Entergy

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Robert G. Smith, P.E.
Site Vice President

January 31, 2011

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

SUBJECT: Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
Docket No. 50-293
License No. DPR-35

Entergy Response to NRC Request for Additional Information dated January 10, 2011, to support the review of Setpoint and Setpoint Tolerance Increases for Safety Relief Valves (SRV) and Spring Safety valves (SSV) (TAC No. ME3543)

REFERENCE:

1. Entergy Letter No. 2.10.016, Proposed License Amendment to Technical Specifications: Revised Technical Specification for Setpoint and Setpoint Tolerances Increases for Safety Valves (SRV) and Spring Safety Valves (SSV), and Related Changes, dated March 15, 2010.

2. NRC Letter, Request for Additional Information-Pilgrim Nuclear Power Station-To Support the Review of Setpoint and Setpoint Tolerance Increases for Safety Relief Valve and Spring Safety Relief Valve, (TAC No. ME3543), dated January 10, 2011

LETTER NUMBER: 2.11.007

Dear Sir or Madam,

This letter supports Entergy's application for the Proposed License Amendment submitted by Reference 1 and dockets Entergy's response to the NRC Request for Additional Information (RAI) forwarded to Entergy by letter dated January 10, 2011.

Enclosure 1 provides the Entergy response to the NRC RAI (Reference 2). Enclosure 1 contains Attachment 1, Pilgrim calculation No. IN1-110, Rev. 1, for ATWS Trip Level Setting and Attachment 2, Pilgrim Surveillance procedure, 8.M.1-29, Rev. 50, ATWS Trip Unit Calibration Test.

Enclosure 2 provides re-typed Pilgrim-specific Technical Specification and bases pages.

Enclosure 3 is Revision 2 of GEH Report, NEDC-33532P. This report was originally provided in Reference 1, and is currently revised to include revised information on the ATWS Trip Level Setting. The report contains proprietary information as defined in 10 CFR 2.390, "Public inspections, exceptions, request for withholding." General Electric Hitachi (GEH), as the owner of the proprietary information, has executed an Affidavit provided within the report, which identifies the information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. Accordingly, it is requested the proprietary information (Enclosure 3) be withheld from public disclosure in accordance with the

A001

provisions of 10 CFR 2.390 and 10 CFR 9.17, "Agency records exempt from public disclosure." A non-proprietary version of the report is provided as Enclosure 4.

The Rev.2 of GEH Report NEDC-33532P replaces all prior revisions of the report and does not change the scope of the Proposed License Amendment submitted by Reference 1; instead it provides information in response to NRC RAI (Reference 2).

Entergy's response to this RAI supports the proposed License Amendment for Setpoint and Setpoint Tolerance Increases for Safety Relief Valves (SRV) and Spring Safety Valves (SSV), and Related Changes and the No Significant Hazards Consideration determination submitted by Reference 1.

There are no commitments made in this submittal.

If you have any questions, please call Mr. Joseph Lynch, Pilgrim Licensing Manager at 508-830-8403.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 31 day of JANUARY, 2011

Sincerely,

Stephen J Bethay for RG Smith

Robert Smith
Site Vice President

Enclosure 1: Entergy Response to NRC Request for Additional Information, dated January 10, 2011 (235 pages)

Enclosure 2: Re-Typed Technical Specification and Bases Pages (14 Pages)

Enclosure 3: (Proprietary Version) GE Hitachi Nuclear Energy Report, NEDC-33532P, "Pilgrim Nuclear Power Station Safety Valve Setpoint Increase", Rev. 2, January 2011 (74 Pages)

Enclosure 4: (Non-Proprietary Version) GE Hitachi Nuclear Energy Report, NEDC-33532, "Pilgrim Nuclear Power Station Safety Valve Setpoint Increase", Rev. 2, January 2011 (71 Pages)

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ENCLOSURE 1

To Entergy Letter Number 2.11.007

ENTERGY RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION

DATED JANUARY 10, 2011

To Support the Review of Setpoint and Setpoint Tolerance Increases for safety Relief valve and Spring Relief Valve (TAC No. ME3543)

(Total 235 pages)

Includes the following:

- **Response to NRC RAI (3 pages)**
- **Attachment 1: Pilgrim Calculation No. IN1-110, Rev. 1 (80 pages) and**
- **Attachment 2: Pilgrim Calibration Procedure, 8.M.1-29, Rev. 50 (152 pages)**

ENCLOSURE 1

to Entergy Letter No. 2.11.007

ENTERGY RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) TO SUPPORT THE REVIEW OF SETPOINT AND SETPOINT TOLERANCE INCREASES FOR SAFETY RELIEF VALVES AND SPRING SAFETY VALVES, AND RELATED CHANGES (TAC No. ME3543)

Reference:

1. Entergy Letter No. 2.10.016, Proposed License Amendment to Technical Specifications: Revised Technical Specification for Setpoint and Setpoint Tolerances Increases for Safety Valves (SRV) and Spring Safety Valves (SSV), and Related Changes, dated March 15, 2010.

2. GE Hitachi Nuclear Energy Report, NEDC-33532P, "Pilgrim Nuclear Power Station Safety Valve Setpoint Increase," Rev. 2, January 2011 (see Enclosure 3)

NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) 1:

1. Definition of "Trip Level Setting" in TS Table 3.2-G:

   Clarify what the column tile , "Trip Level Setting," in TS Table 3.2-G, "Instrumentation that initiate Recirculation Pump Trip and Alternate Rod Insertion," represents compared to the setpoint terms listed in Figure 1 of Regulatory Guide (RG) 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3, dated December 3, 1999.

   Response:

   The term "Trip Level Setting" in TS Table 3.2-G represents the Allowable Value (AV). The proposed value of ≤1210 psig is the Allowable Value, which is also the notify Shift Manager value. It is the limiting value that the instrument setpoint may have when tested periodically, beyond which appropriate action will be required (See Response to RAI 3). The instrument setpoint is 1203.6 ± 1.9 psig and represents the process value at which the switch is expected to change state. The difference between the two values represents the allowable value to trip setpoint margin. The difference between the two values represents errors associated with the as-found tolerance and drift.

NRC RAI 2

2. Setpoint Calculation Methodology:

   Provide documentation of the methodology used for establishing the limiting trip setpoint or normal trip setpoint and limiting acceptable values for the as-found and as-left setpoints as measured during the periodic surveillance testing. Documentation should:

   - Include calculations.
   - Indicate Analytical Limits and/or other limiting design values.
   - Indicate the source of the parameters (Tolerances) used in calculating these three setpoint values and how they comply with RG 1.105 to ensure the 95/95 confidence level is achieved and these setpoints are adequate for the surveillance test interval specified in the plant surveillance requirements.

- As applicable, provide reference(s) to NRC approved documents related to this setpoint calculation.

RESPONSE TO RAI 2

Calculations and Analytical Limits

Attachment 1 to this Enclosure provides the calculation for ATWS RPT trip level setting, which provides analytical limits and design limiting values.

Source Parameters (Tolerances) for Setpoint Values

Entergy has applied the process delineated in RG 1.105 as a means to calculate the analytical limits and design limiting values.

ATWS RPT/ARI instrumentation is not LSSS instrumentation as defined by the NRC in the Standard Technical Specification, Rev. 3, page B3.3.4.2-1 and ATWS is not assumed in the safety analysis. ATWS instrumentation is not safety-related, it is classified as "Management-Q" in accordance with NRC guidance provided for the implementation of ATWS Rule, and for the purpose of setpoint calculation, it is treated in the same manner as safety-related instrumentation.

NRC Approved Documents Related to Setpoint Calculation

NRC approved Pilgrim License Amendment 151, dated April 6, 1994 (TAC Nos.M83787, M87191, and M88390) for the 24-month fuel cycle operation. Pilgrim applied for the License Amendment 151 in accordance with the guidance of NRC Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to accommodate a 24-month Fuel Cycle". As described in the application for the License Amendment 151, Pilgrim performed setpoint calculations and drift evaluations using the guidance provided in Regulatory Guide 1.105, Rev. 2, Regulatory Position C, which specified ISA-S67.04-1982, "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants" for ensuring that the instrument setpoints in safety-related systems are initially within and remain within the technical specification limits.

Pilgrim setpoint calculations and drift evaluations using the ISA-S67.04-1982 practice provides for a 95/95 tolerance limit as acceptable criteria for uncertainties and forms the licensing bases for the Pilgrim setpoint methodology.

The ATWS RPT/ARI setpoint calculation is documented in Pilgrim Calculation No. IN1-110, (Attachment 1) and follows the ISA-S67.04-1982 practice.

NRC RAI 3

3. Test Procedures:

   Describe the measures to be taken to ensure that the associated instrument channels are capable of performing specified functions in accordance with applicable design requirements and associated analysis, including:

   - Information on the controls employed to ensure that the as left trip setting after completion of periodic surveillance is consistent with the setpoint methodology.

   - Discussion on the plant corrective action process for restoring the channels to operable status.

RESPONSE TO RAI 3

The setpoint calculation is documented in Pilgrim Calculation No. IN1-110, Revision 1 dated January 11, 2011. Surveillance procedures are utilized to control the setpoints, record as-found values, record and control as-left values, and identify setpoint drift issues. Pilgrim staff follows procedure EN-DC-115, "Engineering Change" process to ensure that calculated setpoints are translated accurately from design documents and associated analysis into procedures. The station process includes the following elements.

1. Instrumentation and Control (I&C) Design personnel prepare the design documents including calculations to determine the setpoint that will ensure that the protective action occurs at the proper value.

2. The set point is implemented via an Engineering Change process, which complies with the applicable requirements of 10 CFR 50, Appendix A and B, and licensing basis requirements.

3. I&C Maintenance personnel translate the calculated calibration values into the calibration procedure, as part of the EC process. With respect to the ATWS/RPT Trip Setting Level value, Pilgrim has implemented a surveillance procedure, 8.M.1-29, "ATWS Trip Unit Calibration Test" (Attachment 2). The procedure reflects the Technical Specification Value included in TS Table 3.2.G/4.2.G, and includes the following:

   - Acceptance Criteria, based on controlled engineering documents
   - Corrective Action
   - Acceptance Verification
   - I&C Procedure Feedback Form

4. Procedure 8.M.1-29 requires that a condition report be written in accordance with Entergy procedure, EN-LI-102, "Corrective Action Process", if the technician finds an as-found value is outside the no adjust limits. The corrective action process includes operability review, reportability review, engineering evaluation, and corrective actions to restore the equipment to operable status. Condition reports are assigned to Engineers for evaluation of performance issues discovered during periodic surveillances including repetitive findings of excessive drift.

Pilgrim EN-LI-102, "Corrective Action Process" complies with the requirements of 10 CFR 50, Appendix B. The EN-LI-102 process addresses equipment and instrument operability, restoring operability, interim acceptance of degraded conditions, and compensatory measures.

Upon receipt of the approved SRV and SSV License Amendment, Pilgrim procedure 8.M.1-29 will be revised to include revised Technical Specification values and applicable attributes for the ATWS/RPT setpoint calculations and control program.

Attachment 1 to ENCLOSURE 1

To Entergy Letter No. 2.11.007

Pilgrim Calculation No. IN1-110, Rev. 1, "Setpoint Calc for PIS263-123A, B, C, and D-Reactor High Pressure ATWS"

(80 pages)

☐ ANO-1 ☐ ANO-2 ☐ GGNS ☐ IP-2 ☐ IP-3 ☐ PLP

☐ JAF ☒ PNPS ☐ RBS ☐ VY ☐ W3

☐ NP-GGNS-3 ☐ NP-RBS-3

CALCULATION COVER PAGE	(1) **EC # 5000071989**	(2) **Page 1 of 40**

(3) Design Basis Calc. ☐ YES ☒ NO	(4) ☐ CALCULATION ☒ EC Markup
(5) **Calculation No: IN1-110**	(6) **Revision: 1**
(7) **Title: Setpoint Calc for PIS263-123A,B,C, and D – Reactor High Pressure ATWS**	(8) **Editorial** ☐ YES ☒ NO
(9) **System(s): 45B2**	(10) **Review Org (Department): ICED**

(11) **Safety Class:**	(12) **Component/Equipment/Structure Type/Number:**	
☒ **Safety / Quality Related**	PIS263-123A	
☐ **Augmented Quality Program**	PIS263-123B	
☐ **Non-Safety Related**	PIS263-123C	
	PIS263-123D	
	PT263-122A	
	PT263-122B	
(13) **Document Type: B4.01**	PT263-122C	
	PT263-122D	
(14) **Keywords (Description/Topical Codes):**		

REVIEWS

(15) Name/Signature/Date	(16) Name/Signature/Date	(17) Name/Signature/Date
1/10/11	1/10/11	N. Eisenmann Per E-MAIL
Responsible Engineer Bruce Rancourt	☒ **Design Verifier** **George Perry**	**Supervisor/Approval** 1/11/11 N. Eisenmann
	☐ **Reviewer**	
	☒ Comments Attached	☒ Comments Attached

ATTACHMENT 9.4 RECORD OF REVISION

Sheet 1 of 1

Revision	Record of Revision
0	Initial issue.
1	The entire calculation has been typed in electronic format. The Analytical limit has been changed from 1205 psig to 1220 psig as a result of replacing the SRVs per EC5000071989. The setpoint and Allowable value has been revised. Incorporate DRN-06-00655

TABLE OF CONTENTS

I. PURPOSE / BACKGROUND

A. PURPOSE:

The purpose of this calculation is to determine the setpoint and allowable value (Tech Spec value) for Reactor High Pressure ATWS switches PIS263-123A, B, C, and D.

EC5000071989 is replacing the four Safety Relief Valves (SRVs) and two Spring Safety Valves (SSVs). The setpoints associated with the four SRVs, SV-203-3A, B, C, & D and two SSvs SV-203-4A and B will be increased by 40 psig. The increase in SRV setpoints results in increased maximum reactor vessel pressure during transients. ATWS ARI and Recirculation Pump High Pressure Trip setpoint is increased by 40 psi, consistent with the increase in setpoints of the SRVs and SSVs, and will provide the same level of protection to avoid tripping both recirculation pumps during transients that include a successful reactor scram.

B. BACKGROUND

The Reactor High Pressure ATWS switches PIS263-123A, B, C, & D initiate recirculation pump trip (RPT) and alternate rod insertion (ARI) when the Reactor pressure exceeds the switch setpoint. They provide a back-up method for controlling reactivity in the unlikely event that the Reactor fails to scram when required (FSAR Section 3.9.1).

II. DESIGN INPUTS / ASSUMPTIONS

- See Detailed Calculation Section IV for design inputs.
- This calculation is performed based on the methodology described in PNPS NEDWI No. 433, (Reference 4). The calculation has been prepared in accordance with U.S. Nuclear Regulatory Commission Regulatory Guide No. 1.105, (Reference 53) and Instrument Society of America Standard ISA-S67.04 Part I – 1982, (Reference 54).
- Pressure Transmitters PT263-122A, B, C, & D are calibrated using maximum no adjust limits of ± 0.04mA (± 025% of span) over a range of 4 - 20 mA (Reference 15). All measuring and test equipment will be assumed to have a combined accuracy of ± 0.25% or better (Reference 30).
- Master Trip Units are calibrated using maximum no adjust limits of ± 0.02mA (± 0.13% of span) over a range of 4-20 mA (Reference 9). All measuring and test equipment will be assumed to have a combined accuracy of ± 0.13% or better (Reference 30).
- The As-Found Tolerance (AFT) and As-Left Tolerance (ALT) is the tolerance allowed in the accuracy between calibrations of a device. The as found tolerance establishes the limit of error the device can have and still be considered functional. It is the band that

the device must be calibrated to within and remain to avoid recalibration when periodically tested. It is typically a value that is based on the accuracy of the device. The No Adjust Limits are used to determine if the technicians need to adjust the instrument.

- Calibration of Pressure Transmitters will be assumed to be conducted at a nominal frequency of every 24 months or better. However, a frequency of 30 months is used herein to be consistent with the Tech Spec (Reference 27) definition of surveillance frequency (U), which allows a maximum extension of 25% of the specified surveillance interval.

- Calibration of master trip units will be assumed to be conducted at a frequency of 3 months or better. However, a frequency of 4 months is used herein to be consistent with the Tech Spec (Reference 27) definition of surveillance frequency (U), which allows a maximum extension of 25% of the specified surveillance interval.

- This calculation will convert error effects to PSIG for calculating total loop uncertainty (TLU).

- Reactor and Turbine building normal temperatures are taken from FSAR Tables 10.9.1 & 10.9.2 (Reference 8), because the FSAR is the most recent controlled document reference source found with this information. The temperatures are assumed to be correct because they are the same as the temperatures identified in the Bechtel Design Basis Report 6498-HDBR-05 (Reference 41).

- The readability value used for channel crosscheck of the GE master trip unit is assumed based on the readability of the Rosemount master trip unit it replaced. This assumption is justified because the replacement was made for ATWS diversity reasons and the existing loop calibration range has been maintained.

- The determination for dynamic effects such as response time limits is addressed in the accident analysis and is not included within the scope of this calculation.

III. REFERENCES

1. Vendor Manual V-0098, Rev. 36 (Rosemount Instruction Manual 4260/4261 May 1987), "Rosemount Alphaline Model 1151AP Absolute and Model 1151GP Gage Pressure Transmitter"

2. Vendor Manual V-0242, Rev. 12, "ATWS Analog Trip System Instruments" (GEK-83408C, Operation and Maintenance instructions, Analog Trip Unit 184C5988G100-G799)

3. PNPS Nedorandum FS&MC 91-176, October 11, 1991 "Reactor Vessel Thermal Growth Effect on Reactor Instrumentation"

4. PNPS BECo Work Instruction Number NEDWI No. 394, Rev. 3

5. PNPS Dwg. M1P612, Rev. E2, "ATWS Instrument Rack 2275 and 2276"

6. Crane Technical Paper No. 410, "Flow of Fluids through Valves, Fittings, & Pipe"

7. PNPS Procedure 2.2.80, Rev. 45, "Reactor Vessel Level, Temperature and Internal Instrumentation"

8. PNPS, FSAR, Rev. 24

9. PNPS Procedure 8.M.1-29, Rev. 50, "ATWS Trip Unit Calibration Test (High Risk)"

10. PNPS NED No. 85-237, March 8, 1985, "Cable Spreading Room Environment"

11. PNPS Drawing M1001:

    a). Sh. 128, Rev. E1, "Nuclear Boiler System Reference Leg from Nozzle NI5A to Penetration X28C & X82A"

    b). Sh. 129, Rev. E1, "Nuclear Boiler System Reference Leg from Nozzle NI5B to Penetration X-29C & X-82B"

    c). Sh. 61A, Rev. E1, "Nuclear Boiler System Instrument Line from Reactor Vessel Nozzle N-16A to Penetration X-28B"

    d). Sh. 65, Rev. E1, "Nuclear Boiler System Instrument Line from Reactor Vessel Nozzle N-16B to Pen X-298"

12. PNPS Drawing M1002:

    a). Sh. 124, Rev. E0, "Nuclear Boiler System Reference Leg to instrument Racks 2205, 2275, 2251"

    b). Sh. 125, Rev. E0, "Nuclear Boiler System Reference Leg to Instrument Racks 2206, 2276, & X82B"

    c). Sh. 15, Rev. E2, "Nuclear Boiler System Vessel Instrumentation from Penetration X-29B to Racks 2206 & 2276"

    d). Sh. 21, Rev. E2, "Nuclear Boiler System Piping from X-28B to C2205 and C2275"

13. PNPS P&ID M253Sh2, Rev. 29, "Nuclear Boiler Vessel Instrumentation"

14. BEC0 Elementary Diagrams (ATWS System):

    a). M1Y2, Rev. E3
    b). M1Y6, Rev. E6
    c). M1Y7, Rev. E6
    d). M1Y4,Rev.E2
    e). M1Y5, Rev. E2

15. PNPS Procedure 8.M.1-30, Rev. 56, "ATWS System Calibration Test (High Risk)"

16. ENN-MS-S-009-PNP, Revision 1, "Pilgrim safety Classification site Specific Guidance and System Safety Function Sheets"

17. PNPS Dwg. M-187, Rev. 9, "Instrument Location Reactor Building Plan - El. 51'-O"

18. ~~PNPS Dwg. M1PA16, Rev. 7, "Selected Item Power Supply"~~

19. ~~PNPS Dwg. M1PA20, Rev. El, "Inverter ATWS System Panels C2277 & C2278"~~ (Void per PDC93-26)

20. PNPS Dwg. C-151, Rev. 8, "Reactor Building Containment Vessel - Requirements Drywell Plans & Sections"

21. PNPS Electronic Analog Data Sheets: (See IAS Equipment Data Base)

    ~~a. M1PA1-8, Sh. 144, Rev. E2~~
    ~~b. M1PA1-8DS162-1, Rev. El~~
    ~~c. M1PA1-8DS162-2, Rev. El~~

22. PNPS P&ID M253SH1, Rev. E43, "Nuclear Boiler Vessel Instrumentation"

23. ~~ABB Impell Project Instruction, 25-226-PI-001, Rev. 2 "Data collection and Analysis~~

24. PNPS NED Procedure 3-05. Rev. 16, "Design Calculations"

25. PNPS Nedorandum FS&MC 91-176, October 11, 1991 "Reactor Vessel Thermal Growth on Reactor instrumentation"

26. Rosemount Letter from T. Layer to B. Rancourt, August 8, 1989 Rosemount Nuclear Specifications"

27. PNPS Technical Specifications Rev. 287

28. ~~ABB Impell Quality Assurance Manual Procedure QP-3.4, Rev. 6, "Calculations"~~

29. NRC Generic Letter (GL) 91-04, April 2, 1991 "Changes in Technical Specification Surveillance Intervals to Accommodate a 24 month Fuel Cycle

30. PNPS Procedure 1.3.36, Rev 21, "Measuring and Test Equipment"

31. ~~ABB Impell Project Instruction, 25-226-PI-002, Rev. 1, "Setpoint Calculations"~~

32. GE NEDO-21617-A, December, 1978, Licensing Topical Report "Analog Transmitter/Trip Unit System for Engineered Safeguards Sensor Trip Units"

33. PNPS Dwg. M292, Rev. 31, "Control & Cable Spreading Room, Intake Structure, Access Control, Warehouse & Machine Shop Air Flow Diagrams"

34. Safety Evaluation SE2279, Rev. 0, "Modification of Control Room High Efficiency Air Filtration System Heater Controls (CRH EAFSY

35. PNPS Equipment Qualification Master List (EQML), Rev. 51

36. PDC 91-047,Rev. 0, Modification to ATWS System"

37. ~~PNPS Calc. IN1-42, Rev 0, "ATWS Reactor Dome Pressure High and High-High Setpoints"~~ (Replaced by this calc, IN1-110).

38. PNPS Calc. IN1-28, Rev, 2, Reactor Vessel Reference Leg Static Pressure

39. ASME Steam Tables, 5th Edition

40. PNPS Calc. No. IN1-24, Rev. 0, Reactor Water Level Instrument Calibration

41. Bechtel Report 6498-HDBR-05, Rev, 1, "Design Basis Report Control Room, Cable Spreading and Computer Room Air Conditioning System", Enclosure in Bechtel Letter 17322-GBLE-91/002, Dated 6/28/91, S. Veale (Bechtel) to R. Fairbank (PNPS).

42. PNPS Procedure No. 2.1.15, Rev. 204, "Daily Surveillance Log (Tech Specs and Regulatory Agencies)"

43. ARP-C905L, Rev. 35, "Alarm Response Procedure

44. 10CFR50.62, Anticipated Transients Without Scram"

45. PNPS S&SA Memo 93-42, 5/18/93, "ATWS Low-Low Reactor Water Level & High Pressure Instrumentation"

46. NEDC-33532P, Revision 2, GEH "Pilgrim Nuclear Power Station Safety Valve Setpoint Increase"

47. EN-DC-126, Revision 3 – "Engineering Calculation Process"

48. ENN-IC-G-001, Revision 0 – Instrument Uncertainty and Setpoint Calculation Guide"

49. ENN-IC-G-003, Revision 0 – Instrument Loop Accuracy and Setpoint Calculation Methodology"

50. S&SA200, PNPS Reload Analysis Inputs Basis (OPL-3), Rev. 0

51. TDP-0087, Technical Design Procedure, OPL-3 Design Guide, Rev. 4, Appendix 110 Parameter Sensitivities.

52. E536, Revision 12, "Environmental Parameters for use in the Environmental Qualification of Electrical Equipment (per 10CFR50.49)

53. U.S. NRC Regulatory Guide 1.105, Revision 2; Instrument Setpoints for Safety Related Systems.

54. ISA Standard ISA-67.04-1982; Setpoints for Nuclear Safety Related Instrumentation.

IV. DETAILED CALCULATION

A. METHODOLOGY

This calculation is performed per PNPS NEDWI No. 394, (Reference 4), and NRC GL 91-04 (Reference 29). The format of this calculation has been specifically modified to meet the content requirements identified in PNPS NED Procedure 3.05 (Reference 24).

PNPS setpoint calculations and drift evaluations are performed using ISA-S67.04-1982 practice and utilize 95/95 tolerance limits as acceptable criteria for uncertainties, as discussed in the application for License Amendment 151. This methodology using ISA-S67.04-1982 and RG 1.105, revision 2 was the basis for License Amendment 151, and forms the licensing basis for Pilgrim setpoint methodology. The NRC approved Pilgrim License Amendment 151, dated April 6, 1994 (TAC numbers M83787, M87191, and M88390 for the 24 month fuel cycle operation. Pilgrim applied for License Amendment 151 in accordance with the guidance of NRC Generic Letter 91-04. "Changes in Technical Specification Surveillance Intervals to Accommodate a 24 month Fuel Cycle".

As described in the application for License Amendment 151, Pilgrim performed setpoint calculations and drift evaluations using the guidance provided in Regulatory Guide 1.105, Revision 2.

This calculation utilizes ≤1220 psig for high pressure ATWS upper analytical limit provided by GE in NEDC-33532P. The goal of this calculation is to maintain the existing high pressure ATWS setpoint, while accounting for loop measurement uncertainty.

The manufacturer's drift specification is used for transmitters PT263-122A, B, C, D and master trip units PIS263-123A, B, C, D because there are not enough data points for a valid statistical analysis at this time.

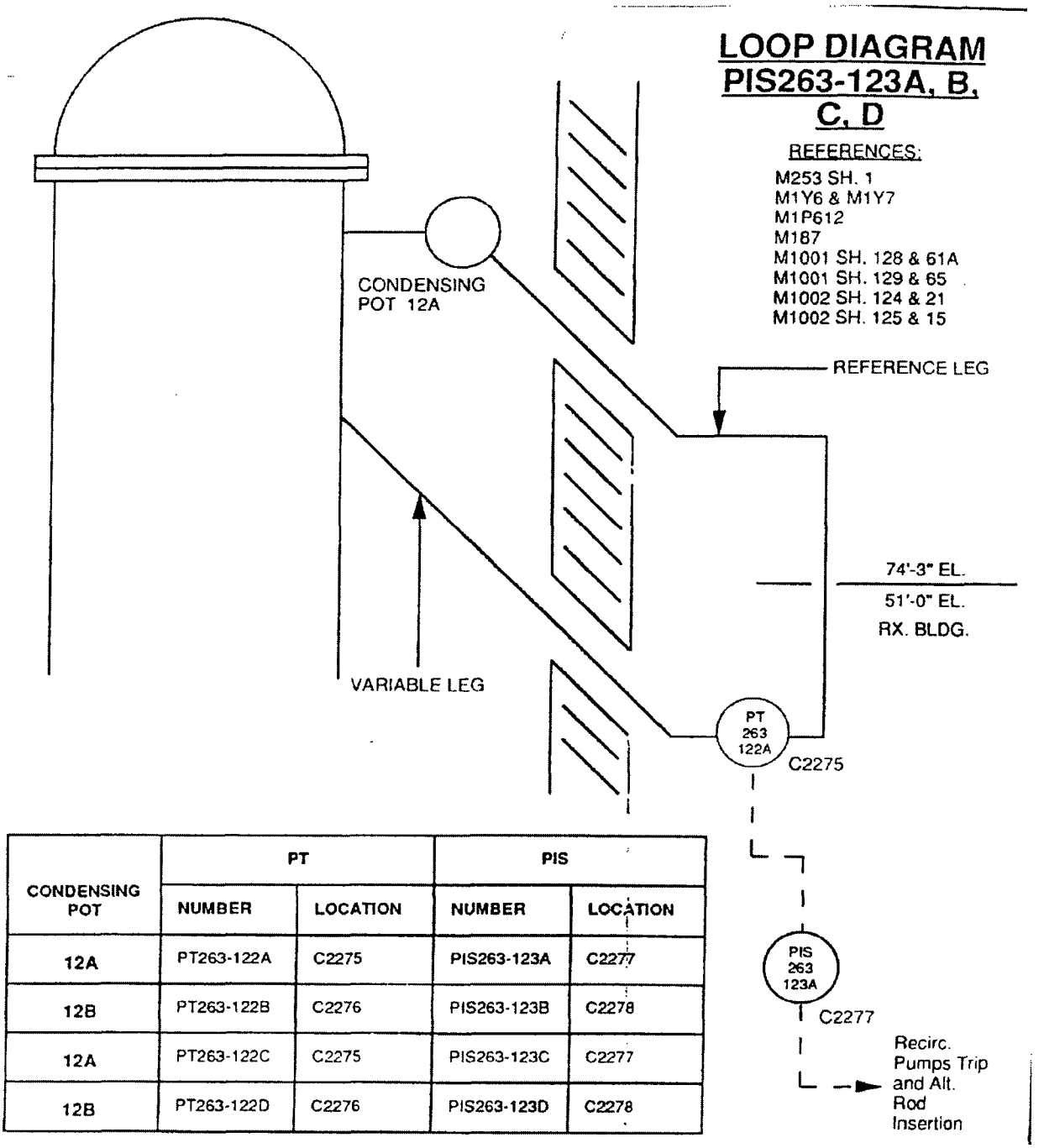
This calculation covers four redundant loops. Where individual loop values differ, the values are compared and the worst case value is used for conservatism. If a loop is required to function during one or more accident scenarios, then the uncertainty effects due to each accident are calculated and compared and the single worst accident scenario is used in calculating total loop uncertainty. The individual switch safety function determines if the loop must function during an accident scenario. This loop is not required to function during an accident scenario. Note 17 provides a tabulation of the error terms for normal operation.

Pma is calculated for normal operation. This equipment is not required to function during accident scenarios (Reference 45). The normal operation Pma is due to temperature variations inside the drywell and Reactor building which affect the density of the reference leg column of water as well as static offset due to the difference between the actual condensate pot elevation and that used in scaling calculation IN1-28 (Reference 38). Maximum and minimum Reactor building temperatures during normal operation were obtained from Reference 8. Maximum and minimum Drywell temperatures (Reference 52).

All errors identified in this calculation are individually evaluated to determine whether they are random or biases. In the context of instrument uncertainty, it is accepted within the industry that random uncertainties are those uncertainties that a manufacturer specifies as having a ± magnitude. Random uncertainties are combined using the root sum of the squares (RSS) technique in accordance with NEDWI 394. Biases are expressed with either a + or - sign and are added together separately according to sign. Individual component error terms which contain both a bias and a random value (for example, -0.95 ± 0.5 psig) may be split up so that the random part (±0.5) is combined with other component error terms by the RSS method and the biases (-0.95) added to other component bias terms of the same sign. Both random and bias terms are added together to determine Total Loop Uncertainty (TLU). A random or bias term can also be further classified as being dependent or independent. Two error terms are classified as dependent if they posses a significant correlation, for whatever cause, known or unknown. Instrument proximity or physical connections alone do not cause dependency,

because the sign of the error term is determined solely by that instrument's measured response to the stimulus (temperature, pressure, etc.). Dependent errors are summed algebraically to form independent errors.

B. LOOP DIAGRAM



CONDENSING POT	PT		PIS	
	NUMBER	LOCATION	NUMBER	LOCATION
12A	PT263-122A	C2275	PIS263-123A	C2277
12B	PT263-122B	C2276	PIS263-123B	C2278
12A	PT263-122C	C2275	PIS263-123C	C2277
12B	PT263-122D	C2276	PIS263-123D	C2278

C. CALCULATION

FORM 1	INSTRUMENT DATA	A) PT263-122A, B, C, & D	B) PIS263-123A, B, C, & D	
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
GENERAL INFORMATION	INSTRUMENT NUMBER	A) PT263-122A,B,C,D B) PIS263-123A,B,C,D	M253SH1	The A) and B) used on this form are meant to distinguish between the transmitter and Master Trip Unit.
	SERVICE DESCRIPTION	Reactor High Pressure ATWS	M253SH1	N/A
	QUALITY CATEGORY	A) Q B) MQCI	PNPS Q-List	Locations: A) C2275 & C2276 B) C2277 & C2278
	ENVIROMENTAL QUALIFICATION	N/A	EQML	N/A
	SAFETY FUNCTION (IF APPLICABLE)	N/A	N/A	See Note 1.
	TECHNICAL SPECIFICATION (IF APPLICABLE)	≤ 1210 psig	Tech Spec Table 3.2.G	
	MANUFACTURER	A) Rosemount B) GE	A) M1PA1-8SH144 B) M1PA1-8DS162-1&2	Old Data sheets See IAS for info
	MODEL NUMBER	A) 1151GP9E22T0003BP B) 184C5988G112	A) M1PA1-8SH144 B) M1PA1-8DS162-1&2	Old Data sheets See IAS for info

FORM 1	INSTRUMENT DATA	A) PT263-122A, B, C, & D	B) PIS263-123A, B, C, & D	
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
INSTRUMENT SETPOINT DATA	ANALYTICAL LIMIT (AL)	1220 psig	Note 3	N/A
	ALLOWABLE VALUE (AV)	≤ 1210 psig	This calculation, Form 3	N/A
	SETPOINT TRIP	1203.57 psig increasing	This calculation, Form 3	N/A
	SETPOINT RESET	1173.57 psig decreasing	See note 15	
	NORMAL OPERATION UPPER LIMIT (NUL)	1045 psig	See Note 2	
	NORMAL OPERATION LOWER LIMIT (NLL)	N/A	N/A	N/A
	PROCESS CALIBRATED RANGE	A) 15 to 1515 psig B) 0 to 1500 psig	A) 8.M.1-30 B) 8.M.1-29	N/A
	OPERATING MARGIN (OM)	158.6 psig	This calculation, Form 3	N/A
	NOTE: Adequate Operating Margin is required between the setpoint and the Normal Operating Upper or Lower Limit, as applicable, to avoid inadvertent trips due to process noise, transients and measurement uncertainties.			

FORM 1	INSTRUMENT DATA	A) PT263-122A, B, C, & D	B) PIS263-123A, B, C, & D	
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
INSTRUMENT SETPOINT DATA (CONT.)	ADJUSTABLE RANGE	0 to 500 psig LRL 0 to 3000 psig URL	Vendor Manual V-0098	LRL = lower range limit URL = Upper range limit
	INPUT SIGNAL FROM	PT263-122A, B, C, & D	M1Y6, M1Y7 M253SH1	N/A
	INPUT SIGNAL CALIBRATED RANGE	4 to 20 ma dc	M1PA1-8SH144	Span = 16 ma
	OUTPUT SIGNAL TO	Relays K2A,B,C & D Relays K5A,B,C,& D	M1Y6 M1Y7	N/A
	OUTPUT SIGNAL CALIBRATION RANGE	Contact Position Change	M1Y6 M1Y7	N/A
	SETPOINT CALIBRATION FREQUENCY (NOMINAL)	A) 24 MONTHS B) 3 MONTHS	A) 8.M.1-30 B) 8.M.1-29	This calculation Design Inputs and assumptions

FORM 1	INSTRUMENT DATA	A) PT263-122A, B, C, & D	B) PIS263-123A, B, C, & D	
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
ENVIRONMENTAL ALLOWANCE (EA) FORM 3 STEP 1	TEMPERATURE EFFECT (Te)	N/A	N/A	Te included in Ste
	RADIATION EFFECT (Re)	N/A	N/A	See Note 1 See 10CFR50.62
	STEAM / CHEMICAL SPRAY EFFECT (S/Ce)	N/A	M253SH1	Only applicable to components located in the Drywell
	PRESSURIZATION (EXTERNAL EFFECT) (Pe)	N/A	EQML	N/A
	SEISMIC EFFECT (Se)	N/A	EQML	See 10CFR50.62
CIRCUIT LEAKAGE ALLOWANCE (LA) FORM 3 STEP 2	CABLE LEAKAGE (Cl)	N/A	N/A	N/A
	TERMINAL BLOCK LEAKAGE (Tl)	N/A	M1Y6, M1Y7	Loop does not have terminal blocks located in harsh environments
	PENETRATION LEAKAGE (Pl)	N/A	M1Y6, M1Y7	No drywell penetrations

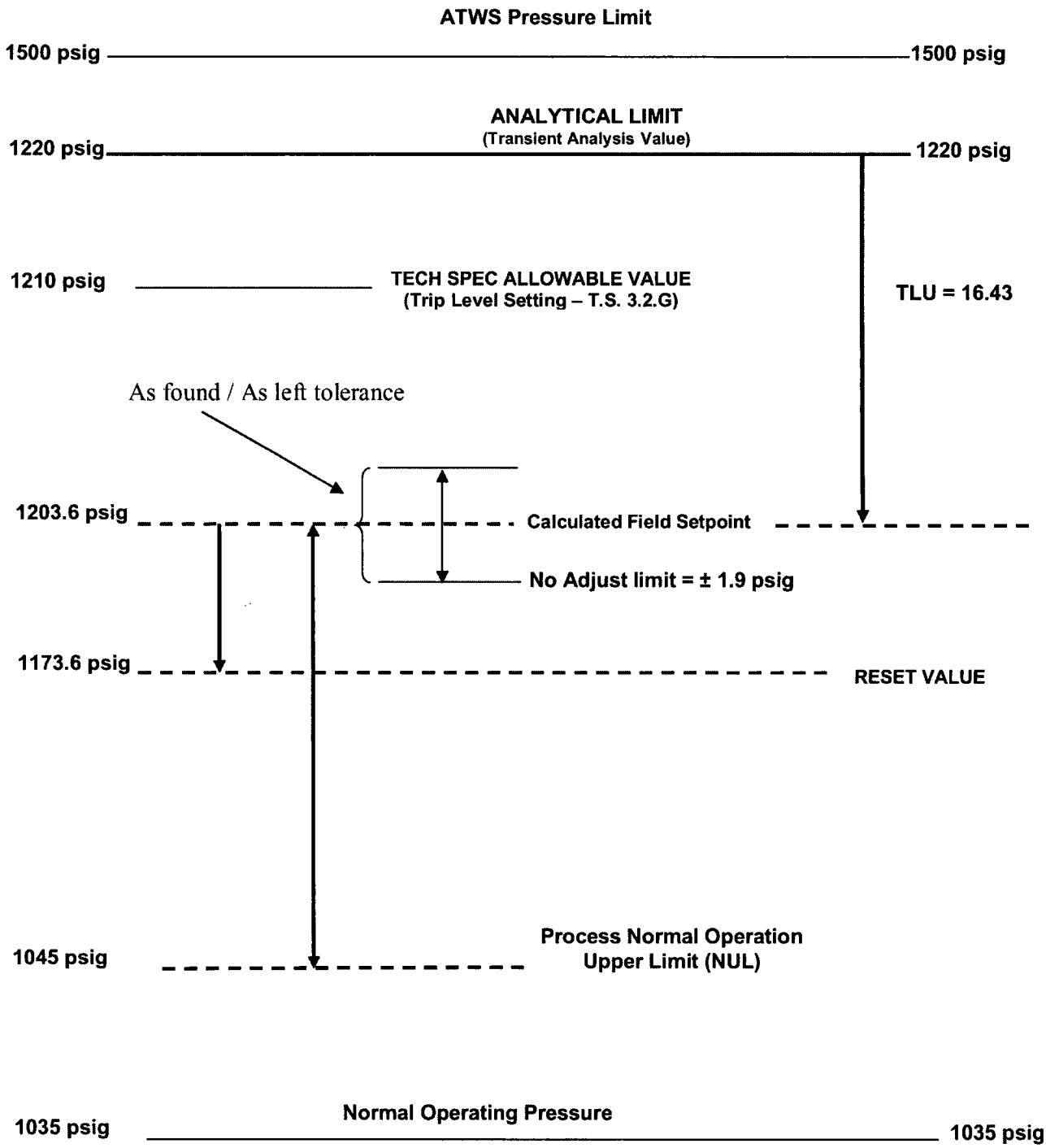
FORM 1	INSTRUMENT DATA	A) PT263-122A, B, C, & D	B) PIS263-123A, B, C, & D	
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
CIRCUIT LEAKAGE ALLOWANCE (LA) (CONTINUED)	SPLICE LEAKAGE (SI)	N/A	N/A	See Note 1
	SEALING DEVICE LEAKAGE (DI)	N/A	N/A	See Note 1
PROCESS ALLOWANCE (PA) FORM 3 STEP 3	PROCESS MEASUREMENT ACCURACY (Pma)	0 PSIG	N/A	See Notes 1 and 7
	PRIMARY ELEMENT ACCURACY (Pea)	N/A	N/A	No Primary Element
CALIBRATION ALLOWANCE (CA) FORM 3 STEP 4	SENSOR CALIBRATION ACCURACY (Sca)	± 0.25% Span = ±0.25% (1500 psig) ± 3.75 psig	V-0098 PNPS Procedure 1.3.36	Sca = Sa
	RACK EQUIPMENT CALIBRATION ACCURACY (Rca)	= ± 0.13% FS = ± 0.13%(1500 psig) = ± 1.95 psig	Attachment 1 PNPS Procedure 1.3.36	Rca = Rea

FORM 1	INSTRUMENT DATA A) PT263-122A, B, C, & D B) PIS263-123A, B, C, & D			
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
RACK EQUIPMENT ALLOWANCE (RA) FORM 3 STEP 5	RACK EQUIPMENT ACCURACY (Rea)	= ± 0.13% Full Scale = ±0.0013 (1500 psig) = ±1.95 psig	Attachment 1	Assume random and independent
	RACK TEMPERATURE EFFECTS (Rte)	± 4.66 psig	Attachment 3	See Note 9 Master Trip Unit only
	RACK POWER SUPPLY EFFECTS (Rps)	N/A	Attachments 1 and 2	See Note 8
	RACK EQUIPMENT MISCELLANEOUS EFFECTS (Rme)	N/A	N/A	N/A

FORM 1	INSTRUMENT DATA	A) PT263-122A, B, C, & D B) PIS263-123A, B, C, & D		
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
SENSOR ALLOWANCE (SA) FORM 3 STEP 6	SENSOR BASIC ACCURACY (Sa)	= ± 0.25% Span = ± 0.0025 (1500 psig) = ± 3.75 psig	V-0098	N/A
	SENSOR STATIC PRESSURE SPAN SHIFT (Ssps)	N/A	N/A	Not a Differential Pressure Transmitter
	SENSOR STATIC PRESSURE ZERO SHIFT (Sspz)	N/A	N/A	Not a Differential Pressure Transmitter
	SENSOR TEMPERATURE EFFECTS (Ste)	± 10.13 psig	Vendor Manual V-0098 FSAR Tables 10.9.1 and 10.9.2	See Note 10
	SENSOR POWER SUPPLY EFFECTS (Spse)	± 0.375 psig	Vendor Manual V-0098	See Note 11
	SENSOR MISCELLANEOUS EFFECTS (Sme)	N/A	N/A	N/A

FORM 1	INSTRUMENT DATA	A) PT263-122A, B, C, & D B) PIS263-123A, B, C, & D		
TITLE		DESCRIPTION / VALUE	REFERENCE	REMARKS
DRIFT ALLOWANCE (DA) FORM 3 STEP 7	SENSOR DRIFT (Sd)	± 7.5 psig	Attachment 6 Vendor Manual V-0098	See Note 12
	RACK EQUPMENT DRIFT (Red)	= ± 0.10% Full Scale for 1 month =± 0.0010 (1500) psig)(4) =± 6.00 psig for 4 months	Attachment 2	Assume random and independent
TOLERANCE ALLOWANCE (TA) FORM 3 STEP 8	SENSOR TOLERANCE (St)	±0.04 ma/16ma = ±0.0025 ±(0.0025)(1500 psig) =± 3.75 psig NOTE: ±(0.0025)16ma=±0.04 ma	PNPS Procedure 8.M.1-30	PNPS NO ADJUST limits not to exceed this value
	RACK EQUIPMENT TOLERANCE (Ret)	±0.02ma/16ma= ±0.0013 (±0.0013)1500 psig =±1.88 psig NOTE: ±(0.0013)16ma=±0.02 ma	PNPS Procedure 8.M.1-29	PNPS NO ADJUST limits not to exceed this value

Calculated Limits and Setpoint Relationship (Figure 2)



FORM 3: CALCULATION SHEET

1. Environmental Allowance (EA)

EA= $\pm\sqrt{(Te)^2 + (Re)^2 + (S/Ce)^2 + (Pe)^2 + (Se)^2}$

EA= $\pm\sqrt{(N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2}$ **N/A**

2. Circuit Leakage Allowance (LA)

LA= CI + TI + PI + SI + DI

LA= N/A **N/A**

3. Process Allowance (PA)

PA= $\pm\sqrt{(Pma)^2 + (Pea)^2 + (Pte)^2}$

PA= $\pm\sqrt{(0)^2 + (N/A)^2 + (N/A)^2}$ **0 psig**

4. Calibration Allowance (CA)

CA= $\pm\sqrt{(Sca)^2 + (Rca)^2}$

CA= $\pm\sqrt{(3.75)^2 + (1.95)^2}$ **± 4.23 psig**

5. Rack Equipment Allowance (RA)

RA= $\pm\sqrt{(Rea)^2 + (Rte)^2 + (Rps)^2 + (Rme)^2}$

RA= $\pm\sqrt{(1.95)^2 + (4.66)^2 + (N/A)^2 + (N/A)^2}$ **± 5.05 psig**

FORM 3: CALCULATION SHEET

6. Sensor Allowance (SA)

$$SA = \pm\sqrt{(Sa)^2 + (Ssps + Sspz)^2 + (Ste)^2 + (Spse)^2 + (Sme)^2}$$

$$SA = \pm\sqrt{(3.75)^2 + (N/A + N/A)^2 + (10.13)^2 + (0.375)^2 + (N/A)^2}$$ **± 10.81 psig**

7. Drift Allowance (DA)

$$DA = \pm\sqrt{(Sd)^2 + (Red)^2}$$

$$DA = \pm\sqrt{(7.5)^2 + (6.00)^2}$$ **± 9.60 psig**

8. Tolerance Allowance (TA)

$$TA = \pm\sqrt{(St)^2 + (Ret)^2}$$

$$TA = \pm\sqrt{(3.75)^2 + (1.88)^2}$$ **± 4.19 psig**

9. Total Loop Uncertainty Allowance (TLU)

$$TLU = LA \pm\sqrt{(EA)^2 + (PA)^2 + (CA)^2 + (RA)^2 + (SA)^2 + (DA)^2 + (TA)^2}$$

$$TLU = N/A \pm\sqrt{(N/A)^2 + (0)^2 + (4.23)^2 + (5.05)^2 + (10.81)^2 + (9.60)^2 + (4.19)^2}$$

TLU = ± 16.43 psig

10. TRIP SETPOINT (Tsp) in Process Units - FOR INCREASING SETPOINT

Tsp = AL – TLU
Tsp = 1220 – 16.43 = 1203.57 psig

11. ALLOWABLE VALUE (AV) in Process Units for increasing setpoint

$AV = TSp + \sqrt{(\mathrm{Re}\,t)^2 + (\mathrm{Re}\,d)^2}$ since this is the only portion of the loop being tested

$AV = 1203.57 + \sqrt{(1.88)^2 + (6.00)^2}$

AV = 1203.57 + 6.29
AV = 1209.86 psig

12. OPEREATING MARGIN (OM) for increasing setpoint

OM = TSp – NUL
OM = 1203.57 – 1045 = 158.57 psig

13. TRIP SETPOINT (TSp) IN PROCESS UNITS for increasing setpoint

TSs = TSp modified by the factors accounting for conversion from process units to signal units.

TSp = 1203. 57 psig

TSs = [(1203.57 / 1500) * 16] + 4 ma

TSs = 16.84 madc

PARAMETER	DESCRIPTION	ABBREVIATION/VALUE *	COMMENTS
	ATWS Pressure Limit	**1500 psig**	
ANALYTICAL LIMIT		**AL =1220 psig**	
Environmental Allowance (EA)	TEMPERATURE EFFECT RADIATION EFFECT STEAM/CHEM SPRAY EFFECT PRESSURIZATION (EXT.) EFFECT SEISMIC EFFECT	Te = N/A Re = N/A S/Ce = N/A Pe = N/A Se = N/A	
TOTAL LOOP UNCERTAINTY Circuit Leakage Allowance (LA)	CABLE LEAKAGE TERMINAL BLOCK LEAKAGE PENETRATION LEAKAGE SPLICE LEAKAGE SEALING DEVICE LEAKAGE	Cl = N/A Tl = N/A Pl = N/A Sl = N/A Dl = N/A	
Process Allowance (PA)	PROCESS MEASUREMENT ACCURACY PRIMARY ELEMENT ACCURACY	Pma = 0 psig Pea = N/A	
Calibration Allowance (CA)	SENSOR CALIBRATION ACCURACY RACK EQUIPMENT CALIBRATION ACCURACY	Sca = ± 3.75 psig Rca = ± 1.95 psig	
Rack Equipment Allowance (RA)	RACK EQUIPMENT ACCURACY RACK TEMPERATURE EFFECT RACK POWER SUPPLY EFFECT RACK EQUIPMENT MISCELLANEOUS EFFECT	Rea = ± 1.95 psig Rte = ± 4.66 psig Rps = N/A Rme = N/A	
Sensor Allowance (SA)	SENSOR BASIC ACCURACY SENSOR STATIC PRESSURE SPAN SHIFT SENSOR STATIC PRESSURE ZERO SHIFT SENSOR TEMPERATURE EFFECTS SENSOR POWER SUPPLY EFFECTS SENSOR MISCELLANEOUS EFFECTS	Sa = ± 3.75 psig Ssps = N/A Sspz = N/A Ste = ± 10.13 psig Spse = ± 0.375psig Sme = N/A	
ALLOWABLE VALUE		**AV= 1210 psig**	
Drift Allowance (DA) Tolerance Allowance (TA)	SENSOR DRIFT RACK EQUIPMENT DRIFT SENSOR TOLERANCE RACK EQUIPMENT TOLERANCE	Sd = ± 7.5 psig Red = ± 6.00 psig St = ± 3.75 psig Ret = ± 1.88 psig	
TRIP SETPOINT		**TSp = 1203.57 psig**	
RESET VALUE		RV = 1173.57 psig	
	OPERATING MARGIN	OM = psig	
NORMAL OPERATION UPPER LIMIT		NUL= 1045 psig	
	NORMAL OPERATING BAND		
NORMAL OPERATION LOWER LIMIT		NLL = 1035	

D. NOTES:

1. This equipment is not listed on the PNPS EQML and does not perform a safety function (See 10CFR50.62 - Reference 44). It initiates recirculation pump trip (RPT) and alternate rod insertion (ARI), which is a back-up method of reactivity control at reactor high pressure. This equipment is only required to function during anticipated operational occurrences. At PNPS this equipment is classified MQCI.

2. A value of 1045 psig will be used for the normal operation upper limit (NUL).

3. The ATWS recirculation pump trip setpoint is selected to trip the pumps during the initial reactor pressure transient following a failure of the control rods to insert. The selected trip set point is low enough to ensure that the ASME pressure limit for emergency events of 1500 psig is not exceeded. Note 2 to Table 3-3 "Key Equipment Parameters" in NEDC-33532P describes that the ATWS transient analysis uses a trip setpoint of 1220 psig, which is the analytical limit shown on Figure 2. The results of the worst case ATWS pressurization events are tabulated in Table 3-4 "Summary of Key ODYN Parameters for ATWS Calculation" and the worst case peak vessel pressure is 1478 psig. The analysis of 1220 psig is demonstrated to be adequate because the peak vessel pressure results from the transient analysis described in Section 3 of NEDC-33532P is below 1500 psig.

- An analysis reactor steam dome pressure setpoint of 1220 psig is used for the ATWS Recirculation Pump Trip (RPT) function. Starting with Reload 18 Cycle 19 this analysis setpoint is specified for transient analysis that assumes a successful reactor scram performed for Reload Licensing Analysis (RLA) [Reference 50] and ATWS analysis [Reference 46]. The previous analysis setpoint was 1180 psig which corresponded with the Technical Specification allowable value upper limit. The value of 1220 psig is referred to as the "Trip Level Setting" in Tech Spec 3.2.G.
- A lower analysis setpoint limit is not specified for the ATWS Recirculation Pump Trip (RPT) function:
- Inadvertent trip of the recirculation pumps during a transient event that includes a successful scram is an operational inconvenience not a safety concern. The operational inconvenience arises due to the loss of forced circulation to sweep cold water from the reactor vessel bottom head. Reactor water level is manually raised to improve core flow by natural circulation and control thermal stratification in the bottom head.
- The loss of both recirculation pumps is an evaluated transient that is non-limiting with respect to fuel thermal limits. As indicated by GEH in the OPL-3 Design Guide for RLA transient analysis inputs, increases in the RPT setpoint have minimal effect on peak pressure and causes negligible change in critical power ratio [Reference51].

4. In accordance with PNPS Procedure 1.3.36, measurement and test equipment utilized for calibration shall be equal to or better than the device being calibrated. The

manufacturer's stated accuracy is ± 0.25% span (Reference 1) for the transmitter and ± 0.13% span for the master trip unit (Att. 1 & 3).

5. This calculation supports a 24 month fuel cycle.

6. The no adjust limits and reset will be based on the existing settings utilized. These values are shown in PNPS Procedures 8.M.1-30 and 8.M.1-29.

7. Evaluation of Reference Leg Temperature Variations on Reactor Vessel Pressure Measurement.

   The distance from the bottom of the Reactor vessel to the bottom of the inside of the pipe from the Reactor vessel to the condensing pot for each train is calculated below. Note, this should correspond to the water level in the condensing pot, hcp.

	"A" Train Level	**"B" Train Level**	**Reference**
Top of Pipe	83' 9.3125" (1005.3125")	83' 9.375" (1005.375")	M1001 Sh. 128, M1001 Sh. 129
Reactor Zero Elevation	37' 11 1/4"(-455.25")	37' 11 ¼" (-455.25")	M23
Internal diameter 2" Sch. 80 Pipe + Wall Thickness	-2.157"	-2.157"	M1001 Sh. 128, M1001 Sh. 129
Actual Cold h_{cp}	547.91"	547.97"	

Per FS&MC memo 91-176 (Reference 25), thermal growth is 7.3×10^{-6} in/in/°F and the cold distance of the upper tap is 547". Assuming a cold temperature of 60°F:

$\Delta l = e_{elongation}$ = total thermal growth of vessel = 3.993×10^{-3}" (T-60°F)

Using T = Tsat (1035 psig) = 546°F, $\Delta l = e_{elongation}$ 1.96"

According to PNPS calculations IN1-28 (Reference 38), IN1-24 (Reference 40), drawings M253 Sh. 1 (Reference 13), M1001 Sh. 128 & 129 (Reference 11), the following elevations relative to the bottom of the Reactor vessel were assumed to exist at calibration:

$h_{cp}^{\text{CAL ASSUMED}}$ = 548.5" ("A" & "B' Train)

$e_{offset} = hcp^{\text{ACTUAL COLD}} - hcp^{\text{CAL ASSUMED}}$

$e^{cp} = e_{offset} + e_{elongation} = hcp^{\text{ACTUAL COLD}} - hcp^{\text{CAL ASSUMED}} + \Delta l$

= (547.91 - 548.5)" + 1.96" = - 0.59"+ 1.96" = 1.37" (A Train)

= (547.97-548.5)" + 1.96" = -0.53"+ 1.96"= 1.43" (B Train)

From Reference 38 & 40, the reference leg penetration of the Drywell is at 534.375" for Train A and 535.75" for Train B. As depicted on drawing MIP-612 (Reference 5) and PNPS calculation INI-028 (Reference 38), the pressure transmitters are at 176.79" above reactor vessel zero (52.67' - 37' 11.25"). Therefore the height of the reference leg in the Drywell and in the Reactor Building is:

Train	error in h_{cp} (e_{cp})	Height in DW, h_{DW}	Height in RB, hRB
A	+1.37"	14.125"	357.585"
B	+1.43"	12.75"	358.96"

Per PNPS calculation INI-24 (Reference 40), PNPS FSAR (Reference 8), and ASME Steam Tables (Reference 39) the density of the fluid in the drywell and in the reactor building reference leg due to different ambient temperatures:

Location	Ref. Temp's	Highest Temp's	Lowest Temp's	Ref. Density	Highest Temp Density	Lowest Temp Density
Drywell	138°F	148°F	125° F	61.6523	61.4818	61.8104
Reactor Building	80°F	105°F	60° F	62.422	62.1118	62.5783

Substituting these values into the following equation for the static head pressure on the transmitter:

$P_{Static\ Head} = h_{DW} * \rho_{DW} \pm h_{RB} * \rho_{RB}$

where h_{DW} = height of water column in drywell
h_{RB} = height of water column in reactor building
ρ_{RB} = density of water in drywell portion of reference leg
ρ_{RB} = density of water in reactor building portion of reference leg

Normal Operation

$P_{Static\ Head}^{(Ret\ Temp)}$ = [14.125 (61.652) + 357.585 (62.422)]*[1 ft^3 / 1728 in^3]
= 13.42 PSIG (Train "A")

= [12.75 (61.652) + 358.96 (62.422)]*[1ft3/1728 in^3]
= 13.42 PSIG (Train "B")

$P_{Static\ Head}^{(Lowest\ Temp)}$ = [14.125 (61.8104) + 357.585 (62.5783)] * [1ft^3/1728 in^3]

= 13.45 PSIG (Train "A")

= (12.75 (61.8104) + 358.96 (62.5783)] * [1 ft/1728 in^3]
= 13.46 PSIG (Train "B")

$P_{Static\ Head}^{(Highest\ Temp)}$ = [14.125 (61.4818) + 357.585 (62.1118)] * [1ft^3 / 178 in^3]

= 13.36 PSIG (Train "A")

= [12.75 (61.4818) + 358.96 (62.1118)] * [1 ft^3/1 728 in^3]

= 13.36 PSIG (Train "B")

Maximum error equals difference between lowest pressure calculated above and the +13.4 PSIG correction factor from PNPS calculation IN1-28 (Reference 38).

Pma = (13.36 - 13.4) / 1200*100% = -0.003% Span and can he neglected.

8. Rack Power Supply Effects (Rps):

Attachments 1 & 2 specify the performance parameters applicable to the GE master trip units. Among these parameters are the supply voltage requirements for power to the units. It is assumed that if the input voltage is maintained within the design requirements of the trip units there will be no adverse affect on the performance specifications.

The master trip unit requires a supply voltage of 21.2 to 29.1 Vdc as described in Attachment 1. The ATWS power supplies are fed from two sources; 115 Vac distribution panels Y3 & Y4 and 125 Vdc distribution panels D36 & D37 (Reference 14). The outputs from D36 and D37 are converted to AC by voltage inverters prior to feeding the ATWS power supplies.The voltages throughout the ATWS trip circuits will remain within the equipment specifications and therefore no adverse performance from any ATWS equipment can be attributed to abnormal variations in supply voltages.

9. Rack Temperature Effects (Rte):

The temperature effect for the GE master trip unit trip output which provides the reactor high pressure ARI/RPT is listed in the GE proposal dated 9/30/91 (Attachment 3). This error is ± 0.2% of full scale assuming the error is random for an internal cabinet temperature change from 113.5°F to 142.5°F. The corresponding external cabinet temperature is 76°F to 105°F. PNPS FSAR Tables 10.9.1 & 10.9.2 list the minimum and maximum temperatures at the cabinet location (Reactor Building – 51 foot elevation) as 60°F to 105°F. Therefore;

Rte = (±0.2%) (1500 psig) [(105°F - 60°F)/(105°F - 76°F] = ± 4.66 psig

10. Sensor Temperature Effect (St):

PT263-122A, B, C, & D are located on instrument racks C2275 & C2276, Rx bldg elevation 51' (Reference drawings M253 & M187).

Area temperature range: 60°F to 105°F (winter & summer design temperatures from FSAR tables 10.9.1 & 10.92)

Using V-0098 and proportioning the Ste at the pressure transmitter upper & lower range limits (URL & LRL):

Ste_{URL} = ± 1% span per 100°F = ± (0.01) (3000 psig) / 100°F = ± 30.0 psig / 100°F

Ste_{LRL} = ± 3.5% span per 100°F = ± (0.035) (500 psig) / 100°F ± 17.5 psig / 100°F.

Therefore at the calibrated span of 1500 psig: (1500 - 500) psig / (3000 -500) psig = 0.4 psig

Ste = ± [(0.4) (30.0 - 17.5) psig/100°F] + ± 17.5 psig / 100°F = ± 22.5 psig/100°F

Adjusting for temp. range: (± 22.5 psig/100°F) (105°F - 60°F) = ±10.13 psig

11. Sensor Power Supply Effects (Spse):

Note 8 details the review of the voltage regulation for the ATWS trip circuits. The review confirms the GE master trip units have a supply voltage within required limits. These trip units provide supply voltage to the Rosemount transmitters, PT263-122A, B, C, and D. From Reference 1,

Spse = (±0.005%) (1500 psig) (28v - 23v) = ± 0.375 psig

12. Sensor Drift (Sd)

Reference 1 gives stability (drift) for model 1151G transmitters as ±0.25% of URL for six months. Per Attachment 6, there will be no additional drift for at least two years after the first

two days of operation/setting. Therefore, the value given in Reference 1 will be used to calculate Sd over the full calibration cycle:

Sd = ±0.25% of URL = (±0.0025) (3000 psig) = ± 7.5 psig

13. For actual values implemented at PNPS, see Figure 1.

14. A review of Reference 15 shows that the inaccuracy due to static pressure in the reference leg (from Reference 38) is accounted for in the calibration of the transmitters except for one minor calibration error. This term, CR, is the difference between the desired setpoint and the actual setpoint at which the trip will occur. This actual setpoint is determined by substituting the calibrated high setpoint in the transmitter calibration formula. The calibrated setpoint is 16.84 mA per Note 15 of this calculation. Convert this to the actual pressure the transmitter senses at the trip as follows;

The ratio of mA to psig is obtained from Reference 15:
[(Actual Tsp + static Head)- 15) psig / (16.84 - 4.02) mA] = [(1510 - 15) psig / (19.97 - 4.02) mA]

Therefore, Actual Tsp = 1216.62 psig, which is 1203.22 psig + 13.4 psig static head (from Reference 38).

CR = Tsp - Actual Tsp = 1203.57 psig - 1203.22 psig = 0.35 psig

This is a conservative error, i.e. the switch will trip before Reactor pressure reaches 1203.57 psig. Therefore this will not be included in TLU.

15. Calculated Reset Value & Trip Setpoint (Tsp):

<u>Trip Setpoint:</u>

Calibrated range:	0 to 1500 psig. span = 1500 psig
Signal range:	4 mA to 20 mA, span = l6mA
Tsp=	1203.57 psig

Then:

Tss = [(1203.57 psig/1500 psig) (16 mA)] + 4 mA = 16.84 mA
With no adjust limits (±0.02 mA): 16.82 mA to 16.86 mA (per Reference 9)

<u>Reset Value:</u>

Per Reference 21 & 36 the reset differential will be set at 0.32mA ± .016mA

(0.32mA/16mA) = 2% of span = (0.02) 1500 psig = 30 psig
Therefore Reset Value = Tsp - 30 psig = 1203.57 psig - 30 psig = 1173.57 psig

Convert to signal units:

16mA (1173.57 psig/1500 psig) + 4mA = 16.52 mA

which corresponds to a no adjust limit of ±0.16mA (16.36mA to 16.68mA):

This reset value (RV) is acceptable because (1) reset occurs at 2% span, which falls within the manufacturer's specification of 0.5% to 20% of the input span and (2) reset occurs before the process normal operation limit is reached. See Figure 1.

16. Channel Cross Check

Channel cross check criteria is intended to be used by PNPS operators to determine when a channel may be malfunctioning based on a comparison of its indicated value for a plant parameter versus the value displayed by the other channels displaying the same parameter. It is intended that this comparison will be performed during plant normal operation.

1. Methodology

A. Total Loop Uncertainty for Cross Check

The TLU used for cross check purposes is defined as:

$$TLU_{CROSSCHECK} = \sqrt{(PA)^2 + (CA)^2 + (RA)^2 + (SA)^2 + (DA)^2 + (TA)^2}$$

where:

PA = Pea

$CA^2 = Sca^2 + Rca^2$

Note: Rca includes the readability of the meter (1/2 minimum gradation)

$RA^2 = Rea^2 + Rte\ [N.O.]^2 + Ma^2$

Note: Rte [N.O.] is the error due to temperature difference between calibration and Normal Operation temperature. Ma is the master trip unit analog meter accuracy.

$SA^2 = Sa^2 + (Ssps + Sspz)^2 + Ste[N.O.]^2$

Note: Ste[N.O.] is the error due to temperature difference between calibration and Normal Operation temperature.

$DA^2 = Sd^2 + Red^2$

$TA^2 = St^2 + Ret^2$

Note: Ret is the "As Left" setting tolerance of the meter indication.

The following terms from the equation for TLU in NEDWI 394 are not considered for the following reasons:

EA and its constituent terms Te, Re, S/Ce, Pe, and Se are not considered since these errors are associated with Post Accident conditions and the cross check is performed only during Normal Operation. Similar reasoning is why LA and its constituents CI, TI, PI, SI, and DI are not considered.

The process measurement accuracy, Pma constituent of PA is not considered since it would equally affect all channels.

The sensor and rack power supply affects Spse and Rps, and are not considered because minor voltage variations on the 120 Vac buses are well within the regulation capability of the individual sensor and rack power supplies. Also, a severe degraded voltage condition is not considered, because this is not a normal plant operating condition.

For differential pressure transmitters in pressurized applications, the static pressure span and zero error terms, Ssps and Sspz, consist only of the random portion of the error. They account for the uncertainty in the correction actually applied and are still applicable.

B. Development of Channel Cross Check Criteria

The purpose of this section is to discuss the derivation of the channel cross check methodology to be used at the Pilgrim Nuclear Power Station (PNPS). The purpose of the cross check process is to detect when a channel's performance begins to deviate from within analyzed bounds and is performed by comparing an individual channel's indication against some criteria.

An ideal test would be to compare the channel indication against the actual value of the parameter being monitored. In this case the criteria would be that "the difference between the indicated and the actual value must be less than the uncertainty established for the channel indication".

However, the actual value of a parameter is never known with absolute certainty. From a statistical standpoint, reduced uncertainty in the value of a parameter can be achieved by making a series of repeated independent measurements.

From Section 2, "Fundamental Considerations", of ASME PTC 19.1 - 1985 (Reference 64), "Part 1 Measurement Uncertainty", if a series of independent measurements (readings) are made, then the mean value of the series is given by

$$\left(\sum_{i=1}^{N}(Xi)/N\right)$$

From the same document, the uncertainty associated with the mean value of a series of independent readings is related to the uncertainty in each of the measurements in the series used to calculate the mean value. This uncertainty is given by

$$S_{Mean} = \frac{S_{Series}}{\sqrt{N}}$$

Where

$$S_{series} = \sqrt{\left(\frac{\sum_{i=1}^{N}(s_i)^2}{N}\right)}$$

and s_i = uncertainty associated with the ith measurement.

If the measurement uncertainties are the same (all $S_i = S_{measurement}$) then $S_{series} = S_{Measurement}$ and

$$S_{mean} = \frac{S_{series}}{\sqrt{N}} = \frac{S_{measurement}}{\sqrt{N}}$$

This indicates that if you are estimating the actual value of a parameter by averaging several measurements, then the uncertainty in your estimate decreases as the number of measurements in the average increases.

If one were to compare the indication of a single channel with the mean indication of several channels monitoring the same parameter, what would be an appropriate comparison criteria? The criteria proposed is that "the difference between the indication of a single channel and the mean indication of several channels monitoring the same parameter must be less than the uncertainty established for the channel indication plus the uncertainty established for the mean value". Mathematically, the criteria is expressed as follows:

$$\left|Reading_{Channel\,i} - \left(\sum_{i=1}^{N} Reading_{Channel\,i}\right)/N_{Channels}\right| < S_{Channel} + S_{Mean}$$

$$\left|Reading_{Channel\,i} - \left(\sum_{i=1}^{N} Reading_{Channel\,i}\right)/N_{Channels}\right| < S_{Channel} + S_{Channel/\sqrt{N_{Channels}}}$$

The criteria is based on the fact that the first uncertainty is that of the reading being compared and the second uncertainty is that of the standard being compared against. In the limiting case of N = 1, i.e. comparing two readings to each other, the criteria states that the difference must be less than twice the established channel indication uncertainty. In the limiting case of N approaching infinity the uncertainty associated with the mean value approaches zero and the criteria reverts to the ideal case above.

Using the above equation and substituting $TLU_{Cross\ Check}$ for $S_{Channel}$ and simplifying yields:

$$|Channel\ i\ \mathrm{Re}ading - Average\ Channel\ \mathrm{Re}ading| < \left(1 + \frac{1}{\sqrt{N}}\right) TLU_{Cross\ Check}$$

Tabulated below are values for $\left(1 + \frac{1}{\sqrt{N}}\right)$

N (No. of channels)	$\left(1+\frac{1}{\sqrt{N}}\right)$ TLU Cross check Multiplier (M)
2	1.707
3	1.577
4	1.500
7	1.378
8	1.354

The current PNPS Channel Cross Check procedure is performed by comparing two readings to each other, which is the limiting case of N=1 described above. Therefore, the calculation presented in Part 2 will consider both the Cross Check between Channels (limiting case of N=1) and the Cross Check against the average.

C. Application of Cross Check Criteria

Round off the calculated cross check value to the nearest readable value. Compare the calculated value of the cross check criteria to the existing value taken from PNPS Procedures. If the existing value is larger than the calculated value, coordinate with PNPS ICED to evaluate reducing the existing cross check criteria to the calculated value. If not, use the existing value. Identify the cross check value in Section V, Results and Conclusions.

2. Calculation

$$TLU_{CROSSCHECK} = \sqrt{(PA)^2 + (CA)^2 + (RA)^2 + (SA)^2 + (DA)^2 + (TA)^2}$$

where:

(PA) = N/A

(CA)= ± 25.35 psig,

where $CA^2 = Sca^2 + Rca^2$

and

Sca = ±3.75 psig

$$Rca = \sqrt{\left(Rca_{Form1}\right)^2 + \left(\text{Re}adability\right)^2} = 25.08 \text{ psig}$$

where: Rca_{Form1} = ±1.95 psig (See Form 1)

Readability = 25 psig (See Assumptions, Section II)

(RA) = ± 45.28 psig, where $RA^2 = Rea^2 + Rte^2 + Ma^2$

Rte = ±4.66 psig (See Form 1)

Rea = ± 1.95 psig (See Form 1)

Ma =±3% of Full Scale (Attachment 1) = ± (0.03)(1500 psig) = ± 45 psig

(SA) = ±10.80 psig, where $SA^2 = Sa^2 + (Ssps + Sspz)^2 + Ste^2$

Sa =± 3.75 psig (See Form 1, Sht. 7)

Ssps=N/A (See Form 1)
Sspz= N/A (See Form 1)
Ste = ± 10.13 psig (See Note 10)
(DA) = ± 9.60 psig (See Form 3, sht. 2)

(TA) = ± 4.19 psig (See Form 3, sht. 2) Since there is no meter adjustment possible, the setting tolerance for the master trip unit and the setting tolerance for the sensor will be used to calculate TA. Therefore,

$$TLU_{CROSS\ CHECK} = \sqrt{(N/A)^2 + (25.35)^2 + (45.28)^2 + (10.80)^2 + (9.60)^2 + (4.19)^2}$$

$$TLU_{CROSS\ CHECK} = 54.03 \text{ psig}$$

$$TLU_{Cross\ check\ Mean} = \frac{TLU_{Cross\ Check}}{\sqrt{N}}$$ where N = number of channels

<u>Case 1:</u> Comparison to an Average of the Four Channels:

$$TLU_{Cross\ check\ Mean} = \frac{54.03 psig}{\sqrt{4}} = 27.02\ psig$$

From section B, all channel readings must satisfy the relationship:

$$|Channel\ i\ Reading - Average\ Channel\ Reading| < TLU_{CrossCheck\ Mean} + TLU_{CrossCheck}$$

Which after substituting 27.02 psig and 54.03 psig for $TLU_{Cross\ check\ mean}$ and $TLU_{Cross\ Check}$

$$|Channel\ i\ Reading - Average\ Channel\ Reading| < 27.02 psig + 54.03 psig = 81.05 psig$$

81.05 psig will be rounded off to the nearest 10 psig, therefore, will equal 80 psig. Per PNPS Procedure 2.1.15 (Ref 42), the existing cross check value is 90 psig.

Case 2: Comparison between Two Channels:

$$|Channel\ i\ Reading - Channel\ j\ Reading| < 54.06 psig + 54.06 psig = 108.12 psig$$

$$TLU_{Cross\ check\ Mean} = \frac{54.06 psig}{\sqrt{1}} = 54.06\ psig$$

$$|Channel\ i\ Reading - Channel\ j\ Reading| < 54.06 psig + 54.06 psig = 108.12 psig$$

Since the calculated value is larger than the existing value in reference 42, the existing value is conservative and will be used.

V. RESULTS & CONCLUSION

Plant Impact

Parameter	Instrument	
	PT263-122A, B,C,D	PIS263-123A, B, C, D
Surveillance Interval	24 Months	3 Months
Combined Measurement and Test Equipment	±0.25% of Span or ±3.75 psig	±0.13% of Span or ±0.02 mA
No Adjust Limits	±0.04 mA	±0.02 mA

SETPOINT DATA

Field Trip Setpoint	1203.6 =	16.84 mA
Field Reset	1173.6 =	16.52 mA
Notify Watch Engineer Value	1210=	16.91 mA
Channel Cross Check Value	90 psig	

The relationship of the field setpoint to the calculated limits is shown on Figure 2.

VI. ATTACHMENT COVER PAGE

1. GE Letter to David Himle, from C.C. Canham, dated 7/24/91 with GE Trip Unit Performance Specification (14 sheets)
2. Technical Description for GE Nuclear Energy Analog Trip Unit, GE Drawing 184C5988, dated 4/91 (15 sheets).
3. GE Proposal for Nuclear safety Related Trip Units – Proposal Number HK1507DP1, dated 9/30/91 (6 sheets)
4. PSD Nedorandum Number 91-81, dated 9/25/91 (2 sheets)
5. Not Used
6. Telephone Call Record From R. Swanson (Rosemount) to B. Brousseau (PNPS) dated 8/21/91 (1 sheet)

ATTACHMENT 1

~~CALC NO. 25-226-6025~~

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IN1-110

GE NUCLEAR ENERGY
San Jose, California

IN1-110

July 24 1991

TO: David Himle

SUBJECT: BECO REQUEST FOR TRIP UNIT PERFORMANCE SPECIFICATION

Attached is the requested information. It is verified as accurately extracted from 22A7716 and 22A7011. Verification is contained in DRF-A00-02406-1 Index 9.

C F Canham

C. F. Canham, Manager
Plant Electronics
Application Engineering

GE TRIP UNIT 184C5988

PERFORMANCE SPECIFICATIONS

DIMENSIONS:	6.969" High, 9.875" Deep, 1.188" Wide
WEIGHT:	18 OZ.
MOUNTING:	Printed Circuit Card/Slide in Card File
INDICATOR SCALE:	Scale/Legend to be specified by Buyer when ordered. Analog signal meter: ±3% FS
POWER SUPPLY REQUIREMENTS:	
Voltage	+25VDC ±1.5V (Qual limit = 21.2 to 29.1 VDC)
Current	<260mA
TRIP UNIT OUTPUT VOLTAGE/CURRENT:	
Trip Output Limits	≥22 VDC (Typ 24 ±0.5)
Gross Failure Limits Hi - 50-100% (Adjustable) Low - 1-12% (Adjustable)	≥22 VDC
Trip Status Limits	0-12 VDC
Analog Output to Slave Limits	1-5 VDC Calibrated
Auxiliary Output Limits	1-5 VDC Calibrated
TRIP UNIT INPUT VOLTAGE/CURRENT:	
Calibration Command	25 VDC
Trip Unit Input Impedance	250 ohms
Trip Logic Status	Front-Mounted - Led Indicator
Trip Unit Frequency Response	250 Hz ±2.5 Hz
Analog Output to Slave Frequency Response	250 Hz ±2.5 Hz

Auxiliary Analog Output Frequency Response	0.8 - 8 Hz ±0.8 Hz (Adjustable)
Trip Unit Input/Out Isolation	300 VDC
Trip Unit Analog Output Accuracy	0.15% FS
Trip Unit Trip Point Repeatability (Accuracy)	0.13% FS
Electromagnetic Susceptibility	0.5-60 MHz at 5.0 VP/P 60 MHz to 85 MHz at 3.5 VP/P 85 MHz to 100 MHz at 2.5 VP/P
Operating Temperature Limits	≤115 °F Normal ≤145°F Max.
Relative Humidity Limits	≤50% Normal ≤90% Max.

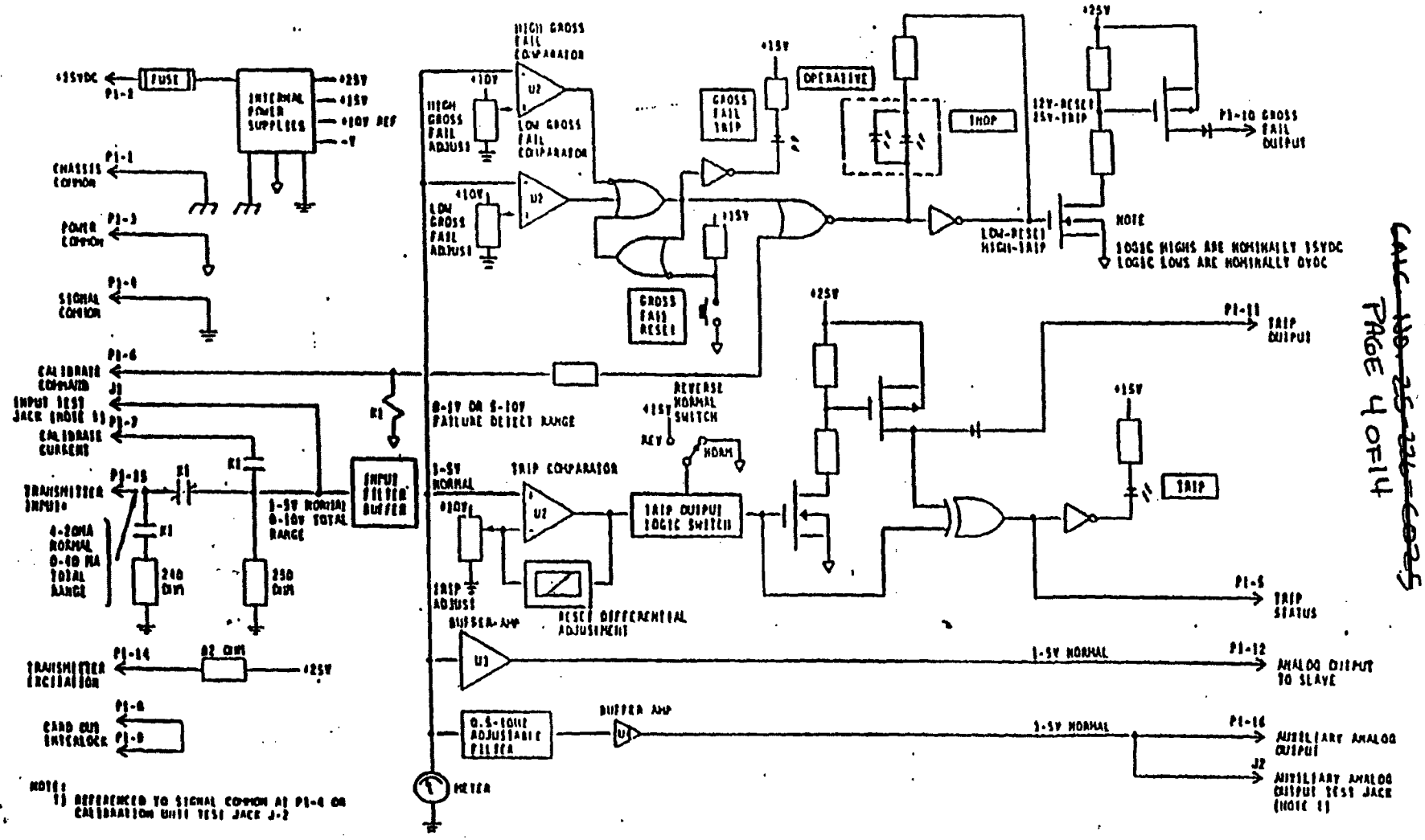
Seismic Qualification Profile

The Required Response Spectrum is provided in Attachments #2 and #3. These spectra represent the minimum floor acceleration spectra to be applied to the MTU and STU (Slave Trip Unit) enclosure (cabinets only). The seismic exposure levels for both Operating Basis Earthquake (OBE) and Safe Shutdown Earthquake (SSE) for a cabinet containing the trip units are also contained in Attachments #2 and #3. The figures do not include amplification from the floor to the trip unit mounting locations.

The seismic exposure levels to which the trip units may be exposed during plant life are dependent on the seismic levels at their mounting locations. Attachments #4 thru #9 show the trip unit seismic qualification levels. These figures do not include any margin.

The trip units required seismic testing using multifrequency test inputs. The Test Response Spectra (TRS) at the cabinet assembly base were to exceed the service conditions of Attachments #2 and #3. This assured that the trip units in their mounting locations experienced actual seismic levels in excess of their specified service condition. The trip units were to be subjected to five OBEs and one SSE in two orientations. The Required Response Spectra (RRS), Attachment #10 and #11, used during seismic testing as input into the cabinet containing installed aged trip units exceeded the service conditions of Attachments #2 and #3 by at least 21%.

Master Trip Unit (Current Input) Block Diagram



ATT. 1
~~CALC NO. 25-226-C025~~
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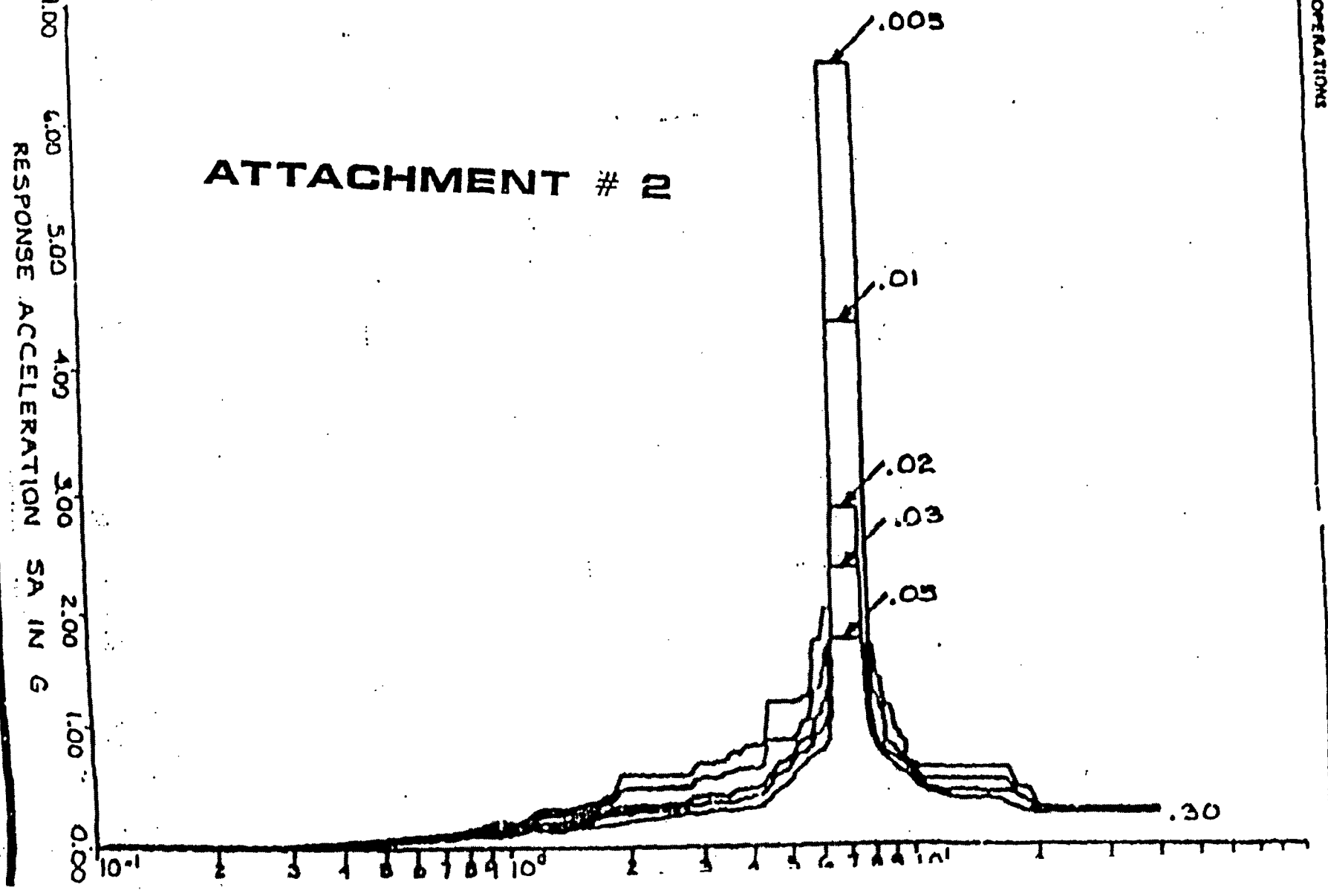
ATTACHMENT # 1

REQUIRED RESPONSE SPECTRUM

CONTROL BUILDING
MASS POINT NO. 4 HORIZONTAL
EL. 164 FT.
DAMPING RATIO 0.005, 0.01, 0.02, 0.03, 0.05
RESPONSE ACCELERATION

VALUES SHOWN ARE FOR
OPERATING BASIS
EARTHQUAKE MULTIPLY BY 1.6
FOR DESIGN BASIS
EARTHQUAKE
NORMALIZING RATIO 1.00



ATTACHMENT # 2

NUCLEAR ENERGY BUSINESS OPERATIONS

GENERAL ELECTRIC

IN1-110

ATT. 1
~~CALC NO. 25-226-C025~~
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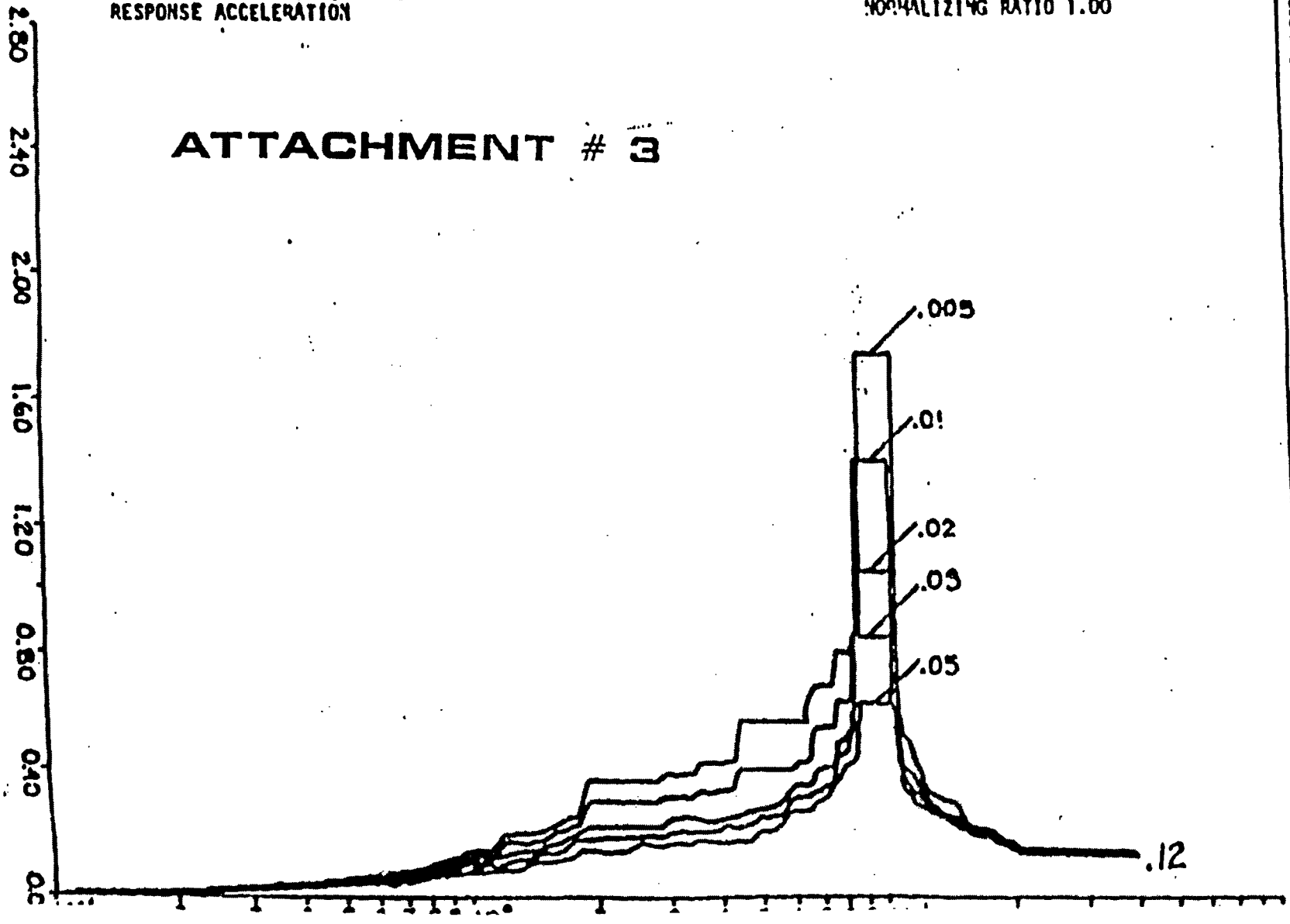
REQUIRED RESPONSE SPECTRUM

CONTROL BUILDING
MASS POINT NO. 4 VERTICAL
EL. 164 FT.
DAMPING RATIO 0.005, 0.01, 0.02, 0.03, 0.05
RESPONSE ACCELERATION

VALUES SHOWN ARE FOR
OPERATING BASIS
EARTHQUAKE MULTIPLY BY 1.6
FOR DESIGN BASIS
EARTHQUAKE
NORMALIZING RATIO 1.00

ATTACHMENT # 3



NUCLEAR ENERGY BUSINESS OPERATIONS

GENERAL ELECTRIC

IN1-110

ATT. 1
~~CALC NO. 26-226-005~~
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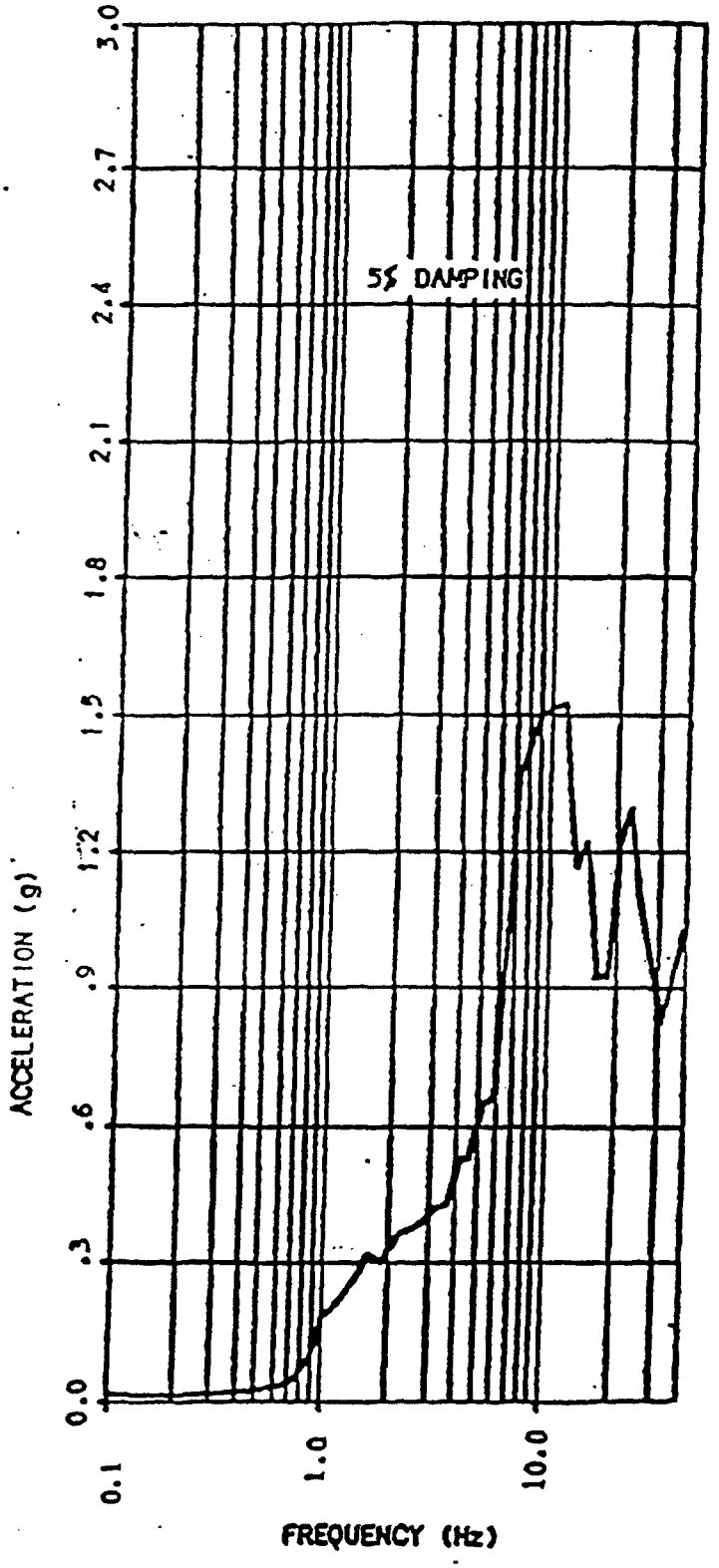
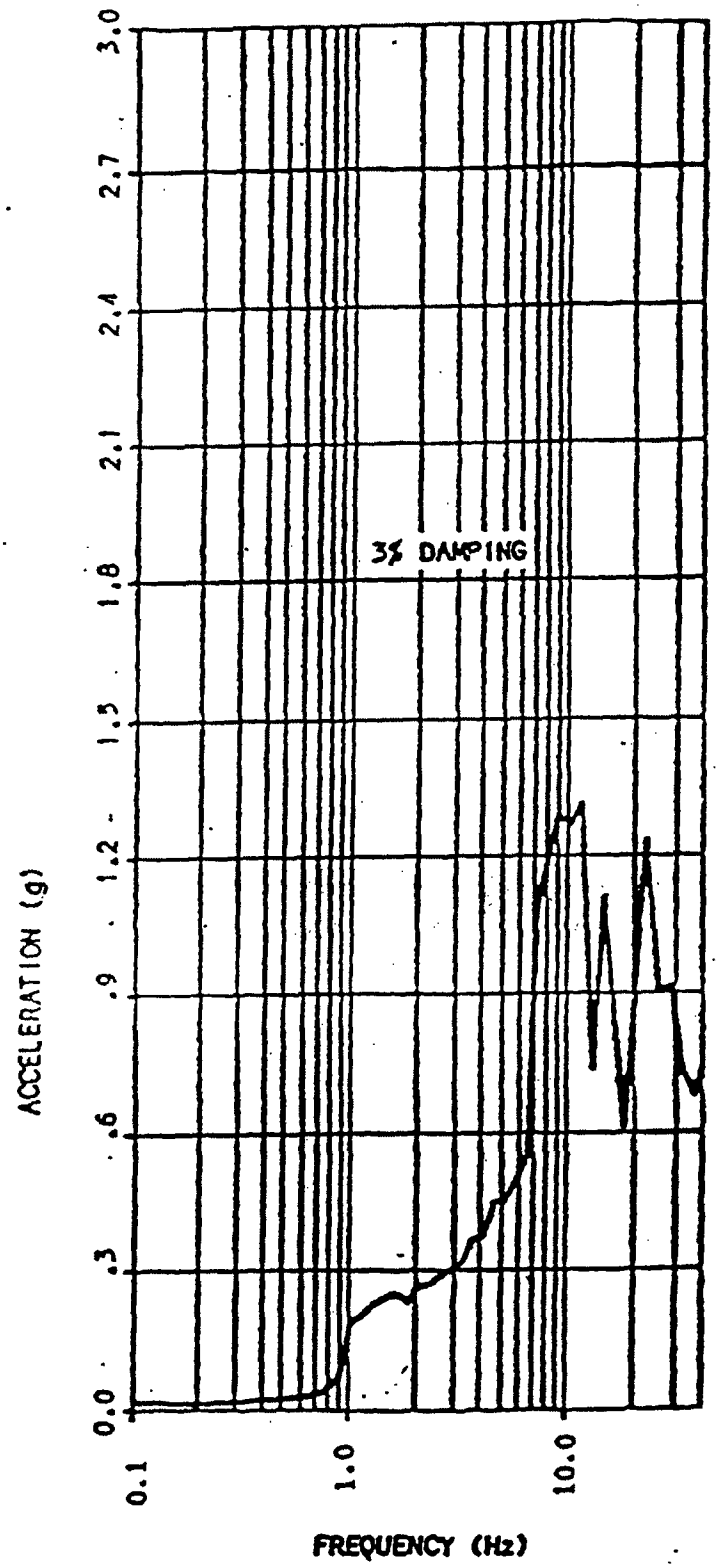
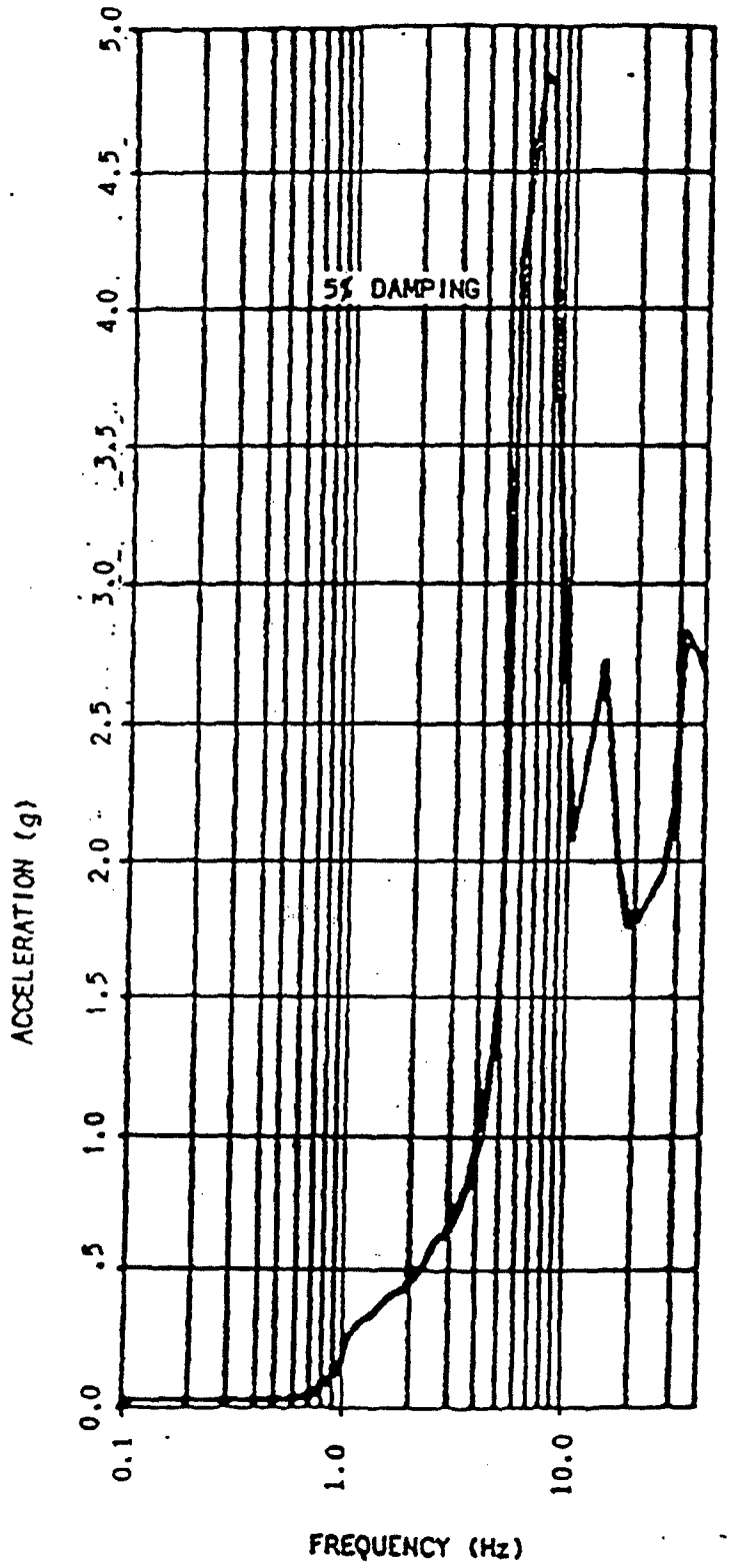


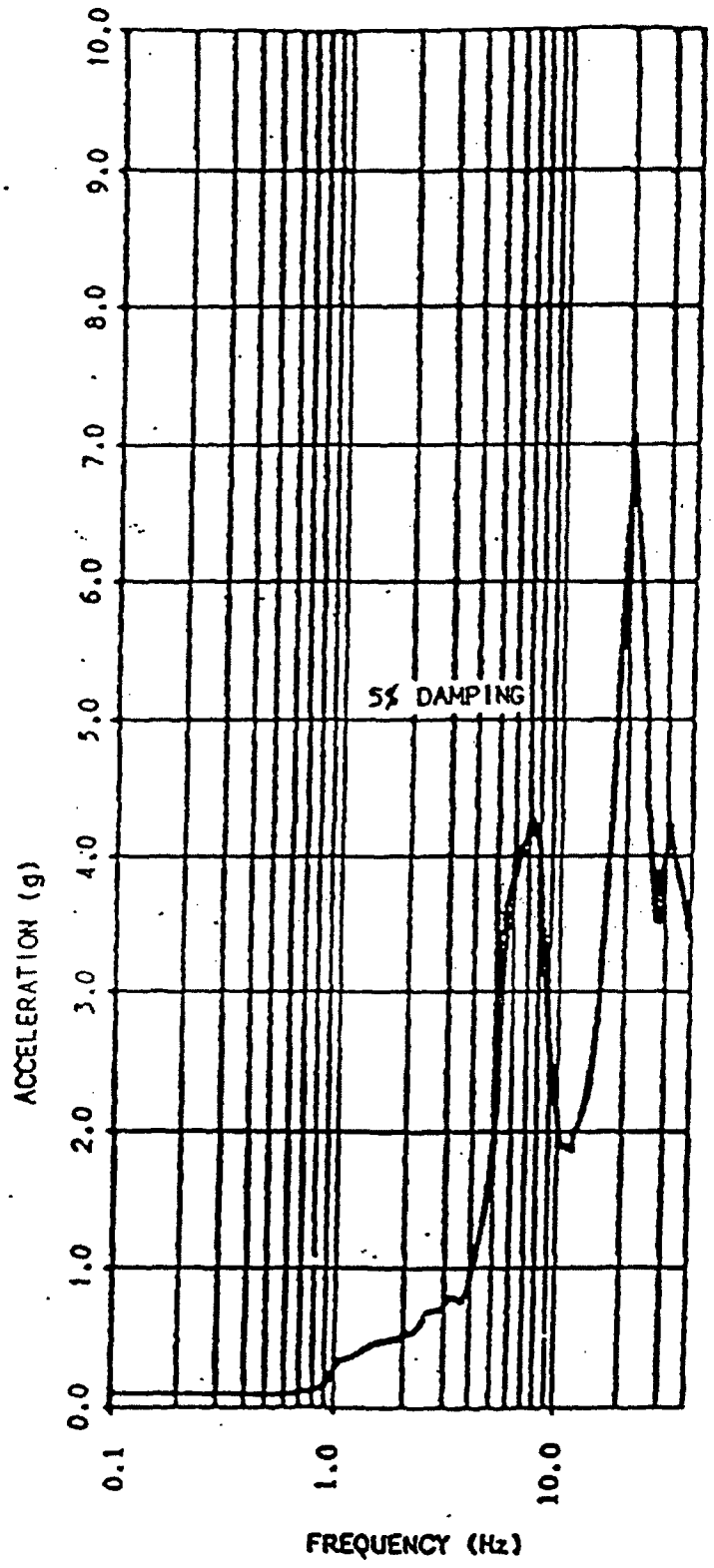
TRIP UNIT SSE VERTICAL QUALIFICATION CURVE



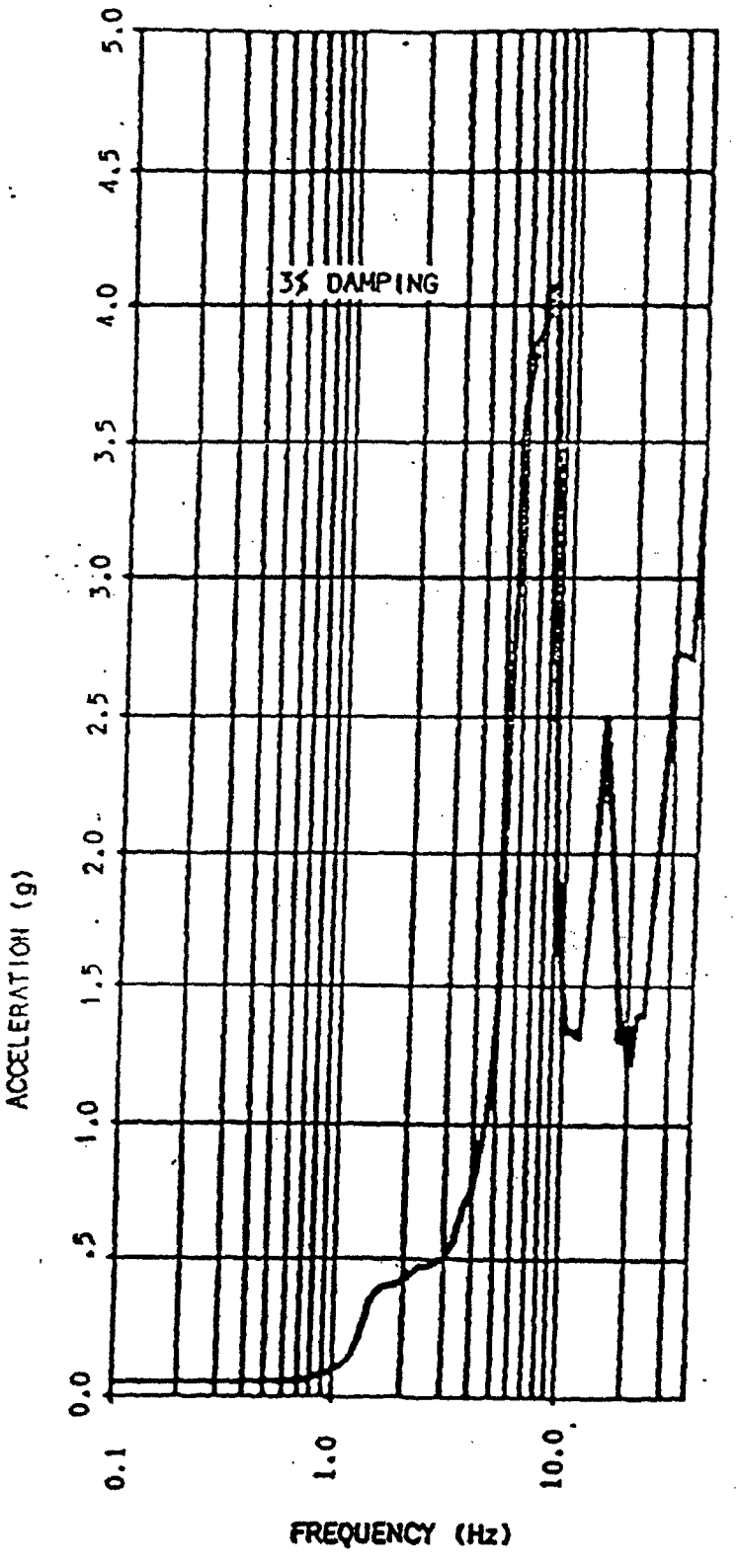
TRIP UNIT OBE VERTICAL QUALIFICATION CURVE



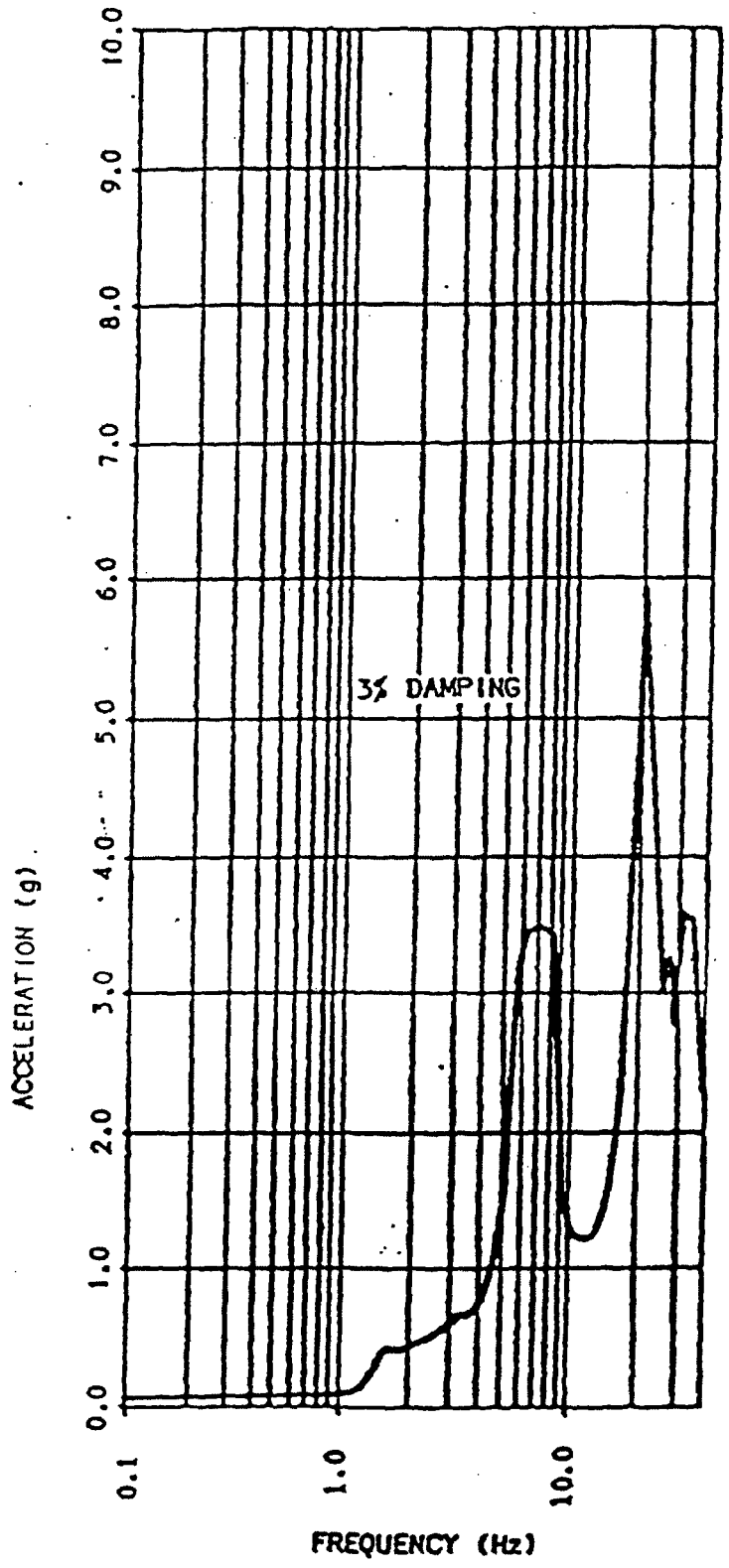
TRIP UNIT SSE Y-DIRECTION QUALIFICATION CURVE



TRIP UNIT SSE X-DIRECTION QUALIFICATION CURVE

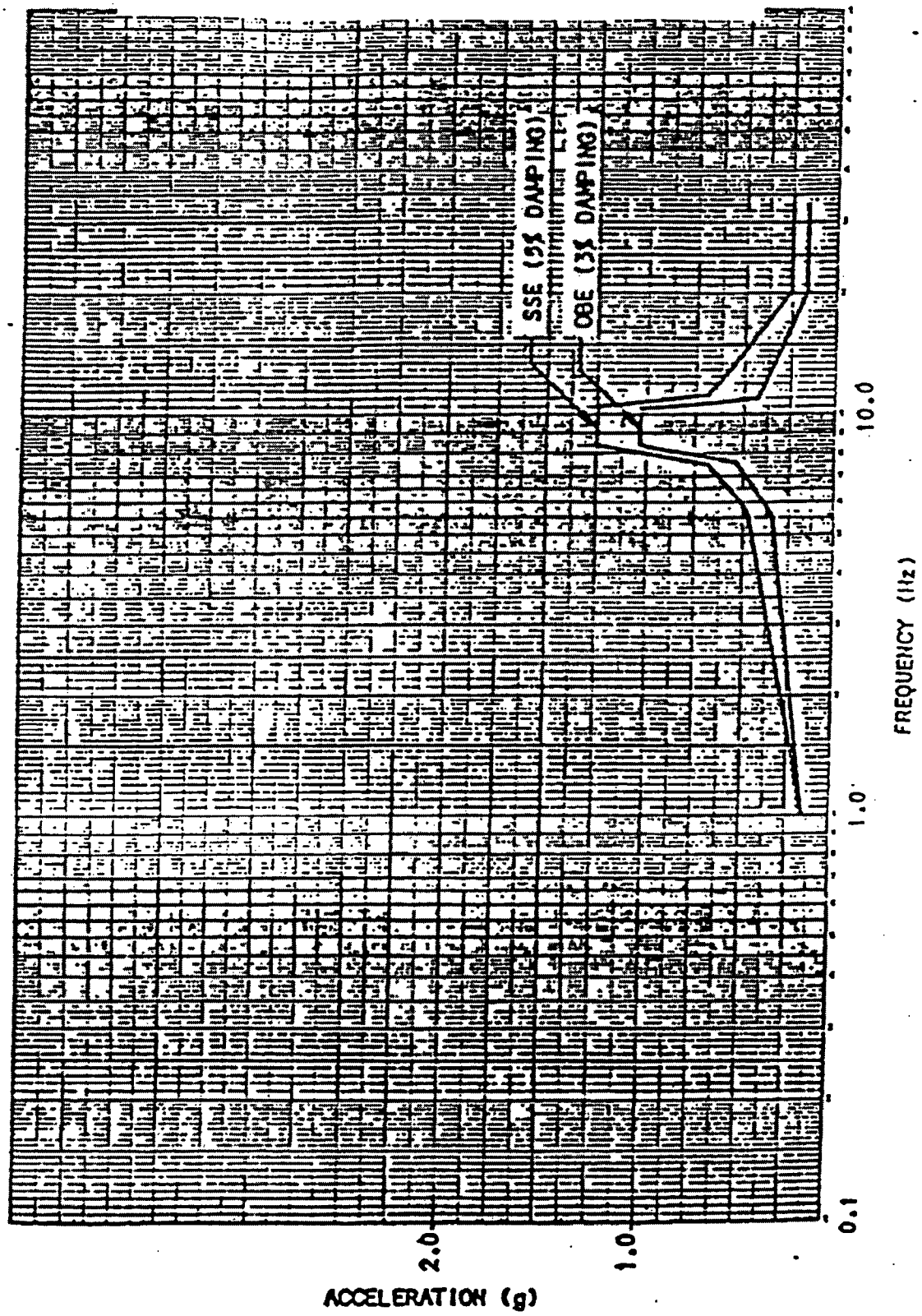


TRIP UNIT OBE Y-DIRECTION QUALIFICATION CURVE



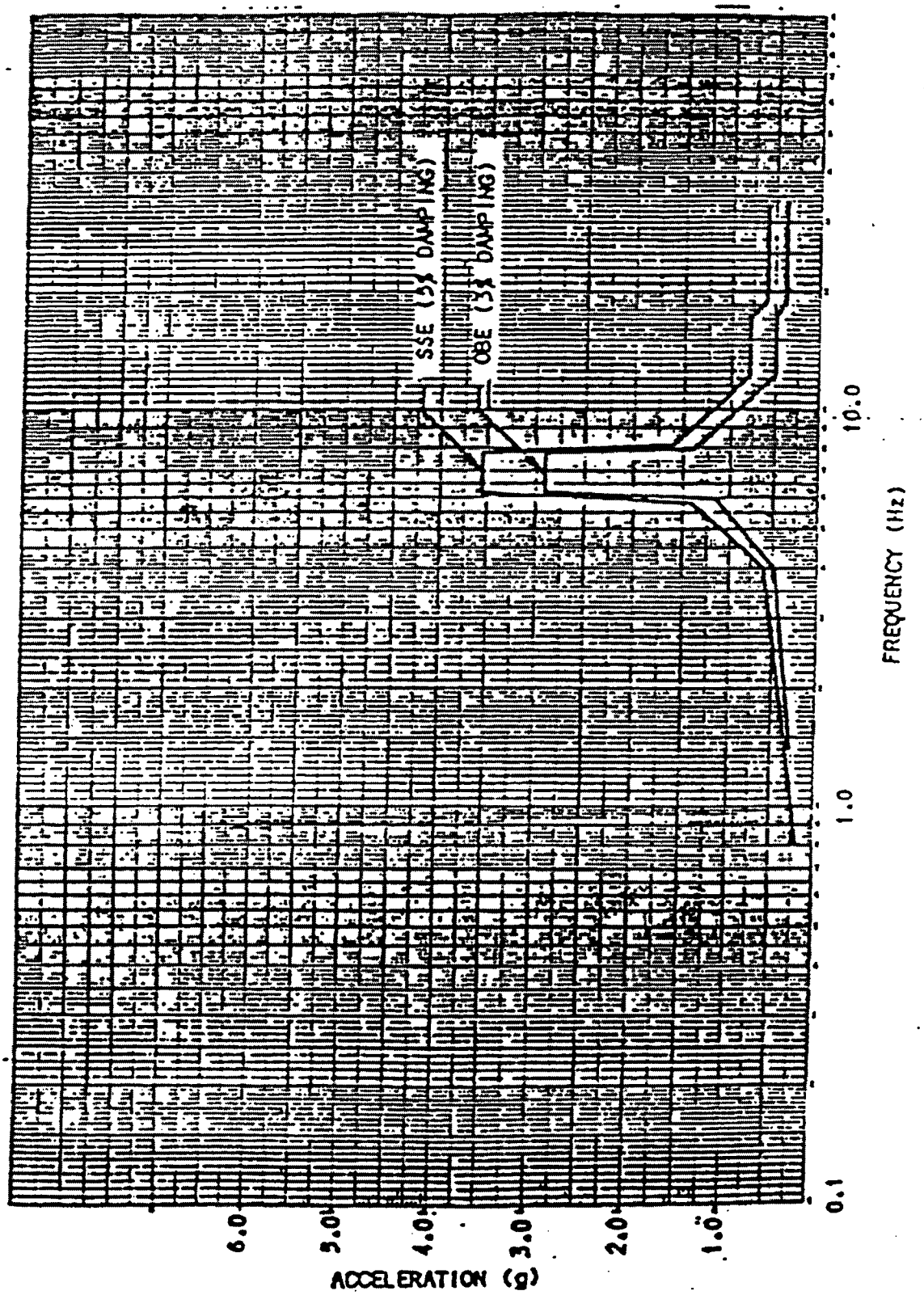
TRIP UNIT OBE X-DIRECTION QUALIFICATION CURVE

ATTACHMENT # 10



CABINET QUALIFICATION SEISMIC OBE/SSE LEVELS - VERTICAL

ATTACHMENT # 11



CABINET QUALIFICATION SEISMIC OBE/SSE LEVELS HORIZONTAL

ATTACHMENT 2.

~~CNG NO 25-326-0025~~ IN1-110

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GE NUCLEAR ENERGY

175 Curtner Avenue
San Jose, CA 95125

GE-NE-901-001-0491
DRF-A00-02406-1(5)
Class I
April 1991

TECHNICAL DESCRIPTION

FOR

GE NUCLEAR ENERGY

ANALOG TRIP UNIT

GE Dwg # 184C5988

PREPARED BY: Philip F. Garber Date: 4/5/91
Philip F. Garber
Technical Project Engineer
Electrical Design Engineering

VERIFIED BY: Clark F. Canham Date: 4-5-91
Clark F. Canham
Manager Plant Electronics
Apllication Engineering

REVIEWED BY: W R Marklein Date: 4/5/91
William R. Marklein, Manager
Electrical Design Engineering

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

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IN1-110

ATT. –

~~CALCND 35-226 COLS~~

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Contents

I. BACKGROUND ON MASTER TRIP UNIT-(MTU) AND SLAVE TRIP UNIT (STU)

The base number for the GE Trip Unit is 184C5988GXXX, where the three X's will be replaced with a three digit number, such as 184C5988G112.

Master Trip Units belong to the Group 100, 200, 400, 500, or 600 Trip Units series. Slave Trip Units are the Group 300 and 700 series.

TRIP UNIT GROUPS			
APPLICATION	INPUT FILTER (Hz)	RESET DIFFERENTIAL (%)	GROUP
4-20 ma DC Current Input MTU	250	0.5 - 20	G100
100-ohm Platinum RTD MTU	250	0.5 - 20	G200
Slave Trip Unit	250	0.5 - 20	G300
Voltage Input MTU	250	0.5 - 20	G400
4-20 ma Current Input MTU	1	0.5 - 20	G500
4-20 ma Current Input MTU	250	0.5 - 50	G600
Slave Trip Unit	250	0.5 - 50	G700

The MTU receives its input signals from analog transmitters, typically Rosemount 1150 series. When the input signal reaches a predetermined value (the setpoint), the MTU changes the state of its trip output. The MTU visually indicates the magnitude of the process parameter monitored with a meter on its front panel. The MTU provide 1 to 5 Vdc output signals, linearly related to the input signal. One output is for driving Slave Trip Units (STU), the other for driving auxiliary analog devices (recorders, meters, etc.).

It should be noted that the GE Trip Units are a direct "plug-in" compatible unit with the Rosemount unit, and no additional accessory hardware and/or components such as card files, calibration units, readout assemblies, card extenders, etc. are required.

II. FUNCTIONAL BLOCK DIAGRAM OF THE MASTER TRIP UNIT

Refer to Attachment No. 1.

III. MASTER TRIP UNIT CALIBRATION AND GROSS FAILURE SETPOINTS

Each MTU provides gross failure detection circuitry which detects when the input signal has deviated beyond the normal 4-20 ma process range. The MTU provides high and low, adjustable gross failure limits. The gross failure output will be low and the gross failure indicator off until the input signal exceeds either gross failure limit; then, the gross failure output will latch high and the gross failure indicator will illuminate and latch.

The High Gross Failure Setpoint is adjustable from approximately 20 to 40 milliamps. The Low Gross Failure Setpoint is adjustable from approximately 0.4 to 4.0 ma. A momentary contact pushbutton resets the gross failure indicator when illuminated and latched, if the input signal has returned to its normal range. The momentary contact pushbutton also resets the gross failure output when latched, only if the input signal has returned to its normal range, and the trip unit is not in the calibration mode.

When the input signal is disconnected from the MTU, and the MTU is not in the calibration mode, the gross failure output latches high, and the gross failure indicator illuminates.

Terminals 8 and 9 are shorted together on the printed circuit (PC) card. This feature is used as part of a continuity loop to detect a "card-out-of-file" condition.

The front-mounted TRIP status indicator, which illuminates when the input signal reaches (or exceeds) the setpoint, is labeled TRIP. The front-mounted GROSS FAILURE status indicator which illuminates when either gross failure limit is exceeded is labeled GROSS FAILURE.

The GE units are plug-in compatible replacements with the Rosemount units and basically utilize similar calibration requirements. There are slight differences in the Gross Fail and Trip Setpoint Hysteresis setpoints. It should be noted that even though the differences are slight, it may require a "note" correction to the Surveillance & Operational Test Procedures or Calibration Procedures to account for slight differences in the reset points.

GROSS FAILURE LED (RED) OPERATION		
MODE	GE	ROSEMOUNT 510 & 710
CAL	1. LED 'OFF' if: LGFS < INPUT < HGFS. 2. LED 'ON' & latched if: INPUT < LGFS or INPUT > HGFS. Can be turned 'OFF' if input returned to within gross fail limits & RESET. Permits checking GROSS FAIL setpoints using CAL UNIT & READOUT ASSEMBLY with TU in cardfile.	1. LED 'ON' but not latched if: LGFS < INPUT < HGFS. 2. LED 'ON' & latched if: INPUT < LGFS or INPUT > HGFS. Cannot be turned 'OFF'. Cannot check GROSS FAIL setpoints with TU in cardfile.
NOT IN CAL	1. LED 'OFF' if: LGFS < INPUT < HGFS. 2. LED 'ON' & latched if: INPUT < LGFS or INPUT > HGFS. Can be turned 'OFF' if input returned to within gross fail limits & RESET.	1. SAME AS GE. 2. SAME AS GE.

GE TRIP UNIT STATUS LED (BI-COLOR GREEN/RED) OPERATION		
MODE	GE	ROSEMOUNT 510 & 710
CAL	Illuminates RED independent of INPUT	Not provided.
NOT IN CAL	1. Illuminates GREEN if: LGFS < INPUT < HGFS. 2. Illuminates & latches RED if: INPUT < LGFS or INPUT > HGFS. Illuminates GREEN when INPUT returns to within GROSS FAIL limits & RESET.	Not provided

IV. MAXIMUM ALLOWABLE TRANSMITTER LOOP RESISTANCE

Total transmitter loop resistance between the +25 Vdc (nominal) power supply and signal common (excluding the resistance of the transmitter and the wiring to and from the MTU to the transmitter) is to be less than 330 ohms.

The loop is powered by the MTU from an external +25 Vdc (nominal) power supply which is connected as input power to the MTU.

V. PERFORMANCE SPECIFICATIONS FOR 18-MONTH DRIFT AND THE EFFECTS OF TEMPERATURE, SEISMIC VIBRATION, AND RADIATION ON THE ACCURACY OF THE TRIP UNIT

Performance specifications for 18-month drift for the MTU would be strictly from empirical data, and does not exist at this time.

Drift is expressed in Percent Full Scale (%FS) of calibrated span for a one month interval.

The MTU meets or exceeds the design drift values listed as follows:

Normal:	0.10% FS
Abnormal (1 Day/Year):	0.20% FS
Design Basis Earthquake (DBE) (LOCA-HELB 180 Days):	0.10% FS

where LOCA = Loss of Coolant Accident
HELB = High Energy Line Break

The design drift value is defined as the amount the output, test jack value, or setpoint deviates from the value it was set at during calibration and the value at which it is found or trips at the end of one month under the identical operational and environmental conditions of the preceeding calibration.

The maximum environmental conditions to which the trip units may be exposed during plant life are as follows:

MAXIMUM ENVIRONMENTAL CONDITIONS			
PARAMETER	NORMAL	ABNORMAL	DBE/POST DBE
DURATION	40 years	1 day/year	180 days
TEMP °F	76.0 for Room Ambient --- 113.5 Cabinet Internal *	40(min)/105(max) for Room Ambient --- 77.5(min)/142.5(max) for Cabinet Internal --- *	76.0 for Room Ambient --- 113.5 Cabinet Internal *
HUMIDITY %RH	50	90	50
PRESSURE	ATM	ATM	ATM
RADIATION	2.5×10^2 Rads total integrated dose	N/A	2.5×10^2 Rads total integrated dose
*	Includes a 37.5 °F cabinet temperature rise based on test data from the cabinet qualification program.		

VI. SEISMIC QUALIFICATION OF THE GE TRIP UNIT AND ROSEMOUNT CARD FILE CONTAINING GE TRIP UNITS OR BOTH GE AND ROSEMOUNT TRIP UNITS

The GE Analog Trip Units have been seismically qualified to generic, bounding seismic exposure levels. During qualification tests, the Test Response Spectra exceeded the Required Response Spectra. This assured the Trip Units at their mounting locations in the test cabinet experienced seismic levels in excess of their specified service condition. The Trip Units were operational during OBE and SSE tests. They were subjected to at least five OBEs and on SSEs in two orientations.

Seismic qualification and adequacy evaluations of specific mounting and service conditions can be performed by analysis and upon request.

VII. PHYSICAL DIMENSIONS AND WEIGHT

Dimensions of the trip units are 6.969 inches high by 1.188 inches wide by 9.875 inches deep.

The weight is 18.0 oz.

VIII TERMINAL ASSIGNMENT AND GROUNDING AND SHIELDING REQUIREMENTS

See Attachment # 2.

IX. LIST OF EXISTING LEGEND/SCALE CONFIGURATIONS

GE Master Trip Unit Model# 184C5988GXXX					
XXX	Input Type	Meter Range	Legend	Type	Div
100	4-20 MA	NO SCALE			
101	4-20 MA	0 TO 1200	PSIG	LINEAR	60
102	4-20 MA	0 TO 35	PSIG	LINEAR	70
103	4-20 MA	0 TO 250	PSIG	LINEAR	50
104	4-20 MA	-150 TO +60	INCHES WC	LINEAR	42
105	4-20 MA	0 TO +60	INCHES WC	LINEAR	60
106	4-20 MA	800 TO 1200	PSIG	LINEAR	40
107	4-20 MA	0 TO +80	INCHES H_2O	LINEAR	40
108	4-20 MA	30 TO 40	PSI IN Hg VAC	OTHER	
109	4-20 MA	0 TO +50	INCHES WC	LINEAR	50
110	4-20 MA	200 TO 500	INCHES WC	LINEAR	60
111	4-20 MA	0 TO 10	PSIG	LINEAR	50
112	4-20 MA	0 TO 1500	PSIG	LINEAR	75
113	4-20 MA	0 TO 30	INCHES	LINEAR	60
114	4-20 MA	0 TO 100	INCHES WC	LINEAR	50
115	4-20 MA	NO SCALE			
116	4-20 MA	0 TO 30	INCHES Hg VAC	LINEAR	60

GE Master Trip Unit
Model# 184C5988GXXX

XXX	Input Type	Meter Range	Legend	Type	Div
117	4-20 MA	-500 TO 0 TO 500	INCHES WC	LINEAR	50
118	4-20 MA	-200 TO 0 TO 200	INCHES WC	LINEAR	40
119	4-20 MA	0 TO 150	PSI	LINEAR	75
120	4-20 MA	0 TO 50	PERCENT	LINEAR	50
121	4-20 MA	0 TO 300	PSIG	LINEAR	50
122	4-20 MA	0 TO 100	PERCENT	LINEAR	50
123	4-20 MA	-3.1 TO 49.6	INCHES ABOVE 263 FT 10 IN	LINEAR	13
124	4-20 MA	-2.2 TO 50.6	INCHES ABOVE 263 FT 10 IN	LINEAR	14
125	4-20 MA	0 TO 210	INCHES	LINEAR	42
200	RTD 3 WIRE PLATINUM	NO SCALE			
201	RTD 3 WIRE PLATINUM	50 TO 350	°F	LINEAR	60
202	RTD 3 WIRE PLATINUM	0 TO 250	°F	LINEAR	50
203					
204					
205					
400	1-5 VDC DIFFERENTIAL	NO SCALE			
401	1-5 VDC DIFFERENTIAL	0 TO 300	°F DIFFERENTIAL	LINEAR	60
402					
403					
404					
405					
500	4-20 MA	NO SCALE			

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~~CALC NO 25-226-C025~~ IN1-110
PAGE 11 OF 15

GE Master Trip Unit Model# 184C5988GXXX					
XXX	Input Type	Meter Range	Legend	Type	Div
501	4-20 MA	-300 TO +300	INCHES WC	LINEAR	60
502	4-20 MA	10 TO 50	INCHES WC	LINEAR	50
503	4-20 MA	0 TO 1200	PSIG	LINEAR	60
504	4-20 MA	0 TO 500	PSIG	LINEAR	50
505	4-20 MA	0 TO 150	PSID	LINEAR	75
506	4-20 MA	NO SCALE			
507	4-20 MA	NO SCALE			
508	4-20 MA	NO SCALE			
509	4-20 MA	NO SCALE			
510	4-20 MA	NO SCALE			
600	4-20 MA	NO SCALE			
602	4-20 MA	0 TO 50	INCHES WC	LINEAR	50
606	4-20 MA	800 TO 1200	PSIG	LINEAR	40

X. PRICING AND DELIVERY

Prices for both MTU's and SLU's are given below. Order quantities of 8 or greater for any particular group (e.g. 184C5988G112) qualify for the volume prices shown below.

Quantity	Master Trip Unit	Slave Trip Unit
1 - 7	$ 12,390 each	$ 10,970 each
8 - 15	$ 11,151 each	$ 9,873 each
16 - 49	$ 9,912 each	$ 8,776 each

ANY QUANTITY ABOVE QUANTITY 49 WILL BE CONSIDERED A BULK PURCHASE. A SEPARATE PRICING LIST HAS BEEN SUPPLIED TO THE BWR OWNERS' GROUP FOR THIS BULK PURCHASE.

Scheduling is approximately 26 weeks from date of order.

Orders above quantity 49 may require special scheduling.

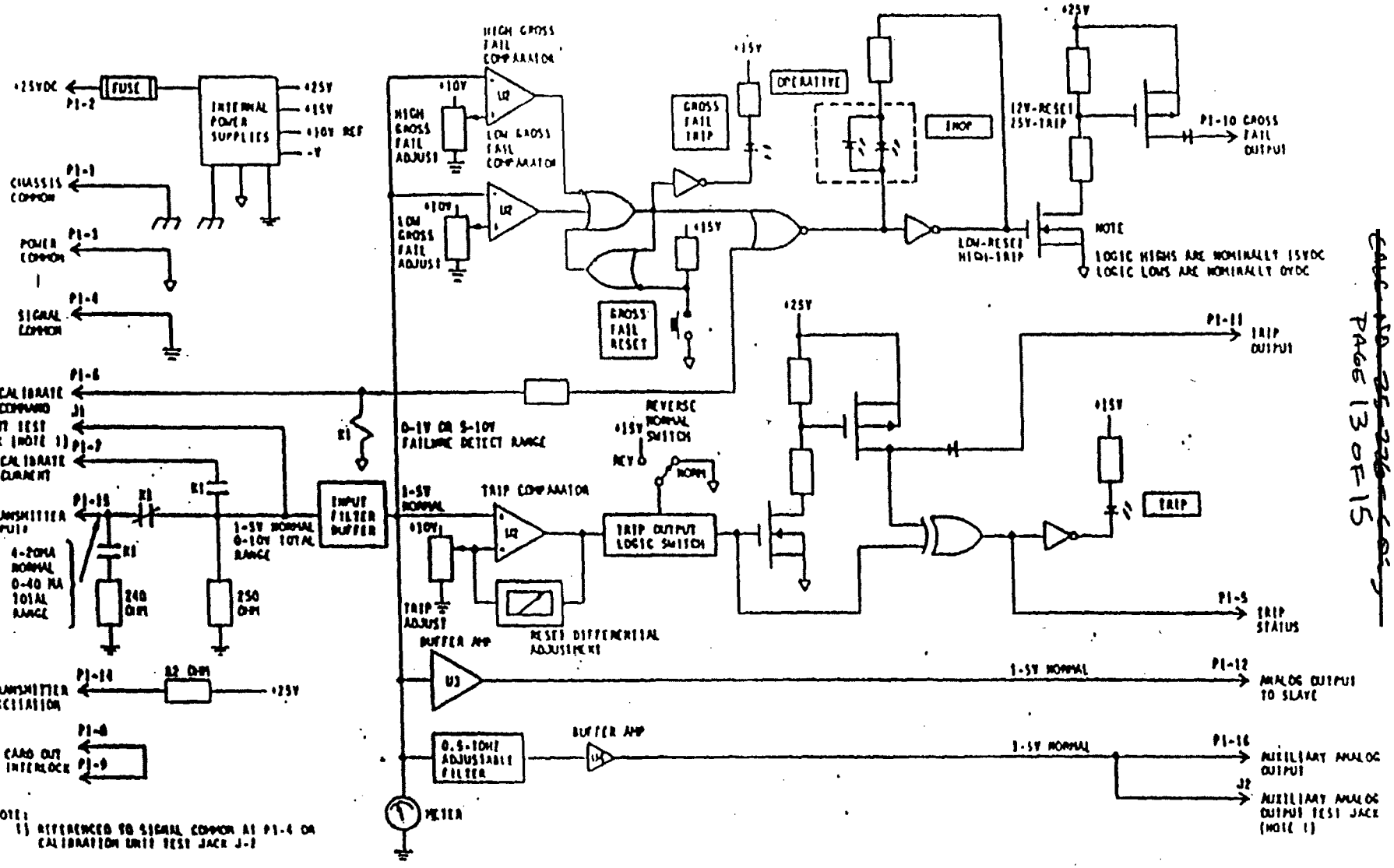

Figure 2-2. Current Input Heater Trip Unit Block Diagram

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GE-NE-901-001-0

Table 3-1. Trip Unit Terminal Assignments

Master and Slave Trip Units
Terminal Bars TB1 through TB12

NOTE: Although calibrate command and calibration current signals are routed to all Trip Units, they are used only by Master Trip Units.

TERMINAL	SIGNAL NOMENCLATURE	REMARKS
1	Chassis Ground	Should be grounded to the relay rack external to the Card File.
2	+25V Power	
3	25V Power Return	This ground is the return for all loads except the analog-to-Slave and auxiliary analog outputs. Power return must be bussed back to the power supply separate from the signal return.
4	Signal Return	This ground is the return for the analog-to-Slave and auxiliary analog outputs, transmitter current, and small currents used to generate reference voltages in each Master Trip Unit. Signal return must be bussed back to the power supply separate from the power return.
5	Trip Status	0 to 12 Vdc logic level to the Readout Assembly in the Calibration Unit. It latches the trip current display after a trip action.
6	Calibrate Command (Master Trip Units)	25 Vdc signal from the Calibration Unit which opens the transmitter signal loop and closes the calibration current loop. It also causes a gross failure indication/output on the Master Trip Unit.
7	Calibration Current (Master Trip Units)	Input of total calibration current from the Calibration Unit.
8	Card Out Alarm	Terminals 8 and 9 are shorted together on the printed circuit board for the Card Out Alarm system.
9	Card Out Alarm	

Table 3-1. Trip Unit Terminal Assignments (Continued)

TERMINAL	SIGNAL NOMENCLATURE	REMARKS
10	Gross Failure Output	Drive for external relays which signals that preset high or low transmitter signal limits have been exceeded, or a Trip Unit is being calibrated.
11	Trip Output	Drive for external relays which operates when the trip point is bypassed through.
12	Analog-Output-to-Slave (Master Trip Units with Analog Output)	0 to 10 Vdc (calibrated from 1 to 5 Vdc) analog signal proportional to transmitter current. Bussed back to power supply by signal return.
	Analog Input (Slave Trip Units)	0 to 10 Vdc (calibrated from 1 to 5 Vdc) analog signal from Master Trip Unit with Analog Output Slave Trip Unit comparators use this signal to determine the trip output state.
13	Not used	
14	4 to 20 mA Transmitter Excitation	23 to 24 Vdc nominal excitation to remote transmitter.
15	4 to 20 mA Transmitter Return	Transmitter current input to Master Trip Unit. Current is fed through a 250-ohm resistor.
16	Auxiliary Analog Output (Master Trip Units with Analog Output)	0 to 10 Vdc (calibrated from 1 to 5 Vdc) analog signal proportional to transmitter current for driving external recorders, controllers, etc. Bussed back to power supply by signal return. The signal is capable of driving resistive loads from 1,500 ohms and up.

ATTACHMENT 3

~~CALC NO. 25-226-6025~~

PAGE 1 OF 6

GE Nuclear Energy

IN1-110

September 30, 1991
NL91.012

Mr. J. Delani
Boston Edison Company
Purchasing Department
800 Boylston Street
Boston, MA 02199

SUBJECT: PROPOSAL FOR NUCLEAR SAFETY RELATED TRIP UNITS - PROPOSAL NO. HK1507DP1

REFERENCE: Boston Edison Company Purchase Order No. NST014526

Dear Mr. Delani:

In response to the referenced purchase order for equipment and qualification documentation for subject trip units, GE Nuclear Energy (GE) is pleased to provide this proposal to Boston Edison Company (BECo).

1.0 SCOPE OF SUPPLY

The proposed scope of supply includes the hardware and associated services to provide the safety related and qualified trip units.

The following is included in the proposed scope of supply as requested by your referenced purchase order:

Item 1 - Six (6) Class 1E, Master Analog Trip Units 184C5988G112

Item 2 - Six (6) Class 1E, Master Analog Trip Units, 184C5988GXX (A group number will be added for the required scale.)

Item 3 - Three (3) copies of Environmental and Seismic Qualification Report

Item 4 - Four (4) copies of GEK-83408 (latest revision)

Item 5 - Safety Related Product Quality Certificate (PQC) for Items 1 and 2.

The master trip units will be furnished safety related and qualified to IEEE 323-1974 and IEEE 344-1975.

2.0 EXCEPTIONS/COMMENTS

2.1 Para 3.0 (APPLICABLE DOCUMENTS)

The provisions of Federal Regulations, IEEE and ANSI standards apply as interpreted by GE.

2.2 Para 4.2 (Analog Output Accuracy)

Exception is taken to the requirement that under normal operating conditions, analog output accuracy shall be within +/- 0.15% from 85°F to 115°F and +/- 0.35% of span per 100°F temperature change over reference conditions.

The trip units will be furnished qualified to the following design requirements:

4-20 mA MTU Slave and Auxiliary Analog Outputs	0.15% of full scale to 113.5 °F and 0.25% of full scale from 113.5°F to 142.5°F (includes 37.5°F cabinet temperature rise)

2.3 Para 4.3 (Trip Point Repeatability)

Exception is taken to the requirement that under normal operating conditions, Master Trip Unit trip point repeatability shall be within +/- 0.13% of span from 85°F to 115°F and +/- 0.20% of span per 100°F temperature change over reference conditions.

The trip units will be furnished qualified to the following design requirements for accuracy (trip point repeatability):

4-20 mA MTU Setpoint	0.13% of full scale to 113.5 °F and 0.20% of full scale from 113.5°F to 142.5°F (includes 37.5°F cabinet temperature rise))

2.4 Para 4.5 (Environmental and Seismic Qualification)

- Environmental - exception is taken to the humidity (abnormal) and radiation requirements. The trip units will be furnished qualified to:

  HUMIDITY (Normal): 90%
  RADIATION: 1E3 (four years qualified life).
  Qualification can be extended provided period surveillance and calibration are performed by BECo as recommended on a monthly basis.

- Seismic - exception is taken to the seismic loading conditions of Appendix A. The trip units as qualified by GE can meet the Appendix A SRRS at 3% Damping, not 5%.

2.5 Para 6.0 (FABRICATION REQUIREMENTS)

Exception is taken to the requirement that trip unit front panels shall be finished with black luster-less polyerethane paint (American Coatings and Chemicals No. 37038) with white lettering.

2.6 Para 8.0 (INSPECTION, EXAMINATION AND TEST REQUIREMENTS)

Present production test practices do not include setting and verification of set points as required by Paragraph 8.1. However, GE can provide this service to BECo as an option at the additional cost indicated in Paragraph 5.5 below.

2.7 Para 9.0 (MAINTENANCE)

- o GE will provide four (4) copies of the latest revision of the standard GEK-83408 (Operating and Maintenance Instructions.)
- o GE does not recommend any spare parts. In case of malfunction, it is recommended that the trip units be returned to GE for repair and return or replacement.

2.8 Para 10.0 (HANDLING, PACKAGING, SHIPPING AND STORAGE)

BECo may audit GE documentation at mutually agreeable terms. Instructions will not be submitted to BECo for approval.

2.9 Para 11.0 (QUALITY ASSURANCE REQUIREMENTS)

- o Quality Assurance functions will be performed under NRC approved and BECo audited and accepted General Electric BWR Quality Assurance Program as described in Licensing Topical Report NEDO-11209.
- o Hold/Witness points are not included in this proposal. Requests for hold/witness points will be discussed and mutually agreed upon.
- o GE cannot assure access to sub-tier vendors for audit purposes.

2.10 Para 12.0 (GUARANTEE)

Guarantee will be per terms and conditions of paragraph 7.0 below.

2.11 Para 13.0 (PROPOSAL REQUIREMENTS)

- o GE cannot provide a list of subcontractors and lower tier suppliers.
- o BECo will be kept advised by the Personal Account Representative of the fabrication and test schedule. Witness and hold points will be discussed and mutually agreed upon.
- o Estimated delivery is thirty six (36) weeks after receipt and GE acceptance of a purchase order from BECo. Actual schedule will be established after order is placed.

2.12 Para 16.0 (DOCUMENTATION REQUIREMENTS)

- o Appendix B. Exception is taken to these requirements. BECo may audit GE documentation at mutually agreeable terms.
- o Spare Parts List. GE does not recommend any spares. We recommend that the trip units be returned to GE for repair and return or replacement.
- o Seismic Report. Exception is taken to the requirement for submittal of Seismic Qualification Report for BECo approval.
- o Drawings. Exception is taken to the requirement for submitting drawings.
- o Instruction Manuals. GE will furnish four (4) copies of the latest revision of the standard GEK-83408 (Operating and Maintenance Instructions - latest revision.)
- o Handling, Packaging, Shipping and Storage. BECo may audit GE instructions related to these activities.
- o Certification. GE will provide certification as described in this proposal.

3.0 RESPONSIBILITIES

3.1 GE

3.1.1 Identify a cognizant program manager responsible for the GE/BECo interface applicable to this program.

3.1.2 Establish a delivery schedule upon receipt and acceptance of the purchase order.

3.1.3 Supply GE scope of hardware and documentation as defined in Section 1.0.

3.1 BECo

3.2.1 Issue a purchase order referencing this proposal and terms and conditions.

3.2.2 Designate a cognizant individual to interface with GE on all matters applicable to this proposal.

3.2.3 Identify any plant specific licensing requirements as well as any state and/or local requirements applicable to the hardware and services offered in this proposal.

3.2.4 Obtain all licensing and regulatory agency approvals.

3.2.5 Provide plant specific seismic requirements (enveloping RRS at the mounting locations).

4.0 SAFETY CLASSIFICATION/QUALITY ASSURANCE

4.1 Services shall be performed in accordance with the General Electric BWR Quality Assurance Program as described in the current NRC accepted revision of Licensing Topical Report, NEDO-11209.

4.2 The proposed Trip Units are classified "Safety Related". The provisions of 10CFR50 Appendix B, and 10CFR21, apply as interpreted by GE.

4.3 BECo access requirements for audits of GE is not included in the proposed scope of supply and shall be arranged upon request at mutually agreeable terms.

4.4 The adequacy and accuracy of all BECo supplied information is the responsibility of BECo.

5.0 PRICE

The firm prices for the scope of supply described in Section 1.0 are as follows:

	DRAWING	DESCRIPTION	QTY.	UNIT PRICE	TOTAL
5.1	184C5988G112	Master Trip Unit	6	$ 12,390	$ 74,340
5.2	184C5988GXXX	Master Trip Unit	6	$ 12,390	$ 74,340
5.3	-----	Environmental and Seismic Qualification Report	1	----	$ 27,800
5.4	----	Operating and Maintenance Manual GEK-83408 (latest revision)	4	----	$ ----
5.5	----	Set & Verification of Set Points	12	$ 1,000	$ 12,000
				TOTAL	$ 188,480

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6.0 SCHEDULE

6.1 Estimated shipment is 36 weeks after receipt and GE acceptance of a purchase order from BECo. Actual schedule will be established after order is placed.

6.2 Documentation identified in Paragraph 1.0 and 2.0 of this proposal will be supplied four (4) weeks after shipment of hardware.

7.0 TERMS AND CONDITIONS

This offering shall be in accordance with and subject to the terms and conditions of the "Agreement between Boston Edison Company considering the Sale of Spare Parts and Services for use in Nuclear Power Plants dated January 12, 1971, as amended to date.

8.0 PROPRIETARY INFORMATION NOTICE

This proposal document is proprietary to GE and is furnished in confidence solely for use in considering the merits of the proposal and for no other direct or indirect use. The information contained herein is not to be distributed, in whole or part, to third parties without the prior consent of GE. If this proposal is not accepted, it is subject to return to GE upon request.

9.0 EXPIRATION DATE

This proposal is valid for a period of ninety (90) days from date of issue, unless extended in writing by GE.

GE is pleased to be of service to BECo in the supply of these trip units. Should you have any questions regarding this proposal, please contact me or N. Lamberti on (408) 925-3602.

925-3652 Cust Svc.

Very truly yours,

Kiran Kumar

Kiran Kumar
Personal Account Representative
PRODUCT SERVICES
MATERIALS & PROCUREMENT SERVICES
M/C 853 - (408) 925-6993

/ng

NEDORANDUM

ATTACHMENT 4

IN1-110

~~CALC NO. 25-220-C025~~

B.E.Co. Form X6604
REV. 3/89

PAGE 1 OF 2

To S. Dasgupta From A. Balta Date 9/25/91

Subject: AC & DC Power Supplies to ATWS Panels C2277 & C2278

Replies to: N/A

References: PSD Calculations PS47, PS65A, PS70 & PS97

Reply Requested: NONE

Requested Date: N/A

Message: (Use attached sheets if required)

SEE ATTACHED

Distribution:

- ☐ Nuclear Engineering Manager
- ☐ Nuclear Engineering Deputy Manager
- ☐ Field Engineering Section Manager
- ☐ Design Section Manager
- ☐ Analysis Section Manager

(Specify others - NED only)

D.P. Richard
B.C. Brousseau
J.J. Coughlin
PSD 91-81

Your memo I&CS #91-231 requested PSD to verify that the 120VAC and 125VDC supplies to the ATWS panels C2277 and C2278 will remain within the following limits under all operating conditions.

120VAC 102-127 volts
125VDC 100-140 volts

Review of calculations PS 47 (DC) and PS 70 (AC) shows that under the worst case loading scenario's the minimum voltage available at the ATWS panels will exceed the minimum allowed voltage. PS 65A and PS 97 (independently review/not approved) show that the 480 V buses supplying 120 volt power to the ATWS panels will not allow the 120V supply to exceed the maximum allowed under normal and shutdown conditions.

The 125VDC supply will not exceed the 140V maximum under any condition. The batteries have a maximum float voltage of less than 135 volts and during equalization when the voltage could be higher, all equipment is disconnected from that bus, or equalization is performed on individual cells.

Based on the above the voltage ranges listed above acceptable for the ATWS equipment

IN1-110

BOSTON
EDISON

ATTACHMENT 5
~~CALC NO 25-226-C025~~
PAGE 1 OF 2

MEMORANDUM
NAD #91-95

TO: S. Dasgupta FROM: J. W. Gosnell DATE: December 26, 1991

Subject: Analytical Limits For ATWS Setpoints

Replies To: I&C 91-314

Reply Requested: N/A

Requested Date: N/A

Message:

(See Attached)

DOCUMENT RELEASED
DEC 30 1991
FOR USE
CONTROL STATION 1

Distribution:
__ Nuclear Engineering Manager
__ Field Engineering Section Manager
X Design Section Manager
X Analysis Section Manager

NAD File #91-95
R. Kelley
D. Richard

Background/Purpose

The current technical specifications for PNPS specify high reactor pressure and low reactor water level setpoints for ATWS mitigation at allowable values equal to that used in the analyses of record, NEDO-25016. Analytical values in a later document, NEDC 31425, have additional margin for measurement uncertainty. However, this document was not reviewed and accepted by BECo until recently. I&CS #91-314 requests that NAD resolve the differences between the documents and related issues. This nedorandum responds to the same.

Discussion

NEDC 31425 was reviewed and accepted by SUDDS 91-178. The upper analytical limit for high pressure ATWS is 1220 psia (1205 psig). Currently, the lower analytical limit is 1190 psia (1175 psig). This limit is not ATWS related and has only a slight affect on reload analyses' peak pressures. Based on the typical sensitivity given in GE document A63HA247, Rev 1, Sheet 30 and the margin available in the analysis of Cycle 9, an analytic limit of 1145 would not invalidate the current core analysis. A value of 1145 psig will be used in the cycle 10 reload analysis. The analytical limit for reactor water level is -57 inches based upon a clarification to NEDC 31425, Table A-2, as given in GE-NE-187-69-1291 (p. 4-6, 7). See also SUDDS 91-177.

There are no errors associated with these setpoints except that identified in GE letter LLC-52-91. ATWS must be functional for the pressure range from 800 psig to 1205 psig. ATWS events that depressurize the reactor would be isolated at 800 psig and repressurize due to reactor power. ATWS need not be functional above the pressure it is designed to actuate. The reactor water temperature range is 500°F-570°F. The air temperature in the drywell is not expected to vary significantly from normal during an ATWS. However, we recommend assuming a range of 100-150°F. The analytical limits are not a function of operating pressure and temperature.

NAD will provide a resolution to S&SA memo 91-67.

Conclusion

The above information provides a response to I&CS #91-314.

IN1-110

BOSTON EDISON COMPANY
PILGRIM STATION

ATTACHMENT 6
~~CALL NO 25-[illegible]~~

TELEPHONE CALL RECORD

PAGE 1 OF 1

TO Brad Brousseau DATE 8/21/91 TIME 3:15 pm

FROM Bob Swanson COMPANY/OFFICE Rosemount Inc.

SUBJECT Stability Beyond 6 months for 1151's PHONE NO. 612-941-7114

Mr. Swanson stated that Rosemount has been conducting extended stability testing on the 1151 transmitters. This testing is informal and will not be used to revise the basic stability specification. The test data does support the conclusion that 1151's will exhibit the majority of drift within the first 48 hours of use and will thereafter remain within specification for at least 2 years.

Action Required: ~~(Yes)~~ (No)

Copies to: Group Leader
RA&P - GL (For Licensing Items)
DCC

SIGNED B Brousseau

Chrono File No: _____

DATE 8/21/91

Subject File No: _____

Page 1 of 1

BECo Form X-5104

Attachment 2 to ENCLOSURE 1

To Entergy Letter No. 2.11.007

Pilgrim Calibration Procedure, 8.M.1-29, "ATWS Trip Unit Calibration Test" Rev. 50
(152 pages)

RTYPE H6.08

PILGRIM NUCLEAR POWER STATION

Procedure No. 8.M.1-29

ATWS TRIP UNIT CALIBRATION TEST

STAR

Stop
Think
Act
Review

CONTINUOUS USE

PM DATABASE RELATED

REVISION LOG

REVISION 50 **Date Originated 11/10**

Pages Affected	Description
	(Revisions 40 through 49 omitted due to MERLIN revision numbering scheme.)
10	In Step 9.0[3](b), correct component to be a PIS instead of an LIS and correct actuation pressure from 1160-1190 psig to 1170-1180 psig. (CR-PNP-2010-3540)
10,12,81	Update terminology to reflect Asset Suite implementation.
12,81	Delete reference to PNPS 1.3.34 regarding Pre-Evolution Brief.
79,149	Change Superintendent to Supervision.

REVISION 39 **Date Originated 8/04**

Pages Affected	Description
1	Delete "High Risk" from title.
3,11,13,77,141	Add Alarm Summary Sheet Attachment.
10	Allow Maintenance Lead to perform Maintenance Management functions/responsibilities.
12,76	Add "if required" to PEB step.
15	Correct referenced Rx Bldg elevation to be 51', not -51'.
37	Add DS10C Panel C2277 to supervisory lights to be verified.
140	Add lines to record date and performer's name and statement to include applicable Attachment number.

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

This Procedure provides detailed instructions for qualified Maintenance personnel in performing functional testing and calibration of the Anticipated Transient Without Scram (ATWS) analog trip system. Performance of this Procedure partially satisfies Technical Specifications as listed on the table below.

TECHNICAL SPECIFICATIONS SURVEILLANCE REQUIREMENTS	EQUIPMENT TESTED
4.2.G Minimum Test and Calibration Frequency for ATWS RPT/ARI Instrumentation	
Reactor High Pressure	PIS-263-123A PIS-263-123B PIS-263-123C PIS-263-123D PS-263-123A-1 PS-263-123B-1 PS-263-123C-1 PS-263-123D-1
Reactor Low-Low Water Level	LIS-263-121A LIS-263-121B LIS-263-121C LIS-263-121D

2.0 REFERENCES

2.1 DEVELOPMENTAL

[1] NRCCC Item PAPR 020 (Pre-Evolution Briefing)

[2] Plant Design Changes (PDCs/FRNs/ERs/ECs)

(a) 86-102: SEP Feedwater Pump Trip Modification

(b) 87-30: RPT Motor Drive Breaker

(c) 91-47: Replacement of Rosemount Master Analog Trip Units

[3] Problem Reports (PRs)

(a) 93.9004, ATWS Cont. Lights DS10A/DS10C De-energized

(b) 95.9314.04, LIS-263-121A (ATWS) Failed During 8.M.1-29

[4] Technical Specifications

(a) Table 3.2.G: Instrumentation That Initiates Recirculation Pump Trip and Alternate Rod Insertion

(b) Table 4.2.G: Minimum Test and Calibration Frequency for ATWS RPT/ARI Instrumentation

[5] Vendor Manual V-0242: ATWS Analog Trip System Instruments

2.2 IMPLEMENTING

[1] P&ID M250: Control Rod Hydraulic System

[2] P&ID M253: Nuclear Boiler

[3] PNPS 1.3.34, *"Operations Administrative Policies and Processes"*

[4] PNPS Elementary Diagrams

(a) M1Y1: ATWS System

(b) M1Y2: ATWS System-Instrument Data Sheet

(c) M1Y3: ATWS System

(d) M1Y4: ATWS System Power Supply

(e) M1Y5: ATWS System Power Supply

(f) M1Y6: ATWS System

(g) M1Y7: ATWS System

(h) M1Y8: ATWS System

(i) M1Y9: ATWS System

(j) M1Y10: ATWS System

(k) M1Y11: ATWS System

(l) M1Y12: ATWS System

(m) M1Y13: ATWS Feedwater Pump Trip System

[5] PNPS Schematic Diagram

(a) E550 Sh. 7, Reactor Water Level Loop 'A' PAM System

(b) E550 Sh. 8, Reactor Water Level Loop 'B' PAM System

3.0 DEFINITIONS

None

4.0 DISCUSSION

[1] Impact on Operations

(a) Surveillance Summary - This Procedure calibrates the Division 1 (C2277) and Division 2 (C2278) ATWS trip units by simulating an input signal by use of a readout assembly for Reactor level and Reactor pressure, including the following:

- Trip setpoints [Low-Low Reactor Level (-46"), High Reactor Pressure (1175 psig and 1400 psig)]
- Proper alarm response
- Proper relay response
- Proper circuit supervisory light response
- Calibration of the trip unit indicators

(b) Impact

- ATWS Division 1 will be inoperable during performance of Attachment 1.
- ATWS Division 2 will be inoperable during performance of Attachment 2.

(c) Technical Specifications

- Tables 3.2.G/4.2.G

(d) Other

- PNPS 1.3.34 Section 6.14

[2] The ATWS System provides for an addition of negative reactivity to the core (tripping Recirculation Pumps and letting air off Scram header) in the event of a transient (Hi-Hi Reactor pressure or Low-Low Reactor water level) without a Scram having taken place.

[3] The ATWS System is composed of four trip channels which make two trip systems.

Channels "A" and "C" compose Trip System "A" and it is housed in Panel C2277.
Channels "B" and "D" compose Trip System "B" and it is housed in Panel C2278.

NOTE

Recirculation pump trip circuits are valid only when pumps are running. Lights will be off when pumps are off.

Feedwater pump trip circuits are valid only when pumps are running. Lights will not light when the pumps are off.

Neon lamps are used in these circuits to minimize the current flow through the trip coil and prevent false trip.

[4] Each trip system has three trip circuits, each trip circuit is equipped with a light system. Two neon lamps are connected in series and are in series with a trip coil. During normal operation the trip relays are de-energized (untripped) and normal voltage across each neon lamp is approximately 66V DC.

[5] When one trip relay energizes (half-trip), the voltage across lamps connected in parallel with closed contacts will go to approximately 0 volts DC and the lamps will turn off. This indicates tripped relay contacts have closed. Relay contacts and associated lamps are listed in Attachments 1 and 2.

[6] The indicator lights used are neon lamps which, when lit with one channel tripped, draw insufficient current to actuate the trip devices. When no channel is tripped, it is intended that none of the indicator lights be lit. However, because the voltage to maintain neon lamps lit is less than the threshold firing voltage of lamps, in some cases, both lamps in series may be lit. Therefore, when no channel is tripped, the pairs of indicator lamps may be either both lit or both off. When a channel is tripped, only one of the lights will be lit.

[7] Notify Operations that EPIC "RPV Level Validation Screen #71" will be affected during the calibration of LIS-263-121A and LIS-263-121C.

5.0 SPECIAL TOOLS AND EQUIPMENT

[1] Rosemount readout assembly and extender card

[2] Multimeter

[3] CR keys for access to Racks C2277 and C2278

6.0 PRECAUTIONS AND LIMITATIONS

6.1 PRECAUTIONS

[1] Only one master trip unit and associated slave unit(s) may be tested or calibrated at a given time.

[2] Exercise caution while performing test. Reactor Scram and inadvertent safeguard initiation could be the result of not following instructions.

[3] During the prejob brief the need for extra caution when manipulating the trip unit Calibration Selector knob (Press To Cal small knob) needs to be discussed. It is necessary to verify that the calibration unit CAL light does not light while manipulating the rotary knob. Whenever the CAL light is on, the calibration current is being supplied to the selected trip units. If care is not taken when using the trip unit Calibration Selector knob (Press To Cal small knob), the potential exists that an ATWS may be received if multiple trips occur. (PR01.8151)

[4] The indicator lights used are neon lamps which, when lit with one channel tripped, draw insufficient current to actuate the trip devices. When no channel is tripped, it is intended that none of the indicator lights be lit. However, because the voltage to maintain neon lamps lit is less than the threshold firing voltage of lamps, in some cases, both lamps in series may be lit. Therefore, when no channel is tripped, the pairs of indicator lamps may be either both lit or both off. When a channel is tripped, only one of the lights will be lit.

[5] I&C Technicians shall use a different Rosemount readout assembly for Attachment 2 than what was used in Attachment 1.

6.2 LIMITATIONS

The ATWS System is only required when the REACTOR MODE switch is in the RUN mode. Refer to Technical Specifications Table 3.2.G for the required number of instrument channels per trip system.

7.0 PREREQUISITES

[1] No channels within the ATWS System may be in calibration, test, or alarm condition.

[2] ATWS System must be powered up.

[3] Readout assembly must be calibrated in accordance with PNPS 3.M.1-10.4, "*Calibration of Rosemount Trip Unit Readout Assembly*", prior to use. After calibration, readout assembly shall not be left unattended until its usage for this Procedure is finished.

[4] Check with Radiation Protection (RP) on conditions and requirements. Initiate a Radiological Work Permit (RWP) if required.

[5] Obtain the on-shift SRO's signature for permission to begin test.

8.0 PROCEDURE

[1] One or more trip units may be skipped while performing this Procedure. After performing calibration of number of trip units desired, Return to Service steps must be performed. Upon completion of trip unit calibration, alarm(s) associated with the trip unit must be reset before proceeding to next trip unit.

[2] **WHEN** test is being performed with Reactor Recirculation Pumps and Reactor Feed Pumps not running, **ENTER** "N/P" (for "not performed") for steps which verify circuit supervisory lights become bright. (Lights are normally off when pumps are not running.)

(a) ARI circuit supervisory lights DS5A, B, C, and D are valid during all plant conditions and must operate according to Procedure.

[3] **WHEN** test is being performed with Reactor Recirculation Pump and Reactor Feed Pumps running, **ENTER** "N/P" (for "not performed") for steps which verify relay status. (Lights changing status verifies relay status change.)

[4] **PERFORM** the procedural steps for ATWS Trip Unit Cabinet C2277 calibration test as written in Attachment 1.

[5] **PERFORM** the procedural steps for ATWS Trip Unit Cabinet C2278 calibration test as written in Attachment 2.

9.0 ACCEPTANCE CRITERIA

[1] The instrument calibration test was performed as written without discrepancies or with discrepancies evaluated as acceptable by the Shift Manager (SM) as indicated by Attachments 1 and 2 being completed with required signatures and initials, and with a second person's verification of system restorations.

[2] All channels tested satisfactorily and caused the appropriate trip relay to change state.

[3] ATWS analog trip units actuate as follows:

(a) LIS-263-121A, B, C, and D actuate at greater than 4.16mA signal (-49 inches indicator level) or greater than or equal to 77.26 inches above the top of the active fuel. **[Tech Spec Table 3.2-G]**

(b) PIS-263-123A, B, C, and D actuate on increasing signal between 1170 psig and 1180 psig (16.37 to 16.69V DC) in accordance with Technical Specifications requirements. **[Tech Spec Table 3.2-G]**

[4] Verification of relay position is not required if the Reactor Feed Pumps and Reactor Recirculation Pumps are running.

10.0 CORRECTIVE ACTION

[1] If equipment failed to perform its intended function or a discrepancy is encountered during the test, discontinue testing and immediately notify the Maintenance Supervisor and the SM. The Maintenance Supervisor and the SM must determine whether testing should be terminated, continued, or an investigation be performed.

[2] If equipment failed to perform its intended function, the appropriate corrective action document shall be initiated. The SM must be notified of the failure to allow Operations to initiate action deemed necessary in accordance with Technical Specifications.

11.0 ACCEPTANCE VERIFICATION AND SIGNOFF

[1] Maintenance Management/Lead is responsible for reviewing this Procedure to ensure all Acceptance Criteria have been satisfied prior to taking credit for test performance in the PM database.

[2] The on-shift SRO shall verify that all Acceptance Criteria were met and evaluate any discrepancies for acceptability.

[3] Maintenance Management/Lead shall review steps marked as "N/P" to verify correct component response(s) and proper data gathering.

12.0 ATTACHMENTS

ATTACHMENT 1 - ATWS TRIP UNIT CABINET C2277 CALIBRATION

ATTACHMENT 2 - ATWS TRIP UNIT CABINET C2278 CALIBRATION

ATTACHMENT 3 - I&C PROCEDURE FEEDBACK FORM

ATTACHMENT 4 - ALARM SUMMARY SHEET

ATWS TRIP UNIT CABINET C2277 CALIBRATION

[1] **PERFORM** the procedural steps for each instrument in the order they are written. For each step with a [ ], **SIGNIFY** completion with a check mark. For each step with a _____, **ENTER** initials or data as appropriate. For a step followed by a double _____, that step shall require verification with two individuals' signed initials required to signify completion. "N/P" (for "not performed") may be placed by a procedural step where performance of that step has been conditionally stated and the condition(s) has not been met.

[2] **DOCUMENT** in the space provided below the reason this test is being performed (**CHECK** one):

[ ] Routine Surveillance

[ ] Postwork testing for Work Order # _____

[ ] Other (specify) _____

_____

[3] Prerequisites

(a) Personnel assigned to perform this Attachment have read and understand what is required. All personnel involved must print their name and the date and sign their initials below.

Name (print)	Date	Initials

(b) IF required, a Pre-Evolution Brief has been completed and attached to this surveillance. **[NRCCC Item PAPR 020]**

_____
Initials

(c) **COORDINATE** action to be taken with Operations personnel **AND OBTAIN** the on-shift SRO's signature as permission to begin test.

On-Shift SRO signature	Date	Time

(d) **CONFIRM** with Operations that no other testing is being performed on the ATWS System.

_____ Initials

(e) **PRIOR** to start of testing, **PROVIDE** Operations with Attachment 4 (Alarm Summary Sheet).

_____ Initials

(f) **VERIFY** that the prejob brief discussed the need to verify that the CAL light is OFF when the Press To Cal knob (smaller knob) is pulled out. (PR01.8151)

_____ Initials

(g) Radiation Protection (RP) notified.

_____ Initials

(h) ATWS System is powered up.

_____ Initials

NOTE

Readout assembly must be calibrated prior to calibration of trip unit(s). Readout assembly need not be recalibrated for continuous use for more than one trip unit; but if the readout assembly is left unattended, it must be recalibrated prior to use.

(i) **IF** PNPS 8.M.1-29 Attachment 2 was performed within the last 4 days, **THEN RECORD** the readout assembly used in PNPS 8.M.1-29 Attachment 2. **IF** PNPS 8.M.1-29 Attachment 2 was NOT performed within the last 4 days, **ENTER** "N/P".

_____
Initials

Readout assembly for PNPS 8.M.1-29 Attachment 2 M&TE #_____

IF PNPS 8.M.1-29 Attachment 2 was performed within the last 4 days, **THEN OBTAIN** from M&TE a different readout assembly than what was used in PNPS 8.M.1-29 Attachment 2. **RECORD** the information from the calibration sticker for readout assembly to be used in PNPS 8.M.1-29 Attachment 1. **IF** PNPS 8.M.1-29 Attachment 2 was NOT performed within the last 4 days, **ENTER** "N/P".

Readout assembly for PNPS 8.M.1-29 Attachment 1 M&TE #_____

Calibration performed by _____

Time _____ Date _____

IF PNPS 8.M.1-29 Attachment 2 was NOT performed within the last 4 days, **THEN OBTAIN** a calibrated readout assembly from M&TE personnel **AND RECORD** information from the calibration sticker. **IF** PNPS 8.M.1-29 Attachment 2 was performed within the last 4 days, **ENTER** "N//P".

Readout assembly for PNPS 8.M.1-29 Attachment 1 M&TE #_____

Calibration performed by _____

Time _____ Date _____

(1) **VERIFY** calibration of readout assembly was performed within the last 48 hours **AND** the readout assembly has NOT been left unattended since the calibration. _____ Initials

(j) **ESTABLISH** communications between Control Room and ATWS Cabinet C2277 (Rx Bldg 51'). _____ Initials

[4] Cabinet Power Supply Test

(a) **VERIFY** the following power supply to ATWS logic Panel C2277 lights are ON:

(1) Power Supply PS1A _____ Initials

(2) Power Supply PS2A _____ Initials

(b) **DEPRESS** power supply monitoring circuit test button K37A at Panel C2277. [ ]

(c) **VERIFY** associated power supply light PS1A goes off. _____ Initials

(d) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. _____ Initials

(e) **RELEASE** power supply test button K37A. [ ]

(f) **VERIFY** power supply light PS1A comes on. _____ Initials

(g) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

(h) **DEPRESS** power supply monitor circuit test button K38A at Panel C2277. [ ]

(i) **VERIFY** associated power supply light PS2A goes off. _____ Initials

(j) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. _____ Initials

(k) **RELEASE** power supply test button K38A. [ ]

(l) **VERIFY** power supply light PS2A comes on. _____ Initials

(m) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

[5] Calibration Unit: General Preparation

(a) **VERIFY** the calibration unit is in the following condition at ATWS Cabinet C2277:

(1) Power switch is in "OFF" position. [ ]

(2) Transient Current knob is pulled out and turned fully counterclockwise. [ ]

(3) Press To Cal knob (smaller knob) is in the "OFF" position and pushed in. [ ]

(4) Press To Cal knob (larger knob) is in the "OFF" position. [ ]

(b) **TURN** the Stable Current knob fully counterclockwise. [ ]

(c) **PLUG IN** the readout assembly with extender card to the calibration unit. [ ]

(d) **TURN ON** the power. [ ]

(e) **ALLOW** minimum of 10 minutes warm-up time for the readout assembly. [ ]

[6] Trip Unit Calibration

(a) LIS-263-121A

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #1 for LIS-263-121A. [ ]

b. **SET** smaller knob to slot #1 for LIS-263-121A. [ ]

(3) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR.

_____ Initials

(4) **SELECT OR VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to LIS-263-121A by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are bright.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____
Initials

b. Circuit supervisory lights are OFF.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____
Initials

c. Relays are ENERGIZED:

1. K1A at Panel C2277
_____
Initials

2. K101A at Panel C2277
(This relay has a 9-second time delay.)
_____
Initials

3. K4A at Panel C2277
_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly. (**IF** required, **PUSH** Trip Current Display Reset.) [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND RECORD** the "As-Found" data for LIS-263-121A indicator.

Stable Current Reading mA	Indicator Inches	Increasing "As-Found"
4.32	-48 (-46 to -50)	_____
8.0	-25 (-23 to -27)	_____
12.0	0 (-2 to +2)	_____
16.0	+25 (+23 to +27)	_____
19.68	+48 (+46 to +50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 4.96mA; No Adjust Limits are 4.80 to 5.12mA.

"As-Found" Reset _____ mA
Data

(10) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit LIS-263-121A. _____
Initials

(11) **VERIFY** the following:

a. Relays are DE-ENERGIZED:

1. K1A at Panel C2277 _____ Initials

2. K101A at Panel C2277
(This relay has a 9-second time delay.) _____ Initials

3. K4A at Panel C2277 _____ Initials

b. Circuit supervisory lights become normal - not bright

1. DS3C at Panel C2277 [ ]

2. DS4C at Panel C2277 [ ]

3. DS5C at Panel C2277 [ ]

4. DS10C at Panel C2277 [ ]

5. DS11C at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright

1. DS3A at Panel C2277 [ ]

2. DS4A at Panel C2277 [ ]

3. DS5A at Panel C2277 [ ]

4. DS10A at Panel C2277 [ ]

5. DS11A at Panel C2277 [ ]

_____ Initials

(12) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for LIS-263-121A indicator.

Stable Current Reading mA	Indicator Inches	Decreasing "As-Found"
19.68	+48 (+46 to +50)	_____
16.0	+25 (+23 to +27)	_____
12.0	0 (-2 to +2)	_____
8.0	-25 (-23 to -27)	_____
4.32	-48 (-46 to -50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(14) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 4.64mA (-46 inches indicator reading); No Adjust Limits are 4.62 to 4.66mA.

"As-Found" Trip _____ mA
Data

(15) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit LIS-263-121A. _____
Initials

(16) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K1A at Panel C2277 _____ Initials

2. K101A at Panel C2277 _____ Initials

3. K4A at Panel C2277 _____ Initials

b. Circuit supervisory lights are OFF.

1. DS3A at Panel C2277 [ ]

2. DS4A at Panel C2277 [ ]

3. DS5A at Panel C2277 [ ]

4. DS10A at Panel C2277 [ ]

5. DS11A at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights become bright.

1. DS3C at Panel C2277 [ ]

2. DS4C at Panel C2277 [ ]

3. DS5C at Panel C2277 [ ]

4. DS10C at Panel C2277 [ ]

5. DS11C at Panel C2277 [ ]

_____ Initials

(17) **IF** trip point was less than 4.59mA (-46.3 inches indicator reading), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(18) **PUSH** the Trip Current Display Reset **AND VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **CALIBRATE AND RECORD** "As-Left" data.

a. LIS-263-121A "As-Left" Trip 4.64mA (4.62 to 4.66mA) _____ mA
Data

b. LIS-263-121A "As-Left" Reset 4.96mA (4.80 to 5.12mA) _____ mA
Data

c. Indicator LIS-263-121A

Current Reading mA	Desired Reading inches	"As-Left" Inc.	"As-Left" Dec.
4.32	-48 (-46 to -50)	_____	_____
8.0	-25 (-23 to -27)	_____	_____
12.0	0 (-2 to +2)	_____	_____
16.0	+25 (+23 to +27)	_____	_____
19.68	+48 (+46 to +50)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND** **TURN FULLY COUNTERCLOCKWISE.** [ ]

e. **PUSH** Gross Fail Reset button on Trip Unit LIS-263-121A **AND VERIFY** Gross Fail light is OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** the Gross Fail Reset button on Trip Unit LIS-263-121A **AND VERIFY** Gross Fail light is OFF. _____ Initials

THEN

c. **ROTATE** the Press to Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(23) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS3C at Panel C2277 [ ]

b. DS4C at Panel C2277 [ ]

c. DS5C at Panel C2277 [ ]

d. DS3A at Panel C2277 [ ]

e. DS4A at Panel C2277 [ ]

f. DS5A at Panel C2277 [ ]

g. DS10A at Panel C2277 [ ]

h. DS10C at Panel C2277 [ ]

i. DS11A at Panel C2277 [ ]

j. DS11C at Panel C2277 [ ]

_____
Initials

(b) LIS-263-121C

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND** **VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #2 for LIS-263-121C. [ ]

b. **SET** smaller knob to slot #2 for LIS-263-121C. [ ]

(3) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR.

_____ Initials

(4) **SELECT** **OR** **VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to LIS-263-121C by pushing in the smaller knob of the Press to Cal knob **AND** **VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are OFF.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____
Initials

b. Circuit supervisory lights are bright.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____
Initials

c. Relays are ENERGIZED:

1. K1C at Panel C2277
_____
Initials

2. K101C at Panel C2277
(This relay has a 9-second time delay.)
_____
Initials

3. K4C at Panel C2277
_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND RECORD** the "As-Found" data for LIS-263-121C indicator.

Stable Current Reading mA	Indicator inches	Increasing "As-Found"
4.32	-48 (-46 to -50)	_____
8.0	-25 (-23 to -27)	_____
12.0	0 (-2 to +2)	_____
16.0	+25 (+23 to +27)	_____
19.68	+48 (+46 to +50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 4.96mA; No Adjust Limits are 4.80 to 5.12mA.

"As-Found" Reset _____ mA
Data

(10) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit LIS-263-121C. _____
Initials

(11) **VERIFY** the following:

a. Relays are DE-ENERGIZED:

1. K1C at Panel C2277 _____ Initials

2. K101C at Panel C2277
(This relay has 9-second time delay.) _____ Initials

3. K4C at Panel C2277 _____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS3C at Panel C2277 [ ]

2. DS4C at Panel C2277 [ ]

3. DS5C at Panel C2277 [ ]

4. DS10C at Panel C2277 [ ]

5. DS11C at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS3A at Panel C2277 [ ]

2. DS4A at Panel C2277 [ ]

3. DS5A at Panel C2277 [ ]

4. DS10A at Panel C2277 [ ]

5. DS11A at Panel C2277 [ ]

_____ Initials

(12) **PUSH** the Trip Current Display reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for LIS-263-121C indicator.

Stable Current Reading mA	Indicator inches	Decreasing "As-Found"
19.68	+48 (+46 to +50)	_____
16.0	+25 (+23 to +27)	_____
12.0	0 (-2 to +2)	_____
8.0	-25 (-23 to -27)	_____
4.32	-48 (-46 to -50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(14) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 4.64mA (-46 inches indicator reading); No Adjust Limits are 4.62 to 4.66mA.

"As-Found" Trip _____ mA
Data

(15) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit LIS-263-121C. _____
Initials

(16) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K1C at Panel C2277 _____ Initials

2. K101C at Panel C2277 _____ Initials

3. K4C at Panel C2277 _____ Initials

b. Circuit supervisory lights become bright.

1. DS3A at Panel C2277 [ ]

2. DS4A at Panel C2277 [ ]

3. DS5A at Panel C2277 [ ]

4. DS10A at Panel C2277 [ ]

5. DS11A at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights are OFF.

1. DS3C at Panel C2277 [ ]

2. DS4C at Panel C2277 [ ]

3. DS5C at Panel C2277 [ ]

4. DS10C at Panel C2277 [ ]

5. DS11C at Panel C2277 [ ]

_____ Initials

(17) **IF** trip point was less than 4.59 mA (-46.3 inches indicator reading), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(18) **PUSH** the Trip Current Display Reset **AND VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **THEN CALIBRATE AND RECORD** "As-Left" data.

a. LIS-263-121C "As-Left" Trip 4.64mA (4.62 to 4.66mA) _____ mA
Data

b. LIS-263-121C "As-Left" Reset 4.96mA (4.80 to 5.12mA) _____ mA
Data

c. Indicator LIS-263-121C

Current Reading mA	Desired Reading inches	"As-Left" Inc.	Dec.
4.32	-48 (-46 to -50)	_____	_____
8.0	-25 (-23 to -27)	_____	_____
12.0	0 (-2 to +2)	_____	_____
16.0	+25 (+23 to +27)	_____	_____
19.68	+48 (+46 to +50)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (and, if required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset button on Trip Unit LIS-263-121C **AND VERIFY** Gross Fail light is OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** the Gross Fail Reset button on Trip Unit LIS-263-121C **AND VERIFY** Gross Fail light is OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(23) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a.	DS3C at Panel C2277	[ ]
b.	DS4C at Panel C2277	[ ]
c.	DS5C at Panel C2277	[ ]
d.	DS3A at Panel C2277	[ ]
e.	DS4A at Panel C2277	[ ]
f.	DS5A at Panel C2277	[ ]
g.	DS10A at Panel C2277	[ ]
h.	DS10C at Panel C2277	[ ]
i.	DS11A at Panel C2277	[ ]
j.	DS11C at Panel C2277	[ ]

_____
Initials

(c) PIS-263-123A

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND** **VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #3 for PIS-263-123A. [ ]

b. **SET** smaller knob to slot #3 for PIS-263-123A. [ ]

(3) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR.

_____ Initials

(4) **SELECT** **OR** **VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PIS-263-123A by pushing in the smaller knob of the Press to Cal knob **AND** **VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____
Initials

c. Relays are DE-ENERGIZED:

1. K2A at Panel C2277

_____
Initials

2. K5A at Panel C2277

_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND** **RECORD** the"As-Found" data for PIS-263-123A indicator.

Stable Current Reading mA	Indicator psig	Increasing "As-Found"
4.8	75 (30 to 120)	_____
8.0	375 (330 to 420)	_____
12.0	750 (705 to 795)	_____
16.0	1125 (1080 to 1170)	_____
19.2	1425 (1380 to 1470)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 16.53mA (1175 psig); No Adjust Limits are 16.51 to 16.55mA.

"As-Found" Trip _____ mA
Data

(10) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PIS-263-123A. _____
Initials

(11) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K2A at Panel C2277 _____ Initials

2. K5A at Panel C2277 _____ Initials

b. Circuit supervisory lights are OFF.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights become bright.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____ Initials

(12) **IF** trip point was less than 16.48mA (1170 psig) **OR** greater than 16.58mA (1180 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(13) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(14) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for PIS-263-123A indicator.

Stable Current Reading mA	Indicator psig	Decreasing "As-Found"
19.2	1425 (1380 to 1470)	_____
16.0	1125 (1080 to 1170)	_____
12.0	750 (705 to 795)	_____
8.0	375 (330 to 420)	_____
4.8	75 (30 to 120)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

a) **OR**

[ ] Calibration Required

(15) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 16.21mA; No Adjust Limits are 16.05 to 16.37mA.

"As-Found" Reset _____ mA
Data

(16) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PIS-263-123A. _____
Initials

(17) **VERIFY** the following:

a. Relays are DE-ENERGIZED:

1. K2A at Panel C2277 _____ Initials

2. K5A at Panel C2277 _____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____ Initials

(18) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **THEN CALIBRATE AND RECORD** "As-Left" data.

a. PIS-263-123A "As-Left" Trip
16.53mA (16.51 to 16.55mA) _____ mA
Data

b. PIS-263-123A "As-Left" Reset
16.21mA (16.05 to 16.37mA) _____ mA
Data

c. Indicator PIS-263-123A

Current Reading mA	Desired Reading inches	"As-Left" Inc.	"As-Left" Dec.
4.8	75 (30 to 120)	_____	_____
8.0	375 (330 to 420)	_____	_____
12.0	750 (705 to 795)	_____	_____
16.0	1125 (1080 to 1170)	_____	_____
19.2	1425 (1380 to 1470)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND** **TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PIS-263-123A and PS-263-123A-1 **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** the Gross Fail Reset button on Trip Units PIS-263-123A and PS-263-123A-1 **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. [ ]

(23) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a.	DS3C at Panel C2277	[ ]
b.	DS4C at Panel C2277	[ ]
c.	DS5C at Panel C2277	[ ]
d.	DS3A at Panel C2277	[ ]
e.	DS4A at Panel C2277	[ ]
f.	DS5A at Panel C2277	[ ]
g.	DS10A at Panel C2277	[ ]
h.	DS11A at Panel C2277	[ ]
i.	DS10C at Panel C2277	[ ]
j.	DS11C at Panel C2277	[ ]

_____
Initials

(d) PS-263-123A-1

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #4 for PS-263-123A-1. [ ]

b. **SET** smaller knob to slot #3 for PIS-263-123A. [ ]

(3) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR.

_____ Initials

(4) **SELECT OR VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PS-263-123A-1 by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS7A at Panel C2277 [ ]

2. DS8A at Panel C2277 [ ]

3. DS9A at Panel C2277 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS7C at Panel C2277 [ ]

2. DS8C at Panel C2277 [ ]

3. DS9C at Panel C2277 [ ]

_____
Initials

c. Relay K3A at Panel C2277 is DE-ENERGIZED.

_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current until PS-263-123A-1 trips. **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 18.93mA (1400 psig); No Adjust Limits are 18.91 to 18.95mA.

"As-Found" Trip _____ mA
Data

(9) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PS-263-123A-1. _____
Initials

(10) **VERIFY** the following:

a. Relay K3A at Panel C2277 is ENERGIZED. _____
Initials

b. Circuit supervisory lights are OFF.

1. DS7A at Panel C2277 [ ]
2. DS8A at Panel C2277 [ ]
3. DS9A at Panel C2277 [ ]

_____
Initials

c. Circuit supervisory lights become bright.

1. DS7C at Panel C2277 [ ]
2. DS8C at Panel C2277 [ ]
3. DS9C at Panel C2277 [ ]

_____
Initials

(11) **IF** trip point was greater than 18.98mA (1405 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(12) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob until PS-263-123A-1 resets **AND RECORD** the reset point.

"As-Found" Reset _____ mA
Data

(14) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PS-263-123A-1. _____
Initials

(15) **VERIFY** the following:

a. Relay K3A at Panel C2277 is DE-ENERGIZED.

_____
Initials

b. Circuit supervisory lights become normal - not bright.

1. DS7C at Panel C2277 [ ]
2. DS8C at Panel C2277 [ ]
3. DS9C at Panel C2277 [ ]

_____
Initials

c. Circuit supervisory lights become normal - not bright.

1. DS7A at Panel C2277 [ ]
2. DS8A at Panel C2277 [ ]
3. DS9A at Panel C2277 [ ]

_____
Initials

(16) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(17) **IF** trip did NOT fall within the No Adjust Limits, **CALIBRATE AND RECORD** "As-Left" data.

a. PS-263-123A-1 "As-Left" Trip 18.93mA (18.91 to 18.95mA) _____ mA
Data

b. PS-263-123A-1 "As-Left" Reset _____ mA
Data

(18) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PS-263-123A-1 **AND** PIS-263-123A **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(19) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(20) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** the Gross Fail Reset button on Trip Units PS-263-123A-1 and PIS-263-123A **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(21) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

(22) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(23) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS7C at Panel C2277 [ ]

b. DS8C at Panel C2277 [ ]

c. DS9C at Panel C2277 [ ]

d. DS7A at Panel C2277 [ ]

e. DS8A at Panel C2277 [ ]

f. DS9A at Panel C2277 [ ]

_____
Initials

(e) PIS-263-123C

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND** **VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #5 for PIS-263-123C. [ ]

b. **SET** smaller knob to slot #5 for PIS-263-123C. [ ]

(3) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR.

_____ Initials

(4) **SELECT** **OR** **VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PIS-263-123C by pushing in the smaller knob of the Press To Cal knob **AND** **VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____
Initials

c. Relays are DE-ENERGIZED:

1. K2C at Panel C2277 _____ Initials
2. K5C at Panel C2277 _____ Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND RECORD** the "As-Found" data for PIS-263-123C indicator.

Stable Current Reading mA	Indicator psig	Increasing "As-Found"
4.8	75 (30 to 120)	_____
8.0	375 (330 to 420)	_____
12.0	750 (705 to 795)	_____
16.0	1125 (1080 to 1170)	_____
19.2	1425 (1380 to 1470)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 16.53mA (1175 psig); No Adjust Limits are 16.51 to 16.55mA.

"As-Found" Trip _____ mA
Data

(10) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PIS-263-123C. _____
Initials

(11) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K2C at Panel C2277 _____ Initials

2. K5C at Panel C2277 _____ Initials

b. Circuit supervisory lights are bright.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights are OFF.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____ Initials

(12) **IF** trip point was less than 16.48mA (1170 psig) **OR** greater than 16.58mA (1180 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(13) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(14) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for PIS-263-123C indicator.

Stable Current Reading mA	Indicator psig	Decreasing "As-Found"
19.2	1425 (1380 to 1470)	_____
16.0	1125 (1080 to 1170)	_____
12.0	750 (705 to 795)	_____
8.0	375 (330 to 420)	_____
4.8	75 (30 to 120)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(15) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 16.21mA; No Adjust Limits are 16.05 to 16.37mA.

"As-Found" Reset _____ mA
Data

(16) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PIS-263-123C. _____
Initials

(17) **VERIFY** the following:

a. Relays are DE-ENERGIZED

1. K2C at Panel C2277 _____ Initials

2. K5C at Panel C2277 _____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS3C at Panel C2277 [ ]
2. DS4C at Panel C2277 [ ]
3. DS5C at Panel C2277 [ ]
4. DS10C at Panel C2277 [ ]
5. DS11C at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS3A at Panel C2277 [ ]
2. DS4A at Panel C2277 [ ]
3. DS5A at Panel C2277 [ ]
4. DS10A at Panel C2277 [ ]
5. DS11A at Panel C2277 [ ]

_____ Initials

(18) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **THEN CALIBRATE AND RECORD** "As-Left" data.

a. PIS-263-123C "As-Left" Trip
16.53 mA (16.51 to 16.55mA) _____mA
Data

b. PIS-263-123C "As-Left" Reset
16.21 mA (16.05 to 16.37mA) _____mA
Data

c. Indicator PIS-263-123C

Current Reading mA	Desired Reading psig	"As-Left" Inc.	"As-Left" Dec.
4.8	75 (30 to 120)	_____	_____
8.0	375 (330 to 420)	_____	_____
12.0	750 (705 to 795)	_____	_____
16.0	1125 (1050 to 1170)	_____	_____
19.2	1425 (1380 to 1470)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18 mA. [ ]

a. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____ mA
Data

d. **PULL OUT** Transient Current knob **AND** **TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PIS-263-123C and PS-263-123C-1 **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset buttons on Trip Units PIS-263-123C and PS-263-123C-1 **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. [ ]

(23) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS3C at Panel C2277 [ ]

b. DS4C at Panel C2277 [ ]

c. DS5C at Panel C2277 [ ]

d. DS3A at Panel C2277 [ ]

e. DS4A at Panel C2277 [ ]

f. DS5A at Panel C2277 [ ]

g. DS10A at Panel C2277 [ ]

h. DS11A at Panel C2277 [ ]

i. DS10C at Panel C2277 [ ]

j. DS11C at Panel C2277 [ ]

_____
Initials

(f) PS-263-123C-1

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND** **VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #6 for PS-263-123C-1. [ ]

b. **SET** smaller knob to slot #5 for PIS-263-123C. [ ]

(3) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR.

_____ Initials

(4) **SELECT** **OR** **VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PS-263-123C-1 by pushing in the smaller knob of the Press To Cal knob **AND** **VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS7C at Panel C2277 [ ]

2. DS8C at Panel C2277 [ ]

3. DS9C at Panel C2277 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS7A at Panel C2277 [ ]

2. DS8A at Panel C2277 [ ]

3. DS9A at Panel C2277 [ ]

_____
Initials

c. Relay K3C at Panel C2277 is DE-ENERGIZED.

_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current until PS-263-123C-1 trips. **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 18.93mA (1400 psig); No Adjust Limits are 18.91 to 18.95mA.

"As-Found" Trip _____ mA
Data

(9) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PS-263-123C-1. _____
Initials

(10) **VERIFY** the following:

a. Relay K3C at Panel C2277 is ENERGIZED.

_____
Initials

b. Circuit supervisory lights become bright.

1. DS7A at Panel C2277 [ ]
2. DS8A at Panel C2277 [ ]
3. DS9A at Panel C2277 [ ]

_____
Initials

c. Circuit supervisory lights are OFF.

1. DS7C at Panel C2277 [ ]
2. DS8C at Panel C2277 [ ]
3. DS9C at Panel C2277 [ ]

_____
Initials

(11) **IF** trip point was greater than 18.98mA (1405 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(12) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob until PS-263-123C-1 resets **AND RECORD** the reset point.

"As-Found" Reset _____ mA
Data

(14) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PS-263-123C-1. _____ Initials

(15) **VERIFY** the following:

a. Relay K3C at Panel C2277 is DE-ENERGIZED. _____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS7C at Panel C2277 [ ]

2. DS8C at Panel C2277 [ ]

3. DS9C at Panel C2277 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS7A at Panel C2277 [ ]

2. DS8A at Panel C2277 [ ]

3. DS9A at Panel C2277 [ ]

_____ Initials

(16) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes OFF at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(17) **IF** trip did NOT fall within the No Adjust Limits, **CALIBRATE AND RECORD** "As-Left" data.

a. PS-263-123C-1 "As-Left" Trip 18.93mA (18.91 to 18.95mA) _____mA
Data

b. PS-263-123C-1 "As-Left" Reset _____mA
Data

(18) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE.** [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PS-263-123C-1, PIS-263-123C **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE.** [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(19) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(20) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset buttons on Trip Units PS-263-123C-1 and PIS-263-123C **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the OFF position, **THEN PUSH** the knob back in. _____ Initials

(21) **VERIFY** alarm **"DIVISION ONE PANEL TROUBLE"** (C905L-B5) is CLEAR. _____ Initials

(22) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(23) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS7C at Panel C2277 [ ]

b. DS8C at Panel C2277 [ ]

c. DS9C at Panel C2277 [ ]

d. DS7A at Panel C2277 [ ]

e. DS8A at Panel C2277 [ ]

f. DS9A at Panel C2277 [ ]

_____
Initials

[7] Return to Service

(a) **ROTATE** the Press To Cal knob (larger knob) to "OFF" position. [ ]

(b) **TURN OFF** power to the calibration unit. [ ]

(c) **VERIFY** the CAL light is OFF at the calibration unit. [ ]

(d) **PUSH** the Gross Fail Reset buttons. [ ]

(e) **VERIFY** the following:

(1) Gross Fail Lights are OFF at Cabinet C2277. _____ Initials _____ Verifier

(2) 125V DC power light is ON. _____ Initials _____ Verifier

(f) **PULL OUT** readout assembly with extender card from Cabinet C2277. _____ Initials _____ Verifier

[8] **NOTIFY** the on-shift SRO that test is complete. [ ]

[9] **COMPLETE** documentation **AND UPDATE** Maintenance records. [ ]

[10] **RECORD** test equipment used:

M&TE #_____ Due Date _____

_____ _____

_____ _____

[11] **FILL OUT** the I&C Procedure Feedback Form (Attachment 3) **AND FORWARD** to I&C Supervision. _____ |
Initials

Discrepancies noted during surveillance performance:

Notes:

Date Completed: _____

[ ] Acceptance Criteria of Section 9.0 of the base document were met.

Maintenance Management _____ Date _____

On-Shift SRO _____ Date _____ Time _____

[ ] Acceptance Criteria of Section 9.0 of the base document were not met. Notify the on-shift SRO.

Discrepancies: _____

_____

_____

Action taken: _____

_____

_____

Maint Management _____ Date _____ Time _____

ATWS TRIP UNIT CABINET C2278 CALIBRATION

[1] **PERFORM** the procedural steps for each instrument in the order they are written. For each step with a [ ], **SIGNIFY** completion with a check mark. For each step with a _____, **ENTER** initials or data as appropriate. For a step followed by a double _____, that step shall require verification with two individuals' signed initials required to signify completion. "N/P" (for "not performed") may be placed by a procedural step where performance of that step has been conditionally stated and the condition(s) has not been met.

[2] **DOCUMENT** in the space provided below the reason this test is being performed (**CHECK** one):

[ ] Routine Surveillance

[ ] Postwork testing for Work Order # _____

[ ] Other (specify) _____

_____

[3] Prerequisites

(a) Personnel assigned to perform this Attachment have read and understand what is required. All personnel involved must print their name and the date and sign their initials below.

Name (print)	Date	Initials

(b) **IF** required, a Pre-Evolution Brief has been completed and attached to this surveillance. **[NRCCC Item PAPR 020]**

_____
Initials

(c) **COORDINATE** action to be taken with Operations personnel **AND OBTAIN** the on-shift SRO's signature as permission to begin test.

_____	_____	_____
On-Shift SRO signature	Date	Time

(d) **CONFIRM** with Operations that no other testing is being performed on the ATWS System.

_____ Initials

(e) **PRIOR** to start of testing, **PROVIDE** Operations with Attachment 4 (Alarm Summary Sheet).

_____ Initials

(f) **VERIFY** that the prejob brief discussed the need to verify that the CAL light is OFF when the Press to Cal knob (smaller knob) is pulled out. (PR01.8151)

_____ Initials

(g) Radiation Protection (RP) notified.

_____ Initials

(h) ATWS System is powered up.

_____ Initials

NOTE

Readout assembly must be calibrated prior to calibration of trip unit(s). Readout assembly need not be recalibrated for continuous use for more than one trip unit; but if the readout assembly is left unattended, it must be recalibrated prior to use.

(i) **IF** PNPS 8.M.1-29 Attachment 1 was performed within the last 4 days, **THEN RECORD** the readout assembly used in PNPS 8.M.1-29 Attachment 1. **IF** PNPS 8.M.1-29 Attachment 1 was NOT performed within the last 4 days, **ENTER** "N/P".

_____
Initials

Readout assembly for PNPS 8.M.1-29 Attachment 1 M&TE #_____

IF PNPS 8.M.1-29 Attachment 1 was performed within the last 4 days, **THEN OBTAIN** from M&TE a different readout assembly than what was used in PNPS 8.M.1-29 Attachment 1. **RECORD** the information from the calibration sticker for readout assembly to be used in PNPS 8.M.1-29 Attachment 2. **IF** PNPS 8.M.1-29 Attachment 1 was NOT performed within the last 4 days, **ENTER** "N/P".

Readout assembly for PNPS 8.M.1-29 Attachment 2 M&TE #_____

Calibration performed by _____

Time _____ Date _____

IF PNPS 8.M.1-29 Attachment 1 was NOT performed within the last 4 days, **THEN OBTAIN** a calibrated readout assembly from M&TE personnel **AND RECORD** information from the calibration sticker. **IF** PNPS 8.M.1-29 Attachment 1 was performed within the last 4 days, **ENTER** "N//P".

Readout assembly for PNPS 8.M.1-29 Attachment 2 M&TE #_____

Calibration performed by _____

Time _____ Date _____

(1) **VERIFY** calibration of readout assembly was performed within last 48 hours **AND** the readout assembly has not been left unattended since calibration.

_____ Initials

(j) **ESTABLISH** communications between Control Room and ATWS Cabinet C2278 (Rx Bldg 51').

_____ Initials

[4] Cabinet Power Supply Test

(a) **VERIFY** the following power supply to ATWS logic Panel C2278 lights are ON:

(1) Power Supply PS1B

_____ Initials

(2) Power Supply PS2B

_____ Initials

(b) **DEPRESS** power supply monitoring circuit test button K37B at Panel C2278. [ ]

(c) **VERIFY** associated power supply light PS1B goes off.

_____ Initials

(d) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON.

_____ Initials

(e) **RELEASE** power supply test button K37B. [ ]

(f) **VERIFY** power supply light PS1B comes on.

_____ Initials

(g) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR.

_____ Initials

(h) **DEPRESS** power supply monitor circuit test button K38B at Panel C2278. [ ]

(i) **VERIFY** associated power supply light PS2B goes off.

_____ Initials

(j) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON. _____ Initials

(k) **RELEASE** power supply test button K38B. [ ]

(l) **VERIFY** power supply light PS2B comes on. _____ Initials

(m) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR. _____ Initials

[5] Calibration Unit: General Preparation

(a) **VERIFY** the calibration unit is in the following condition at ATWS Cabinet C2278:

(1) Power switch is in the "OFF" position. [ ]

(2) Transient Current knob is pulled out and turned fully counterclockwise. [ ]

(3) Press To Cal knob (smaller knob) is in the "OFF" position and pushed in. [ ]

(4) Press To Cal knob (larger knob) is in the "OFF" position. [ ]

(b) **TURN** the Stable Current knob fully counterclockwise. [ ]

(c) **PLUG** the readout assembly with extender card into the calibration unit. [ ]

(d) **TURN ON** the power. [ ]

(e) **ALLOW** minimum of 10 minutes warm-up time for the readout assembly. [ ]

[6] Trip Unit Calibration

(a) LIS-263-121B

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND** **VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #1 for LIS-263-121B. [ ]

b. **SET** smaller knob to slot #1 for LIS-263-121B. [ ]

(3) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR.

_____ Initials

(4) **SELECT OR VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to LIS-263-121B by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are bright.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____
Initials

b. Circuit supervisory lights are OFF.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____
Initials

c. Relays are ENERGIZED:

1. K1B at Panel C2278 _____ Initials

2. K101B at Panel C2278
(This relay has a 9-second time delay) _____ Initials

3. K4B at Panel C2278 _____ Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND RECORD** the "As-Found" data for LIS-263-121B indicator.

Stable Current Reading mA	Indicator inches	Increasing "As-Found"
4.32	-48 (-46 to -50)	_____
8.0	-25 (-23 to -27)	_____
12.0	0 (-2 to +2)	_____
16.0	+25 (+23 to +27)	_____
19.68	+48 (+46 to +50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 4.96mA; No Adjust Limits are 4.80 to 5.12mA.

"As-Found" Reset _____ mA
Data

(10) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit LIS-263-121B. _____
Initials

(11) **VERIFY** the following:

a. Relays are DE-ENERGIZED.

1. K1B at Panel C2278 _____
Initials

2. K101B at Panel C2278
(This relay has a 9-second time delay.) _____
Initials

3. K4B at Panel C2278 _____
Initials

b. Circuit supervisory lights become normal - not bright.

1. DS3D at Panel C2278 [ ]

2. DS4D at Panel C2278 [ ]

3. DS5D at Panel C2278 [ ]

4. DS10D at Panel C2278 [ ]

5. DS11D at Panel C2278 [ ]

_____
Initials

c. Circuit supervisory lights become normal - not bright.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____
Initials

(12) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for LIS-263-121B indicator.

Stable Current Reading mA	Indicator inches	Decreasing "As-Found"
19.68	+48 (+46 to +50)	_____
16.0	+25 (+23 to +27)	_____
12.0	0 (-2 to +2)	_____
8.0	-25 (-23 to -27)	_____
4.32	-48 (-46 to -50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(14) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 4.64mA (-46 inches indicator reading); No Adjust Limits are 4.62 to 4.66mA.

"As-Found" Trip _____ mA
Data

(15) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit LIS-263-121B. _____
Initials

(16) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K1B at Panel C2278 _____ Initials

2. K101B at Panel C2278
(This relay has a 9-second time delay.) _____ Initials

3. K4B at Panel C2278 _____ Initials

b. Circuit supervisory lights are OFF.

1. DS3B at Panel C2278 [ ]

2. DS4B at Panel C2278 [ ]

3. DS5B at Panel C2278 [ ]

4. DS10B at Panel C2278 [ ]

5. DS11B at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become bright.

1. DS3D at Panel C2278 [ ]

2. DS4D at Panel C2278 [ ]

3. DS5D at Panel C2278 [ ]

4. DS10D at Panel C2278 [ ]

5. DS11D at Panel C2278 [ ]

_____ Initials

(17) **IF** trip point was less than 4.59mA (-46.3 inches indicator reading), **THEN NOTIFY** the SM.

SM notified? Yes [ ] No [ ]

(18) **PUSH** the Trip Current Display Reset **AND VERIFY** Trip Status LED goes off at the readout assembly . [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **THEN CALIBRATE AND RECORD** "As-Left" data.

a. LIS-263-121B "As-Left" Trip 4.64mA (4.62 to 4.66mA) _____ mA
Data

b. LIS-263-121B "As-Left" Reset 4.96mA (4.80 to 5.12mA) _____ mA
Data

c. Indicator LIS-263-121B

Current Reading mA	Desired Reading inches	"As-Left" Inc.	Dec.
4.32	-48 (-46 to -50)	_____	_____
8.0	-25 (-23 to -27)	_____	_____
12.0	0 (-2 to +2)	_____	_____
16.0	+25 (+23 to +27)	_____	_____
19.68	+48 (+46 to +50)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND** **TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Unit LIS-263-121B **AND** **VERIFY** Gross Fail light is OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset button on Trip Unit LIS-263-121B **AND VERIFY** Gross Fail light is OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(23) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS3B at Panel C2278 [ ]

b. DS4B at Panel C2278 [ ]

c. DS5B at Panel C2278 [ ]

d. DS3D at Panel C2278 [ ]

e. DS4D at Panel C2278 [ ]

f. DS5D at Panel C2278 [ ]

g. DS10B at Panel C2278 [ ]

h. DS11B at Panel C2278 [ ]

i. DS10D at Panel C2278 [ ]

j. DS11D at Panel C2278 [ ]

_____
Initials

(b) LIS-263-121D

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #2 for LIS-263-121D. [ ]

b. **SET** smaller knob to slot #2 for LIS-263-121D. [ ]

(3) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR.

_____ Initials

(4) **SELECT OR VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to LIS-263-121D by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are bright.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____
Initials

b. Circuit supervisory lights are OFF.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____
Initials

c. Relays are ENERGIZED:

1. K1D at Panel C2278
_____
Initials

2. K101D at Panel C2278
(This relay has a 9-second time delay.)
_____
Initials

3. K4D at Panel C2278
_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND RECORD** the "As-Found" data for LIS-263-121D indicator.

Stable Current Reading mA	Indicator inches	Increasing "As-Found"
4.32	-48 (-46 to -50)	_____
8.0	-25 (-23 to -27)	_____
12.0	0 (-2 to +2)	_____
16.0	+25 (+23 to +27)	_____
19.68	+48 (+46 to +50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 4.96mA; No Adjust Limits are 4.80 to 5.12mA.

"As-Found" Reset _____ mA
Data

(10) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit LIS-263-121D. _____
Initials

(11) **VERIFY** the following:

a. Relays are DE-ENERGIZED:

1. K1D at Panel C2278 _____ Initials

2. K101D at Panel C2278
(This relay has a 9-second time delay.) _____ Initials

3. K4D at Panel C2278 _____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS3B at Panel C2278 [ ]

2. DS4B at Panel C2278 [ ]

3. DS5B at Panel C2278 [ ]

4. DS10B at Panel C2278 [ ]

5. DS11B at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS3D at Panel C2278 [ ]

2. DS4D at Panel C2278 [ ]

3. DS5D at Panel C2278 [ ]

4. DS10D at Panel C2278 [ ]

5. DS11D at Panel C2278 [ ]

_____ Initials

(12) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for LIS-263-121D indicator.

Stable Current Reading mA	Indicator inches	Decreasing "As-Found"
19.68	+48 (+46 to +50)	_____
16.0	+25 (+23 to +27)	_____
12.0	0 (-2 to +2)	_____
8.0	-25 (-23 to -27)	_____
4.32	-48 (-46 to -50)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(14) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 4.64mA (-46 inches indicator reading); No Adjust Limits are 4.62 to 4.66mA.

"As-Found" Trip _____ mA
Data

(15) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit LIS-263-121D. _____
Initials

(16) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K1D at Panel C2278 _____ Initials

2. K101D at Panel C2278 _____ Initials

3. K4D at Panel C2278 _____ Initials

b. Circuit supervisory lights are OFF.

1. DS3D at Panel C2278 [ ]

2. DS4D at Panel C2278 [ ]

3. DS5D at Panel C2278 [ ]

4. DS10D at Panel C2278 [ ]

5. DS11D at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become bright.

1. DS3B at Panel C2278 [ ]

2. DS4B at Panel C2278 [ ]

3. DS5B at Panel C2278 [ ]

4. DS10B at Panel C2278 [ ]

5. DS11B at Panel C2278 [ ]

_____ Initials

(17) **IF** trip point was less than 4.59mA (-46.3 inches indicator reading), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(18) **PUSH** the Trip Current Display Reset **AND VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **THEN CALIBRATE AND RECORD** "As-Left" data.

a. LIS-263-121D "As-Left" Trip 4.64mA (4.62 to 4.66mA) _____ mA
Data

b. LIS-263-121D "As-Left" Reset 4.96mA (4.80 to 5.12mA) _____ mA
Data

c. Indicator LIS-263-121D

Current Reading mA	Desired Reading inches	"As-Left" Inc.	"As-Left" Dec.
4.32	-48 (-46 to -50)	_____	_____
8.0	-25 (-23 to -27)	_____	_____
12.0	0 (-2 to +2)	_____	_____
16.0	+25 (+23 to +27)	_____	_____
19.68	+48 (+46 to +50)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND** **TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset button on Trip Unit LIS-263-121D **AND** **VERIFY** Gross Fail light is OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset button on Trip Unit LIS-263-121D **AND VERIFY** Gross Fail light is OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(23) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS system.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS3B at Panel C2278 [ ]

b. DS4B at Panel C2278 [ ]

c. DS5B at Panel C2278 [ ]

d. DS3D at Panel C2278 [ ]

e. DS4D at Panel C2278 [ ]

f. DS5D at Panel C2278 [ ]

g. DS10B at Panel C2278 [ ]

h. DS11B at Panel C2278 [ ]

i. DS10D at Panel C2278 [ ]

j. DS11D at Panel C2278 [ ]

_____
Initials

(c) PIS-263-123B

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #3 for PIS-263-123B. [ ]

b. **SET** smaller knob to slot #3 for PIS-263-123B. [ ]

(3) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR.

_____ Initials

(4) **SELECT OR VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PIS-263-123B by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____
Initials

c. Relays are DE-ENERGIZED:

1. K2B at Panel C2278 _____ Initials
2. K5B at Panel C2278 _____ Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND RECORD** the "As-Found" data for PIS-263-123B indicator.

Stable Current Reading mA	Indicator psig	Increasing "As-Found"
4.8	75 (30 to 120)	_____
8.0	375 (330 to 420)	_____
12.0	750 (705 to 795)	_____
16.0	1125 (1080 to 1170)	_____
19.2	1425 (1380 to 1470)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 16.53mA (1175 psig); No Adjust Limits are 16.51 to 16.55mA.

"As-Found" Trip _____ mA
Data

(10) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PIS-263-123B. _____
Initials

(11) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K2B at Panel C2278 _____ Initials

2. K5B at Panel C2278 _____ Initials

b. Circuit supervisory lights are OFF.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become bright.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____ Initials

(12) **IF** trip point was less than 16.48mA (1170 psig) **OR** greater than 16.58mA (1180 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(13) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(14) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for PIS-263-123B indicator.

Stable Current Reading mA	Indicator psig	Decreasing "As-Found"
19.2	1425 (1380 to 1470)	_____
16.0	1125 (1080 to 1170)	_____
12.0	750 (705 to 795)	_____
8.0	375 (330 to 420)	_____
4.8	75 (30 to 120)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(15) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 16.21mA; No Adjust Limits are 16.05 to 16.37mA.

"As-Found" Reset _____ mA
Data

(16) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PIS-263-123B. _____
Initials

(17) **VERIFY** the following:

a. Relays are DE-ENERGIZED:

1. K2B at Panel C2278 _____ Initials

2. K5B at Panel C2278 _____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____ Initials

(18) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **THEN CALIBRATE AND RECORD** "As-Left" data.

a. PIS-263-123B "As-Left" Trip 16.53mA (16.51 to 16.55mA) _____ mA
Data

b. PIS-263-123B "As-Left" Reset 16.21mA (16.05 to 16.37mA) _____ mA
Data

c. PIS-263-123B Indicator

Current Reading mA	Desired Reading psig	"As-Left" Inc.	"As-Left" Dec.
4.8	75 (30 to 120)	_____	_____
8.0	375 (330 to 420)	_____	_____
12.0	750 (705 to 795)	_____	_____
16.0	1125 (1080 to 1170)	_____	_____
19.2	1425 (1380 to 1470)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PIS-263-123B, PS-263-123B-1 **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset buttons on Trip Units PIS-263-123B and PS-263-123B-1 **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(23) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS3B at Panel C2278 [ ]

b. DS4B at Panel C2278 [ ]

c. DS5B at Panel C2278 [ ]

d. DS3D at Panel C2278 [ ]

e. DS4D at Panel C2278 [ ]

f. DS5D at Panel C2278 [ ]

g. DS10B at Panel C2278 [ ]

h. DS11B at Panel C2278 [ ]

i. DS10D at Panel C2278 [ ]

j. DS11D at Panel C2278 [ ]

_____
Initials

(d) PS-263-123B-1

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #4 for PS-263-123B-1. [ ]

b. **SET** smaller knob to slot #3 for PIS-263-123. [ ]

(3) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR.

_____ Initials

(4) **SELECT OR VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PS-263-123B-1 by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS7B at Panel C2278 [ ]
2. DS8B at Panel C2278 [ ]
3. DS9B at Panel C2278 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS7D at Panel C2278 [ ]
2. DS8D at Panel C2278 [ ]
3. DS9D at Panel C2278 [ ]

_____
Initials

c. Relay K3B at Panel C2278 is DE-ENERGIZED.

_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** stable current until PS-263-123B-1 trips. **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 18.93mA (1400 psig); No Adjust Limits are 18.91 to 18.95mA.

"As-Found" Trip _____ mA
Data

(9) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PS-263-123B-1. _____
Initials

(10) **VERIFY** the following:

a. Relay K3B at Panel C2278 is ENERGIZED. _____
Initials

b. Circuit supervisory lights are OFF.

1. DS7B at Panel C2278 [ ]

2. DS8B at Panel C2278 [ ]

3. DS9B at Panel C2278 [ ]

_____
Initials

c. Circuit supervisory lights become bright.

1. DS7D at Panel C2278 [ ]

2. DS8D at Panel C2278 [ ]

3. DS9D at Panel C2278 [ ]

_____
Initials

(11) **IF** trip point was greater than 18.98mA (1405 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(12) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob until PS-263-123B-1 resets **AND RECORD** the reset point.

"As-Found" Reset _____ mA
Data

(14) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PS-263-123B-1.

_____
Initials

(15) **VERIFY** the following:

a. Relay K3B at Panel C2278 is DE-ENERGIZED.

_____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS7B at Panel C2278 [ ]
2. DS8B at Panel C2278 [ ]
3. DS9B at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS7D at Panel C2278 [ ]
2. DS8D at Panel C2278 [ ]
3. DS9D at Panel C2278 [ ]

_____ Initials

(16) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(17) **IF** trip did NOT fall within the No Adjust Limits, **CALIBRATE AND RECORD** "As-Left" data.

a. PS-263-123B-1 "As-Left" Trip 18.93mA (18.91 to 18.95mA) _____ mA
Data

b. PS-263-123B-1 "As-Left" Reset _____ mA
Data

(18) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PS-263-123B-1 and PIS-263-123B **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(19) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(20) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset buttons on Trip Units PS-263-123B-1 and PIS-263-123B **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(21) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR. _____ Initials

(22) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(23) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS7B at Panel C2278 [ ]

b. DS8B at Panel C2278 [ ]

c. DS9B at Panel C2278 [ ]

d. DS7D at Panel C2278 [ ]

e. DS8D at Panel C2278 [ ]

f. DS9D at Panel C2278 [ ]

_____
Initials

(e) PIS-263-123D

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #5 for PIS-263-123D. [ ]

b. **SET** smaller knob to slot #5 for PIS-263-123D. [ ]

(3) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR.

_____ Initials

(4) **SELECT OR VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PIS-263-123D by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____
Initials

c. Relays are DE-ENERGIZED:

1. K2D at Panel C2278
_____
Initials

2. K5D at Panel C2278
_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current **AND RECORD** the "As-Found" data for PIS-263-123D indicator.

Stable Current Reading mA	Indicator psig	Increasing "As-Found"
4.8	75 (30 to 120)	_____
8.0	375 (330 to 420)	_____
12.0	750 (705 to 795)	_____
16.0	1125 (1080 to 1170)	_____
19.2	1425 (1380 to 1470)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(9) **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 16.53mA (1175 psig); No Adjust Limits are 16.51 to 16.55mA.

"As-Found" Trip _____ mA
Data

(10) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PIS-263-123D. _____
Initials

(11) **VERIFY** the following:

a. Relays are ENERGIZED:

1. K2D at Panel C2278 _____ Initials

2. K5D at Panel C2278 _____ Initials

b. Circuit supervisory lights are OFF.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become bright.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____ Initials

(12) **IF** trip point was less than 16.48mA (1170 psig) **OR** greater than 16.58mA (1180 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(13) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(14) **SLOWLY DECREASE** current with the Stable Current knob **AND RECORD** the "As-Found" data for PIS-263-123D indicator.

Stable Current Reading mA	Indicator psig	Decreasing "As-Found"
19.2	1425 (1380 to 1470)	_____
16.0	1125 (1080 to 1170)	_____
12.0	750 (705 to 795)	_____
8.0	375 (330 to 420)	_____
4.8	75 (30 to 120)	_____

[ ] Data falls within Acceptance Criteria, "As-Left" same as "As-Found"

OR

[ ] Calibration Required

(15) **RECORD** the reset point as shown latched on readout assembly. Setpoint is 16.21mA; No Adjust Limits are 16.05 to 16.37mA.

"As-Found" Reset _____ mA
Data

(16) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PIS-263-123D. _____
Initials

(17) **VERIFY** the following:

a. Relays are DE-ENERGIZED:

1. K2D at Panel C2278 _____ Initials

2. K5D at Panel C2278 _____ Initials

b. Circuit supervisory lights become normal - not bright.

1. DS3D at Panel C2278 [ ]
2. DS4D at Panel C2278 [ ]
3. DS5D at Panel C2278 [ ]
4. DS10D at Panel C2278 [ ]
5. DS11D at Panel C2278 [ ]

_____ Initials

c. Circuit supervisory lights become normal - not bright.

1. DS3B at Panel C2278 [ ]
2. DS4B at Panel C2278 [ ]
3. DS5B at Panel C2278 [ ]
4. DS10B at Panel C2278 [ ]
5. DS11B at Panel C2278 [ ]

_____ Initials

(18) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(19) **IF** trip **AND/OR** indicator did NOT fall within the No Adjust Limits, **THEN CALIBRATE AND RECORD** "As-Left" data.

a. PIS-263-123D "As-Left" Trip 16.53mA (16.51 to 16.55mA) _____ mA
Data

b. PIS-263-123D "As-Left" Reset 16.21mA (16.05 to 16.37mA) _____ mA
Data

c. Indicator PIS-263-123D

Current Reading mA	Desired Reading psig	"As-Left" Inc.	Dec.
4.8	75 (30 to 120)	_____	_____
8.0	375 (330 to 420)	_____	_____
12.0	750 (705 to 795)	_____	_____
16.0	1125 (1080 to 1170)	_____	_____
19.2	1425 (1380 to 1470)	_____	_____

(20) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PIS-263-123D and PS-263-123D-1 **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT within No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(21) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(22) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset buttons on Trip Units PIS-263-123D and PS-263-123D-1 **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(23) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR. _____ Initials

(24) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(25) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS3B at Panel C2278 [ ]

b. DS4B at Panel C2278 [ ]

c. DS5B at Panel C2278 [ ]

d. DS3D at Panel C2278 [ ]

e. DS4D at Panel C2278 [ ]

f. DS5D at Panel C2278 [ ]

g. DS10B at Panel C2278 [ ]

h. DS11B at Panel C2278 [ ]

i. DS10D at Panel C2278 [ ]

j. DS11D at Panel C2278 [ ]

_____
Initials

(f) PS-263-123D-1

(1) **VERIFY** appropriate Prerequisites **AND** **REVIEW** appropriate Precautions and Limitations before proceeding further.

_____ Initials

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(2) **PULL OUT** the Press To Cal knob (smaller knob) **AND** **VERIFY** that the CAL light is OFF.

_____ Initials

a. **SET** larger knob to slot #6 for PS-263-123D-1. [ ]

b. **SET** smaller knob to slot #5 for PIS-263-123D. [ ]

(3) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR.

_____ Initials

(4) **SELECT** **OR** **VERIFY SELECTED** positive polarity with Transient Polarity Switch.

_____ Initials

(5) **APPLY** stable calibration current to PS-263-123D-1 by pushing in the smaller knob of the Press To Cal knob **AND VERIFY** the CAL light is ON at the calibration unit **AND** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is ON. [ ]

(6) **VERIFY** the following:

a. Circuit supervisory lights are normal - not bright.

1. DS7D at Panel C2278 [ ]
2. DS8D at Panel C2278 [ ]
3. DS9D at Panel C2278 [ ]

_____
Initials

b. Circuit supervisory lights are normal - not bright.

1. DS7B at Panel C2278 [ ]
2. DS8B at Panel C2278 [ ]
3. DS9B at Panel C2278 [ ]

_____
Initials

c. Relay K3D at Panel C2278 is DE-ENERGIZED.

_____
Initials

(7) **VERIFY** the Trip Status LED is OFF at the readout assembly (**IF** required, **PUSH** Trip Current Display Reset). [ ]

NOTE

If setpoints are found outside the No Adjust Limits, test must be continued. The required adjustment will be made at the end of the test for each trip unit.

(8) **INCREASE** the stable current until PS-263-123D-1 trips. **RECORD** the trip point as shown latched on the readout assembly. Setpoint is 18.93mA (1400 psig); No Adjust Limits are 18.91 to 18.95mA.

"As-Found" Trip _____ mA
Data

(9) **VERIFY** Trip Status LED is ON:

a. At readout assembly. [ ]

b. At Trip Unit PS-263-123D-1. _____
Initials

(10) **VERIFY** the following:

a. Relay K3D at Panel C2278 is ENERGIZED.

_____
Initials

b. Circuit supervisory lights are OFF.

1. DS7D at Panel C2278 [ ]
2. DS8D at Panel C2278 [ ]
3. DS9D at Panel C2278 [ ]

_____
Initials

c. Circuit supervisory lights become bright.

1. DS7B at Panel C2278 [ ]
2. DS8B at Panel C2278 [ ]
3. DS9B at Panel C2278 [ ]

_____
Initials

(11) **IF** trip point was greater than 18.98mA (1405 psig), **THEN NOTIFY** SM.

SM notified? Yes [ ] No [ ]

(12) **PUSH** the Trip Current Display Reset on the readout assembly **AND VERIFY** the Trip Status LED goes off. [ ]

(13) **SLOWLY DECREASE** current with the Stable Current knob until PS-263-123D-1 resets. **RECORD** the reset point.

"As-Found" Reset _____ mA
Data

(14) **VERIFY** Trip Status LED is:

a. ON at readout assembly. [ ]

b. OFF at Trip Unit PS-263-123D-1.

_____
Initials

(15) **VERIFY** the following:

a. Relay K3D at Panel C2278 is DE-ENERGIZED.

_____
Initials

b. Circuit supervisory lights become normal - not bright.

1. DS7D at Panel C2278 [ ]
2. DS8D at Panel C2278 [ ]
3. DS9D at Panel C2278 [ ]

_____
Initials

c. Circuit supervisory lights become normal - not bright.

1. DS7B at Panel C2278 [ ]
2. DS8B at Panel C2278 [ ]
3. DS9B at Panel C2278 [ ]

_____
Initials

(16) **PUSH** the Trip Current Display Reset **AND** **VERIFY** Trip Status LED goes off at the readout assembly. [ ]

NOTE

The trip point adjustments are located on the front of the trip unit.

(17) **IF** trip did NOT fall within the No Adjust Limits, **CALIBRATE AND RECORD** "As-Left" data.

a. PS-263-123D-1 "As-Left" Trip 18.93mA (18.91 to 18.95mA) _____ mA
Data

b. PS-263-123D-1 "As-Left" Reset _____ mA
Data

(18) **TEST** the Gross Failure function(s) by adjusting the stable current to approximately 18mA. [ ]

a. **PUSH IN** Transient Current knob **AND TURN CLOCKWISE** to approximately 29mA on readout assembly. [ ]

b. Using Stable Current knob, **SLOWLY INCREASE** the reading until Gross Fail LED comes on. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 30.0 mA; No Adjust Limits are 29.5mA to 30.5mA.

"As-Found" Gross Fail High _____mA
Data

c. **IF** "As-Found" data was NOT within the No Adjust Limits, **REMOVE** the trip unit to adjust R39. **REINSTALL** trip unit to repeat testing by decreasing transient current (**AND**, **IF** required, stable current) to obtain reset **AND** increasing to repeat testing of trip point. **RECORD** "As-Left" Gross Fail Trip value.

"As-Left" Gross Fail High _____mA
Data

d. **PULL OUT** Transient Current knob **AND** **TURN FULLY COUNTERCLOCKWISE**. [ ]

e. **PUSH** Gross Fail Reset buttons on Trip Units PS-263-123D-1 and PIS-263-123D **AND VERIFY** Gross Fail lights are OFF. [ ]

f. **CHANGE** Transient Polarity switch to negative. [ ]

g. **DECREASE** the stable current to approximately 5.0mA. [ ]

h. **PUSH IN** Transient Current knob **AND** **TURN CLOCKWISE** to approximately 3.5mA on readout assembly. [ ]

i. Using Stable Current knob, **SLOWLY DECREASE** the reading until Gross Fail LED comes on. [ ]

j. **RECORD** Gross Fail trip as read on the readout assembly. Setpoint is 2.5mA; No Adjust Limits are 3.0mA to 2.0mA.

"As-Found" Gross Fail Low _____mA
Data

k. **IF** "As-Found" reading is NOT with No Adjust Limits, **ADJUST** R40. **INCREASE** transient current (**AND**, **IF** required, stable current) to obtain reset **AND DECREASE** to repeat testing of trip point. **RECORD** "As-Left" Gross Fail trip value.

"As-Left" Gross Fail Low _____mA
Data

l. **PULL OUT** Transient Current knob **AND** **TURN FULLY COUNTERCLOCKWISE**. [ ]

m. **CHANGE** Transient Polarity switch to positive position. [ ]

(19) **TURN** the Stable Current knob fully counterclockwise. [ ]

CAUTION

SELECTOR SWITCH INTERLOCK VERIFICATION (Ref. PR01.8151)

Rotation of the trip unit Calibration Selection knob (Press To Cal small knob) through the various positions **must** be performed at a speed that will allow for the verification of:

1. The CAL light does not light; **AND**
2. No unit gross failure alarm lights actuate; **AND**
3. The unit status indicating light remains green.

(20) **PULL OUT** the Press To Cal knob (smaller knob) **AND**:

a. **VERIFY** that the CAL light is OFF. _____ Initials

THEN

b. **PUSH** Gross Fail Reset buttons on Trip Units PS-263-123D-1 and PIS-263-123D **AND VERIFY** Gross Fail lights are OFF. _____ Initials

THEN

c. **ROTATE** the Press To Cal knob (smaller knob) to the "OFF" position, **THEN PUSH** the knob back in. _____ Initials

(21) **VERIFY** alarm **"DIVISION TWO PANEL TROUBLE"** (C905L-F5) is CLEAR. _____ Initials

(22) **IF** required, **HAVE** Operations reset alarm(s). [ ]

NOTE

If operating conditions have to be confirmed, the reading of meter under calibration should match the reading indicated by the three other channels of the same function within the ATWS System.

(23) **VERIFY** circuit supervisory lights have returned to their normal status (not bright).

a. DS7D at Panel C2278 [ ]

b. DS8D at Panel C2278 [ ]

c. DS9D at Panel C2278 [ ]

d. DS7B at Panel C2278 [ ]

e. DS8B at Panel C2278 [ ]

f. DS9B at Panel C2278 [ ]

_____
Initials

[7] Return to Service

(a) **ROTATE** the Press To Cal knob (larger knob) to "OFF" position. [ ]

(b) **TURN OFF** power to the calibration unit. [ ]

(c) **VERIFY** the CAL light is OFF at the calibration unit. [ ]

(d) **PUSH** the Gross Fail Reset buttons. [ ]

(e) **VERIFY** the following:

(1) Gross Fail lights are OFF at Cabinet C2278. _____ Initials _____ Verifier

(2) 125V DC power light is ON. _____ Initials _____ Verifier

(f) **PULL OUT** readout assembly with extender card from Cabinet C2278. _____ Initials _____ Verifier

[8] **NOTIFY** the on-shift SRO that test is complete. [ ]

[9] **COMPLETE** documentation **AND UPDATE** Maintenance records. [ ]

[10] **RECORD** test equipment used:

M&TE #_____ Due Date _____

_____ _____

_____ _____

[11] **FILL OUT** the I&C Procedure Feedback Form (Attachment 3) **AND FORWARD** to I&C Supervision. _____ Initials

Discrepancies noted during surveillance performance:

Notes:

Date Completed: _____

[ ] Acceptance Criteria of Section 9.0 of the base document were met.

Maintenance Management _____ Date _____

On-Shift SRO _____ Date _____ Time _____

[ ] Acceptance Criteria of Section 9.0 of the base document were not met. Notify the on-shift SRO.

Discrepancies: _____

_____

_____

Action taken: _____

_____

_____

Maint Management _____ Date _____ Time _____

I&C PROCEDURE FEEDBACK FORM

Date: _____

Name (print): _____

[1] Were there any problems found while performing this Procedure:

YES ☐ NO ☐

(a) If YES, record problem(s) in Step [3] below.

[2] Are there any enhancements that need to be made to this Procedure:

YES ☐ NO ☐

(a) If YES, record step(s) to be enhanced and a description of the enhancement(s) in Step [3] below. Include Attachment number if applicable.

[3] Problem/Enhancement: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

ALARM SUMMARY SHEET

ATTACHMENT	ALARM	LOCATION
1	**"DIVISION ONE PANEL TROUBLE"**	C905L-B5
2	**"DIVISION TWO PANEL TROUBLE"**	C905L-F5

ENCLOSURE 2

To Entergy Letter No. 2.11.007

RE-TYPED TECHNCIAL SPECIFICATION AND BASES PAGES

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B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. Records

ENO shall keep facility operating records in accordance with the requirements of the Technical Specifications.

D. Equalizer Valve Restriction - DELETED

E. Recirculation Loop Inoperable - DELETED

F. Fire Protection

ENO shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility and as approved in the SER dated December 21, 1978 as supplemented subject to the following provision:

ENO may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

G. Physical Protection

The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contain Safeguards Information protected under 10 CFR 73.21, is entitled: "Pilgrim Nuclear Power Station Physical Security, Training and Qualification, and Safeguards Contingency Plan, Revision 0" submitted by letter dated October 13, 2004, as supplemented by letter dated May 15, 2006.

2.0 SAFETY LIMITS

2.1 Safety Limits

2.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% of rated core flow:

THERMAL POWER shall be ≤ 25% of RATED THERMAL POWER.

2.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% of rated core flow:

MINIMUM CRITICAL POWER RATIO shall be ≥ 1.08 for two recirculation loop operation or ≥ 1.11 for single recirculation loop operation.

2.1.3 Whenever the reactor is in the cold shutdown condition with irradiated fuel in the reactor vessel, the water level shall not be less than 12 inches above the top of the normal active fuel zone.

2.1.4 Reactor steam dome pressure shall be ≤ 1340 psig at any time when irradiated fuel is present in the reactor vessel.

2.2 Safety Limit Violation

With any Safety Limit not met within two hours the following actions shall be met:

2.2.1 Restore compliance with all Safety Limits, and

2.2.2 Insert all insertable control rods.

REACTOR STEAM DOME PRESSURE (2.1.4)

The Safety Limit for the reactor steam dome pressure has been selected such that it is at a pressure below which it can be shown that the integrity of the reactor coolant system is not endangered. The reactor pressure limit of 1340 psig as measured in the vessel steam dome was derived from the design pressure of the reactor vessel. The peak pressures for the piping systems connected to the reactor vessel have been recalculated based on a reactor steam dome peak pressure of 1340 psig. These peak pressures are below the lowest of the transient pressures permitted by the applicable design code: ASME Boiler and Pressure Vessel (B&PV) Code (1965 Edition, including the January 1966 Addendum) for the pressure vessel, USAS Piping Code B31.1 for the steam space piping and ASME Section III for the reactor coolant system recirculation piping. The ASME B&PV Code permits pressure transients up to 10% over the design pressure (110% x1250=1375 psig). The USAS Piping Code and ASME Section III permit pressure transients and other occasional loads whose combined effect do not exceed stress levels based on the duration of the loads and the applicable service limit.

REFERENCES

1) "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A (through the latest approved amendment at the time the reload analyses are performed as specified in the CORE OPERATING LIMITS REPORT).

2) General Electric Thermal Analysis Basis (GETAB): Data, Correlation and Design Application, General Electric Co. BWR Systems Department, January 1977, NEDE-10958-PA and NEDO-10958-A.

3) "Methodology & Uncertainties for SLMCPR Evaluations," NEDC-32601-P-A (August 1999).

4) "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," NEDC-32694-P-A (August 1999).

5) "GE 11 Compliance with Amendment 22 of GESTAR II," NEDE-31917P (April 1991).

6) "GE 14 Compliance with Amendment 22 of GESTAR II," NEDC-32868P (December 1998).

7) "Pilgrim Nuclear Power Station Safety Valve Setpoint Increase," GE Hitachi Nuclear Energy Report, NEDC-33532P, Rev. 2 (January 2011)

TABLE 3.2.F (Cont)

SURVEILLANCE INSTRUMENTATION

Minimum # of Channels	Operable Instrument Instrument #	Parameter	Type Indication and Range	Notes
2	TI-5021-2A TRU-5021-1A TI-5022-2B TRU-5022-1B	Suppression Chamber Water Temperature Suppression Chamber Water Temperature	Indicator/ Multipoint Recorder 30-230°F (Bulk) Indicator/ Multipoint Recorder 30-230°F (Bulk)	(1) (2) (3) (4)) (1) (2) (3) (4)
1	PID-5021	Drywell/Torus Diff. Pressure	Indicator - .25 - +3.0 psig	(1) (2) (3) (4)
1	PID-5067A PID-5067B	Drywell Pressure Torus Pressure	Indicator -.25 - +3.0 psig Indicator -1.0 - +2.0 psig	(1) (2) (3) (4)
1/Valve	(a) Primary or (b) Backup	Safety/Relief Valve Position	a) Acoustic monitor b) Thermocouple	(5)
1/Valve	(a) Primary or (b) Backup	Safety Valve Position Indicator	a) Acoustic monitor b) Thermocouple	(5)
2	LI-1001-604A LR- 1001-604A LI-1001- 604B LR-1001- 604B	Torus Water Level (Wide Range) Torus Water Level (Wide Range)	Indicator /Multipoint Recorder 0 - 300"H_2O Indicator /Multipoint Recorder 0 - 300"H_2O	(1) (2) (3) (4) (1) (2) (3) (4)

NOTES FOR TABLE 3.2.F

(1) With less than the minimum number of instrument channels, restore the inoperable channel(s) within 30 days.

(2) With the instrument channel(s) providing no indication to the control room, restore the indication to the control room within seven days.

(3) If the requirements of notes (1) or (2) cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the Cold Shutdown Condition within 24 hours.

(4) These surveillance instruments are considered to be redundant to each other.

(5) At a minimum, the primary or backup parameter indicators shall be operable for each valve when the valves are required to be operable. With both primary and backup instrument channels inoperable either return one (1) channel to operable status within 31 days or be in a shutdown mode within 24 hours.

The following instruments are associated with the safety/relief and safety valves:

Valve	Primary Acoustic Monitor	Backup Tail Pipe Temperature Thermocouple
203-3A	ZT-203-3A	TE6285
203-3B	ZT-203-3B	TE6286
203-3C	ZT-203-3C	TE6287
203-3D	ZT-203-3D	TE6288
203-4A	ZT-203-4A	TE6274-B
203-4B	ZT-203-4B	TE6275-B

(6) Deleted.

(7) With less than the minimum number of operable instrument channels, restore the inoperable channels to operable status within 7 days or prepare and submit a special report to the Commission within 14 days of the event outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the channels to operable status.

TABLE 3.2-G

INSTRUMENTATION THAT INITIATES RECIRCULATION PUMP TRIP
AND
ALTERNATE ROD INSERTION

Minimum Number of Operable or Tripped Instrument Channels Per Trip System (1)	Trip Function	Trip Level Setting
2	High Reactor Dome Pressure	≤1210 psig
2	Low-Low Reactor Water Level	≥-46.3" indicated level

Actions (1) There shall be two (2) operable trip systems for each function.

(a) If the minimum number of operable or tripped instrument channels for one (1) trip system cannot be met, restore the trip system to operable status within 14 days or be in at least hot shutdown within 24 hours.

(b) If the minimum operability conditions (1.a) cannot be met for both (2) trip systems, be in at least hot shutdown within 24 hours.

3.2 PROTECTIVE INSTRUMENTATION (Cont)

The recirculation pump trip/alternate rod insertion systems are consistent with the "Monticello RPT/ARI" design described in NEDO-25016 (Reference 1) as referenced by the NRC as an acceptable design (Reference 2) for RPT. Reference 1 provides both system descriptions and performance analyses. The pump trip is provided to minimize reactor pressure in the highly unlikely event of a plant transient coincident with the failure of all control rods to scram. The rapid flow reduction increases core voiding providing a negative reactivity feedback. High pressure sensors and low water level sensors initiate the trip. The recirculation pump trip is only required at high reactor power levels, where the safety/relief valves have insufficient capacity to relieve the steam which continues to be generated in this unlikely postulated event. Requiring the trip to be operable only when in the RUN mode is therefore conservative. The low water level trip function includes a time delay of nine (9) seconds ± one (1) second to avoid increasing the consequences of a postulated LOCA. This delay has an insignificant effect on ATWS consequences. Additional analysis of the ARI/RPT Setpoint for High Reactor Dome Pressure is identified in Reference 3.

Alternate rod insertion utlizes the same initiation logic and functions as RPT and provides a diverse means of initiating a reactor scram. ARI uses sensors diverse from the reactor protection system to depressurize the scram pilot air header, which in turn causes all control rods to be inserted.

References

1. NEDO-25016, "Evaluation of Anticipated Transients Without Scram for the Monticello Nuclear Generating Plant," September 1976.

2. NUREG-0460, Volume 3, December 1978.

3. "Pilgrim Nuclear Power Station Safety Valve Setpoint Increase," GE Hitachi Nuclear Energy Report, NEDC-33532P, Rev. 2, January 2011.

Drywell Temperature

The drywell temperature limitations of Specification 3.2.H.1 ensure that safety related equipment will not be subjected to excess temperature. Exposure to excessive temperatures may degrade equipment and can cause loss of its operability.

The temperature elements for monitoring drywell temperature specified in Table 3.2.H were chosen on the basis of their reliability, location, and their redundancy (dual - element RTD's). These temperature elements are the primary elements used for the PCILRT.

The "nominal instrument elevations" provided in Tables 3.2.H and 4.2.H assist personnel in locating the instruments for surveillance and maintenance purposes and define the approximate containment region to be monitored. The "nominal instrument elevations" are not intended to provide a precise instrument location.

LIMITING CONDITIONS FOR OPERATION

3.5 CORE AND CONTAINMENT COOLING SYSTEMS

C. HPCI System

1. The HPCI system shall be operable whenever there is irradiated fuel in the reactor vessel, reactor pressure is greater than 150 psig., and reactor coolant temperature is greater than 365°F, except as specified in 3.5.C.2 below.

2. From and after the date that the HPCI system is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 14 days unless such system is sooner made operable, providing that during such 14 days all active components of the ADS system, the RCIC system, the LPCI system and both core spray systems are operable.

3. If the requirements of 3.5.C cannot be met, an orderly shutdown of the reactor shall be initiated and the reactor shall be in the Cold Shutdown Condition within 24 hours.

SURVEILLANCE REQUIREMENTS

4.5 CORE AND CONTAINMENT COOLING SYSTEMS

C. HPCI System

1. HPCI system testing shall be as follows:

a. Simulated Automatic Actuation Test	Once/ Operating Cycle

---------- Note ----------
Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform test.
---

b. Pump Operability	When tested as specified in 3.13, verify with reactor pressure ≤1035 and ≥ 940 psig, the HPCI pump can develop a flow rate ≥ 4250 gpm against a system head corresponding to reactor pressure.
c. Motor Operated Valve Operability	As Specified in 3.13

---------- Note ----------
Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform test.
---

d. Flow Rate at 150 psig.	Once/ Operating Cycle, verify with reactor pressure ≤ 150 psig, the HPCI pump can develop a flow rate ≥ 4250 gpm against a system head corresponding to reactor pressure.

LIMITING CONDITIONS FOR OPERATION

3.5 CORE AND CONTAINMENT COOLING SYSTEMS

D. Reactor Core Isolation Cooling (RCIC) System

1. The RCIC system shall be operable whenever there is irradiated fuel in the reactor vessel, reactor pressure is greater than 150 psig, and reactor coolant temperature is greater than 365°F, except as specified in 3.5.D.2 below.

2. From and after the date that the RCIC system is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 14 days unless such system is sooner made operable, providing that during such 14 days the HPCIS is operable.

3. If the requirements of 3.5.D cannot be met, an orderly shutdown of the reactor shall be initiated and the reactor shall be in the Cold Shutdown Condition within 24 hours.

SURVEILLANCE REQUIREMENTS

4.5 CORE AND CONTAINMENT COOLING SYSTEMS

D. Reactor Core Isolation Cooling (RCIC) System

1. RCIC system testing shall be as follows:

a. Simulated Automatic Actuation Test	Once/ Operating Cycle

---------- Note ----------
Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform test.
---

b. Pump Operability	When tested as specified in 3.13, verify with reactor pressure ≤ 1035 and ≥ 940 psig, the RCIC pump can develop a flow rate ≥ 400 gpm against a system head corresponding to reactor pressure.
c. Motor Operability Valve Operability	As Specified in 3.13

---------- Note ----------
Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform test.
---

d. Flow Rate at 150 psig.	Once/Operability Cycle verify with reactor pressure ≤ 150 psig, the RCIC pump can develop a flow rate ≥ 400 gpm against a system head corresponding to reactor pressure.

B 3/4.5 CORE AND CONTAINMENT COOLING SYSTEMS

3/4.5.E Automatic Depressurization (ADS) System
BASES

BACKGROUND

This specification ensures the operability of the ADS under all conditions for which the automatic or manual depressurization of the nuclear system is an essential response to station abnormalities.

The nuclear system pressure relief system provides automatic nuclear system depressurization for small breaks in the nuclear system so that the low pressure coolant injection (LPCI) and the core spray systems can operate to protect the fuel barrier.

Because the Automatic Depressurization System does not provide makeup to the reactor primary vessel, no credit is taken for the steam cooling of the core caused by the system actuation to provide further conservatism to the CSCS. Performance analysis of the Automatic Depressurization System is considered only with respect to its depressurizing effect in conjunction with LPCI or Core Spray. There are four valves provided and each has a capacity of 921,235 lb/hr at a reactor pressure of 1155 psig.

APPLICABLE SAFETY ANALYSIS

The limiting conditions for operating the ADS are derived from the Station Nuclear Safety Operational Analysis (FSAR Appendix G) and a detailed functional analysis of the ADS (FSAR Section 6).

ACTIONS

The allowable out of service time for one ADS valve is determined as 14 days because of the redundancy and because of HPCI operability; therefore, redundant protection for the core with a small break in the nuclear system is still available.

SURVEILLANCES

The testing interval for the core and containment cooling systems is based on industry practice, quantitative reliability analysis, judgment and practicality. The core cooling systems have not been designed to be fully testable during operation. For example, complete ADS testing during power operation causes an undesirable loss-of-coolant inventory. When components are tested and found inoperable the impact on system operability is determined, and corrective action or Limiting Conditions of Operation are initiated. A simulated automatic actuation test once each cycle combined with code inservice testing of the pumps and valves is deemed to be adequate testing of these systems. The ADS test circuit permits continued surveillance on the operable relief valves to assure that they will be available if required.

The surveillance requirements provide adequate assurance that the core and containment cooling systems will be operable when required.

LIMITING CONDITIONS FOR OPERATION

3.6 PRIMARY SYSTEM BOUNDARY (Cont)

c. With no required leakage detection systems Operable, be in Hot Shutdown within the next 12 hours and in Cold Shutdown within the following 24 hours.

D. Safety and Relief Valves

1. During reactor power operating conditions and prior to reactor startup from a Cold Condition, or whenever reactor coolant pressure is greater than 104 psig and temperature greater than 340°F, both safety valves and the safety modes of all relief valves shall be operable.

2. If Specification 3.6.D.1 is not met, an orderly shutdown shall be initiated and the reactor coolant pressure shall be below 104 psig within 24 hours.

SURVEILLANCE REQUIREMENTS

4.6 PRIMARY SYSTEM BOUNDARY (Cont)

D. Safety and Relief Valves

1. As specified in accordance with 3.13, verify the safety function lift setpoints of the safety and relief valves as follows:

No. of S/R Valves	Setpoint (psig)
2 Safety	1280 ± 38.4
4 Relief	1155 ± 34.6

Following testing, lift setting shall be within ± 1%.

---------- Note ----------
Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform test.
---

2. Once/ Operating Cycle, verify each relief valve opens when manually actuated.

LIMITING CONDITIONS FOR OPERATION

3.6 PRIMARY SYSTEM BOUNDARY (Cont)

E. Jet Pumps

1. Whenever the reactor is in the Startup or Run Modes, all jet pumps shall be Operable. If it is determined that a jet pump is inoperable, the reactor shall be in Hot Shutdown within 12 hours.

SURVEILLANCE REQUIREMENTS

4.6 PRIMARY SYSTEM BOUNDARY (Cont)

E. Jet Pumps

NOTES

1. Not required to be performed until 4 hours after the associated recirculation loop is in operation.
2. Not required to be performed until 24 hours after >25% Rated Thermal Power.

Whenever there is recirculation flow with the reactor in the Startup or Run Modes, jet pump operability shall be checked daily by verifying at least one of the following criteria (1, 2, or 3) is satisfied for each operating recirculation loop:

1. Recirculation pump flow to speed ratio differs by ≤ 5% from established patterns, and jet pump loop flow to recirculation pump speed ratio differs by ≤ 5% from established patterns.
2. Each jet pump diffuser to lower plenum differential pressure differs by ≤ 20% from established patterns.
3. Each jet pump flow differs by ≤ 10% from established patterns.

BASES:

3/4.6 PRIMARY SYSTEM BOUNDARY (Cont)

C. Coolant Leakage (Cont)

The 2 gpm limit for unidentified coolant leakage rate increase within any 24 hour period is a limit specified by the NRC in Generic Letter 88-01: "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping". This limit applies only during the RUN mode to accommodate the expected coolant leakage increase during pressurization.

The total leakage rate consists of all leakage, which flows to the drywell equipment drain sump (Identified leakage) and floor drain sump (Unidentified leakage).

In addition to the sump monitoring of coolant leakage, airborne radioactivity levels of the drywell atmosphere is monitored by the Reactor Pressure Boundary Leak Detection System. This system consists of two panels capable of monitoring the primary containment atmosphere for particulate and gaseous radioactivity as a result of coolant leaks

D. Safety and Relief Valves

The valve sizing analysis considered four relief/safety valves and two safety valves. The set pressures are established in accordance with the following three requirements of Section III of the ASME Code:

1. The lowest safety valve must be set to open at or below vessel design pressure and the highest safety valve be set at or below 105% of design pressure.

2. The valves must limit the reactor vessel pressure to no more than 110% of design pressure.

3. Protection systems directly related to the valve sizing transient must not be credited with action (i.e., an indirect scram must be assumed).

BASES:

3/4.6 PRIMARY SYSTEM BOUNDARY (Cont)

D. Safety and Relief Valves (Cont)

A main steam line isolation with flux scram has been selected to be used as the safety valve sizing transient since this transient results in the highest peak vessel pressure of any transient when analyzed with an indirect scram. The original FSAR analysis concluded that the peak pressure transient with indirect scram would be caused by a loss of condenser vacuum (turbine trip with failure of the bypass valves to open). However, later observations have shown that the long lengths of steam lines to the turbine buffer the faster stop valve closure isolation and thereby reduce the peak pressure caused by this transient to a value below that produced by a main steam line isolation with flux scram.

Item 3 above indicates that no credit be taken for the primary scram signal generated by closure of the main steam isolation valves. Two other scram initiation signals would be generated, one due to high neutron flux and one due to high reactor pressure. Thus item 3 will be satisfied by assuming a scram due to high neutron flux.

Relieving capacity of 4 relief/safety valves in combination with 2 safety valves results in a peak pressure during the transient conditions used in the safety valve sizing analysis which is well below the pressure safety limit.

The relief/safety valve settings satisfy the Code requirements that the lowest safety valve set point be at or below the vessel design pressure range to prevent unnecessary cycling caused by minor transients. The results of postulated transients where inherent relief/safety valve actuation is required are identified or referenced in the Updated Final Safety Analysis Report.

Experience in safety valve operation shows that a testing of at least 50% of the safety valves per refueling outage is adequate to detect failures or deterioration. The tolerance value of ± 3% is in accordance with Section III of the ASME Boiler and Pressure Vessel Code. An analysis has been performed which shows that with all safety valves set 3% higher, the reactor coolant system pressure safety limit of 1375 psig is not exceeded.

The relief/safety valves have two functions; i.e., power relief or self-actuated by high pressure. Power relief is a solenoid actuated function (Automatic Pressure Relief) in which external instrumentation signals of coincident high drywell pressure and low-low water level initiate the valves to open. This function is discussed in Specification 3.5.E. In addition, the valves can be operated manually.