FORM 5326

INDIANA & MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT

PROCEDURE COVER SHEET

Procedure No. 12 PMP 4021.TRP.001
Revision No. 0

TITLE REACTOR TRIP REVIEW

SCOPE OF REVISION

INFORMATION ONLY

SIGNATURES	REVISION NUMBER			
* * * * * *	ORIGINAL			
PREPARED BY				
DEPARTMENT HEAD APPROVAL	NA			
INTERFACING DEPARTMENT HEAD CONCURRENCE	N.A.			
	N.A.			
QUALITY ASSURANCE SUPERVISOR APPROVAL				
PLANT NUCLEAR SAFETY COMMITTEE				
PLANT MANAGER APPROVAL				
APPROVAL DATE	3/20/84			
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INDIANA AND MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT

REACTOR TRIP REVIEW

1.0 OBJECTIVES

1.1 To provide for the collection and retention of data required to implement objectives 1.2 and 1.3.

1.2 To ensure that all required automatic responses associated with a reactor trip have functioned.

1.3 To determine the cause of the reactor trip.

1.4 To establish requirements for reactor restart.

1.5 To establish criteria for requesting independent assessment of the event.

1.6 To provide a written compilation of event circumstances.

1.7 To provide operating instructions for equipment which provide data useful for event analysis.

2.0 REFERENCES

2.1 References on which the procedure is based.

2.1.1 The ATWS Events of February 22 and 25, 1983 at Salem Nuclear Generating Station have demonstrated the need for a procedure for comprehensive data collection and review following a reactor trip. The Salem events are described in NUREG 0977 and NUREG 1000, Vol. 1.

2.1.2 This procedure has been written with consideration of items listed in the NRC "Salem Restart Status Report", March 28, 1983 which includes items appropriate for such a procedure.

2.1.3 Generic Letter 83-28, "Required Actions based on Generic Implications of Salem ATWAS Events", July 8, 1983.

2.1.4 AEPSC response to Generic Letter 83-28, file AEP: NRC: 0838A

2.1.5 INPO Good Practice OP-211, "Post Trip Reviews", 9/83

2.1.6 10 CFR 50.73 (IV)

2.1.7 OSO .052, 6/3/82 issue, and 0S0.056, 10/27/82 issue

2.1.8 1-OHP 4021.001.002 Rev. 11 and 2-OHP 4021.001.002 Rev. 5

2.1.9 Oconee Nuclear Station directive, Investigation of Unit Trips, Revision of 10/23/75

2.1.10 Oconee Nuclear Station Performance Manual, Section 4.7, Support of Reactor Trips, Revision of 2/16/83

2.1.11 Memo, V. VanderBurg to W.G. Smith, 6/30/83

2.2 References to assist in procedure implementation.

2.2.1 Elementary Diagrams

2.2.1.1 98501 - 98515, Reactor Protection and Safeguards Logic Diagrams.

2.2.1.2 98361 - 98377, Elementary Diagrams for Protection System and Safeguards, Train A.

2.2.1.3 98381 - 98397, Elementary Diagrams for Protection System and Safeguards, Train B.

2.2.1.4 1-98101, 2-98101, 2-98102, Turbine Control.

2.2.1.5 98211, Steam Generator Feedwater Turbine E. 98212, Steam Generator Feedwater Turbine W.

2.2.1.6 98021, Generator and Transformer Differential.

2.2.1.7 98120, Turbine Events Monitor and Miscellaneous Recorders.

2.2.1.8 98655, 98656, 98657, Operations Sequence Monitor.

2.2.1.9 98665, 98666, 98667, Oscillograph.

2.2.1.10 1200-A,B,C,G, one Line Electrical Diagrams.

2.2.2 Recorder Chart Index, 4/21/81 Revision

2.2.3 Hathaway H634 Manual, Issue #5, May 1975

2.2.4 Hathaway H-559 Manual, Issue #1, April 1970

2.2.5 Westinghouse DI11 P250 manual, 1/68 Revision

2.2.6 Westinghouse P250 Continuous Monitoring System Manual S2G-08A, issued 11/68

2.2.7 S2G-09B Westinghouse Post Trip Review Program Description, original issue.

2.2.8 D. C. Cook Plant operating records.

3.0 PREREQUISITES

The purpose of this procedure is to collect and provide for the retention of reactor trip data which will be used to verify that required automatic responses occurred and to determine the cause of the trip. This procedure is intended to be implemented after the reactor has been placed in a safe condition. Therefore, the following prerequisites apply:

3.1 A reactor trip has occurred.

3.2 The immediate and subsequent actions of the "reactor trip" operating procedure have been completed.

3.3 Any other abnormal or emergency operating procedures which may be required in conjunction with the "reactor trip" operating procedure or which may supercede it have been completed.

3.4 The affected unit has been placed in a safe condition.

3.5 This procedure is not applicable to intentional complete or partial trips initiated as directed by an approved surveillance test procedure.

4.0 CONDITION I EVENT REVIEWS

Using the description below, the SS and STA shall determine if the trip is to be reviewed as a Condition I event. If the SS and STA do not concur on whether the trip meets Condition I criteria, the matter will be referred to the Operations Superintendent for resolution.

CONDITION I: The cause of the trip is positively known and has been corrected; all safety-related equipment functioned properly during the trip.

Examples of events in this category are lo-lo steam generator level trips during startup and human error during Reactor Protection System Surveillance procedures.

Since the cause of the event is clearly understood, data collection can be limited to that which cannot be recovered later, is required to prepare the LER, or is needed to verify proper automatic response. The only data analysis required is verification that automatic protective responses took place and occurred in an acceptable time frame.

The judgement that a trip is a Condition I event shall be documented on Signoff Sheet 4.1. For these trips, only procedure sections 5.0, DATA COLLECTION, and 6.1, VERIFICATION OF AUTOMATIC RESPONSES need be completed.

If during performance of VERIFICATION OF AUTOMATIC RESPONSES a malfunction is discovered, the trip no longer satisfies the criteria of a Condition I event. In this case, as well as for trips which cannot initially be classified as Condition I events, completion of the comprehensive review (i.e. performance of all review procedure sections) is required.

5.0 DATA COLLECTION

5.1 Checkoff sheets are provided for data collection. These are:

a) Relay Target Data
b) Unit 1 EHC First Hit Annunciator Data
c) Recorder chart and Trip Monitor Data
d) System status and Response Form
e) Personnel Interview Form

NOTE: The extent of data collection required will depend on circumstances of the trip. These include trip classification, plant configuration (turbine rolled, exciter breaker closed, etc.) and involvement of certain plant equipment (main feedpumps, etc.)

NOTE: If space alotted on any signoff sheet is inadequate for a complete answer, use additional pages. Label these pages with the appropriate signoff sheet and step numbers and attach to the back of the associated signoff sheet.

5.2 When the affected unit has been placed in a safe condition, the S.S. shall assign personnel to complete sign off sheets 5.1 and 5.2. These will be required as follows:

Sign Off Sheet	Required When
5.1	Generator exciter field breaker was closed when reactor tripped
5.2	turbine reset, Unit 1 only

NOTE: Steps 5.3 and 5.4 may be performed simultaneously.

5.3 Marking of Recorder Charts

The SS shall assign personnel to mark recorder charts as specified below.

5.3.1 Condition I event reviews: Mark Turbine Events Monitors and any chart directly related to the trip. Example: For a trip initiated by a lo-lo level on steam generator #2, mark the level and flow chart for that steam generator.

5.3.2 Reviews other than Condition I: Refer to Signoff Sheet 5.3 and mark those charts which are required to be copied or collected for the particular circumstances of the trip being reviewed.

Mark the time on each applicable chart and indicate with arrows the pen positions at this time. The arrow shall be drawn to the tip of the pen when the mark is made and the time shall be legible. For recorders where selection of recorded channels is possible, indicate on the chart which channels are selected.

5.4 Collection of Chart and Printout Data

The SS shall assign personnel to obtain copies or originals of charts and printouts as specified below.

5.4.1 Condition I event reviews: Obtain originals of the Turbine Events Monitor, P-250 Sequence of Events printout, P-250 Post-Trip Review printout, Operation Sequence Monitor printout, and Oscillograph. Obtain copies of the control room log and any charts marked in Step 5.3.1 as directly related to the trip.

Follow the methods outlined on Signoff Sheet 5.3, Steps 5.3.3, 5.3.4, and 5.3.6 for obtaining these items.

5.4.2 Reviews other than Condition I: Perform Signoff Sheet 5.3. This will include collection of items marked in Step 5.3.2 above.

Make a list of all originals retained. Include name, dates, and times for each item. Note on the list that these items were obtained for a reactor trip review report. Specify date and unit. Forward this list to the Performance Section.

5.5 If RMS alarms occurred in conjunction with the trip, the S.S. shall assign personnel to obtain RMS 10 minute averages from the RMS control terminal when the plant has been placed in a safe condition. The alarming and related channels shall be obtained. For example, if ERS-1305 alarms on unit I, obtain VRS 1101, 1201, ERS 1301, 1303, 1305, 1401, 1403, 1405, 1307 (if indicating) and 1407 (if indicating). If more than 3 hours have elapsed since the trip obtain 1 hour averages.

5.6 After the affected unit has been placed in a safe condition, the STA shall complete signoff sheet 5.4 which requests information on system status and response, consulting with operations personnel as required.

5.7 The STA shall conduct personal interviews using signoff sheet 5.5 with each of the following personnel:

Both control room RO's (affected unit)
Unit Supervisor (affected unit)
Other operators or technical personnel who may provide additional insight into the situation or who played a major role during the transient.

6.0 DATA ANALYSIS

NOTE: There are two distinct aspects to the analysis of reactor trip data. These are:

a) Verify that required automatic responses took place and occurred within an acceptable time.

b) Determine the cause of the trip.

6.1 VERIFICATION OF AUTOMATIC RESPONSES

NOTE: Signoff sheets 6.1Rx, 6.1TUR, 6.1GEN, for Unit I or Unit II, provide a format for verifying and documenting expected plant response. The signoff sheets include the expected response, an indication of whether the response time is to be measured or only be observed to occur, an indication of plant configuration for which each event is expected, and acceptance criteria. Data collected during performance of section 5 provide the information needed to complete signoff sheets 6.1Rx, 6.1TUR, 6.1GEN. The SS and STA are responsible for the review of signoff sheets 6.1Rx, 6.1TUR, and 6.1GEN. If S.S. cannot participate in this review, he shall designate someone to work with the STA. They shall look for failed or degraded response of equipment to control signals.

For those items of Signoff Sheet 6.1 where acceptance criteria have yet to be developed, compare performance to that of previous trips (from STA "Rx Trip Writeups" file). Check for major variations in system performance which appear to indicate degradation or failure of protective functions and which cannot be attributed to variations of trip circumstances (such as origin of trip signal). Any such indications must be examined by appropriate support personnel to determine if a failure has occurred.

6.1.1 Examine recorder charts and monitor printouts to verify that the SSPS functioned as expected:

6.1.1.1 As closely as can be determined, the signal which initiated the reactor trip was actuated at the proper value of the deviant parameter.

6.1.1.2 While the events leading to the trip took place, no trip setpoint was exceeded without trip signal actuation.

Document on signoff sheet 6.1 step 6.1.2.

6.1.2 The initial event on signoff sheet 6.1Rx is the initiating event for the reactor trip. This could be steam generator lo-lo level or turbine trip above P-7, for example. This signoff sheet shall be completed for every reactor trip.

6.1.3 The initial event on signoff sheet 6.1TUR is the initiating event for the turbine trip. This could be steam generator hi-hi level or turbine trip from reactor trip. This signoff sheet shall be completed for every reactor trip which occurs with the turbine reset.

6.1.4 The initial event on signoff 6.1GEN is the initiating event for the generator trip. This could be turbine stop valves closed and generator motoring cause overall differential trip. This signoff shall be completed for every reactor trip which occurs with the generator exciter field breaker closed.

6.1.5 If expected responses were not obtained or were outside the acceptable time frame, and the trip had initially been deemed a Condition I event, then the trip no longer satisfies the criteria for a Condition I event and the full-length performance of this procedure is required.

NOTE: Reactor restart may not take place until the failure is corrected if the failure is safety related.

6.1.6 Signoff sheet 6.1 includes a signoff (signoff sheet step 6.1.3) to document SS and STA concurrence for acceptability of restart for those trips which are classified as Condition I events in section 4.0 of this procedure. Completion of this signoff is sufficient to recommend restart of the affected unit to the Plant Manager for Condition I events.

NOTE: The Plant Manager's decision to restart is documented in OHP 4021.001.002.

6.1.7 If the event is being reviewed as a Condition I event, complete signoff sheet 6.3, Review Report cover sheet, and attach to it all signoff sheets completed in the Condition I event review. See Step 6.2.10 for distribution of this review package.

This concludes the Condition I trip review.

6.2 INVESTIGATION INTO THE CAUSE OF THE TRIP

NOTE: Trouble shooting and diagnosis are activities which cannot be readily described in a procedure. The following steps include objectives, authorization to obtain additional assistance, direction for putting the data in a form which may lead to understanding, and instructions to verify certain automatic responses not addressed in section 6.1. Judgement is permitted in the implementation of this section. The procedural steps are to be used as a guide. Alternate techniques may be employed to analyze the event as long as the end result is an understanding of the cause of the event, verification that required automatic responses took place, and identification of any detrimental effects on the plant or equipment.

6.2.1 If the trip has not been classified a Condition I event, a full investigation of the situation is called for. To release the SS to fulfill his other obligations, this function will normally be carried out by the Operations Superintendent, or his designee. After addressing performance of the data gathering and "verification of response" portions of this procedure, the SS shall contact the Operations Superintendent and request that he assume responsibility for completion of the investigation. The SS may at his option, perform the functions of the Operations Superintendent listed below, relinquishing the responsibility if the investigation becomes too involved or his attentions are required for other functions.

6.2.2 The purpose of the investigation is to determine the cause of the trip and assess the plant's readiness to return to power. If at any point in the investigation, the Operations Superintendent concludes that he is unable to achieve the purpose of the investigation

without additional technical support, he shall immediately call the department superintendent(s) who can best supply needed expertise. If he cannot reach the department superintendents, he shall call the Staff Duty Week End Supervisor. They shall ensure that appropriate support is supplied.

6.2.3 The Operations Superintendent, the STA, and other investigating personnel shall look beyond the obvious indications to diagnose the cause of the trip and evaluate the plant response. They shall review the available information thoroughly, looking for (1) abnormal indications or degraded trends in equipment performance, (2) events occurring out of the normal or anticipated sequence, (3) failed or degraded response of equipment to control signals, (4) unusual radiation readings, and (5) unanticipated alarms. The actual or suspected cause of the trip and any abnormal or degraded indication identified during the transient shall be documented in the Reactor Trip Summary, Signoff sheet 6.2 and the Reactor Trip Review Report.

6.2.4 The Operations Superintendent or his designee, and the STA will reconstruct the transient using the collected data. A chronological description of the event should be developed, using the Operations Sequence Monitor data as a base. Pertinent alarms, trips, actuations, and isolations will be listed. Selected plant parameters should be incorporated into the chronological list of events in the reconstruction. Information from the Turbine Events Monitor, Unit I EHC First Hit Annunciator, Oscillograph, and the P250 Sequence of Events Record shall be used to confirm and augment the Operations Sequence Monitor information.

If the Operations Sequence Monitor is out of service, the event shall be reconstructed using other available data.

NOTE: The preparation of signoff sheets 6.1Rx, 6.1TUR, and 6.1GEN will provide much of the input for this step.

6.2.5 Plot data from the P250 post-trip review as appropriate to evaluate the behavior of any logged parameter which initiated the trip or which was observed to exhibit unusual response.

6.2.6 Review signoff sheet 5.4, System Status and Response, and signoff sheets 5.5, Personnel Interview Form, for clues to the nature of the event and information that should be included in the chronological description of the event prepared in step 6.2.4.

6.2.7 Examine recorder charts, monitor printout, and signoff sheets 5.4 and 5.5 to verify that setpoints for the following protective features were not exceeded or that expected automatic responses occurred:

6.2.7.1 Safety Injection (any automatic initiation).

6.2.7.2 Phase B containment isolation and containment spray.

6.2.7.3 Pressurizer PORV or Safety Valve actuation.

6.2.7.4 Steam Generator PORV or Safety Valve actuation.

6.2.7.5 Steam dump block below 541°F.

6.2.8 Verify that RCS temperature changes were within the cooldown limits of Tech. Specs. 3.4.9.1 and 3.4.9.2.

6.2.9 Document the analysis of the event by completing signoff sheet 6.2. Completion of all signoffs for step 6.2.10.1 OR 6.2.10.2 OR 6.2.10.3 of signoff sheet 6.2 is sufficient to recommend restart of the affected unit to the plant manager.

6.2.10 Complete Signoff Sheet 6.3, Review Report Cover Sheet, and attach to it all signoff sheets, operator interviews, and chart and printout copies. Copies of this trip review package shall be supplied to the following:

Operations Department
Technical-Engineering Department

Technical-Chemical/RP Department
Managerial Department
STA's
PNSRC
AEPSC
Plant Master File (original)
AEPSC Onsite QA

The original shall be maintained for the life of the plant.

NOTE: The Plant Manager's decision to restart is documented in OHP 4021.001.002.

7.0 ACCEPTANCE CRITERIA AND AUTHORITY FOR UNIT RESTART

7.1 Acceptance criteria for specific responses are included on the signoff sheets.

7.2 Event Classification and Authority for Plant Restart.

NOTE: The following classification scheme differentiates between "minor" and "major" safety-related equipment. The classification is relative and no implication is intended that "minor" equipment is unimportant.

Failure of major equipment could have a substantial adverse impact on a normal plant shutdown or an accident situation. Such failures merit examination by the PNSRC prior to plant start-up. Examples: failure of an auxiliary feedpump to start when required, failure of a reactor trip breaker to open, failure of a turbine trip system to depressurize. Examples of minor equipment failures: failure of a single reactor trip instrumentation channel, feedwater isolation actuation slightly below spec. 553° vs 554°. Whether a failure has serious safety significance shall be determined by those classifying the event.

7.2.1 Condition I — The cause of the trip is positively known and has been corrected; all safety-related equipment functioned properly during the trip.

If the SS and STA concur that an event satisfies the criteria for condition I, the S.S. shall have the authority to recommend restart of the affected unit to the Plant Manager.

7.2.2 Condition II — The cause of the trip is positively known and has been corrected; some minor safety-related equipment did not function properly; however, the malfunction has been corrected and no Tech. Spec. constraint prohibits start-up.

If the Operations Superintendent and STA concur that an event satisfies the criteria for Condition II, the Operations Superintendent shall have authority to recommend restart of the affected unit to the Plant Manager.

7.2.3 Condition III — The cause of the trip is not positively known, or some minor safety-related equipment malfunctioned and has not been repaired; or some major safety-related equipment malfunctioned during the event (whether or not repairs have been made).

If the Operations Superintendent and STA concur that an event satisfies the criteria for Condition III, the affected unit shall not be restarted until the PNSRC reviews the event.

7.2.4 If the Operations Superintendent and the STA do not concur on event classification, the Assistant Plant Manager for Operations shall classify the event.

7.2.5 The PNSRC will review all reactor trips. Condition III events shall be reviewed prior to restart of the affected unit.

The PNSRC will analyze the event reconstruction, emphasizing the determination of the cause of the trip and the resolution of abnormal or degraded indications. The PNSRC shall use available expertise to resolve questions concerning the cause and plant response. Sources of expertise that should be considered by the PNSRC include nuclear steam supply vendors, vendor engineers, on-site engineering staff, corporate engineering staff, and other experienced operations and

maintenance personnel. The PNSRC shall supply the following information to the plant manager:

a) the actual or most probable cause of the trip or

b) the maintenance and testing necessary before reactor restart including additional measures to verify the most probable cause

c) additional monitoring or trending required during and/or after reactor restart

d) necessary briefings to operations and/or maintenance personnel concerning specific equipment indications or possible malfunctions

e) the conditions necessary for a reactor restart

7.2.6 The plant manager shall evaluate the recommendation made by the personnel performing the trip investigation and, if necessary, the PNSRC review. His decision to restart the reactor shall include the following considerations:

a) The cause of the trip is known and corrected.

b) Major safety-related and other important equipment functioned properly during the transient, or corrective maintenance and satisfactory testing has been performed or will be completed when plant conditions permit.

c) The plant response during the event has been analyzed and the plant responded as anticipated, or all abnormalities are understood and corrected as required by Technical Specifications.

If the cause of the trip has not been positively identified, the plant manager shall determine if the cause and the circumstances surrounding the cause have been analyzed

adequately. He shall ensure adequate measures are taken to prevent repetitive challenges to safety systems during future power operations.

ABBREVIATED IMPLEMENTATION OF PROCEDURE CONCURRENCE

The reactor trip on Unit _____ which occurred on _____ at _____ is classified as a Condition I event for which only data collection and verification of automatic response is required.

S.S. _____

STA _____

RELAY TARGETS

5.1.1 Check the relay targets on the G panel and panels A-1 through A-14 in the control room, and the relay targets in the switch gear complex. Use the attached data sheets. Place an x in the appropriate square on the data sheets to indicate actuated status.

5.1.2 Completed by _____

UNIT 1 (HAA)

T1 Turbine Valves	T2 Generator Relays	T3 Excitation Relays
T4 Turbine Mech. Trip Soleniod	T5 Transformer Relays	T6 Emerg. P.B. Trip Gen. Panel

(HAA)

T11 Turbine Hyd. Trip Soleniod	T12 Stator Cooling Trip	T13 Trans. 1 Sudden Pressure
T12 Trans. 1AB Sudden Pressure	T15 Trans. 1CD Sudden Pressure	T16 Trans 1 Tap Chgr hndl in

UNIT DIFFERENTIAL (HEA)

87X-U1 | 87X1-U1 | 87X2-U1

OVERALL DIFFERENTIAL (HEA)

87X-OA1 | 87X1-OA1 | 87X2-OA1

UNIT 2 (HAA)

T17 Main Transf Sudden Press. Ø 1	T18 Main Transf Sudden Press. Ø 2	T19 Main Transf Sudden Press. Ø 3
T20 Trans. 2AB Sudden Press.	T21 Trans 2CD Sudden Press.	

(HAA)

T1 Turbine Valves	T2 Generator Relays	T3 Excitation Relays
T4 Turbine Trippping (Left Syst)	T5 Transformer Relays	T6 Emerg. P.B. Trip Gen. Panel

(HAA)

T11 Turbine Tripping (Right Sys)	T12 Stator Cooling Trip	

UNIT DIFFERENTIAL (HEA)

87X-U2 | 87X1-U2 | 87X2-U2

OVERALL DIFFERENTIAL (HEA)

87X-OA2 | 87X1-OA2 | 87X2-OA2

PANEL A RELAY TARGETS
UNIT 1

A-2			A-3		A-4		
52-KX	52-K1K -AUX	52-K1X	25P	25TX	63X-SP1		
				15			
87X UOA AUX		87X1 VOA AUX	25		87-0A PH.1	87-0A PH.2	87-0A PH.3
87-A1 PH.1	87-A1 PH.2	87-A1 PH.3	83G	83B			
			25Z	25A			
64-GF		64-AF			87-T PH.1	87-T PH.2	87-T PH.3
151X-G1S	96-G1S	151X1-G1S	59 N		87-G PH.1	87-G PH.2	87-G PH.3
	151-G1S		159N				

PANEL A RELAY TARGETS
UNIT 1

A-8			A-7		A-6	
63X-SP1CD			63X-SP1AB			
125A						
87T-1CD PH.1	87T-1CD PH.2	87T-1CD PH.3	87T-1AB PH.1	87T-1AB PH.2	87T-1AB PH.3	
51TN-1CD		251TN-1CD	51TN-1AB		251TN-1AB	27-4EP1 27-4EP3

PANEL A RELAY TARGETS
UNIT 1

A-11				A-10			A-9	
51X-B7		51X-B5	27X-T11D1	63X-SP101CD	27XT11D2	27XT11A1	63X-SP101AB	27XT11A2
51T-11A PH.1	51N-T11B	51T-11B PH.1	51 12CD	25-TCD	27XT11D3	51 12AB	25 TAB	27XT11A3
51T-11A PH.3		51T-11B PH.3	87-TCDLD PH.1	87-TCDLD PH.2	87-TCLD PH.3	87-TABLD PH.1	87-TABLD PH.2	87-TABLD PH.3
87-DGAB PH.1	87-DGAB PH.2	87-DGAB PH.3	87T-101CD PH.1	87T-101CD PH.2	87T-101CD PH.3	87T-101AB PH.1	87T-101AB PH.2	87T-101AB PH.3
87T-11A PH.1	87T-11A PH.2	87T-11A PH.3						
87T-11B PH.1	87T-11B PH.2	87T-11B PH.3	51TN-101CD		251TN-101CD	51TN-101AB		251TN-101AB
51-DGAB PH.1	51N-DGAB	51-DGAB PH.3	27T11D-1	27T11D-2	27T11D-3	27T11A-1	27T11A-2	27T11A-3
TR 11A		TR 11B						

PANEL A RELAY TARGETS
UNIT 1

A-13			A-12		
51X-C6		51X-C4			
51T-11C PH.1	51N-T11C	51T-11D PH.1	87 RCP1 PH.1	87 RCP1 PH.2	87 RCP1 PH.3
51T-11C PH.3		51T-11D PH.3	87 RCP2 PH.1	87 RCP2 PH.2	87 RCP2 PH.3
87-DGCD PH.1	87-DGCD PH.2	87-DGCD PH.3	87-TBMC PH.1	87-TBMC PH.2	87-TBMC PH.3
87T-11C PH.1	87T-11C PH.2	87T-11C PH.3	87-TCMC PH.1	87-TCMC PH.2	87-TCMC PH.3
87T-11D PH.1	87T-11D PH.2	87T-11D PH.3	87-RCP3 PH.1	87-RCP3 PH.2	87-RCP3 PH.3
51DGCD PH.1	51N-DGCD	51DGCD PH.3	87-RCP4 PH.1	87-RCP4 PH.2	87-RCP-4 PH.3
TR11C		TR11D			

PANEL A RELAY TARGETS
UNIT 2

A-2			A-3		A-4		
52-A2X	52-A1A2 -Aux	52-A1X	25P	25TX	63X-SPM1	63X-SPM2	63X-SPM3
				15			
*	*	*	25		87-0A PH.1	87-0A PH.2	87-0A PH.3
87-A PH.1	87-A PH.2	87-A PH.3	83 G	83B			
			25 Z	25A			
64-GF		64-AF			87-T PH.1	87-T PH.2	87-T PH.3
151X-G1S	96-G1S	151X1-G1S	59N		87-G PH.1	87-G PH.2	87-G PH.3
	151-G1S		159N				

* No Identification

PANEL A RELAY TARGETS
UNIT 2

A-7	A-8	A-9
63X-SPAB	63X-SPCD	63X SP201AB
125A	125A	25 TAB

87T-AB PH.1	87T-AB PH.2	87T-AB PH.3	87T-CD PH.1	87T-CD PH.2	87T-CD PH.3	87T-201AB PH.1	87T-201AB PH.2	87T-201AB PH.3
51TN-AB		251TN -AB	51TN-CD		251TN CD	51TN- 201AB		251TN 201AB
						27-T21A PH.1	27-T21A PH.2	27-T21A PH.3

PANEL A RELAY TARGETS
UNIT 2

A-10			A-11			A-12		
	63X-SP201CD		51X-B7		51X-B5			
	25-TCD		51T-21A PH.1	51N-T21B	51T-21B PH.1	87-RCP1 PH.1	87-RCP1 PH.2	87-RCP1 PH.2
			51T-21A PH.3		51T-21B PH.3	87-RCP2 PH.1	87-RCP2 PH.2	87-RCP2 PH.3
			87-DGAB PH.1	87-DGAB PH.2	87-DGAB PH.3	87-TBMC PH.1	87-TBMC PH.2	87-TBMC PH.3
87T-201CD PH.1	87T-201CD PH.2	87T-201CD PH.3	87T-21A PH.1	87T-21A PH.2	87T-21A PH.3	87-TCMC PH.1	87-TCMC PH.2	87-TCMC PH.3
51TN-201CD		251TN-201CD	87T21B PH.1	87T21B PH.2	87T21B PH.3	87-RCP3 PH.1	87-RCP3 PH.2	87-RCP3 PH.3
27-T21D PH.1	27-T21D PH.2	27-T21D PH.3	51DGAB PH.1	51NDGAB	51DGAB PH.3	87-RCP4 PH.1	87-RCP4 PH.2	87-RCP4 PH.3
			TR-21A		TR-21B			

PANEL A RELAY TARGETS
UNIT 2

A-13

51X-C6		
51T-21C PH.1	51NT-21C	51T-21D PH.1
51T-21C PH.3		51T-21D PH.3
87-DGCD PH.1	87-DGCD PH.2	87-DGCD PH.3
87T-21C PH.1	87T-21C PH.2	87T-21C PH.3
87T-21D PH.1	87T-21D PH.2	87T-21D PH.3
51-DGCD PH.1	51-DGCD PH.2	51-DGCD PH.3
TR-21C		TR-21D

SWITCHGEAR COMPLEX RELAY TARGETS

UNIT _____

TIME _____ DATE _____ PERFORMED BY: _____

RC Pump Bus and T-bus 4KV Switchgear:

List all relay targets actuated. Specify "1", "3", or "N" where applicable. Note alarm lights lit ("GF", "OT", etc.).

Breaker	Instrument No.	Name	Reset Attempted	Reset Successful

600 V Safety Bus Switchgear

List all relay targets actuated. Include relays on back of breaker panels (feeder relays).

Instrument No.	Name	Reset Attempted	Reset Successful

U1 EHC FIRST HIT ANNUNCIATOR

5.2.1 For a Unit I reactor trip which occurred with the turbine reset, check the first hit annunciator in the EHC control cabinet. Use the attached data sheet. Place x in the appropriate square on the data sheet to indicate actuated status.

UNIT I EHC FIRST HIT ANNUNCIATOR

FIRST HIT	PS 100 A & B	CUST. TRIP	NO EHC DC INPUT POWER		FIRST HIT			POWER/LOAD UNBALANCE	-22VDC LOST
& RESET	SPD SIG LOST	MA TRIP BUS ENERGIZER	BACKUP OVERSPEED TRIP		& RESET			FAST CLST IV'S	+30VDC LOST

RECORDER CHART AND MONITOR PRINTOUT DATA

NOTE: Except as a general guide to chart and printout retrieval methods this signoff sheet is not applicable to abbreviated reviews of Condition I events.

5.3.1 Step 5.3.5 of this signoff sheet is a list of plant recorder chart data which must be copied and retained in conjunction with a reactor trip analysis. The list includes a column labeled "Requirement". The codes in this column indicate the circumstances which require obtaining the indicated data. These codes are:

All	:	all reactor trips
Reset	:	turbine reset
Rolled	:	turbine rolled off turning gear
Turbine	:	turbine initiated events except steam generator hi-hi level during startup
Exciter	:	exciter field breaker closed
Generator	:	generator initiated event
Vacuum	:	vacuum initiated event
FPT	:	feed pump turbine initiated events
SI	:	events associated with SI
Judge	:	based on SS or STA judgement
5.5	:	when required by procedure step 5.5

5.3.2 The list below also includes a column labeled "Copy". A C in this column indicates the recorder chart is to be copied. An O in this column indicates the original data is to be attached to the trip review package. An O will be found next to data from equipment which is dedicated to monitoring reactor trips.

5.3.3 Cut out and remove portions of the listed charts and printouts extending from before the initiation of the transient until after conditions have stabilized. Judgement must be utilized to ensure that all data which may lead to an understanding of the cause of the event is included. Two to four hours of data before the event shall be included for slow moving (~1"/hour) control room charts. For the OSM, P250 TREND (Post Trip Review), and P250 Alarms (Sequence of Events) 4 hours of data prior to the event shall be included. When a strip chart is cut for copying, label with

recorder number and function for ease of replacement and later analysis. For multipen recorders each trace must be clearly labeled. Be certain to include the time labels and marks made in accordance with procedure step 5.3. After copying, restore these chart and printout segments to their original positions by taping. Ensure proper functioning of the recorders.

5.3.4 For those recorders whose input channels can be selected, ensure that channel selection is identified on the chart. If selection was changed during the transient, identify this on the chart.

5.3.5 Chart Recorder Data to be copied/collected

Recorder Chart	Requirement	Copy	Signoff
Pressurizer pressure chart	All	C	_____
Pressurizer level chart	All	C	_____
NI recorder NR045 chart	All	C	_____
ΔT chart	All	C	_____
Tref-Tavg chart	All	C	_____
Steam generator level/flow charts (4)	All	C	_____
Main Steam/First Stage Pressure Chart	All	C	_____
P250 sequence of events printout (Alarm typewriter)	All	C	_____
P250 Post-trip review printout (Trend typewriter)	All	C	_____
Operation sequence monitor printout	All	O	_____
Turbine events monitor chart	Reset	O	_____
BBC turbine events monitor chart	Reset (U2 only)	O	_____
Oscillograph chart	Exciter	O	_____
Generator Voltage and reactance chart	Exciter	C	_____

Valve position and turbine speed chart (U1)	Rolled	C	_____
Vibration and turbine speed chart (U2)	Rolled	C	_____
Generator frequency chart (if selected to generator)	Exciter	C	_____
Main Vacuum Chart	Vacuum	C	_____
FPT Steam/Backpressure Chart	Vacuum	C	_____
Turbine Supervisory Charts U1: bearing temperature vibration metal temperature shell, rotor expansion U2: bearing temperature vibration, eccentricity, speed metal temperatures	Turbine	C	_____
FPT Vibration Chart	FPT	C	_____
FPT Bearing Temperature Chart	FPT	C	_____
Feedpump Suction and Discharge Pressure Chart	FPT	C	_____
Wide Range Thot and Tcold charts (4)	SI	C	_____
Wide Range RCS Pressure Chart	SI	C	_____
Containment Pressure Chart	SI	C	_____
Computer Analog Trend Charts (2)	Judge	C	_____
Computer Alarm Printout	Judge	C	_____
RMS 10 minute averages	5.5	O	_____

5.3.6 Obtain a copy of control room log to include one full shift of entries prior to the event.

5.3.7 In addition to those listed above, obtain copies of any recorder charts which are known to apply to the specific transient

Include with any additional charts all information necessary for interpretation of these charts, such as chart speed (if variable), channel selected, bank number, etc.

Additional charts copied:	Comments:
_____	_____
_____	_____
_____	_____
_____	_____

PERFORMED BY_____

_____

SYSTEM STATUS AND RESPONSE

5.4.1 Nuclear Instrumentation

5.4.1.1 List all NI drawer "negative rate" trip status lights which are energized.

5.4.1.2 Source Range instrument power restored automatically as designed (both channels) _____

5.4.1.3 Major equipment out of service:

5.4.1.4 Describe any abnormal conditions (such as 'loss of detector voltage' or 'channel on test') or behavior noticed during the transient.

5.4.2 Reactor Coolant Pumps

5.4.2.1 Describe circumstances, including place in sequence of events, of any RCP trips (manual or automatic) which occurred during the transient.

5.4.2.2 Describe effect of reactor transient on leakoff flows.

5.4.2.3 Describe any behavioral abnormalities noticed during the transient.

5.4.3 RCS Pressure Control

5.4.3.1 Control status prior to trip (man/auto) _____

5.4.3.2 Backup heaters "on" _____ banks

"auto" _____ banks

5.4.3.3 Pressure channels selected (control/bistables) _____/_____

5.4.3.4 Pressurizer PORV's blocked prior to transient: _____

5.4.3.5 Spray valves in "auto"

_____

5.4.3.6 Did pressurizer PORV's or safeties lift during transient? Describe circumstances.

5.4.3.7 Major equipment out of service:

5.4.3.8 Describe any behavioral abnormalities noticed during the transient

5.4.4 Pressurizer Level Control

5.4.4.1 Control Status prior to trip (man/auto) _____

5.4.4.2 Charging pump in service

_____

5.4.4.3 Charging flow controller (QRV-251 or Recip speed controller) status prior to trip (man/auto)

_____

5.4.4.4 Level channels selected (control/bistables) _____/_____

5.4.4.5 Describe any behavioral abnormalities noticed during the transient.

5.4.5 CVCS Makeup

5.4.5.1 Prior to transient, blender line contained (acid, pri. water, blend)

_____

5.4.5.2 Makeup in auto with 'start' signal? (yes/no)

_____

5.4.6 Control and Shutdown Rods

5.4.6.1 Full insertion of all control and shutdown rods verified.

_____

Rods that did not insert:

_____

5.4.6.2 Rod control status prior to trip (auto/man) _____

5.4.6.3 Was the rod control status changed during the transient? If so, when in the sequence of events?

5.4.6.4 Major equipment out of service:

5.4.6.5 Describe any behavioral abnormalities noticed during the transient.

5.4.7 Main Feedwater/Steam Generator Level

5.4.7.1 Operating main feed pumps tripped on reactor trip (yes/no/OOS)

EMFP _____

WMFP _____

5.4.7.2 Feed water isolation received when Tavg <554°F. Valves closed (yes/no)

FRV210	_____
FRV220	_____
FRV230	_____
FRV240	_____
FMO201	_____
FMO202	_____
FMO203	_____
FMO204	_____

5.4.7.3 Feedpump control status prior to trip (auto/man)

East feedpump speed control_____
West feedpump speed control_____
DP controller _____

5.4.7.4 Feedpump steam supply prior to trip

East feedpump (reheat/main/aux)
_____

West feedpump (reheat/main/aux)
_____

5.4.7.5 Feedwater regulating valve status prior to trip (auto/man)

FRV210	_____
FRV220	_____
FRV230	_____
FRV240	_____

5.4.7.6 Condensate bypass valve status prior to trip (auto/man)

CRV224	_____

5.4.7.7 Feedwater Heater level controls in manual prior to trip:

5.4.7.8 Major equipment out of service:

5.4.7.9 Describe any behavioral abnormalities noticed during the transient.

5.4.8 Auxiliary Feedwater

5.4.8.1 MDAFP's started automatically on trip of main feedpumps

EMDAFP _____

WMDAFP _____

5.4.8.2 TDAFP operated? Describe circumstances and approximate duration of operation.

5.4.8.3 Did operator intervene in the TDAFP response (manually adjust or trip)? If so, when in the sequence of events?

5.4.8.4 Major equipment out of service:

5.4.8.5 Describe any behavioral abnormalities noticed during the transient.

5.4.9 <u>Steam Dump/Steam Generator Pressure Relief</u>

5.4.9.1 Control status prior to trip (Tavg/Steam Pressure/Off)

_____

5.4.9.2 If in Tavg mode, steam dump valves modulated to maintain Tavg ~547. (yes/no)

_____

5.4.9.3 If Tavg dropped below 541°F, steam dump blocked (yes/no)

_____

5.4.9.4 Did steam dump valve open prior to trip (yes/no)? If yes describe.

_____

5.4.9.5 If vacuum trip, did steam dump valves stay closed (yes/no)?

_____

5.4.9.6 Control status of atmospheric steam dumps prior to trip (auto/manual)

MRV213 _____
MRV223 _____
MRV233 _____
MRV243 _____

5.4.9.7 Did atmospheric steam dumps operate during transient (yes/no)? If yes, describe (automatically, manually, circumstances).

_____

5.4.9.8 Was the control status of atmospheric steam dumps changed during the course of the transient? If so, when in the sequence of events?

5.4.9.9 Did steam generator safeties lift during transient (yes/no)? If yes describe.

_____

5.4.9.10 Major equipment out of service.

5.4.9.11 Describe any other behavioral abnormalities noticed during transient.

5.4.10 Main Turbine/MSR

5.4.10.1 Was there a turbine runback (yes/no)?

_____

5.4.10.2 If yes, provide best estimate of power change and the time in sequence of events when it occurred.

5.4.10.3 Did the operator intervene in the turbine runback? If so, when in the sequence of events?

5.4.10.4 Turbine trip: Main turbine stop, reheat stop, control, and intercept valves closed

_____

5.4.10.5 Controlling device prior to trip (load limiter/operating device/load changer/turbomat)

_____

5.4.10.6 Set rates loading _____

unloading _____

5.4.10.7 Were valve or misc turbine tests in progress when the trip occurred?
Which one?

_____

5.4.10.8 Did exhaust hood sprays actuate (yes/no)?

_____

5.4.10.9 Vacuum breakers opened following trip? (yes/no)

_____

5.4.10.10 'Hogging' SJAE's in service following trip? (yes/no)

_____

5.4.10.11 MSR in service prior to trip? (no/partial/full)

_____

5.4.10.12 Did any MSR safety valves lift during the transient (yes/no/identify)?

_____

5.4.10.13 Major equipment out of service:

_____

5.4.10.14 Describe any behavioral abnormalities noticed during the transient.

5.4.11 Generator/Electrical

5.4.11.1 Generator trip. This will occur 30 seconds after the reactor trip unless it results from a generator event.

output breakers open (yes/no)

K or A1 _____

K1 or A2 _____

Exciter breaker open (yes/no)

_____

5.4.11.2 If auxiliaries were suppled by the generator, were auxiliaries automatically transferred to normal reserve (yes/no/NA)? Describe any failures.

_____

5.4.11.3 Diesel generators operated? Describe curcumstances.

5.4.11.4 Any CRID or CRP bus switched to alternate supply? Describe circumstances.

5.4.11.5 Major equipment out of service:

5.4.11.6 Describe any behavioral abnormalities noticed during transient.

5.4.12 Safety Injection

5.4.12.1 Was the event associated with an SI (yes/no)?

_____

5.4.12.2 If yes, did verification of automatic actuations indicate failure of any required response (yes/no)?

_____

5.4.12.3 If yes, list actuations not received, reason if known, and whether the response was successfully initiated manually.

5.4.12.4 List major equipment out of service.

5.4.12.5 Describe any abnormalities noticed in the response of the safety injection system.

5.4.13 Phase B

5.4.13.1 Was there a phase B/CTS actuation (yes/no)?

_____

5.4.13.2 If yes, did verification of automatic actuations indicate failure of any required response (yes/no)?

_____

5.4.13.3 If yes, list actuations not received, reason if known, and whether the response was successfully initiated manually.

5.4.13.4 List major equipment out of service.

5.4.13.5 Describe any abnormalities noticed in the response of the CTS System.

5.4.14 Miscellaneous

5.4.14.1 List any major plant equipment not covered above which is out of service and could have had an effect on the progression of the transient.

5.4.14.2 Describe any behavioral abnormalities of systems not covered above which may affect plant safety.

COMPLETED BY _____

_____

PERSONNEL INTERVIEW FORM

5.5.1 Person interviewed _____

5.5.2 Role in event _____

5.5.3 Interview by _____

5.5.4 Description of the event:

Include the plant conditions prior to the trip, your indications that a problem existed, your action as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies.

5.5.5 Sequence of events and actions taken:

5.5.6 Apparent cause of the event:

Include description of any related activity in progress when the event occurred and any underlying or contributory factors.

5.5.7 Additional comments including any unexpected aspect of transient behavior:

VERIFICATION OF AUTOMATIC RESPONSE

6.1.1 This signoff sheet uses forms 6.1RX, 6.1TUR, 6.1GEN for reactor trip, turbine trip, and generator trip, respectively. Column 1 lists the expected response starting with the initiating event. Column 2 will either indicate obsv. or meas. The former means the response is to be assessed as yes or no based on operator observation. Meas means the time from the initiating event to that expected response is to be measured on a monitoring device such as the OSM, TEM, Oscillograph, or P250 Sequence of Events Recorder. The OSM will be considered the primary device and the quantitative acceptance criteria is based on OSM data. Column 3 will indicate whether the expected response should always be present or whether it may only be present under certain circumstances. For example, an Auxiliary Feed pump start will not be present if the steam generators are being fed from Auxiliary Feed pumps prior to the trip. Column 4 will be used to indicate the time from the initiating event to the expected event or a yes no entry for an operator observation. Column 5 will contain acceptance criteria.

The procedure specifies when each signoff sheet must be used.

6.1.2 Procedure step 6.1.1 has been completed.

6.1.2.1 As closely as can be determined, the reactor trip initiating signal occurred at the proper value of the deviant parameter.

_____

6.1.2.2 While the events leading to the trip took place, no trip setpoint was exceeded without trip signal actuation.

_____

REACTOR TRIP EXPECTED RESPONSE (U1)

Expected Response	Data Type	Requirement	Time	Acceptance Criteria
(Initial Event)	Meas	All	0	0
Reactor Trip Breaker A	Meas	All		*
Reactor Trip Breaker B	Meas	All		*
Reactor Trip Breaker Undervoltage coil A	Meas	All		*
Reactor Trip Breaker Undervoltage coil B	Meas	All		*
Control Rods Bottom	Obsv	All		Yes
Mechnical Trip Operated (Turb)	Obsv	All		*
WMFPT Vacuum Trip	Obsv	WMFPT Vac Trip Reset		*
EMFPT Vacuum Trip	Obsv	EMFPT Vac Trip Reset		*
WMFPT Hydr Pr Low	Obsv	WMFPT Reset		*
EMFPT Hydr Pr Low	Obsv	EMFPT Reset		*
Feedwater Isolation	Obsv	On Main Feed		Yes
WMDAFP Start	Obsv	On Main Feed, Aux feed on standby		Yes
EMDAFP Start	Obsv	On Main Feed, Aux feed on standby		Yes
TDAFP Start	Obsv	On Main Feed, Aux feed on standby		Yes If start signal required

*To Be Prepared

TURBINE TRIP EXPECTED RESPONSE (U1)

Expected Response	Data Type	Requirement	Time	Acceptance Criteria
(Initial Event)			0	0
RT-Turbine Trip + P7	Meas	Turbine Reset & above P-7		*
Mech Trip Oper	Meas	Turbine Reset		*
Emerg Gov OVSP Trip	Meas	Turb Reset		*
MT Reheat VA CL	Meas	Turb Reset		*
MT Stop VA CL	Meas	Turb Reset		*
Overall Diff Oper	Meas	Turb Reset		*
EHC Trip Sys Trip	Meas	Turb Reset		*
DC BRG Oil PP Run	Meas	Turb Reset		*
TRB Oil Bupp Run	Meas	Turb Reset		*
STM Seal PR Low	Meas	Turb Reset		*
STM Dump Actuation	Obsv	Tavg Mode		Yes

*To Be Prepared

GENERATOR TRIP EXPECTED RESPONSE (U1)

Expected Response	Data Type	Requirement	Time	Acceptance Criteria
(Initial Event)	Meas	Generator Exciter	0	0
Mech Trip Oper	Meas	Generator Exciter		*
Overall Diff Oper	Meas	Generator Exciter		*
Alterx Diff Oper	Meas	Generator Exciter		*
Generat Motoring	Meas	Generator Exciter		*
Unit/Sys Freq Hi Lo	Meas	Generator Exciter		*
Gen Cool Flow Lo	Meas	Generator Exciter		*
Gen Cool Trip Oper	Meas	Generator Exciter		*
Trans To Normal Reserve	Obsv	Gen Supplies Auxiliaries		Yes
Generator Field Brk. Open	Obsv	Field Brk Closed		Yes
Generator Output Brk Open	Obsv	Paralleled		Yes
Diesel Generator AB Start	Meas	Blackout/SI		*
Diesel Generator CD Start	Meas	Blackout/SI		*

* To Be Prepared

REACTOR TRIP EXPECTED RESPONSE (U2)

Expected Response	Data Type	Requirement	Time	Criteria
(Initial Event)	Meas	All	0	0
Reactor Trip Breaker A	Meas	All		*
Reactor Trip Breaker B	Meas	All		*
Reactor Trip Breaker Undervoltage coil A	Meas	All		*
Reactor Trip Breaker Undervoltage coil B	Meas	All		*
Control Rods Bottom	Obsv	All		Yes
Main Turbine Left System Trip	Meas	All		*
Main Turbine Right System Trip	Meas	All		*
WMFPT Vacuum Trip	Meas	WMFPT Vac Trip Reset		*
EMFPT Vacuum Trip	Meas	EMFPT Vac Trip Reset		*
WMFPT Emergency System Trip	Meas	WMFPT Reset		*
EMFPT Emergency System Trip	Meas	EMFPT Reset		*
Feedwater Isolation (<554°F)	Obsv	On Main Feed		Yes
WMDAFP Start	Obsv	On Main Feed, Aux feed on standby		Yes
EMDAFP Start	Obsv	On Main Feed, Aux feed on standby		Yes
TDAFP Start	Obsv	On Main Feed, Aux feed on standby		Yes If start signal required

* To Be Prepared

TURBINE TRIP EXPECTED RESPONSE (U2)

Expected Response	Data Type	Requirement	Time	Acceptance Criteria
(Initial Event)	Meas	Turb Reset	0	0
Main Turbine Left System Trip	Meas	Turb Reset		*
Main Turbine Right System Trip	Meas	Turb Reset		*
Left Emergency Circuit Trip (<8.5 psig)	Meas	Turb Reset		*
Right Emergency Circuit Trip (<8.5 psig)	Meas	Turb Reset		*
Control Fluid Safety Circuit Trip	Meas	Turb Reset		*
Auxilliary Lube Oil Pump	Meas	Turb Reset		*
West Emergency Lube Oil Pump	Meas	Turb Reset		*
East Emergency Lube Oil Pump	Meas	Turb Reset		*
Main Turbine Stop Valves Closed	Meas	Turb Reset		*
Main Turbine Intercept Valves Closed	Meas	Turb Reset		*
Reactor Trip from Turbine Trip	Meas	Above P-7		*
Overall Differential Generator Trip from Turbine Stop Valves Closed	Meas	Turb Reset		*
Steam Dump Actuation	Obs	Tavg Mode		Yes

* To Be Prepared

GENERATOR TRIP EXPECTED RESPONSE (U2)

Expected Response	Data Type	Requirement	Time	Acceptance Criteria
(Initial Event)	Meas	Generator Exciter	0	0
Main Turbine Left System Trip	Meas	Generator Exciter		*
Main Tubine Right System Trip	Meas	Generator Exciter		*
Transfer to Normal Reserve	Obs	Gen Supplies Auxiliaries		Yes
Generator Field Breakers Open	Obs	Field Breaker Closed		Yes
Generator Output Breakers Open	Obs	Paralleled		Yes
Diesel Generator AB Start	Meas	Blackout /SI		*
Diesel Generator CD Start	Meas	Blackout /SI		*

* To Be Prepared

6.1.3 This signoff is to be used only for events classified as Condition I in section 4.0. This classification is documented in signoff sheet 4.1.

Automatic responses to the reactor trip on Unit _____ which occurred on _____ at _____ have been reviewed. This review determined that reactor restart is acceptable.

SS _____

STA _____

REACTOR TRIP SUMMARY

6.2.1 Trip: time_____ date_____ Unit_____

6.2.2 Plant status prior to trip (power level, load changes in progress, startup, etc).

6.2.3 Shift crew (affected unit)

S.S. _____
Asst. S.S. _____
U.F. _____
Control room R.O. _____
Control room R.O. _____
S.T.A. _____

6.2.4 Data collected as required by the plant configuration.

Signoff Sheet 5.1 _____ Signoff Sheet 5.2 _____ Signoff Sheet 5.3 _____ Signoff Sheet 5.4 _____ Signoff Sheet 5.5 _____

6.2.5 Verification of expected responses using signoff sheet 6.1 complete.

Expected response occurred _____

OR

Failure of expected response.

Describe the nature of the failure and corrective action taken.

NOTE: Reactor restart may not take place until the failure is corrected if the failure is safety related. Reactor restart may not take place without the approval of the Operations Superintendent and the Plant Manager if the failure is non-safety related.

Description:

Failure corrected _____

Approval to restart with non-safety related failure

_____
Operations Superintendent

_____
Plant Manager

6.2.6 Verification of protective features (procedure step 6.2.7.) complete

Expected response occurred _____

OR

Failure of expected response

Describe the nature of the failure and corrective action taken.

NOTE: Reactor restart may not take place until the failure is corrected

Description:

Failure corrected _____

6.2.8 Verification of cooldown limits (procedure step 6.2.8) complete.

_____

6.2.9 Analysis of reactor trip.

6.2.9.1 Describe the immediate (trip signal) and the root causes of the event.

6.2.9.2 Describe factors contributing to the trip or the initiation of the transient which resulted in the trip.

6.2.9.3 Describe events subsequent to the trip until the plant was placed in a safe condition.

6.2.9.4 Describe any damage to the plant that resulted from the trip.

6.2.9.5 Describe any abnormalities associated with the trip or the unit response to the trip that have not been previously addressed.

6.2.10 Event Classification

6.2.10.1 The event is reclassified a condition I event

OPS SUP _____

STA _____

OR

6.2.10.2.a The event is classified a condition II event

OPS SUP _____

STA _____

AND

6.2.10.2.b All condition Reports associated with the event are closed.

PNSRC _____

AND

6.2.10.2.c The Operations Superintendent concurs that a recommendation to restart the affected unit be made to the Plant Manager.

OPS SUP _____

OR

6.2.10.3.a The event is classified a condition III event.

OPS SUP _____

STA _____

AND

6.2.10.3.b All Condition Reports associated with the event are closed.

PNSRC _____

AND

6.2.10.3.c The PNSRC concurs that a recommendation to restart the affected unit be made to the Plant Manager

PNSRC _____

6.2.10.4 Completion of all signoffs for step 6.2.10.1 or 6.2.10.2 or 6.2.10.3 is sufficient to recommend restart of the affected unit to the Plant Manager.

NOTE: The Plant Manager's decision to restart is documented in OHP 4021.001.002

D. C. COOK PLANT

REACTOR TRIP REVIEW REPORT

AFFECTED UNIT_____

EVENT DATE _____

EVENT TIME _____

TRIP REVIEW PERFORMED BY_____

_____

_____

APPENDIX A: Miscellaneous Information

Relating to the Operation of Trip Monitoring Devices.

I. HATHAWAY OPERATIONS SEQUENCE MONITOR

The sequence monitor provides a printed record of the operation of certain selected events. It has the capacity to monitor 192 on-off points and produces a line item output on a printer located in the control room when any one of the monitored points indicates an abnormal condition. Forty five points are used to monitor events related to reactor trip initiation or reactor trip circuit breaker position, 6 points monitor condensate or hotwell pumps, 13 points monitor feedwater heater extreme high level events, 6 points monitor onsite power diesel generators, 22 points monitor the main feedwater pumps, 40 points monitor the main turbine-generator, and 8 points monitor the step-up and auxiliary transformers and miscellaneous items.

The operations sequence monitor permits discrimination for contact closures which occur more than 2 milliseconds apart.

A contact closure will result in a line item printout on a dedicated printer located in the control room. The line item contains a 3 digit number for the day of the year, a 4 digit number for the hours a minute, a 2 digit number for the second, a 3 digit number for the milliseconds, an "A" indicating an off normal condition, a 3 digit number to identify the event to the operator. A sample output is attached to the end of this section.

The following information elaborates on the meaning of particular alarms that commonly appear as a result of reactor trips.

A. UNIT I

019 Reactor Trip, S.G. Lo Lo Water Level, Loop 4.

This alarm is a typical example of a signal from the RPS initiating a trip.

044 Reactor Trip Breaker Tripped, Train A.

This alarm originates from breaker position limit switches. It indicates the breaker is actually open.

046 Reactor Breaker Undervoltage, Train A.

This alarm indicates the undervoltage trip attachments have operated. They report late in spite of the fact UVTA's actuate the trip breakers for reactor trips other than manual trips. This situation results from the fact that the auxiliary relay the reports the event is part of an RL circuit. The delay is ~200 msec.

112 WMFP Vaccuum Trip

As indicated on elementary, Dia 1-98212-5 coordinate H-3, this alarm indicates a vacuum trip has occurred.

1118 WMFP HYDR. Press Low.

This alarm results when the MFP Hydr. Oil pressure reaches 130 psi dec.

140 Mechanical Trip Operated.

This alarm indicates a turbine trip has been initiated. As indicated on elementary diagram 1-98101, the following trip signals will initiate this alarm:

1) Overall differential
2) Unit differential

3) Thrust bearing wear & low bearing oil trip

4) MSR level

5) Turbine high vibration trip

6) Turbine solenoid trip

7) Loss of stator cooling turbine trip

8) Turbine low vacuum trip

9) EHC low hydraulic press trip

10) EHC trip system press trip

11) Turbine shaft P.P. low oil press trip

12) EHC master trip

13) Rx trip train A + SG HI HI or S.I.

156 Generator Motoring

As indicated on elementary Dia 1-98021-2 coordinates C1, this alarm results from: (All valves closed or control valves at no load position) and (generator output breakers closed).

B. UNIT II

019 Reactor Trip, S.G. Lo Lo Water Level, Loop 4

This alarm is a typical example of a signal from the RPS initiating a trip.

044 Reactor Trip Breaker Tripped, Train A

This alarm originates from breaker position limit switches. It indicates the breaker is actually open. (verbal comment by T. King)

046 Reactor Breaker Undervoltage, Train A

This alarm indicates the undervoltage trip attachments (UVTA's) have operated. They report late in spite of the fact UVTA's actuate the trip breakers for reactor trips other than manual trips. This situation results from the fact that the auxiliary relay that reports the event is part of an RL circuit. The delay is typically ~200 msec.

131 Main Turbine Left System Trip

This alarm indicates a turbine trip has been initiated. As indicated on Elementary Diagram 2-98101, coordinate D-2, the following trip signals will initiate this alarm:

1) Turbine solenoid trip control switch
2) Unit overall differential
3) Transformer and generator unit differential
4) Thrust bearing position trip
5) Moisture separator reheater high level trip
6) Turbine vibration
7) Lube oil pressure low
8) Loss of stator cooling
9) Reactor trip, SI, or steam generator hi-hi
10) Turbine low vacuum trip
11) High exhaust hood temperature

137 Main Turbine Control Fluid Safety Circuit Tripped

As indicated on Elementary Diagram 2-98101, coordinate H1, this signal results from pressure switch 63X TSP indicating low pressure in the safety fluid circuit. It is operated by pressure switch 2515 on the Turbine Control Diagram, Figure PGS-4B-11 in the training manuals.

151 Left Emergency Circuit Tripped

As indicated on Elementary Diagram 2-98102, coordinate D-7, this alarm results from pressure switch 63 ECL indicating that emergency circuit pressure dropped below 8.5 psig. It is operated by pressure switch 4591 on the Turbine Control Diagram, Figure PGS-4B-11 in the training manual.

NOTE: 63 indicates a pressure switch on an elementary diagram.

158 Generator Motoring

As indicated on Elementary Diagram 2-98021-2, coordinates D2, this alarm results from: (all valves closed OR control valves at no load position) AND (generator output breakers closed)

165 Turbine valve Trip overall Differential

As indicated on Elementary Diagram 2-98021-2, this signal results from a trip of the unit overall differential by turbine valves closed and required delays.

111 FPTW Vacuum Trip

As indicated on Elementary, Diagram 98217-3, coordinate D-4, this alarm indicates a vacuum trip has occurred. It is operated by limit switch 33X BVTW on a mechanical linkage. This mechanical linkage is operated by all trips (verbal coment by T. King) and is expected for FPT trips initiated with the vacuum trip reset.

114 FPTW Emergency System Trip

As indicated on Elementary Diagram 2-98217, coordinate H-3, this signal results from pressure switch 63X BESTW indicating low pressure in the emergency circuit.

NOTE: 33 indicates a limit switch on an elementary diagram.

NOTE: 63 indicates a pressure switch on an elementary diagram.

SAMPLE OSM OUTPUT

```
026 1630 00 401 T 000 DCCOOK 2 TEST PT
026 1730 00 400 T 000 DCCOOK 2 TEST PT
026 1830 00 400 T 000 DCCOOK 2 TEST PT
026 1930 00 401 T 000 DCCOOK 2 TEST PT
026 2030 00 401 T 000 DCCOOK 2 TEST PT
026 2130 00 401 T 000 DCCOOK 2 TEST PT
026 2215 08 210 A 058 DG2AB.HEA OPER
026 2226 03 820 A 060 DG 2AB START
026 2230 00 401 T 000 DCCOOK 2 TEST PT
026 2330 00 400 T 000 DCCOOK 2 TEST PT
027 0030 00 400 T 000 DCCOOK 2 TEST PT
027 0130 00 401 T 000 DCCOOK 2 TEST PT
027 0230 00 401 T 000 DCCOOK 2 TEST PT
027 0330 00 401 T 000 DCCOOK 2 TEST PT
027 0350 53 105 A 075 HTR 1C LEVEL HI
027 0424 58 082 A 149 MT VAC TRIP BLOCKED
027 0424 59 019 A 149 MT VAC TRIP BLOCKED
027 0425 23 307 A 158 GENERAT MOTORING
027 0425 25 128 A 010 RT LP3FDWT FL LO
027 0425 25 217 A 045 REACT BKR  TRIP B
027 0425 25 237 A 044 REACT BKR  TRIP A
027 0425 25 261 A 131 MT L SYSTEM TRIP
027 0425 25 282 A 132 MT R SYSTEM TRIP
027 0425 25 436 A 008 RT LP1FDWT FL LO
027 0425 25 461 A 151 LEFT EMERG CKT TRIP
027 0425 25 463 A 006 RT TURB TRIP & P7
027 0425 25 489 A 111 FPTW VACUUM TRIP
027 0425 25 535 A 099 FPTE VACUUM TRIP
027 0425 25 610 A 029 RT PWRG PNRATE TR
027 0425 25 635 A 046 REACT BKR UV A
027 0425 25 639 A 047 REACT BKR UV B
027 0425 25 654 A 010 RT LP3FDWT FL LO
027 0425 25 656 A 137 MT CONFL.SAFCKT TR
027 0425 26 224 A 102 FPTE EMERGSYS TR
027 0425 26 242 A 075 HTR 1C LEVEL HI
027 0425 26 298 A 102 FPTE EMERGSYS TR
027 0425 26 669 A 114 FPTW EMERGSYS TR
027 0425 27 480 A 016 RT SG1 LEV EX LO
027 0425 27 756 A 016 RT SG1 LEV EX LO
027 0425 27 804 A 018 RT SG3 LEV EX LO
027 0425 28 089 A 017 RT SG2 LEV EX LO
027 0425 28 595 A 009 RT LP2FDWT FL LO
027 0425 28 644 A 018 RT SG3 LEV EX LO
027 0425 28 895 A 010 RT LP3FDWT FL LO
027 0425 28 924 A 009 RT LP2FDWT FL LO
027 0425 29 070 A 017 RT SG2 LEV EX LO
027 0425 29 174 A 008 RT LP1FDWT FL LO
027 0425 29 448 A 011 RT LP4FDWT FL LO
027 0425 29 856 A 011 RT LP4FDWT FL LO
027 0425 30 220 A 019 RT SG4 LEV EX LO
027 0425 34 467 A 113 FPTW CONTOIL PR LO
027 0425 34 845 A 101 FPTE CONTOIL PR LO
027 0425 35 271 A 101 FPTE CONTOIL PR LO
027 0425 36 217 A 011 RT LP4FDWT FL LO
027 0425 36 389 A 113 FPTW CONTOIL PR LO
027 0425 36 681 A 009 RT LP2FDWT FL LO
027 0425 36 868 A 101 FPTE CONTOIL PR LO
027 0425 38 207 A 011 RT LP4FDWT FL LO
027 0425 38 622 A 009 RT LP2FDWT FL LO
027 0425 38 763 A 010 RT LP3FDWT FL LO
027 0425 38 799 A 011 RT LP4FDWT FL LO
027 0425 38 816 A 008 RT LP1FDWT FL LO
027 0425 39 248 A 011 RT LP4FDWT FL LO
027 0425 39 264 A 008 RT LP1FDWT FL LO
```

0425 1-27-83 Trip

II. ESTERLINE ANGUS TURBINE EVENT MONITOR.

The turbine event monitor is a dual unit strip chart recorder. Each of the 2 charts has 20 on-off points. The speed of the continuously moving charts is changed after a trip initiation so that 24 hours of chart are advanced through the recorder in 24 seconds. Fast speed on Unit I is 3 inches/sec. Fast speed on Unit II is 1.5 inches/sec. The chart speed then returns to normal and a trip initiation event recurs. Two points, one on each chart, are used to monitor the Train A and Train B reactor trip circuit breakers, 2 points monitor electrical lockout relays which indicate an electrical system level trip, 16 points monitor the position of turbine emergency and pre-emergency valves (stop and interceptor valves). The remaining points monitor various turbine trip initiating events.

The time discrimination between events is approximately 20 milliseconds when the chart is in high speed operation.

The data is displayed on 2 strip charts. Each point operates a heat pen which leaves a continuous trace on the thermally sensitized chart. The pens trace a printed line on the chart to indicate a normal condition. The pen moves off the printed line to a position approximately midway between the printed lines for 2 adjacent points to indicate an off normal condition. A sample strip chart is attached to the end of this section.

UNIT I PEN IDENTIFICATIONS

Stylus number Chart	Equipment or Device Being Monitored
1.	* Unit differential
2.	* Overall differential
3.	* Reactor trip TR-A
4.	* Reactor trip TR-B
5.	* Mechanical trip
6.	* AEP to master trip
7.	* EHC master trip
8.	* Back-up overspeed trip
9.	* Loss of speed
10.	* Loss of station battery
11.	* Trip system pressure EHC
12.	* Mechanical overspeed trip operated
13.	* Mechanical trip operated
14.	* Power load unbalance
15.	* AEP EHC trip system
16.	* Stop valves closed
17.	* Reheat and Intercept valves closed
18.	* Vibration trip operated
19.	* Trip system pressure HFA
20.	* Time

Stylus Number, Chart 2	Equipment or Device
21.	Stop valve No. 1 closed
22.	Stop valve No. 2 closed
23.	Stop valve No. 3 closed
24.	Stop valve No. 4 closed
25.	Reheat valve No. 1 closed
26.	Reheat valve No. 2 closed
27.	Reheat valve No. 3 closed
28.	Reheat valve No. 4 closed
29.	Reheat valve No. 5 closed
30.	Reheat valve No. 6 closed
31.	Intercept valve No. 1 closed
32.	Intercept valve No. 2 closed
33.	Intercept valve No. 3 closed
34.	Intercept valve No. 4 closed
35.	Intercept valve No. 5 closed
36.	Intercept valve No. 6 closed
37.	* Thrust bearing wear or low bearing oil trip operated
38.	* Low vacuum trip operated
39.	* Moisture separator trip operated
40.	Time

*Those devices that will automatically activate the turbine sequence of events monitor hi-speed drive when operated.

UNIT II PEN IDENTIFICATIONS

Stylus number	Equipment or Device Being Monitored
1.	* Unit differential
2.	* Overall differential
3.	* Reactor bkr tripped TR-A
4.	* Reactor bkr tripped TR-B
5.	* Turbine trip left system
6.	* Loc Vacuum trip operated
7.	* Condenser A low Vacuum trip
8.	* Condenser B low Vacuum trip
9.	* Condenser C low Vacuum trip
10.	Spare
11.	Spare
12.	* Left emergency ckt tripped
13.	* Right emergency ckt tripped
14.	* Feed pump turbine "E" & "W" emergency trip
15.	* Turbine trip right system
16.	* Stop valves closed
17.	* Reheat stop and intercept valves closed
18.	* Vibration trip operated
19.	* Cont. fluid safety circ. tripped
20.	Time

Recorder Points 21-40

Stylus Number	Equipment or Device
21.	No. 1 stop valve closed
22.	No. 2 stop valve closed
23.	No. 3 stop valve closed
24.	No. 4 stop valve closed
25.	No. 1 reheat stop valve closed
26.	No. 4 reheat stop valve closed
27.	No. 2 reheat stop valve closed
28.	No. 5 reheat stop valve closed
29.	No. 3 reheat stop valve closed
30.	No. 6 reheat stop valve closed
31.	No. 1 intercept valve closed
32.	No. 4 intercept valve closed

*Those devices that will automatically activate the turbine sequence of events monitor hi-speed drive when operated.

Recorder Points 21-40 (cont.)

Stylus Number	Equipment or Device
33.	No. 2 intercept valve closed
34.	No. 5 intercept valve closed
35.	No. 3 intercept valve closed
36.	No. 6 intercept valve closed
37.	Feed pump turbine "E" emergency trip
38.	Feed pump turbine "W" emergency trip
39.	* Moisture separator Hi level trip
40.	Time

*Those devices that will automatically activate the turbine sequence of events monitor hi-speed drive when operated.

SAMPLE TEM STRIP CHARTS

6 AM
5 AM
4 AM
3 AM
60
FEET
LEFT
PRINTED IN U.S.A.
RECORDING CHARTS
GRAPHIC CONTROLS

FEET
LEFT

PRINTED IN U.S.A.

U2 TEM 2/18/89 pts 21-40

RECORDING CHARTS GRAPHIC CONTROLS CORPORATION BUFFAL

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2

5 AM

4 AM

3 AM

7=0

III. UNIT I EHC FIRST HIT MONITOR PANEL

PS 100 A & B	Are the Emergency Trip Pressure Switches which signal the electrical trip system logic that the Emergency Trip System has depressurized.
SPD SIG LOST	Activated by concurrent loss of primary and secondary speed signals with turbine speed greater than 200 RPM.
CUST. TRIP	Customer trips are the following: Thrust bearing wear & low bearing oil trip Steam Generator High Level Overall differential Unit differential MSR high level Reactor trip (P-7) Turbine high vibration (1 right plus 1 left) Solenoid trip (Control Switch) Loss of stator cooling Low condensor vacuum EHC hydraulic pressure low: 1100 PSIG EHC system pressure trip: 800 PSIG Shaft pump oil pressure low > 1300 RPM Safety injection
MA TRIP BUS ENERGIZER	Indicates that a turbine trip has occured, and the master trip bus has been energized. Also indicates trip is sealed in.
NO EHC DC INPUT POWER	Loss of 24 V DC @1800 RPM or 250 V DC if < 1800 RPM. Verify "No Station Battery" Annunciator in Miscellaneous Turbine Test Cabinet.
BACKUP OVER-SPEED TRIP	Activated by excessive turbine speed.
POWER LOAD UNBALANCE	Initiates rapid control and intercept valve closure on greater than 40% power/load mismatch.
FAST CLST IV'S	Rapid closure of intercept valves demanded by turbine supervisory instruments.
-22 VDC LOST OR +30 VDC LOST	DC supply for electrical control lost. Verify indication on lambda power supplies to the left of the First Hit Panel.

IV. HATHAWAY OSCILLOGRAPH

The unit oscillograph has 32 galvanometers. Each galvanometer will record one analog channel or, if properly modified, 4 on-off functions. Eight galvanometers have been converted to on-off functions and the remaining galvanometers are reserved for electrical analog quantities. The unit has a prefault recording feature where all input quantities are continuously recorded on a magnetic disc. Under normal conditions, the data are erased and current recordings written over the old space after approximately 100 milliseconds. If one of a specific set of events occurs, the data are recorded on ultra-violet sensitive photographic paper such that the information recorded prior to the event is recorded followed by additional data resulting from the event. The recording is continued for a fixed time period following the event. Recording chart speed may be selected to be either 12" or 3" per second, the usual practice being to record the initial portion of the event at the higher chart speed followed by additional recording at the slower chart speed.

Six points are used to monitor the A and B train reactor trip circuit breaker positions, undervoltage trip initiation, and safety injection actuation, 2 points monitor the start of onsite power diesel generators, 1 point monitors the trip of the feedwater pumps, 10 points monitor turbine initiated events, 7 points monitor generator and excitation events, and 4 traces are used for references to assist in identification of trace

locations. The analog traces record generator phase currents, phase and ground voltages, and field current.

The display provided by the developed photographic paper is a reproduction of the amplitude and wave shapes of the analog electrical quantities. The on-off events are indicated by a continuous straight line trace for a normal condition or the absence of the trace at that location signifying an off normal event. The photographic paper is developed by exposure to ultra-violet light (fluorescent lights are adequate sources) and no wet chemical processes are required. A sample strip chart is included at the end of this section.

The time descrimination between events during higher chart speed is better than 5 milliseconds between events and better than 10 milliseconds during slower chart speed.

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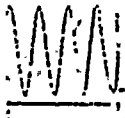
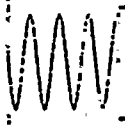
UNIT #1 OSCILLOGRAPH

TRACE	NO.	TRACE ASSIGNMENT	RATIO	CALIBRATION
	1	Generator Current Ø1	7000/1	37,960 A/in.
	2	Spare	------	--------
	3	Generator Current Ø3	7000/1	37,960 A/in.
	4	Spare	------	--------
	5	Spare	------	--------
	6	Spare	------	--------
	7	Gen. Grounding Trans. Voltage	41.5/1	220 V/in.
	8	Spare	------	--------
	(9)	Gen. Field Current Zero Mirror	------	--------
	9	Gen. Field Current (Shunt-6000 A/100 M.V.)	160 M.V./In.	9,466 A/in.
	10	Spare	------	--------
	11	Gen. Metering Pot. Voltage	220/1	227 V/in.
	12	Spare	------	------
	13	345 KV Pot. Timing Trace	1800/1	213 V/in.
	14	Spare (Current)	------	--------
	15	Spare	------	--------
	16	Spare (Current)	------	--------
	17	OM4 Traces: 1-Reference; 2-Reactor Breaker Tripped 'A'; 3-Reactor Breaker Tripped 'B'; 4-Reactor Breaker Undervolt Trip 'A'	--------	On/Off
	18	OM4 Traces: 1-Safety Injection 'A'; 2-Safety Injection 'B'; 3-Diesel Gen. 'AB'Start; 4-Diesel Gen. 'CD' Start.	--------	On/Off
	19	OM4 Traces: 1-Reference; 2-Feed PP. Turb. 'E'. 'W' Trip; 3-Spare; 4-Spare.	--------	On/Off
	20	OM4 Traces: 1-Main Stop Valves Closed; 2-Main Turb. Mech. Trip; 3-Emerg. Gov. Overspeed Trip; 4-Back-up Overspeed Trip.	--------	On/Off
	21	OM4 Traces: 1-Reference; 2-FHC System Trip; 3-Reactor Bkr. Undervolt Trip 'B'; 4-Thrust Bearing Trip.	--------	On/Off
	22	OM4 Traces: 1-Moisture Separator Hi. Level Trip; 2-Vacuum Trip Operating; 3-Main Turb. High Vib. Trip; 4-Lube Oil Press. Low Trip.	-------	On/Off
	23	OM4 Traces: 1-Reference; 2-Stator Outlet Cooling Water Temp. High; 3-Stator Cool Turb. Trip; 4-Stator Cool Gen. Trip.	---------	On/Off
	24	OM4 Traces: 1-Generator Motoring; 2-Unit HEA Operated; 3-Overall HEA operated; 4-Alterrex & Excitation Trip.	---------	On/Off

OSCILLOGRAPH STARTING SENSOR CALIBRATION

1.-3Ø Undervoltage - - - 109 VAC Note: Overcurrent - (Not Used)
2.-3Ø Overvoltage - - - 130 VAC
3.-1Ø Overvoltage - - - 50 VAC
4.-Any on/off operation will start oscillograph

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UNIT NO. 2 OSCILLOGRAPH

TRACE	NO.	TRACE ASSIGNMENT	RATIO	CALIBRATION
	1	Generator Potential EØ1-2 Volts	220/1	130 V/in.
	2	Generator Potential EØ2-3 Volts	220/1	128 V/in.
	3	Generator Potential EØ3-1 Volts	220/1	124 V/in.
	4	Generator Current IØ1	7,000/1	36,119 A/in.
	5	Spare	--------	----------
	6	Generator Neutral Voltage	--------	126 V/in.
	7	Spare	--------	----------
	8	Generator Current IØ2	7,000/1	36,119 A/in.
	9	Generator Current IØ3	7,000/1	43,914 A/in.
	10	Spare	--------	----------
	11	Spare	--------	----------
	12	Spare	--------	----------
	13	Spare	--------	----------
	14	765 KV Timing Trace	--------	128 V/in.
	15	OM4 Traces: 1-Reference; 2-Reactor Breaker Tripped "A"; 3-Reactor Breaker Tripped "B"; 4-Reactor Breaker Undervoltage Trip "A"	--------	On/Off
	16	OM4 Traces: 1-Safety Injection "A"; 2-Safety Injection "B"; 3-Diesel Generator AB Start; 4-Diesel Generator CD Start.	--------	On/Off
	17	OM4 Traces: 1-Reference; 2-Feed Pump Turbine "E" and "W" Trip; 3-Feed Pump Turbine "E" and "W" Trip (Emergency); 4-Spare	--------	On/Off
	18	OM4 Traces: 1-Vacuum Trip Operated; 2-Main Stop Valve Closed; 3-Main Turbine Left System Trip; 4-Main Turbine Right System Trip.	--------	On/Off
	19	OM4 Traces: 1-Reference; 2-Control Fluid Safety Circ. Tripped; 3-Reactor Breaker Undervoltage Trip "B"; 4-Thrust Bearing Trip	--------	On/Off
	20	OM4 Traces: 1-Moisture Separator Hi-Level Trip; 2-Air-Oil, H_2 Diff. Press. Low Trip; 3-Main Turbine High Vib. Trip; 4-Lube Oil Press. Low Trip.	--------	On/Off
	21	OM4 Traces: 1-Reference; 2-Stator Outlet Cooling Water Temp High; 3-Stator Cooling Turbine Trip; 4-Stator Cooling Generator Trip	--------	On/Off
	22	OM4 Traces: 1-Generator Motoring; 2-Unit Hea Operated; 3-Overall Hea Operated: 4-Alterrex and Excitation Trip	--------	On/Off

OSCILLOGRAPH STARTING SENSOR CALIBRATION

1. 3Ø Undervoltage EØ1-2 -- 102 VAC
   " EØ2-3 -- 105 VAC
   " EØ3-1 -- 107 VAC

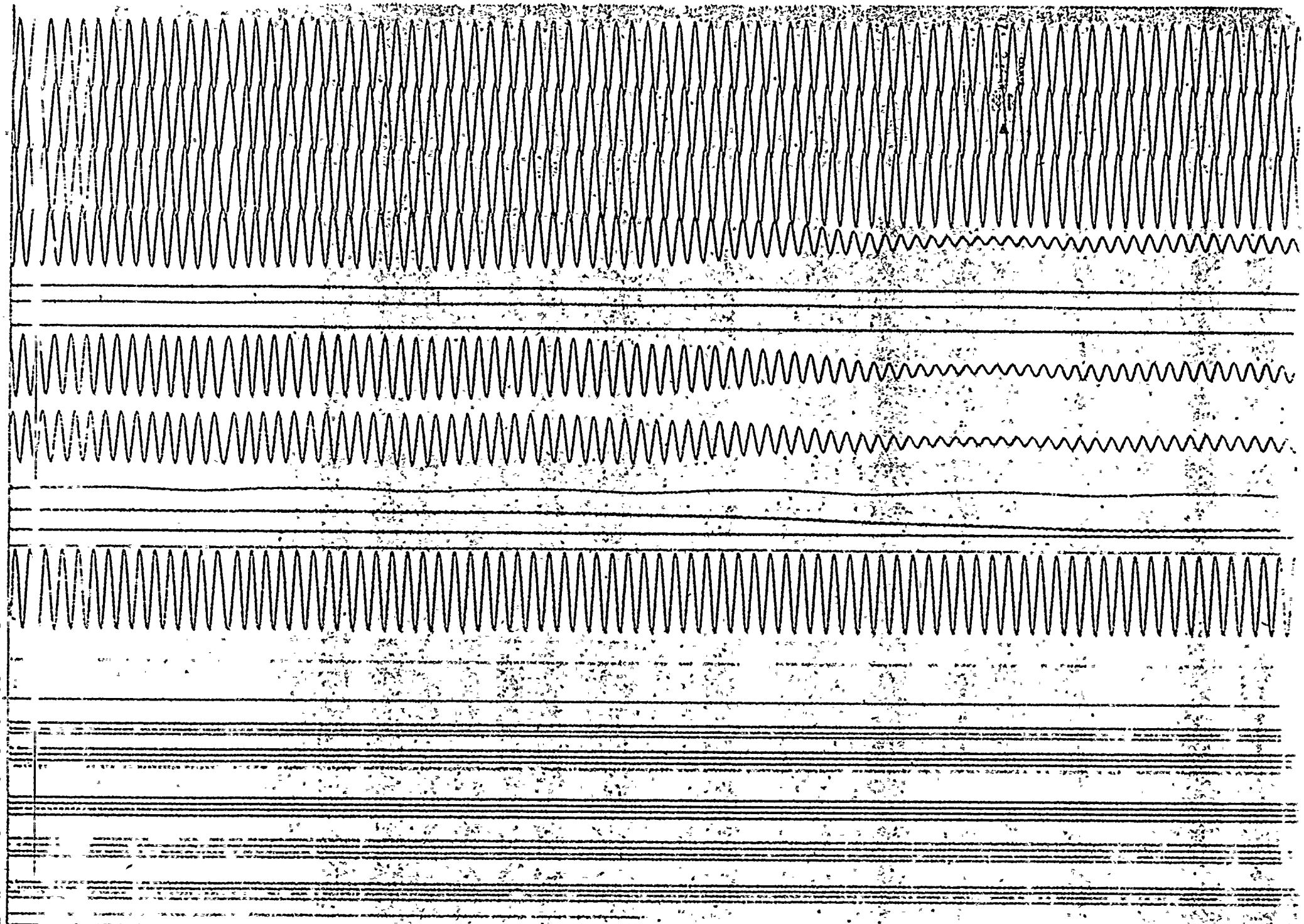
2. 3Ø Overvoltage EØ1-2 -- 128 VAC
   " EØ2-3 -- 129 VAC
   " EØ3-1 -- 125 VAC

3. 1Ø Overvoltage 52 VAC

4. Any on/off operation will start oscillograph.

SAMPLE OSCILLOGRAPH STRIP CHART

UNIT 2 2/18/84 TRIP



V. P250 SEQUENCE OF EVENTS RECORDING PROGRAM

The Sequence of Events Recording program records the sequence of operation of a number of monitored contacts to a high time resolution. When one of the monitored contacts changes state, an interrupt is initiated which causes the P250 to scan each monitored contact for any change from its previous state. The program stores such changes and the cycle count since the first event. A cycle is approximately 20 milliseconds in length. Due to a dead time of 2 milliseconds in the interrupt process, an automatic rebid of the program is programmed for the cycle following each interrupt bid. This is done to avoid loss of contact changes during the dead time. The Sequence of Events Recording program is terminated when either the cycle count reaches 3600 or 25 contact changes have been recorded.

When the program is terminated, an output routine is called. All collected data are first moved to the output program buffers to free the Sequence of Events Recording program buffers for continued monitoring. The output routine prints the time of the first event in hours, minutes, and seconds. Following this message, the alpha-numeric address, a 36 character contact description, and cycle count from the first event are printed for each contact change. The first event will always have a cycle count of zero. A sample output is included at the end of this section.

SEQUENCE OF EVENT ADDRESSES
(Reference P250 Manual TPS129)

F0403D	RCL LO F ABOVE P-8 CAUS RE
F0423D	RCL LO F ABOVE P-7 CAUS REF
F0493D	STM LINE HI F SI CAUS RE
L0406D	STM GEN A LO LO L CAUS RE
L0426D	STM GEN B LO LO L CAUS RE
L0446D	STM GEN C LO LO L CAUS RE
L0466D	STM GEN D LO LO L CAUS RE
L0483D	PRESSURIZER HI 1 CAUS RE
N0005D	PWR RNG CHAN HI Q CAUS RE
N0010D	PWR RNG CHAN LO Q CAUS RE
N0024D	INTERM RNG HI Q CAUS RE
N0029D	PWR RNG CHAN HI Q RATE CAUS RE
N0036D	SOURCE RNG HI Q CAUSE RE
P0407D	STM LINE A HI DP SI CAUS RE
P0427D	STM LINE B HI DP SI CAUS RE
P0447D	STM LINE C HI DP SI CAUS RE
P0467D	STM LINE D HI DP SI CAUS RE
P0483D	PRESSURIZER HI P CAUS RE
P0488D	PRESSURIZER LO P CAUS RE
P1003D	CONTAINM HI P SI CAUS RE
T0498D	RCL OVERTEMP DI CAUS RE
T0499D	RCL OVERPWR DT CAUS RE
V0324D	RCP BUS UNDER VOLT &P7 CAUSE RE
Y0004D	REAC MANUAL TR 1 CAUS RE
Y0005D	REAC MANUAL TR 2 CAUS RE
Y0006D	REAC MAIN TR BKR A
Y0007D	REAC MAIN TR BKR B
Y0026D	REAC AUX TR BKR A
Y0027D	REAC AUX TR BKR B
Y0320D	RCP BUS UNDER FREQ PART RE
Y0321D	RCP BUS UNDER FREQ PART RE
Y0322D	RCP BUS UNDER FREQ PART RE
Y0323D	RCP BUS UNDER FREQ PART RE
Y0324D	RCP BUS UNDER FREQ CAUS RE
Y0335D	UNIT ON LINE TIE OCB A1 BKR
Y0335D	UNIT ON LINE TIE OCB A2 BKR
Y0337D	UNIT ON LINE TIE OCB B1 BKR
Y0390D	TB TRIP CAUSE RE
Y0391D	TB STOP VLV A CI PART RE
Y0392D	TB STOP VLV B CI PART RE
Y0393D	TB STOP VLV C CI PART RE
Y0394D	TB STOP VLV D CI PART RE
Y0400D	RCPA BKR OP CAUS RE
Y0401D	STM GEN A LO L & FW F CAUS RE
Y0420D	RCPB BKR OP CAUS RE
Y0421D	STM GEN B LO L & FW F CAUS RE
Y0440D	RCPC BKR OP CAUS RE
Y0441D	STM GEN C LO L & FW F CAUS RE
Y0460D	RCPD BKR OP CAUS RE
Y0461D	STM GEN D LO L & FW F CAUS RE
Y0480D	PRESUZER LO P&L SI CAUS RE
Y0920D	SFTY INJ SET MANUAL 1 CAUS RE
Y0921D	SFTY INJ SET MANUAL 2 CAUS RE

SAMPLE SEQUENCE OF EVENTS OUTPUT

```
0257  ALARM HI  T0410A  AI  RCLA OVERTEMP DT 1 SP                    178.5    H  152.0    DEGF
0257  RETRN OR  T0430A  AI  RCLB OVERTEMP DT 1 SP          159.4  DEGF
0257  RETRN OR  T0450A  AI  RCLC OVERTEMP DT 1 SP          164.1  DEGF
0257  RETRN OR  T0470A  AI  RCLD OVERTEMP DT 1 SP          160.3  DEGF
0257  ALARM LO  T0400A  AI  RCLA 1 TAVG                              546.7    L  552.0    DEGF

0257  SEQUENCE OF EVENTS RECORD.  FIRST EVENT AT H 2 M56 S40
0257  ALARM LO  T0420A  AI  RCLB 1 TAVG                              547.5    L  553.0    DEGF
      Y0390D  TB TRIP CAUSE RE                TR      C    0
0258  RETRN LO  Q0340A  AI  UNIT GENERATOR GROSS MW          3.0    L   -2.0   MW
0258  ALARM HI  T0450A  AI  RCLC OVERTEMP DT 1 SP                    152.4    H  152.0    DEGF
      Y0007D  REAC MAIN TR BKR B              TR      C    4
0258  ALARM LO  T0440A  AI  RCLC 1 TAVG                              545.6    L  552.0    DEGF
0258  ALARM HI  U0408   CV  RCLA OVERPWR SP DEV FR COMPUTED          104.2    H    6.0    PC
      Y0006D  REAC MAIN TR BKR A              TR      C    5
0258  ALARM LO  T0460A  AI  RCLD 1 TAVG                              545.2    L  552.0    DEGF
      N0029D  PWR RNG CHAN HI Q RATE CAUS RE  TR      C   21
0258  ALARM HI  U0448   CV  RCLC OVERPWR SP DEV FR COMPUTED          104.7    H    6.0    PC
0258  ALARM HI  U0468   CV  RCLD OVERPWR SP DEV FR COMPUTED          104.1    H    6.0    PC
      Y0392D  TB STOP VLV B CL PART RE        TR      C   28
0258  ALARM HI  T0470A  AI  RCLD OVERTEMP DT 1 SP                    150.1    H  150.0    DEGF
0258  ALARM LO  P0142A  AI  CHARG PMP DISCH HDR P                   2165.0    L 2200.0    PSIG
      Y0394D  TB STOP VLV D CL PART RE        TR      C   28
 0258 DELTA FLUX PROGRAM IN LOW POWER CUTOFF MODE
      Y0393D  TB STOP VLV C CL PART RE        TR      C   30
      Y0391D  TB STOP VLV A CL PART RE        TR      C   37
      Y0441D  STM GEN C LO L & FW F CAUS RE   TR      C  226
      L0426D  STM GEN B LO LO L CAUS RE       TR      C  257
      P0488D  PRESSURIZER LO P CAUS RE        TR      C  266
0259  ALARM HI  U0428   CV  RCLB OVERPWR SP DEV FR COMPUTED          106.0    H    6.0    PC
      L0406D  STM GEN A LO LO L CAUS RE       TR      C  271
      L0466D  STM GEN D LO LO L CAUS RE       TR      C  272
0259  INCR  HI  T0470A  AI  RCLD OVERTEMP DT 1 SP                    152.2    I  152.0    DEGF
      L0446D  STM GEN C LO LO L CAUS RE       TR      C  278
      Y0421D  STM GEN B LO L & FW F CAUS RE   TR      C  278
      Y0401D  STM GEN A LO L & FW F CAUS RE   TR      C  307
      Y0461D  STM GEN D LO L & FW F CAUS RE   TR      C  307
0300   2/18/1984  OC COOK UNIT 2
      Y0461D  STM GEN D LO L & FW F CAUS RE   NT TR   C  317
      Y0461D  STM GEN D LO L & FW F CAUS RE   TR      C  323
      Y0421D  STM GEN B LO L & FW F CAUS RE   NT TR   C  660
      Y0401D  STM GEN A LO L & FW F CAUS RE   NT TR   C  666
0300  ALARM HI  T0430A  AI  RCLB OVERTEMP DT 1 SP                    150.6    H  150.0    DEGF
      Y0461D  STM GEN D LO L & FW F CAUS RE   NT TR   C  679
      Y0441D  STM GEN C LO L & FW F CAUS RE   NT TR   C  746
      P0488D  PRESSURIZER LO P CAUS RE        NT TR   C 1082
0301  INCR  HI  T0430A  AI  RCLB OVERTEMP DT 1 SP                    152.0    I  152.0    DEGF
      Y0336D  UNIT ON LINE TIE OCB A2 BKR     OP      C 1476
      Y0335D  UNIT ON LINE TIE OCB A1 BKR     OP      C 1476
0301  END SEQUENCE OF EVENTS RECORD

0301  SEQUENCE OF EVENTS RECORD.  FIRST EVENT AT H 2 M59 S31
      Y0390D  TB TRIP CAUSE RE                NT TR   C    0
      Y0441D  STM GEN C LO L & FW F CAUS RE   TR      C 1811
      Y0441D  STM GEN C LO L & FW F CAUS RE   NT TR   C 2250
0301  END SEQUENCE OF EVENTS RECORD
          0303  ANALOG TREND-DEVICE  2 STOPPED
```

VI. POST TRIP REVIEW PROGRAM.

The Post Trip Review program periodically records a number of pre-selected inputs. These inputs are stored on a disc in a circular buffer, with newer sets of data replacing the older sets. When a trip occurs, either automatically (Post Trip) or manually (Test Trip), the pre trip data being entered into the circular buffer are frozen and the data are thereafter stored in a post trip buffer. When this buffer is filled, both sets of data (pre and post) are printed out on the typewriter..

The parameters monitored are analog in nature. At the present time, they include selected RPI indication (for unit 2 only), steam generator feed water flow and steam flow, steam generator narrow range and wide range level, pressurizer level, pressurizer livel setpoint, source range detector output, intermediate range detector output, power range detector output, first stage turbine pressure, steam generator pressure, pressurizer pressure, containment pressure, unit gross electrical output, Taverage, delta T power, overtemperature delta T setpoint, overpower delta T setpoint, wide range cold leg temperatures, pressurizer steam temperatures, T-reference, auctioneered delta T, and auctioneered Tavg. These parameters remain as selected by the computor vendor, Westinghouse Electric Corporation, except for certain RPI indications on Unit 2. The RPI indications were substituted for the four channels of total power range NIS power in order to obtain data on the anomalous response of RPI H-8 upon trip. The individual power range upper

and lower detector outputs remain in the Post Trip Review output for both units to monitor NIS power range indications.

Eight of the parameters in the previous paragraph are sampled at 2 second intervals 6 seconds before and after the trip. These are total NIS power range power on unit 1 and RPI indications on unit 2, turbine first stage pressure, unit gross electrical output, and auctioneered Taverage. All parameters are sampled at 8 second intervals for 2 minutes before and 3 minutes after the trip. These sampling times remain as set by the computor vendor.

The Post Trip Print program first outputs a start message on the appropriate typewriter. It then outputs a line of headings for the values which will be printed in columnar form. The headings consist of the six-character name of the point. The values are printed below their names starting with the oldest set of data on the first line, the next oldest on the next line and so on until the most recent pre-trip data are printed. Included in each row of data is a column indicating the time. When all the pre-trip data for this set of points are printed, the message POST TRIP DATA - TRIP TIME XXXX is printed. All the post-trip data for these points are printed in the same format as described above.

After all the post-trip data for these points are finished, the program starts over with another set of data in the same format: 6 character names, pre-trip values, trip message, and post-trip values. When all the points have been printed, the program outputs a finished message, unblocks the collection

programs, and exits. A sample output is included at the end of this section.

POST TRIP REVIEW ADDRESSES

C0010A	Cont. Rod Bank B Group 1 Pos M08 (Unit 2 Only)
C0027A	Cont. Rod Bank D Group 2 Pos P10 (Unit 2 Only)
C0029A	Cont. Rod Bank D Group 2 Pos H08 (Unit 2 Only)
C0075A	SD Rod Bank D Group 1 Pos F10 (Unit 2 Only)
F0403A	Stm Gen A Feed Wtr in 1 F
F0404A	Stm Gen A Feed Wtr in 2 F
F0405A	Stm Gen A Stm Out 1 F
F0406A	Stm Gen A Stm Out 2 F
F0423A	Stm Gen B Feed Wtr in 1 F
F0424A	Stm Gen B Feed Wtr in 2 F
F0425A	Stm Gen B Stm Out 1 F
F0426A	Stm Gen B Stm Out 2 F
F0443A	Stm Gen C Feed Wtr in 1 F
F0444A	Stm Gen C Feed Wtr in 2 F
F0445A	Stm Gen C Stm Out 1 F
F0446A	Stm Gen C Stm Out 2 F
F0463A	Stm Gen D Feed Wtr in 1 F
F0464A	Stm Gen D Feed Wtr in 2 F
F0465A	Stm Gen D Stm Out 1 F
F0466A	Stm Gen D Stm Out 2 F
L0400A	Stm Gen A Nar Rng 1 L
L0401A	Stm Gen A Nar Rng 2 L
L0402A	Stm Gen A Nar Rng 3 L
L0403A	Stm Gen A Wide Rng L
L0420A	Stm Gen B Nar Rng 1 L
L0421A	Stm Gen B Nar Rng 2 L
L0422A	Stm Gen B Nar Rng 3 L
L0423A	Stm Gen B Wide Rng L
L0440A	Stm Gen C Nar Rng 1 L
L0441A	Stm Gen C Nar Rng 2 L
L0442A	Stm Gen C Nar Rng 3 L
L0443A	Stm Gen C Wide Rng L
L0460A	Stm Gen D Nar Rng 1 L
L0461A	Stm Gen D Nar Rng 2 L
L0462A	Stm Gen D Nar Rng 3 L
L0463A	Stm Gen D Wide Rng L
L0480A	Pressurizer 1 L
L0481A	Pressurizer 2 L
L0482A	Pressurizer 3 L
L0483A	Pressurizer Lvl Control S.P.
N0031A	Source Rng Detector 1 Log Q
N0032A	Source Rng Detector 2 Log Q
N0035A	Source Rng Detector 1 Log Q
N0036A	Interm Rng Detector 2 Log Q
N0041A	PWR Rng 1 Top Detector Q
N0042A	PWR Rng 1 Bottom Detector Q
N0043A	PWR Rng 2 Top Detector Q
N0044A	PWR Rng 2 Bottom Detector Q
N0045A	PWR Rng 3 Top Detector Q
N0046A	PWR Rng 3 Bottom Detector Q
N0047A	PWR Rng 4 Top Detector Q
N0048A	PWR Rng 4 Bottom Detector Q

POST TRIP REVIEW ADDRESSES

N0049A	PWR Rng Channel 1 Q (Unit 1 Only)
N0050A	PWR Rng Channel 2 Q (Unit 1 Only)
N0051A	PWR Rng Channel 3 Q (Unit 1 Only)
N0052A	PWR Rng Channel 4 Q (Unit 1 Only)
P0398A	Tb First Stage 1 P
P0399A	Tb First Stage 2 P
P0400A	Stm Gen A Stm Out 1 P
P0401A	Stm Gen A Stm Out 2 P
P0402A	Stm Gen A Stm Out 3 P
P0420A	Stm Gen B Stm Out 1 P
P0421A	Stm Gen B Stm Out 2 P
P0422A	Stm Gen B Stm Out 3 P
P0440A	Stm Gen C Stm Out 1 P
P0441A	Stm Gen C Stm Out 2 P
P0442A	Stm Gen C Stm Out 3 P
P0460A	Stm Gen D Stm Out 1 P
P0461A	Stm Gen D Stm Out 2 P
P0462A	Stm Gen D Stm Out 3 P
P0480A	Pressurizer 1 P
P0481A	Pressurizer 2 P
P0482A	Pressurizer 3 P
P0483A	Pressurizer 4 P
P1000A	Containment 1 P
P1001A	Containment 2 P
P1002A	Containment 3 P
P1003A	Containment 4 P
Q0340A	Unit Generator Gross
T0400A	RCL A 1 T-Avg.
T0403A	RCL A 1 DT
T0406A	RCL A 1 Cold T
T0407A	RCL Overpwr DT 1 SP
T0410A	RCL A Overtemperature ΔT Setpoint
T0420A	RCL B 1 T-Avg.
T0423A	RCL B 1 DT
T0426A	RCL B Cold T
T0427A	RCL B Overpwr DT 1 SP
T0430A	RCL B Overtemp DT 1 SP
T0440A	RCL C 1 T-Avg.
T0443A	RCL C 1 DT
T0446A	RCL C Cold T
T0447A	RCL C Overpwr DT 1 SP
T0450A	RCL C Overtemp DT 1 SP
T0460A	RCL D 1 T-Avg.
T0463A	RCL D 1 DT
T0466A	RCL D Cold T
T0467A	RCL D Overpwr DT 1 SP
T0470A	RCL D Overpwr DT 1 SP
T0481A	Pressurizer Stm T
T0496A	RC T-Ref.
T0497A	RCL Auct. DT
T0499A	RCL Auct. T-Avg.

SAMPLE POST TRIP REVIEW OUTPUT

```
01  0143    217. *  36.8     0.1     1.3     32.     32.      6.    18.7    20.9      6.      5.     14.      3.     97.     0.2     0.2    103.
01  0144    325. *  36.8     0.1     0.9     32.     32.      5.    20.4    13.6      7.      4.     11.      3.    100.     0.3     0.2     70.
01  0145    211. *  36.8     0.1     1.7     32.     32.      6.    19.0    19.8      8.      4.     10.      3.     80.     0.4     0.2     73.
01  0146    269. *  36.8     0.1     1.3     32.     32.      5.    29.2    19.2      4.      4.      8.      2.     62.     0.4     0.2    132.
01  0147    297. *  36.8     0.1     1.6     32.     32.      5.    20.9    20.0      7.      2.      9.      3.     70.     0.3     0.2    116.
01  0148    186. *  36.8     0.1     1.3     32.     32.      5.    21.3    14.6      6.      3.     11.      3.     63.     0.4     0.2    112.
01  0149    281. *  36.8     0.1     1.7     32.     32.      6.    13.6    14.0      6.      2.     13.      3.     83.     0.3     0.2    117.
03  0149  U9901   U9902   U9903   U9904   U0484  10403A  10423A  10443A  10463A  U1118  10406A  10426A  10446A  10466A  10455A  10456A
03  0149   0.00    0.00    0.00    0.00   546.3    -0.6    -0.5    -2.3    -0.7 *115.5   539.1   545.5   542.6   544.2   121.6   117.1
04  0149 10112A  U0483   U0482   U0484   U1150  10006A  T0009A  T0052A  U0100   U0484  U1118   U0980  T0403A  T0400A  T0406A  T0426A  T0446A  10466A
04  0150   95.7    19.0  2230.3   546.3     0.0 E   0.0   541.4   548.0   193.2   546.3 * 115.5  3143.2    -0.6   545.4   539.1   545.1   542.6   544.2
01  0150 R0018A  R0002A  R0004A  R0007A  R0011A  R0012A  R0015A  R0016A  R0017A  R0019A  R0024A  R0025A  R0026A  R0021A  R0001A  R0005A  R0022A
01  0150    207. *  36.8     0.1     0.9     32.     32.      4.    27.0    19.7      7.      3.     10.      2.     74.     0.4     0.2    126.
06  0151  U0418   U0438   U0458   U0478   U1261   U1262   U1263   U1264   U1265   U1266   U1267   U1268   U1159   U1160   U1161   U1162   U0052   U0980
06  0151  -37.3   -41.7  -139.8   -51.6   1.085   1.070   0.704   1.141   1.382   0.654   0.906   1.258   0.998   0.995   1.000   1.007      0.  3153.7
01  0151 R0018A  R0002A  R0004A  R0007A  R0011A  R0012A  R0015A  R0016A  R0017A  R0019A  R0024A  R0025A  R0026A  R0021A  R0001A  R0005A  R0022A
01  0151    275. *  36.8     0.1     1.2     32.     32.      7.    26.8    13.1      4.      3.     10.      2.     70.     0.4     0.2    104.
07  0151 10403A  10423A  T0443A  10463A  U0485  10400A  T0420A  10440A  T0460A  U0484  N0049A  N0050A  N0051A  N0052A  U1150  U1169  U1118  00340A
07  0152   -0.7    -0.8    -2.4    -0.9    -1.1   544.9   546.1   547.7   545.7   545.7    -0.1    -0.1    -0.1    -0.1     0.1    -0.0 * 140.6     0.0
08  0152  U0400   U0420   U0440   U0460   U9901   U9902   U9903   U9904   U1163   U9909   U1110   U1111   U1112   U1113   U0482   U1300   U0100   U0101
08  0152   99.7    99.6    99.7   100.2    0.00    0.00    0.00    0.00   14.55     0.0 * -51.4 * -38.7 *  90.6 *  -0.5  2225.1 * 183.8   227.2   794.0
01  0153 R0018A  R0002A  R0004A  R0007A  R0011A  R0012A  R0015A  R0016A  R0017A  R0019A  R0024A  R0025A  R0026A  R0021A  R0001A  R0005A  R0022A
01  0153    178. *  36.8     0.1     1.5     32.     32.      7.    14.4    22.9      4.      4.     11.      2.    107.     0.3     0.2     82.
01  0154    306. *  36.8     0.1     1.3     32.     32.      5.    25.5    14.0      5.      3.      8.      3.     97.     0.2     0.2     98.
01  0155    257. *  36.8     0.1     1.2     32.     32.      6.    23.8    21.5      4.      3.     11.      3.     79.     0.3     0.2     98.
01  0156    213. *  36.8     0.1     1.0     32.     32.      8.    26.7    21.6      5.      2.     12.      3.    124.     0.3     0.2     97.
01  0157    266. *  36.8     0.1     1.3     32.     32.      4.    20.1    17.7      4.      3.      8.      3.     59.     0.3     0.2     83.
01  0158    221. *  36.8     0.1     1.5     32.     32.      6.    29.3    14.0      8.      2.      9.      3.     96.     0.2     0.2    101.
01  0159    346. *  36.8     0.1     1.2     32.     32.      5.    19.1    15.0      4.      4.     10.      3.    102.     0.3     0.2     97.
01  0200    286. *  36.8     0.1     1.6     32.     32.      4.    17.0   -16.7      5.      3.     12.      2.     64.     0.3     0.2     72.
0200   7/16/1983  OC COOK UNIT 1
01  0201    325. *  36.8     0.1     1.0     32.     32.      5.    16.5    15.9      5.      2.     12.      2.     73.     0.5     0.2    100.
0201  HOURLY XENON SUMMARY
      D.C.COOK UNIT 1   7/16/83

      XENON CONCENTRATION      0.186083E16 ATOMS/CC IODINE CONCENTRATION      0.280295E16 ATOMS/CC
      XENON REACTIVITY          -3200.6     PCM      BORON  U1300          *  212.4      PPM
      AVTEMP U0484               546.5      DEGF     RCSNKD U0052              0.0      STEPS
      NISPWR U1169                -0.0      %PWR     OTPWR  U0405             -1.1      %PWR
      TURBPW U1118           *  121.4      MEGWT

      DAILY BURNUP      0.131890110-01  EFPH    CYCLE BURNUP      0.635961230 04  EFPH
      DAILY BURNUP      0.216653140-01  MWD/MT  CYCLE BURNUP      0.104468030 05  MWD/MT
      DAILY BURNUP      0.146291480 03  MBTU    COREAVBURNUP      0.210998970 05  MWD/MT

06  0201  U0418   U0438   U0458   U0478   U1261   U1262   U1263   U1264   U1265   U1266   U1267   U1268   U1159   U1160   U1161   U1162   U0052   U0980
06  0201  -37.3   -26.3  -139.8   -41.5   0.932   1.114   0.639   1.315   0.929   0.536   1.036   1.500   0.998   0.995   1.000   1.007      0.  3200.6

0202  POST TRIP REVIEW
      N0049A      N0050A      N0051A      N0052A      TIME1       P0398A      P0399A      00340A      T0496A      TIME2
         0.1         0.1        -0.1         0.0     5839.7   *  -83.7        18.6         0.0       547.7      5839.7
         0.1         0.1         0.0        -0.1     5841.7   *  -83.7        18.6         0.0       547.8      5841.7
         0.0         0.0         0.0         0.0     5843.7   *  -83.7        18.6         0.0       547.7      5843.7
         0.0         0.0        -0.1         0.0     5845.6   *  -83.7        18.6        -1.0       547.7      5845.6
0203  POST-TRIP DATA - TRIP TIME 015847
         0.1         0.0        -0.1        -0.1     5847.7   *  -83.7        18.6        -1.0       547.7      5847.7
         0.0         0.0        -0.1         0.0     5849.6   *  -83.7        18.6        -1.0       547.7      5849.6
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0.0	0.1	-0.1	0.1	5851.8	* -83.7	18.6	-1.0	547.7	5851.8
0.1	0.0	-0.1	-0.1	5853.6	* -83.7	18.6	-1.0	547.7	5853.6

N0041A	N0042A	N0043A	N0044A	N0045A	N0046A	N0047A	N0048A	N0049A	N0050A	N0051A	N0052A	TIME1	N0031A	N0032A
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.1	0.1	5645.6	43.9	53.0
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	-0.1	0.0	5653.6	39.7	50.6
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.1	0.0	5701.6	42.9	48.9
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.0	0.1	5709.6	38.6	51.6
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.1	0.0	-0.1	-0.1	5717.6	35.2	47.3
0.00	0.00	0.00	-0.00	0.00	0.00	0.00	-0.00	-0.1	0.0	-0.1	-0.1	5725.6	39.2	39.4
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	0.0	5733.6	39.7	47.9
0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.0	-0.1	-0.1	-0.1	5741.6	34.4	48.9
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.0	-0.1	-0.1	-0.1	5749.6	43.2	44.8
0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	0.0	0.0	-0.1	-0.1	5757.6	35.2	42.2
0.00	0.00	0.00	-0.00	0.00	0.00	0.00	-0.00	0.0	0.0	-0.1	-0.1	5805.6	42.3	48.6
0.00	-0.00	0.00	-0.00	0.00	0.00	0.00	-0.00	0.0	-0.1	-0.1	-0.1	5813.6	36.7	44.8
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.1	-0.1	0.0	5821.6	37.5	45.7
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.0	-0.1	0.0	5829.6	39.2	47.9
0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.1	0.1	0.0	0.1	5837.6	35.2	46.7
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	0.0	5845.6	34.4	49.9
D205 POST-TRIP DATA - TRIP TIME 015847														
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.0	-0.1	-0.1	5853.6	41.2	50.3
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.0	0.0	5901.6	38.1	50.3
-0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.1	0.0	-0.1	0.0	5911.7	33.0	42.2
0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.1	0.2	0.1	0.1	5917.6	40.0	49.6
0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.0	0.1	5925.6	38.9	43.3
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.1	0.1	5933.6	39.4	47.9
0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.0	0.0	5941.6	37.5	46.0
0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.0	0.1	5949.6	42.6	47.0
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.1	0.0	5959.7	31.2	47.0
0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.1	0.1	5.6	32.8	44.8
0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.0	0.1	13.6	37.8	38.9
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	-0.1	21.6	37.5	44.8
0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	0.0	0.0	-0.1	-0.1	29.6	38.3	53.8
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	-0.1	37.6	40.0	49.6
0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	0.0	45.6	35.7	43.6
0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.0	-0.1	0.0	-0.1	53.6	38.9	43.6
0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.0	0.0	-0.1	0.0	103.7	31.2	43.9
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	-0.1	109.6	30.5	51.6
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.1	-0.1	0.1	117.6	33.3	45.7
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.0	0.0	-0.1	0.0	125.6	31.9	47.3
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	0.1	133.6	39.4	47.6
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	0.1	0.1	141.6	39.4	47.3
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.1	-0.1	0.1	149.6	43.6	50.6
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.1	0.1	157.6	41.7	47.6

N0035A	N0036A	F0398A	F0399A	Q0340A	T0496A	TIME2	F0403A	F0404A	F0405A	F0406A	F0423A	F0424A	F0425A	F0426A
0.00	0.00 *	-83.7	17.2	1.0	547.7	5645.6 *	0.0	62.5	139.8 *	0.0 *	0.0	116.9	250.0 *	0.0
0.00	0.00 *	-83.7	17.2	1.0	547.7	5653.6 *	0.0 *	0.0	221.0 *	0.0 *	0.0	116.9	268.8 *	0.0
0.00	0.00 *	-83.7	17.5	1.0	547.7	5701.6 *	0.0 *	0.0	242.1 *	0.0 *	0.0	116.9	229.6 *	0.0
0.00	0.00 *	-83.7	17.5	1.0	547.7	5709.6 *	0.0 *	0.0	139.8 *	0.0 *	0.0	62.5	250.0 *	0.0
0.00	0.00 *	-83.7	17.2	0.0	547.6	5717.6 *	0.0	62.5	139.8 *	0.0 *	0.0	116.9	250.0 *	0.0
0.00	0.00 *	-83.7	16.8	0.0	547.6	5725.6 *	0.0 *	0.0	0.0 *	0.0 *	0.0 *	0.0	207.3 *	0.0
0.00	0.00 *	-83.7	17.2	0.0	547.7	5733.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0 *	0.0	387.8 *	0.0
0.00	0.00 *	-83.7	17.2	0.0	547.6	5741.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0 *	0.0	229.6 *	0.0
0.00	0.00 *	-83.7	17.5	0.0	547.7	5749.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0 *	0.0	229.6 *	0.0
0.00	0.00 *	-83.7	17.2	0.0	547.7	5757.6 *	0.0 *	0.0	0.0 *	0.0 *	0.0 *	0.0	229.6 *	0.0
0.00	0.00 *	-83.7	17.5	-1.0	547.6	5805.6 *	0.0 *	0.0	139.8 *	0.0 *	0.0 *	0.0	229.6 *	0.0
0.00	0.00 *	-83.7	17.5	-1.0	547.6	5813.6 *	0.0 *	0.0	0.0 *	0.0 *	0.0 *	0.0	207.3 *	0.0

	0.00	0.00 *	-83.7	18.2	-1.0	547.7	5821.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	229.6 *	0.0	
	0.00	0.00 *	-83.7	18.2	0.0	547.7	5829.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	250.0 *	0.0	
	0.00	0.00 *	-83.7	18.6	1.0	547.7	5837.6 *	0.0 *	0.0	139.8 *	0.0 *	0.0	116.9	250.0 *	0.0	
	0.00	0.00 *	-83.7	18.6	-1.0	547.7	5845.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	268.8 *	0.0	
0207	POST-TRIP DATA - TRIP TIME 015847															
	0.00	0.00 *	-83.7	18.6	-1.0	547.7	5853.6 *	0.0 *	0.0	221.0 *	0.0 *	0.0	62.5	229.6 *	0.0	
	0.00	0.00 *	-83.7	18.6	0.0	547.7	5901.6 *	0.0 *	0.0	197.6 *	0.0 *	0.0	62.5	229.6 *	0.0	
	0.00	0.00 *	-83.7	18.6	0.0	547.7	5911.7 *	0.0 *	0.0	171.2 *	0.0 *	0.0	62.5	250.0 *	0.0	
	0.00	0.00 *	-83.7	19.2	1.0	547.9	5917.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	250.0 *	0.0	
	0.00	0.00 *	-83.7	18.9	1.0	547.8	5925.6 *	0.0	116.9	171.2 *	0.0 *	0.0	116.9	268.8 *	0.0	
	0.00	0.00 *	-83.7	19.2	1.0	547.8	5933.6 *	0.0	62.5	139.8 *	0.0 *	0.0	116.9	412.2 *	0.0	
	0.00	0.00 *	-83.7	19.2	0.0	547.8	5941.6 *	0.0 *	0.0	139.8 *	0.0 *	0.0	116.9	250.0 *	0.0	
	0.00	0.00 *	-83.7	19.6	1.0	547.8	5949.6 *	0.0 *	0.0	242.1 *	0.0 *	0.0	116.9	250.0 *	0.0	
	0.00	0.00 *	-83.7	19.6	1.0	547.8	5959.7 *	0.0	62.5	139.8 *	0.0 *	0.0	116.9	286.4 *	0.0	
	0.00	0.00 *	-83.7	19.6	1.0	547.8	5.6 *	0.0	62.5	171.2 *	0.0 *	0.0	116.9	268.8 *	0.0	
	0.00	0.00 *	-83.7	19.6	1.0	547.9	13.6 *	0.0	62.5	242.1 *	0.0 *	0.0	116.9	250.0 *	0.0	
	0.00	0.00 *	-83.7	18.9	1.0	547.7	21.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	250.0 *	0.0	
	0.00	0.00 *	-83.7	19.2	0.0	547.7	29.6 *	0.0 *	0.0	221.0 *	0.0 *	0.0 *	0.0	207.3 *	0.0	
	0.00	0.00 *	-83.7	18.9	0.0	547.7	37.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	250.0 *	0.0	
	0.00	0.00 *	-83.7	18.9	0.0	547.7	45.6 *	0.0 *	0.0	0.0 *	0.0 *	0.0	62.5	250.0 *	0.0	
	0.00	0.00 *	-83.7	18.6	0.0	547.7	53.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0 *	0.0	207.3 *	0.0	
	0.00	0.00 *	-83.7	18.9	0.0	547.8	103.7 *	0.0 *	0.0	0.0 *	0.0 *	0.0 *	0.0	229.6 *	0.0	
	0.00	0.00 *	-83.7	18.6	0.0	547.7	109.6 *	0.0 *	0.0	0.0 *	0.0 *	0.0 *	0.0	229.6 *	0.0	
	0.00	0.00 *	-83.7	18.6	0.0	547.7	117.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0 *	0.0	229.6 *	0.0	
	0.00	0.00 *	-83.7	18.6	0.0	547.7	125.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	250.0 *	0.0	
	0.00	0.00 *	-83.7	18.2	0.0	547.7	133.6 *	0.0 *	0.0	0.0 *	0.0 *	0.0 *	0.0	207.3 *	0.0	
	0.00	0.00 *	-83.7	18.6	1.0	547.7	141.6 *	0.0 *	0.0	98.8 *	0.0 *	0.0	62.5	229.6 *	0.0	
	0.00	0.00 *	-83.7	18.6	1.0	547.7	149.6 *	0.0 *	0.0	221.0 *	0.0 *	0.0	62.5 *	0.0 *	0.0	
	0.00	0.00 *	-83.7	18.6	1.0	547.7	157.6 *	0.0 *	0.0	171.2 *	0.0 *	0.0	62.5	250.0 *	0.0	
	TIME3	F0443A	F0444A	F0445A	F0446A	F0463A	F0464A	F0465A	F0466A	P0440A	P0441A	P0442A	P0460A	P0461A	P0462A	
	5641.8	250.0 *	0.0 *	0.0	153.1 *	0.0	182.2	116.9	62.5	971.7	973.2	985.2	972.0	969.1	970.5	
	5649.8	250.0 *	0.0 *	0.0	182.2 *	0.0	182.2	116.9	116.9	971.7	973.2	985.2	972.0	969.9	969.9	
	5657.8	250.0 *	0.0 *	0.0	116.9 *	0.0	153.1	62.5	62.5	971.7	972.5	983.7	972.0	969.1	969.9	
	5705.8	250.0 *	0.0 *	0.0	153.1 *	0.0	153.1	62.5	62.5	971.7	973.2	983.7	972.0	969.9	970.5	
	5713.8	250.0 *	0.0 *	0.0	116.9 *	0.0	153.1	116.9	62.5	971.7	973.2	985.2	972.0	969.9	970.5	
	5721.8	207.3 *	0.0 *	0.0	116.9 *	0.0	116.9 *	0.0 *	0.0	971.0	973.2	983.7	971.2	969.1	969.9	
	5729.8	229.6 *	0.0 *	0.0	62.5 *	0.0	116.9 *	0.0 *	0.0	971.7	973.2	984.5	971.2	969.1	970.5	
	5737.8	207.3 *	0.0 *	0.0	116.9 *	0.0	116.9 *	0.0 *	0.0	971.7	973.2	984.5	971.2	969.9	969.9	
	5745.8	207.3 *	0.0 *	0.0	62.5 *	0.0	116.9 *	0.0 *	0.0	971.7	973.2	985.2	972.0	969.9	970.5	
	5753.8	207.3 *	0.0 *	0.0	62.5 *	0.0	116.9 *	0.0 *	0.0	971.7	972.5	983.7	971.2	969.9	969.9	
	5801.8	229.6 *	0.0 *	0.0	62.5 *	0.0	116.9 *	0.0 *	0.0	971.7	973.2	985.2	972.0	970.5	970.5	
	5809.9	182.2 *	0.0 *	0.0	62.5 *	0.0	62.5 *	0.0 *	0.0	971.7	973.2	984.5	972.0	969.9	969.9	
	5817.8	229.6 *	0.0 *	0.0	116.9 *	0.0	153.1	62.5	62.5	972.5	974.7	985.9	973.5	970.5	971.2	
	5825.8	250.0 *	0.0 *	0.0	116.9 *	0.0	153.1	62.5	62.5	973.2	975.5	985.9	972.7	971.2	971.2	
	5833.8	250.0 *	0.0 *	0.0	153.1 *	0.0	153.1	62.5	62.5	973.2	975.5	988.1	973.5	971.2	972.0	
	5841.9	229.6 *	0.0 *	0.0	153.1 *	0.0	116.9	62.5 *	0.0	973.2	975.5	987.4	973.5	971.2	972.0	
0209	POST-TRIP DATA - TRIP TIME 015847															
	5849.8	207.3 *	0.0 *	0.0	116.9 *	0.0	116.9	62.5 *	0.0	973.2	975.5	985.9	973.5	971.2	972.0	
	5857.8	229.6 *	0.0 *	0.0	153.1 *	0.0	153.1	62.5	62.5	974.0	975.5	985.9	973.5	972.0	972.0	
	5905.8	250.0 *	0.0 *	0.0	153.1 *	0.0	153.1	62.5	62.5	974.7	975.5	986.6	975.0	972.0	972.7	
	5913.8	229.6 *	0.0 *	0.0	153.1 *	0.0	153.1	62.5	62.5	974.7	976.2	987.4	974.2	972.7	973.5	
	5921.8	268.8	62.5 *	0.0	207.3 *	0.0	207.3	153.1	116.9	976.2	977.6	988.9	975.6	973.5	974.2	
	5929.8	268.8 *	0.0 *	0.0	182.2 *	0.0	182.2	116.9	116.9	976.2	977.6	988.9	975.6	974.2	974.2	
	5937.8	250.0 *	0.0 *	0.0	153.1 *	0.0	182.2	116.9	62.5	976.2	977.6	988.9	975.6	974.2	974.2	
	5945.9	229.6 *	0.0 *	0.0	116.9 *	0.0	182.2	116.9	116.9	975.5	977.6	988.1	976.4	973.5	974.2	
	5953.8	250.0 *	0.0 *	0.0	182.2 *	0.0	153.1	116.9	116.9	976.9	977.6	989.6	976.4	974.2	975.0	
	1.8	250.0 *	0.0 *	0.0	153.1 *	0.0	153.1	116.9	62.5	976.2	978.4	989.6	977.1	975.0	975.6	

9.8	250.0 *	0.0 *	0.0	153.1 *	0.0	182.2	116.9	116.9	976.9	978.4	989.6	977.1	975.0	975.6
17.8	229.6 *	0.0 *	0.0	153.1 *	0.0	153.1	62.5	62.5	976.9	979.1	991.1	977.1	975.0	975.0
25.9	229.6 *	0.0 *	0.0	116.9 *	0.0	116.9	62.5 *	0.0	976.2	977.6	988.9	976.4	974.2	975.0
33.8	250.0 *	0.0 *	0.0	116.9 *	0.0	153.1	62.5	62.5	976.9	979.1	990.4	977.1	975.0	975.6
41.8	229.6 *	0.0 *	0.0	182.2 *	0.0	116.9 *	0.0	62.5	976.9	979.1	991.1	977.1	975.0	975.6
49.9	229.6 *	0.0 *	0.0	62.5 *	0.0	116.9 *	0.0 *	0.0	976.9	978.4	989.6	976.4	974.2	975.0
57.8	207.3 *	0.0 *	0.0	116.9 *	0.0	62.5	62.5 *	0.0	976.9	978.4	989.6	977.1	975.0	975.6
105.8	207.3 *	0.0 *	0.0	116.9 *	0.0	116.9 *	0.0 *	0.0	976.9	978.4	989.6	976.4	975.0	975.0
113.8	229.6 *	0.0 *	0.0	153.1 *	0.0	62.5	62.5 *	0.0	976.9	978.4	990.4	977.1	975.0	976.4
121.8	229.6 *	0.0 *	0.0	116.9 *	0.0	153.1 *	0.0	62.5	976.9	978.4	989.6	977.1	975.0	975.6
129.8	229.6 *	0.0 *	0.0	62.5 *	0.0	116.9 *	0.0 *	0.0	976.2	977.6	989.6	976.4	974.2	975.0
137.8	229.6 *	0.0 *	0.0	116.9 *	0.0	116.9	62.5	62.5	976.2	977.6	988.9	976.4	975.0	975.0
145.8	250.0 *	0.0 *	0.0	116.9 *	0.0	153.1 *	0.0	62.5	976.2	978.4	988.9	976.4	975.0	975.0
153.8	250.0 *	0.0 *	0.0	116.9 *	0.0	153.1	62.5	62.5	975.5	977.6	988.9	975.6	974.2	974.2

TIME4	P0400A	P0401A	P0402A	P0420A	P0421A	P0422A	TIME5	T0400A	T0403A	T0407A	T0410A	T0420A	T0423A	T0427A
5641.9	974.2	974.2	968.4	964.7	968.4	962.6	5641.9	545.4	-0.5	108.0	131.7	546.5	-0.5	108.1
5649.9	975.0	975.0	967.6	965.4	968.4	962.6	5650.0	545.5	-0.6	108.0	131.7	546.5	-0.5	108.1
5658.0	975.0	974.2	967.6	964.7	967.6	962.6	5658.1	545.5	-0.6	108.0	131.5	546.5	-0.6	108.1
5705.9	974.2	974.2	967.6	965.4	968.4	963.4	5706.0	545.5	-0.5	107.9	131.5	546.5	-0.5	108.0
5713.9	975.0	974.2	968.4	965.4	968.4	963.4	5713.9	545.5	-0.4	108.0	131.5	546.5	-0.5	108.1
5722.0	974.2	973.5	967.6	964.7	967.6	962.6	5722.0	545.4	-0.6	107.8	131.5	546.5	-0.7	107.9
5730.0	975.0	974.2	967.6	964.7	968.4	962.6	5730.0	545.5	-0.6	107.8	131.5	546.6	-0.6	108.0
5737.9	975.0	974.2	968.4	965.4	968.4	962.6	5738.0	545.5	-0.6	107.8	131.5	546.5	-0.7	108.0
5745.9	975.0	975.0	968.4	965.4	968.4	962.6	5745.9	545.5	-0.6	107.9	131.5	546.6	-0.7	107.9
5753.9	974.2	975.0	967.6	965.4	968.4	963.4	5754.0	545.5	-0.7	107.8	131.4	546.6	-0.8	107.9
5801.9	975.0	975.0	968.4	965.4	968.4	962.6	5802.0	545.5	-0.6	107.8	131.5	546.6	-0.7	107.9
5810.0	974.2	974.2	968.4	965.4	968.4	962.6	5810.1	545.5	-0.7	107.8	131.5	546.6	-0.8	107.8
5817.9	975.6	975.6	970.5	966.9	969.9	964.1	5818.0	545.7	-0.6	107.9	131.5	546.7	-0.7	108.0
5825.9	975.6	976.4	969.9	966.9	969.9	964.1	5825.9	545.7	-0.6	107.9	131.5	546.7	-0.7	108.0
5834.0	977.1	976.4	970.5	966.9	970.5	964.9	5834.0	545.7	-0.6	108.0	131.5	546.7	-0.6	108.1
5842.0	976.4	976.4	969.9	967.6	970.5	964.9	5842.1	545.7	-0.6	107.9	131.5	546.7	-0.6	108.0

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5850.0	975.6	975.6	969.9	966.1	969.9	965.5	5850.1	545.6	-0.6	107.9	131.5	546.7	-0.6	107.9
5857.9	976.4	976.4	969.9	966.9	970.5	964.9	5858.0	545.7	-0.6	107.9	131.5	546.7	-0.7	108.0
5905.9	977.1	977.1	970.5	968.4	971.2	965.5	5906.0	545.7	-0.6	107.9	131.5	546.8	-0.7	108.0
5913.9	977.9	977.9	971.2	968.4	971.2	965.5	5913.9	545.8	-0.6	107.9	131.5	546.8	-0.7	108.0
5921.9	978.6	978.6	972.7	969.1	972.7	967.7	5922.0	545.8	-0.6	108.0	131.5	547.0	-0.5	108.2
5929.9	978.6	978.6	972.0	969.1	972.7	967.0	5930.0	545.9	-0.6	108.0	131.5	546.9	-0.6	108.1
5937.9	978.6	978.6	972.0	969.1	972.7	967.0	5937.9	545.9	-0.6	108.0	131.4	547.0	-0.6	108.0
5946.0	978.6	978.6	972.0	969.9	972.7	967.0	5946.1	545.9	-0.6	108.0	131.3	547.0	-0.6	108.1
5953.9	977.1	978.6	972.7	968.4	972.7	966.2	5954.0	546.0	-0.6	108.1	131.3	547.0	-0.5	108.1
1.9	979.4	980.1	973.5	970.5	974.2	967.7	2.0	546.0	-0.6	108.0	131.3	547.0	-0.5	108.1
9.9	980.1	980.1	973.5	970.5	973.5	968.5	10.0	546.0	-0.6	108.0	131.4	547.0	-0.5	108.1
17.9	979.4	979.4	973.5	970.5	973.5	967.7	17.9	546.0	-0.6	108.0	131.3	547.0	-0.5	108.0
26.0	979.4	979.4	972.7	969.9	972.7	967.0	26.0	545.8	-0.6	107.8	131.4	546.9	-0.6	107.9
33.9	980.1	980.1	973.5	970.5	973.5	968.5	33.9	545.9	-0.4	107.9	131.3	547.0	-0.5	108.0
41.9	980.1	980.1	973.5	970.5	973.5	968.5	42.0	545.8	-0.4	107.9	131.4	547.0	-0.6	108.0
50.0	979.4	979.4	972.7	970.5	973.5	968.5	50.1	545.8	-0.5	107.8	131.2	546.9	-0.6	107.9
57.9	979.4	979.4	974.2	969.9	973.5	967.7	58.0	545.8	-0.6	107.8	131.1	546.9	-0.6	107.9
105.9	979.4	980.1	973.5	969.9	973.5	968.5	105.9	545.9	-0.6	107.8	131.0	546.9	-0.5	108.0
113.9	979.4	979.4	973.5	970.5	973.5	969.2	113.9	545.8	-0.6	107.9	131.2	546.9	-0.6	108.0
121.9	979.4	979.4	972.7	970.5	972.7	969.2	122.0	545.8	-0.7	107.9	131.2	546.9	-0.5	107.9
129.9	979.4	979.4	972.7	969.9	972.7	967.7	129.9	545.8	-0.6	107.9	131.4	546.8	-0.5	108.0
137.9	979.4	979.4	972.7	969.9	972.7	967.7	138.0	545.8	-0.6	107.9	131.5	546.7	-0.5	108.0
145.9	979.4	978.6	972.7	969.9	973.5	967.0	146.0	545.7	-0.5	107.9	131.7	546.7	-0.5	108.1
154.0	977.9	977.1	972.0	969.1	972.7	967.0	154.0	545.6	-0.5	107.9	131.8	546.7	-0.5	108.0

T0430A	T0440A	T0443A	T0447A	T0450A	T0460A	T0463A	T0467A	T0470A	T0497A	T0499A	TIME6	I0480A	I0481A	I0482A

134.0	548.2	-2.3	107.4	127.9	546.2	-0.7	107.7	129.5	-0.4	548.3	5642.1	17.6	19.1	17.5
134.1	548.2	-2.4	107.4	128.0	546.2	-0.7	107.6	129.4	-0.4	548.3	5650.1	17.6	19.1	17.5
133.9	548.2	-2.5	107.4	128.0	546.2	-0.8	107.6	129.4	-0.5	548.4	5658.2	17.6	19.0	17.5
133.9	548.2	-2.5	107.3	128.0	546.3	-0.8	107.6	129.4	-0.5	548.4	5706.1	17.5	19.0	17.3
133.9	548.2	-2.4	107.4	128.0	546.3	-0.8	107.7	129.4	-0.4	548.4	5714.1	17.5	19.0	17.3
133.7	548.1	-2.5	107.2	127.7	546.2	-0.9	107.4	129.3	-0.5	548.3	5722.2	17.3	18.8	17.2
133.9	548.2	-2.5	107.3	127.7	546.2	-0.8	107.5	129.4	-0.5	548.5	5730.2	17.5	18.9	17.3
133.8	548.2	-2.5	107.3	127.8	546.2	-0.8	107.5	129.4	-0.5	548.5	5738.1	17.5	19.0	17.3
133.8	548.2	-2.5	107.3	127.7	546.2	-0.7	107.4	129.3	-0.5	548.5	5746.1	17.5	19.0	17.3
133.8	548.2	-2.5	107.2	127.8	546.2	-0.9	107.5	129.3	-0.5	548.5	5754.1	17.5	19.0	17.3
133.7	548.2	-2.5	107.2	127.7	546.2	-0.8	107.4	129.3	-0.5	548.5	5802.1	17.6	19.1	17.4
133.6	548.2	-2.5	107.2	127.7	546.2	-0.9	107.5	129.2	-0.5	548.5	5810.2	17.6	19.1	17.5
133.8	548.3	-2.5	107.3	127.8	546.3	-0.7	107.6	129.4	-0.5	548.5	5818.1	17.8	19.3	17.6
133.8	548.3	-2.4	107.3	127.8	546.4	-0.7	107.6	129.3	-0.5	548.6	5826.1	17.9	19.3	17.6
133.9	548.4	-2.4	107.4	127.8	546.4	-0.6	107.6	129.5	-0.3	548.7	5834.2	17.9	19.5	17.8
133.8	548.4	-2.4	107.3	127.8	546.4	-0.7	107.6	129.4	-0.4	548.7	5842.2	18.0	19.5	17.8
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133.6	548.4	-2.5	107.3	127.7	546.4	-0.8	107.5	129.3	-0.5	548.6	5850.2	18.1	19.5	17.9
133.8	548.4	-2.5	107.3	127.7	546.4	-0.8	107.6	129.3	-0.4	548.6	5858.1	18.2	19.6	18.1
133.7	548.5	-2.4	107.3	127.8	546.4	-0.8	107.6	129.4	-0.4	548.7	5906.1	18.2	19.8	18.2
133.8	548.5	-2.5	107.4	127.7	546.4	-0.8	107.6	129.3	-0.5	548.7	5914.1	18.4	19.9	18.4
133.8	548.6	-2.4	107.4	127.7	546.6	-0.7	107.8	129.4	-0.4	548.8	5922.1	18.6	20.1	18.4
133.7	548.6	-2.4	107.4	127.7	546.6	-0.8	107.7	129.2	-0.5	548.8	5930.1	18.7	20.1	18.5
133.7	548.6	-2.5	107.4	127.7	546.6	-0.8	107.6	129.2	-0.5	548.8	5938.1	18.7	20.2	18.5
133.6	548.6	-2.5	107.4	127.7	546.7	-0.8	107.6	129.2	-0.5	548.8	5946.2	18.9	20.3	18.7
133.7	548.7	-2.4	107.4	127.6	546.7	-0.8	107.6	129.2	-0.5	549.0	5954.1	18.9	20.5	18.9
133.7	548.7	-2.4	107.4	127.7	546.7	-0.7	107.7	129.1	-0.5	548.9	2.2	19.0	20.5	19.0
133.7	548.7	-2.3	107.4	127.7	546.7	-0.8	107.6	129.0	-0.5	549.0	10.1	19.1	20.6	19.0
133.5	548.7	-2.5	107.3	127.5	546.7	-1.0	107.5	129.0	-0.5	548.9	18.1	19.2	20.7	19.2
133.6	548.7	-2.5	107.2	127.3	546.6	-1.0	107.4	128.9	-0.6	548.9	26.2	19.2	20.7	19.1
133.5	548.7	-2.5	107.3	127.4	546.7	-0.9	107.6	129.0	-0.5	549.0	34.1	19.3	20.8	19.2
133.4	548.8	-2.5	107.3	127.3	546.7	-0.9	107.5	129.0	-0.5	549.0	42.1	19.4	20.9	19.3
133.4	548.8	-2.5	107.2	127.1	546.7	-0.9	107.4	129.0	-0.5	549.0	50.2	19.4	20.9	19.3
133.2	548.8	-2.5	107.2	127.2	546.7	-0.9	107.5	128.8	-0.5	549.0	58.1	19.4	20.9	19.3
133.4	548.7	-2.5	107.4	127.4	546.6	-0.6	107.4	129.0	-0.5	549.0	106.1	19.4	20.9	19.3
133.6	548.8	-2.5	107.3	127.4	546.6	-0.6	107.6	129.1	-0.4	549.0	114.1	19.4	20.9	19.3
133.6	548.7	-2.5	107.4	127.6	546.6	-0.7	107.5	128.9	-0.5	548.9	122.1	19.3	20.8	19.2
133.8	548.7	-2.5	107.3	127.5	546.6	-0.7	107.5	129.0	-0.5	548.9	130.1	19.3	20.7	19.2
133.8	548.6	-2.4	107.4	127.7	546.6	-0.7	107.5	129.2	-0.4	548.8	138.1	19.3	20.7	19.2
134.0	548.5	-2.3	107.4	127.8	546.5	-0.6	107.6	129.3	-0.4	548.8	146.1	19.2	20.7	19.1
133.8	548.4	-2.1	107.3	127.9	546.4	-0.6	107.5	129.4	-0.3	548.7	154.2	19.1	20.6	19.0
I0483A	P0480A	P0481A	P0482A	P0483A	I0406A	I0426A	I0446A	I0466A	TIME7	I0400A	I0401A	I0402A	I0403A	I0420A
23.5	2237.7	2223.0	2235.9	2223.5	539.5	545.1	542.2	544.2	5642.2	46.2	46.8	48.3	65.5	51.0
23.4	2237.7	2223.0	2235.4	2223.5	539.5	544.6	542.6	543.8	5650.2	46.3	46.8	48.2	65.6	50.9
23.4	2237.7	2223.0	2235.9	2223.5	539.5	544.6	542.6	544.2	5658.3	46.0	46.8	48.2	65.4	50.9
23.4	2237.2	2222.5	2235.9	2223.5	539.1	545.1	541.7	543.8	5706.2	46.0	46.7	48.1	65.5	50.8
23.4	2237.7	2223.0	2235.9	2223.5	539.1	545.1	542.6	543.8	5714.2	46.1	46.8	48.2	65.2	50.9
23.4	2237.2	2222.5	2235.4	2223.0	539.1	544.6	541.7	543.4	5722.2	46.0	46.7	48.1	65.2	50.6
23.4	2238.2	2223.5	2236.4	2224.0	538.7	544.6	541.7	543.8	5730.3	46.2	46.7	48.2	65.3	50.6
23.4	2238.2	2224.0	2236.9	2224.0	539.1	544.2	541.7	543.8	5738.2	46.2	46.8	48.1	65.1	50.6
23.4	2238.2	2224.0	2236.9	2224.5	539.1	544.6	541.3	543.8	5746.2	46.0	46.7	48.1	65.2	50.4
23.3	2238.7	2224.0	2236.9	2224.5	538.7	544.2	541.3	542.9	5754.2	45.9	46.4	47.9	65.2	50.5
23.4	2238.7	2224.5	2236.9	2224.5	538.7	544.6	541.7	543.4	5802.2	45.7	46.3	47.7	65.3	50.5
23.3	2238.7	2223.5	2236.9	2224.0	538.7	544.2	541.3	543.4	5810.3	45.4	46.2	47.5	65.1	50.4
23.4	2239.7	2224.5	2237.2	2225.5	539.1	544.6	541.7	543.8	5818.2	45.6	46.2	47.6	65.3	50.4
23.5	2240.2	2224.5	2237.2	2226.0	539.1	545.1	542.2	543.8	5826.2	45.4	46.1	47.5	65.2	50.4
23.4	2240.2	2225.5	2238.2	2226.5	539.9	545.5	542.2	544.2	5834.3	45.4	46.1	47.4	65.3	50.4

	23.4	2240.2	2225.0	2237.7	2226.0	539.5	545.1	542.6	543.8	5842.3	45.1	45.9	47.3	65.1	50.3
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	23.4	2239.7	2225.0	2237.7	2226.0	539.5	545.1	542.6	543.8	5850.3	45.2	45.8	47.1	65.1	50.3
	23.4	2240.7	2225.5	2237.7	2226.0	539.1	545.1	541.7	543.8	5858.2	45.3	45.9	47.2	65.2	50.2
	23.5	2240.7	2226.0	2238.2	2226.5	539.5	545.5	542.2	544.2	5906.2	45.2	45.9	47.4	65.3	50.4
	23.5	2241.2	2226.0	2238.2	2226.9	539.9	545.1	542.2	544.2	5914.2	45.5	46.0	47.5	65.3	50.6
	23.5	2241.7	2227.0	2239.2	2227.4	539.9	545.9	543.0	545.1	5922.2	45.8	46.4	47.8	65.5	50.8
	23.5	2241.2	2226.5	2238.7	2226.9	539.9	545.5	542.6	544.2	5930.2	45.7	46.3	47.6	65.6	50.9
	23.5	2241.2	2226.0	2238.7	2226.9	539.9	545.5	542.6	544.6	5938.2	45.9	46.4	47.8	65.7	51.0
	23.5	2240.7	2226.0	2238.7	2226.5	539.9	545.5	542.2	544.2	5946.3	45.7	46.2	47.6	65.9	51.0
	23.5	2240.7	2225.5	2238.7	2226.5	539.9	545.5	542.2	544.2	5954.2	45.9	46.4	47.8	65.9	51.1
	23.5	2240.7	2226.0	2238.7	2226.9	540.4	545.5	542.6	544.6	2.3	45.7	46.5	47.9	66.1	51.0
	23.5	2241.2	2226.0	2238.2	2226.9	540.4	545.9	542.6	544.6	10.2	45.9	46.7	48.1	66.1	51.0
	23.5	2240.2	2225.0	2238.2	2226.0	539.9	545.5	542.6	544.2	18.2	45.9	46.5	47.9	66.3	51.0
	23.4	2239.7	2224.5	2237.2	2225.5	539.5	545.1	541.7	543.8	26.3	45.7	46.5	47.9	66.2	51.3
	23.5	2240.2	2225.0	2237.7	2225.5	539.9	545.5	542.2	544.2	34.2	46.1	47.0	48.3	66.4	51.6
	23.5	2239.2	2225.0	2236.9	2225.0	539.1	545.5	542.2	544.2	42.2	46.6	47.4	48.7	66.4	51.8
	23.4	2238.7	2223.5	2236.4	2224.5	539.5	545.1	541.7	543.8	50.3	47.1	47.7	49.1	66.4	52.1
	23.5	2238.7	2223.0	2235.9	2224.5	539.5	545.1	542.2	544.2	58.2	46.5	47.4	48.7	66.8	52.3
	23.5	2238.2	2223.0	2235.9	2224.0	539.1	545.1	542.2	544.2	106.2	46.8	47.6	48.9	66.8	52.6
	23.5	2238.2	2222.5	2235.4	2223.5	539.5	545.5	542.2	543.8	114.2	47.2	47.8	49.3	66.9	52.9
	23.5	2237.7	2222.5	2234.9	2223.0	539.5	545.1	542.2	542.5	122.2	47.0	47.8	49.2	66.9	53.0
	23.4	2237.2	2222.0	2234.9	2223.0	539.5	545.1	542.2	543.8	130.2	47.2	47.9	49.3	67.0	53.1
	23.4	2236.9	2222.0	2234.9	2223.0	539.5	545.5	542.2	544.2	138.2	47.3	48.0	49.5	67.0	53.2
	23.4	2237.2	2222.0	2234.9	2222.5	539.9	545.5	542.6	544.2	146.2	47.5	48.2	49.6	67.0	53.4
	23.4	2236.9	2221.5	2234.4	2222.0	539.5	545.1	542.6	544.6	154.3	47.8	48.5	49.9	67.0	53.7
	I0421A	I0422A	I0423A	I0440A	I0441A	I0442A	I0443A	I0460A	I0461A	I0462A	I0463A	TIME8	P1000A	P1001A	P1002A
	52.0	51.5	67.4	46.0	46.2	47.3	65.9	46.2	44.9	45.7	66.3	5842.3	0.008	0.086	0.000
	51.9	51.5	67.4	46.0	46.2	47.3	65.7	46.2	44.9	45.9	66.1	5850.4	0.000	0.086	-0.008
	52.0	51.5	67.4	46.1	46.3	47.4	65.9	45.9	44.8	45.6	66.2	5858.5	0.008	0.086	-0.008
	51.8	51.4	67.3	46.2	46.4	47.4	65.8	45.8	44.6	45.6	66.2	5706.4	0.008	0.086	-0.008
	51.8	51.4	67.4	46.0	46.2	47.3	65.8	45.7	44.5	45.4	66.2	5714.4	0.000	0.086	0.000
	51.7	51.2	67.2	45.9	46.1	47.1	65.7	45.9	44.8	45.5	66.0	5722.4	0.000	0.062	-0.008
	51.6	51.2	67.2	45.7	45.9	47.0	65.8	45.7	44.5	45.4	66.1	5730.4	-0.008	0.070	-0.023
	51.6	51.2	67.3	45.6	45.7	46.9	65.7	45.5	44.3	45.2	66.1	5738.4	-0.008	0.062	-0.023
	51.5	51.1	67.2	45.5	45.7	46.8	65.6	45.4	44.2	45.1	66.1	5746.4	0.000	0.070	-0.008
	51.5	51.0	67.1	45.4	45.5	46.6	65.6	45.4	44.2	44.9	66.0	5754.4	0.000	0.070	-0.031
	51.5	51.0	67.1	45.2	45.4	46.5	65.7	45.4	44.4	45.1	66.0	5802.4	-0.008	0.062	-0.023
	51.4	50.9	67.1	45.1	45.2	46.4	65.6	45.2	43.9	44.9	65.9	5810.5	-0.008	0.062	-0.023
	51.4	51.0	67.2	45.1	45.3	46.4	65.5	45.4	44.2	45.0	66.0	5818.4	0.000	0.070	-0.008
	51.4	50.9	67.2	45.1	45.3	46.4	65.6	45.2	43.7	44.8	66.0	5826.3	0.008	0.070	0.000
	51.5	51.0	67.2	45.1	45.3	46.4	65.6	45.3	44.1	44.9	66.0	5834.4	0.008	0.086	-0.008
	51.4	50.9	67.1	45.0	45.2	46.3	65.5	45.2	44.0	44.8	65.9	5842.5	0.000	0.086	-0.008
0218	POST-TRIP DATA - TRIP TIME 015847														
	51.2	50.9	67.1	44.8	45.0	46.1	65.5	45.1	44.0	44.8	65.9	5850.5	0.000	0.070	-0.023
	51.2	50.9	67.1	44.9	45.0	46.2	65.4	45.1	44.0	44.9	65.8	5858.4	0.008	0.070	-0.008
	51.4	50.9	67.1	44.9	45.1	46.2	65.5	45.3	44.2	44.9	65.7	5906.4	0.008	0.086	0.008
	51.6	51.0	67.1	45.0	45.2	46.4	65.7	45.2	44.0	44.8	65.9	5914.4	0.008	0.086	-0.008
	51.7	51.4	67.3	45.1	45.4	46.4	65.6	45.4	44.2	45.0	66.0	5922.4	0.023	0.094	0.000
	51.8	51.4	67.3	45.2	45.4	46.5	65.6	45.4	44.2	45.1	66.0	5930.4	0.023	0.086	0.000
	52.0	51.5	67.4	45.2	45.5	46.6	65.8	45.7	44.5	45.3	65.9	5938.4	0.008	0.086	0.000
	52.0	51.5	67.6	45.3	45.5	46.6	65.8	45.7	44.5	45.3	66.0	5946.5	0.008	0.086	-0.008
	52.1	51.7	67.7	45.5	45.7	46.8	65.9	45.8	44.6	45.4	66.1	5954.4	0.023	0.086	-0.008
	52.0	51.6	67.8	45.5	45.7	46.8	65.9	45.7	44.5	45.4	66.2	2.5	0.008	0.086	0.000
	52.0	51.6	67.9	45.7	45.9	47.0	65.9	45.8	44.5	45.4	66.2	10.4	0.008	0.086	0.000
	52.1	51.7	68.0	45.5	45.7	46.8	66.1	45.9	44.6	45.5	66.3	18.4	0.000	0.086	-0.008
	52.3	51.8	67.9	45.5	45.6	46.7	66.1	45.8	44.5	45.4	66.2	26.4	0.000	0.062	0.000

52.6	52.1	68.1	45.5	45.7	46.8	66.2	46.2	45.0	45.9	66.3	34.4	0.008	0.070	-0.008
52.8	52.3	68.1	45.3	45.5	46.7	66.3	46.3	45.1	46.0	66.2	42.4	0.000	0.070	-0.023
53.0	52.6	68.2	45.1	45.3	46.5	66.6	46.2	45.3	45.9	66.3	50.5	0.000	0.070	-0.023
53.3	52.9	68.2	45.3	45.6	46.7	66.6	46.3	45.6	45.9	66.5	58.4	-0.008	0.070	-0.023
53.6	53.1	68.3	45.2	45.6	46.6	66.7	46.3	45.2	45.6	66.5	106.4	0.000	0.070	-0.023
53.7	53.3	68.4	45.4	45.5	46.7	66.7	46.5	45.2	46.0	66.7	114.4	0.000	0.070	-0.008
53.9	53.6	68.5	45.4	45.5	46.7	66.8	46.6	45.1	46.0	66.9	122.4	0.000	0.070	-0.023
53.9	53.6	68.4	45.7	46.0	47.1	66.9	46.9	45.8	46.7	66.8	130.3	0.000	0.070	-0.023
54.2	53.7	68.6	45.8	46.0	47.1	67.0	47.1	45.9	46.8	67.0	138.4	0.000	0.070	0.000
54.3	53.9	68.6	45.9	46.2	47.3	67.1	47.3	46.2	46.3	67.1	146.4	0.008	0.070	-0.008
54.6	54.2	68.7	45.9	46.1	47.3	67.2	47.4	46.5	47.0	67.1	154.5	0.008	0.062	-0.008

P1003A	TIME9	T0481A	TIME10
0.0	5642.5	657.5	5647.1
0.0	5650.5	656.4	5655.1
0.0	5658.6	657.1	5702.8
0.0	5706.5	656.8	5711.0
0.1	5714.5	656.4	5718.7
0.0	5722.6	656.4	5727.1
0.0	5730.6	656.8	5734.8
0.0	5738.6	656.4	5743.0
0.0	5746.5	656.4	5750.8
0.0	5754.5	656.4	5758.9
0.0	5802.5	656.4	5806.8
0.0	5810.7	656.1	5814.7
0.0	5818.5	656.8	5823.0
0.0	5826.5	656.4	5830.9
0.0	5834.6	656.4	5839.1
0.0	5842.6	656.8	5846.8

0220 POST-TRIP DATA - TRIP TIME 015847

0.0	5850.7	656.8	5854.9
0.0	5858.5	656.4	5902.8
0.0	5906.5	656.8	5910.8
0.0	5914.5	657.9	5919.1
0.0	5922.6	657.5	5927.0
0.0	5930.6	656.8	5934.7
0.0	5938.5	656.8	5943.1
0.0	5946.6	657.5	5950.7
0.0	5954.5	657.1	5958.9
0.0	2.6	656.8	7.1
0.0	10.5	657.1	14.8
0.0	18.5	656.4	22.8
0.0	26.6	656.4	31.0
0.0	34.5	656.8	38.8
0.0	42.5	656.4	47.0
0.0	50.7	656.4	54.8
0.0	58.6	656.8	102.9
0.0	106.5	656.4	110.7
0.0	114.5	657.1	118.8
0.0	122.6	656.8	126.7
0.0	130.5	656.4	134.8
0.0	138.5	656.4	143.1
0.0	146.6	657.1	150.7
0.0	154.6	657.1	158.7

0222 POST TRIP REVIEW FINISHED

01	0222	K0018A	K0002A	K0004A	K0007A	K0011A	K0012A	K0015A	K0016A	K0017A	K0019A	K0024A	K0025A	K0026A	K0021A	K0001A	K0005A	K0022A
01	0222	278.	* 36.8	0.1	1.7	32.	32.	5.	21.9	15.9	4.	2.	11.	4.	80.	0.4	0.2	227.
07	0222	T0403A	T0423A	T0443A	T0463A	U0485	T0400A	T0420A	T0440A	T0460A	U0484	N0049A	N0050A	N0051A	N0052A	U1150	U1169	U1118	R0340A

PROTECTION AND SAFEGUARDS SETPOINTS

TRIP DESCRIPTION	UNIT 1 SETPOINTS		UNIT 2 SETPOINTS	
	Actual	Tech. Spec.	Actual	Tech. Spec.
1) Manual	N/A	N/A	N/A	N/A
2) Pwr. Range Neutron Flux				
a) Low	25%	≤25%	25%	≤25%
b) High	109%	≤109%	109%	≤109%
3) Pwr. Range Flux Rate				
a) Positive	5% In 2 sec	≤5% In ≥ 2 sec	5% In 2 sec	≤5% In ≥ 2 sec
b) Negative	5% In 2 sec	≤5% In ≥ 2 sec	5% In 2 sec	≤5% In ≥ 2 sec
4) Intermediate Range Neutron Flux	25% (Current Equival.) (9.6×10^{-5}amps)	≤25% (Current Equival.)	25% (Current Equival.) (8.1×10^{-5}amps)	≤25% (Current Equival.)
5) Source Range Neutron Flux	9×10^4cps	$\leq 10^5$cps	9×10^4cps	$\leq 10^5$cps
6) OTΔT	As Per Tech Spec		As Per Tech Spec	
7) OPΔT	As Per Tech Spec		As Per Tech Spec	
8) Low PZR. Press	1872 psig	≥1865 psig	1966 psig	≥1950 psig
9) High PZR Press	2378 psig	≤2385 psig	2378 psig	≤2385 psig
10) High PZR Lvl.	91%	≤92%	91%	≤92%
11) Loss of Flow	90%	≥90%	93%	≥90%

PROTECTION AND SAFEGUARDS SETPOINTS

TRIP DESCRIPTION	UNIT I SETPOINTS Actual	UNIT I SETPOINTS Tech. Spec.	UNIT 2 SETPOINTS Actual	UNIT 2 SETPOINTS Tech. Spec.
12) S/G Wtr. Lvl.Low-Low	17%(N.R.)	≧17%(N.R.)	21%(N.R.)	≧21%(N.R.)
13) Stm./Feed Flow Mismatch W/Low S/G Wtr Lvl	0.6 x 10^6pph Coincident with 26% (N.R.)	≦0.71 x 10^6pph Coincident with ≧25% (N.R.)	0.6 x 10^6pph Coincident with 26% (N.R.)	≦1.47 x 10^6pph Coincident with ≧25% (N.R.)
14) RCP Undervoltage	3150 Volts	≧2750 Volts	3150 Volts	≧2905 Volts
15) RCP Underfrequency	58.2 HZ	≧57.5 HZ	58.2 HZ	≧57.5 HZ
16) RCP Bkr. Position	1/4 Open Bkrs Above P-8 2/4 Open Bkrs Between P-7 & P-8	NA	1/4 Open Bkrs. Above P-8, 2/4 Open Bkrs. between P-7 & P-8	NA
17) Turbine Trip				
a) Low Sys. Press.	800 psig	≧800 psig	62 psig	≧58 psig
b) Stop Vlv. Position	1% open	≧1% open	1% open	≧1% open
18) Safety Injection				
a) Manual	NA	NA	NA	NA
b) High Containment Press	1.1 psig	≦1.1 psig	1.1 psig	≦1.1 psig
c) Low PZR Press.	1837 psig	≧1815 psig	1908 psig	≧1900 psig
d) High Stm. Line Diff. Press.	100 psid	≦100 psid	100 psid	≦100 psid
e) High Stm. Line Flow Coincident with	1.42 x 10^6 pph for 0→20% Pwr. Ramped to 3.88 x 10^6 pph at 100%	≦1.42 x 10^6 pph for 0→20% Pwr. Ramped to 3.88 x 10^6 pph at 100%	NA	NA
Lo-Lo Tavg or	541°F	≧541°F	NA	NA
Low Stm. Line Press.	600 psig	≧600 psig	600 psig	≧600 psig

INFORMATION ONLY

ATTACHMENT II

2.2 Equipment Classification and Vendor Interface (Programs for All Safety-Related Components)

2.2.1 Equipment Classification

2.2.1.1 Criteria

The criteria for classifying the components of the D.C. Cook Plant were described in Section 2.1, attachment to letter AEP:NRC:0830A, M. P. Alexich to Darrel G. Eisenhut, dated November 4, 1983. These criteria were used to classify all components, not just the Reactor Trip System components.

2.2.1.2 Information Handling System

Safety-related components (with known exceptions) are entered in a computerized list known as the N-List. Structural items and piping are entered as a single line item. Electrical items such as relays, switches, conduit, fittings, and trays also are covered by single line items.

Since the N-List is not all inclusive and does not individually list such items as pipe spool pieces, switches and relays, other documents such as the FSAR, technical specifications, related communications to the NRC, flow diagrams, electrical elementary and one-line diagrams and purchase specifications are also consulted. For example, the boundaries of each pipe specification are shown on the flow diagrams.

The control of the N-List, including updating and maintenance, is set forth in corporate level general procedures. If any one within AEPSC or the plant is unsure of the classification of a component, he is required by procedure to check with the responsible AEPSC cognizant engineer. Drawings are controlled by general procedures and design procedures of the cognizant engineering groups. The D.C. Cook Plant equipment specifications are the documents which were used in specifying the procurement, fabrication, installation and (in some cases) repair of systems or equipment. The specifications were prepared during the construction phase of the plant and supplemented as required. Control of the specifications, including updating and maintenance is set forth in corporate level general procedures.

Since this information system is cumbersome to use, we plan to transfer the required information to a new computerized component classification record. This will provide for uniform identification and description of plant components in a single document.

Until the new information system is in place and operational, we will continue to review and update the existing system as required and conduct refresher training for appropriate plant staff.

The new system is described in Section 2.2.1.6.

2.2.1.3 Plant Use

Under the present system of work control, a job order is prepared for all repair and modification work performed at the plant. During the job order preparation process, the safety classification of the equipment, as well as procedures required to perform the work, are entered on the job order form. The same reference documents are used to assure that properly certified replacement parts are used when required. Plant procedures control the ordering of replacement parts.

Following completion of every repair and modification, the job orders undergo a review process by experienced and knowledgeable supervisory personnel. This review process provides verification that the information handling system is being used on a routine basis. Particular attention is given to safety related job orders to verify that proper procedures were used and that properly certified replacement parts were installed where required.

2.2.1.4 Management Controls

The activities described above for work control process are addressed in various plant instructions and procedures. The Quality Assurance Department performs audits of activities covered by the plant instructions and procedures and notifies appropriate plant management of any deficiencies noted. Thus, the audit program provides additional verification of the routine utilization of the information handling system.

2.2.1.5 We are currently engaged in the completion of the qualification of components of safety related systems located in harsh environments associated with IE Bulletin 79-01B. This program includes consideration of aging of these devices.

Rule 10 CFR 50.49 requires that replacement components for safety related systems meet the conditions of IEEE 323-1974 which includes aging requirements. Specific criteria for exemptions are provided by Rule 10 CFR 50.49.

Our current specifications used to procure new or replacement components identify normal and accident service conditions or reference applicable codes. Qualification testing and performance evaluation is required for harsh environments and test reports of this qualification testing are required to meet the conditions of the specifications.

Prior to future use for procurement, each specification subject to the requirements of 10 CFR 50.49 will be revised to include the requirements that the vendor establish service life by test or performance evaluation and require the vendor to supply documentation in support of the service life qualification.

2.2.1.6 New Classification Program

We plan to implement a new computerized component classification record which will list all plant components, their safety classification and their procurement and QA requirements.

Cross-references to drawings and relevant plant and corporate procedures will ensure that the safety role of a component is kept in focus whenever a component is taken out of service, bought, maintained, replaced or returned to service. The job control classification will rely on the record.

We recognize the need to address the issue of "important to safety" and to tie it to specific components and their applications. This subject is being actively debated within the industry and is the subject of Mr. Darrel Eisenhut's Generic Letter 84-01 dated January 5, 1984. At the present time, however, the definition of the scope of the term "important to safety" has not been established; we do not have formal criteria to allow classification on a component by component basis.

We are planning our new component classification record to accommodate such classifications. As additional requirements are developed for the "important to safety" classified equipment these will be reviewed and, if appropriate, incorporated into the program.

We are starting work on our new data-base project. We currently expect to have the new system in place before the end of 1986.

3.2 POST MAINTENANCE TESTING (ALL OTHER SAFETY-RELATED COMPONENTS)

3.2.1 We have reviewed our plant testing and maintenance procedures which cover safety related components and have determined that post maintenance testing is included. We are conducting reviews to verify that the testing specified is adequate to demonstrate that the equipment is capable of performing its safety function. This review is expected to be completed by March 31, 1985.

Plant tagout procedures require that operability is demonstrated prior to returning the component or system to service. Components within the tagouts boundary are reviewed for operability verification.

Plant procedures governing job orders require adequate testing upon completion of the job. The testing performed by the department completing the work has to be entered on the job order.

When a change is made to a plant structure, system, or component, the request for change (RFC) package is reviewed by the design change coordinator. RFC installations are normally required to be tested to verify operability. If such a test is not to be performed, the Lead Engineer has to document the justification for the exception. Operability testing which is complex is performed by using an approved procedure.

The D.C. Cook Nuclear Plant technical specifications are the standardized format. However, they do not specifically require that post-maintenance testing be conducted before returning a system or component to service (i.e., declared operable). Specified surveillance test(s) (operability demonstration) are required prior to entry into an operational mode.

In addition, when the plant is in a condition that requires entry into a "Technical Specification Action Statement", the relevant plant tagout, job order and change control procedures are activated. This ensures that the operability of all safety related components is verified before they are returned to service. The plant can then be considered to be out of the Action Statement condition.

3.2.2 We have commenced a review of the plant maintenance procedures. The check for vendor and engineering recommendations to determine that appropriate test guidance is included will be included in the review. In addition, a separate review is being made of the technical bulletins for the Westinghouse supplied NSSS safety related equipment as defined by the Westinghouse bulletin. This same review will be made on other safety-related device bulletins as they are received

(including previously issued bulletins) under the program described by Section 2.2.2. In conjunction with our VDCS, we will give you a status report on the results of our review by December 31, 1985.

ATTACHMENT III

2.2.2 The following description expands our November 4, 1983 letter AEP:NRC:0838, Vendor Document Control System and provides an implementation schedule

General

In order to ensure that vendor information for safety-related components is complete, current, and controlled throughout the life of the D.C. Cook Nuclear Plant, a "Vendor Document Control System" (VDCS) has been developed and is in the initial stages of implementation. The VDCS is comprised of a corporate level general procedure and associated review documentation forms, and is designed to track Vendor Technical Documents (VTD's) from their receipt to final disposition and filing, utilizing positive feedback at each stage to guarantee receipt and on-schedule review. To assure implementation of and adherence to the VDCS, the AEPSC Quality Assurance section has been assigned the responsibility for monitoring and auditing the general procedure.

VDCS Objectives

Prior to the detailed development of the VDCS, it was essential that program objectives be well defined. The resulting objectives were realistic, achievable, and addressed the intent of Generic Letter 83-28, Section 2.2.2. These objectives and the manner in which they were addressed are described as follows:

1. Centralization of Responsibility for VTD's

   Because the vendors use such diverse methods for tranamitting VTD's to AEP, the assigning to one central group the responsibility for receiving, classifying, and determining distribution for all VTD's was a prime requirement. The Nuclear Operations Section (NOS) within the AEPSC Nuclear Engineering Division has been assigned this responsibility. All VTD's pertaining to D.C. Cook Plant, regardless of their points of arrival within the AEP System, will be forwarded to the NOS for initial processing.

2. Traceability of all VTD's

   The ability to trace and locate a VTD, not only during the initial review process but at any time during the life of the plant, will be achieved through the assignment of unique processing and filing numbers. Upon receipt, the NOS will assign to each VTD a unique processing number. This number will be retained from initial sorting through final disposition and filing. During the review of the VTD by the cognizant divisions, all VDCS forms will be identified with this unique processing number. During the review, if the VTD(s) is determined to be "applicable", it will be assigned a unique control number. A "Controlled Document" stamp will be affixed to the VTD, and the control number printed thereon.

   Both the processing number and the control number along with all other pertinent data, will be recorded in the VDCS. This system (detailed later) will enable the VTD to be located and its status determined.

3. System to Record and Track VTD Data

Because of the large number of VTD's both existing and projected to be received in the future, a computerized tracking system is under development. This system will enable all VTD's to be tracked at each point of the review process from initial receipt through final disposition and filing. All data pertinent to the VTD and the component to which it is applicable will be included.

4. Complete Documentation for all VTD's

The documentation required for the receipt, review, and dispositioning of each VTD is prescribed by the VDCS corporate level general procedure. Each step of the review process requires the use of a form specifically developed for that step. All forms contain a separate "receipt/acknowledgement" section which must be completed, signed, and returned to the originator. The VTD, along with all disposition forms, will be microfilmed and filed at the completion of the review process.

5. Timely Review and Determination of Required Actions

The time allotted to the cognizant divisions for review on a VTD is specified by the NOS on the transmittal form attached to the VTD. A monthly review of VDCS items will be conducted by the NOS. The NOS will initiate an "overdue notice" to a cognizant division and/or adjust completion dates when necessary.

All VTD's will be processed through the VDCS. However, if a VTD indicates that immediate action is required, and the processing delay through the VDCS could adversely affect either the health and welfare of the general public or Cook Plant operations, the general procedure permits the required action to be taken without immediate VDCS processing and review. After the actions are completed, the general procedure prescribes that the VTD must be processed through the VDCS in the normal manner.

6. Ability to Retain and Retrieve all VTD's and Associated Material

Upon completion of the review process, the VTD and all associated documentation will be microfilmed for permanent storage and all pertinent information recorded in the VDCS tracking system. Whenever information is required concerning a VTD, a search of the computerized tracking system can be made. Once the VTD is located, it may be viewed on microfilm and/or reproduced as required.

7. Ensure Receipt and Correct Processing of all VTD's

To ensure that all VTD's transmitted to AEP by vendors are received, the VDCS contains provisions for a periodic contact with each safety-related vendor. Over any given twelve (12) month period, each vendor will be sent a form letter, including a "receipt/acknowledgement" section, with an attachment listing the documents received from the vendor during the previous twelve (12) month period. If this listing is correct, the

vendor will be requested to sign and return the document. If documents are missing, the vendor will be requested to so inform AEP and provide copies of all missing documents. These VTD's, upon receipt, will be processed through the VDCS.

Processing of all VTD'S includes an evaluation of "applicability" to D.C. Cook Plant. "Applicable" VTD's will be automatically processed through the VDCS. However, if a VTD is classified as "not applicable" by the NOS, it will be automatically sent to a cognizant engineering group for a second evaluation of applicability. This step reduces the possibility of an "applicable" document being misclassified and not being reviewed and correctly dispositioned.

8. Incorporation of Existing VTD's into System

The incorporation of existing VTD's into the new VDCS is underway. Each document will be reviewed and assigned a unique processing number. Each VTD applicable to D.C. Cook Plant will be classified and stamped as a "Controlled Document" and assigned a control number. All pertinent data will be recorded in the VDCS tracking system.

NUTAC

AEP actively participated in the Nuclear Utility Task Action Committee (NUTAC) on NRC Generic Letter 83-28, Section 2.2.2 - Vendor Interface. While AEP is in general agreement with the NUTAC recommendations (transmitted to the NRC by E. Griffing, NUTAC Chairman), we have modified the program slightly to meet our specific requirements.

VDCS Current Status and Implementation Schedule

Subsequent to the receipt of Generic Letter 83-28, an intense effort has been underway within AEP to develop and implement a program to address the document control concerns contained therein. AEP is committed to the successful and on-schedule implementation of the VDCS. The following schedule is contingent upon the objective previously defined remaining unchanged through the targeted completion dates. Additional regulatory requirements or unforeseeable difficulties arising from the full-scale implementation of the VDCS general procedure could cause delays. Because the implementation schedule is heavily dependent upon the performance of the vendors, the following are targets dates rather than commitment dates.

1. VDCS General Procedure

The corporate level general procedure and associated documents detailing the handling and review process for all VTD's has been completed and forwarded to AEP senior management for review and approval. Anticipating approval, implementation is proceeding and the VDCS is expected to be operational with the completion of the component classification record described under 2.2.1.6.

2. Reactor Trip System (RTS) Component Vendors

All RTS vendors have been contacted, and responses are being evaluated for determination of required actions. As the completion of this activity is almost totally dependent upon a vendor response it is not possible to project a completion date. However, the timeliness of responses is being monitored, and those vendors who are late are being recontacted.

3. Safety-Related Component Vendors

AEP is in the process of contacting all suppliers of safety-related components and requesting a list of technical documents (VTD's) pertaining to D.C. Cook Plant. Because of the depth of the information which must be gathered and supplied to the vendor for each component, this will be a lengthy undertaking. It is anticipated that all safety-related vendors will be contacted and new documents reviewed and incorporated into the VDCS by the targeted date of December 31, 1985. As the responses are received, they are evaluated for determination of required actions.

4. Incorporation of Existing VTD's into the VDCS

The existing system for monitoring and tracking VTD's is much less sophisticated and incorporating these existing VTD's into the VDCS described herein requires a comprehensive inventory of the Cook Plant master files. This effort is underway and is anticipated to be completed by the targeted date of September 1984. Transfer of these VTD's into the VDCS will take approximately nine (9) months beyond this.

ATTACHMENT IV

Amendments to pages 7, 23, and 24 of our submittal
AEP:NRC:0838A dated November 4, 1983

1.2.2 The complement of programs for the P250 process computer includes two programs which are relevant to the analysis of reactor trips. These two programs are the Post Trip Review Program and the Sequence of Events Recording Program

The Sequence of Events Recording Program records the sequence of operation of a number of monitored contacts to a high time resolution. When one of the monitored contacts changes state, an interrupt is initiated which causes the P250 to scan each monitored contact for any change from its previous state. The program stores such changes and the cycle count since the first event. A cycle is nominally 20 milliseconds in length. Due to a dead time of 2 milliseconds in the interrupt process, an automatic rebid of the program is programmed for the cycle following each interrupt bid. This is done to avoid loss of contact changes during the dead time. The Sequence of Events Recording Program is terminated when either the cycle count reaches 3600 or 25 contact changes have been recorded.

When the program is terminated, an output routine is called. All collected data are first moved to the output program buffers to free the Sequence of Events Recording Program buffers for continued monitoring. The output routine prints the time of the first event in hours, minutes, and seconds. Following this message, the alpha-numeric address, a 36-character contact description, and cycle count from the first event are printed for each contact change. The first event will always have a cycle count of zero.

The P250 address list indicates that there is an input to the Sequence of Events Recording Program for each potential reactor trip. In the case of reactor coolant pump underfrequency, partial trips are also included. In addition, the reactor trip and reactor trip bypass circuit breakers, main generator output circuit breakers, and turbine stop valves are monitored.

The time discrimination between events is one cycle or nominally 20 milliseconds. The format for data display is discussed above in the description of the program. The data is output on one of the P250 typewriters. The printer output sheets may be retained for future reference.

The primary power source for the P250 computer is an inverter supplied by the AB battery and 600 volt bus 11B. If the inverter should fail, the P250 computer would be switched by an automatic bus transfer to the control room power distribution circuit, CRP-3, which is supplied from the plant lighting transformer. The power source is balance of plant (non class IE).

4.5 System Functional Testing

4.5.1. STA and UVTA Testing

The reactor trip breakers are currently tested on-line by operation of the undervoltage trip device.

The present arrangement of four circuit breakers, two trip and two bypass, permits on-line testing of the breakers. We currently test the UVTA prior to every start-up and once every month during unit operation. The shunt trip is independently tested prior to each start-up. No failures have been encountered.

Once the modification to enable automatic actuation of the shunt trip attachment is made, we will test both the UVTA and the STA while the unit is in operation.

4.5.2. On-line Testing

Since we perform on-line testing, this section does not apply to our plant.

4.5.3. Frequency of On-line Testing

Our position is as follows:

The reactor trip circuit breakers at the D.C. Cook Plant are installed in a clean and dry location and are not subject to any deleterious environmental influences. The present maintenance program requires that the circuit breakers be serviced at every refueling outage. At this time the mechanical features of the circuit breakers are inspected and adjusted as necessary to maintain the critical clearances determined by the manufacturer to be necessary for reliable operation. The circuit breaker and its compartment are cleaned and lubrication is applied as recommended by the manufacturer. The main contact resistance is verified to be acceptable by test. The circuit breakers are then installed in the metal clad enclosures.

Prior to returning the circuit breaker to service, an electrical functional test is performed which tests the electrical closing, electrical shunt trip and the undervoltage trip. In compliance with the Technical Specifications, the undervoltage trip of each circuit breaker has been tested on line at monthly intervals.

There have been no failures of the reactor trip circuit breakers to trip during tests or in actual operation. This history of excellent performance has been maintained for over 9 years for one unit and 6 years for the other. The present surveillance and maintenance program has been adequate, resulting in no failures.

The present maintenance schedule permits inspections and adjustments to the circuit breakers at intervals which are more frequent than necessary, considering the clean environment and light electrical service required of the circuit breakers. The testing at one month intervals has provided the necessary exercise to ensure freedom of motion of the circuit breakers and its

attachments when they are called on to operate to perform their safety function. Assuming a maximum test interval of one hour for each on-line surveillance test for each circuit breaker, the reactor protection system is dependent on one safety train for tripping for two hours every month. Increased on-line testing frequency will result in greater time dependency on one train for tripping without increasing the assurance that the reliability of the circuit breakers has been improved.

The Westinghouse Owner's Group is carrying out tests on these breakers. We expect to receive their results in February 1984. If there are any changes we feel we need to make as a result of the tests, we will communicate to you by March 30, 1984.