Entergy

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Mike Bellamy
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October 10, 2002

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

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

Request for Technical Specification Change Concerning Change of Trip Level Settings, Calibration Frequencies, and Editorial Changes, Revision 1

REFERENCE: Entergy Letter No. 2.01.086, Request for Technical Specification Change Concerning Change of Trip Level Settings, Calibration Frequencies, and Editorial Changes, dated December 12, 2001.

LETTER NUMBER: 2.02.084

Dear Sir or Madam:

By the above reference, Pilgrim Nuclear Power Station (Pilgrim) requested NRC review and approval of changes to Pilgrim's Technical Specification Tables 3.2.A, 3.2.B, 4.2.A, and 4.2.B in accordance with 10 CFR 50.90. Subsequent discussions with the NRC staff have identified changes needed in the submittal to support the NRC's review. This letter provides the information discussed with the NRC Staff and replaces the original submittal.

If you have any questions or require additional information, please contact Mr. Bryan Ford, Licensing Manager, at (508) 830-8403.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 10th day of October, 2002.

Sincerely,

Robert M. Bellamy

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ATTACHMENT 1

NARRATIVE ON PROPOSED CHANGES AND "NO SIGNIFICANT HAZARDS CONSIDERATION"

ATTACHMENT 1

Description of Proposed Changes

1) Pilgrim Nuclear Power Station (Pilgrim) proposes the following changes to Technical Specification Table 3.2.A, *"Instrumentation That Initiates Primary Containment Isolation"* (page 3/4.2-7).

   a) The current trip level setting for the “Main Steam Line Tunnel Exhaust Duct High Temperature” is ≤ 170° F. Pilgrim proposes to change the trip level setting to ≤ 175° F.

   b) The trip level setting of the “Turbine Basement Exhaust Duct High Temperature” is currently ≤ 150° F. Pilgrim proposes to change the trip level setting to ≤ 155° F.

   c) The name of the instrument *"Reactor Cleanup System High Flow"* is changed to *"Reactor Water Cleanup System (RWCU) High Flow."*

   d) The trip level setting of the "Reactor Water Cleanup System High Temperature" is currently ≤ 150° F. Pilgrim proposes to change the trip level setting to ≤ 148° F. The number of required channels is corrected to identify the sensors and their locations consistent with plant design and to show that there is one required channel in each of the two trip systems for each location. The sensors and their locations are as follows:

      “RWCU Back Wash Receiver Tank Room High Temperature”
      “RWCU Heat Exchanger and Pump Rooms High Temperature”
      “RWCU Line in RHR Valve Room “A” High Temperature”
      “RWCU Line Near East CRD Modules High Temperature”

   e) The column identifying the number of available channels is removed from the table.

2) Pilgrim proposes the following changes to Technical Specification Table 3.2.B, *"Instrumentation That Initiates or Controls the Core and Containment Cooling Systems"* (pages 3/4.2-12, 3/4.2-16, and 3/4.2-17).

   a) Not used.

   b) Not used.

   c) The trip level settings of the “RCIC Turbine Compartment Wall” is currently ≤ 170° F. Pilgrim proposes to change the trip level setting to ≤ 168° F.

   d) The "Torus Cavity Exhaust Duct" is renamed "RCIC Exhaust Duct Torus Cavity." The trip level setting of the “RCIC Exhaust Duct Torus Cavity” is currently ≤ 150° F. Pilgrim proposes to change the trip level setting to ≤148° F.

   e) The trip level setting of the “RCIC Valve Station Area Wall” is currently ≤ 200° F. Pilgrim proposes to change the trip level setting to ≤198° F.

f) The "RCIC" Steam Line Lo-Press" is renamed "RCIC Steam Line Low Pressure". The current trip level setting for the "RCIC Steam Line Low Pressure" trip level setting is 100 > P > 50 psig. The new trip level setting is proposed to be 77 > P > 63 psig.

g) The current trip level setting of the "HPCI Turbine Steam Line High Flow" is ≤ 300% of rated flow. Pilgrim proposes to change the trip level setting to ≤ 296% of rated flow.

h) The "HPCI Turbine Compartment Exhaust Ducts" is renamed "HPCI Turbine Compartment Exhaust Duct." The trip level settings of the "HPCI Turbine Compartment Exhaust Duct" is currently ≤ 170° F. Pilgrim proposes to change the trip level setting to ≤ 168° F.

i) The "Torus Cavity Exhaust Duct" for HPCI is renamed "HPCI Exhaust Duct Torus Cavity." The current trip level setting for the "HPCI Exhaust Duct Torus Cavity" high temperature is 190° F - 200° F. Pilgrim proposes to change the trip level setting of this trip function to ≤ 198° F.

j) The current trip level setting for the "HPCI/RHR Valve Station Area Exhaust Duct" high temperature is currently ≤ 170° F. Pilgrim proposes to change the trip level settings of these trip functions to ≤ 168° F.

k) Table 3.2.B footnote 6 (page 3/4.2-17) is added regarding the trip level setting for the RCIC steam line low-pressure trip function. The footnote clarifies that the pressure indicated for the trip level setting, 70 ± 7 psig, does not include the static head pressure which is 17.5 psi.

l) Pilgrim proposes to move the note numbers on page 3/4.2-16 to the "Remarks" column to correct the numbers' misplacement.

3) Pilgrim proposes the following change to Technical Specification Table 4.2.A, *"Minimum Test and Calibration Frequency for PCIS"* (page 3/4.2-31 and 3/4.2-41).

a) The current calibration frequency of the "Main Steam High Temp" is "Once/3 months". Pilgrim proposes to change the calibration frequency to "Once/24 months".

b) The "Reactor Water Cleanup High Flow" on Table 4.2.A is renamed "Reactor Water Cleanup System (RWCU) High Flow ". The "Reactor Water Cleanup High Temp" on Table 4.2.A is changed to the following to reflect the change made to Table 3.2.A (see 1d):

"RWCU Back Wash Receiver Tank Room High Temperature"
"RWCU Heat Exchanger and Pump Rooms High Temperature"
"RWCU Line in RHR Valve Room "A" High Temperature"
"RWCU Line Near East CRD Modules High Temperature"

The current calibration frequency for the "Reactor Water Cleanup High Temperature" is "Once/3 months." Pilgrim proposes to change the calibration frequency to "Once/24 months".

c) Reference to Figure 4.1.1 in Note 1 on "Notes for Tables 4.2.A through 4.2.G (page 3/4.2-41)" is changed to reference the correct figure (Figure 4.2.1).

4) Pilgrim proposes the following changes to Technical Specifications Table 4.2.B, "Minimum Test and Calibration Frequency for CSCS" (pages 3/4.-32 and 3/4.2-33).

   a) Not used.

   b) The current calibration frequency of the "Steam Line High Temp. (HPCI & RCIC)" is "Once/3 months". Pilgrim proposes to change the calibration frequency to "Once/24 months".

   c) The current calibration frequency of the "Safeguards Area High Temperature" is "Once/3 months". Pilgrim proposes to change the calibration frequency to "Once/24 months".

   d) The current calibration frequency for the "RCIC Steam Line Low Pressure" is "Once/3 months". Pilgrim Station proposes to change the calibration frequencies for these instrument channels to "Once/12 months".

5) Following approval of the proposed Technical Specification changes Pilgrim will make the following changes to Technical Specifications Bases in accordance with Technical Specification 5.6.6 (Technical Specifications Bases Control Program).

   a) Pilgrim proposes the following changes to Technical Specification Bases 3.2 "Protective Instrumentation" (page B3/4.2-2):

      The current setting of 170° F for the main steam line tunnel detector is low enough to detect leaks on the order of 5 – 10 gpm. Pilgrim proposes to change the trip value to 175° F for the "main steam line tunnel detector," which is low enough to detect leaks of ≥ 20 gpm.

   b) Pilgrim proposes the following changes to Technical Specification Bases 3.2 "Protective Instrumentation" (page B3/4.2-3).

      i) The current setting of ≤ 300% of design flow for HPCI high flow and 200° F or 170° F, depending on sensor location, for HPCI high temperature require revision. Pilgrim proposes to change the HPCI high flow trip value to ≤ 296% and HPCI high temperature sensors to ≤ 198° F or ≤ 168° F, depending on sensor location.

      ii) The current setting for RCIC area high temperature is 200° F, 170° F, or 150° F, depending on sensor location. Pilgrim proposes to change the RCIC high temperature sensor trip setting to ≤ 198° F, ≤ 168° F, or ≤ 148° F, depending on sensor location.

      iii) The current Bases description of the RWCU system temperature and high flow instrumentation is changed by substituting the phrase"... is arranged with one instrument in each trip system for each area" for the current "... are arranged similar as that for the HPCI."

The revision of the submittal adds additional information that was identified as needed during discussions with the NRC staff and removes the changes previously requested as items 2.a, 2.b, and 4.a.

Reason for Proposed Change

Pilgrim station proposes setpoint changes to incorporate the results of setpoint calculations and decreased calibration frequencies associated with existing instruments, without adversely affecting instrument reliability. The changes also enhance the usability of the Technical Specifications by providing a clearer description of the "RWCU High Temperature" trip configuration. Changing the names of certain trips gives clearer definition of the system and is editorial. Moving the note numbers is editorial and is done for consistency. Correcting the mis-referenced figure is administrative.

These changes will have the affect of improving the usability of the Technical Specifications, decreasing plant staff burden, and reduces radiological dose.

Safety Evaluation

The functions affected by the proposed changes provide isolation signals to isolate non-limiting leaks from piping outside of containment. These instruments do not have a design basis safety function. Other functions provide the required isolation during design basis accidents.

To support the requested Technical Specification changes Pilgrim analyzed the associated setpoint and calibration frequency changes using the following methodology:

1. Proposed instrument setpoint changes (changes 1a, 1b, 1d, 2c, 2d, 2e, 2f, 2g, 2h, 2i, 2j) were determined following the guidance of Regulatory Guide 1.105, Revision 2. This is a more recent and rigorous methodology than the original license and design bases for these instruments. As a result, the setpoints for the associated instruments are more conservative than the original setpoints. The trip level settings were determined while analyzing the instruments in accordance with procedures that are subject to a quality assurance program that complies with 10 CFR 50 Appendix B and were found to be acceptable for the reasons described below. The analyses supporting the setpoint changes are based on a 95% probability limit that the trips would occur before the design basis analytical limit is exceeded. Each instrument has a documented "analytical limit" and an "allowable limit." The setpoint calculations fully document the basis for changes to limits, trip level settings, and calibration frequencies.

2. Proposed instrument calibration frequencies (changes 3a, 3b, 4b, 4c, and 4d) were determined following the guidance of Generic Letter 91-04.

3. The new calculated instrument setpoints were evaluated against the original associated analysis assumptions. The original associated analysis assumptions correspond to the nominal setpoints originally identified in the Technical Specifications for these instruments. When possible, the original associated analysis assumptions are maintained and the proposed instrumentation setpoints support these analysis assumptions (changes 1d, 2c, 2d, 2e, 2f, 2g, 2h, 2i, 2j).

4. Applying the more rigorous setpoint methodology to the original analysis assumptions resulted in inadequate margins to support plant operational needs (e.g., potential for spurious actuations). The associated analysis was revised to provide necessary margin (changes 1a and 1b). The values chosen for the new analysis assumptions were chosen to be high enough to support plant operational needs while being low enough to limit the potential impact of the associated leaks.

Additional information concerning the calculation methodology and selected portions of two of the calculations can be found in Attachments 3 and 4.

The following provides a discussion of the specific changes requested.

The trip level setting for the "Main Steam Line Tunnel Exhaust Duct High Temperature" (1a) is currently ≤ 170° F. It is proposed that the trip level setting be increased to ≤ 175° F to support an analytical limit of 178° F. The existing Technical Specification limit of ≤170° F was based on detection and isolation of a 10 gpm leak from the main steam lines inside the main steam tunnel while meeting 10 CFR 20 dose limits. The purpose of this isolation is to limit the release of radiation during a non-limiting leak from the main steam lines, while other systems and functions are designed to address a limiting main steam line break. This isolation is designed to limit dose effects of the analyzed leak to within 10 CFR 20 dose limits and ensure that for leaks smaller than the analyzed leak, it is not credible that dose limits are challenged prior to manually isolating the leak. The new trip setting allows detection and isolation of a main steam line leak of 20 gpm with an associated new analytical limit of 178° F. Calculations show that 20 gpm of system leakage would be detected and isolated in a timely manner (approximately 1.5 hours). The 20 gpm would need to go undetected for > 1000 days before 10 CFR 20 radiological limits could be exceeded. Such a leak going undetected for such a period is highly unlikely and thus the new setting does not result in consequences that exceed 10 CFR 20 dose limits. There is no impact on environmental qualification of electrical equipment from the potential increase in main steam tunnel temperatures. The new setting ensures adequate margin exists between the trip level setting and the new design basis analytical limit to account for all instrument and process inaccuracies and is high enough to avoid spurious isolation signals. Leaks < 20 gpm from adjacent feedwater and RWCU piping inside the main steam tunnel will still be detected by this instrumentation and result in increased area temperature indication in the control room. If the temperature increase persists, actions to identify and isolate these leaks can still be performed as described in the current licensing basis.

The trip level setting for the "Turbine Basement Exhaust Duct High Temperature" (1b) is currently ≤ 150° F. It is proposed that the trip level setting be increased to ≤ 155° F to support an analytical limit of 158° F. The existing Technical Specification limit of ≤ 150° F was based on detection and isolation of a 150 gpm leak from the main steam lines in the turbine basement while meeting 10 CFR 20 dose limits. The purpose of this isolation is to limit the release of radiation during a non-limiting leak from the main steam lines, while other systems and functions are designed to address a limiting main steam line break. This isolation is designed to limit dose effects of the analyzed leak to within 10 CFR 20 dose limits and ensure that for leaks smaller than the analyzed leak, it is not credible that dose limits are challenged prior to manually isolating the leak. The new trip setting allows detection and isolation of a main steam line leak of 225 gpm with an associated new analytical limit of 158° F. Calculations show that the system leakage would still be detected and isolated in a timely manner (approximately 1.3 hours). The 225 gpm leak would need to continue undetected for > 7 days before 10 CFR 20 radiological limits could be exceeded. Such a leak going undetected for such a period is unlikely and thus the new setting does not result in consequences that exceed 10 CFR 20 dose limits. There is no impact on environmental qualification of electrical equipment from the potential increase in main steam tunnel temperatures. The new setting ensures adequate margin exists between the trip level setting and the new design basis analytical limit to account for all instrument and process inaccuracies and is high enough to avoid spurious isolation signals. Leaks from other piping in the turbine basement will still be detected by this instrumentation. If the temperature increase persists, actions to identify and isolate these leaks can still be performed as described in the current licensing basis. Renaming the "Reactor Cleanup System High Flow" to "Reactor Water Cleanup System (RWCU) High Flow" (1c, 3b), removing the column identifying the number of available instruments channels (1e), and relocating footnote numbers to the "Remarks" column (2l) are administrative changes that do not change any technical requirements and do not impact safety.

The trip level setting of the "Reactor Water Cleanup System High Temperature" (1d) is currently ≤ 150° F. It is proposed that the trip level setting be decreased to ≤148° F to support an analytical limit of 150° F for all four sensor locations. High temperature in the vicinity of the reactor water cleanup (RWCU) equipment and piping could indicate a break in a RWCU line. When high temperature occurs near the RWCU equipment, the RWCU system is isolated. This new trip level setting ensures that the analytical limit of 150° F will not be exceeded and timely detection and isolation of the RWCU system occurs in the event of a RWCU line break. The new trip level setting of ≤148° F is sufficiently above normal operational upper limits to avoid spurious isolation, yet low enough to provide timely detection of a line break.

The RWCU system high temperature instruments are delineated by instrument location to ensure the appropriate requirements are implemented. The minimum number of instrument channels required to be operable for each location is changed to one in each of 2 trip systems (1d). High temperature in the vicinity of the RWCU system is sensed by four sets of two bimetallic temperature switches. A set of two temperature switches is installed in each of the four areas to be monitored. Each of the switches in an area is capable of initiating isolation of its associated valve(s). This change is consistent with plant design as described in the UFSAR and the presentation of this function in NUREG-1433, "Standard Technical Specifications, BWR 3/4."

The trip level setting for the "RCIC Turbine Compartment Wall" (2c) is currently ≤ 170° F. The proposed trip level setting is ≤ 168° F to support an analytical limit of 170° F. The trip level setting for the "RCIC Exhaust Duct Torus Cavity" (2d) is currently ≤ 150° F. The proposed trip level setting is ≤ 148° F to support an analytical limit of 150° F. The trip level setting for the "RCIC Valve Station Area Wall" (2e) is currently ≤ 200° F. The proposed trip level setting is ≤ 198° F to support an analytical limit of 200° F. The new trip level settings for the "RCIC Turbine Compartment Wall" (2c), "RCIC Exhaust Duct Torus Cavity" (2d), and "RCIC Valve Station Area Wall" (2e) are lower. The analytical limits for these setpoints are based on detecting RCIC steam line leaks of approximately 10 gpm and initiating isolation of the RCIC steam line. Calculations conclude that satisfactory margin exists between the trip level settings and the design basis analytical limit to account for all instrument and process inaccuracies. The probability of an inadvertent actuation caused by the decrease in operating margin was evaluated and found to be acceptable; the proposed changes do not increase the probability of an inadvertent actuation based on normal historical operating conditions. The new trip level settings are sufficiently below those for the HPCI system so that preferential isolation of the RCIC steam line occurs in the event of a small line break, and permits the HPCI system to remain operable.

Changing the RCIC "Torus Cavity Exhaust Duct" to "RCIC Exhaust Duct Torus Cavity" (2d) clarifies the instruments' location. This is an administrative change and has no impact on safety. The trip level setting for the "RCIC Steam Line Low Pressure" (2f), is currently 100 > P > 50 psig. The proposed trip level setting is 77 > P > 63 psig. The analytical limits (100 > P > 50 psig) for the "RCIC Steam Line Low Pressure" (2f) were selected to ensure the RCIC steam line is isolated at a value that ensures steam and radioactive gases will not escape from the RCIC turbine shaft seals into the reactor building after steam pressure has decreased to such a low value that the turbine can not be operated. The proposed trip level setting of 77 > P > 63 psig, by taking into account total instrument loop uncertainty, ensures steam line isolation occurs before the analytical limit is exceeded.

The "HPCI Turbine Steam Line High Flow" (2g) trip level setting is currently ≤ 300% of rated flow. The proposed trip level setting for the "HPCI Turbine Steam Line High Flow" instruments of ≤ 296% is more conservative than the current setting because it isolates HPCI at a slightly lower flow, thereby increasing the margin between the trip level setting and the analytical limit of

300%. The new trip level setting is closer to the normal operating band but it has been determined that adequate operating margin exists. This change does not adversely impact HPCI performance.

The trip level setting for the "HPCI Turbine Compartment Exhaust Duct" (2h) is currently ≤ 170° F. The proposed trip level setting is ≤ 168° F to support an analytical limit of 170° F. The trip level setting for the "HPCI Exhaust Duct Torus Cavity" (2i) is currently 190° F – 200° F. The proposed setting is ≤ 198° F to support an analytical limit of 200° F with the removal of the bottom of the band for the isolation. The lower end of the current band is to preserve system availability by establishing a setting high enough to preclude spurious isolations. However, this lower setting point is not assumed in the accident analysis and therefore, is removed from the Technical Specifications.

The trip level setting for the "HPCI/RHR Valve Station Area Exhaust Duct" (2j) is currently ≤ 170° F. The proposed trip level setting is ≤ 168° F to support an analytical limit of 170° F. The new trip level settings for the "HPCI Turbine Compartment Exhaust Duct" (2h), "HPCI Exhaust Duct Torus Cavity" (2i), and "HPCI/RHR Valve Station Area Exhaust Duct" (2j) are lower. The analytical limits for these setpoints are based on detecting HPCI steam line leaks of approximately 10 gpm and initiating isolation of the HPCI steam line. Decreasing the trip level settings will slightly improve the ability of the instrumentation to detect and isolate steam leaks. Calculations conclude that satisfactory margin exists between the trip level settings and the design basis analytical limit to account for all instrument and process inaccuracies. The probability of an inadvertent actuation caused by the decrease in operating margin was evaluated and found to be acceptable; thus the proposed changes do not increase the probability of an inadvertent actuation based on normal historical operating conditions.

Renaming the "HPCI Turbine Compartment Exhaust Ducts" to "HPCI Turbine Exhaust Duct" (2h) is editorial and does not impact safety.

Renaming the "Torus Cavity Exhaust Duct" to "HPCI Exhaust Duct Cavity"(2i), clarifies the instrument's location. This is an administrative change and has no impact on safety.

The addition of Note 6 (2k) provides information concerning the presence of 17.5 psi static head due to the difference in elevation between the location of the sensing lines attached to the RCIC steam line and the location of the pressure sensing instrument. The note is intended to clarify that the trip level setting is based on the pressure in the steam line (process pressure) rather than instrument sensed pressure. Adding Note 6 is an administrative change and has no impact on safety.

Calibration frequencies are decreased for the "Main Steam High Temp" (3a), and the renamed "Reactor Water Cleanup High Temp" (3b) systems, the "Steamline High Temp (HPCI & RCIC)" (4b), the "Safeguards Area High Temperature" (4c), and the "RCIC Steam Line Low Pressure" (4d). The effect on total instrument loop uncertainty due to decreasing the calibration frequencies were included in the calculations that established the new Technical Specification trip settings in accordance with methodologies endorsed by R.G. 1.105. The calculations conclude that sufficient margin exists between the trip level settings and the design basis analytical limit to account for all instrument and process inaccuracies, including decreased calibration frequencies. Therefore, the decreased calibration frequencies will have no effect on the ability of the affected instrumentation to perform their safety functions. Note 1 of "Notes for Tables 4.2.A through 4.2.G" is changed to reference Figure 4.2-1 instead of the currently referenced Figure 4.1.1 (3c). This change corrects an oversight that occurred when the reformatting of Technical Specifications granted by Revision 177 renamed the Figure as Figure 4.2-1, but Note 1 was not changed. The content of Figure 4.2-1 is identical to the previous Figure 4.1.1; therefore, this is an administrative change.

Environmental Consideration

The proposed amendment changes instrument surveillance intervals and trip level settings. The proposed change is consistent with accepted engineering practice and methodologies.

The proposed change does not impact plant configuration or design. Each proposed change is to be used within the restricted area as defined in 10 CFR Part 20. Pilgrim has determined the amendment involves no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite, and there is no significant increase in individual or cumulative occupational radiation exposure resulting from the implementation of this proposed change. Pilgrim has performed a no significant hazards consideration analysis (see below) and found the proposed amendment involves no significant hazards. Accordingly, Pilgrim concludes the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Part 51.22(c)(9). Therefore, pursuant to 10 CFR Part 51.22(b), Pilgrim concludes no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

No Significant Hazards Considerations

10 CFR 50.91 requires that at the time a licensee requests an amendment, it must provide to the Commission its analysis using the standards in 10 CFR 50.92, to determine no significant hazards considerations. In accordance with 10 CFR 50.91, Pilgrim has performed an analysis for the proposed changes to Technical Specification Tables 3.2.A and 3.2.B and 4.2.A and 4.2.B. Operation of Pilgrim in accordance with the proposed amendment:

- Will not involve a significant increase in the probability or consequences of an accident previously evaluated.

  The methodology used to determine the proposed trip level settings and surveillance intervals ensure adequate performance of the affected instrumentation. In addition, the affected instruments are not initiators of any accident previously evaluated. Therefore, the proposed trip level settings and surveillance intervals will not involve a significant increase in the probability of an accident previously evaluated.

  The proposed changes to trip level settings and surveillance intervals were established using methodologies subject to a 10 CFR Appendix B Quality Assurance program and ensure existing radiological limits are met. Therefore, the proposed trip level settings and surveillance intervals will not involve a significant increase in the consequences of an accident previously evaluated.

  Other changes are editorial or administrative in nature and can not significantly increase the probability or consequences of an accident previously evaluated.

- Will not create the possibility of a new or different kind of accident from any accident previously evaluated.

  No new or different types of accidents or malfunctions than those previously analyzed in Pilgrim's UFSAR are introduced by this proposed change because there are no new failure modes introduced. Therefore, the proposed changes will not create the possibility of a new or different kind of accident from any accident previously evaluated.

- Will not involve a significant reduction in the margin of safety.

  The proposed changes to trip level settings and surveillance intervals were established using approved methodologies subject to a 10 CFR, Appendix B, Quality Assurance program and existing radiological limits are met. These changes do not impact Pilgrim's configuration or operation.

  Editorial and administrative type changes do not impact the operation or configuration of Pilgrim. For the above reasons the proposed change does not result in a significant reduction in the margin of safety.

Schedule of Change

This change will be implemented within 90 days following Pilgrim's receipt of NRC approval.

ATTACHMENT 2

MARKED UP TECHNICAL SPECIFICATION PAGES

TABLE 3.2.A

INSTRUMENTATION THAT INITIATES PRIMARY CONTAINMENT ISOLATION

MINIMUM # OF Operable Instrument Channels Per Trip System (1) Minimum	Available	Instrument	Trip Level Setting	Action (2)
2(7)	~~2~~	Reactor Low Water Level	≥11.6" indicated level (3)	A and D
1	~~1~~	Reactor High Pressure	≤76 psig	D
2	~~2~~	Reactor Low-Low Water Level	at or above - 46.4 in. indicated level (4)	A
2	~~2~~	Reactor High Water Level	≤55.4" indicated level (5)	B
2(7)	~~2~~	High Drywell Pressure	≤2.22 psig	A
2	~~2~~	Low Pressure Main Steam Line	≥810 psig (8)	B
2(6)	~~2~~	High Flow Main Steam Line	≤136% of rated steam flow	B
2	~~2~~	Main Steam Line Tunnel Exhaust Duct High Temperature	≤170°F 175	B
2	~~2~~	Turbine Basement Exhaust Duct High Temperature	≤150°F. 155	B
1	~~1~~	Reactor WATER Cleanup System (RWCU) High Flow	≤300% of rated flow	C
~~2~~	~~2~~	~~Reactor Cleanup System High Temperature~~	~~≤150°F~~	C
1		RWCU BACK WASH RECEIVER TANK ROOM HIGH TEMPERATURE	≤ 148°F	C
1		RWCU HEAT EXCHANGER AND PUMP ROOM HIGH TEMPERATURE	≤ 148°F	C
1		RWCU LINE IN RHR VALVE ROOM "A" HIGH TEMPERATURE	≤ 148°F	C
1		RWCU LINE NEAR EAST CRD MODULES HIGH TEMPERATURE	≤ 148°F	C

PNPS
TABLE 3.2.B (Cont)

INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Minimum # of Operable Instrument Channels Per Trip System (1)	Trip Function	Trip Level Setting	Remarks
2	Condensate Storage Tank Low Level	≥18" above tank zero	Provides interlock to HPCI pump suction valves.
2	Suppression Chamber High Level	≤1'11" below torus zero	
1	RCIC Turbine Steam Line High Flow	≤300% of rated steam flow	(2)
2	RCIC Turbine Compartment Wall	≤~~170~~ 168 °F	(2)
2	~~Torus Gavity Exhaust Duct~~ RCIC EXHAUST DUCT TORUS CAVITY	≤~~150~~ 148 °F	(2)
2	RCIC Valve Station Area Wall	≤~~200~~ 198 °F	(2)
4 (5)	~~RCIC Steam Line Lo Press~~ RCIC STEAM LINE LOW PRESSURE	~~100~~ 77 >P> ~~50~~ 63 psig	(2) (6)
1	HPCI Turbine Steam Line High Flow	≤~~300~~ 296 % of rated flow	(3)
2	HPCI Turbine Compartment Exhaust ~~Duct~~	≤~~170~~ 168 °F	(3)
2	~~Torus Gavity Exhaust Duct~~ HPCI EXHAUST DUCT TORUS CAVITY	~~190~~ ~~200~~ °F ≤198	(3)
2	HPCI/RHR Valve Station Area Exhaust Duct	≤~~170~~ 168 °F	(3)

NOTES FOR TABLE 3.2.B

1. Whenever any CSCS subsystem is required by Section 3.5 to be operable, there shall be two (Note 5) operable trip systems. If the first column cannot be met for one of the trip systems, that system shall be repaired or the reactor shall be placed in the Cold Shutdown Condition within 24 hours after this trip system is made or found to be inoperable.
2. Close isolation valves in RCIC subsystem.
3. Close isolation valves in HPCI subsystem.
4. Instrument set point corresponds to 79.96 inches above top of active fuel.
5. RCIC has only one trip system for these sensors.
6. DOES NOT INCLUDE STATIC HEAD OF 17.5 psi

TABLE 4.2.A

MINIMUM TEST AND CALIBRATION FREQUENCY FOR PCIS

Instrument Channel (5)	Instrument Functional Test		Calibration Frequency	Instrument Check
1) Reactor High Pressure	(1)		Once/3 months	None
2) Reactor Low-Low Water Level	Once/3 months	(7)	(7)	Once/day
3) Reactor High Water Level	Once/3 months	(7)	(7)	Once/day
4) Main Steam High Temp.	(1)		Once/~~8~~ 24 months	None
5) Main Steam High Flow	Once/3 months	(7)	(7)	Once/day
6) Main Steam Low Pressure	Once/3 months	(7)	(7)	Once/day
7) Reactor Water Cleanup SYSTEM (RWCU) High Flow	(1)		Once/3 months	Once/day
8) ~~Reactor Water Cleanup High Temp~~	(1)		Once/~~3~~ months 24	None
	(1) (1) (1)		ONCE/24 MONTHS ONCE/24 MONTHS ONCE/24 MONTHS	NONE NONE NONE

Logic System Functional Test (4) (6)	Frequency
1) Main Steam Line Isolation Vvs. Main Steam Line Drain Vvs. Reactor Water Sample Vvs.	Once/Operating Cycle
2) RHR - Isolation Vv. Control Shutdown Cooling Vvs. Head Spray Discharge to Radwaste	Once/Operating Cycle
3) Reactor Water Cleanup Isolation	Once/Operating Cycle
4) Drywell Isolation Vvs. TIP Withdrawal Atmospheric Control Vvs. Sump Drain Valves	Once/Operating Cycle
5) Standby Gas Treatment System Reactor Building Isolation	Once/Operating Cycle

8) "RWCU Back Wash Receiver Tank Room High Temperature"
9) "RWCU Heat Exchanger and Pump Rooms High Temperature"
10) "RWCU Line In RHR Valve Room "A" High Temperature"
11) "RWCU Line Near East CRD Modules High Temperature"

~~Revision 177~~
Amendment No. 99, -107, -130, -151

PNPS
TABLE 4.2.B

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CSCS

	Instrument Channel	Instrument Functional Test	Calibration Frequency	Instrument Check
1)	Reactor Water Level	(1) (7)	(7)	Once/day
2)	Drywell Pressure	(1) (7)	(7)	Once/day
3)	Reactor Pressure	(1) (7)	(7)	Once/day
4)	Auto Sequencing Timers	NA	Once/Operating Cycle	None
5)	ADS - LPCI or CS Pump Disch. Pressure Interlock	(1)	Once/3 months	None
6)	Start-up Transf. (4160V) a. Loss of Voltage Relays	Monthly	Once/Operating Cycle	None
	b. Degraded Voltage Relays	Monthly	Once/Operating Cycle	None
7)	Trip System Bus Power Monitors	Once/Operating Cycle	NA	Once/day
8)	Recirculation System d/p	(1)	Once/3 months	Once/day
9)	Core Spray Sparger d/p	NA	Once/18 months	Once/day
10)	Steam Line High Flow (HPCI & RCIC)	(1)	Once/3 months	None
11)	Steam Line High Temp. (HPCI & RCIC)	(1)	Once/~~3~~ 24 months	None
12)	Safeguards Area High Temp.	(1)	Once/~~3~~ 24 months	None

PNPS
TABLE 4.2.B (Cont)

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CSCS

	Instrument Channel	Instrument Functional Test	Calibration Frequency	Instrument Check
13)	RCIC Steam Line Low Pressure	(1)	Once/3 months 12	None
14)	HPCI Suction Tank Levels	(1)	Once/3 months	None
15)	Emergency 4160V Buses A5 & A6 Loss of Voltage Relays	Monthly	Once/Operating Cycle	None

NOTES FOR TABLES 4.2.A THROUGH 4.2.G

1. Initially once per month until exposure hours (M as defined on Figure ~~4.1.1~~ 4.2-1) is 2.0 x 10^5; thereafter, according to Figure ~~4.1.1~~ 4.2-1 with an interval not less than one month nor more than three months.

2. Functional tests, calibrations and instrument checks are not required when these instruments are not required to be operable or are tripped. Functional tests shall be performed before each startup with a required frequency not to exceed once per week. Calibrations of IRMs and SRMs shall be performed during each startup or during controlled shutdowns with a required frequency not to exceed once per week. Instrument checks shall be performed at least once per day during those periods when the instruments are required to be operable.

3. This instrumentation is excepted from the functional test definition. The functional test will consist of injecting a simulated electrical signal into the measurement channel.

4. Simulated automatic actuation shall be performed once each operating cycle. Where possible, all logic system functional tests will be performed using the test jacks.

5. Reactor low water level and high drywell pressure are not included on Table 4.2.A since they are tested on Tables 4.1.1 and 4.1.2.

6. The logic system functional tests shall include a calibration of time delay relays and timers necessary for proper functioning of the trip systems.

7. Calibration of analog trip units will be performed concurrent with functional testing. The functional test will consist of injecting a simulated electrical signal into the measurement channel. Calibration of associated analog transmitters will be performed each refueling outage.

3.2 PROTECTIVE INSTRUMENTATION (Cont)

up to the complete circumferential break of a 28-inch recirculation line and with the trip setting given above, CSCS initiation and primary system isolation are initiated in time to meet the above criteria.

The high drywell pressure instrumentation is a diverse signal to the water level instrumentation and in addition to initiating CSCS, it causes isolation of Group 2 isolation valves. For the breaks discussed above, this instrumentation will initiate CSCS operation at about the same time as the low low water level instrumentation; thus the results given above are applicable here also. The low low water level instrumentation initiates protection for the full spectrum of loss-of-coolant accidents and causes isolation of Group 1 isolation valves.

Venturis are provided in the main steam lines as a means of measuring steam flow and also limiting the loss of mass inventory from the vessel during a steam line break accident. The primary function of the instrumentation is to detect a break in the main steam line. For the worst case accident, main steam line break outside the drywell, steam flow trip setting in conjunction with the flow limiters and main steam line valve closure, limits the mass inventory loss such that fuel is not uncovered, fuel temperatures remain approximately 1000°F and release of radioactivity to the environs is well below 10CFR100 guidelines.

175 ≥ 20gpm

Temperature monitoring instrumentation is provided in the main steam line tunnel and the turbine basement to detect leaks in these areas. Trips are provided on this instrumentation and when exceeded, cause closure of isolation valves. The setting of ~~[illegible]~~°F for the main steam line tunnel detector is low enough to detect leaks on the order of ~~5 to 10~~ gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, the high steam flow instrumentation is a backup to the temperature instrumentation.

Pressure instrumentation is provided to close the main steam isolation valves in the RUN mode before the reactor pressure drops below 785 psig. This function is primarily intended to prevent excessive vessel depressuirzation in the event of a malfunction of the nuclear system pressure regulator. This function also provides automatic protection of the low-pressure core-thermal-power safety limit (25% of rated core thermal power for reactor pressure < 785 psig). In the Refuel or Startup Mode, the inventory loss associated with such a malfunction would be limited by closure of the Main Steam Isolation Valves due to either high or low reactor water level; no fuel would be uncovered. This function is not required to satisfy any safety design bases.

BASES:

3.2 PROTECTIVE INSTRUMENTATION (Cont)

The HPCI high flow and temperature instrumentation ~~are~~ is provided to detect a break in the HPCI steam piping. Tripping of this instrumentation results in actuation of HPCI isolation valves. Tripping logic for the high flow is a 1 out of 2 logic, and all sensors are required to be operable.

Temperature is monitored at three (3) locations with four (4) temperature sensors at each location. Two (2) sensors at each location are powered by "A" direct current control bus and two (2) by "B" direct current control bus. Each pair of sensors, e.g., "A" or "B", at each location are physically separated and the tripping of either "A" or "B" bus sensor will actuate HPCI isolation valves.

The trip settings of ≤ ~~300~~ 296% of design flow for high flow and ~~200~~ ≤ 198°F or ~~170~~ ≤ 168°F, depending on sensor location, for high temperature are such that core uncovery is prevented and fission product release is within limits.

The RCIC high flow and temperature instrumentation ~~are~~ is arranged the same as that for the HPCI. The trip setting of ≤ 300% for high flow and ~~200~~ ≤ 198°F, ~~170~~ ≤ 168°F ~~and~~ or ~~150~~ ≤ 148°F, depending on sensor location, for temperature are based on the same criteria as the HPCI.

The Reactor Water Cleanup System high flow and temperature instrumentation ~~are~~ is arranged ~~similar as that for the HPCI~~ with one instrument in each trip system for each area. The trip settings are such that core uncovery is prevented and fission product release is within limits.

The instrumentation which initiates CSCS action is arranged in a dual bus system. As for other vital instrumentation arranged in this fashion, the Specification preserves the effectiveness of the system even during periods when maintenance or testing is being performed. An exception to this is when logic functional testing is being performed.

The control rod block functions are provided to prevent excessive control rod withdrawal. The trip logic for this function is 1 out of n: e.g., any trip on one of six APRM's, two RMB's, eight IRM's, or four SRM's will result in a rod block.

The minimum instrument channel requirements assure sufficient instrumentation to assure the single failure criteria is met. The minimum instrument channel requirements for the RBM may be reduced by one for not longer than 24 hours without significantly increasing the risk of an inadvertent control rod withdrawal.

Reactor power may be varied by moving control rods or by varying the recirculation flow rate. The APRM system provides a control rod block to prevent rod withdrawal beyond a given point; thereby possibly avoiding an APRM Scram. The rod block setpoint is automatically reduced with recirculation flow to form the upper boundary of the PNPS power/flow map. The flow biased APRM rod block is not necessary to prohibit fuel damage and is not included in the analysis of anticipated transients.

ATTACHMENT 3

CALCULATION METHODOLOGY INFORMATION

A. Application of the Guidance of Generic Letter 91-04

Generic Letter 91-04 provided a methodology for determining and evaluating instrument surveillance intervals. As discussed in the Generic Letter a proposed surveillance interval was acceptable if it met certain requirements.

A setpoint calculation using the same methodology that was used for the proposed changes was submitted to the NRC by letter, dated June 7, 1993. The submittal was made to facilitate NRC review and approval of a 24-month fuel cycle for Pilgrim in accordance with Generic Letter 91-04. The NRC found Pilgrim's method and results acceptable in the NRC's safety evaluation report granting License Amendment 151, dated April 6, 1994, (TAC Nos. M83787, M87191, and M88390). In addition, as requested by the NRC staff, selected portions on two of the calculations associated with this change are included in Attachment 4.

The following is a discussion of the application of the requirements of Generic Letter 91-04 for the proposed calibration frequencies.

1. Confirm that instrument drift as determined by as-found and as-left calibration data from surveillance and maintenance records has not, except on rare occasions, exceeded acceptable limits for a calibration interval.

   Discussion

   As-found and as-left data for the instruments being evaluated were obtained and the instrument drift for the proposed duration confirmed that the drift supported the requested interval.

   As-found and as-left calibration data was collected from calibration records and statistically analyzed to determine drift. Pilgrim looked at the proposed calibration intervals plus a 25% margin (e.g.15 months for yearly calibration intervals and 30 months for 2 year calibration intervals). Pilgrim then evaluated the intervals associated with the device for which no adjustments were required during the entire interval, i.e., the device had not drifted for the entire interval and required no action on the part of the technician.

   From the raw data, the shift between calibrations and the interval between calibrations was determined. Mean, standard deviation, and outliers were determined for each set of data. Then, based on the sample size, the appropriate multiplier was determined and utilized to convert the standard deviation value corresponding to 95% probability at a 95% confidence level. Statistical analysis was performed on the data to determine if the data set is normal or bounded by the normal curve. WAPD-TM-1292 (DOE Research and Development Report) "Statistics for Nuclear Engineers and Scientist, Part 1: Basic Statistical Inference" was used to obtain the multiplier to obtain a 95% probability at a 95% confidence level.

2. Confirm that the values of drift for each instrument type (make, model, and range) and application have been determined with a high probability and a high degree of confidence. Provide a summary of the methodology and assumptions used to determine the rate of instrument drift with time based upon historical plant calibration data.

Discussion

The as-found and as-left data were analyzed to ensure that the drift values corresponded to a 95% probability at a 95% confidence level. A detailed discussion of the methodology used is supplied in a Pilgrim letter to the NRC dated June 7,1993. In addition, as requested by the NRC staff, selected portions on two of the calculations associated with this change are included in Attachment 4.

3. Confirm that the magnitude of instrument drift has been determined with a high probability and a high degree of confidence for a bounding calibration interval of 30 months for each instrument type (make, model number, and range) and application that performs a safety function. Provide a list of the channels by TS section that identifies these instrument applications.

Discussion

Attachment 1 in the Description of Proposed Changes section provides a list of the instrument applications affected.

The calculations used existing analytical limits as bounding values for the setpoint analyses. As-found/as-left historical instrument calibration data were statistically analyzed to calculate 95/95% probability and confidence level values. These values were then used in the setpoint calculations. The value determined in this process was considered to include the effects of measurement and test equipment (M&TE), reference or basic component accuracy and other parameters as well as component drift. The rack and sensor setting tolerances were retained. This approach is consistent with the proposed Instrument Society of America (ISA) Recommended Practice (ISA-S67.04-1982, "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants", including consideration of the 6 items in Section 4.2.1 of the Standard).

The 95% probability at a 95% confidence level values were statistically analyzed to determine if the data sets were normal or bounded by a normal curve.

All uncertainties identified in the calculations were individually evaluated to determine whether they were random or biased. 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 + or - magnitude. Random uncertainties were combined using the root sum of the squares (RSS) technique. Biases were expressed with either a + or a - sign and were added together separately according to sign. Individual component error terms which contained both a bias and a random value were split up so that the random part was combined with other component error terms, and the biases were added to other component bias terms of the same sign. Both random and bias terms were 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 possess 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 were summed algebraically to form independent errors.

The interval used for the calculations was the proposed calibration interval plus 25% (i.e., 15 months or 30 months).

4. Confirm that a comparison of the projected instrument drift errors has been made with the values of drift used in the setpoint analysis. If this results in revised setpoints to accommodate larger drift errors, provide proposed TS changes to update trip setpoints. If the drift errors result in a revised safety analysis to support existing setpoints, provide a summary of the updated analysis conclusions to confirm that safety limits and safety analysis assumptions are not exceeded.

   Discussion

   A comparison of projected drift errors was made with the drift values used in the setpoint analysis. The calculations determined setpoints with sufficient margin to ensure at least a 95% probability of achieving the design basis setpoint analytical limit. The cases where the safety analysis assumptions needed to be revised are discussed in Attachment 1 in the Safety Evaluation section.

5. Confirm that the projected instrument errors caused by drift are acceptable for control of plant parameters to effect a safe shutdown with the associated instrumentation.

   Discussion

   Instrument errors caused by drift were evaluated as part of the process and found to be acceptable as part of the calculation process.

6. Confirm that all conditions and assumptions of the setpoint and safety analyses have been checked and are appropriately reflected in the acceptance criteria of plant surveillance procedures for channel checks, channel functional tests, and channel calibrations.

   Discussion

   The assumptions of the calculations were validated as required by the applicable setpoint calculation procedures.

7. Provide a summary description of the program for monitoring and assessing the effects of increased calibration surveillance intervals on instrument drift and its effect on safety.

   Discussion

   Pilgrim commits to a program that consists of monitoring, feedback, and assessment to verify instrument performance, including drift, is consistent with the parameters specified in the calculations for those instruments whose surveillance interval is being increased. Data collected from surveillance procedures will be evaluated to confirm the validity of assumptions supporting the setpoint calculations and the calculations' conclusions. The proposed (revised) setpoints will be evaluated during the first calibration interval(s) to ensure the new setpoints have no adverse impact on plant operations. The extended surveillance intervals will be monitored for three calibration interval(s) to ensure the assumptions in the calculations continue to be valid. If surveillance test results indicate that instrument performance does not meet surveillance procedure requirements, corrective actions will be taken in accordance with existing station procedures. Changes made as a result of the corrective action will be reflected in the setpoint calculations. Subsequent monitoring will rely on existing plant procedures and controls to ensure continued safe operation of Pilgrim.

B. Calculation Methodology

The methodologies used are in accordance with Regulatory Guide 1.105, Revision 2, ISA-S67.04-1982, and Generic Letter 91-04. A sample setpoint calculation using the same methodology that was used for the proposed changes was submitted to the NRC by letter dated June 7, 1993. The submittal was made to facilitate NRC approval of a 24-month fuel cycle for Pilgrim in accordance with Generic Letter 91-04. The NRC found Pilgrim's method and results acceptable in the NRC's safety evaluation report granting License Amendment 151, dated April 6, 1994, (TAC Nos. M83787, M87191, and M88390). In addition, as requested by the NRC staff, selected portions on two of the calculations associated with this change are included in Attachment 4.

In the calculations, as-found and as-left calibration data was collected from calibration records and statistically analyzed to determine drift. From the raw data, the shift between calibrations and the interval between calibrations was determined. Mean, standard deviation, and outliers were determined for each set of data. Then, based on the sample size, the appropriate multiplier was determined and utilized to convert the standard deviation value corresponding to 95% probability at a 95% confidence level. Statistical analysis was performed on the data to determine if the data set is normal or bounded by the normal curve. WAPD-TM-1292 (DOE Research and Development Report) "Statistics for Nuclear Engineers and Scientist, Part 1: Basic Statistical Inference" was used to obtain the multiplier to obtain a 95/95 confidence level.

All calculations were prepared using this same methodology.

ATTACHMENT 4

PORTIONS OF TWO OF THE ASSOCIATED CALCULATIONS

Pilgrim Calculation No. 1-N1-115

Pages 2 thru 21 and 24 thru 38

CALCULATION SHEET

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FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-115

CALCULATION WORK OR REMARKS:

Statement of Problem

This calculation will provide the uncertainity analysis for the development of the RWCU system space high temperature group 6 isolation setpoint based on a twenty-four month calibration frequency. It will determine a plant setpoint and allowable value which will ensure at least 95% probability of achieving the isolation on or before reaching the setpoint analytical limit. Parameters determined by this calculation are:

- Trip Setpoint
- Technical Specification Allowable Value
- Setpoint Analytical Limit
- Field Reset Value
- Calibration No Adjust Limits
- Instrument Surveillance Interval
- Measurement and Test Equipment Equipment Accuracy

Method of Solution

This calculation is performed based on the methodology described in BECO NEDWI No. 394 and uses ABB Impell Project Instruction No. 25-226-PI-001 for the analysis of the as-found as-left instrument calibration data. The calculation is in accordance with the U.S. NRC Regulatory Guide No. 1.105, Rev. 2 and Instrument Society of America Standard ISA-S67.04-1982.

Input Data and Assumptions

The RWCU system space high area temperature instruments consists of four sets of two bimetallic temperature switches. Each set is a one out of two trip system capable of initiating isolation. The temperature switch sets are located in the following areas:

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CALCULATION NUMBER I-N1-115

- HV duct from the Backwash Receiver Tank Room
- HV duct from the RWCU Heat Exchanger Room
- RHR Piping Room
- HV duct from the RHR "A" Valve Room

Input data and references are listed on Form 1 of this calculation. Any assumptions are identified under the notes section.

Summary of Results and Recommendations

This calculation determined a new instrument setpoint, technical specification allowable value and setpoint calibration frequency. These values were determined based on industry and plant specific calibration data and NEDWI No. 394 methodology. The new setpoint is more conservative than the present. The new values determined by this calculation require a plant design change for implementation at PNPS.
Note, the new setpoint allowable value and calibration frequency require a Technical Specification change.

The results of this calculation are listed below:

Trip Setpoint: 138 deg F
Technical Specification Allowable Value: ≤148 deg F
Setpoint Analytical Limit: ≤150 deg F
Setpoint Reset Value: 133 deg F (Typically)
No Adjust Limits: ± 3 deg F
Surveillance Interval: Once per 24 months plus 25%
M&TE Accuracy: ± 5 deg F

CALCULATION SHEET

Rev 0 Date 4/1/96 **Boston Edison**

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-115

CALCULATION WORK OR REMARKS:

RWCU SYSTEM SPACE TEMP. ISOLATION

Initiation of Primary Containment Group 6 Isolation

Notes:
TS 1291-14E, F, G, H
I and K are similar

References:
Dwg. M 247
Dwg. MIN 39-13, Sh. 1

CALCULATION SHEET

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FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-115

CALCULATION WORK OR REMARKS:

Notes:

1. The RWCU system space high temperature switches are part of the Primary Containment and Reactor Vessel Isolation Control System (PCIS). The objective of the PCIS is to provide timely protection against the onset and consequences of accidents (leaks and breaks) involving the gross release of radioactive materials from the fuel and nuclear system process barrier by initiating automatic isolation of appropriate lines which penetrate the primary containment whenever monitored variables exceed preselected operational limits (FSAR Section 7.3.1). This protects the fuel by limiting losses of reactor coolant and stopping the release of radioactive materials. See FSAR Section 7.3.3 for the PCIS Safety Design Bases.

The safety function of the RWCU system space high temperature instrumentation is to detect high temperature in the vicinity of the RWCU system equipment in excess of its preselected setpoint. High temperature could indicate a leak or a break in a RWCU system pipe line. The high temperature isolation setting is selected far enough above anticipated normal RWCU system operational levels to avoid spurious isolations, but low enough to provide timely detection of a RWCU line break (FSAR section 7.3.4.7).

2. The Circuit Leakage Allowance is applicable to low energy analog signals only. The RWCU system space high temperature switches are mechanical on/off 120 vac devices. The performance of 120 vac on/off signals are not affected by circuit leakage. Therefore, this error is not applicable.

3. Process Measurement Accuracy for a temperature switch is typically the response time of the sensor. The actual sensor temperature always lags a change in the process temperature which translates to an error in the process setpoint if time is essential in the operation of the switch. Because dynamic effects such as time response are addressed in the plant accident analysis the error associated with sensor response time will not be included in the setpoint calculation.

Also, it is assumed the temperature switches are located at the highest temperature of the room. Therefore, there will not be an error due to sensor location.

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4. The sensor drift was statistically analyzed for a three month interval in attachment no. 2 in accordance with ABB Impell Project Instruction 25-226-PI-001. The analysis used empirical data from 5/18/93 through 5/21/95 obtained from the PNPS as-found as-left instrument calibration records. Reference PNPS Procedure 8.M.2-1.2.2. The drift value determined is .62 ± 6.27. Also, industry data for the EGS Patel temperature switch was statistically analyzed in attachment no. 3 for a 30 month interval. The drift value determined is 2.22 ± 7.05. The value obtained from the statistical analysis has a probability and confidence of 95/95%.

The Pilgrim specific drift data for a 3 month interval when compared to industry drift data for a 30 month interval is not significantly different. It is therefore concluded the drift of these switches are not a function of time. Based on this data the calibration interval for these switches is to be extended to 24 months. This calculation will assume drift of TS 1291-14C,D,E,F,G,H,J&K for a 24 month calibration frequency is the value determined from the industry data above.

The as-found as-left calibration data used to determine the drift also includes the error associated with sensor accuracy and measurement and test equipment (M&TE) accuracy. Therefore, the value for the sensor normal accuracy and calibration accuracy is considered to be included in the drift error and will be identified as N/A in this calculation. It is assumed that the accuracy of the M&TE used for calibration is less than or equal to the accuracy of the instrument being calibrated. Reference PNPS Procedure 1.3.36.

5. The Environmental Allowance includes errors due to temperature, radiation, humidity, pressure, and seismic effects. This error is identified in Patel Report PEI-TR-831200-1 in section X-2.3.2.1. The accuracy of the switches tested remained within the ± 6 deg F acceptance criteria throughout the entire test program without any adjustments. The environmental conditions for TS-1291-14C, TS-1291-14D, TS-1291-14E, TS-1291-14F, TS-1291-14G, TS-1291-14H, TS-1291-14J and TS-1291-14K applications are identified in Boston Edison Co. Environmental Qualification Evaluation Sheets. The conditions of the Patel test program envelope both the normal and accident environment at PNPS. Therefore, the Environmental Allowance of TS-1291-14C, TS-1291-14D, TS-1291-14E, TS-1291-14F, TS-1291-14G, TS-1291-14H, TS-1291-14J and TS-1291-14K is considered to include all the above effects.

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6. From the as-found as-left calibration data (reference PNPS Procedure 8.M.2-1.2.2) the reset differential for the EGS Patel temperature switch, model no. 01-170020-090 is typically less than 5 deg F. Therefore the reset value is typically greater than 133 deg F.

CALCULATION SHEET

Boston Edison

REV__0___ DATE__11/21/95______

Calculation Number__I-N1-115____ Instrument Number_TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
GENERAL INFORMATION	INSTRUMENT NUMBER	TS-1291-14C,D,E,F,G,H,J & K	DWG. M 247	
	SERVICE DESCRIPTION	Reactor Water Cleanup System Space High Temperature Isolation	FSAR Section 7.3.4.7	
	QUALITY CATEGORY	Q	PNPS Q-List Page 3-45-9	
	ENVIRONMENTAL QUALIFICATION	YES EQ Area 1.11C, 1.11, 1.9A, & 1.9	EQ Master List System 45	
	SAFETY FUNCTION (IF APPLICABLE)	See Note 1	FSAR Section 7.3.3 and 7.3.4.7	
	TECHNICAL SPECIFICATION (IF APPLICABLE)	≤150 deg F	Technical Specification Table 3.2.A	
	MANUFACTURER	EGS Patel	Equipment Qualification Data Files TS-1291-14C,D ,E,F,G,H,J & K	
	MODEL NUMBER	01-170020-090	Equipment Qualification Data Files TS-1291-14C,D ,E,F,G,H,J & K	

CALCULATION SHEET

Boston Edison

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Calculation Number__I-N1-115_____ Instrument Number_TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE			DESCRIPTION/VALUE	REFERENCE	REMARKS
INSTRUMENT SETPOINT DATA	ANALYTICAL LIMIT (AL)		≤150 deg F	S&SA Memo 95-47	
	ALLOWABLE VALUE (AV)		≤148 deg F	Sheet 3, Form 3 this calc	
	SETPOINT	TRIP	138 deg F	Sheet 3, Form 3 this calc	
		RESET	133 deg F	Sheet 4, Form 3 this calc.	Switch has a fixed reset
	NORMAL OPERATION UPPER LIMIT (NUL)		105 deg F	Specification E536	
	NORMAL OPERATION LOWER LIMIT (NLL)		N/A	N/A	Not a decreasing setpoint
	PROCESS CALIBRATED RANGE		N/A		The switch is calibrated at the setpoint only
	OPERATING MARGIN (OM)*		33 deg F	Sheet 4, Form 3 this calc.	
	*NOTE: ADEQUATE OPERATING MARGIN IS REQUIRED BETWEEN THE SETPOINT AND THE NORMAL OPERATION UPPER OR LOWER LIMIT, AS APPLICABLE, TO AVOID INADVERTENT TRIPS DUE TO PROCESS NOISE, TRANSIENTS AND MEASUREMENT UNCERTAINTIES.				

CALCULATION SHEET

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Calculation Number__I-N1-115____ Instrument Number_TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
INSTRUMENT SETPOINT DATA (CONT)	ADJUSTABLE RANGE	-100 deg F to 600 deg F	Patel/EGS Product Data Sheet (Attachment 1)	
	INPUT SIGNAL FROM	Ambient Air	FSAR Section 7.3.4.7	
	INPUT SIGNAL CALIBRATED RANGE	N/A	N/A	The switch is calibrated at the setpoint only
	OUTPUT SIGNAL TO	Group 6 Isolation	FSAR Table 5.2-4	
	OUTPUT SIGNAL CALIBRATED RANGE	N/A	N/A	The switch is calibrated at the setpoint only
	SETPOINT CALIBRATION FREQUENCY	Once per 24 months plus 25%	This Calculation	See Note 4

Calculation Number__I-N1-115_____	Instrument Number_TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
ENVIRONMENT ALLOWANCE (EA) FORM 3 STEP 1	TEMPERATURE EFFECT (Te)		Patel Report PEI-TR-831200-1 (EQDF REF 340)	See Note 5
	RADIATION EFFECT (Re)		Patel Report PEI-TR-831200-1 (EQDF REF 340)	See Note 5
	STEAM/CHEMICAL SPRAY EFFECT (S/Ce)	±6°F	Patel Report PEI-TR-831200-1 (EQDF REF 340)	See Note 5
	PRESSURIZATION (EXTERNAL) EFFECT (Pe)		Patel Report PEI-TR-831200-1 (EQDF REF 340)	See Note 5
	SEISMIC EFFECT (Se)		Patel Report PEI-TR-831200-1 (EQDF REF 340)	See Note 5
CIRCUIT LEAKAGE ALLOWANCE (LA) FORM 3 STEP 2	CABLE LEAKAGE (Cl)	N/A	N/A	See Note 2
	TERMINAL BLOCK LEAKAGE (Tl)	N/A	N/A	See Note 2
	PENETRATION LEAKAGE (Pl)	N/A	N/A	See Note 2

Calculation Number__I-N1-115____	Instrument Number_TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
CIRCUIT LEAKAGE ALLOWANCE (LA) (CONTINUED)	SPLICE LEAKAGE (SI)	N/A	N/A	See Note 2
	SEALING DEVICE LEAKAGE (DI)	N/A	N/A	See Note 2
PROCESS ALLOWANCE (PA) FORM 3 STEP 3	PROCESS MEASUREMENT ACCURACY (Pma)	N/A	N/A	See Note 3
	PRIMARY ELEMENT ACCURACY (Pea)	N/A	N/A	No Primary Element
CALIBRATION ALLOWANCE (CA) FORM 3 STEP 4	SENSOR CALIBRATION ACCURACY (Sca)	N/A	N/A	See Note 4
	RACK EQUIPMENT CALIBRATION ACCURACY (Rca)	N/A	N/A	No Rack Equipment

Calculation Number__I-N1-115____	Instrument Number_TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
RACK EQUIPMENT ALLOWANCE (RA) FORM 3 STEP 5	RACK EQUIPMENT ACCURACY (Rea)	N/A	N/A	No rack equipment
	RACK TEMPERATURE EFFECTS (Rte)	N/A	N/A	No rack equipment
	RACK POWER SUPPLY EFFECTS (Rps)	N/A	N/A	No rack equipment
	RACK EQUIPMENT MISCELLANEOUS EFFECTS (Rme)	N/A	N/A	No rack equipment

Calculation Number__I-N1-115____ Instrument Number_TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
SENSOR ALLOWANCE (SA) FORM 3 STEP 6	SENSOR BASIC ACCURACY (Sa)	N/A	N/A	See Note 4
	SENSOR STATIC PRESSURE SPAN SHIFT (Ssps)	N/A	N/A	Temperature elements are not pressure sensitive
	SENSOR STATIC PRESSURE ZERO SHIFT (Sspz)	N/A	N/A	Temperature elements are not pressure sensitive
	SENSOR TEMPERATURE EFFECTS (Ste)	N/A	N/A	Not applicable to temperature sensors
	SENSOR POWER SUPPLY EFFECTS (Spse)	N/A	N/A	Mechanical temperature sensors do not use power supplies for operation
	SENSOR MISCELLANEOUS EFFECTS (Sme)	N/A	N/A	

Calculation Number I-N1-115 Instrument Number TS-1291-14C thru k

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
DRIFT ALLOWANCE (DA) FORM 3 STEP 7	SENSOR DRIFT (Sd)	+ 2.22 ± 7.05 deg F	See Note 4 and Attachment 2 and 3	
	RACK EQUIPMENT DRIFT (Red)	N/A	N/A	No rack equipment
TOLERANCE ALLOWANCE (TA) FORM 3 STEP 8	SENSOR TOLERANCE (St)	±3 deg F	PNPS Procedure 8.M.2-1.2.2	This application is to use the same no adjust limits as utilized by the HPCI, RCIC & Main Steam line leak detection setpoints
	RACK EQUIPMENT TOLERANCE (Ret)	N/A	N/A	No rack equipment

CALCULATION SHEET

Boston Edison

REV_0_ DATE_11/17/95_ SHEET 15 OF 47

Calculation Number_I-N1-115_ Instrument Number TS-1291-14C, 14D, 14E, 14F, 14G, 14H, 14J &14K

FORM 2A CALCULATION INPUT SHEET (INCREASING SETPOINT)

PARAMETER	DESCRIPTION	ABBREVIATION/VALUE *	COMMENTS
ANALYTICAL LIMIT		AL ≤ 150 deg F	S&SA Memo 95-47
ENVIRONMENTAL ALLOWANCE (EA)	TEMPERATURE EFFECT	Te = ±6°F	See note 5
	RADIATION EFFECT	Re = ±6°F	See note 5
	STEAM/CHEM SPRAY EFFECT	S/Ce = ±6°F	See note 5
	PRESSURIZATION (EXT.) EFFECT	Pe = ±6°F	See note 5
	SEISMIC EFFECT	Se = ±6°F	See note 5
CIRCUIT LEAKAGE ALLOWANCE (LA)	CABLE LEAKAGE	Cl = N/A	See note 2
	TERMINAL BLOCK LEAKAGE	Tl = N/A	See note 2
	PENETRATION LEAKAGE	Pl = N/A	See note 2
	SPLICE LEAKAGE	Sl = N/A	See note 2
	SEALING DEVICE LEAKAGE	Dl = N/A	See note 2
PROCESS ALLOWANCE (PA)	PROCESS MEASUREMENT ACCURACY	Pma = N/A	See note 3
	PRIMARY ELEMENT ACCURACY	Pea = N/A	
CALIBRATION ALLOWANCE (CA)	SENSOR CALIBRATION ACCURACY	Sca = N/A	See note 4
	RACK EQUIPMENT CALIBRATION ACCURACY	Rca = N/A	
RACK EQUIPMENT ALLOWANCE (RA)	RACK EQUIPMENT ACCURACY	Rea = N/A	
	RACK TEMPERATURE EFFECT	Rte = N/A	
	RACK POWER SUPPLY EFFECT	Rps = N/A	
	RACK EQUIPMENT MISCELLANEOUS EFFECT	Rme = N/A	
SENSOR ALLOWANCE (SA)	SENSOR BASIC ACCURACY	Sa = ±5 deg F	See note 4
	SENSOR STATIC PRESSURE SPAN SHIFT	Ssps = N/A	
	SENSOR STATIC PRESSURE ZERO SHIFT	Sspz = N/A	
	SENSOR TEMPERATURE EFFECTS	Ste = N/A	
	SENSOR POWER SUPPLY EFFECTS	Spse = N/A	
	SENSOR MISCELLANEOUS EFFECTS	Sme = N/A	
ALLOWABLE VALUE		AV** ≤ 148 deg F	
DRIFT ALLOWANCE (DA)	SENSOR DRIFT	Sd= + 2.22 ± 7.05 deg F	See note 4
	RACK EQUIPMENT DRIFT	Red = N/A	
TOLERANCE ALLOWANCE (TA)	SENSOR TOLERANCE	St = ±3 deg F	
	RACK EQUIPMENT TOLERANCE	Ret = N/A	
TRIP SETPOINT		TSp** = 138 deg F	
RESET VALUE		RV = 133 deg F	See note 6
	OPERATING MARGIN	OM = 33 deg F	
NORMAL OPERATION UPPER LIMIT		NUL = 105 deg F	
	NORMAL OPERATING BAND		
NORMAL OPERATION LOWER LIMIT		NLL = N/A	

TOTAL LOOP UNCERTAINTY

*NOTE: VALUES ARE IDENTIFIED FOR MAGNITUDE ONLY AND ARE COMBINED IN ACCORDANCE WITH THE EQUATIONS ON FORM 3
**NOTE: CALCULATED VALUES FROM FORM 3

CALCULATION SHEET

Boston Edison

REV 0 DATE 11/17/95 SHEET 16 OF 47

FORM 3. CALCULATION SHEET SHEET NO. 1 of 4

Calculation Number I -N1-115

Instrument Number TS-1291-14C, 14D, 14E, 14F, 14G, 14H, 14J & 14K

1. ENVIRONMENTAL ALLOWANCE (EA)

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

$$EA = \sqrt{(Te)^2 + (Re)^2 + (S/Ce)^2 + (Pe)^2 + (Se)^2} = \pm 6 \text{ deg F}$$

2. CIRCUIT LEAKAGE ALLOWANCE (LA)

LA = CI + TI + PI + SI + DI

LA = N/A + N/A + N/A + N/A + N/A = N/A

3. PROCESS ALLOWANCE (PA)

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

$$PA = \sqrt{(N/A)^2 + (N/A)^2} = N/A$$

4. CALIBRATION ALLOWANCE (CA)

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

$$CA = \sqrt{(N/A)^2 + (N/A)^2} = N/A$$

5. RACK EQUIPMENT ALLOWANCE (RA)

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

$$RA = \sqrt{(N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2} = N/A$$

CALCULATION SHEET

Boston Edison

REV 0 DATE 11/17/95 SHEET 17 OF 47

FORM 3. CALCULATION SHEET SHEET NO. 2 of 4

Calculation Number I -N1-115

Instrument Number TS-1291-14C, 14D, 14E, 14F, 14G, 14H, 14J & 14K

6. SENSOR ALLOWANCE (SA)

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

$$SA = \sqrt{(N/A)^2 + (N/A + N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2}$$

SA = N/A

7. DRIFT ALLOWANCE (DA)

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

$$DA = 2.22 \sqrt{(7.05)^2 + (N/A)^2} = +2.22 \pm 7.05 \text{ deg F}$$

8. TOLERANCE ALLOWANCE (TA)

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

$$TA = \sqrt{(3)^2 + (N/A)^2} = \pm 3 \text{ deg F}$$

9. TOTAL LOOP UNCERTAINTY ALLOWANCE (TLU)

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

$$TLU = N/A \pm \sqrt{(6)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2 + (7.05)^2 + (3)^2} \quad +2.22$$

TLU = 2.22 ± 9.73 deg F

FORM 3. CALCULATION SHEET SHEET NO. 3 of 4

Calculation Number I-N1-115
Instrument Number TS-1291-14C, 14D, 14E, 14F, 14G, 14H, 14J & 14K

10. TRIP SETPOINT (TSp) IN PROCESS UNITS

10A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

$$TSp = AL - TLU$$

$$TSp = 150 - 11.95 = 138.05, \text{ say } 138 \text{ deg F}$$

10B. FOR DECREASING SETPOINT - FROM 2B: (ENTER N/A IF INCREASING SETPOINT)

$$TSp = AL + TLU$$

$$TSp = N/A + N/A = N/A$$

11. ALLOWABLE VALUE (AV)

11A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

$$AV = TSp + \sqrt{DA^2 + TA^2}$$

$$AV = 138 + \sqrt{(7.05)^2 + (3)^2 + 2.22}$$

$$AV = 147.88, \text{ say } 148 \text{ deg F}$$

11B. FOR DECREASING SETPOINT - FORM 2B: (ENTER N/A IF INCREASING SETPOINT)

$$AV = TSp - \sqrt{DA^2 + TA^2}$$

$$AV = N/A - \sqrt{(N/A)^2 + (N/A)^2}$$

$$AV = N/A$$

FORM 3. CALCULATION SHEET SHEET NO. 4 of 4

Calculation Number I -N1-115
Instrument Number TS-1291-14C, 14D, 14E, 14F, 14G, 14H, 14J & 14K

12. OPERATING MARGIN (OM)

12A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

OM = TSp - NUL

OM = 138 - 105 = 33 deg F

12B. FOR DECREASING SETPOINT - FORM 2B: (ENTER N/A IF INCREASING SETPOINT)

OM = NLL - TSp

OM = N/A - N/A = N/A

13. RESET VALUE (RV)

13A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

RV > NUL
RV = 133 deg F See note 6
NUL = 105 deg F

13B. FOR DECREASING SETPOINT - FORM 2B: (ENTER N/A IF INCREASING SETPOINT)

RV < NLL
RV = N/A
NLL = N/A

14. TRIP SETPOINT (TSp) IN PROCESS UNITS

TSs = TSp MODIFIED BY THE FACTORS ACCOUNTING FOR CONVERSION FROM PROCESS UNIT TO SIGNAL UNITS (VOLTS, AMPS, COUNTS, etc.).

TSs = N/A

CALCULATION SHEET

FORM 4. CALCULATION SHEET
CALCULATION NUMBER I -N1-115

CALCULATION WORK OR REMARKS:

References:

1. Drawings:
- M-247, Rev. E36 - P&ID; RWCU System
- M-312, Rev. E6 - HV&AC; Reactor Bldg. Aux. Bay
- M-313, Rev. E5 - HV&AC; Reactor Bldg. Plan El. 51
- M-319, Rev. E4 - HV&AC; Reactor Bldg. Aux. Bay
- M1N39-13, Rev. E17 - Elementary Diagram; Primary Containment Isolation System

2. Pilgrim Unit 1 Specification E-536, Rev. 4; Environmental Parameters for use in the Environmental Qualification of Electrical Equipment (Per 10CFR50.49)

3. PNPS EQ List, Rev. E43

4. PNPS Q-List, Rev. E63

5. PNPS - FSAR, Rev. 16

6. PNPS Technical Specification, Rev. 184

7. Boston Edison Co. Equipment Qualification Data Files; TS-1291-14C, TS-1291-14D, TS-1291-14E, TS-1291-14F, TS-1291-14G, TS-1291-14H, TS-1291-14J & TS-1291-14K; Rev. E2

8. PNPS Procedure No.1.3.36, Rev. 13; Measurement and Test Equipment

9. PNPS Procedure No. 8.M.2-1.2.2, Rev. 22; RWCU Area High Temperature Sensors

10. Office Memorandum No. S&SA 95-47, Dated 9/7/95; HPCI, RCIC and RWCU Steam Leak Detection Setpoint Information

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-115

11. Patel Engineers Technical Report No. PEI-TR-831200-1, Rev. a; Final Report on the Qualification of a Patel Engineers Modified Fenwal Temperature Switch Manufactured by Fenwal Inc. (EQDF Ref. # 340)

12. Patel / EGS Temperature Switch Product Data Sheet,Rev. 11/89 (Attachment 1)

13. ABB Impell Project Instruction No. 25-226-PI-001, Rev. E2; Data Collection and Analysis

14. NEDWI 394, Rev. 3; Methodology for Calculation of Instrument Setpoints

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

16. Instrument Society of America Standard ISA-67.04-1982; Setpoints for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants

ATTACHMENT 2
TS1291-14C,D,E,F,G,H,J,K DRIFT DATA
CALC. NO. I-N1-115 R.0

DATE	DATA STATUS	CAL. DATA "I"	CAL. DATA "D"	INT	REMARKS	RAW DATA SUM. "I"	RAW DATA SUM. "D"	1ST OUT. SUM. "I"	1ST OUT. SUM. "D"	2ND OUT. SUM "I"	2ND OUT. SUM "D"
5/18/93	AS FOUND	149.2			TS1291-14C						
	AS LEFT	146 1									
7/16/93	AS FOUND	149.2		59		3.10		3.10		3.10	
	AS LEFT	146.9									
10/19/93	AS FOUND	145		95		-1.90		-1.90		-1.90	
	AS LEFT	143.3									
1/19/94	AS FOUND	143.3		92		0.00		0.00		0.00	
	AS LEFT	141.7									
4/28/94	AS FOUND	142.1		99		0.40		0.40		0 40	
	AS LEFT	141.2									
7/28/94	AS FOUND	141.7		91		0.50		0.50		0.50	
	AS LEFT	141.7									
11/14/94	AS FOUND	142.2		109		0.50		0.50		0.50	
	AS LEFT	140.3									
2/15/95	AS FOUND	142.1		93		1.80		1.80		1.80	
	AS LEFT	142.3									
5/21/95	AS FOUND	145.2		95		2.90		2.90		2.90	
	AS LEFT	140.6									
5/18/93	AS FOUND	148.3			TS1291-14D						
	AS LEFT	146.5									
7/16/93	AS FOUND	152.6		59		6.10		6.10		6.10	
	AS LEFT	144.3									
10/19/93	AS FOUND	141.8		95		-2.50		-2.50		-2.50	
	AS LEFT	140.9									
1/19/94	AS FOUND	146.1		92		5.20		5.20		5 20	
	AS LEFT	144.1									
4/28/94	AS FOUND	142 6		99		-1.50		-1.50		-1.50	
	AS LEFT	140.1									
7/28/94	AS FOUND	145 8		91		5.70		5.70		5.70	
	AS LEFT	140.7									
11/14/94	AS FOUND	145.3		109		4.60		4.60		4.60	
	AS LEFT	145.4									
2/15/95	AS FOUND	145		93		-0.40		-0.40		-0 40	
	AS LEFT	142.9									
5/21/95	AS FOUND	143.9		95		1.00		1.00		1.00	
	AS LEFT	143.5									
5/18/93	AS FOUND	139.3			TS1291-14E						
	AS LEFT	144.9									

7/16/93	AS FOUND	149.3		59		4.40		4.40		4 40	
	AS LEFT	144.3									
10/19/93	AS FOUND	140.9		95		-3 40		-3.40		-3.40	
	AS LEFT	144.2									
1/19/94	AS FOUND	145		92		0.80		0.80		0.80	
	AS LEFT	142.4									
4/28/94	AS FOUND	139.1		99		-3.30		-3.30		-3.30	
	AS LEFT	142.6									
7/28/94	AS FOUND	141.7		91		-0.90		-0.90		-0.90	
	AS LEFT	142.4									
11/14/94	AS FOUND	142.8		109		0.40		0.40		0.40	
	AS LEFT	143.4									
2/15/95	AS FOUND	143.9		93		0.50		0.50		0.50	
	AS LEFT	140.9									
5/21/95	AS FOUND	144.9		95		4.00		4.00		4.00	
	AS LEFT	145.1									
5/18/93	AS FOUND	146.1			TS1291-14F						
	AS LEFT	146.4									
7/16/93	AS FOUND	147.5		59		1.10		1.10		1.10	
	AS LEFT	143.5									
10/19/93	AS FOUND	138.1		95		-5.40		-5.40		-5.40	
	AS LEFT	142.5									
1/19/94	AS FOUND	142.9		92		0.40		0.40		0.40	
	AS LEFT	143.8									
4/28/94	AS FOUND	140.9		99		-2.90		-2.90		-2.90	
	AS LEFT	144.8									
7/28/94	AS FOUND	146.2		91		1.40		1.40		1.40	
	AS LEFT	142.4									
11/14/94	AS FOUND	145.7		109		3.30		3.30		3.30	
	AS LEFT	146.7									
2/15/95	AS FOUND	145.8		93		-0.90		-0.90		-0.90	
	AS LEFT	141.6									
5/21/95	AS FOUND	143.7		95		2.10		2.10		2.10	
	AS LEFT	145.7									
5/18/93	AS FOUND	148 8			TS1291-14G						
	AS LEFT	144.6									
7/16/93	AS FOUND	146.8		59		2.20		2.20		2.20	
	AS LEFT	143.8									
10/19/93	AS FOUND	147.4		95		3.60		3.60		3.60	
	AS LEFT	146.6									
1/19/94	AS FOUND	147.7		92		1.10		1.10		1.10	

ATTACHMENT 2
TS1291-14C,D,E,F,G,H,J,K DRIFT DATA
CALC. NO. I-N1-115 R.0

	AS LEFT	141.5									
4/28/94	AS FOUND	141.2		99		-0.30		-0.30		-0.30	
	AS LEFT	142.5									
7/28/94	AS FOUND	145.4		91		2.90		2.90		2.90	
	AS LEFT	142.1									
11/14/94	AS FOUND	145.1		109		3.00		3.00		3.00	
	AS LEFT	145.9									
2/15/95	AS FOUND	145		93		-0.90		-0.90		-0.90	
	AS LEFT	141.8									
5/21/95	AS FOUND	144.7		95		2.90		2.90		2.90	
	AS LEFT	145.3									
5/18/93	AS FOUND	153.5			TS1291-14H						
	AS LEFT	143.1									
7/16/93	AS FOUND	144.9		59		1.80		1.80		1.80	
	AS LEFT	143.1									
10/19/93	AS FOUND	142.5		95		-0.60		-0.60		-0 60	
	AS LEFT	143.2									
1/19/94	AS FOUND	142.9		92		-0.30		-0.30		-0.30	
	AS LEFT	145.3									
4/28/94	AS FOUND	145.8		99		0.50		0.50		0 50	
	AS LEFT	140.5									
7/28/94	AS FOUND	142.4		91		1.90		1.90		1.90	
	AS LEFT	145.4									
11/14/94	AS FOUND	143.2		109		-2.20		-2.20		-2.20	
	AS LEFT	142.3									
2/15/95	AS FOUND	143.2		93		0.90		0.90		0.90	
	AS LEFT	145.5									
5/21/95	AS FOUND	145 6		95		0.10		0.10		0.10	
	AS LEFT	143.2									
5/18/93	AS FOUND	145.1			TS1291-14J						
	AS LEFT	147									
7/16/93	AS FOUND	148.2		59		1.20		1.20		1.20	
	AS LEFT	144.7									
10/19/93	AS FOUND	147.5		95		2.80		2.80		2.80	
	AS LEFT	142.3									
1/19/94	AS FOUND	149.8		92		7.50		7.50		7.50	
	AS LEFT	142.8									
4/28/94	AS FOUND	141.3		99		-1.50		-1.50		-1.50	
	AS LEFT	144.7									
7/28/94	AS FOUND	143.6		91		-1.10		-1.10		-1.10	
	AS LEFT	141.4									

ATTACHMENT 2
TS1291-14C,D,E,F,G,H,J,K DRIFT DATA
CALC. NO. I-N1-115 R.0

11/14/94	AS FOUND	143.8		109		2.40		2.40		2.40	
	AS LEFT	145.3									
2/15/95	AS FOUND	145.1		93		-0.20		-0.20		-0.20	
	AS LEFT	142									
5/21/95	AS FOUND	143.1		95		1.10		1.10		1.10	
	AS LEFT	144.5									
5/18/93	AS FOUND	144			TS1291-14K						
	AS LEFT	146.5									
7/16/93	AS FOUND	144.3		59		-2.20		-2.20		-2.20	
	AS LEFT	144									
10/19/93	AS FOUND	137.9		95		-6.10		-6.10		-6.10	
	AS LEFT	145.1									
1/19/94	AS FOUND	143.4		92		-1.70		-1.70		-1.70	
	AS LEFT	144.2									
4/28/94	AS FOUND	144.3		99		0.10		0.10		0.10	
	AS LEFT	141.5									
7/28/94	AS FOUND	142.6		91		1.10		1.10		1.10	
	AS LEFT	143.4									
11/14/94	AS FOUND	143		109		-0.40		-0.40		-0.40	
	AS LEFT	143.4									
2/15/95	AS FOUND	138.5		93		-4.90		-4.90		-4.90	
	AS LEFT	142.7									
5/21/95	AS FOUND	140.6		95		-2.10		-2.10		-2.10	
	AS LEFT	146.6									
					AVERAGE	0.62		0.62		0.62	
					STANDARD DEVIATION	2.69		2.69		2.69	
					COUNT	64		64		64	
					% OF ORIGINAL DATA POINTS			100%		100%	
					95%/95% TOL. INT.DEG F			6.27		6.27	

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

DATE	DATA STATUS	CAL. DATA "I"	CAL. DATA "D"	INT	SERIAL NUMBER	RAW DATA SUM. "I"	RAW DATA SUM. "D"	1ST OUT. SUM. "I"	1ST OUT. SUM. "D"	2ND OUT. SUM. "I"	2ND OUT. SUM. "D"
8/13/86	AS FOUND										
	AS LEFT	189.5									
3/9/89	AS FOUND	194		939	1733	4.50		4.50		4.50	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	197.2		939	1731	7.20		7.20		7.20	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	188.5									
3/9/89	AS FOUND	207		939	1752	18.50		OUTLIER		OUTLIER	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189.5									
3/9/89	AS FOUND	190		939	1783	0.50		0.50		0.50	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189.5									
3/9/89	AS FOUND	187		939	1755	-2.50		-2.50		-2.50	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189									
3/9/89	AS FOUND	189.9		939	1712	0.90		0.90		0 90	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189									
3/9/89	AS FOUND	187		939	1718	-2.00		-2.00		-2.00	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189									
3/9/89	AS FOUND	190		939	1760	1.00		1.00		1.00	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	190.5		939	1711	0.50		0.50		0.50	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	191									

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

3/9/89	AS FOUND	190.9		939	1708	-0.10		-0.10		-0.10	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189.2									
3/9/89	AS FOUND	191.9		939	1769	2.70		2.70		2.70	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	190.5									
3/9/89	AS FOUND	193.3		939	1706	2.80		2.80		2.80	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	191									
3/9/89	AS FOUND	192.1		939	1743	1.10		1.10		1.10	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189.6									
3/9/89	AS FOUND	192.5		939	1728	2.90		2.90		2.90	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189.8									
3/9/89	AS FOUND	194		939	1726	4.20		4.20		4.20	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	189.8									
3/9/89	AS FOUND	191		939	1749	1.20		1.20		1.20	
	AS LEFT										
8/13/86	AS FOUND										
	AS LEFT	190.2									
3/9/89	AS FOUND	190.5		939	1737	0.30		0.30		0.30	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189									
3/9/89	AS FOUND	191		938	1704	2.00		2.00		2.00	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	191.6									
3/9/89	AS FOUND	194.9		938	1723	3.30		3.30		3.30	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	192.6		938	1719	2.60		2.60		2.60	

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	194		938	1758	4.00		4.00		4.00	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	191.8									
3/9/89	AS FOUND	198.2		938	1714	6.40		6.40		6.40	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.4									
3/9/89	AS FOUND	189.9		938	1735	0.50		0.50		0.50	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.2									
3/9/89	AS FOUND	194		938	1740	4.80		4.80		4.80	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190.1									
3/9/89	AS FOUND	199.7		938	1710	9.60		9.60		9.60	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	199.8		938	1764	9.80		9.80		9.80	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	188.3									
3/9/89	AS FOUND	188		938	1753	-0.30		-0.30		-0.30	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	191									
3/9/89	AS FOUND	192.2		938	1722	1.20		1.20		1.20	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190.6									
3/9/89	AS FOUND	189.5		938	1738	-1.10		-1.10		-1.10	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190.2									
3/9/89	AS FOUND	195		938	1739	4.80		4.80		4.80	
	AS LEFT										

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

8/14/86	AS FOUND										
	AS LEFT	189.9									
3/9/89	AS FOUND	191.9		938	1757	2.00		2.00		2.00	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.3									
3/9/89	AS FOUND	188.5		938	1716	-0.80		-0.80		-0.80	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189									
3/9/89	AS FOUND	192.5		938	1759	3.50		3.50		3.50	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190.5									
3/9/89	AS FOUND	196		938	1763	5.50		5.50		5.50	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190.9									
3/9/89	AS FOUND	191.1		938	1727	0.20		0.20		0.20	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	188.3									
3/9/89	AS FOUND	192.5		938	1767	4.20		4.20		4.20	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	188									
3/9/89	AS FOUND	192.5		938	1746	4.50		4.50		4.50	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.1									
3/9/89	AS FOUND	193		938	1734	3 90		3.90		3.90	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.5									
3/9/89	AS FOUND	189.6		938	1736	0.10		0.10		0.10	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189									
3/9/89	AS FOUND	191.5		938	1777	2.50		2.50		2.50	
	AS LEFT										
8/14/86	AS FOUND										

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	AS LEFT	190									
3/9/89	AS FOUND	189.3		938	1707	-0.70		-0.70		-0.70	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	190.5									
3/9/89	AS FOUND	187.9		938	1744	-2.60		-2.60		-2.60	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.3									
3/9/89	AS FOUND	190.1		938	1697	0.80		0.80		0.80	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.7									
3/9/89	AS FOUND	188.9		938	1725	-0.80		-0.80		-0.80	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.5									
3/9/89	AS FOUND	182.9		938	1703	-6.60		-6.60		-6.60	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	189.1									
3/9/89	AS FOUND	191.4		938	1771	2.30		2.30		2.30	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	188.1									
3/9/89	AS FOUND	186.5		938	1768	-1.60		-1.60		-1.60	
	AS LEFT										
8/14/86	AS FOUND										
	AS LEFT	191									
3/9/89	AS FOUND	195		938	1778	4.00		4.00		4.00	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	189.6									
3/9/89	AS FOUND	195.9		934	1779	6.30		6.30		6.30	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	189.8									
3/9/89	AS FOUND	190.6		934	1761	0.80		0.80		0.80	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	189.3									

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ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

3/9/89	AS FOUND	188.3		934	1705	-1.00		-1.00		-1.00	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	190		934	1721	0.00		0.00		0.00	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	190		934	1732	0.00		0.00		0.00	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	188.8									
3/9/89	AS FOUND	195.9		934	1774	7.10		7.10		7.10	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	190									
3/9/89	AS FOUND	194.2		934	1730	4.20		4.20		4.20	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	191.5									
3/9/89	AS FOUND	194.5		934	1773	3.00		3.00		3.00	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	191									
3/9/89	AS FOUND	195.1		934	1700	4.10		4.10		4.10	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	189									
3/9/89	AS FOUND	192.3		934	1766	3.30		3.30		3.30	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	188									
3/9/89	AS FOUND	193		934	1724	5.00		5.00		5.00	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	188.4									
3/9/89	AS FOUND	193.2		934	1782	4.80		4.80		4.80	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	190.9									
3/9/89	AS FOUND	197.4		934	1770	6.50		6.50		6.50	

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	188.6									
3/9/89	AS FOUND	195		934	1780	6.40		6.40		6.40	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	189.8									
3/9/89	AS FOUND	191		934	1696	1.20		1.20		1.20	
	AS LEFT										
8/18/86	AS FOUND										
	AS LEFT	190.9									
3/9/89	AS FOUND	195		934	1729	4.10		4.10		4.10	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190									
3/3/89	AS FOUND	193.9		807	1789	3.90		3.90		3.90	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	192									
3/3/89	AS FOUND	188.8		807	1834	-3.20		-3.20		-3.20	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	191									
3/3/89	AS FOUND	192.5		807	1825	1.50		1.50		1.50	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	188									
3/3/89	AS FOUND	187.1		807	1843	-0.90		-0.90		-0.90	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	192									
3/3/89	AS FOUND	190.4		807	1899	-1.60		-1.60		-1.60	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	193									
3/3/89	AS FOUND	191.8		807	1713	-1.20		-1.20		-1.20	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	193									
3/3/89	AS FOUND	193.4		807	1841	0.40		0.40		0.40	
	AS LEFT										

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

12/17/86	AS FOUND										
	AS LEFT	189									
3/3/89	AS FOUND	190.2		807	1829	1.20		1.20		1.20	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	193									
3/3/89	AS FOUND	191.3		807	1833	-1.70		-1.70		-1.70	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	191									
3/3/89	AS FOUND	192.5		807	1842	1.50		1.50		1.50	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190									
3/3/89	AS FOUND	198.5		807	1835	8.50		8.50		8.50	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	191									
3/3/89	AS FOUND	191		807	1827	0 00		0.00		0.00	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190									
3/3/89	AS FOUND	188		807	1826	-2.00		-2.00		-2.00	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	188									
3/3/89	AS FOUND	199.6		807	1822	11.60		11.60		11.60	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	188									
3/3/89	AS FOUND	196		807	1933	8.00		8.00		8.00	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190.2									
3/3/89	AS FOUND	191.6		807	1874	1.40		1.40		1.40	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	192									
3/3/89	AS FOUND	194		807	1875	2.00		2.00		2.00	
	AS LEFT										
12/17/86	AS FOUND										

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

	AS LEFT	190									
3/3/89	AS FOUND	190.9		807	1838	0.90		0.90		0.90	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190.8									
3/3/89	AS FOUND	192		807	1925	1.20		1.20		1.20	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	192									
3/3/89	AS FOUND	190		807	1839	-2.00		-2.00		-2.00	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190.5									
3/3/89	AS FOUND	191.2		807	1830	0.70		0.70		0.70	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	189									
3/3/89	AS FOUND	190.9		807	1836	1.90		1.90		1.90	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	188 5									
3/3/89	AS FOUND	211		807	1919	22.50		OUTLIER		OUTLIER	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	189.5									
3/3/89	AS FOUND	189.8		807	1930	0.30		0.30		0.30	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190									
3/3/89	AS FOUND	191.4		807	1916	1.40		1.40		1.40	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	189.8									
3/3/89	AS FOUND	192.3		807	1790	2.50		2.50		2.50	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	188.1									
3/3/89	AS FOUND	189.1		807	1846	1.00		1.00		1.00	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190									

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

3/3/89	AS FOUND	191.4		807	1854	1.40		1.40		1.40	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	190.8									
3/3/89	AS FOUND	199		807	1880	8.20		8.20		8.20	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	186 8									
3/3/89	AS FOUND	189.6		807	1754	2.80		2.80		2.80	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	189.2									
3/3/89	AS FOUND	191.6		807	1844	2.40		2.40		2.40	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	187.8									
3/3/89	AS FOUND	194.6		807	1795	6.80		6.80		6.80	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	192.8									
3/3/89	AS FOUND	191.6		807	1845	-1.20		-1.20		-1.20	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	189									
3/3/89	AS FOUND	193		807	1882	4.00		4.00		4.00	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	191									
3/3/89	AS FOUND	194.1		807	1741	3.10		3.10		3.10	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	186									
3/3/89	AS FOUND	193.1		807	1698	7.10		7.10		7.10	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	188.1									
3/3/89	AS FOUND	190		807	1896	1.90		1.90		1 90	
	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	186.2									
3/3/89	AS FOUND	190.5		807	1848	4.30		4.30		4.30	

ATTACHMENT 3
PATEL/EGS TEMP. SWITCH DRIFT DATA
CALC. NO. I-N1-115, Rev. 0

	AS LEFT										
12/17/86	AS FOUND										
	AS LEFT	191									
3/3/89	AS FOUND	188		807	1891	-3.00		-3.00		-3.00	
	AS LEFT										
					AVERAGE	2.57		2.22		2.22	
					STANDARD DEVIATION	4.04		3.17		3.17	
					COUNT	103		101		101	
					% OF ORIGINAL DATA POINTS			98.1%		98.1%	
					95%/95% TOL. INT.DEG F			7.06		7.06	

Pilgrim Calculation No. 1-N1-195

Pages 3 thru 26 and 31 and 32

CALCULATION SHEET

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-195

CALCULATION WORK OR REMARKS:

Statement of Problem

This calculation will provide the uncertainty analysis for the development of the RCIC steam line low pressure isolation setpoint. It will determine a plant setpoint and allowable value which will ensure initiation on or before reaching the design basis analytical limits. Other parameters determined by this calculation are:

- Instrument Surveillance Interval
- Measurement and Test Equipment Accuracy
- Calibration No Adjust Limits
- Field Reset Value

Method of solution

This calculation is performed based on the methodology described in Beco NEDWI No. 394 and uses ABB Impell Project Instructions No. 25-226-PI-001 for analysis of the as-found and as-left instrument calibration data. The calculation has been prepared in accordance with the U.S. Nuclear Regulatory Commission Regulatory Guide No. 1.105, Rev. 2 and Instrument Society of America Standard ISA-S67.04-1982.

Input Data and Assumptions

In accordance with PNPS FSAR Sections 7.3.4.7 and 7.3.4.8 the RCIC turbine steam line low pressure switches are utilized to isolate the RCIC turbine steam line so that steam and radioactive gases will not escape from the RCIC turbine shaft seals into the Reactor building after steam pressure has decreased to such a low value that the turbine cannot be operated. This trip is not considered a PCIS function. The mission time of these switches is based upon an accident which RCIC is required to function.

CALCULATION SHEET

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-195

Summary of Results and Recommendations

This calculation determined a new setpoint and Technical Specification allowable value. These values were determined based on plant specific calibration data and NEDWI No. 394 methodology. The sensed instrument setpoint includes margin to account for an instrument line static head of 17.5 psig. The sensed instrument setpoint is equal to the process setpoint plus the instrument line static head.

The results of the calculation are listed below (see note 8):

Trip Setpoint:
70 psig (process pressure)
87.5 psig (instrument sensed pressure)

Technical Specification Allowable Value:
70 ± 7 psig (process pressure)
87.5 ± 7 psig (instrument sensed pressure)

Setpoint Analytical limit:
>50 psig, but < 100 psig (process pressure)
>67.5 psig, but < 117.5 psig (instrument sensed pressure)

Setpoint Reset Value:
≤79 psig (process pressure)
≤96.5 psig (instrument sensed pressure)

No Adjust Limits: ±5 psig

Surveillance Interval: Once per 24 months

M&TE Accuracy: ± 1% of full scale

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-195

This calculation is based on the accuracy specifications of the Static-O-Ring pressure switch model number 6TA-B3-U8-C1A-JJTTNQ and PNPS specific drift data for the Static -O-Ring pressure switch model number 6TA-B3-NX-C1A-JJTTX6 and 6TA-B3-NX-C1A-JJTTX12. These switches are similar in design. The performance data used in the calculation is considered representative of these model numbers.

Pressure switch PS1360-9B is a Static-O-Ring model no. 6TA-B3-NX-C1A-JJTTX12 and PS1360-9A, C and D are Barksdale model no. P1H-M85SSV. Replacement of switches PS1360-9A, C and D with Static-O-Ring model no. 6TA-B3-U8-C1A-JJTTNQ or 6TA-B3-NX-C1A-JJTTX12 is required for this calculation to be in effect. The Barksdale switches are being replaced because their setpoint cannot be adjusted to the new value determined by this calculation.

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CALCULATION NUMBER I-N1-195

Calculation Work Or Remarks:

Notes:

1. RCIC turbine steam line low pressure is used to automatically close the two isolation valves in the RCIC turbine steam line, so that steam and radioactive gases will not escape from the RCIC turbine shaft seals into the reactor building after steam pressure has decreased to such a low value that the turbine cannot be operated. See FSAR Section 7.3.4.7.9. In accordance with FSAR Table 4.7-1 the RCIC Turbine Steam Inlet pressure range is 150 to 1,120 psia. Therefore, to ensure that RCIC is available for the above pressure range the Turbine should not be trip off or re-started greater than 135 psig. The isolation setpoint and reset are chosen at a pressure below that at which the RCIC turbine can operate effectively. This isolation is expected to be operational anytime RCIC is operated including after an accident.

2. The calculation is based on the Static-O-Ring switch model numbers 6TA-B3-U8-C1A-JJTTNQ and 6TA-B3-NX-C1A-JJTTX12. The switches are similar in design and the accuracy data used in this calculation is considered representative of these switches. See SOR Forms # 216 and 651. Presently, switches PS1360-9A,C and D are Barksdale model no. P1H-M85SSV and switch PS1360-9B is a Static-O-Ring model no. 6TA-B3-NX-C1A-JJTTX12. A design change is to be performed which will replace the Barksdale switches with static-o-ring model no. 6TA-B3-U8-C1A-JJTTNQ. Therefore, the results of this calculation are not in effect until the design change has been completed.

3. The Static-O-Ring pressure switch will not experience a pressure effect due to a pipe break outside containment. The maximum ambient pressure due to a steam line break is 15.22 psia. Reference Pilgrim Unit 1 Specification E-536, Figure C.4.1-7 for the pressure profile. This transient will not cause the pressure switch to experience an error because the switch housing is sealed and the sensing element is referenced to the pressure inside the switch housing. Reference Attachment 1. See note 4 for internal housing pressure changes due to ambient temperature variations.

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4. The temperature effect of the Static-O-Ring pressure switch is identified in Attachment 1. The switch setpoint changes as a result of a sealed housing effect and natural temperature influence. This relationship is applicable to the Static-O-Ring pressure switch model numbers 6TA-B3-U8-C1A-JJTTNQ and 6TA-B3-NX-C1A-JJTTX12. The change in setpoint due to a temperature increase from a normal operating temperature of 60 deg. F to the peak accident temperature of 242 deg. F (reference FSAR Table 10.9-1 and Specification E-536, Fig.C.4.1-7) is:

Change in Setpoint = (.04psi/deg F - .0003 x SP psi/deg F)Δ deg F

(.04psig/deg. F)(242-60)deg. F - (.0003/deg. F)(87.5)psig(242-60)deg. F= 2.5 psig

Because the change in setpoint is positive, the error will make the switch trip sooner on a decreasing signal and therefore will be subtracted from the upper Analytical Limit when determining the setpoint.

5. The radiation effect or error is defined as the change in setpoint due to radiation testing. The radiation effect of the Static-O-Ring pressure switch is determined in attachment 2. Six switches were tested. Though the models 6TA-B3-U8-C1A-JJTTNQ and 6TA-B3-NX-C1A-JJTTX12 switches were not included in the switches tested, the test results are representative of these models and can be used in this analysis. The greatest change (error) for a decreasing setpoint in these tests is 2.8% of span. Assuming this error is random and independent of the other errors in this analysis, a value of (+/- .028 * 88 psig = +/- 2.5 psig) is to be used for the radiation effect of the Static-O-Ring switch.

6. The seismic effect or error is defined as the change in setpoint due to seismic testing. The seismic effect of the static-o-ring pressure switch is determined from attachment 2. Six switches were tested. Though the model 6TA-B3-U8-C1A-JJTTNQ and 6TA-B3-U8-C1A-JJTTX12 switches were not included in the test, the results are representative of these models and can be used in this analysis. The greatest change for a decreasing setpoint in these tests is 4% of span. Assuming the error is random and independent of the errors in this analysis, a value of (+/- .04 * 88 psig = +/- 3.5 psig) is to be used for the seismic effect.

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CALCULATION NUMBER I-N1-195

7. The circuit leakage allowance is applicable to low energy analog signals only. The RCIC low pressure switches are mechanical on/off switches. Therefore, this error is not applicable.

8. The RCIC steam line low pressure switches connect to the process at approximately 44'- 6 " elevation in the drywell. Reference drawings M1001 sh 55 and 56 and M100BC21-3. the pressure switches are located in the reactor building and are shown on drawings M15 and M1P355-5. The instrument line drywell penetrations are shown on drawings M1002 sh. 68 and 69. These drawings delineate the instrument line routing and are used to determine equipment elevations in the below static head calculation.

The instrument lines are maintained filled with condensate which creates a static head that is sensed by PS1360-9A ,B ,C & D. Due to dimensional differences, these four installations have different instrument line static heads. This analysis will use the installation which has the greatest head to determine "Sensed Instrument Setpoint". The sensed instrument setpoint is equal to the process setpoint plus instrument line greatest static head.

The instrument line head is a function of reactor pressure, and drywell and reactor building temperature. The operating conditions which causes the greatest static head will be assumed. The conditions are reactor pressure equal to 50 psig, drywell ambient temperature equal to 120 deg. F and reactor bldg. ambient temperature equal to 60 deg. F (reference Pilgrim Unit 1 Specification E-536, Figure C.4.1-18 and FSAR Table 10.9-1).

<u>Instrument Line Greatest Static Head</u>

Static Head Inside Drywell = [Process Conn. El. -D.W. Pent. El] Density

= [45.25'-17.19'] x (61.73 lbs./ cu. ft.) / 144 sq. in. / sq. ft.

=12.03 psig

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-195

Static Head Outside Drywell = [D.W. Pent. El. -Instrument El.] Density

=[17.19' - 4.583'] x (62.38 lbs./ cu. ft.)/144 sq. in./ sq. ft.
= 5.46 psig

Total Static Head = 17.5 psig

The effects on the instrument setpoint of this static head being less than maximum will introduce a nonconservative error between the setpoint and the upper analytical limit. The instrument line installation and operating condition (LOCA) which provides the least static head is calculated below. This value is to be used when determining the instrument line static head error. See Form 3, sheet 3, item 10b.

The operating condition is reactor pressure equal to 50 psig, drywell ambient temperature equal to 330 deg.F and reactor bldg. ambient temperature equal to 112 deg. F (reference Pilgrim Unit 1 Specification E-536, Figure C.4.1-18 and Table 7.0-1).

<u>Instrument Line Least Static Head</u>

Static Head Inside Drywell = [Process Conn. El. - Drywell Pent. El.] Density

= [44.3' - 17.11'][.14306 lbs./cu. ft.] /144 sq. in. / sq. ft.
= .03 psig (Flashing)

Static Head Outside Drywell = [Drywell Pent. El. - Inst. El.] Density

= [17.11' - 6.58'][61.84 lbs./ cu. ft.]/144 sq. in. / sq. ft.
= 4.52 psig

Total Static Head = 4.55psig

CALCULATION SHEET

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-195

Instrument Line Static Head Error

Error = Maximum Static Head - Minimum Static Head
= 17.5 psig - 4.55psig
= 13 psig

This error will make the switch trip sooner on a decreasing signal and therefore will be subtracted from the upper Analytical Limit when determining the setpoint.

9. The sensor drift was statistically analyzed in Attachment no. 3 in accordance with ABB Impell Project Instruction 25-226-PI-001. The analysis used empirical data from 6/20/88 through 6/27/96 obtained from the PNPS as-found as-left instrument calibration records (reference PNPS Procedure 8.M.2- 2.6.4). The calibration frequency of the switches for the above data is once per 3 months. The drift interval for the above analysis is 30 months. This interval is determined by combining consecutive surveillance's that do not require interim calibration. The value obtained from the statistical analysis has a probability and confidence of 95/95 %.

The sensor drift determined is considered to include the effects of measurement and test equipment (M&TE) and sensor basic accuracy. Therefore, values will not be entered in this calculation for SCA (calibration accuracy) or SA (sensor accuracy). It is assumed the accuracy of the M&TE used for calibration is less than or equal to the instrument being calibrated (reference PNPS Procedure 1.3.36).

10. The errors identified in this calculation are to be used to determine the setpoint and allowable value. See Form 3, sheets 2 and 3. Because of the instrument line static head, the process setpoint and allowable value are different than the "sensed" instrument setpoint and notify watch engineer value. The relationship between these values are:

Instrument Setpoint = Process Setpoint + Maximum Instrument Line Static Head

Notify Watch Engineer Value = Allowable Value + Maximum Instrument Line Static Head

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-195

The process setpoint and allowable value are:

Process Setpoint = 70 psig
Allowable Value = 70 ± 7 psig

The instrument setpoint and notify watch engineer value are:

Instrument Setpoint = 87.5
Notify Watch Engineer Value = 87.5 ± 7 psig

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Calculation Number I-N1-195 Instrument Number PS1360-9A,B,C&D

FORM 1 INSTRUMENT DATA

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TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
GENERAL INFORMATION	INSTRUMENT NUMBER	PS1360-9A, B, C & D	Dwg. M245	
	SERVICE DESCRIPTION	RCIC Turb. Steam Line Low Press. Isolation	FSAR Section 7.3.4.8	
	QUALITY CATEGORY	Q	PNPS Q-List	
	ENVIRONMENTAL QUALIFICATION	Yes, EQ Area 1.7	Environmental Qualification Master List	
	SAFETY FUNCTION (IF APPLICABLE)	See Note 1	FSAR Section 7.3.4.7.9	
	TECHNICAL SPECIFICATION (IF APPLICABLE)	100 psig >p > 50 psig	Technical Specification Table 3.2.B	
	MANUFACTURER	Static-O-Ring	Data sheet M221ADS7	See Note 2
	MODEL NUMBER	6TA-B3-NX-C1A-JJTTX12 & 6TA-B3-U8-C1A-JJTTNQ	Data sheet M221ADS7	See Note 2

CALCULATION SHEET

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Calculation Number__I-N1-195___ Instrument Number_PS1360-9A,B,C&D_

FORM 1 INSTRUMENT DATA

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TITLE			DESCRIPTION/VALUE	REFERENCE	REMARKS
INSTRUMENT SETPOINT DATA	ANALYTICAL LIMIT (AL)		> 50 psig, <100 psig	FSAR Table 7.3-2 S&SA Memo 95-10	See Note1
	ALLOWABLE VALUE (AV)		70 ± 7 psig (process pressure)	Form 3, Sheet 3 this calc.	See Note 10
	SETPOINT	TRIP	70 psig (process press.)	Form 3, Sh. 3 this calc.	See Note 10
		RESET	< 79 psig (process press.)	Form 3, Sh.4 this calc.	
	NORMAL OPERATION UPPER LIMIT (NUL)		N/A		Decreasing setpoint
	NORMAL OPERATION LOWER LIMIT (NLL)		940 psig	PNPS Procedure 2.1.1	
	PROCESS CALIBRATED RANGE		Adjustable, 12 TO 100 psig	SOR Inc. Form 216 and 651	
	OPERATING MARGIN (OM)*		870 psig	Form 3 Sheet 4, this calc.	

*NOTE: ADEQUATE OPERATING MARGIN IS REQUIRED BETWEEN THE SETPOINT AND THE NORMAL OPERATION UPPER OR LOWER LIMIT, AS APPLICABLE, TO AVOID INADVERTENT TRIPS DUE TO PROCESS NOISE, TRANSIENTS AND MEASUREMENT UNCERTAINTIES.

Calculation Number I-N1-195	Instrument Number PS1360-9A,B,C&D

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
INSTRUMENT SETPOINT DATA (CONT)	ADJUSTABLE RANGE	12 TO 100 psig	SOR Inc. Form 216 and 651	
	INPUT SIGNAL FROM	RCIC Steamline	Dwg. M245	
	INPUT SIGNAL CALIBRATED RANGE	N/A		Instrument is a pressure switch
	OUTPUT SIGNAL TO	RCIC automatic isolation	DWG. M1G12-12	
	OUTPUT SIGNAL CALIBRATED RANGE	N/A		Instrument is a pressure switch
	SETPOINT CALIBRATION FREQUENCY	Once per 3 months plus 25%	PNPS Tech. Spec. Table 4.2.b and Section 1.0, u	This calculation is performed based on a 24 month calibration frequency. The Tech. Spec. is to be revised.

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Calculation Number I-N1-195			Instrument Number PS1360-9A,B,C&D
FORM 1 INSTRUMENT DATA			Page 4 of 9

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
ENVIRONMENT ALLOWANCE (EA) FORM 3 STEP 1	TEMPERATURE EFFECT (Te)	-2.5 psig	Attachment 1	See Note 4
	RADIATION EFFECT (Re)	± 2.5 psig	Attachment 2	See Note 5
	STEAM/CHEMICAL SPRAY EFFECT (S/Ce)	N/A		Equipment is environmentally sealed and located in secondary cont.
	PRESSURIZATION (EXTERNAL) EFFECT (Pe)	N/A	Attachment 1	See Note 3
	SEISMIC EFFECT (Se)	± 3.5 psig	Attachment 2	See Note 6
CIRCUIT LEAKAGE ALLOWANCE (LA) FORM 3 STEP 2	CABLE LEAKAGE (Cl)	N/A		See Note 7
	TERMINAL BLOCK LEAKAGE (Tl)	N/A		See Note 7
	PENETRATION LEAKAGE (Pl)	N/A		See Note 7

CALCULATION SHEET

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REV__1__ DATE 2/28/97 SHEET 16 OF 34

Calculation Number__I-N1-195__		Instrument Number_PS1360-9A,B,C&D_		

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
CIRCUIT LEAKAGE ALLOWANCE (LA) (CONTINUED)	SPLICE LEAKAGE (SI)	N/A		See Note 7
	SEALING DEVICE LEAKAGE (DI)	N/A		See Note 7
PROCESS ALLOWANCE (PA) FORM 3 STEP 3	PROCESS MEASUREMENT ACCURACY (Pma)	- 13 psig	Dwgs. M1001, Sh 55 & 56; M1002, Sh 68 & 69; M100BC21-3; M1P355-5; M15 and ASME.Stm Table	See Note 8
	PRIMARY ELEMENT ACCURACY (Pea)	N/A		No primary element. Switch directly sensors process.
CALIBRATION ALLOWANCE (CA) FORM 3 STEP 4	SENSOR CALIBRATION ACCURACY (Sca)	N/A		See Note 9
	RACK EQUIPMENT CALIBRATION ACCURACY (Rca)	N/A		No rack equipment

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Calculation Number__I-N1-195___	Instrument Number_PS1360-9A,B,C&D_

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
RACK EQUIPMENT ALLOWANCE (RA) FORM 3 STEP 5	RACK EQUIPMENT ACCURACY (Rea)	N/A		No rack equipment
	RACK TEMPERATURE EFFECTS (Rte)	N/A		No rack equipment
	RACK POWER SUPPLY EFFECTS (Rps)	N/A		No rack equipment
	RACK EQUIPMENT MISCELLANEOUS EFFECTS (Rme)	N/A		No rack equipment

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Calculation Number I-N1-195	Instrument Number PS1360-9A,B,C&D

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
SENSOR ALLOWANCE (SA) FORM 3 STEP 6	SENSOR BASIC ACCURACY (Sa)	N/A		See Note 9
	SENSOR STATIC PRESSURE SPAN SHIFT (Ssps)	N/A		Sensor is not a differential pressure switch
	SENSOR STATIC PRESSURE ZERO SHIFT (Sspz)	N/A		Sensor is not a differential pressure switch
	SENSOR TEMPERATURE EFFECTS (Ste)	N/A		Sensor Temperature effect Included in Temperature Effect, Te
	SENSOR POWER SUPPLY EFFECTS (Spse)	N/A		
	SENSOR MISCELLANEOUS EFFECTS (Sme)	N/A		

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Calculation Number __I-N1-195__ Instrument Number_PS1360-9A,B,C&D_

FORM 1 INSTRUMENT DATA

TITLE		DESCRIPTION/VALUE	REFERENCE	REMARKS
DRIFT ALLOWANCE (DA) FORM 3 STEP 7	SENSOR DRIFT (Sd)	±4.7 psig	Attachment 3	95/95 drift value based on 30 months. See note 9
	RACK EQUIPMENT DRIFT (Red)	N/A		No rack equipment
TOLERANCE ALLOWANCE (TA) FORM 3 STEP 8	SENSOR TOLERANCE (St)	±5 psig	PNPS Procedure 8.M.2-2.6.4	
	RACK EQUIPMENT TOLERANCE (Ret)	N/A		No rack equipment

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Calculation Number___ I-N1-195_____ Instrument Number_PS1360-9A, B, C & D__

FORM 2B CALCULATION INPUT SHEET (DECREASING SETPOINT)

	DESCRIPTION	ABBREVIATION/VALUE *	COMMENTS
NORMAL OPERATION UPPER LIMIT		NUL = N/A	
	NORMAL OPERATING BAND		
NORMAL OPERATION LOWER LIMIT		NLL = 940 PSIG	
	OPERATING MARGIN	OM = 870 PSIG	
RESET VALUE		RV = 96.5 PSIG	
TRIP SETPOINT		TSp** = 70 PSIG	SEE NOTE 10
DRIFT ALLOWANCE (DA)	SENSOR DRIFT	Sd = ±4.7 PSIG	SEE NOTE 9
	RACK EQUIPMENT DRIFT	Red = N/A	
TOLERANCE ALLOWANCE (TA)	SENSOR TOLERANCE	St = ±5 PSIG	
	RACK EQUIPMENT TOLERANCE	Ret = N/A	
ALLOWABLE VALUE		AV** = 70±7 PSIG	SEE NOTE 10
ENVIRONMENTAL ALLOWANCE (EA)	TEMPERATURE EFFECT	Te = -2.5 PSIG	SEE NOTE 4
	RADIATION EFFECT	Re = ±2.5 PSIG	SEE NOTE 5
	STEAM/CHEM SPRAY EFFECT	S/Ce = N/A	
	PRESSURIZATION (EXT.) EFFECT	Pe = N/A	
	SEISMIC EFFECT	Se = ±3.5 PSIG	SEE NOTE 6
CIRCUIT LEAKAGE ALLOWANCE (LA)	CABLE LEAKAGE	Cl = N/A	
	TERMINAL BLOCK LEAKAGE	Tl = N/A	
	PENETRATION LEAKAGE	Pl = N/A	
	SPLICE LEAKAGE	Sl = N/A	
	SEALING DEVICE LEAKAGE	Dl = N/A	
PROCESS ALLOWANCE (PA)	PROCESS MEASUREMENT ACCURACY	Pma = -13 PSIG	SEE NOTE 8
	PRIMARY ELEMENT ACCURACY	Pea = N/A	
CALIBRATION ALLOWANCE (CA)	SENSOR CALIBRATION ACCURACY	Sca = N/A	
	RACK EQUIPMENT CALIBRATION ACCURACY	Rca = N/A	
RACK EQUIPMENT ALLOWANCE (RA)	RACK EQUIPMENT ACCURACY	Rea = N/A	
	RACK TEMPERATURE EFFECT	Rte = N/A	
	RACK POWER SUPPLY EFFECT	Rps = N/A	
	RACK EQUIPMENT MISCELLANEOUS EFFECT	Rme = N/A	
SENSOR ALLOWANCE (SA)	SENSOR BASIC ACCURACY	Sa = N/A	
	SENSOR STATIC PRESSURE SPAN SHIFT	Ssps = N/A	
	SENSOR STATIC PRESSURE ZERO SHIFT	Sspz = N/A	
	SENSOR TEMPERATURE EFFECTS	Ste = N/A	
	SENSOR POWER SUPPLY EFFECTS	Spse = N/A	
	SENSOR MISCELLANEOUS EFFECTS	Sme = N/A	
ANALYTICAL LIMIT		AL = >50PSIG, BUT <100 PSIG	

TOTAL LOOP UNCERTAINTY

*NOTE: VALUES ARE IDENTIFIED FOR MAGNITUDE ONLY AND ARE COMBINED IN ACCORDANCE WITH THE EQUATIONS ON FORM 3

**NOTE: CALCULATED VALUE FROM FORM 3

CALCULATION SHEET

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FORM 3. CALCULATION SHEET SHEET NO. 1 of 4

Calculation Number I-N1-195

Instrument Number PS-1360-9A, B, C & D

1. ENVIRONMENTAL ALLOWANCE (EA)

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

$$EA = \sqrt{(N/A)^2 + (2.5)^2 + (N/A)^2 + (N/A)^2 + (3.5)^2} \quad -2.5 \quad = -2.5 \pm 4.3$$

2. CIRCUIT LEAKAGE ALLOWANCE (LA)

LA = CI + TI + PI + SI + DI

LA = _N/A_ + _N/A_ + _N/A_ + _N/A_ + _N/A_ = _N/A_

3. PROCESS ALLOWANCE (PA)

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

$$PA = \sqrt{(N/A)^2 + (N/A)^2} \quad -13 \quad = -13$$

4. CALIBRATION ALLOWANCE (CA)

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

$$CA = \sqrt{(N/A)^2 + (N/A)^2} \quad = N/A$$

5. RACK EQUIPMENT ALLOWANCE (RA)

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

$$RA = \sqrt{(N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2} \quad = N/A$$

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FORM 3. CALCULATION SHEET SHEET NO. 2 of 4

Calculation Number I-N1-195
Instrument Number PS-1360-9A, B, C & D

6. SENSOR ALLOWANCE (SA)

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

$$SA = \sqrt{(N/A)^2 + (N/A + N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2}$$

SA = N/A

7. DRIFT ALLOWANCE (DA)

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

$$DA = \sqrt{(4.7)^2 + (N/A)^2} = \pm 4.7$$

8. TOLERANCE ALLOWANCE (TA)

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

$$TA = \sqrt{(5)^2 + (N/A)^2} = \pm 5$$

9. TOTAL LOOP UNCERTAINTY ALLOWANCE (TLU)

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

$$TLU = N/A \pm \sqrt{(4.3)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2 + (N/A)^2 + (4.7)^2 + (5)^2} \quad -2.5 - 13$$

TLU = + 8.1 - 23.6

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FORM 3. CALCULATION SHEET SHEET NO. 3 of 4

Calculation Number _____I-N1-195_____

Instrument Number ______PS-1360-9A, B, C & D______

10. TRIP SETPOINT (TSp) IN PROCESS UNITS

10A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

TSp = AL - TLU

TSp = _N/A_ - _N/A_ = __N/A__

10B. FOR DECREASING SETPOINT - FROM 2B: (ENTER N/A IF INCREASING SETPOINT)

LOWER AL	UPPER AL
TSp = AL + TLU	Tsp = AL - TLU
TSp = _50_ + _8.1_ = _58.1_	Tsp = _100_ - _23.6_ = _76.4_

CHOSE A SETPOINT = 70 PSIG (PROCESS PRESSURE) SEE NOTE 10

11. ALLOWABLE VALUE (AV)

11A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

$$AV = TSp + \sqrt{DA^2 + TA^2}$$

$$AV = \_N/A\_ + \sqrt{(\_N/A\_)^2 + (\_N/A\_)^2}$$

AV = _N/A_

11B. FOR DECREASING SETPOINT - FORM 2B: (ENTER N/A IF INCREASING SETPOINT)

$$AV = TSp - \sqrt{DA^2 + TA^2}$$

$$AV = \_70\_ - \sqrt{(\_4.7\_)^2 + (\_5\_)^2}$$

AV = _70 ± 6.9_PSIG;_ SAY 70 ± 7 PSIG (PROCESS PRESSURE)

CALCULATION SHEET

Boston Edison

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FORM 3. CALCULATION SHEET SHEET NO. 4 of 4

Calculation Number _____I-N1-195

Instrument Number ______PS-1360-9A, B, C & D

12. OPERATING MARGIN (OM)

12A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

OM = TSp - NUL

OM = _N/A_ - _N/A_ = _N/A_

12B. FOR DECREASING SETPOINT - FORM 2B: (ENTER N/A IF INCREASING SETPOINT)

OM = NLL - TSp

OM = _940_ - _70_ = _870 PSIG___ (PROCESS PRESSURE) SEE NOTE 10

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13. RESET VALUE (RV)

13A. FOR INCREASING SETPOINT - FORM 2A: (ENTER N/A IF DECREASING SETPOINT)

RV > NUL

RV = __N/A____

NUL = __N/A____

13B. FOR DECREASING SETPOINT - FORM 2B: (ENTER N/A IF INCREASING SETPOINT)

RV < NLL

RV = __< 79 PSIG_ (PROCESS PRESSURE)__

NLL = ___940 PSIG___ FROM DATA SHEET M221ADS7 RESET DIFFERENTIAL GREATEST VALUE EQUAL TO 9 PSI i.e. RV = SP + RESET DIFF.

14. TRIP SETPOINT (TSp) IN PROCESS UNITS

TSs = TSp MODIFIED BY THE FACTORS ACCOUNTING FOR CONVERSION FROM PROCESS UNIT TO SIGNAL UNITS (VOLTS, AMPS, COUNTS, etc.).

TSs = _____N/A_______________ (NOTE: DOCUMENT CONVERSION ON FORM 4)

CALCULATION SHEET

FORM 4. CALCULATION SHEET

CALCULATION NUMBER I-N1-195

CALCULATION WORK OR REMARKS:

References

1. Drawings
    - M245, Rev. 25 - P&ID RCIC System
    - M1G2-5, Rev. E9 - Function Control Diagram RCIC System
    - M1G12-12, Rev. E14 - Elementary Digram RCIC System
    - M1P355-5, Rev.E3 - Arrangement Drawing Leak Detection Instrument Rack 2257
    - M1001 Sh. 55, Rev. 5 - RCIC System Diff. Press. 1360-1
    - M1001 Sh. 56, Rev. 4 - RCIC System Diff. Press. 1360-1
    - M1002 Sh. 68, Rev. 7 - RCIC Instrument Piping to DPIS 1360-1
    - M1002 Sh. 69, Rev. 7 - RCIC Instrument Piping to DPIS 1360-1
    - M100BC21-3, Rev. E3 - RCIC Syst. Steam Supply Line to Turbine X-202
    - M15, Rev. E17 - Equipment Location Reactor Building

2. NEDWI 394, Rev. 3; Methodology for Calculation of Instrument Setpoints

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

4. Instrument Society of America Standard ISA-67.04-1982; Setpoints for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants

5. PNPS - FSAR, Rev. 19

6. PNPS Technical Specification, Rev. 187

7. PNPS Q-List, Rev. E64

8. PNPS Equipment Qualification Master List, Rev. E45

9. PNPS Procedure No. 1.3.36, Rev. 13; Measurement and Test Equipment

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10. PNPS Procedure No. 2.1.1, Rev. 83; Startup from Shutdown

11. PNPS Procedure No. 8.M.2-2.6.4, Rev. 21; RCIC Steamline Low Pressure

12. ABB Impell Project Instruction No. 25-226-PI-001, Rev. E2; Data Collection and Analysis

13. SOR Inc. Form No. 216 - Rev. 3/90; Pressure Switch by SOR Inc. for Process Applications

14. SOR Inc. Form No. 651 - Rev. 7/93; SOR 1E Qualified Pressure, Vacuum & Temperature Switches for the Nuclear Power Industry

15. Pilgrim Unit 1 Specification E-536, Rev. E5; Environmental Parameters for Use in the Environmental Qualification of Electrical Equipment

16. Data Sheet M221ADS7, Rev. 1

17. Boston Edison Co. Equipment Qualification Data Files; PS1360-9B; Rev. E3

18. SOR Inc. Test Report No. 9058-102, Copyright 1993; Nuclear Qualification Test Report for SOR Pressure , Vacuum, and Temperature Switches (EQDF Ref. 419)

ATTACHMENT 3
PS-1360-9B DRIFT DATA
CALC. NO. I-N1-195, Rev. 1

DATE	DATA STATUS	CAL. DATA "I"	CAL. DATA "D"	INT	REMARKS	RAW DATA SUM. "D"	RAW DATA SUM. "I"	1ST OUT. SUM. "D"	1ST OUT. SUM. "I"	2ND OUT. SUM. "D"	2ND OUT. SUM. "I"
	AS FOUND	76			PS1360-9B						
6/20/88	AS LEFT	76									
	AS FOUND	76.5									
8/13/88	AS LEFT	76.5									
	AS FOUND	76									
11/13/88	AS LEFT	76									
	AS FOUND	76.6									
2/10/89	AS LEFT	76.6									
	AS FOUND	73									
5/14/89	AS LEFT	73									
	AS FOUND	73									
8/14/89	AS LEFT	73									
	AS FOUND	75.4									
11/13/89	AS LEFT	75.4									
	AS FOUND	74									
2/15/90	AS LEFT	74									
	AS FOUND	77									
5/16/90	AS LEFT	77									
	AS FOUND	76									
8/22/90	AS LEFT	76									
	AS FOUND	77		889		1.00		1.00		1.00	
11/26/90	AS LEFT	77									
	AS FOUND	77		926		0.50		0.50		0.50	
2/25/91	AS LEFT	77									
	AS FOUND	76.5		955		0.50		0.50		0.50	
6/26/91	AS LEFT	76.5									
	AS FOUND	76		957		-0.60		-0.60		-0.60	
9/25/91	AS LEFT	76									
	AS FOUND	77		961		4.00		4.00		4.00	
12/31/91	AS LEFT	77									
	AS FOUND	75.5		964		2.50		2.50		2.50	
4/4/92	AS LEFT	75.5									
	AS FOUND	74.4		968		-1.00		-1.00		-1.00	
7/8/92	AS LEFT	74.4									
	AS FOUND	73.5		966		-0.50		-0.50		-0.50	
10/8/92	AS LEFT	73.5									
	AS FOUND	76		979		-1.00		-1.00		-1.00	
1/19/93	AS LEFT	76									

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ATTACHMENT 3
PS-1360-9B DRIFT DATA
CALC. NO. I-N1-195, Rev. 1

	AS FOUND	75.25		1003		-0.75		-0.75		-0.75	
5/21/93	AS LEFT	75.25									
	AS FOUND	76		1018		-1.00		-1.00		-1.00	
9/9/93	AS LEFT	76									
	AS FOUND	75		1015		-2.00		-2.00		-2.00	
12/6/93	AS LEFT	75									
	AS FOUND	74		989		-2.50		-2.50		-2.50	
3/11/94	AS LEFT	74									
	AS FOUND	73.4		999		-2.60		-2.60		-2.60	
6/20/94	AS LEFT	73.4									
	AS FOUND	79		994		2.00		2.00		2.00	
9/20/94	AS LEFT	79									
	AS FOUND	75.25		991		-0.25		-0.25		-0.25	
12/21/94	AS LEFT	75.25									
	AS FOUND	75		973		0.60		0.60		0.60	
3/8/95	AS LEFT	75									
	AS FOUND	75		995		1.50		1.50		1.50	
6/30/95	AS LEFT	75									
	AS FOUND	76.2		974		0.20		0.20		0.20	
9/20/95	AS LEFT	76.2									
	AS FOUND				SWITCH REPLACED						
10/19/95	AS LEFT	76									
	AS FOUND	75									
12/20/95	AS LEFT	75									
	AS FOUND	74.5									
3/26/96	AS LEFT	74.5									
	AS FOUND	73.4									
6/27/96	AS LEFT	73.4									
					AVERAGE	0.03		0.03		0.03	
					STANDARD DEVIATION	1.69		1.69		1.69	
					COUNT	19		19		19	
					% OF ORIGINAL DATA POINTS			100.00%		100%	
					95%/95% TOL. INT.DEG F			4.66		4.66	

ATTACHMENT 5

SUMMARY OF REGULATORY COMMITMENTS

Summary of Regulatory Commitments

The following table identified those actions committed to by Pilgrim in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

REGULATORY COMMITMENTS	DUE DATE
1. Monitor and assess the effects of decreased calibration surveillance intervals on instrument drift and it's effect on safety.	For three (3) calibration intervals.
2. Implement changes to the Technical Specifications within 90 days of approval.	90 days following approval of the amendment.