PDR (42)

POST TRIP REVIEW GUIDELINES

July 3, 1984

Purpose

The purpose of this booklet is to provide guidance on the performance of a review of a plant transient or trip. This is intended as generic guidance only and is not intended to cover every possible event. Each event should be reviewed on an individual basis with the scope of review determined by the type of event.

Transient analysis is basically divided into four phases:

1. Data Collection
2. Data Analysis
3. Support of Outside Organizations
4. Report Preparations and Review

These guidelines will discuss each of the four phases.

1. DATA COLLECTION

1.1 Information Available

The capability to record and recall the plant information necessary to assist in the determination of the cause or causes of unscheduled reactor trips currently exists at Davis-Besse Unit 1. Digital indications (e.g., on/off, open/close, etc.) and key analog information are recorded by various transient monitoring systems during a reactor trip for subsequent analysis. The Plant Process Computer records and displays both digital and analog information. The Data Acquisition and Display System (DADS) located in the Technical Support Center also provides a means for recording and displaying analog information. An additional source of analog information used to support post trip efforts comes from the Control Room strip chart recorders. These systems provide the primary sources of information used for trip analysis at Davis-Besse Unit 1.

Plant Process Computer

The Plant Process Computer monitors digital and analog information from all major plant systems. Approximately 2,500 digital points and 2,000 analog points are fed into the computer. Some of this information is manipulated and stored for plant performance monitoring purposes, and all of the information is available to the Control Room operator in various display formats. Three functions of the Plant Process Computer provide information useful for transient analysis efforts. These functions include the Sequence of Events Monitor, the Post Trip Review, and the Alarm Printout.

The Sequence of Events (SOE) Monitor is designed to provide a sequential list of important plant events. All inputs to this function are digital. The list of monitored points is provided as Enclosure 1. A change of state of any of these digital points is recorded in the SOE file along with the time of occurrence. The time of occurrence listed with the event is based on computer clock time and recorded to the nearest five milliseconds. The SOE file can hold up to 256 records. Once the SOE file is filled, subsequent events replace the oldest recorded event in the file. The first event to be recorded in the file triggers an indicator to the operator that an SOE monitored event has occurred. This indication is cleared, and the SOE file is emptied when the operator requests a printout of

the SOE file. Enclosure 2 illustrates the format of information presented in the SOE printout.

The Post Trip Review function is designed to record selected analog information for a period of time before and after a reactor trip. The list of parameters monitored by this function is provided in Enclosure 3. The most recent 15 minutes of historical values for these parameters is maintained in a rolling file. In the event of a reactor trip, this rolling file is frozen and data for the next 15 minutes is recorded. An indication that the Post Trip Review function has been initiated is provided to the operator. The operator may then request the Post Trip Review printout which clears the file. The Post Trip Review printout provides parametric data in engineering units given at 15 second intervals from 15 minutes prior to the trip until 15 minutes after the trip. Enclosure 4 provides a sample of one segment of a Post Trip Review printout. Note that some of the parameters monitored have scan intervals of more than 15 seconds. Consequently, some data may be repeated in successive 15 second records. The parameters monitored for the Post Trip Review function were chosen as a part of the original plant process computer design. The variables monitored are key parameters of the major primary and secondary systems which could indicate abnormal trends that may lead to, or result from, a reactor trip. Normally inoperative safety systems are not monitored by this function. The scan intervals selected for the parameters were based on the anticipated rates of change of the individual parameters, and multiplexing hardware and memory capacity limitations that existed at the time of the initial design.

The Alarm Printout function provides an historical listing of both digital and analog information recorded when the monitored parameters enter a predetermined alarm state. Essentially, all digital and analog input points are monitored for alarm status. Alarm messages are recorded as they occur on the alarm printer along with the time of occurrence. No operator action is required to initiate the Alarm Printout. All digital points are scanned once per second, and a change of point status is identified on the alarm printer. Analog points are scanned at varying intervals (either 1, 5, 15, 30, or 60 second intervals) and are compared at each scan to a predetermined alarm value. Each time the parameter exceeds the alarm limit or returns to within limits, the event is recorded on the Alarm Printout. An example of a section of the Alarm Printout is provided in Enclosure 5.

The Plant Process Computer consists of redundant MODCOMP Classic 7870 CPUs. The CPUs are powered from separate uninterruptable instrumentation buses YAU and YBU. The uninterruptable buses are supplied from the station battery backed 250 volt DC power supply system through an inverter. Power can also be supplied to the bus from a nonessential regulated instrumentation bus through a static transfer switch within the inverter. The redundant CPUs were installed during the 1982 Refueling Outage

as a part of the overall project to upgrade the Plant Process Computer system. The multiplexers providing inputs to the processors will be replaced in future outages. The multiplexers are currently supplied from YBU, consequently, a loss of YBU will interrupt all three transient monitor functions of the Plant Process Computer. The DADS will still be functional. As the multiplexers are replaced, they will be equipped with redundant power supplies.

Data Acquisition and Display System (DADS)

The DADS, located in the Technical Support Center, was designed as a part of the emergency response facilities at Davis-Besse Unit 1. The primary function of the system is to provide information to emergency response personnel in the Technical Support Center to assist in evaluating plant status in an accident situation. Consequently, those variables important to determining the safety status of plant systems and the proper functioning of safety systems are inputs to the DADS.

While the DADS receives inputs from numerous sources, such as the Meteorological Tower and the Plant Process Computer, the inputs of importance to the transient monitoring function are supplied through a separate multiplexer (the Validyne). The list of parameters supplied by this multiplexer is provided in Enclosure 6. The scan rate for these variables is approximately once per second. Data is recorded at that rate for a period of 24 hours in a rolling file. Access to information in this data file is possible in several formats. Individual points or groups of points can be examined by a CRT or a line printer output. Additional output formats are being developed and will include the use of a printer/plotter to provide graphical trends.

The Prime Comupter stores information from both the MODCOMP and Validyne inputs. These values can be called up and printed out per Section 1.2. The power supply for the multiplexer located in the station is YAU. The power supply for the DADS computer system is independent of the station electrical system. The Davis-Besse Administration Building (DBAB) which houses the Technical Support Center and the DADS, is supplied from a construction feeder independent of the three 345 KV lines connected to the station grid. The DBAB electrical system supplies an emergency response facilities bus which can also be fed by an emergency diesel generator through an automatic transfer switch. The emergency response facilities bus in turn feeds an uninterruptable distribution network. Power to the uninterruptable distribution network is backed up by a battery driven system through a static transfer switch which assures continuous operation of the DADS computer system. The emergency battery system is charged from the emergency response facilities bus.

Strip Chart Recorders

In the event that the Plant Process Computer and the DADS are unable to perform their transient monitor functions, the Control Room strip chart recorders act as a backup source of information for transient analysis. Due to the compressed time scales of the strip chart recorders, the information cannot be used for sequence of events determination and the limited number of parameters recorded make determination of the cause of a transient very difficult. However, the parameters that are recorded are important major system parameters such as pressurizer level, Reactor Coolant System (RCS) pressure, steam generator levels, feedwater flows, etc. The information available on the strip chart can be very useful in assuring that major system upsets did not occur as a result of the transient. Strip chart recorders are also useful in recognizing long term trends that may be indicative of problems leading to, or resulting from, a transient.

1.2 Technical Section Function

It has become a Technical Section function to collect all the available plant data and have copies given as soon as possible to the Assistant Station Superintendent (Steve Quennoz), Operations (Dale Miller), NRC Resident Inspector (Walt Rogers), and I&C (acting I&C Engineer). This job normally requires a trip to the Control Room to retrieve the alarms (at least 20 minutes prior to trip and for an hour after), the SOE printout and the Post Trip Review (may have to ask the operators to print out).

If possible, attempt to set up a post trip meeting which includes operators from the shift that was on. Copies of the Reactor Operator Log and Unit Log should also be obtained when completed (usually not until the day after the trip).

If possible, talk with the operators which are on shift. The purpose of this interview is to record pertinent information as seen by the operator during a transient condition. The interview should be conducted as soon as possible after the event. Typical questions are:

1. Briefly describe plant conditions prior to the trip. (Include Integrated Control System (ICS) mode and pertinent testing, operations, or maintenance in progress or recently completed.)

2. What was the first indication or alarm which keyed you to a problem? What actions did you take as a result of these indications?

3. Were any alarms or indications out of service or did any fail during the course of the transient? Did any indications or alarms mislead you? Could the Control Room alarms or controls have been relocated in such a manner to have aided your actions on this transient?

4. Did existing plant procedures provide adequate action for this transient? Was it necessary to take action beyond their scope.

5. What additional information or guidance do you feel would have assisted you during the transient?

6. Summarize the transient including both indications and actions. Discuss any equipment problems observed.

The data from the Prime Computer must be manually hard copied within 24 hours of the trip as follows:

1) Go to the Technical Support Center Computer Room and turn on the orange line printer (the "run" light should be "on", the "off" light should be lit unless the printer is in the act of printing).

2) Turn on a Technical Support Center Ramtek terminal and push reset button located at the rear of the keyboard.

3) At the Ramtek terminal: (NOTE: two runs, one of 35 minutes length and 30 seconds interval, and a second of 5 minutes at 1 second interval provide the best data)

ENTER: LOGIN_TSC

HIT: f_3 function key (hard copy)

HIT: f_1 function key (to obtain Validyne data)

ENTER: P (to output to line printer)

ENTER: beginning hours and minutes HHMM
Run 1: use 5 minutes before trip
Run 2: use 1 minute before trip

ENTER: number of minutes wanted to display
Run 1: use 30 minutes
Run 2: use 5 minutes

ENTER: interval desired in seconds
Run 1: use 30 seconds
Run 2: use 1 second

ENTER: point number or "ALL" for all Validyne points

Data will now be printed*

OR

f_2 function key (for selected MODCOMP points)

ENTER: point number

ENTER: starting time using HHMM format
(normally use 5 minutes before trip)

ENTER: how long in HHMM
(normally 30 minutes)

ENTER: interval in minutes or <CR> for 30 seconds

Data will now be printed*

4) To exit, enter LO

*If data does not print, do not repeatedly attempt to request printouts since all requests will be remembered and printed when the system returns to working order. Call for assistance from Computer personnel.

The Prime data can be displayed on the Ramtek terminal and a video copy of the display obtained on the Tektronix hard copy printer.

1) Go to the TSC, turn on Tektronix Video copy printer and let warm up.

2) Turn on a Ramtek terminal and press reset button located at the rear edge of the keyboard.

3) At the Ramtek:

ENTER: LOGIN_LARRY_SMART1
ENTER: DIS
ENTER: OB
ENTER: SEG_#DISPLAYS

ENTER: 4 (to plot data vs. time)
ENTER: 1 (for CRT display)
ENTER: 2 (to access 24 hour circular file data)
ENTER: 1 (always)

HIT: Return if data displayed looks OK when presented for review

ENTER: Point number (NOTE: If a Validyne point is requested, V must prefix the point number,
i.e., VT801 RCP 2-1 Tc
VZ675 MN FW S/O CTRL VLV 1)

Data will now be displayed and updated on the terminal.

4) To obtain a video copy of the Ramtek display:

With the display finished updating, press the black button beside the terminal and the video copy will be automatically taken.

If it is desired to freeze the display during updating, the terminal can be frozen by hitting "control" "S" (simultaneously).

To resume updating:

HIT: "control" "Q" (simultaneously)

5) To exit program:

HIT: "Break" key

ENTER: "Q"

ENTER: LO

The printer/plotter is being programmed to have a fixed set of plots (see Enclosure 10 for list) be printed by manual command. Presently, only Larry Konopka can use this feature. This will, in the future, be the primary method of data retrieval. Details of use will be added later.

2. DATA ANALYSIS

Data analysis is the most difficult part of the post trip review process. Every analysis is different since every event is different. Some points need to be checked for almost every event, and the following provides an indication of the extent of the review required.

The SOE and Alarm Printout must be reviewed to verify the safety systems operated as required. This means verifying not only why some channels tripped, but also verifying that all channels that should have tripped did trip. Enclosure 7 provides a list of all SOE points and what causes the SOE to initiate. Enclosure 8 has a list of specific points to be checked.

The plots must be reviewed to determine if the overall plant response was acceptable. After a trip, the main feedwater control valves are closed, the startup feedwater valves are targeted to approximately 20% open, and the main feed pump speed is increased to target (approximately 4600 RPM) by the rapid feedwater reduction system. Steam generator levels should be maintained at 35 inches (and rapid feedwater reduction startup feedwater valve target released). The main steam safety valves should reseat at approximately 960 PSIG and Tave should tend towards 551°F. Pressurizer level should reach a minimum of 10-20 inches if originally at full power (higher if originally at lower power).

RCS pressure should not fall below 1800 PSIG unless problems occur with main steam safety valves (MSSV)s resetting or makeup flow is inadequate. Cold leg temperature will most likely rise for the first 10-20 seconds from the drastically increasing steam generator pressure, but will then tend toward 550°F. Since 100% FP is 48°F ΔT (Th - Tc), the post trip ΔT is approximately 2-3°F for the first 20 minutes (dependent on decay heat load).

The drastic changes in steam generator pressure will cause momentary glitches in the steam generator level transmitters. These are to be expected since the level transmitters are just ΔP indicators.

High deaerator levels have been a problem post trip. It appears the Deaerator Level Control Valve #2 fails to close and the equalizing valve caused both deaerator levels to increase. Monitor both deaerator levels and the time the condensate pumps are reduced to one operating.

All turbine bypass valves should normally open initially after the trip and then close during the MSSV blowdown. The atmospheric vents should open when steam generator pressure rises above 1025 PSIG (providing no Steam and Feedwater Rupture Control System (SFRCS) actuation).

RCS pressure, pressurizer level, and RCS Tave should have nearly identical curve shapes until the makeup pumps have added significant volume (1-2 minutes). RCS pressure is the most sensitive indicator of RCS temperature; the RTDs and thermowells response time, as well as the loop transport time, adds a significant time delay (5-15 seconds) in the sensing of actual Tave during a rapid coolant temperature change.

One additional caution is necessary on using the out-of-core power range NIs. These detectors are monitoring core neutron leakage, which is affected drastically by changes in cold leg temperature (approximately .5% FP per °F). If Tc increases 6°F, indicated core power will increase 3% without any actual change in core power.

The analysis performed depends largely on the transient. A closure of one main steam isolation valve (MSIV) requires a much more detailed review than a "screwdriver" trip. An imbalance trip requires a detailed core physics review, while an electro-hydraulic control (EHC) induced transient may require a significant review of the secondary plant. Common sense and an inquisitive attitude must be maintained throughout the review. Murphy's Law definitely applies to nuclear power; Don't assume anything worked like it should.

3. SUPPORT OF OUTSIDE ORGANIZATIONS

The Technical Section provides support to the TAP Team and places information on NETWORK to provide information to outside organizations. The B&W Resident Engineer (Jim Albert) has his own method of communication with other B&W plants (ELEX) which can also be used as the method of communication between B&W units.

Within 48 hours of the event, the Technical Section should make an entry on NETWORK to the other B&W units describing the event. If the event has significance beyond the B&W design (such as failure mechanism of MSSVs), an entry should also be made on NETWORK to all operating units.

The Technical Section is responsible for telling the B&W Resident Engineer if a TAP Team site visit is desired. A TAP Team should be called in for most involved transients, but no site visit is necessary for a well understood transient. When requesting a site team, ask for personnel qualified in the area of the equipment involved in the transient; i.e., if ICS operation is in question, ask for an ICS "expert".

The Technical Section representative acts as a liaison for the B&W TAP Team. The entrance interview should be well prepared with all information necessary to analyze the event provided to the team. They should be provided with:

1) An oral review of the transient details known

2) All plots, alarms, SOE, post trip review, and operator logs

3) Names, work extension, and schedule of personnel who were on shift during transient

4) A work area - typically a conference area in the DBAB

5) Escorts as required into the protected area

After the draft report is prepared, we have Duplicating make 10-12 copies. An exit interview is then set up with Steve Quennoz, Bernie Beyer, I&C Engineer, Dale Miller, Louis Simon, other available operators, Shift Technical Advisors, Jim Albert, and the Technical Section representative. The draft report is then reviewed and several days given to receive comments.

If the TAP Team was not called in, only the NETWORK entry need be completed. Section 4 describes the details of report preparation to be followed.

4. REPORT PREPARATION AND REVIEW

A TAP report will be prepared for all unscheduled reactor trips at Davis-Besse. Reports may also be prepared for other significant events. The purpose of the report is to provide transient event information for all members of the 177 FA Owners Group. The operational experience shared in this program will lead to improved plant reliability and a better understanding of the plant's performance by all participants.

The format of the report should be as follows:

I. Executive Summary
   - A. Plant Name, Data, Time of Trip
   - B. Brief Description
   - C. Root Cause
   - D. Performance Anomalies
   - E. Lessons Learned

II. Transient Assessment
   - A. Sequence of Events
   - B. Plant Performance
     1. Pre-trip Review
     2. Initiating Event
     3. Plant Post-trip Response
     4. Operator Actions/Procedural Adequacy
   - C. Safety Considerations
   - D. Assessment Conclusions
   - E. Annotated Plots

The "Executive Summary" section should be a single page containing the following information: plant name, date and time of trip, brief description of the event, including initial power level, root cause of the transient, any performance anomalies, and lessons learned.

The "Sequence of Events" section should contain those major events or conditions which delineate the progressive course of the transient. It normally contains a combination of the SOE, alarms, and Reactor Operator Log.

The "Pre-trip Review" section should contain a statement of the plant conditions prior to the transient. Examples to be included would be power level, ICS status, maintenance or testing in progress, and equipment deficiencies.

The "Initiating Event" section should describe the sequence of events and plant conditions leading up to transient initiation. Try not to be repetitive with other sections.

The "Plant Post-trip Response" section should include a discussion of the response of the NSS and BOP from a process point of view; i.e., Tave, reactor coolant pressure, pressurizer level, feedwater flow, OTSG level, and main steam pressure. These parameters should be plotted versus time and annotated to indicate major events, departures, etc., to support the text of this section. Also, this section should include a discussion of performance of components and their departures from the expected. Proposed corrective actions and corrective actions previously completed should be included in the text of this section.

The "Operator Action/Procedural Adequacy" section should include information concerning specific operator actions taken during the transient which have not been included in any previous sections. Additionally, procedures followed during the transient, and any information which would be beneficial to other operators should be included. This section is of major interest to other operators regarding the TAP report and should be as detailed as possible. Operator interviews, operator logs, computer printout and plant procedures provide good source material. This section should provide an evaluation of the shift operator's ability to use the procedures to mitigate a plant transient. Avoid repetition of earlier sections when possible.

The "Safety Considerations" section should include the basis for which safety, as it relates to the transient, has been considered. Those bases may include plant design requirements, Final Safety Analysis Report (FSAR) accident analysis, or other information.

The "Assessment Conclusions/Corrective Actions" section should be a summary of the significant aspects of the transient, including departures from expected component and plant performance, suggested/actual corrective actions, and any preventative measures if not already discussed in the Plant Post-trip Response section. For component failures, list name, model and serial number, manufacturer name, date of installation, etc. Try to give this section a positive, "we're fixing it" tone instead of a "dink sheet".

The "Annotated Plots" section should consist of a number of parameter versus time plots annotated with trip times and other important occurrences (pump starts/stops, emergency Safety Features Actuation System (SFAS) initiation, power operated relief valve (PORV) lifts, main steam relief valve (MSRV) / MSSV lifts, etc.) The Abnormal Transient Operator Guidelines (ATOG) P-T plot should be included in this section.

After the report has been reviewed in the exit meeting and modified by the Technical Section, it is sent out for review (see Laura for distribution). After the date that the comments were due (usually two weeks), the report comments are incorporated, and it is then sent to the Station Review Board (SRB). After SRB review and comment incorporation, the report will be sent to B&W with the cover letter signed by the Technical Section TAP representative. B&W will place the report in the booklets and distribute to all participating utilities.

The data is then stored in the trip files (along with the Attachment 3 to PP 1102.03 from Operations). Revisions are not normally made to TAP reports, but can be completed if serious errors exist.

This completes the post trip review guidelines - these are only guidelines and are not cast in concrete. Enclosure 9 includes a checklist for post trip review which may be used to ensure no items are missed.

SEQUENCE OF EVENTS POINTS LIST

Auxiliary Transformer 11 Trouble

Bus A Electrical Fault

Bus B Electrical Fault

Bus A to Transformer AC Breaker

Bus C2 Trouble

Bus D2 Trouble

Control Rod Drive (CRD) Trip Confirm

CRD Channel AC Any Trip Device

CRD Channel BD Any Trip Device

Electro Hydraulic Control Emergency Trip System Low Pressure

Emergency Diesel Generator 1 Trouble

Emergency Diesel Generator 2 Trouble

Essential Bus C1 Trouble

Essential Bus D1 Trouble

Essential Transformer CE 1-1 Trouble (typical CE 1-1, DF 1-1, CE 1-2), DF 1-2)

Generator and Main Transformer Overall Differential Trip

Generator Overcurrent Trip

Generator Reverse Current Power Trip

Generator Field Failure

Generator Out of Step

Generator Underfrequency

Generator Differential

Generator Ground Current

Main Feed Pump Turbine (MFPT) 1 Trip (typical MFPTs 1 and 2)

Main Transformer Sudden Pressure Change

Moisture Separator Reheater 1 High Level Turbine Trip

Moisture Separator Reheater 2 High Level Turbine Trip

Reactor Protection System (RPS) Channel 1 Flux/Delta Flux/Flow Trip (typical Channels 1 through 4)

RPS Channel 1 High Flux/Number of Reactor Coolant Pumps (RCPs) Running Trip (typical Channels 1 through 4)

RPS Channel 1 Reactor Coolant (RC) Pressure/Temperature (typical Channels 1 through 4)

RPS Shutdown Bypass High Pressure Trip (typical Channels 1 through 4)

RPS Channel 1 Containment High Pressure Trip (typical Channels 1 through 4)

RPS Channel 1 RC High Pressure Trip (typical Channels 1 through 4)

RPS Channel 1 RC Low Pressure Trip (typical Channels 1 through 4)

RPS Channel 1 Channel Trip (typical Channels 1 through 4)

RPS Channel 1 High Flux Trip (typical Channels 1 through 4)

RPS Channel 1 RC High Temperature Trip (typical Channels 1 through 4)

RPS Startup Rate Rod Withdrawal Inhibit

RC Pressurizer Low Level Heater Interlock

RCP 1-1 Motor Trouble (typical RCPs 1-1, 1-2, 2-1, and 2-2)

Safety Features Actuation System (SFAS) Channel 1 Borated Water Storage Tank (BWST) Level Low (typical Channels 1 through 4)

SFAS Channel 1 Containment Pressure > 38.4 psia (typical Channels 1 through 4)

SFAS Channel 1 Containment Pressure > 18.4 psia (typical Channels 1 through 4)

SFAS Channel 1 RC Pressure < 1650 psig (typical Channels 1 through 4)

SFAS Channel 1 RC Pressure < 450 psig (typical Channels 1 through 4)

SFAS Channel 1 Containment Radiation High (typical Channels 1 through 4)

Steam and Feedwater Rupture Control System (SFRCS) Full Trip

SFRCS Differential Pressure Half/Full Trip Steam Generator (SG) 1 (typical SGs 1 and 2)

Startup Transformer 01 Trouble

Startup Transformer 02 Trouble

Switchyard Oscillograph Started

Switchyard Bus J Differential

Switchyard Breaker 34563 Open/Closed (typical five breakers)

Turbine Generator Mechanical Trip Solenoid Turbine Trip

Turbine Generator Master Turbine Trip

Turbine Generator Mechanical Trip Valve Trip

Turbine Generator Master Trip Solenoid Trip

Turbine Bypass Valve 1-1 Open/Closed (typical six valves)

Unit Seismic Instrumentation Started

:D DAVIS-BESSE UNIT 1

:NUP 10 SEQUENCE OF EVENTS REVIEW
:30:27 10/15/83

1:20:13:170	X027	SWYD ACB 34562	OPEN
1:20:31:495	P702	SFRCS DP HALF/FULL TRIP ,SG 2	TRIP
1:20:31:505	P702	SFRCS DP HALF/FULL TRIP ,SG 2	NORM
1:20:41:895	Q963	SFRCS FULL TRIP	TRIP
1:20:41:905	X038	T-G MASTER TURB TRIP	TRIP
1:20:41:940	X030	T-G MASTER TRIP SOLENOIDS	TRIP
1:20:41:945	Q181	CRD CH B/D ANY TRIP DEVICE	TRIP
1:20:41:950	Q180	CRD CH A/C ANY TRIP DEVICE	TRIP
1:20:42: 45	Q260	CRD TRIP CONFIRM	TRIP
1:20:42:105	X033	T-G MECH TRIP SOLENOID TURB TRIP	TRIP
1:20:42:185	X032	T-G MECH TRIP VLV	TRIP
1:20:44:420	P382	EHC EMER TRIP SYS LOW PRESS	TRIP
1:27:11:540	J428	GEN REVERSE PWR	TRIP
1:27:11:565	X026	SWYD ACB 34561	OPEN
1:27:11:565	X025	SWYD ACB 34560	OPEN
1:27:13:630	J428	GEN REVERSE PWR	NORM
1:27:32: 95	Y060	TURB BYPASS VLV 1-1	NC
1:27:32:445	Y060	TURB BYPASS VLV 1-1	CLOS
1:27:50:630	Y063	TURB BYPASS VLV 2-1	NC
1:27:52: 5	Y063	TURB BYPASS VLV 2-1	CLOS
1:33: 1:815	Q963	SFRCS FULL TRIP	NORM
1:33:18:730	Q841	RPS SU RATE AND WIDERNL INHIBIT	INHP
1:34: 3:105	Q841	RPS SU RATE AND WIDERNL INHIBIT	NORM
1:13:27:755	X026	SWYD ACB 34561	CLOS
1:13:32:820	X025	SWYD ACB 34560	CLOS

Enclosure 2
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POST TRIP REVIEW POINT LIST

Auxiliary Feed Pump Turbine 1 Speed (typical Pumps 1 and 2)

Channel 1 Power Range Flux (typical Channels 1 through 4)

Channel 1 Power Range Delta Flux (typical Channels 1 through 4)

Condensate Pump Flow

Control Rod Drive Group 5 Position (typical Groups 5 through 8)

Deaerator 1 Storage Tank Level (typical Deaerators 1 and 2)

Generator Gross Megawatts

High Pressure Condenser Pressure

High Pressure Condenser Hotwell Level

High Pressure Turbine First Stage Turbine End Pressure

High Pressure Turbine First Stage Generator End Pressure

High Pressure Turbine Side 1 Inlet Temperature

High Pressure Turbine Side 2 Inlet Temperature

Low Pressure Condenser Pressure

Main Feedwater Average Flow Loop 1 (typical Loops 1 and 2)

Main Feedwater Temperature (typical Loops 1 and 2)

Main Feedwater Compensated Flow (typical Loops 1 and 2)

Main Feedwater Pump Turbine 1 Speed (typical Pumps 1 and 2)

Pressurizer Average Level

Pressurizer Pressure

Reactor Coolant Makeup Tank Level

Reactor Coolant Makeup Flow

Reactor Coolant Pump (RCP) Seal Injection Flow

RCP 1-1 Discharge Cold Leg Narrow Range Temperature (typical RCPs 1-1 and 2-1)

Reactor Coolant System (RCS) Loop 1 Hot Leg Narrow Range Temperature (typical Loops 1 and 2)

RCS Average Temperature

RCS Loop 1 Hot Leg Narrow Range Pressure (typical Loops 1 and 2)

RCS Average Hot Leg Total Flow

RCS Letdown Boron Concentration

Safety Features Actuation System (SFAS) Channel 1 Containment Pressure

SFAS Channel 1 Containment Radiation Core Power

SFAS Channel 3 Borated Water Storage Tank Level

Steam Generator (SG) 1 Full Range Level (typical SGs 1 and 2)

SG 1 Startup Level (typical SGs 1 and 2)

SG 1 Operate Level (typical SGs 1 and 2)

SG 1 Outlet Temperature (typical SGs 1 and 2)

SG 1 Outlet Pressure (typical SGs 1 and 2)

SG 1 Feedwater Pressure (typical SGs 1 and 2)

TED DAVIS-BESSE UNIT NO. 1

GROUP 3 POSTTRIP REVIEW
19:52:23 1/15/1983

1/15/1983

REACTOR PROTECTION SYSTEM (RPS)

TIME	CH1 PR NI6 FLUX% R795	CH2 PR NI5 FLUX% R804	CH3 PR NI8 FLUX% R814	CH4 PR NI7 FLUX% R820	CH1 PR NI6 DFLUX% R794	CH2 PR NI5 DFLUX% R803	CH3 PR NI8 DFLUX% R813	CH4 PR NI7 DFLUX% R819
16:44: 9	101.0	100.6	100.8	100.3	I-12,888	I-12,415	I-12,796	I-13,040
16:44:24	100.8	100.6	100.9	100.6	I-12,964	I-12,521	I-12,857	I-12,979
16:44:39	100.8	100.6	101.0	100.6	I-12,964	I-12,521	I-12,918	I-13,086
16:44:54	101.0	100.6	101.0	100.6	I-12,964	I-12,521	I-12,918	I-13,086
16:45: 9	100.9	100.4	100.7	100.5	I-13,086	I-12,521	I-12,918	I-13,086
16:45:24	101.0	100.7	101.0	100.3	I-13,086	I-12,613	I-12,918	I-13,086
16:45:39	101.2	100.6	101.0	100.5	I-13,086	I-12,613	I-13,010	I-13,147
16:45:54	100.4	100.5	100.2	99.8	I-13,834	I-13,345	I-13,757	I-14,017
16:46: 9	100.6	100.3	100.5	99.9	I-13,925	I-13,422	I-13,757	I-13,910
16:46:24	100.6	100.1	100.3	100.0	I-13,925	I-13,422	I-13,834	I-14,002
16:46:39	100.7	100.1	100.6	100.1	I-14,047	I-13,605	I-13,834	I-14,002
16:46:54	100.8	100.5	100.6	100.2	I-14,047	I-13,605	I-13,925	I-14,108
16:47: 9	100.8	100.3	100.6	100.2	I-14,047	I-13,605	I-13,925	I-14,108
16:47:24	100.7	100.4	100.6	100.3	I-14,139	I-13,712	I-14,002	I-14,215
16:47:39	101.0	100.3	100.8	100.4	I-14,139	I-13,635	I-14,078	I-14,215
16:47:54	100.8	100.7	100.5	100.2	I-14,200	I-13,696	I-14,078	I-14,292
16:48: 9	100.9	100.5	100.8	100.3	I-14,200	I-13,696	I-14,078	I-14,292
16:48:24	100.8	100.4	100.7	100.2	I-14,353	I-13,803	I-14,139	I-14,292
16:48:39	100.8	100.5	100.8	100.3	I-14,353	I-13,803	I-14,139	I-14,368
16:48:54	101.0	100.5	100.8	100.3	I-14,276	I-13,803	I-14,200	I-14,368
16:49: 9	100.9	100.4	100.7	100.4	I-14,398	I-13,864	I-14,200	I-14,368
16:49:24	101.0	100.6	100.9	100.3	I-14,398	I-13,864	I-14,261	I-14,429
16:49:39	101.0	100.6	100.9	100.4	I-14,398	I-13,925	I-14,261	I-14,429
16:49:54	100.8	100.4	100.7	100.4	I-14,490	I-14,002	I-14,353	I-14,429
16:50: 9	100.9	100.6	100.8	100.4	I-14,490	I-14,002	I-14,353	I-14,429
16:50:24	101.1	100.6	100.9	100.4	I-14,490	I-14,002	I-14,353	I-14,429
16:50:39	100.9	100.5	101.0	100.4	I-14,490	I-14,002	I-14,353	I-14,429
16:50:54	101.1	100.7	101.0	100.3	I-14,490	I-14,002	I-14,429	I-14,429
16:51: 9	101.2	100.6	100.9	100.3	I-14,490	I-14,093	I-14,429	I-14,429
16:51:24	101.1	100.4	100.9	100.5	I-14,582	I-14,093	I-14,505	I-14,521
16:51:39	100.9	101.0	100.9	100.5	I-14,688	I-14,200	I-14,505	I-14,521
16:51:54	101.3	100.5	100.8	100.6	I-14,688	I-14,108	I-14,582	I-14,627
16:52: 9	101.1	100.9	101.0	100.5	I-14,826	I-14,246	I-14,490	I-14,627
16:52:24	101.2	100.7	101.0	100.6	I-14,826	I-14,246	I-14,582	I-14,627
16:52:39	101.0	100.8	101.1	100.6	I-14,826	I-14,337	I-14,673	I-14,688
16:52:54	100.3	100.9	101.1	100.6	I-15,894	I-15,436	I-14,673	I-14,688
16:53: 9	100.4	99.9	100.1	99.8	I-15,894	I-15,436	I-15,741	I-16,184
16:53:24	100.6	100.2	100.6	100.3	I-15,955	I-15,436	I-15,741	I-16,184
16:53:39	100.8	100.4	100.7	100.2	I-15,955	I-15,543	I-15,848	I-16,184
16:53:54	100.8	100.5	100.6	100.2	I-16,077	I-15,619	I-15,924	I-16,275

TED DAVIS-BESSE UNIT N0, 1

GR0UP 3 P0STTRIP REVIEW
19:52:23 1/15/1983

1/15/1983

REACT0R PR0TECTI0N SYSTEM (RPS)

TIME	CH1 PR NI6 FLUX% R795	CH2 PR NI5 FLUX% R804	CH3 PR NI8 FLUX% R814	CH4 PR NI7 FLUX% R820	CH1 PR NI6 DFLUX% R794	CH2 PR NI5 DFLUX% R803	CH3 PR NI8 DFLUX% R813	CH4 PR NI7 DFLUX% R819
16:54: 9	100,6	100,4	100,6	100,4	I-16,077	I-15,619	I-15,924	I-16,275
16:54:24	100,9	100,6	100,9	100,3	I-16,199	I-15,619	I-15,986	I-16,275
16:54:39	101,0	100,6	100,9	100,3	I-16,199	I-15,680	I-15,986	I-16,337
16:54:54	101,0	100,5	100,7	100,3	I-16,306	I-15,680	I-16,092	I-16,398
16:55: 9	100,9	100,6	100,8	100,5	I-16,306	I-15,818	I-16,092	I-16,398
16:55:24	101,1	100,6	101,0	100,5	I-16,306	I-15,818	I-16,184	I-16,398
16:55:39	101,0	100,7	101,0	100,5	I-16,398	I-15,970	I-16,184	I-16,398
16:55:54	101,0	100,4	100,9	100,6	I-16,398	I-15,970	I-16,275	I-16,550
16:56: 9	101,1	100,6	100,7	100,4	I-16,474	I-15,970	I-16,275	I-16,550
16:56:24	100,9	100,4	100,8	100,5	I-16,535	I-16,047	I-16,352	I-16,550
16:56:39	100,9	100,5	101,0	100,8	I-16,535	I-16,108	I-16,352	I-16,550
16:56:54	100,9	100,6	100,8	100,4	I-16,535	I-16,047	I-16,352	I-16,550
16:57: 9	100,7	100,6	100,6	100,7	I-16,535	I-16,123	I-16,459	I-16,611
16:57:24	100,8	100,4	100,6	100,6	I-16,535	I-16,123	I-16,459	I-16,688
16:57:39	101,0	100,4	100,8	100,6	I-16,535	I-16,214	I-16,459	I-16,688
16:57:54	100,9	100,5	100,7	100,6	I-16,642	I-16,214	I-16,565	I-16,688
16:58: 9	101,1	100,6	100,9	100,4	I-16,642	I-16,214	I-16,565	I-16,688
16:58:24	100,4	100,1	100,1	99,8	I-17,252	I-16,825	I-17,054	I-17,420
16:58:39	100,7	100,1	100,4	100,3	I-17,252	I-16,886	I-17,161	I-17,420
16:58:54	100,7	100,5	100,5	100,3	I-17,374	I-16,962	I-17,267	I-17,420
	**********	**********	**********	TRIP	**********	**********	**********	
16:59:12	100,7	100,3	100,5	100,2	I-17,374	I-17,023	I-17,267	I-17,496
16:59:26	4,3	3,2	100,5	100,5	I -0,954	I -0,847	I -0,893	I-17,496
16:59:41	1,9	1,5	3,0	2,4	I -0,374	I -0,465	I -0,572	I -0,832
16:59:56	1,1	0,9	1,6	1,2	I -0,267	I -0,359	I -0,481	I -0,557
17: 0: 9	0,7	0,9	1,0	0,7	I -0,206	I -0,298	I -0,481	I -0,450
17: 0:26	0,5	0,3	0,7	0,3	I -0,206	I -0,298	I -0,420	I -0,450
17: 0:39	0,3	0,3	0,4	0,1	I -0,130	I -0,298	I -0,420	I -0,389
17: 0:55	0,2	0,0	0,3	0,0	I -0,130	I -0,237	I -0,420	I -0,389
17: 1: 9	0,1	0,0	0,2	-0,1	I -0,130	I -0,237	I -0,343	I -0,389
17: 1:27	0,1	-0,1	0,1	-0,1	I -0,130	I -0,237	I -0,343	I -0,328
17: 1:39	0,1	-0,1	0,1	-0,2	I -0,130	I -0,237	I -0,343	I -0,328
17: 1:54	0,0	-0,1	0,0	-0,2	I -0,130	I -0,237	I -0,343	I -0,328
17: 2: 9	0,0	-0,1	0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328
17: 2:24	0,0	-0,1	0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328
17: 2:39	0,0	-0,1	0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328
17: 2:54	0,0	-0,1	0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328
17: 3: 9	0,0	-0,2	-0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328
17: 3:24	0,0	-0,2	-0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328
17: 3:39	0,0	-0,2	-0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328
17: 3:54	0,0	-0,2	-0,0	-0,3	I -0,130	I -0,237	I -0,343	I -0,328

TED DAVIS-BESSE UNIT NO. 1

GROUP 3 POSTTRIP REVIEW
19:52:23 1/15/1983

1/15/1983

REACTOR PROTECTION SYSTEM (RPS)

TIME	CH1 PR NI6 FLUX% R795	CH2 PR NI5 FLUX% R804	CH3 PR NI8 FLUX% R814	CH4 PR NI7 FLUX% R820	CH1 PR NI6 DFLUX% R794	CH2 PR NI5 DFLUX% R803	CH3 PR NI8 DFLUX% R813	CH4 PR NI7 DFLUX% R819
17: 4: 9	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 4:25	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 4:39	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 4:54	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 5: 9	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 5:24	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 5:39	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 5:54	*0,0	*0,2	*0,0	*0,3	*0,130	*0,237	*0,343	*0,328
17: 6: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 6:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 6:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 6:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 7: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 7:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 7:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 7:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 8: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 8:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 8:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 8:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 9: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 9:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 9:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17: 9:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:10: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:10:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:10:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:10:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:11: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:11:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:11:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:11:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:12: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:12:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:12:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:12:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:13: 9	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:13:24	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:13:39	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328
17:13:54	*0,0	*0,2	*0,1	*0,3	*0,069	*0,237	*0,343	*0,328

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10:14:16 CONT Q327  EHC HP DISCH FLT ...                               NORM
10:14:16 CONT Q418  RESER BUS C1 CTRL PWR                               NORM
10:14:20 BAD  V661  MFPT 2 BFP END BRG VIB (MILS)         -0.18          0.00
10:14:24 CONT Z464  HP FW HTR 1-6 HI LVL DRN VLV                        CLOS
10:14:26 CONT Q627  MFPT 2 HP OIL PMP 2                                 ON
10:14:29 CONT L466  HP FW HTR 2-4 LVL                                   HIGH
10:14:30 NORM P931  SG 1 OUT STM PRESS,PT12B1            901.06        901.93
10:14:43 NORM T968  DEAR HTR 1 TERM TEMP DIFF              0.16          3.00
10:14:48 CONT L466  HP FW HTR 2-4 LVL                                   NORM
10:14:58 CONT Q905  SFAS CTMT AIR CLR LOGIC L223                        TRIP
10:14:59 CONT L762  RC MU TK LVL,MU16-2                                 HILO
10:14:59 FLAG X258  SFAS EMER PWR LOGIC L263                            TRIP
10:15: 1 CONT L760  RC MU TK LVL,MU16-1                                 HILO
10:15:08 CONT Q905  SFAS CTMT AIR CLR LOGIC L223                        NORM
10:15:10 CONT Z732  RC DIVERTING VLV OPEN TO MU TK                      NO
10:15:10 CONT Q001  ARTS IN FROM MFPT                                   TRIP
10:15:12 LOW  A864  RPS CH 3 IR SU RATE DN14 (DPM)        -0.11          0.00
10:15:17 HIGH L761  RC MU TK LVL,MU16-1 (IN)              85.71         81.00
10:15:18 CONT Z733  RC DIVERTING VLV OPEN TO WD SYS                     CLOS
10:15:20 NORM V661  MFPT 2 BFP END BRG VIB (MILS)         -0.17          2.00
10:15:23 CONT L760  RC MU TK LVL,MU16-1                                 NORM
10:15:27 CONT L762  RC MU TK LVL,MU16-2                                 NORM
CURRENT DATE IS: OCT., 19  1983
10:15:43 NORM A871  RPS CH 4 IR SU RATE DN13 (DPM)         0.14          1.00
10:15:46 CONT Q853  SFAS CC WTR LOGIC L233                              TRIP
10:15:58 CONT Q853  SFAS CC WTR LOGIC L233                              NORM
10:16:02 NORM L761  RC MU TK LVL,MU16-1 (IN)              84.73         88.00
10:16: 6 CONT L466  HP FW HTR 2-4 LVL                                   HIGH
10:16:13 NORM A864  RPS CH 3 IR SU RATE DN14 (DPM)         0.13          1.00
10:16:27 CONT L466  HP FW HTR 2-4 LVL                                   NORM
10:16:35 CONT Z464  HP FW HTR 1-6 HI LVL DRN VLV                        NO
10:16:43 LOW  T968  DEAR HTR 1 TERM TEMP DIFF             -0.03          0.00
10:16:43 LOW  A871  RPS CH 4 IR SU RATE DN13 (DPM)        -0.12          0.00
10:16:58 CONT Q953  SFAS SW LOGIC L243                                  TRIP
10:17:12 LOW  A864  RPS CH 3 IR SU RATE DN14 (DPM)        -0.10          0.00
10:17:13 CONT Q953  SFAS SW LOGIC L243                                  NORM
10:17:16 CONT Q001  ARTS IN FROM MFPT                                   NORM
10:17:20 BAD  V661  MFPT 2 BFP END BRG VIB (MILS)         -0.18          0.00
10:17:24 CONT Q004  ARTS TEST TRIP                                      NORM
10:17:28 CONT L466  HP FW HTR 2-4 LVL                                   HIGH
10:17:43 CONT L466  HP FW HTR 2-4 LVL                                   NORM
10:17:43 NORM T968  DEAR HTR 1 TERM TEMP DIFF              0.06          3.00
10:17:43 NORM A871  RPS CH 4 IR SU RATE DN13 (DPM)         0.10          1.00
10:17:50 NORM V661  MFPT 2 BFP END BRG VIB (MILS)         -0.18          2.00
10:18: 4 CONT L466  HP FW HTR 2-4 LVL                                   HIGH
10:18:15 HIGH P931  SG 1 OUT STM PRESS,PT12B1            902.89        901.93
10:18:19 CONT L466  HP FW HTR 2-4 LVL                                   NORM
10:18:24 CONT Z464  HP FW HTR 1-6 HI LVL DRN VLV                        CLOS
10:18:25 CONT Q901  SFAS CS VLV LOGIC L253                              TRIP
10:18:26 FLAG X306  SFAS CTMT ISO 3 LOGIC L123                          TRIP
10:18:30 NORM P931  SG 1 OUT STM PRESS,PT12B1            899.60        901.93
10:18:40 CONT L466  HP FW HTR 2-4 LVL                                   HIGH
10:18:42 NORM A864  RPS CH 3 IR SU RATE DN14 (DPM)         0.12          1.00
10:18:43 LOW  A871  RPS CH 4 IR SU RATE DN13 (DPM)        -0.01          0.00
10:18:43 CONT Q901  SFAS CS VLV LOGIC L253                              NORM
10:18:54 CONT L466  HP FW HTR 2-4 LVL                                   NORM
10:19:13 CONT L466  HP FW HTR 2-4 LVL                                   HIGH
10:19:13 CONT Q929  SFAS EMER PWR LOGIC L263                            TRIP
10:19:14 CONT Q004  ARTS TEST TRIP                                      BYPS
10:19:14 FLAG Q072  CTMT H2 DILUTN OUT ISO VLV, 5038                    NC
10:19:24 FLAG Q072  CTMT H2 DILUTN OUT ISO VLV, 5038                    NORM
10:19:30 CONT L466  HP FW HTR 2-4 LVL                                   NORM
10:19:36 LOW  P637  HPP 1 DISCH PRESS                     44.01        900.00
10:19:42 LOW  A864  RPS CH 3 IR SU RATE DN14 (DPM)        -0.08          0.00
10:20:13 NORM A871  RPS CH 4 IR SU RATE DN13 (DPM)         0.07          1.00
10:20:20 BAD  V661  MFPT 2 BFP END BRG VIB (MILS)         -0.17          0.00
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OCT 19 1983

Enclosure 5
Page 1 of 1

DATA ACQUISITION AND DISPLAY SYSTEM RECORDED POINTS

Auxiliary Feedwater Flow to Steam Generator (SG) 1 (typical SGs 1 and 2)

Auxiliary Feed Pump 1 Discharge Pressure (typical Pumps 1 and 2)

Auxiliary Feed Pump Turbine 1 Speed (typical Pumps 1 and 2)

Containment Hydrogen Concentration

Containment Spray Pump 1 Discharge Flow (typical Pumps 1 and 2)

Containment Normal Sump Level

Containment Wide Range Level

Containment Wide Range Pressure

Containment Atmosphere Particulate Radiation

Containment Atmosphere Iodine Radiation

Containment Atmosphere Noble Gas Radiation

Containment Atmosphere Noble Gas Mid to High Range Radiation

Containment Wide Range Radiation

Unit Vent Particulate Radiation

Unit Vent Iodine 131 Radiation

Unit Vent Xenon 133 Radiation

Generator Gross Megawatts

High Pressure Injection 1-1 Flow (typical Lines 1-1, 1-2, 2-1, and 2-2)

Incore Outlet Temperature (typical 16 sensors)

Low Pressure Injection Pump 1 Flow (typical Pumps 1 and 2)

Main Feedwater Temperature to Integrated Control System

Main Feedwater Control Valve Position Loop 1 (typical Loops 1 and 2)

Main Feedwater Startup Control Valve Position Loop 1 (typical Loops 1 and 2)

Main Feedwater Compensated Flow Loop 1 (typical Loops 1 and 2)

Reactor Coolant Makeup Tank Level

Reactor Coolant System (RCS) Hot Leg Flow Loop 1 (Loops 1 and 2)

RCS Pressurizer Compensated Level

RCS Pressurizer Quench Tank Level

RCS Pressurizer Quench Tank Pressure

RCS Hot Leg Wide Range Pressure Loop 1 (typical Loops 1 and 2)

RCS Average Narrow Range Temperature

RCS Calculated Hot Leg Subcooled Margin Channel A

RCS Calculated Hot Leg Subcooled Margin Channel B

RCS Hot Leg Wide Range Temperature Loop 1 (typical Loops 1 and 2)

RCS Pressurizer Temperature

RCS Pressurizer Power Operated Relief Valve Position

RCS Pressurizer Pressure Relief Valve Position (typical Valves 1 and 2)

Reactor Coolant Pump (RCP) 1-1 Discharge Cold Leg Wide Range Temperature (typical RCPs 1-1, 1-2, 2-1, and 2-2)

Reactor Protection System (RPS) Auctioneered Average Power

RPS Channel 1 Power Range Flux (typical Channels 1 through 4)

RPS Channel 1 Source Range Flux (typical Channels 1 and 2)

RPS Channel 3 Intermediate Range Flux (typical Channels 3 and 4)

Safety Features Actuation System (SFAS) Channel 1 Borated Water Storage Tank Level

Steam Generator (SG) 1 Outlet Steam Temperature (typical SGs 1 and 2)

SG 1 Operate Level (typical SGs 1 and 2)

SG 1 Startup Range Level (typical SGs 1 and 2)

SG 1 Outlet Pressure (typical SGs 1 and 2)

SOE POINT INDEX

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
A850	QS-RC1-1	RPS CH 1 Flux-DFlux-Flow BSTBL	-32.25% ± 0.25%	RPS CH 1 $\phi/\Delta\phi$/Flow Trip
A851	QS-NI6	RPS CH 1 HI Flux/No RCP ON BSTBL	1. One pump operating in each loop $\leq$ 54.25 ± .25% of RTP 2. Two pumps operating in one loop and no pump operating in other loop, no pumps operating, or only one pump operating $\leq$ 0.0% of RTP	RPS CH 1 Power/Pumps Trip Bistables trips
A852	QS-RC2B2	RPS CH 1 RC Press-Temp BSTBL	12.6 T/Hot -5644 PSIG ± 4.0 PSI	RPS CH 1 RC Press-Temp Trip
A856	QS-RC1-2	RPS CH 2 Flux-DFlux-Flow BSTBL	-13.57% ± 0.12%	RPS CH 2 $\phi/\Delta\phi$/Flow Trip
A857	QS-NI5	RPS CH 2 HI Flux/No RCP ON BSTBL	1. One pump operating in each loop $\leq$ 54.25 ± .25% of RTP 2. Two pumps operating in one loop and no pump operating in other loop, no pumps operating, or only one pump operating $\leq$ 0.0% of RTP	RPS CH 2 Power/Pumps Trip Bistables trips
A858	QS-RC2A2	RPS CH 2 RC Press-Temp BSTBL	12.6 T/Hot -5644 PSIG ± 4.0 PSI	RPS CH 2 RC Press-Temp. Trip
A862	QS-RC1-3	RPS CH 3 Flux-DFlux-Flow BSTBL	7.86% ± 0.14%	RPS CH3 $\phi/\Delta\phi$/Flow Trip

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
A863	QS-NI8	RPS CH 3 HI Flux/No RCP ON BSTBL	1. One pump operating in each loop $\leq$ 54.25 ± .25% of RTP 2. Two pumps operating in one loop and no pump operating in other loop, no pumps operating, or only one pump operating $\leq$ 0.0% of RTP	RPS CH 3 Power/Pumps Trip Bistables trips
A865	QS-RC2B1	RPS CH 3 RC Press-Temp BSTBL	12.6 T/Hot - 5644 PSIG ± 4.0 PSI	RPS CH 3 RC Press-Temp Trip
A869	QS-RC1-4	RPS CH 4 Flux-DFlux-Flow BSTBL	32.25% ± 0.25%	RPS CH 4 $\phi/\Delta\phi$/Flow Trip
A870	QS-NI7	RPS CH 4 HI Flux/No RCP ON BSTBL	1. One pump operating in each loop $\leq$ 54.25 ± .25% of RTP 2. Two pumps operating in one loop and no pump operating in other loop, no pumps operating, or only one pump operating $\leq$ 0.0% of RTP	RPS CH 4 Power/Pumps Trip Bistables trips
A872	QS-RCA1	RPS CH 4 RC Press-Temp BSTBL	12.6 T/Hot -5644 PSIG ± 4.0 PSI	RPS CH 4 RC Press-Temp Trip
I061	IS-6500	Bus A Elec Fault	N/A	Over current condition on the 13.8 KV Bus A or a ground fault on the 13.8 KV Bus A
I069	IS-65001	Bus B Elec Fault	N/A	Over current on the 13.8 KV Bus B or a ground fault on the 13.8 KV Bus B

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
I421	IDS-6400	GEN DIFF	1500 primary amperes (main transformer high side amperes)	An unbalance of current flowing into and out of the generator windings. Trips turbine and main generator breakers 34560 and 34561.
I425	IS-64006	GEN Ground Current	Relay alarms for generator neutral current of 0.853 primary ampers or more up to a maximum of 7.4 primary ampers for a solid ground on the generator 25,000 volt terminals	The alarm is caused by the flow of ground fault current in the generator neutral when it reaches a preset limit due to a ground fault in the stator or on the generator 25,000 volt leads.
I426	IDS-6405	GEN & MN XFMR Overall Diff Trip	346 primary ampers (main transformer high side amperes)	A quantitative difference of currents flowing in the generator stator windings, the two 345 KV air circuit breakers, main transformer and #11 Auxiliary Transformer. Trips turbine and main generator breakers 34560 and 34561.
I427	KS-6400B	GEN Negative Phase Seq	Negative Phase Sequence Relay: Alarms for a negative phase sequence pickup current of 1575 primary amperes (main transformer high side amperes)	When poly phase currents are unbalanced or contain negative phase sequence components above a given amount. Trips generator main breakers 34560 and 34561 for generator negative phase sequence protection.
I428	IS-6400A	GEN Overcurrent	1. With voltage restraint: 50,000 primary amperes (main transformer high side ampers) 2. Zero voltage restraint: 12,500 primary ampers (main transformer high side ampers)	The current in the turbine generator circuit has reached a predetermined value for system fault backup protection. Trips generator main breakers 34560 and 34561 for generator overcurrent protection.

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
I844	IS-6108	SWYD Bus J Diff	N/A	Bus J Elect Fault
J428	JS-6400A	GEN Reverse Pwr	At ≥5,200 KW in, relay times out for 25 seconds and then initiates trip	Motoring occurs as a result of a deficiency in the prime mover input to the a-c generator. When this input cannot supply all the losses, then the deficiency is supplied by absorbing real power from the system. Trips turbine and main generator breakers 34560 and 34561.
L680	LSH-140	MSR 1 HI Lvl Trub Trip	Lvl increases to 3"-5" from bottom of tank	Increasing level in MSR drain line
L690	LSH-164	MSR 2 HI Lvl Turb Trip	Lvl increases to 3"-5" from bottom of tank	Increasing level in MSR drain line
L770	LSLL-RC14	RC PRZR Lo Lvl Htr	40 inches	Low pressurizer level
L862	QS-7640	SFAS Sump Recirc Logic L511	8 feet water	This alarm is generated when any two of the four SFAS BWST low level bistables trip. The alarm is provided to tell when SFAS level 5 allows the transfer to the emergency sump to occur.
L864	QS-7641	SFAS Sump Recirc Logic L512	8 feet water	This alarm is generated when any two of the four SFAS BWST low level bistables trip. The alarm is provided to tell when SFAS level 5 allows the transfer to the emergency sump to occur.

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
L866	QS-7642	SFAS Sump Recirc Logic L513	8 feet water	This alarm is generated when any two of the four SFAS BWST low level bistables trip. The alarm is provided to tell when SFAS level 5 allows the transfer to the emergency sump to occur.
L868	QS-7642	SFAS Sump Recirc Logic L514	8 feet water	This alarm is generated when any two of the four SFAS BWST low level bistables trip. The alarm is provided to tell when SFAS level 5 allows the transfer to the emergency sump to occur.
P683	PSH-6405	MN XFMR 1 Sudden Press	N/A	The alarm is caused by a sudden change in XFMR Tank pressure, possibly accompanied by an arc in the XFMR. The turbine generator and reactor may trip.
P701	QS-2686	SFRCS DP Half/Full Trip, SG 1	177 PSIG	High steam to feedwater DP
P702	QS-2685	SFRCS DP Half/Full Trip, SG 2	177 PSIG	High steam to feedwater DP
P857	PS-NI15-2	RPS CH 1 CTMT HI Press	3.175 PSIG ± 0.2 PSIG	RPS CH 1 CTMT Press HI Trip
P858	PSh-RC2B2	RPS CH 1 RC HI Press	2285.0 PSIG ± 4.0 PSIG	RPS CH 1 RC Press HI Trip
P859	PSL-RC2B2	RPS CH 1 RC LO Press BSTBL	1998.4 PSIG ± 4.0 PSIG	RPS CH 1 RC Press Low Trip
P862	PS-NI15-1	RPS CH 2 CTMT HI Press	3.175 PSIG ± 0.2 PSIG	RPS CH 2 CTMT Press HI Trip
P863	PSL-RC2A2	RPS CH 2 RC LO Press BSTBL	1998.4 PSIG ± 4.0 PSIG	RPS CH 2 RC Press Low Trip
P864	PSH-RC2A2	RPS CH 2 RC HI Press	2285.0 PSIG ± 4.0 PSIG	RPS CH 2 RC Press HI Trip

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
P867	PS-NI15-4	RPS CH 3 CTMT HI Press	3.175 PSIG ± 0.2 PSIG	RPS CH 3 CTMT Press HI Trip
P868	PSH-RC2B1	RPS CH 3 RC HI Press	2285.0 PSIG ± 4.0 PSIG	RPS CH 3 RC Press HI Trip
P869	PSL-RC2B1	RPS CH 3 RC LO Press BSTBL	1998.4 PSIG ± 4.0 PSIG	RPS CH 3 RC Press Low Trip
P872	PS-NI15-3	RPS CH 4 CTMT HI Press	3.175 PSIG ± 0.2 PSIG	RPS CH 4 CTMT Press HI Trip
P873	PSH-RC2A1	RPS CH 4 RC HI Press	2285.0 PSIG ± 4.0 PSIG	RPS CH 4 RC Press HI Trip
P874	PSL-RC2A1	RPS CH 4 RC LO Press BSTBL	1998.4 PSIG ± 4.0 PSIG	RPS CH 4 RC Press Low Trip
P895	PSHH-2000A	SFAS CH 1 CTMT Press > 38.4 PSIA	23.6 PSIG ± 0.4 PSIG	SFAS CH 1 CTMT Press HI HI Trip
P896	PSH-2000A	SFAS CH 1 CTMT Press > 18.4 PSIA	3.5 PSIG ± 0.5 PSIG	SFAS CH 1 CTMT Press HI Trip
P898	PSHH-2001A	SFAS CH 2 CTMT Press > 38.4 PSIA	23.6 PSIG ± 0.4 PSIG	SFAS CH 2 CTMT Press HI HI Trip
P899	PSH-2001A	SFAS CH 2 CTMT Press > 18.4 PSIA	3.5 PSIG ± 0.5 PSIG	SFAS CH 2 CTMT Press HI Trip
P901	PSHH-2002A	SFAS CH 3 CTMT Press > 38.4 PSIA	23.6 PSIG ± 0.4 PSIG	SFAS CH 3 CTMT Press HI HI Trip
P902	PSH-2002A	SFAS CH 3 CTMT Press > 18.4 PSIA	3.5 PSIG ± 0.5 PSIG	SFAS CH 3 CTMT Press HI Trip
P904	PSHH-2003A	SFAS CH 4 CTMT Press > 38.4 PSIA	23.6 PSIG ± 0.4 PSIG	SFAS CH 4 CTMT Press HI HI Trip
P905	PSH-2003A	SFAS CH 4 CTMT Press > 18.4 PSIA	3.5 PSIG ± 0.5 PSIG	SFAS CH 4 CTMT Press HI Trip
P911	PSL-RC2B4	SFAS CH 1 RC < 1650#	1650.0 PSIG ± 25 PSIG	SFAS CH 1 RC Press Low Trip
P912	PSLL-RC2B4	SFAS CH 1 RC < 400#	450 PSIG ± 25 PSIG	SFAS CH 1 RC Press Low Trip
P914	PSL-RC2A4	SFAS CH 2 RC < 1650#	1650.0 PSIG ± 25 PSIG	SFAS CH 2 RC Press Low Trip
P915	PSLL-RC2A4	SFAS CH 2 RC < 400#	450 PSIG ± 25 PSIG	SFAS CH 2 RC Press Low Trip

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
P917	PSL-RC2B3	SFAS CH 3 RC < 1650#	1650 PSIG ± 25 PSIG	SFAS CH 3 RC Press Low Trip
P918	PSLL-RC2B3	SFAS CH 3 RC < 400#	450 PSIG ± 25 PSIG	SFAS CH 3 RC Press Low Trip
P920	PSL-RC2A3	SFAS CH 4 RC < 1650#	1650 PSIG ± 25 PSIG	SFAS CH 4 RC Press Low Trip
P921	PSLL-RC2A3	SFAS CH 4 RC < 400#	450 PSIG ± 25 PSIG	SFAS CH 4 RC Press Low Trip
Q015	QS-6411	Aux XFMR 11 TRBL	N/A	1. A sudden pressure in the XFMR due to a fault 2. A ground fault on the XFMR secondary, or in backup protection breakers HX11A and HX11B 3. A phase overcurrent on the XFMR primary, or in backup protection breakers HX11B and HX11B 4. A differential relay operation caused by a fault in the transformer or its connections to the 13.8 KV buses
Q037	IS-6503	Bus A to XFMR AC BRKR	N/A	1. A bus lockout on Bus A. 2. A primary or secondary ground fault on XFMR AC. 3. A differential or overcurrent on XFMR AC.
Q041	IS-6504	Bus B to XFMR BD BRKR	N/A	1. A bus lockout on Bus B. 2. A primary or secondary ground fault on XFRM BD. 3. A differential or overcurrent on XFMR BD.
Q050	IS-6521	Bus C2 TRBL	N/A	Bus overcurrent sensed by the partial differential overcurrent or ground relay scheme

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
Q058	IS-6522	Bus D2 TRBL	N/A	Bus overcurrent sensed by the partial differential overcurrent or ground relay scheme
Q180	CRD-SW9	CRD CH A/C Any Trip Device	N/A	1. Breakers A or C Trip 2. Electronic Trip C 3. WYE Current Sensor A 4. Return SCR Trip C
Q181	CRD-SW10	CRD CH B/D Any Trip Device	N/A	1. Breakers B or D Trip 2. Electronic Trip D 3. WYE Current Sensor B 4. Return SCR Trip D
Q266	CRD-SW4	CRD Trip Confirm	N/A	Any reactor trip
Q396	QS-6221A	EMER DG 1 Locked Out or TRBL	N/A	1. Lockout Relay 86-1 operation (will trip AC 101 breaker and short the field for No. 1-1 DG) 2. Lockout Relay 86-2 operation (will trip AC 101 breaker and shutdown the engine) 3. Emergency Diesel Generator Voltage Regulator Switch in the OFF position
Q401	QS-6231A	EMER DG 2 Locked Out or TRBL	N/A	1. Lockout Relay 86-1 operation (will trip AD 101 breaker and short the field for No. 1-2 DG) 2. Lockout Relay 86-2 operation (will trip AD 101 breaker and shutdown the engine) 3. Emergency Diesel Generator Voltage Regulator Switch in the off position.

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
Q414	IS-6519	ESSEN Bus C1 TRBL	N/A	1. Phase overcurrent on Bus C1 2. Ground overcurrent on Bus C1
Q417	IS-6520	ESSEN Bus D1 TRBL	N/A	1. Phase overcurrent on Bus D1 2. Ground overcurrent on Bus D1
Q430	IS-6529	ESSEN XFMR CE1-1 TRBL	N/A	Automatic tripping of 4.16 KV Feeder Breaker AC1CE11 for the following: 1. Transformer Ground (51N/1CE) 2. Bus Overcurrent (94-1) 3. Feeder Overcurrent (50-51) 4. Feeder Ground (50GS)
Q432	IS-6530	ESSEN XFMR DF1-1 TRBL	N/A	Automatic tripping of 4.16 KV Feeder Breaker AD1DF11 for essential Unit Substation F1 and 480V breaker BDF11 for the following: 1. Transformer Ground (51N/1DF) 2. Bus Overcurrent (94-1) 3. Feeder Overcurrent (50-51) 4. Feeder Ground (50GS)
Q435	IS-6532	ESSEN XFMR CE1-2 TRBL	N/A	Automatic tripping of 4.16 KV Feeder Breaker AC1CE12 for essential Unit Substation F1 and 480V breaker BCE12 for the following: 1. Transformer Ground (51N/2CE) 2. Bus Overcurrent (94-1) 3. Feeder Overcurrent (50-51) 4. Feeder Ground (50GS)

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
Q437	IS-6532	ESSEN XFMR DF1-2 TRBL	N/A	Automatic tripping of 4.16 KV Feeder Breaker AD1DF12 for essential Unit Substation F1 and 480V breaker BDF12 for the following: 1. Transformer Ground (51N/2DF) 2. Bus Overcurrent (94-1) 3. Feeder Overcurrent (50-51) 4. Feeder Ground (50GS)
Q448	ES-6400A	GEN Field Failure	A typical alarm point is 632,310 KVA power flow into the generator	Loss of excitation by an abnormally low value or failure of generator field current, which causes reactive power flow from the system into the machine. Trips turbine and main generator breakers 34560 and 34561.
Q451	KS-6400A	GEN Out-Of-Step	Gen. Out of step relay: Alarms at a pickup of 0.162 primary ohms and 30,000 primary amperes (main transformer high side ampers).	A phase angle measuring device that functions between two voltages, two currents or between voltage and current. Trips generator main breakers 34560 and 34561 for generator loss of synchronism.
Q613	QS-2731	MFPT 1	1. 5925 RPM 2. 40 PSIG 3. 4 PSIG 4. 4 PSIG 5. 12.5" HgA 6. N/A 7. 1500 PSIG	1. MFPT 1-1 Over Speed Trip 2. MFPT 1-1 Thrust Brg Wear Trip 3. MFPT 1-1 Lube Oil Low Press Trip 4. MFP 1-1 Lube Oil Low Press Trip 5. MFPT 1-1 Exhaust HI Press Trip 6. MFPT 1-1 Manual Trip 7. MFPT 1-1 Disch HI Press Trip

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
Q634	QS-2732	MFPT 2	1. 5925 RPM 2. 40 PSIG 3. 4 PSIG 4. 4 PSIG 5. 12.5" HgA 6. N/A 7. 1500 PSIG	1. MFPT 1-2 Over Speed Trip 2. MFPT 1-2 Thrust Brg Wear Trip 3. MFPT 1-2 Lube Oil Low Press Trip 4. MFP 1-2 Lube Oil Low Press Trip 5. MFPT 1-2 Exhaust Hi Press Trip 6. MFPT 1-2 Manual Trip 7. MFPT 1-2 Disch HI Press Trip
Q783	QS-6515A	RCP 1-1 MTR TRBL	N/A	1. Motor Overcurrent a. Phase, Time and Instantaneous b. Phase, Extremely Inverse Time 2. Instantaneous Ground Fault 3. Phase Imbalance 4. Bus Protection Lockout
Q789	QS-6516A	RCP 1-2 MTR TRBL	N/A	1. Motor Overcurrents a. Phase, Time and Instantaneous b. Phase, Extremely Inverse Time 2. Instantaneous Ground Fault 3. Phase Imbalance 4. Bus Protection Lockout
Q795	QS-6517A	RCP 2-1 MTR TRBL	N/A	1. Motor Overcurrents a. Phase, Time and Instantaneous b. Phase, Extremely Inverse Time 2. Instantaneous Ground Fault 3. Phase Imbalance 4. Bus Protection Lockout

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
Q801	QS-6518A	RCP 2-2 MTR TRBL	N/A	1. Motor Overcurrents a. Phase, Time and Instantaneous b. Phase, Extremely Inverse Time 2. Instantaneous Ground Fault 3. Phase Imbalance 4. Bus Protection Lockout
Q810	RPS-TR-B	RPS CH 1 CH Trip	N/A	When the channel trip relay in the RPS Channel 1 Reactor Trip Module is deenergized
Q818	RPS-TR-A	RPS CH 2 CH Trip	N/A	When the channel trip relay in the RPS Channel 2 Reactor Trip Module is deenergized
Q822	RPS-SHBHP	RPS Shutdown Bypass High Press	1820 PSIG (+0, -1.6 PSIG)	When a channel is in shutdown bypass and the RPS Shutdown Bypass High Pressure Bistable trips
Q826	RPS-TR-D	RPS CH 3 CH Trip	N/A	When the channel trip relay in the RPS CH 3 Reactor Trip Module is deenergized
Q834	RPS-TR-C	RPS CH 4 CH Trip	N/A	When the channel trip relay in the CH 4 Reactor Trip Module is deenergized
Q841	RPS-SRI	RPS SU Rate Rod WTHDRWL INHIBIT	1. $\geq$ 2 DPM in the Source Range (NI 1, 2) with reactor power less than $1x10^{-9}$ amps on the Intermediate Range (NI 3,4). 2. $\geq$ 3 DPM on the Intermediate Range (NI 3, 4) with reactor power less than 10% on the Power Range (NI 5, 6, 7, 8).	When the control rods are inhibited from being withdrawn by the Nuclear Instrumentation

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
Q963	QS-SFRCS	SFRCS Full Trip	1. High or low current indication on all 4 RCP's. 2. Less than 612 PSIG. 3. Greater than 177 PSIG. 4. Less than 26.5"	1. Loss of 4 Reactor Coolant Pumps. 2. Low steam header pressure. 3. High steam to feedwater DP due to loss of feedwater. 4. Low steam gencrator level.
Q981	QS-6401	SU XFMR 01 TRBL	1. Sudden Pressure 8 PSIG 2. Phase overcurrent 144.3 A (86.2 MVA)	1. A sudden pressure in the XFMR due to a fault (AP3101.07) 2. A ground fault on the XFMR secondary or backup protection for breakers HX01A and HX01B 3. A phase overcurrent on the XFMR primary or backup protection for breakers HX01A and HX01B 4. A differential relay operation caused by a fault in the transformer or its connections to the 13.8 KV Busses
Q984	QS-6402	SU XFMR 02 TRBL	1. Sudden Pressure 8 PSIG 2. Phase overcurrent 144.3 A (86.2 MVA)	1. A sudden pressure in the XFMR due to a fault (AP3101.07) 2. A ground fault on the XFMR secondary or backup protection for breakers HX02A and HX02B 3. A phase overcurrent on the XFMR primary or backup protection for breakers HX02A and HX02B 4. A differential relay operation caused by a fault in the transformer or its connections to the 13.8 KV Busses

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
R793	NSH-N15	RPS CH 1 HI Flux	1. 104.75 + 0 - .5% of Rated Thermal Power with four pumps operating 2. 79 + 0 - .5% of Rated Thermal Power with three pumps operating	When any one of the four RPS Overpower Trip Bistables Trip
R802	NSH-N15	RPS CH 2 HI Flux	1. 104.75 + 0 - .5% of Rated Thermal Power with four pumps operating 2. 79 + 0 - .5% of Rated Thermal Power with three pumps operating	When any one of the four RPS Overpower Trip Bistables Trip
R811	NSH-N18	RPS CH 3 HI Flux	1. 104.75 + 0 - .5% of Rated Thermal Power with four pumps operating 2. 79 + 0 - .5% of Rated Thermal Power with three pumps operating	When any one of the four RPS Overpower Trip Bistables Trip
R817	NSH-N17	RPS CH 4 HI Flux	1. 104.75 + 0 - .5% of Rated Thermal Power with four pumps operating 2. 79 + 0 - .5% of Rated Thermal Power with three pumps operating	When any one of the four RPS Overpower Trip Bistables Trip
R832	RSHH-2004	SFAS CH 1 CTMT RAD HI	1. Modes 1, 2, 3, 4: 15 MR/HR or 1.8 x BKGND ± 10% BKGND 2. Mode 6: 2 MR/HR	SFAS CH 1 CTMT RAD HI Trip
R834	RSHH-2005	SFAS CH 2 CTMT RAD HI	1. Modes 1, 2, 3, 4: 25 MR/HR or 1.8 x BKGND ± 10% BKGND 2. Mode 6: 2 MR/HR	SFAS CH 2 CTMT RAD HI Trip

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
R836	RSHH-2006	SFAS CH 3 CTMT RAD HI	1. Modes 1, 2, 3, 4: 25 MR/HR or 1.8 x BKGND ± 10% BKGND 2. Mode 6: 2 MR/HR	SFAS CH 3 CTMT RAD HI Trip
R838	RSHH-2007	SFAS CH 4 CTMT RAD HI	1. Modes 1, 2, 3, 4: 15 MR/HR or 1.8 x BKGND ± 10% BKGND 2. Mode 6: 2 MR/HR	SFAS CH 4 CTMT RAD HI Trip
S426	SSL-5400	GEN Under Frequency	Under frequency relay 81U1 & 81U2 are set for 58.2 Hz and 0.5 seconds. Both contacts are in series so that both under frequency relays must operate to trip.	When the system load exceeds system generation. Trips generator main breakers 34560 and 34561 for generator under frequency protection.
T856	TSH-RC3B2	RPS CH 1 RC HI Temp	616.8 °F ± 0.2 °F	RPS CH 1 RC Temp HI Trip
T857	TSH-RC3A4	RPS CH 2 RC HI Temp	616.8 °F ± 0.2 °F	RPS CH 2 RC Temp HI Trip
T858	TSH-RC3B4	RPS CH 3 RC HI Temp	616.8 °F ± 0.2 °F	RPS CH 3 RC Temp HI Trip
T859	TSH-RC3A2	RPS CH 4 RC HI Temp	616.8 °F ± 0.2 °F	RPS CH 4 RC Temp HI Trip
X014	QS-6044	SWYD ACB 34563	N/A	SWYD ACB 34563 Trip
X015	QS-6045	SWYD ACB 34564	N/A	SWYD ACB 34564 Trip
X024	QS-6117B	SWYD Oscillograph Started	N/A	Electrical fault on 345 KV lines (may also be caused by operating 345 KV breakers).
X025	QS-6041	SWYD ACB 34561	N/A	ACB 34560 Trip
X026	QS-6042	SWYD ACB 34561	N/A	ACB 34561 Trip
X027	QS-6043	SWYD ACB 34562	N/A	SWYD ACB Trip

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
X030	QS-2210	T-G Master Trip Solenoids	N/A	When one or both master trip solenoids are deenergized
X032	QS-2213	T-G Mech Trip VLV	Overspeed trip of 110% (1980 RPM)	1. Excessive turbine generator speed 2. Manual mechanical trip actuated (frount standard) 3. Mechanical trip solenoid energized by one of the following: a. Control Room EHC trip button b. Master trip solenoid valve tripped
X033	ZS-2211	T-G Mech Trip Solenoid Trub Trip	N/A	Energizing the mechanical trip Solenoid
X038	QS-2293A	T-G Master Turb Trip	Turbine master trip buss energized	Turbine tripped
Y060	ZS-SP13B1	Turb Bypass VLV 1-1	N/A	When the valve changes position Clos/NC
Y061	ZS-SP13B2	Turb Bypass VLV 1-2	N/A	When the valve changes position Clos/NC
Y062	ZS-SP13B3	Turb Bypass VLV 1-3	N/A	When the valve changes position Clos/NC
Y063	ZS-SP13A1	Turb Bypass VLV 2-1	N/A	When the valve changes position Clos/NC
Y064	ZS-SP13A2	Turb Bypass VLV 2-2	N/A	When the valve changes position Clos/NC

POINT NO.	INSTR. NO.	DESCRIPTOR	SET POINT	ALARM CONDITION(S)
Y065	ZS-SP13A3	Turb Bypass VLV 2-3	N/A	When the valve changes position Clos/NC
Z980	ZS-2957	Unit Seismic Instr	0.1 g	1. Seismic Event 2. Blasting

SOE/ALARM ANALYSIS

If Reactor Protection System (RPS) Trip:

(1) Each channel has SOE points on both the trip parameter and the verification of a channel trip. Check both.

(2) Verify on SOE, when second channel tripped, the following was received indicating trip occurred:

Q180	"CRD CH A/C ANY TRIP DEVICE"	"TRIP"
Q181	"CRD CH B/D ANY TRIP DEVICE"	"TRIP"
Q266	"CRD TRIP CONFIRM"	"TRIP"

(3) Verify the trip parameter makes sense; for example, you should not get a pressure temperature trip when T_{hot} is less than 606°F.

(4) On SOE after the trip depressurizes the primary, all four RPS channels should receive low pressure trips. This is the time to confirm which RPS channels had not tripped (the channel trip only comes in once on SOE).

(5) On alarms, verify:

Q185	"CRD MTR PWR"	"OFF"
Q186	"CRD PROGRAMMER LAMP FAULT"	"YES"

Check Turbine Generator:

(1) On SOE verify:

X030	"T/G MASTER TRIP SOLENOIDS"	"TRIP"	]
J428	"GEN REVERSE POWER"	"TRIP"	] after
X025	"SWYD ACB 34560"	"OPEN"	] 30
X026	"SWYD ACB 34561"	"OPEN"	] seconds

(2) On alarm printout verify:

Z498 - Z501	"HPT GOV VLV 1-4"	"CLOSED"
Z506, Z508	"HPT STOP VLV 1-4"	"CLOSED"
Z510, Z512, Z591, Z576, Z578, Z593	"LPT 1, 2 RHT STOP VLVS 1-4"	"CLOSED"
Z580, Z581, Z594, Z596,	"LPT 1, 2 RIV 1-4"	"CLOSED"
X070	"TURB EXT AIR DUMP RELAY VLV"	"TRIP"
Q379	"EHC ELECTRICAL"	"TRBL"

Primary

(1) On alarms, check time of second makeup pump on
Q754 or Q759 "RC MU PMP 1 (2)" "ON"

(2) On alarms, check high makeup
F741 "RC MU FLOW" "HIGH"

(3) On SOE, check pressurizer heater cutoff if < 40"
L770 "RC PRZR LO LVL HTR" "TRIP"

Then return to normal

Miscellaneous

(1) On alarms, check atmospheric vent positions
Z961 and Z969 "SG 1, 2 ATM STM VENT VLV" "OPEN" when > 1025 PSIG

(2) On SOE or alarms, check TBV positions
Y060, Y065 "TURB BYPASS VALVE 1, 2 - 1-3" "NC" when > 1015 PSIG

(3) On alarms, check for deaerator hi level trips
L359, L360 "DEAR STRG TK 1, 2 HI LVL" "TRIP"

(4) On alarms, check condensate pumps reduction
Q168, Q171, Q174 "CNDS PMP 1, 2, 3" "OFF"

SFRCS

Presently, only three SFRCS inputs are connected to the SOE monitor; these are:

Point 40	SFRCS Full Trip
Point 62	SFRCS DP Half/Full Trip SG 1
Point 63	SFRCS DP Half/Full Trip SG 2

The only way to tell the input parameter on which SFRCS tripped is to review the alarm printout. Note: When it references Channel 1 or 2, it is Actuation Channel 1 or 2, not Logic Channel 1, 2, 3, or 4.

Q847	SFRCS SG 1 Isol
Q848	SFRCS SG 2 Isol
Q963	SFRCS Full Trip
Q692	SFRCS Mn Stm Low Press Trip, Ch 2
Q693	SFRCS Mn Stm Low Press Trip, Ch 1
L886	SFRCS SG Lvl Half/Full Trip, Ch 1
L896	SFRCS SG Lvl Half/Full Trip, Ch 2
P671	SFRCS DP Half/Full Trip, Ch 1
P680	SFRCS Mn Stm Line Low Press, Ch 2
P681	SFRCS Mn Stm Line Low Press, Ch 1

Q847	SFRCS SG 1 Isol
Q848	SFRCS SG 2 Isol
Q963	SFRCS Full Trip
Q692	SFRCS Mn Stm Low Press Trip, Ch 2
Q693	SFRCS Mn Stm Low Press Trip, Ch 1
L886	SFRCS SG Lvl Half/Full Trip, Ch 1
L896	SFRCS SG Lvl Half/Full Trip, Ch 2
P671	SFRCS DP Half/Full Trip, Ch 1
P680	SFRCS Mn Stm Line Low Press, Ch 2
P681	SFRCS Mn Stm Line Low Press, Ch 1
P684	SFRCS Mn Stm Low Press Blk, Ch 2
P685	SFRCS Mn Stm Line Low Press Blk, Ch 1
P691	SFRCS DP Half/Full Trip, Ch 1
P692	SFRCS DP Half/Full Trip, Ch 2

The SFRCS alarms have several flaws: (1) They only tell the status of actuation channels, not individual logic channels. As happens all too often, a power supply is lost to one logic channel, initiating all the alarms for that actuation channel which prevents proper analysis of the trip. (2) Not enough indication is provided of a full trip. Only Q693 is provided to verify a full trip, and it does not tell which channel.

The stroking of the SFRCS valves should be verified within the proper time interval. The following is a list of the SFRCS valves, the computer points, and the stroke times.

	CPT	RESPONSE TIME
ICS11B	Z961	10 seconds
ICS11A	Z969	10 seconds
MS101-1	Z685	10 seconds
MS100-1	Z688	10 seconds
MS394	Z684	10 seconds
MS375	Z687	10 seconds
SP7A	Z680	[use plots] 12 seconds*
SP7B	Z675	[use plots] 12 seconds*
FW612	Z674	15 seconds*
FW601	Z679	15 seconds*
MS106	Z003	36 seconds
MS107	Z006	40 seconds
MS106A	Z004	38 seconds
MS107A	Z007	34 seconds
MS101	Z683	5 seconds
MS100	Z686	5 seconds
TURBINE TRIP	SEE SOE	
AF3872	Z010	34 seconds
AF3870	Z008	34 seconds
AF3871	Z011	33 seconds

AF3869	Z009	34 seconds
FW779	NONE	N/A
FW780	NONE	N/A
AF599	Z970	10.5 seconds
AF608	Z962	13.5 seconds
SP6B	Z678	[use plots]
SP6A	Z673	[use plots]

Per USAR 7.4.1.3.10-9, auxiliary feedwater pumps will be at full speed within 40 seconds from the time of signal initiation.

*Per USAR 7.4.1.3.10-9

Anticipatory Reactor Trip System (ARTS)

There are presently no ARTS SOE points.

The ARTS computer alarms presently available are:

Q001	ARTS In From MFPT*
Q003	ARTS In From T-G*
Q004	ARTS Test Trip*
Q777	ARTS Trip*
Q778	Rx Pwr > 15% and Rx T-G Trip*
Q779	Rx T-G Trip*

*Note that these come in when any one channel trips on the parameter. Therefore, if a channel was tripped hours before, no new alarm will be received when the second channel trips the plant.

Memos have been written to Engineering requesting separate ARTS channel alarms and SOE points.

POST TRIP REVIEW CHECKLIST

	Item	Comments
____	1.0 SOE, Post Trip Review, alarms reviewed, operators interviewed, post trip meeting	_____ _____ _____
____	1.1 Prime printout delogged	_____
____	1.2 Plots completed	_____
____	1.3 Copies of data distributed	_____

2.0 Data Analysis

____ 2.1 SOE describes sequence

- ____ RPS trip sequence delineated
- ____ Q180, Q181, and Q266 came in when second channel tripped
- ____ RPS trip makes sense
- ____ All four RPS channels tripped on low pressure after trip
- ____ Verify turbine trip (X030)
- ____ After 30 seconds, verify auto trans (J428, X025, X026)
- ____ Check pressurizer heater cutoff (L770)
- ____ Check TBV positions (Y060 - Y065)
- ____ Check SFRCS, SFAS, ARTS operation, including valve operation time

____ 2.2 Alarms

- ____ Read over all alarms (approximately 20 minutes prior to and approximately 1 hour after)
- ____ Verify Q185, Q186 for reactor trip
- ____ Verify turbine operation:

GOV VLVS Z498-Z501	CLOSED
STOP VLVS Z506, Z508, Z510, Z512	CLOSED
RHT STOP VLVS Z591, Z576, Z578, Z593	CLOSED
RHT VLV Z580, Z581, Z594, Z596	CLOSED
AIR DUMP RELAY X070	TRIPPED
EHC ELECT Q379	TRBL

- ____ 2nd Makeup Pump On _____ Time (Q754 or Q759)

  F741 RC MU FLOW "HIGH"

- ____ Check atmospheric vents (Z961, Z969)
- ____ Check deaerator high level trips (L359, L360)
- ____ Check condensate pump reduction time (Q168, Q171, Q174) Time_____

____ Check alarms for SFRCS and ARTS

2.3 Data Analysis

____ RFR operated properly

____ Tave near 552°F

____ Pressurizer level not lost (not < 8")

____ MSSV reset > 960 psig

____ RCS pressure minimum > 1800 psig

____ Review deaerator level after trip

____ Safety systems operated as designed

____ ICS operated as expected

3.0 Support of Outside Organizations

____ NETWORK entry made

____ TAP Team called in/not called in

____ Entrance meeting data complete (if required)

4.0 Report Preparation

____ Report out for comments

____ Comments incorporated and sent to SRB

____ Final report sent to B&W

TRANSIENT COMMENTS:

_____

_____

_____

_____

_____

_____

_____

POST TRIP PLOTS

PLOT NO.			
1	F674	MN FW 1 FLOW	0-7000 KPPH
	L883	SG 1 SU LVL	0-250"
	Z673	MN FW 1 CU POSITION	0-100%
	Z675	SU FW 1 CU POSITION	0-100%
	P932	SG 1 STEAM PRESS	600-1100
2	F679	MN FW 2 FLOW	0-7000 KPPH
	L893	SG 2 SU LVL	0-250"
	Z678	MN FW 2 SU POSITION	0-100%
	Z680	MN FW 2 CU POSITION	0-100%
	P936	SG 2 OUT PRESS	600-1100
3	J427	GEN GROSS POWER	0-1000 MWe
	R790	RPS AUCT AVE PWR	0-110%
	R795	RPS CH 1 PWR RANGE	0-110%
	R804	RPS CH 2 PWR RANGE	0-110%
4	T782	RC LOOP 2 HLG WR TEMP	520-620°F
	T753	RC LOOP 1 HLG WR TEMP	520-620°F
	T781	RCP 1-1 DISCH WR TEMP	520-620°F
	T821	RCP 2-1 DISCH WR TEMP	520-620°F
5	F874	AFW FLOW TO SG #1	0-1000 GPM
	S008	AFP #1 SPEED	0-5000 RPM
	F875	AFW FLOW TO SG #2	0-1000 GPM
	S018	AFP #2 SPEED	0-5000 RPM
6	P725	RC LOOP 1 HLG PRESS	1400-2400 PSIG
	L768	PRESS COMP LEVEL	0-300"
	T709	RCS AVE NR TEMP	520-620°F
	MODCOMP		
7	S657	MFP #1 SPEED	0-6000 RPM
	S667	MFP #2 SPEED	0-6000 RPM
	L352	DEAR 1 STR TK LVL	6-16'
	L356	DEAR 2 STR TK LVL	6-16'
	MODCOMP		
8	Q190	GROUP 7 ROD POSITION	0-100%
	R794	NI6 D FLUX	-25 to +25
	R803	NI 5 D FLUX	-25 TO +25
	R813	NI 8 D FLUX	-25 TO +25
	R819	NI 7 D FLUX	-25 TO +25

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