Maintenance Requests," identifies those responsible for completing the portion of the MR addressing postmaintenance testing, provides instructions on how to address this item, and provides guidance for the QE review before the performance of work.

3.2.2 Licensees and applicants shall submit the results of their check of vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the technical specifications where required.

Response

TVA's philosophy has always been to utilize engineering judgment, operating experience, TVA policy, and industry experience in conjunction with vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the technical specifications where required.

This is supplemented by a program dealing with the review of operating experience reports. This program establishes a system to ensure the review of operating experience reports to document their applicability to TVA plants, to provide required written responses, and to ensure proper disposition of all applicable items.

Also, in order to comply with IE Bulletin 79-01B and NUREG-0588, class 1E electrical equipment is being reviewed for applicable maintenance instructions required to maintain the environmental qualification of the equipment. This activity will be completed in accordance with the NRC ruling on environmental qualification.

In addition to the above, periodic review of procedures and instructions is required by the OQAM to determine if changes are necessary or desirable. This review is conducted no less frequently than every two years by an individual knowledgeable in the area affected by the procedure/instruction.

3.2.3 Licensees and applicants shall identify, if applicable, any postmaintenance test requirements in existing technical specifications which are perceived to degrade rather than enhance safety. Appropriate changes to these test requirements, with supporting justification, shall be submitted for staff approval.

Response

It is not TVA's philosophy to propose changes in existing technical specifications which are perceived to degrade rather than enhance safety. When items are identified, they will be submitted along with the supporting justification.

4.1 REACTOR TRIP SYSTEM RELIABILITY (VENDOR-RELATED MODIFICATIONS)

TVA has adopted the B&W Owners' Group response for this item (J. T. Enos to D. G. Eisenhut dated November 4, 1983).

4.2 Reactor Trip System Reliability (Preventative Maintenance and Surveillance Program for Reactor Trip Breakers)

Action

Licensees and applicants shall describe their preventative maintenance and surveillance program to ensure reliable reactor trip breaker operation. The program shall include the following.

1. A planned program of periodic maintenance, including lubrication, housekeeping, and other items recommended by the equipment supplier.

2. Trending of parameters affecting operation and measurement during testing to forecast degradation of operability.

3. Life testing of the breakers (including the trip attachments) on an acceptable sample size.

4. Periodic replacement of breakers or components consistent with demonstrated life cycles.

Response

1. Maintenance Instruction (MI) Procedure BL EMI-NR-2901 and Technical Specification 3/4.3.1 at Bellefonte govern the programs that are in place for the periodic maintenance of AK-2A-25 reactor trip breakers. A technical standard on reactor trip breakers has been issued from which Bellefonte's MI-NR-2901 will be revised to reflect the recommendations contained in the technical standard by fuel load.

2. A program for trending of parameters is required in the technical standard on reactor trip breakers. The technical standard states that the program should consist of the following.

   a. The compilation of all maintenance activity records into an historical file.

   b. The use of the Nuclear Plant Reliability Data System for breaker failure data.

   c. A maintenance request (MR) system. The MR system is described in section 3.1.1 under response, paragraph 1-3.

   These recommendations will be considered for use at Bellefonte in developing a program by licensing for trending of parameters to assess any possibility of performance degradation.

3.&4. The B&W Owners' Group has reviewed the events at Salem, NUREG-1000, and other information pertinent to the situation leading to the reactor trip breaker failure at Salem. In addition, the B&W Owners' Group has reviewed the failure and performance history of GE AK2A breakers at the B&W facilities. A substantial amount of information has been gathered from numerous sources including GE, B&W, and the utilities' plant maintenance organizations to determine problem areas with the breakers and susceptibility to problems similar to those that occurred at Salem. A presentation was made to NRC on August 26, 1983, outlining B&W Owners' Group program for a Reactor Trip Breaker (RTB) Reliability Monitoring Program. This program will monitor breaker performance which will forecast breaker problems/failures before they occur instead of life cycle testing. This will permit appropriate, preemptive action to be taken. The B&W Owners' Group believes that this program is responsive to all of the concerns underlying NRC's position on this item. Once this informationn is available to TVA, the technical standard on reactor trip breakers will be revised as applicable to incorporate this information. This program will be in place at Bellefonte Nuclear Plant by fuel load.

4.3 REACTOR TRIP SYSTEM RELIABILITY (AUTOMATIC ACTUATION OF SHUNT TRIP ATTACHMENT FOR B&W PLANTS)

TVA has adopted the B&W Owners' Group response for the item (J. T. Enos to D. G. Eisenhut dated November 4, 1983). Bellefonte plant specific information will be provided to the NRC when the design is finalized. This submittal will be made by February 1, 1985.

4.4 REACTOR TRIP SYSTEM RELIABILITY (IMPROVEMENTS IN MAINTENANCE AND TEST PROCEDURES FOR B&W PLANTS)

Position

Licensees and applicants with B&W reactors shall apply safety-related maintenance and test procedures to the diverse reactor trip feature provided by interrupting power to control rods through the silicon controlled rectifiers.

This action shall not be interpreted to require hardware changes or additional environmental or seismic qualification of these components.

Response

TVA intends to apply safety-related maintenance and test procedures to this equipment. We are currently evaluating the B&W Owners' Group generic SCR test guidelines for Davis Besse series plants as a means of performing monthly online functional tests of this reactor trip feature.

TVA does not intend to upgrade hardware associated with this trip feature to safety grade status.

4.5 REACTOR TRIP SYSTEM RELIABILITY (SYSTEM FUNCTIONAL TESTING)

Position

Online functional testing of the reactor trip system, including independent testing of the diverse trip features, shall be performed on all plants.

4.5.3 Existing intervals for online functional testing required by Technical Specifications shall be reviewed to determine that the intervals are consistent with achieving high reactor trip system availability when accounting for consideration such as:

1. uncertainties in component failure rates
2. uncertainty in common mode failure rates
3. reduced redundancy during testing
4. operator errors during testing
5. component "wear-out" caused by the testing

Licensees currently not performing periodic online testing shall determine appropriate test intervals as described above. Changes to existing required intervals for online testing as well as the intervals to be determined by licensees currently not performing online testing shall be justified by information on the sensitivity of reactor trip system availability to parameters such as the test intervals, component failure rates, and common mode failure rates.

Response

The B&W Owners' Group is conducting an analysis program with the objective of demonstrating that the current online test interval for the RTS is consistent with high RTS availability. The program includes sensitivity analyses to account for uncertainties in component and common mode failure rates, reduced redundancy, and operator errors during testing and component wearout caused by testing. Consideration of changes to the current test interval will depend on the results of the analysis. TVA is participating in this B&W Owners' Group activity; however, the results of the analysis program are not yet available for our review.

Since TVA has no operating B&W plant data to review, we cannot determine if existing online test intervals are appropriate until the program results are available.

Future technical specification changes to RTS online functional test intervals will be submitted for approval as appropriate and will consider the results of the B&W Owners' Group analysis program and operational data if available at that time.