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April 9, 2009
BVY 09-009

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Technical Specifications Proposed Change No. 273, Supplement 7
Response to Request for Additional Information
Vermont Yankee Nuclear Power Station
Docket No. 50-271
License No. DPR-28

References: (1) Letter, VYNPS to USNRC, "Technical Specification Proposed Change No. 273 Instrumentation Technical Specifications," BVY 08-001, dated February 12, 2008

Dear Sir or Madam,

In Reference (a), Entergy Nuclear Operations Inc. (ENO) submitted a proposed change to the instrumentation sections of the Vermont Yankee Operating License Technical Specifications. Attachment 1 to this submittal provides ENO's response to questions provided by NRC Staff and discussed with the NRC on a telecoms held on January 27, 2009, February 24, 2009 and March 3, 2009. Attachment 2 provides corresponding proposed changes to the TS and TS Bases. The TS Bases is provided for information only. Attachment 3 provides applicable portions of the related High Pressure Coolant Injection (HPCI) setpoint calculation. Attachment 4 provides applicable portions of the associated station procedures governing calibration of the HPCI setpoint.

This supplement to the original license amendment request does not change the scope or conclusions in the original application, nor does it change ENO's determination of no significant hazards consideration.

This letter contains no new regulatory commitments.

Should you have any questions or require additional information concerning this submittal, please contact Mr. David J. Mannai at (802) 451-3304.

A001
NRR

I declare under penalty of perjury, that the foregoing is true and accurate. Executed on April 9, 2009.

Sincerely,

MJC/JMD

Attachments:
1. Response to Request for Additional Information
2. Proposed Technical Specification Changes
3. Applicable Portions of High Pressure Coolant Injection Setpoint Calculation
4. Applicable Portions of Station Procedures

cc:

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Attachment 1

Technical Specification Proposed Change No. 273, Supplement 7

Vermont Yankee Nuclear Power Station

Response to Request for Additional Information

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RAI No.1

The licensee should docket the correction of the reference from the Instrumentation Uncertainty and Setpoint Design Guide, Revision 2, submitted July 21, 2003 (ADAMS Accession No. ML032130568), to Revision 3, submitted December 11, 2003 (ADAMS Accession No. ML033510764).

Response to RAI No. 1

The appropriate version of the Setpoint Design Guide, that is applicable to this proposed change, is Revision 3 which was submitted to the NRC on December 11, 2003 in Entergy Nuclear Operations Letter BVY 03-115.

RAI No.2

The licensee should confirm that with the changes proposed in the letter dated February 12, 2008 the CTS setpoint philosophy, as depicted in Figure 5, on pages 47 of 75, in the Instrumentation Uncertainty and Setpoint Design Guide, Revision 3 is still maintained for all setpoint changes in this amendment request.

Response to RAI No. 2

For the set-point changes provided in the letter dated February 12, 2008 (BVY 08-001), the CTS setpoint philosophy, as depicted in Figure 5, on pages 47 of 75, in the Instrumentation Uncertainty and Setpoint Design Guide, Revision 3 is still maintained for all setpoint changes in this amendment request.

RAI No.3

For each setpoint change identified in Response to RAI No. 1, in the letter dated December 18, 2008, the licensee should identify the setpoint class (as defined on pages 2 thru 5 of 75 in the Instrumentation Uncertainty and Setpoint Design Guide, Revision 3).

Response to RAI No. 3

All setpoints identified in the letter dated December 18, 2008 (BVY 08-087) are Class 1 setpoints.

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RAI No.4

In Response to RAI No. 2, in the letter dated December 18, 2008, the licensee stated, "None of the setpoints proposed to be modified by this submittal are LSSS setpoints." Included in the setpoints to be modified is TS Table 3.2.1, Emergency Core Cooling System (ECCS), Trip Setpoint 3.b, "High Pressure Coolant Injection (HPCI) System Low Condensate Storage Tank Water Level." The staff has a concern that this setpoint should be considered Limited Safety System Setting (LSSS) Safety Limit (SL)-related.

Part of the basis for this concern is that the Vermont Yankee UFSAR 1.6.2.11.1 states, "The HPCIS provides and maintains an adequate coolant inventory inside the reactor vessel to prevent fuel clad conditions from exceeding 10 CFR 50.46 criteria as a result of postulated small breaks in the nuclear system process barrier." UFSAR 6.4.1 states, "The HPCI System is provided to assure that the reactor core is adequately cooled in the event of a small break in the nuclear system and loss of coolant which does not result in rapid depressurization of the reactor vessel simultaneous with a loss of normal auxiliary power." UFSAR 7.4.3.2.1 states, "When actuated, the HPCI System pumps water from either the Condensate Storage Tank (CST) or the Suppression Chamber to the reactor vessel via the feedwater pipelines."

Paragraph 50.36(d)(1)(ii)(A) of 10 CFR Part 50 states that where an LSSS is specified for a variable on which a safety limit has been placed, the setting must be so chosen that the automatic protective action will correct the abnormal situation before an SL is exceeded. These SLs are designated SL-related LSSSs. Appendix A to 10 CFR Part 50 defines AOOs as those conditions of normal operation that are expected to occur one or more times during the life of a nuclear power unit.

Vermont Yankee TS 1.0 specifies the SLs for the plant. The NRC staff evaluated the Condensate Storage Tank level-low setpoint for HPCI to determine if it should be considered as SL-related. The SL of concern is TS 1.1.D which requires that the reactor vessel water level shall not be less than 12 inches above the top of the enriched fuel.

The licensee should describe how the Condensate Storage Tank, HPCI System, and other systems are used to assure that the reactor vessel water level is above the top of the enriched fuel.

The licensee should also detail any components in these systems that are not safety grade and what safety grade systems are credited to ensure the SL.

Does the Condensate Storage Tank contain sufficient volume to ensure that the reactor water level SL is not exceeded without the switchover to the suppression pool?

Based on the March 3, 2009 conference call with Entergy to discuss the Vermont Yankee instrumentation setpoint issues, the licensee was going to review the Technical Specifications Task Force (TSTF) letter to the NRC, dated February 23, 2009, "Industry Plan to Resolve TSTF-493, Clarify Application of Setpoint Methodology for LSSS

Functions," (ML090540849). Upon review of the TSTF letter, the licensee will determine how they want to approach resolution of the staff's concern about LSSS SL-related setpoint changes.

If the licensee intends to add footnotes based on adoption of Strategy 2, on page 3 of the TSTF letter (the addition of footnotes for functions identified in the TSTF letter) the licensee should provide the proposed footnotes, a summary calculation, and a copy of the surveillance/calibration procedure, for the proposed revised setpoint for Vermont Yankee TS Table 3.2.1, "Emergency Core Cooling System (ECCS)," Function 3.b, "High Pressure Coolant Injection (HPCI) System Low Condensate Storage Tank Water Level." This function is included in Attachment A, of the TSTF letter, on page A-9, Specification 3.3.5.1, "Emergency Core Cooling System Instrumentation," Function 3.d, "HPCI System Condensate Storage Tank Level – Low."

A sample setpoint calculation for RCIC System High Steam Line Space Temperature Isolation setpoint was submitted with the licensee's December 18, 2008 letter (ML083650007). However, this sample calculation is not applicable for the HPCI System Low Condensate Storage Tank Water Level setpoint.

Therefore, the licensee should submit a summary calculation for HPCI System Low Condensate Storage Tank Water Level that includes the Analytical Limit, Total Loop Uncertainty, how the Nominal Trip Setpoint was calculated, how the acceptable As-Left value was calculated, and how the acceptable As-Found value was calculated. The entire calculation is not needed, only a summary calculation.

The licensee provided a description of their surveillance/calibration procedures in the December 18, 2008 letter. The staff's understanding of the description is: The surveillance/calibration procedures list the as-left and as-found calibration tolerances. If the as-found value is within the as-left tolerance, the technician documents that no action is required and the equipment is returned to service. If the as-found value is outside the as-left tolerance, but within the as-found tolerance, the condition is documented, a general conditions inspection is performed, and the equipment is calibrated and returned to service. If the technician does not identify any degradation during the calibration, the equipment is considered operable and returned to service. If the as-found value is outside the as-found tolerance, the equipment is entered into the Corrective Action Program.

However, the licensee's description of their surveillance/calibration procedures did not include a discussion of the plant corrective action process for declaring a channel inoperable when the as-found value is outside the as-found tolerance and for restoring a channel to operable status when the channel has been determined to be inoperable. Therefore, the licensee should provide a description of the surveillance/calibration procedures that (1) includes a discussion of the plant corrective action process for restoring a channel to operable status when the channel is determined to be inoperable and (2) address investigations of why an as-found value drifted outside the as-left tolerance. The licensee should also describe what the general conditions inspection includes.

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For each setpoint change in which footnotes are being added to the TS (HPCI System Low Condensate Storage Tank Level), a copy of the surveillance/calibration procedure should be submitted for information purposes.

Response to RAI No. 4

Based on a telecom held on March 3, 2009, Vermont Yankee (VY) proposes to add the footnotes provided in industry TSTF-493, Revision 3, "Clarify Application of Setpoint Methodology for LSSS" to proposed Technical Specification (TS) Table 3.2.1 "Emergency Core Cooling System Instrumentation" for function 3.b, the High Pressure Coolant Injection (HPCI) System Low Condensate Storage Tank (CST) Water Level setpoint.

The HPCI system works in conjunction with the other Emergency Core Cooling Systems to ensure that 10CFR50.46 requirements are satisfied. The HPCI system and CST components that support this function are safety related. The HPCI system relies on both the CST and the suppression pool to perform required safety functions.

Attachment 2 provides the proposed changes to the TS and an associated TS Bases change. The TS Bases change is provided for information only.

As requested, Attachment 3 provides the applicable portions of the related setpoint calculation.

As requested, copies of the related calibration procedure (OP 4363) and the plant procedure governing surveillance and calibration activities (AP 0310) are included as Attachment 4. A summary of how these procedures interface with the corrective action program and operability is provided below.

VY TS provide a six hour window for the performance of instrument calibrations without entry into the associated TS Limiting Condition for Operation (LCO). Prior to performing an instrument functional test or calibration, the Operations Department Shift Manager is informed of the activity and grants permission to proceed. Upon completion the Shift Manager is notified of the test results and any discrepancies. This ensures that the Shift Manager is aware of any issues that could impact operability and result in the need to be entered into the Corrective Action Program (CAP).

During the instrument calibration if a component is found outside the prescribed as-found range the result is "circled in RED" and brought to the attention of the technician's supervisor and Shift Manager as discussed above. An evaluation of the as-found condition on operability is performed and, if necessary, an LCO is entered. Once entered, the LCO would not be exited until corrective actions are taken that restore operability. This evaluation is documented in the related CAP report which is initiated to trend the occurrence and further investigate and determine if additional corrective actions are required. The evaluation would include an assessment of the as-found condition on the instruments ability to properly perform its intended function and a general condition inspection of the instrument for obvious material conditions that could impact component functionality.

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Following approval of the proposed change, Entergy will enhance procedures to incorporate the specific wording associated with the proposed footnotes and to define expectations for performance and documentation of the required evaluation.

Attachment 2

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Proposed Technical Specification Changes

Table 3.2.1 (page 3 of 4)
Emergency Core Cooling System Instrumentation

TRIP FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	ACTIONS WHEN REQUIRED CHANNELS ARE INOPERABLE	TRIP SETTING
2. LPCI System (Continued)				
i. Auxiliary Power Monitor	RUN, STARTUP/HOT STANDBY, HOT SHUTDOWN, Refuel(a), (b)	1	Note 2	NA
j. Pump Bus Power Monitor	RUN, STARTUP/HOT STANDBY, HOT SHUTDOWN, Refuel(a), (b)	1	Note 2	NA
3. High Pressure Coolant Injection (HPCI) System				
a. Low-Low Reactor Vessel Water Level	RUN, STARTUP/HOT STANDBY(c), HOT SHUTDOWN(c), Refuel(c)	2	Note 4	≥ 82.5 inches
b. Low Condensate Storage Tank Water Level	RUN, STARTUP/HOT STANDBY(c), HOT SHUTDOWN(c), Refuel(c)	2	Notes 5,9,10	≥ 4.24%(d)
c. High Drywell Pressure	RUN, STARTUP/HOT STANDBY(c), HOT SHUTDOWN(c), Refuel(c)	2	Note 4	≤ 2.5 psig
d. High Reactor Vessel Water Level	RUN, STARTUP/HOT STANDBY(c), HOT SHUTDOWN(c), Refuel(c)	2	Note 6	≤ 177 inches

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(a) With reactor coolant temperature > 212 °F.

(b) When associated ECCS subsystem is required to be operable per specification 3.5.

(c) With reactor steam pressure > 150 psig.

(d) Percent of instrument span.

Table 3.2.1 ACTION Notes
(Continued)

6. With one or more channels inoperable for ECCS instrumentation Trip Function 3.d:
   a. Restore any inoperable channel to operable status within 24 hours.

   If the Action and associated completion time of Note 6.a is not met, immediately declare the HPCI System inoperable.

7. With one or more channels inoperable for ECCS instrumentation Trip Functions 4.a and 4.b:
   a. Declare ADS inoperable within 1 hour from discovery of loss of ADS initiation capability in both trip systems; and
   b. Place any inoperable channel in trip within 96 hours from discovery of the inoperable channel concurrent with HPCI System or RCIC System inoperable, and
   c. Place any inoperable channel in trip within 8 days.

   If any applicable Action and associated completion time of Note 7.a, 7.b or 7.c is not met, immediately declare ADS inoperable.

8. With one or more channels inoperable for ECCS instrumentation Trip Functions 1.f, 2.f, 4.c and 4.d:
   a. Declare ADS inoperable within 1 hour from discovery of loss of ADS initiation capability in both trip systems; and
   b. Restore any inoperable channel to operable status within 96 hours from discovery of the inoperable channel concurrent with HPCI System or RCIC System inoperable, and
   c. Restore any inoperable channel to operable status within 8 days.

   If any applicable Action and associated completion time of Note 8.a, 8.b or 8.c is not met, immediately declare ADS inoperable.

9. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

10. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the Limiting Trip Setpoint are acceptable provided that as-found and as-left tolerances apply to the actual setpoint implemented in the surveillance procedures to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the Vermont Yankee Setpoint Program Manual.

BASES 3.2A/4.2A Emergency Core Cooling System (ECCS)

Table 3.2.1 ACTION Notes 9 and 10

The Emergency Core Cooling System Instrumentation, High Pressure Coolant Injection, Low Condensate Storage Tank Water Level function is modified by Notes 9 and 10 as identified in Table 3.2.1. Note 9 requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The ability to reset the setpoint represents continued confidence that the channel can perform its intended safety function. The performance of this channel will be evaluated under the Corrective Action Program. This will ensure required review and documentation of the condition for continued operability. Note 10 requires that the as-left setting for the channel be returned to within the as-left tolerance of the Nominal Trip Setpoint. Where a setpoint more conservative than the Limiting Trip Setpoint is used in the plant surveillance procedures, the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the Nominal Trip Setpoint, then the channel shall be declared inoperable. The methodologies for calculating the Nominal Trip Setpoint and the as-left and the as-found tolerances are located in the Vermont Yankee Setpoint Program Manual which is included by reference in the UFSAR. This ensures changes are evaluated under 10CFR50.59.

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Attachment 3

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Applicable Portions of High Pressure Coolant Injection Setpoint Calculation

VY CALCULATION CHANGE NOTICE (CCN)

CCN Number: 03 **Calculation Number** VYC-0723 **Rev. No.** 3

Calculation Title: CONDENSATE STORAGE TANK LEVEL (HPCI) MONITORING

Initiating Document: ER-2000-1575 01
VYDC/MM/TM/Spec. No./ other

UNCONTROLLED
For Information Only

Safety Evaluation Number: N/A

Superseded Document: N/A

Implementation Required: ☑ Yes ☐ No

Reason for Change:
To increase the assumed normal area temperature in the CST valve room enclosure from 55-85°F to 45-100°F.

Description of Change:
Revise appropriate pages as required to incorporate additional instrument uncertainty (temperature affect) associated with increasing the ambient temperature range for the CST level transmitter to 45-100°F

Technical Justification for Change:
The basis for the temperature range of 45-100°F is contained in ER 2000-1575. The temperature affect uncertainty is based on the vendor's specifications associated with the CST level transmitter.

Conclusions:

1. The increase in instrument uncertainty due to the increase in ambient temperature has been incorporated into the uncertainty analysis..
2. This Calculation or CCN is not an implementing document. Therefore, this CCN does not require a safety evaluation.

Prepared By/Date	Interdiscipline Review By/Date	Independent Review By/Date	Approved By/Date
Joseph Garozzo Joseph C. Garozzo 4/27/01	N/A	James W. Allen 4/29/01 James W. Allen	Richard January 4/30/2001 Richard G. January

Installation Verification/Final Turnover to DCC:

Open Items Associated with CCN ☐ Yes ☑ No ☐ Closed (Section 2.3.2)

Installation Verification (Section 2.3.4)

☐ **Calculation accurately reflects plant as-built configuration, OR**
☐ **N/A, calculation does not affect plant configuration**

Resolution of documents identified in the Design Output Documents Section of VYAPF 0017.07 (Section 2.3.6)

____________________/______________________________/__________________
Print Name **Signature** **Date**

Total number of pages in package including all attachments

Note: **VYAPF 0017.07 should be included immediately following this form.**

VY CALCULATION DATABASE INPUT FORM

VYC-0723 CCN-03	3		
VY Calculation/CCN Number	**Revision Number**	**Vendor Calculation Number**	**Revision Number**

Vendor Name:______________________ **PO Number:**

Originating Department:

Critical References Impacted: ☐ FSAR ☐ DBD ☐ Reload. "Check" the appropriate box if any critical document is identified in the tables below.

EMPAC Asset/Equipment ID Number(s):

EMPAC Asset/System ID Number(s):

Keywords:

For Revision/CCN only: Are deletions to General References, Design Input Documents or Design Output Documents required? ☐ Yes† ☑ No

General References

* Reference #	** DOC #	REV #	*** Reference Title (including Date, if applicable) (See App. A, Section 3.2.7 for Guidance)	**** Affected Program	Critical Reference (_)

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Design Input Documents - The following documents provide design input to this calculation. (Refer to Appendix A, section 4)

* Reference #	** DOC #	REV #	Document Title (including Date, if applicable)	**** Affected Program	Critical Reference (_)
6.34			ER 2000-1575		

Design Output Documents - This calculation provides output to the following documents. (Refer to Appendix A, section 5)

* Reference #	** DOC #	REV #	Document Title (including Date, if applicable)	**** Affected Program	Critical Reference (_)

* Reference # -	Assigned by preparer to identify the reference in the body of the calculation.
** Doc # -	Identifying number on the document, if any (e.g., 5920-0264, G191172, VY6-1286)
*** Reference Title -	List the specific documentation in this column. "See attached list" is not acceptable. Design Input/Output Documents should identify the specific design input document used in the calculation or the specific document affected by the calculation and not simply reference the document (e.g., VYDC, MM) that the calculation was written to support.
**** Affected Program -	List the affected program or the program that reference is related to or part of. If the reference is FSAR, DBD or Reload (IASD or OPL), check Critical Reference column and check FSAR, DBD or Reload, as appropriate, on this form (above).
†	If "yes," attach a copy of "VY Calculation Data" marked-up to reflect deletion (See Section 3.1.8 for Revision and 5.2.3.18 for CCNs).

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and the level transmitters are located on rack RK-25-66 inside an insulated and un-heated room attached to the side of the CST. ~~The expected temperature extremes for the CST instrument room are based on discussions with the E&C System Engineer and the Setpoint Project Site Representative (Attachment N).~~ The normal ambient temperature extremes expected are as listed in Table 2.

ER 2000-1575 (REF. 6.34)

Table 2
Normal Area Temperatures

Plant Area	Minimum	Maximum
Condensate Storage Tank - Instrument Rack 25-66	45 ~~55~~ °F	100 ~~85~~ °F
Control Room – All areas	60 °F	80 °F

2.3.2. CST water minimum temperature is maintained ≥ 50 °F (as read on TI-107-3) per VY Procedure AP-0150, Auxiliary Operator Round Sheet TB/OUT, page 5 of 7 (Attachment M). The tank is heated by auxiliary steam heating coils. As a conservative value for minimum temperature, the assumed value of 40°F from FSAR section 14.5.2 will be used [Ref. 6.2].

CST water maximum temperature is assumed equal to the maximum ambient temperature of 100 °F as identified in FSAR section 2.3.5 and on HPCI Process Diagram 5920-0784 [Ref. 6.29.1].

2.3.3. The calibration interval is assumed to occur once every quarter or 114 days (91.2 days + 25%).

2.3.4. The transmitter loops are calibrated quarterly and the test equipment temperatures will be bounded by the ambient temperatures extremes listed in Table 2 above. For the test equipment uncertainty evaluations performed under VYC-1758 [Ref. 6.9, Attachment K], the RB RHR Crnr Rm 232' environment conservatively bounds the environment to be expected at the CST instrument room, and will therefore be used as representative of the CST instrument room.

2.3.5. The temperature variation within a cabinet is the same as the variation of the room in which it is located. The temperature difference between the room and the cabinet is therefore constant. Calibration data are assumed collected with the equipment at the operating temperature of the cabinet.

2.3.6. Review of the Vermont Yankee Environmental Qualification Program Manual [Ref. 6.7] indicates that none of the loop components covered by this calculation is environmentally qualified and are therefore only expected to operate under mild conditions, and negligible radiation exposure. Other than the pressure transmitters located at the tank enclosure, all loop components are located in the control room.

2.3.7. Calibration Tolerance is an output of this calculation, and will be based on the accuracy of the devices. The existing calibration tolerances shown in Tables 5 through 10 are for information only.

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considerations:

a) The analyzed drift data shows the 50% point to be the largest value at 1.2237% with the 0% value at 1.0625%, and the 100% point at 1.0604%. The 50% analyzed drift value is largest, and will be used as a conservative drift value.

b) From review of this drift analysis and the histograms, the data exhibits a near-normal distribution for all points. As indicated in the time dependency discussion for the OP-4363 CST Level Computer Point Loop (Attachment L), some time dependency is exhibited at the 100% point. However, the Significance F at all points is much greater than 0.05, indicating no correlation between drift magnitude and time interval. Since there is no indication of a drift to time relationship, the 114-day Analyzed Drift Term will be derived directly from the 82-day ADR term.

c) The average drift value for this group is -0.2293% at the 100% point, -0.2163% at the 50% point, and -0.1580% at the 0% point. Since these values are all more than 0.08% (N ≤ 40 and STDEV ≥ 0.25%), this term must be considered as a significant bias term [REF. 6.11].

$ADR_{bias} = -0.2293\%$

d) The ERFIS loop ADR value for the operating cycle is calculated directly as follows:

$ADR_{114\text{-}Days} = ADR_{82\text{-}Days} = \pm 1.2237\%$

2.3.18. Given that Analyzed Drift (ADR) data is available for each of the loops and components evaluated under this calculation, and given that these loops and components will be evaluated for mild environmental conditions for the Control Room and CST (i.e. normal conditions), then it is assumed that the Analyzed Drift (ADR) term for each includes the Temperature Effect (TE), Readability (RD), M&TE Uncertainty (MTE), Barometric Pressure Effect (PB), Power Supply Voltage Effect (VE), Humidity Effect (HE), and Radiation Effect (RE) for each of the associated loop components [Ref. 6.1 section 3.6.5] under both normal and accident conditions.

INSERT "A"

3. INPUT DATA

Data used to calculate loop uncertainties, process corrections, setpoints, and decision points are tabulated below with the applicable reference or basis noted.

3.1. Process and Loop Data

Process data used to evaluate process corrections, decision points, and setpoint limitations are tabulated below ~~with the applicable references.~~

2.3.19. GE INSTRUCTION (ATTACHMENT E) SPECIFIES TE AS:
±1%/100°F @ 100% TO 50% SPAN
±1% TO 2%/100°F FROM 49% TO 20% SPAN.
IT IS ASSUMED THAT BELOW 20% SPAN
TE = ±2%/100°F

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Insert "A"

ER 2000-1575 was issued to document a concern that the CST valve room enclosure general area temperature assumption of 55-85°F (delta - 30 °F) could not be validated. The ER provides the basis for increasing the general area temperature range to 45-100°F (delta - 55 °F).

Per the guidance in the Vermont Yankee Setpoint Program Manual, Appendix D, Sections 3.6.6 and 3.6.8, a delta of 30 °F is assumed to be included in the drift term. The remaining delta of 25°F will be calculated per the vendor's specifications and addressed separately as Temperature Effect (TE).

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Table 3
Process/Loop Inputs

Basis	Description	Data
Ref. 6.2 Section 14.5.2.3 & Assumpt. 2.3.2 Ref. 6.2 section 2.3.5 & Ref. 6.29.1	CST Water Temperature Minimum CST Water Temperature Maximum	40 °F 100 °F
Ref. 6.10 (Attachment C)	Process Limit (ITS/CTS) – Critical height submergence (Vortexing) 10,000 gallon reserve	≥ 28.2" above CST[1] bottom 20.0 " above CST bottom 8.2" above critical height
TS 3.2.A & Table 3.2.1 Ref. 6.10 (Attachment C)	Technical Specification Limit (CTS)	Low CST Water Level Trip (HPCI auto suction transfer) ≥ 3% CST Volume
VYC-723 Rev. 2 Attach. IX (Attachment B)	Lowest point credited for HPCI Suction	11.25" above CST bottom
Ref. 6.30.2 VYC-723 Rev. 2 (Attach. B) Ref. 6.30.2	Reference Elevation; floor at rack 25-66 Transmitter Center Line Transmitter Sensing Tap Elevation	El. 252' 6" El. 253' 8" El. 254'
Ref. 6.3 Table 4.2.1	Calibration Test Interval	Every 3 months (114 days)

3.2. Environmental Conditions

The following information provides the environmental conditions expected for the components located at the Condensate Storage Tank and in the Main Control Room.

Table 4
Environmental Input Data

Basis	Description	Data
Ref. 6.2 Table 2.3.2	CST Area Ambient Temperature Extremes	33 to 100°F
Assumption 2.3.1	CST Rack 25-66 Normal Ambient Temperature	45 100 ~~55~~ to ~~85~~°F
Assumption 2.3.6	CST Rack 25-66 Accident Ambient Temp.	45 100 ~~55 to 85~~°F
Assumption 2.2.1	Control Room Normal Temperature	60 to 80°F
Assumption 2.2.1	Control Room Accident Temperature	60 to 80°F

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[1] This limit includes consideration for the 10,000 gallon inventory requirements and the TS Limit of ≥ 3%. Critical height of submergence prevents introduction of air into HPCI suction prior to completion of transfer to suppression pool; includes consideration for CST Vortexing based on HPCI flow [See Attachment C].

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3.3. Transmitter LT-107-5A and LT-107-5B Data

Table 5
Transmitter Input Data

Basis	Description	Data
Ref. 6.21 & Attachment E	Minimum span Maximum span (URL) Zero Suppr./Elevation Pressure Rating Over-Pressure Protect. Output signal Power Supply Test Jacks Damping	0 to 170 inches water 0 to 850 inches water 0% to 80% of range (URL) 2000 psig Either direction to full pressure rating 10 to 50 mAdc into 0 to 500Ω load 52.5 (± 5%) volts DC Built in (10 to 50 mV full scale, 1mV per mA) Adjustable – 4 positions
Ref. 6.21 & Attachment E	Ambient temperature Maximum fluid temp. Vibration Shock Humidity	-20°F to +185°F 250°F Up to 1G in any direction for 25 to 120 Hz Up to 0.03 inches peak-to-peak amplitude for 0-25 Hz Will not be damaged by shocks up to 100G, any direction Not affected by MIL-F-5272 test (24-hour cycle, 68°F to 158°F at 100% relative humidity)
Ref. 6.2~~3~~1 & Attachment E ASSUMP. 2.3.19 Assump. 2.3.10 Assump. 2.3.10	Accuracy Temperature effect Static Pressure effect Rated drift Power Supply Effect Deadband	± 0.4% span (incl. Linearity, hysteresis, and repeatability) ± 1% span/100°F ΔT at 100% to 50% span ± 1% to ± 2% span/100°F at 49% to 20% span ± 0.4% span/500 psi at 100% to 50% span ± 0.4% to ± 1% span/100°F at ~~49% to 20% span~~ ±2% SPAN/100°F 0-19% SPAN None given 0.1% span for 20 volt variation Negligible
Ref. 6.12 Ref. 6.12	Existing Input Span Existing Output span Existing Cal Tolerance	4.0 to 394.0 inches water 10.00 to 50.00 madc ± 0.2 mV
Assump. 2.3.6	Radiation effect	N/A
Assump. 2.3.10	Seismic Effect	± 0.5% span
Assump. 2.3.10	Analyzed Drift (DA)	0.649%

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3.9. Calibration M&TE Input Data

Table 11
Calibration M&TE Input Data

Basis	Description	Range	Resolution	Accuracy (% Rdg or Span)	Accuracy (Calibr. Units)
Attachment K	HP 34401A DMM	100 mVdc	0.0001 mVdc	0.0216% rdg @ 50 mVdc	0.010817 mVdc
Attachment K	HP 3466 DMM	200 mVdc	0.01 mVdc	0.1095% rdg @ 50 mVdc	0.0547 mVdc
Attachment K	Heise 901B	0 – 400" H_2O	0.01 "H_2O	0.1449% span	0.5797" H_2O
Attach. K & M	Heise 901B	0 – 1000" H_2O	0.1 "H_2O	0.1452% span	1.4524" H_2O
Attach. K & M	Heise CMM	0 – 800" H_2O	1.0 "H_2O	0.1616% span	1.2925" H_2O
Attach. K & M	Heise CMM	0 – 830" H_2O	1.0 "H_2O	0.1613% span	1.3391" H_2O
Attach. K & M	Heise 730A-03	-100 – 860" H_2O	0.1 "H_2O	0.1691% span	1.6236" H_2O

4. CALCULATION DETAIL

The detailed calculation of loop uncertainties, setpoints, testing tolerances, and margins have been performed using MathCad and are documented as Attachment D.

5. RESULTS AND CONCLUSIONS

5.1. Total Loop Uncertainty

Total Loop Uncertainties (TLU) have been evaluated for the HPCI CST Level indication, trip, recorder, and ERFIS Loops and the results are presented in Table 12 below.

Table 12
Total Loop Uncertainty

Loop	TLU Normal	TLU Normal	TLU Accident	TLU Accident
	± % CS	± Cal Units	± % CS	± Cal Units
LT-107-5A/B / LSL-107-5A/B Trip	1.191 ~~1.075~~ ✓	0.476 ~~0.430~~ mVdc ✓	1.295 ~~1.190~~ ✓	0.518 ~~0.476~~ mVdc ✓
LT-107-5A / LI-107-5 Indicator	3.419 ~~3.371~~ ✓	3.419 ~~3.371~~% ✓	3.457 ~~3.414~~ ✓	3.457 ~~3.414~~% ✓
LT-107-5B / LR-23-73 Recorder	2.067 ~~1.984~~ ✓	2.067 ~~1.984~~% ✓	2.308 ~~2.237~~ ✓	2.308 ~~2.237~~% ✓
LT-107-5A / ERFIS F004	2.247 ~~2.163~~ ✓	~~10.318~~ Kgal ✓ 10.723	~~N/A~~	N/A

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5.2. Setpoint Evaluation

5.2.1. Current Low Level Suction Transfer setpoint

As evaluated in Attachment D, section 5.2, the existing Low Level suction transfer setpoint of 12.1 mVdc cannot be supported based on the new requirements for critical height of submergence of the HPCI suction. The revised Process Limit of ≥ 28.2" from CST bottom [Ref. 6.10 and Attachment C] includes consideration for the TS requirement that the setpoint be ≥ 3% and that there be 10,000 gallons reserve at the suction transfer point. See Table 13 below.

5.2.2. Revised Low Level Suction Transfer setpoint

A revised setpoint is evaluated in Attachment D, section 5.3; the proposed setpoint of 12.2 mVdc decreasing supports the requirements for critical height of submergence of the HPCI suction + 10,000 gallon reserve and has adequate margin from LSP to SP. See Table 13 below.

Table 13
Setpoint Results

Loop	Existing Setpoint (12.1 mV) ✓		Revised Setpoint (12.2 mV) ✓	
	Inches[10]	Inches[11]	Inches[10]	Inches[11]
Process Limit (PL)	≥ 28.2 ✓	≥ 20.2 ✓	≥ 28.2 ✓	≥ 20.2 ✓
Accident Uncertainty (U_{a12})	5.052 ~~4.643~~ ✓	5.052 ~~4.643~~ ✓	5.052 ~~4.643~~ ✓	5.052 ~~4.643~~ ✓
Limiting Setpoint (LSP)	33.252 ~~32.843~~ ✓	25.252 ~~24.843~~ ✓	33.252 ~~32.843~~ ✓	25.252 ~~24.843~~ ✓
Setpoint (SP)	32.475 ✓	24.475 ✓	33.45 ✓	25.45 ✓
Margin (M_1)	−0.777 ~~−0.368~~ ✓	−0.777 ~~−0.368~~ ✓	+0.198 ~~0.607~~ ✓	+0.198 ~~0.607~~ ✓

5.3. Calibration and Test Results

In order to support and implement the results of this calculation, the loop instruments are to be calibrated at nine points based on the following ranges :

---

[10] Referenced to tank bottom.

[11] As sensed by transmitter; level above transmitter tap (0") plus 4" static head.

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Table 14
Module Calibration Ranges

Description	Value	Units
Transmitter input range	4 to 394	Inches H_2O
Transmitter output range	10.0 to 50.0	mVdc[12]
Indicator input range	10.0 to 50.0	mAdc
Indicator output range	0 to 100	%
Alarm Unit input range	1.0 to 5.0	Vdc
Alarm Unit Lo Setpoint (CST LEVEL LO)	12.2 decr ✓	mVdc
Alarm Unit Lo-Lo Setpoint (INST PWR TRBL)	10.2 decr ✓	mVdc
Recorder input range	1 to 5	Vdc
Recorder output indication range	0 to 100	%
Computer input range	16 to 80	mVdc[13]
Computer output indication range	0 to 477.1	Kgal

Test as-found tolerances (FT) and as-left tolerances (CT) are shown below.

Table 15
Module Calibration Tolerances

Device	Tag No.	As Found (FT)[14]		As Left (CT)	
		0.960	0.38		
		± % CS	± Cal Units	± % CS	± Cal Units
Transmitter	LT-107-5A & B	~~0.80~~ ✓	~~0.32~~ mVdc ✓	0.50 ✓	0.20 mVdc ✓
Alarm Unit	LSL-107-5A & B[15]	0.60 ✓	0.24 mVdc ✓	0.50 ✓	0.20 mVdc ✓
Indicator	LI-107-5	N/A	N/A	2.0 ✓	2.0 % ✓
Recorder	LR-23-73	N/A	N/A	1.0 ✓	1.0 % ✓
Computer Point	F004	N/A	N/A	0.545 ✓	2.6 Kgal ✓

---

[12] 10-50 mAdc through a 1Ω transmitter test resistor.

[13] 10-50 mAdc through a precision 160Ω resistor.

[14] Module As-Found values provided for alarm unit and transmitter because all other components are Calibration Checked as loops per Ref. 6.12; LSL-107-5A & B tested as modules only per Ref. 6.12 (Attach. M).

[15] As-found and As-left tolerances apply to both setpoints of each alarm unit.

6.30.2. Drawing G-191261 Sheet 65B, "Tank Level Instrument Hookups," Rev. 6.

6.30.3. Drawing B-191260, Sheets 107.1, 111.6, 111.19, and 112.26, Vermont Yankee Instrument List, (Superseded by MPAC).

6.31. International Instruments Test Report #SBI-3, "Seismic Qualification Test Report for Indicating Control Instrument Model 9270 and Meter Models 1122, 1136, 1151," Rev. 1, February 10, 1976, (Excerpts – Attachment G).

6.32. "ASME Steam Tables," Thermodynamic and Transport Properties of Steam, Sixth Edition, 1993.

6.33. VYI 92/97, "Application of CT, CE and A for Single Point Devices, Rev. 1," Memo from G. J. Hengerle/R.T. Vibert to Distribution, dated 6/26/98.

6.34. ER 2000-1575, SSDI INSPECTION IDENTIFIED LACK OF ADMINISTRATIVE CONTROLS TO MONITOR SST TANK VALUE ENCLOSURE GENERAL AREA TEMPERATURE AND ASSOCIATED IMPACT ON INPUT ASSUMPTIONS TO HPCI SST/RCIC/CST LOOP MONITORING CALCULATIONS VYC-723, REV3 AND VYC-706, REV. 1.

$MTE_1 := 0.0 \cdot inWC$

$MTE_1 = 0.000 \cdot inWC$ ✓

Transmitters MTE uncertainty is included in the Loop or Module Drift term (Assumption 2.3.18).

3.2.1.5 Drift (DA)

$DA_1 := 0.649 \cdot \% \cdot CS$

$DA_1 = 2.531 \cdot inWC$ ✓

Transmitter analyzed drift (Assumption 2.3.10 and Attachment P).

3.2.1.6 Temperature Effect (TE)

$TE_{n1} = TE_{a1} =$ ~~0.0 inWC~~ $100 - 45 = 65°F$, $65°F - 30°F = 25°F \Delta$

$25°F \times 2\% / 100°F = 0.50\%$ of $390"wc$ =

$TE_1 :=$ ~~0.0 inWC~~

$TE_1 =$ ~~0.000 inWC~~ 1.95 inWC ✓

Temperature effect during normal and accident conditions are the same and included in the Loop or Module Drift term (Assumption 2.3.18). Normal ΔT of 30°F is included in Loop or module ADR since quart~~erly calibrations experience~~ all conditions.

Additional 25°F temperature effect required

3.2.1.7 Barometric Pressure Effect (PB)

The GE 555 is a differential pressure transmitter monitoring a tank vented to atmosphere, therefore this effect is negligible per Ref. 6.1 section 3.6.8.

Barometric pressure effect is either the effect on the vented side of gage pressure transmitters, or the error associated with calibration of an absolute pressure transmitter using gauge pressure test instruments.

$PB_1 := 0 \cdot inWC$

3.2.1.8 Humidity Effect (HE)

$HE_1 := 0 \cdot inWC$

Humidity effect during normal and accident conditions are the same and included in the Loop or Module Drift term (Assumption 2.3.18)

3.2.1.9 Radiation Effect (RE)

$RE_{a1} = RE_{n1} = 0.0$ inWC

Radiation effect during normal and accident conditions are the same and included in the Loop or Module Drift term (Assumption 2.3.18)

$RE_{1} := 0.0 \cdot inWC$ $RE_{1} = 0.000 \cdot inWC$ ✓

3.2.1.10 Seismic Effect (SE)

$SE_{1} := 0.5 \cdot \% \cdot CS$ $SE_{1} = 1.950 \cdot inWC$ ✓ Assumption 2.3.10

3.2.1.11 Process Pressure Effects (SP)

$SP_{1} := 0.0 \cdot inWC$ $SP_{1} = 0.000 \cdot inWC$ ✓

Since the maximum pressure felt by the transmitter is 394 inWC+ ambient pressure, static pressure and over- pressure effects and corrections for this application are not applicable

3.2.1.12 Power Supply Voltage Effect (VE)

Power Supply Voltage Effect during normal and accident conditions are the same and included in the Loop or Module Drift term (Assumption 2.3.18)

$VE_{1} := 0.0$ inWC $VE_{1} = 0.000 \cdot inWC$ ✓

3.2.2 Transmitter Total Module Uncertainty

3.2.2.1 Normal Conditions

$CE_{1} = 1.950 \cdot inWC$ $DB_{1} = 0.000 \cdot inWC$ $TE_{1} = 1.950$ inwc

$$e_{n1R} := \sqrt{CE_{1}^{2} + DB_{1}^{2} + TE_{1}^{2}}$$

$e_{n1R} =$ ~~1.950~~ $\cdot inWC$ 2.758 ✓

Since MTE, ~~TE,~~ PB, HE, RE and VE are all included in the Analyzed Drift term (Assumption 2.3.18) and SP = 0.

Normal transmitter module uncertainty (e_{n1R}) for calibration every 3 months (114 days)

3.2.2.2 Testing Conditions

$TE_1 = 1.950$ inwc

$$e_{t1R} := \sqrt{CE_1^2 + DB_1^2 + TE_1^2}$$

e_{t1R} = ~~1.950~~ 2.758 ·inWC ✓

Since MTE, PE, ~~TE~~, HE, RE and VE are all included in the Analyzed Drift term (Assumption 2.3.18) and SP = 0.

Testing transmitter module uncertainty (e_{t1R}) for calibration every 3 months (114 days)

3.2.2.3 Accident - LOCA (small break) with Seismic & without Radiation

$CE_1 = 1.950$ ·inWC

$DB_1 = 0.000$ ·inWC

$SE_1 = 1.950$ ·inWC

$TE_1 = 1.950$ inwc

$$e_{a1R} := \sqrt{CE_1^2 + DB_1^2 + SE_1^2 + TE_1^2}$$

e_{a1R} = ~~2.758~~ ·inWC ✓
3.378

Since MTE, PE, ~~TE~~, HE, RE and VE are all included in the Analyzed Drift term (Assumption 2.3.18), SP = 0, and mild environments.

Accident transmitter module uncertainty (e_{a1R}) for calibration every 3 months (114 days)

4.0 Total Loop Uncertainty

4.1 CST Alarm Unit Auto Suction Transfer Trip TLU (LT-107-5A & B, LSL-107-5A & B)

4.1.1 Normal Conditions

4.1.1.1 Random

$DA_1 := 0.649 \cdot \% \cdot CS$

$DA_1 = 2.531 \cdot inWC$ ✓

Transmitter Analyzed Drift Term (Assumption 2.3.10 and Attachment P)

$e_{n1R} =$ ~~1.950~~ 2.758 $\cdot inWC$

Transmitter normal uncertainty from section 3.2.2.1

$e_{n2R} = 2.412 \cdot inWC$

Alarm Unit normal uncertainty from section 3.3.2.1 includes Analyzed Drift

$U_{nR12} := \sqrt{e_{n1R}^2 + e_{n2R}^2 + DA_1^2}$ ✓

$U_{nR12} =$ ~~4.003~~ 4.453 $\cdot inWC$ ✓

Normal Random Uncertainty for alarm unit loop with quarterly calibration.

4.1.1.2 Bias

$\%Level_n$	$PM\ neg_n$	L_n	$PM\ pos_n$
%	inWC	inWC	inWC
0	-0.020 ✓	4.0	0.007 ✓
25.0	-0.506 ✓	101.5	0.190 ✓
50.0	-0.992 ✓	199.0	0.372 ✓
75.0	-1.478 ✓	296.5	0.554 ✓
100.0	-1.964 ✓	394.0	0.736 ✓

From section 2.0. magnitude of bias depends on point of interest

$PM_{bias} := 0.190 \cdot inWC$ ✓

$U_{nB12\_pos} := PM_{bias}$

$U_{nB12\_pos} = 0.190 \cdot inWC$ ✓

For alarm unit actuation on decreasing level, positive bias is limiting (sensed level higher than actual). The process temperature bias is conservatively chosen at the 25% span point with the setpoint expected to be less than 10% (25 inWC setpoint/390 inWC span).

4.1.1.3 Normal Total Loop Uncertainty

$U_{n12} := U_{nR12} + U_{nB12\_pos}$

$U_{n12} =$ ~~4.193~~ 4.643 $\cdot inWC$ ✓

Normal TLU in inWC

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4.1.2 Testing Conditions

	$e_{t2R} = 2.412 \cdot inWC$	Alarm Unit test uncertainty from section 3.3.2.2 includes Analyzed Drift
$U_{tR2} := e_{t2R}$	$U_{tR2} = 2.412 \cdot inWC$ ✓	Testing Random Uncertainty for alarm unit with quarterly calibration. Alarm unit is calibrated as a module rather than as loop. Transmitter output is varied until trip and mV input to trip unit is measured and recorded at trip point.

4.1.2.1 Testing Total Loop Uncertainty

$U_{t2} := U_{tR2}$	$U_{t2} = 2.412 \cdot inWC$ ✓	Testing TLU in inWC. There are no bias terms associated with testing conditions.

4.1.3 Accident - Small Break LOCA with Seismic

4.1.3.1 Random

	$DA_1 = 2.531 \cdot inWC$	Transmitter Analyzed Drift Term (Section Assumption 2.3.14)
	$e_{a1R} =$ ~~2.756~~ 3.378 $\cdot inWC$	Transmitter accident uncertainty from section 3.2.2.3
	$e_{a2R} = 2.412 \cdot inWC$	Alarm Unit accident uncertainty from section 3.3.2.3 includes Analyzed Drift
$U_{aR12} := \sqrt{e_{a1R}^2 + e_{a2R}^2 + DA_1^2}$ ✓	$U_{aR12} =$ ~~4.453~~ 4.862 $\cdot inWC$ ✓	Accident Random Uncertainty for alarm unit loop with quarterly calibration.

4.1.3.2 Bias

$\%Level_n$	$PM\ neg_n$	L_n	$PM\ pos_n$
%	inWC	inWC	inWC
0	-0.020 ✓	4.0	0.007 ✓
25.0	-0.506 ✓	101.5	0.190 ✓
50.0	-0.992 ✓	199.0	0.372 ✓
75.0	-1.478 ✓	296.5	0.554 ✓
100.0	-1.964 ✓	394.0	0.736 ✓

From section 2.0. magnitude of bias depends on point of interest

$PM_{bias} := 0.190 \cdot inWC$ ✓

$U_{aB12\_pos} := PM_{bias}$

$U_{aB12\_pos} = 0.190 \cdot inWC$ ✓

For alarm unit actuation on decreasing level, positive bias is limiting (sensed level higher than actual). The process temperature bias is conservatively chosen at the 25% span point with the setpoint expected to be less than 10% (25 inWC setpoint/390 inWC span).

4.1.3.3 Accident Total Loop Uncertainty

$U_{a12} := U_{aR12} + U_{aB12\_pos}$

U_{a12} = ~~4.643~~ 5.052 ·inWC ✓

Accident TLU in inWC

4.2 CST Indication Loop TLU (LT-107-5A, LI-107-5)

4.2.1 Normal Conditions

4.2.1.1 Random

$DA_{13} := 1.9932 \cdot \% \cdot CS$

$DA_{13} = 7.773 \cdot inWC$ ✓

Indicator Loop Analyzed Drift Term (Assumption 2.3.15)

e_{n1R} = ~~1.950~~ 2.758 ·inWC

Transmitter normal uncertainty from section 3.2.2.1

$e_{n3R} = 7.800 \cdot inWC$

Indicator normal uncertainty from section 3.4.2.1

$U_{nR13} := \sqrt{e_{n1R}^2 + e_{n3R}^2 + DA_{13}^2}$ ✓

U_{nR13} = ~~11.183~~ 11.352 ·inWC ✓

Normal Random Uncertainty for indicator loop with quarterly calibration.

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4.2.1.2 Bias

$\%Level_n$	$PM\ neg_n$	L_n	$PM\ pos_n$
%	inWC	inWC	inWC
0	-0.020 ✓	4.0	0.007 ✓
25.0	-0.506 ✓	101.5	0.190 ✓
50.0	-0.992 ✓	199.0	0.372 ✓
75.0	-1.478 ✓	296.5	0.554 ✓
100.0	-1.964 ✓	394.0	0.736 ✓

From section 2.0. magnitude of bias depends on point of interest

$U_{nB13\_neg_n} := PM_{neg_n}$

$U_{nB13\_pos_n} := PM_{pos_n}$

For the indication function, both positive and negative bias at all points are considered.

4.2.1.3 Normal Total Loop Uncertainty

$U_{nR13_n} := U_{nR13}$

Normal Random uncertainty term

$U_{n13\_pos_n} := U_{nR13_n} + U_{nB13\_pos_n}$ ✓

Normal positive TLU with bias

$U_{n13\_neg_n} := \left(U_{nR13_n}\right)\cdot(-1) + U_{nB13\_neg_n}$ ✓

Normal negative TLU with bias

n	$\%Level_n$	U_{nR13_n}	$U_{nB13\_neg_n}$	$U_{nB13\_pos_n}$	$U_{n13\_neg_n}$	$U_{n13\_pos_n}$
	%	inWC	inWC	inWC	inWC	inWC
0	0	~~11.183~~ ✓	-0.020 ✓	0.007 ✓	~~-11.203~~ ✓	~~11.191~~ ✓
1	25.0	~~11.183~~ ✓	-0.506 ✓	0.190 ✓	~~-11.689~~ ✓	~~11.373~~ ✓
2	50.0	~~11.183~~ ✓	-0.992 ✓	0.372 ✓	~~-12.175~~ ✓	~~11.555~~ ✓
3	75.0	~~11.183~~ ✓	-1.478 ✓	0.554 ✓	~~-12.661~~ ✓	~~11.738~~ ✓
4	100.0	~~11.183~~ ✓	-1.964 ✓	0.736 ✓	~~-13.147~~ ✓	~~11.920~~ ✓
		11.352			13.316	12.088

$U_{n13} := \cancel{13.147}\ inWC$ ✓
13.316

$U_{n13} = \cancel{13.147}\ inWC$
13.316

The bounding normal TLU of ~~13.147~~ 13.316 inWC is conservatively chosen for all points.

4.2.2 Loop Testing Conditions

	$DA_{13} = 7.773 \cdot inWC$	Indicator Loop Analyzed Drift Term (Assumption 2.3.15)
	$e_{t1R} =$ ~~1.950~~ 2.758 $\cdot inWC$	Transmitter test uncertainty from section 3.2.2.2
	$e_{t3R} = 7.800 \cdot inWC$	Indicator test uncertainty from section 3.4.2.2
$U_{tR13} := \sqrt{e_{t1R}^2 + e_{t3R}^2 + DA_{13}^2}$ ✓	$U_{tR13} =$ ~~11.183~~ 11.352 $\cdot inWC$ ✓	Testing Random Uncertainty for indicator loop with quarterly calibration.

4.2.2.1 Testing Total Loop Uncertainty

$U_{t13} := U_{tR13}$	$U_{t13} =$ ~~11.183~~ 11.352 $\cdot inWC$ ✓	Testing TLU in inWC. There are no bias terms associated with testing conditions.

4.2.3 Accident - Small Break LOCA with Seismic

4.2.3.1 Random

	$DA_{13} = 7.773 \cdot inWC$	Indicator Loop Analyzed Drift Term (Assumption 2.3.15)
	$e_{a1R} =$ ~~2.758~~ 3.378 $\cdot inWC$	Transmitter accident uncertainty from section 3.2.2.3
	$e_{a3R} = 7.800 \cdot inWC$	Indicator accident uncertainty from section 3.4.2.3
$U_{aR13} := \sqrt{e_{a1R}^2 + e_{a3R}^2 + DA_{13}^2}$ ✓	$U_{aR13} =$ ~~11.352~~ 11.518 $\cdot inWC$ ✓	Accident Random Uncertainty for indicator loop with quarterly calibration.

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4.2.3.2 Bias

$\%Level_n$	$PM\ neg_n$	L_n	$PM\ pos_n$
%	inWC	inWC	inWC
0	-0.020	4.0	0.007
25.0	-0.506	101.5	0.190
50.0	-0.992	199.0	0.372
75.0	-1.478	296.5	0.554
100.0	-1.964	394.0	0.736

From section 2.0, magnitude of bias depends on point of interest

$$U_{aB13\_neg_n} := PM\ neg_n$$

$$U_{aB13\_pos_n} := PM\ pos_n$$

For the indication function, both positive and negative bias at all points are considered.

4.2.3.3 Accident Total Loop Uncertainty

$$U_{aR13_n} := U_{aR13}$$

Accident Random uncertainty term

$$U_{a13\_pos_n} := U_{aR13_n} + U_{aB13\_pos_n}$$

Accident positive TLU with bias

$$U_{a13\_neg_n} := \left(U_{aR13_n}\right)\cdot(-1) + U_{aB13\_neg_n}$$

Accident negative TLU with bias

n	$\%Level_n$	U_{aR13_n}	$U_{aB13\_neg_n}$	$U_{aB13\_pos_n}$	$U_{a13\_neg_n}$	$U_{a13\_pos_n}$
	%	inWC	inWC	inWC	inWC	inWC
0	0	~~11.352~~	-0.020	0.007	~~-11.372~~	~~11.360~~
1	25.0	~~11.352~~	-0.506	0.190	~~-11.858~~	~~11.542~~
2	50.0	~~11.352~~	-0.992	0.372	~~-12.344~~	~~11.724~~
3	75.0	~~11.352~~	-1.478	0.554	~~-12.830~~	~~11.906~~
4	100.0	~~11.352~~	-1.964	0.736	~~-13.316~~	~~12.089~~
		11.518			-13.482	12.254

$U_{a13} :=$ ~~13.316~~ inWC 13.482

$U_{a13} =$ ~~13.316~~ inWC 13.482

The bounding accident TLU of ~~13.316~~ 13.482 inWC is conservatively chosen for all points.

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4.3 CST Recorder Loop TLU (LT-107-5B, LR-23-73)

4.3.1 Normal Conditions

4.3.1.1 Random

$DA_{14} := 0.9709 \cdot \% \cdot CS$

$DA_{14} = 3.787 \cdot inWC$ ✓ — Recorder Loop Analyzed Drift Term (Assumption 2.3.16)

$e_{n1R} = \overset{2.758}{\cancel{1.950}} \cdot inWC$ — Transmitter normal uncertainty from section 3.2.2.1

$e_{n4R} = 3.900 \cdot inWC$ — Recorder normal uncertainty from section 3.5.2.1

$U_{nR14} := \sqrt{e_{n1R}^2 + e_{n4R}^2 + DA_{14}^2}$ ✓

$U_{nR14} = \underset{6.096}{\cancel{5.775}} \cdot inWC$ ✓ — Normal Random Uncertainty for recorder loop with quarterly calibration.

4.3.1.2 Bias

$\%Level_n$	$PM\ neg_n$	L_n	$PM\ pos_n$
%	inWC	inWC	inWC
0	-0.020 ✓	4.0	0.007 ✓
25.0	-0.506 ✓	101.5	0.190 ✓
50.0	-0.992 ✓	199.0	0.372 ✓
75.0	-1.478 ✓	296.5	0.554 ✓
100.0	-1.964 ✓	394.0	0.736 ✓

From section 2.0. magnitude of bias depends on point of interest

$U_{nB14\_neg_n} := PM\ neg_n$

$U_{nB14\_pos_n} := PM\ pos_n$

For the recorder indication function, both positive and negative bias at all points are considered.

4.3.1.3 Normal Total Loop Uncertainty

$U_{nR14_n} := U_{nR14}$ — Normal Random uncertainty term

$U_{n14\_pos_n} := U_{nR14_n} + U_{nB14\_pos_n}$ ✓ — Normal positive TLU with bias

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$U_{n14\_neg_n} := \left(U_{nR14_n}\right)\cdot(-1) + U_{nB14\_neg_n}$ ✓

Normal negative TLU with bias

n	$\%Level_n$	U_{nR14_n}	$U_{nB14\_neg_n}$	$U_{nB14\_pos_n}$	$U_{n14\_neg_n}$	$U_{n14\_pos_n}$
	%	inWC	inWC	inWC	inWC	inWC
0	0	~~5.775~~ ✓	-0.020 ✓	0.007 ✓	-~~5.795~~ ✓	~~5.782~~ ✓
1	25.0	~~5.776~~ ✓	-0.506 ✓	0.190 ✓	-~~6.281~~ ✓	~~5.965~~ ✓
2	50.0	~~5.775~~ ✓	-0.992 ✓	0.372 ✓	-~~6.767~~ ✓	~~6.147~~ ✓
3	75.0	~~5.775~~ ✓	-1.478 ✓	0.554 ✓	-~~7.253~~ ✓	~~6.329~~ ✓
4	100.0	~~5.775~~ ✓	-1.964 ✓	0.736 ✓	-~~7.739~~ ✓	~~6.511~~ ✓
		6.096			- 8.060	6.832

$U_{n14} := \cancel{7.739}\cdot inWC$ 8.060

$U_{n14} = \cancel{7.739}\cdot inWC$ 8.060 ✓

The bounding normal TLU of ~~7.739~~ 8.060 inWC is conservatively chosen for all points.

4.3.2 Loop Testing Conditions

$DA_{14} = \cancel{3.787}\cdot inWC$ 2.758

Recorder Loop Analyzed Drift Term (Assumption 2.3.16)

$e_{t1R} = \cancel{1.956}\cdot inWC$

Transmitter test uncertainty from section 3.2.2.2

$e_{t4R} = 3.900\cdot inWC$

Recorder test uncertainty from section 3.5.2.2

$U_{tR14} := \sqrt{e_{t1R}^2 + e_{t4R}^2 + DA_{14}^2}$ ✓

$U_{tR14} = \cancel{5.775}\cdot inWC$ 6.096 ✓

Testing Random Uncertainty for recorder loop with quarterly calibration.

4.3.2.1 Testing Total Loop Uncertainty

$U_{t14} := U_{tR14}$

$U_{t14} = \cancel{5.775}\cdot inWC$ 6.096 ✓

Testing TLU in inWC. There are no bias terms associated with testing conditions.

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4.3.3 Accident - Small Break LOCA with Seismic

4.3.3.1 Random

$DA_{14} = 3.787 \cdot inWC$ Recorder Loop Analyzed Drift Term (Assumption 2.3.16)

$e_{a1R} =$ ~~2.758~~ 3.378 $\cdot inWC$ Transmitter accident uncertainty from section 3.2.2.3

$e_{a4R} = 4.875 \cdot inWC$ Recorder accident uncertainty from section 3.5.2.3

$U_{aR14} := \sqrt{e_{a1R}^2 + e_{a4R}^2 + DA_{14}^2}$ ✓

$U_{aR14} =$ ~~6.761~~ 7.037 $\cdot inWC$ ✓ Accident Random Uncertainty for recorder loop with quarterly calibration.

4.3.3.2 Bias

From section 2.0. magnitude of bias depends on point of interest

$\%Level_n$	$PM\ neg_n$	L_n	$PM\ pos_n$
%	inWC	inWC	inWC
0	-0.020 ✓	4.0	0.007 ✓
25.0	-0.506 ✓	101.5	0.190 ✓
50.0	-0.992 ✓	199.0	0.372 ✓
75.0	-1.478 ✓	296.5	0.554 ✓
100.0	-1.964 ✓	394.0	0.736 ✓

$U_{aB14\_neg_n} := PM\ neg_n$

$U_{aB14\_pos_n} := PM\ pos_n$

For the indication function, both positive and negative bias at all points are considered.

4.3.3.3 Accident Total Loop Uncertainty

$U_{aR14_n} := U_{aR14}$ Accident Random uncertainty term

$U_{a14\_pos_n} := U_{aR14_n} + U_{aB14\_pos_n}$ ✓ Accident positive TLU with bias

$U_{a14\_neg_n} := \left(U_{aR14_n}\right) \cdot (-1) + U_{aB14\_neg_n}$ ✓ Accident negative TLU with bias

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n	$\%Level_n$ %	U_{aR14_n} inWC	$U_{aB14\_neg_n}$ inWC	$U_{aB14\_pos_n}$ inWC	$U_{a14\_neg_n}$ inWC	$U_{a14\_pos_n}$ inWC
0	0	~~6.761~~ ✓	-0.020 ✓	0.007 ✓	~~-6.781~~ ✓	~~6.768~~ ✓
1	25.0	~~6.761~~ ✓	-0.506 ✓	0.190 ✓	~~-7.267~~ ✓	~~6.951~~ ✓
2	50.0	~~6.761~~ ✓	-0.992 ✓	0.372 ✓	~~-7.753~~ ✓	~~7.133~~ ✓
3	75.0	~~6.761~~ ✓	-1.478 ✓	0.554 ✓	~~-8.239~~ ✓	~~7.315~~ ✓
4	100.0	~~6.761~~ ✓	-1.964 ✓	0.736 ✓	~~-8.725~~ ✓	~~7.497~~ ✓
		7.037			-9.001	7.773

$U_{a14} := \cancel{8.725} \cdot inWC$ 9.001

$U_{a14} = \cancel{8.725} \cdot inWC$ 9.001 ✓

The bounding accident TLU of ~~8.725~~ 9.001 inWC is conservatively chosen for all points.

4.4 CST ERFIS Loop TLU (LT-107-5A, F004)

4.4.1 Normal Conditions

4.4.1.1 Random

$DA_{15} := 1.2237 \cdot \% \cdot CS$

$DA_{15} = 4.772 \cdot inWC$ ✓ ERFIS Loop Analyzed Drift Term (Assumption 2.3.17)

$e_{n1R} = \cancel{1.950} \cdot inWC$ 2.758 Transmitter normal uncertainty from section 3.2.2.1

$e_{n5R} = 2.125 \cdot inWC$ ERFIS normal uncertainty from section 3.6.2.1

$U_{nR15} := \sqrt{e_{n1R}^2 + e_{n5R}^2 + DA_{15}^2}$ ✓

$U_{nR15} = \cancel{5.576} \cdot inWC$ 5.907 ✓ Normal Random Uncertainty for ERFIS loop with quarterly calibration.

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n	$\%Level_n$	U_{nR15_n}	$U_{nB15\_neg_n}$	$U_{nB15\_pos_n}$	$U_{n15\_neg_n}$	$U_{n15\_pos_n}$
	%	inWC	inWC	inWC	inWC	inWC
0	0	~~5.576~~ ✓	-0.914 ✓	0.007 ✓	~~-6.491~~ ✓	~~5.584~~ ✓
1	25.0	~~5.576~~ ✓	-1.400 ✓	0.190 ✓	~~-6.977~~ ✓	~~5.766~~ ✓
2	50.0	~~5.576~~ ✓	-1.886 ✓	0.372 ✓	~~-7.463~~ ✓	~~5.948~~ ✓
3	75.0	~~5.576~~ ✓	-2.372 ✓	0.554 ✓	~~-7.948~~ ✓	~~6.131~~ ✓
4	100.0	~~5.576~~ ✓	-2.858 ✓	0.736 ✓	~~-8.434~~ ✓	~~6.313~~ ✓
		5.907			-8.765	6.643

$U_{n15} := $ ~~8.434~~ 8.765 $\cdot$inWC

$U_{n15} = $ ~~8.434~~ 8.765 $\cdot$inWC ✓

The bounding normal TLU ~~of 8.434~~ 8.765 inWC is conservatively chosen for all points.

4.4.2 Loop Testing Conditions

$DA_{15} = 4.772\cdot$inWC — ERFIS Loop Analyzed Drift Term (Assumption 2.3.17)

$e_{t1R} = $ ~~1.950~~ 2.758 $\cdot$inWC — Transmitter test uncertainty from section 3.2.2.2

$e_{t5R} = 2.125\cdot$inWC — ERFIS test uncertainty from section 3.6.2.2

$U_{tR15} := \sqrt{e_{t1R}^2 + e_{t5R}^2 + DA_{15}^2}$ ✓

$U_{tR15} = $ ~~5.576~~ 5.907 $\cdot$inWC ✓ — Testing Random Uncertainty for ERFIS loop with quarterly calibration.

4.4.2.1 Testing Total Loop Uncertainty

$DA_{bias} := -0.2293\cdot\%\cdot CS$

$DA_{bias} = -0.894\cdot$inWC ✓ — Bias associated with Analyzed Drift (Assumption 2.3.17)

$U_{t15} := U_{tR15}$

$U_{t15} = $ ~~5.576~~ 5.907 $\cdot$inWC ✓ — Testing TLU in inWC. DA_{bias} term is applicable for testing conditions, however, DA_{bias} term is omitted from U_{t15} equation for conservatism.

4.4.3 Accident - Small Break LOCA with Seismic

Accident conditions are N/A for ERFIS

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4.5 Summary of Results

4.5.1 Module As-Found (FT)/ As-Left (CT) Calibration Tolerances

$DA_1 = 2.531 \cdot inWC$ — Transmitter Analyzed Drift Term (Assumption 2.3.10)

e_{t1R} = ~~1.950~~ 2.758 ·inWC — Transmitter test uncertainty from section 3.2.2.2

$U_{t1} := \sqrt{e_{t1R}^2 + DA_1^2}$ ✓

U_{t1} = ~~3.195~~ 3.743 ·inWC ✓ — Testing Random Uncertainty for transmitter module with quarterly calibration.

Component	FT (inWC)	FT (Calibr. Units)	CT (inWC)	CT (Calibration Units)
Transmitter LT-107-5A & B	U_{t1} = ~~3.195~~ 3.743 ·inWC ✓	$\frac{U_{t1}}{CS} \cdot 40 \cdot mV$ = ~~0.328~~ 0.384 ·mV ✓	$CT_1 = 1.950 \cdot inWC$ ✓	$\frac{CT_1}{CS} \cdot 40 \cdot mV = 0.200 \cdot mV$ ✓
Alarm Unit LSL-107-5A & B	$U_{t2} = 2.412 \cdot inWC$ ✓	$\frac{U_{t2}}{CS} \cdot 40 \cdot mV = 0.247 \cdot mV$ ✓	$CT_2 = 1.950 \cdot inWC$ ✓	$\frac{CT_2}{CS} \cdot 40 \cdot mV = 0.200 \cdot mV$ ✓
Indicator LI-107-5	N/A	N/A	$CT_3 = 7.800 \cdot inWC$ ✓	$\frac{CT_3}{CS} = 2.000 \cdot \%$ ✓
Recorder LR-23-73 (Green)	N/A	N/A	$CT_4 = 3.900 \cdot inWC$ ✓	$\frac{CT_4}{CS} = 1.000 \cdot \%$ ✓
ERFIS F004	N/A	N/A	$CT_5 = 2.13 \cdot inWC$ ✓	$\frac{CT_5}{CS} \cdot 477.1 \cdot K \cdot gal = 2.600 \cdot K \cdot gal$ ✓

Note: The Transmitters and Alarm Units are the only devices calibration checked as modules rather than as a loop under OP-4363 (Attachment M).

4.5.2 Loop As-Found Calibration Tolerances (FT)

Loop	FT (inWC)	FT (Calibration Units)	
Alarm Unit Trip (LSL-107-5A & B)	N/A	N/A	Alarm Unit is calibrated as a module rather than as a loop (See section 4.1.2 and Attach. M page 6)
Indicator (LI-107-5)	U_{t13} = ~~11.183~~ 11.352 ·inWC ✓	$\frac{U_{t13}}{CS}$ = ~~2.868~~ 2.911 ·% ✓	
Recorder Indication (LR-27-73 Green Pen)	U_{t14} = ~~5.775~~ 6.096 ·inWC ✓	$\frac{U_{t14}}{CS}$ = ~~1.481~~ 1.563 ·% ✓	
ERFIS Indication (F004)	U_{t15} = ~~5.58~~ 5.907 ·inWC ✓	$\frac{U_{t15}}{CS}\cdot 477.1\cdot K\cdot gal$ = ~~6.822~~ 7.226 ·K·gal ✓	

4.5.3 Loop As-Left Calibration Tolerances (CT)

$CT_1 = 1.950 \cdot inWC$ — Transmitter CT from section 3.2

$CT_3 = 7.800 \cdot inWC$ — Indicator CT from section 3.4

$CT_4 = 3.900 \cdot inWC$ — Recorder CT from section 3.5

$CT_5 = 2.125 \cdot inWC$ — ERFIS CT from section 3.6

$CT_{loop13} := \sqrt{CT_1^2 + CT_3^2}$ ✓ $CT_{loop13} = 8.040 \cdot inWC$ ✓ Indicator Loop CT in inWC

$CT_{loop14} := \sqrt{CT_1^2 + CT_4^2}$ ✓ $CT_{loop14} = 4.360 \cdot inWC$ ✓ Recorder Loop CT in inWC

$CT_{loop15} := \sqrt{CT_1^2 + CT_5^2}$ ✓ $CT_{loop15} = 2.884 \cdot inWC$ ✓ ERFIS Loop CT in inWC

4.5.3.1 Loop As-Left Calibration Tolerances (CT)

Loop	CT (inWC)	CT (Calibration Units)	
Alarm Unit Trip (LSL-107-5A & B)	N/A	N/A	Alarm Unit is calibrated as a module rather than as a loop (See section 4.1.2 and Attach. M page 6)
Indicator (LI-107-5)	$CT_{loop13} = 8.040 \cdot inWC$ ✓	$\frac{CT_{loop13}}{CS} = 2.062 \cdot \%$ ✓	
Recorder Indication (LR-27-73 Green Pen)	$CT_{loop14} = 4.360 \cdot inWC$ ✓	$\frac{CT_{loop14}}{CS} = 1.118 \cdot \%$ ✓	
ERFIS Indication (F004)	$CT_{loop15} = 2.884 \cdot inWC$ ✓	$\frac{CT_{loop15}}{CS} \cdot 477.1 \cdot K \cdot gal = 3.529 \cdot K \cdot gal$ ✓	

4.5.4 Normal/Accident Total Loop Uncertainty (TLU)

Loop	Normal (inWC)	Normal (Calib. Units)	Accident (InWC)	Accident (Calib. Units)
Alarm Unit Trip (LSL-107-5A & B)	U_{n12} = 4.643 ~~4.193~~ ·inWC ✓	$\frac{U_{n12}}{CS} \cdot 40 \cdot mV$ = 0.476 ~~0.439~~ ·mV ✓	U_{a12} = 5.052 ~~4.643~~ ·inWC ✓	$\frac{U_{a12}}{CS} \cdot 40 \cdot mV$ = 0.518 ~~0.476~~ ·mV ✓
Indicator (LI-107-5)	U_{n13} = 13.316 ~~13.147~~ ·inWC ✓	$\frac{U_{n13}}{CS}$ = 3.414 ~~3.371~~ ·% ✓	U_{a13} = 13.482 ~~13.310~~ ·inWC ✓	$\frac{U_{a13}}{CS}$ = 3.457 ~~3.444~~ ·% ✓
Recorder Indication (LR-27-73 Green Pen)	U_{n14} = 8.066 ~~7.739~~ ·inWC ✓	$\frac{U_{n14}}{CS}$ = 2.067 ~~1.984~~ ·% ✓	U_{a14} = 9.001 ~~8.725~~ ·inWC ✓	$\frac{U_{a14}}{CS}$ = 2.308 ~~2.237~~ ·% ✓
ERFIS Indication (F004)	U_{n15} = 8.765 ~~8.434~~ ·inWC ✓	$\frac{U_{n15}}{CS} \cdot 477.1 \cdot K \cdot gal$ = 10.723 ~~10.318~~ ·K ·gal ✓	N/A	N/A

$$SP := \frac{(SP_{mv} - 10 \cdot mV)}{40 \cdot mV} \cdot 390 \cdot in + L_2$$ ✓ $SP = 32.475 \cdot in$ ✓ Current setpoint referenced to tank bottom.

It should be noted that the previously calculated setpoint did not consider the requirement for minimum height of submergence due to the effects of potential vortexing within the CST; in addition, the calculated TLU used in the setpoint determination was +/- 8".

5.2 Evaluation of Current Setpoint (12.1mV = 32.475 inWC above tank bottom)

5.2.1 Current Tech Specs (CTS)/ Improved Tech Specs (ITS) - Quarterly Testing

LSP = Process limit + TLU (accident) = $L_5 + U_{a12}$

$M_1 = SP - LSP$

$SP = 32.475 \cdot in$ $U_{a12} =$ ~~4.643~~ 5.052 $\cdot inWC$

$LSP := L_5 + \frac{U_{a12}}{inWC} \cdot in$ ✓ $LSP =$ ~~32.843~~ 33.252 $\cdot in$ ✓

$M_1 := SP - LSP$ ✓ $M_1 =$ ~~-0.368~~ -0.777 $\cdot in$ ✓

5.2.2 Conclusion: The current setpoint of 12.1 mV is not acceptable because it does not support the minimum level requirement of ≥ 28.2" above tank bottom [Ref. 6.10 & Attachment C] plus alarm Unit TLU with positive margin from the SP to the LSP.

Requirement	Required Level	LSP	Current Setpoint	Margin to LSP
Process Limit	≥ 28.2" above bottom (L_5) ✓	$LSP =$ ~~32.843~~ $\cdot in$ ✓ 33.252	$SP = 32.475 \cdot in$ ✓	$M_1 =$ ~~-0.368~~ $\cdot in$ ✓ -0.777

5.3 Evaluation of Revised Setpoint

5.3.1 Current Tech Specs (CTS)/ Improved Tech Specs (ITS) - Quarterly Testing

An value of 33.45" (equal to 12.2 mV) is chosen as a proposed new setpoint such that it is larger than the minimum level requirement (with uncertainties).

LSP = Process limit + TLU (accident) = $L_5 + U_{a12}$

$M_1 = SP - LSP$

$SP := 33.45 \cdot in$	$SP = 33.450 \cdot in$	Proposed new setpoint referenced to tank bottom
	$L_5 = 28.200 \cdot in$	Process Limit referenced to bottom of tank
	$U_{a12} =$ ~~4.643~~ 5.052 $\cdot inWC$ ✓	Accident Alarm Unit TLU from section 4.1.3.3
$LSP := L_5 + \frac{U_{a12}}{inWC} \cdot in$ ✓	$LSP =$ ~~32.843~~ 33.252 $\cdot in$ ✓	
$M_1 := SP - LSP$ ✓	$M_1 =$ ~~0.607~~ 0.198 $\cdot in$	Setpoint Margin for proposed setpoint

5.3.2 Determination of calibration setpoint value

$SP_{cal} := \left[\frac{(SP - L_2) + head}{in}\right] \cdot inWC$ ✓	$SP_{cal} = 25.450 \cdot inWC$ ✓	New calibration setpoint in inWC as sensed by the transmitter
$SP_{mv} := \left[\frac{(SP - L_2)}{390 \cdot in} \cdot 40 \cdot mV\right] + 10 \cdot mV$ ✓	$SP_{mv} = 12.200 \cdot mV$ ✓	New calibration setpoint in mV as measured at the transmitter output

5.3.3 Conclusion: The revised setpoint of 12.2 mV is acceptable because it is higher than the Limiting Setpoint by a Margin of ~~0.607~~ 0.198".

Requirement	Required Level	LSP	New Setpoint	Margin to LSP
Process Limit	≥ 28.2" above bottom (L_5) ✓	$LSP =$ ~~32.843~~ 33.252 $\cdot in$ ✓	$SP = 33.450 \cdot in$ ✓	$M_1 =$ ~~0.607~~ 0.198 $\cdot in$ ✓

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VERMONT YANKEE SETPOINT CONTROL PROGRAM
INTERDEPARTMENTAL REVIEW OF CALCULATION:

ATT. O

VYC- 723 Revision 3

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VYC-723 Revision 3, has been prepared and independently reviewed. The Departments impacted by this calculation are requested to review the results of this calculation, concur with the results and/or recommendations, and document the department's acceptance prior to the calculation being approved.

1. Summary: This calculation evaluates the uncertainty for the High Pressure Coolant Injection (HPCI) System Auto Suction Transfer on Low CST Level as well as CST Level Indication Loop for normal and Post Accident, CST Level Recorder Loop, and CST ERFIS Indication Loop. The loop components evaluated are as follows:

   LT-107-5A & B, LSL-107-5A & B, LI-107-5, LR-23-73, and ERFIS PTID F004

2. Calculation Open Items: AP-0028 to be Assigned

   2.1. Approval of Dirft Calculation Memo for GE 555 Transmitters LT-107-5A & B; — used as design input for Assumption 2.3.10 and included as Attach. P. Approved 11-23-98 GH

3. Department Review - contact the Setpoint Program Manager (G. Hengerle) if not in agreement with the conclusions/statements.

   3.1. Vermont Yankee E&C

   3.1.a. The Calibration Sections of OP-4363 for LT-107-5A & B, LSL-107-5A & B, LI-107-5, LR-23-73, and ERFIS PTID F004 will require the following changes based on CTS/ITS and quarterly calibrations:

   3.1.a. Procedure OP-4363 Revision 24 will require the following changes (changes based on Custom Technical Specifications/standard surveillance cycle):

   1. Add the following in the procedure discussion:

      a. Limiting Setpoint (LSP):

LSL-107-5A & B Low Level Suction Transfer	12.180 ~~12.138~~ mVDC (33.252 ~~32.843~~ inches)*
LSL-107-5A & B Low-Low Level Alarm	N/A

      - * Referenced to Tank Bottom (~~24.843~~ ~~29.252~~ 21.252 inches applied ~~at transmitter~~)

      b. Module As Found values:

Module As Found values:	From	To 38
Transmitter LT-107-5A & B	± 0.2mVDC	± 0.3~~2~~mVDC
Alarm Unit LSL-107-5A & B (Lo & Lo-Lo)	± 0.2mVDC	~~± 0.24mVDC~~
Indicator LI-107-5	± 2%	No Change
Recorder LR-23-73	± 1%	No Change
ERFIS PTID F004	± 2.6kGal	No Change

      c. Loop As Found values:

Loop As Found values:	From	To
Indicator LT-107-5A to LI-107-5	± 2.5%	No Change
Recorder LT-107-5B to LR-23-73	± 1.0%	~~± 1.5%~~
ERFIS LT-107-5A to ERFIS F004	± 2.6kGal	± ~~6.82~~ 7.23 kGal

      d. Head correction to remain at: 4"H20

      e. Revise the M&TE requirements of OP-4363 to remove the Heise 730A-03. The following test equipment (or equivalent) is recommended for use:

Gauge	Heise 901B (0-400 inwc)
DMM	HP 34401A (0-100mV Range)

   2. In the body of the procedure and the data sheet revise as follows:

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VY CALCULATION REVIEW FORM

Calculation Number: VYC-0723 **Revision Number:** 3 **CCN Number:** 03

Title: CONDENSATE STORAGE TANK LEVEL (HPCI) MONITORING

Reviewer Assigned: James W. Allen **Required Date:** ____________

☐ **Interdiscipline Review** ☒ **Independent Review**

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Comments*

N/C

James W. Allen / 4/29/01
Reviewer Signature **Date**

Method of Review:
☐ **Calculation/Analysis Review**
☐ **Alternative Calculation**
☐ **Qualification Testing**

Resolution

______________________ / ________
Calculation Preparer (Comments Resolved) **Date**

______________________ / ________
Reviewer Signature (Comments Resolved) **Date**

***Comments shall be specific, not general. Do not list questions or suggestions unless suggesting wording to ensure the correct interpretation of issues. Questions should be asked of the preparer directly.**

Docket 50-271
BVY 09-009

Attachment 4

Technical Specification Proposed Change No. 273, Supplement 7

Vermont Yankee Nuclear Power Station

Applicable Portions of Station Procedures

VERMONT YANKEE NUCLEAR POWER STATION

OPERATING PROCEDURE

OP 4363

REVISION 27

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL FUNCTIONAL TEST AND CST LEVEL INSTRUMENTATION CALIBRATION

USE CLASSIFICATION: **CONTINUOUS**

LPC No.	Effective Date	Affected Pages

UNCONTROLLED
For Information Only

Implementation Statement: N/A

Issue Date: 09/30/03

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PURPOSE

To provide Instrument and Control Department personnel with approved methods of functionally testing the HPCI suction valves auto transfer, calibrating the CST level transmitter loops and calibrating other associated CST level instruments.

Performance of the Functional section of this procedure satisfies the Functional Test requirements as specified by the following Technical Specifications:

Table 4.2.1 for the HPCI Low Condensate Storage Tank Water Level.

Performance of the Calibration section of this procedure satisfies the Calibration and Functional Test requirements as specified by the following Technical Specifications:

Table 4.2.1 for the HPCI Low Condensate Storage Tank Water Level.

DISCUSSION

The CST level transmitters and associated loop instruments provide information on water level in the CST. This level information is used to automatically shift the HPCI suction valves from the CST to the torus in the event of a low CST level signal, provide level indication in the Control Room and provide CST low level and instrument loop trouble annunciation in the Control Room.

Additionally, CST Hi and Low level pressure switches and a local indicator are also tapped off of the sensing lines to the transmitters and are calibrated per this procedure. Calibration of these instruments do not satisfy any T.S related surveillance.

This procedure shall be accomplished by using Measuring and Test Equipment to inject pressure signals as required for the instrument(s) being tested.

The CST water level instruments tested by this procedure are listed in Table 1 below. Calibration of LSH-107-6, LSL-107-7 and LI-107-6 is not being performed as part of any Technical Specification requirements.

The level transmitter has a positive 4" H_2O head applied at all times due to the transmitter being located below the instrument tap. The tap is located at an elevation of 254' and the transmitter centerline is located at 253'8".

SURVEILLANCE SETPOINT CRITERIA

Instrument Number	Measured Parameter	Action	Tech Spec Setting	VY Trip Setting
LSL-107-5A/B	CST Level	Transfer HPCI Suction Valves Auto Transfer & Annun 9-3-S-4	≥3% 11.2mV	*12.2 ±0.2mV
LSL-107-5A/B	CST Level	Annun 9-3-T-9	NA	10.2 ±0.2mV
LSH-107-6	CST Level	Annun 9-6-H-7	NA	359 ±3 in.
LSL-107-7	CST Level	Annun 9-6-H-7	NA	105 ±3 in.
Out of specification analog data may affect setpoint data, and will require additional evaluation. *VYC-723 provides a limiting setpoint of 12.180mV (33.252 inches referenced to tank bottom or 21.252 inches applied at transmitter) for the Auto Transfer of the HPCI Suction Valves.				

SURVEILLANCE AS FOUND/AS LEFT TOLERANCES

Instrument Number	VYC-723 Component Calibration As Found	Component Calibration As Left	Loop Components	VYC-723 Loop Calibration As Found	Loop Calibration As Left
LSL-107-5A/B	± 0.24mV	±0.20mV	N/A	N/A	N/A
LT-107-5A/B	± 0.38mV	±0.20mV	N/A	N/A	N/A
LI-107-5	± 2.0%	±2.0%	LT-107-5A to LI-107-5	±2.5%	±2.0%
LR-23-73(Grn)	± 1.0%	±1.0%	LT-107-5B to LR-23-73(Grn)	±1.5%	±1.0%
PTID F004	± 2.6 KGAL	±2.6 KGAL	LT-107-5A to PTID F004	±7.23 KGAL	±3.53 KGAL
LSH-107-6	± 3" H_20	±3" H_20	N/A	N/A	N/A
LSL-107-7	± 3" H_20	±3" H_20	N/A	N/A	N/A
LI-107-6	± 2%	±2%	N/A	N/A	N/A

TABLE 1 - CST LEVEL INSTRUMENTS

Loop	Sensor	Indicator/Recorder	Level Alarm	Annunciator/Computer Pt
A	LT-107-5A	LI-107-5	LSL-107-5A	Annun 9-3-S-4, 9-3-T-9/Comp Pt F004
B	LT-107-5B	LR-23-73(GRN)	LSL-107-5B	Annun 9-3-S-4, 9-3-T-9
N/A	LSH-107-6	N/A	N/A	Annun 9-6-H-7
N/A	LSL-107-7	N/A	N/A	Annun 9-6-H-7
N/A	LI-107-6	Local	N/A	N/A

ATTACHMENTS

1.	VYOPF 4363.01	Deleted
2.	VYOPF 4363.02	Deleted
3.	VYOPF 4363.03	HPCI Suction Transfer on Condensate Storage Tank (CST) Low Level Functional Data Sheets
4.	VYOPF 4363.04	HPCI Suction Transfer on Condensate Storage Tank (CST) Low Level Instrumentation Calibration Data Sheets

QA REQUIREMENTS CROSS REFERENCE

1. None

REFERENCES AND COMMITMENTS

1. Technical Specifications and Site Documents
    a. Tables 3.2.1 and 4.2.1
    b. UFSAR Sections 6.4 and 7.4

2. Codes, Standards, and Regulations
    a. None

3. Commitments
    a. INF96022_00, Improper Equipment Settings Due to the Use of Non-Temperature-Compensated Test Equipment

4. Supplemental References
    a. Ashcroft 6480 Bulletin
    b. CWDs 1229a, 528
    c. GEK27805, Tab 1 and 3
    d. P/IDs G191176 Sh. 1, G191169 Sh. 1
    e. VYEM-0018, E27R Series Recorder
    f. VYC-723, Condensate Storage Tank Level (HPCI) Monitoring
    g. AP 0047, Work Request
    h. AP 0310, Surveillance, Preventive and Corrective Maintenance Program
    i. OP 4120, High Pressure Coolant Injection System Surveillance
    j. AP 6807, Collection, Temporary Storage and Retrieval of QA Records

PRECAUTIONS/LIMITATIONS

1. Only one (1) level instrument loop will be tested at a time.
2. If this procedure cannot be completed as written, hold at the most secure point, notify the Shift Manager and discuss the problem and possible resolution with an I/C Supervisor.
3. If the need for corrective maintenance is determined during the performance of this procedure, initiate a Work Request (WR) per AP 0047.
4. Valves HPCI-17, 57, and 58 are restricted to 3 valve strokes (e.g., closed to open or open to closed) within one hour per OP 4120.

PREREQUISITES

1. Measurement and Test Equipment:
    a. Pressure Gauge, Section B (calibration only) (INF96022_00)
        1) Heise 901B with a range not to exceed 1000" H_2O

        or

        2) Heise temperature compensated with a range not to exceed 830" H_2O
    b. DMM HP-34401A (0-100mV Range)
2. HPCI-17, HPCI-57 and HPCI-58 must be fully operational to perform this test.
3. The CST level must be above the CST low level auto swap setpoint to perform this test.

PROCEDURE

A. Functional
(VYOPF 4363.03)

1. The Shift Manager is fully knowledgeable of the scope of this procedure and by initialing the data sheet, grants his permission to perform the work.

2. Verify that HPCI-17 is OPEN, HPCI-57 and HPCI-58 are CLOSED.

3. Establish communications between the local instruments at the CST and the Control Room.

4. Record the reading of LI-107-5 (CRP 9-6).

5. Prepare level transmitter LT-107-5A for testing as follows:

    a. Record start time and date.

    b. SHUT the isolation valve.

    c. Second party verify Step 5.b.

    d. Remove the span access cover for access to the transmitter test jacks.

    e. Connect the DMM to the transmitter test jacks.

NOTE

The test tubing cap can be manipulated as needed by the performer to obtain the most precise pressure control. Use of the cap will allow the rising action of the test valve stem to more slowly and accurately decrease pressure to the alarm setpoint.

    f. Remove test tubing cap, as needed, to perform testing.

NOTE

The high side test valve is a NEEDLE VALVE, DO NOT OVERTORQUE. This valve will be used to reduce pressure for two trip points.

6. Slowly decrease the pressure using the transmitters Hi side test valve until the first trip point is achieved as indicated by Relay 23A-K15 DE-ENERGIZING and verify the following:
    a. Relay 23A-K15 (CRP 9-39) DE-ENERGIZES.
    b. Annun 9-3-S-4 HPCI CST LEVEL LO - ALARM.
    c. Valve HPCI 17 - CLOSES.
    d. Valve HPCI 57 - OPENS.
    e. Valve HPCI 58 - OPENS.
    f. Record the As-Found DMM trip level indication. (12.2 ±0.2 mV)
    g. Record the As-Found LI-107-5 (CRP 9-6) trip level indication. (5.50 ±2.0%)
7. Slowly decrease the pressure using the transmitters Hi side test valve until the second trip point is achieved as indicated by Annun 9-3-T-9 CST/TORUS LVL PWR TRBL - ALARM and verify the following:
    a. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - ALARM.
    b. Record the As-Found DMM Trip indication. (10.2 ±0.2 mV)
8. If the As-Found data in Steps 6 or 7 are **NOT** in tolerance, mark "N/A" on data sheet for Steps 10 through 12, then proceed to Section B and complete Steps 7 through 13 for loop calibration check.
9. If the As-Found data in Steps 6 and 7 are in tolerance, proceed to Step 10.

10. At the CST Instrument Rack perform the following:

    a. SHUT the Hi side test valve and replace the tubing cap.

    b. Slowly OPEN the Hi side isolation valve.

    c. Perform Steps c.1 and c.2, if needed, to remove any air from the sensor that may have been introduced during testing. If no air is introduced, N/A Steps c.1 and c.2 and continue with Step d.

        1) Ensure that no air is left in the sensor by opening the vent plug and bleeding off all trapped air.

        2) SHUT the vent.

    d. Remove the DMM and replace the span access cover.

    e. Second party verify that Steps 10.a-d have been performed.

11. At the Control Room, verify the following:

    a. LI-107-5 reads same as in Step 4.

    b. Relay 23A-K15 is ENERGIZED.

    c. Annun 9-3-S-4 HPCI CST LEVEL LO - CLEAR.

    d. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - CLEAR.

    e. Record stop time and date, calculate OOS time. Notify SM if OOS time >6 hours.

12. Record the reading of LR-23-73 (CRP 9-3).

13. Prepare level transmitter LT-107-5B for testing as follows:

    a. Record start time and date.

    b. SHUT the isolation valve.

    c. Second party verify Step 13.b.

    d. Remove the span access cover for access to the transmitters test jacks.

    e. Connect the DMM to the transmitters test jacks.

NOTE

The test tubing cap can be manipulated as needed by the performer to obtain the most precise pressure control. Use of the cap will allow the rising action of the test valve stem to more slowly and accurately decrease pressure to the alarm setpoint.

f. Remove test tubing cap, as needed, to perform testing.

NOTE

The high side test valve is a NEEDLE VALVE, DO NOT OVERTORQUE. This valve will be used to reduce pressure for two trip points.

14. Slowly decrease the pressure using the transmitters Hi side test valve until the first trip point is achieved as indicated by Relay 23A-K15 DE-ENERGIZING and verify the following:

    a. Relay 23A-K15 (CRP 9-39) DE-ENERGIZES.

    b. Annun 9-3-S-4 HPCI CST LEVEL LO - ALARM.

    c. Record the As-Found DMM trip level indication. (12.2 ±0.2 mV)

    d. Record the As-Found LR-23-73 (CRP 9-3) trip level indication. (5.50 ±1.0%)

15. Slowly decrease the pressure using the transmitters Hi side test valve until the second trip point is achieved as indicated by Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - ALARM and verify the following:

    a. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - ALARM.

    b. Record the As-Found DMM Trip indication. Required 10.2 ±0.2 mV.

16. If the As-Found data in Steps 14 or 15 are **NOT** in tolerance, mark "N/A" on data sheet Steps 18 through 19, then proceed to Section B and complete Steps 17 through 23 for loop calibration check.

17. If the As-Found data in Steps 14 and 15 are in tolerance, proceed to Step 18.

18. At the CST Instrument Rack perform the following:

    a. SHUT the Hi side test valve and replace the tubing cap.

    b. Slowly OPEN the Hi side isolation valve.

    c. Perform Steps c.1 and c.2, if needed, to remove any air from the sensor that may have been introduced during testing. If no air is introduced, N/A Steps c.1 and c.2 and continue with Step d.

        1) Ensure that no air is left in the sensor by opening the vent plug and bleeding off all trapped air.

        2) SHUT the vent.

    d. Remove the DMM and replace the span access cover.

    e. Second party verify that Steps 18.a-d have been performed.

19. At the Control Room, verify the following:

    a. LR-23-73 reads same as Step 12.

    b. Relay 23A-K15 is ENERGIZED.

    c. Annun 9-3-S-4 HPCI CST LEVEL LO - CLEAR.

    d. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - CLEAR.

    e. Record stop time and date, calculate OOS time. Notify SM if OOS time >6 hours.

20. Request the Control Room Operator fully CLOSE V23-57 and V23-58.

21. Request the Control Room Operator fully OPEN V23-17.

22. Proceed to Final Conditions.

B. Calibration
(VYOPF 4363.04)

NOTE

Performance of the calibration procedure accomplishes the functional test procedure.

1. The Shift Manager is fully knowledgeable of the scope of this procedure and by initialing the data sheet, grants his permission to perform the work.

2. Verify that HPCI-17 is open, HPCI-57 and HPCI-58 are closed.

3. Establish communications between the local instruments at the CST and the Control Room.

4. Prepare level transmitter LT-107-5A for testing as follows:

    a. Record start time and date.

    b. SHUT the isolation valve.

    c. Second party verify Step 4.b.

    d. Remove the span access cover for access to the transmitter test jacks.

    e. Connect the DMM to the transmitter test jacks.

NOTE

The test tubing cap can be manipulated as needed by the performer to obtain the most precise pressure control. Use of the cap will allow the rising action of the test valve stem to more slowly and accurately decrease pressure to the alarm setpoint.

    f. Remove test tubing cap, as needed, to perform testing.

NOTE

The high side test valve is a NEEDLE VALVE, DO NOT OVERTORQUE. This valve will be used to reduce pressure for two trip points.

5. Slowly decrease the pressure using the transmitters Hi side test valve until the first trip point is achieved as indicated by Relay 23A-K15 DE-ENERGIZING and verify the following:

   a. Relay 23A-K15 (CRP 9-39) DE-ENERGIZES.

   b. Annun 9-3-S-4 HPCI CST LEVEL LO - ALARM.

   c. Valve HPCI 17 - CLOSES.

   d. Valve HPCI 57 - OPENS.

   e. Valve HPCI 58 - OPENS.

   f. Record the As-Found DMM trip level indication. (12.2 ±0.2 mV)

   g. Record the As-Found LI-107-5 (CRP 9-6) trip level indication. (5.50 ±2.0%)

6. Slowly decrease the pressure using the transmitters Hi side test valve until the second trip point is achieved as indicated by Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - ALARM and verify the following:

   a. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - ALARM.

   b. Record the As-Found DMM Trip indication. (10.2 ±0.2 mV)

7. Loop A (LT-107-5A) Calibration Check

   a. Remove the test tubing cap if not previously removed and fully OPEN the test valve.

   b. Drain all water from the Hi side sensor by opening the transmitter Hi side vent plug.

   c. Connect the pressure source to the test connection.

   d. SHUT the Hi side vent plug.

8. Applying the values specified in Table B-1 below:

TABLE B-1 – LOOP A CALIBRATION TABLE

TRANSMITTER VALUES		INDICATIONS	
Input Pressures	Output	Level Indicator	ERFIS Point
LT-107-5A	LT-107-5A	LI-107-5	F004
43.0”H$_2$0 Increasing	14.0 mV (±0.2mV)	10% (±2.0%)	47.7 KGAL (±3.53 KGAL)
101.5”H$_2$0 Increasing	20.0 mV (±0.2mV)	25% (±2.0%)	
199.0”H$_2$0 Increasing	30.0 mV (±0.2mV)	50% (±2.0%)	238.6 KGAL (±3.53 KGAL)
296.5”H$_2$0 Increasing	40.0 mV (±0.2mV)	75% (±2.0%)	
355.0”H$_2$0 Increasing	46.0 mV (±0.2mV)	90% (±2.0%)	429.4 KGAL (±3.53 KGAL)
296.5”H$_2$0 Decreasing	40.0 mV (±0.2mV)	75% (±2.0%)	
199.0”H$_2$0 Decreasing	30.0 mV (±0.2mV)	50% (±2.0%)	238.6 KGAL (±3.53 KGAL)
101.5”H$_2$0 Decreasing	20.0 mV (±0.2mV)	25% (±2.0%)	
43.0”H$_2$0 Decreasing	14.0 mV (±0.2mV)	10% (±2.0%)	47.7 KGAL (±3.53 KGAL)

   a. Record the As-Found CRP 9-6 indicator, ERFIS point, and transmitter output values, as applicable at each specified pressure.

9. If the As-Found data in Steps 5, 6 or 8 are **NOT** in tolerance, proceed to Step 11.

10. If the As-Found data in Steps 5, 6 and 8 are in tolerance, record "As-Found" data as "As-Left" on data sheet Step 11, then proceed to Step 12.

11. Component Calibration

   a. Transmitter (LT-107-5A)

      1) Apply pressures to LT-107-5A as specified in Table B-1 above.

      2) Adjust the transmitter zero, span, and linearity adjustments as necessary to bring the mV indication within the allowable tolerance.

      3) Record the transmitter As-Left data.

   b. Indicator (LI-107-5) and ERFIS point (F004):

      1) Apply pressure to LT-107-5A as specified in Table B-1 above.

      2) Adjust the LI-107-5 zero as necessary for specified values above.

NOTE

If ERFIS point As-Found data is out of tolerance, initiate WR.

3) Record the As-Left data.

c. Alarm Unit (CRP 9-20)

NOTE

LSL-107-5A has two alarm points which are set in the decreasing direction.

1) Adjust the alarm unit to obtain the following trip points:

12.2 mV ±0.2 mV (Decreasing) CKT 1 (upper pot)
10.2 mV ±0.2 mV (Decreasing) CKT 2 (lower pot)

2) Record As-Left value on the data sheet.

12. At the CST Instrument Rack perform the following:

a. Remove the pressure source.

b. SHUT the Hi side test valve and replace the tubing cap.

c. Slowly OPEN the Hi side isolation valve.

d. Ensure that no air is left in the sensor by Opening the vent plug and bleeding off all trapped air.

e. SHUT the vent, remove the DMM and replace the span access cover.

f. Second party verify that Steps 12.b-e have been performed.

13. At the Control Room, verify the following:

a. Relay 23A-K15 is ENERGIZED.

b. Annun 9-3-S-4 HPCI CST LEVEL LO - CLEAR.

c. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - CLEAR.

d. Record stop time and date, calculate OOS time. Notify SM if OOS time >6 hours.

14. Prepare level transmitter LT-107-5B for testing as follows:

    a. Record start time and date.

    b. SHUT the isolation valve.

    c. Second party verify Step 14.a.

    d. Remove the span access cover for access to the transmitters test jacks.

    e. Connect the DMM to the transmitters test jacks.

NOTE

The test tubing cap can be manipulated as needed by the performer to obtain the most precise pressure control. Use of the cap will allow the rising action of the test valve stem to more slowly and accurately decrease pressure to the alarm setpoint.

    f. Remove test tubing cap, as needed, to perform testing.

NOTE

The high side test valve is a NEEDLE VALVE, DO NOT OVERTORQUE. This valve will be used to reduce pressure for two trip points.

15. Slowly decrease the pressure using the transmitters Hi side test valve until the first trip point is achieved as indicated by Relay 23A-K15 DE-ENERGIZING and verify the following:

    a. Relay 23A-K15 (CRP 9-39) DE-ENERGIZES.

    b. Annun 9-3-S-4 HPCI CST LEVEL LO - ALARM.

    c. Record the As-Found DMM trip level indication. (12.2 ±0.2 mV)

    d. Record the As-Found LR-23-73 (CRP 9-3 trip level indication. (5.50 ±1%)

16. Slowly decrease the pressure using the transmitters Hi side test valve until the second trip point is achieved as indicated by Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - ALARM and verify the following:

    a. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - ALARM.

    b. Record the As-Found DMM Trip indication. Required 10.2 ±0.2 mV.

17. Loop B (LT-107-5B) Calibration Check

    a. Remove the test tubing cap if not previously removed and fully OPEN the test valve.

    b. Drain all water from the Hi side sensor by opening the transmitter Hi side vent plug.

    c. Connect the pressure source to the test connection.

    d. SHUT the Hi side vent plug.

18. Applying the values specified in Table B-2 below:

TABLE B-2 – LOOP B CALIBRATION TABLE

TRANSMITTER VALUES		INDICATIONS
Input Pressures	Output	Level Recorder
LT-107-5B	LT-107-5B	LR-23-73 Grn
43.0"H_20 Increasing	14.0 mV (±0.2mV)	10% (±1.0%)
101.5"H_20 Increasing	20.0 mV (±0.2mV)	25% (±1.0%)
199.0"H_20 Increasing	30.0 mV (±0.2mV)	50% (±1.0%)
296.5"H_20 Increasing	40.0 mV (±0.2mV)	75% (±1.0%)
355.0"H_20 Increasing	46.0 mV (±0.2mV)	90% (±1.0%)
296.5"H_20 Decreasing	40.0 mV (±0.2mV)	75% (±1.0%)
199.0"H_20 Decreasing	30.0 mV (±0.2mV)	50% (±1.0%)
101.5"H_20 Decreasing	20.0 mV (±0.2mV)	25% (±1.0%)
43.0"H_20 Decreasing	14.0 mV (±0.2mV)	10% (±1.0%)

    a. Record the As-Found CRP 9-3 recorder and transmitter output valves as applicable at each specified pressure.

19. If the As-Found data in Steps 15, 16, or 18 are NOT in tolerance, proceed to Step 21.

20. If the As-Found data in Steps 15, 16 and 18 are in tolerance, record "As-Found" data as "As-Left" on data sheet Step 21, then proceed to Step 22.

21. Component Calibration

    a. Transmitter (LT-107-5B)

        1) Apply pressures to LT-107-5B as specified in Table B-2 above.

        2) Adjust the transmitter zero, span, and linearity adjustments as necessary to bring the mV indication within the allowable tolerance.

        3) Record the transmitter As-Left data.

    b. Recorder (LR-23-73)

        1) Apply pressures to LT-107-5B as specified in Table B-2 above.

        2) Adjust the LR-23-73 zero and span adjustments as necessary for specified values above.

        3) Record the As-Left data.

    c. Alarm Unit (CRP 9-20)

NOTE

LSL-107-5B has two alarm points which are set in the decreasing direction.

        1) Adjust the alarm unit to obtain the following trip points:

            12.2 mV ±0.2 mV (Decreasing) CKT 1 (upper pot)
            10.2 mV ±0.2 mV (Decreasing) CKT 2 (lower pot)

        2) Record As-Left value on the data sheet.

22. At the CST Instrument Rack perform the following:

    a. Remove the pressure source.

    b. SHUT the Hi side test valve and replace the tubing cap.

    c. Slowly OPEN the Hi side isolation valve.

    d. Ensure that no air is left in the sensor by opening the vent plug and bleeding off all trapped air.

    e. SHUT the vent, remove the DMM and replace the span access cover.

    f. Second party verify that Steps 22.b-e have been performed.

23. At the Control Room, verify the following:

    a. Relay 23A-K15 is ENERGIZED.

    b. Annun 9-3-S-4 HPCI CST LEVEL LO - CLEAR.

    c. Annun 9-3-T-9 CST/TORUS LVL INST PWR TRBL - CLEAR.

    d. Record stop time and date, calculate OOS time. Notify SM if OOS time >6 hours.

24. Request the Control Room Operator fully CLOSE V23-57 and V23-58.

25. Request the Control Room Operator fully OPEN V23-17.

26. At the CST Instrument Rack calibrate Level switches LSH-107-6 and LSL-107-7 by performing the following:

    a. Isolate the Level switch to be tested by SHUTTING its respective isolation valve. Remove the test tubing cap.

    b. Second party verify Step 26.a has been performed.

    c. OPEN test valve and connect the pressure source to the test connection.

    d. Apply pressure as specified on the data sheet.

    e. Have the specialist in the Control Room provide a mark at Annun 9-6-H-7 COND XFER SYS TROUBLE - ALARM.

    f. Record the As-Found pressure applied.

g. Adjust the pressure switch as required to maintain the acceptance criteria as specified on the data sheet.

h. Record the As-Left trip pressure.

i. Remove the pressure source, SHUT the test valve and replace the test tubing cap.

j. Return the instrument to service by OPENING the isolation valve.

k. Second party verify that Steps 26.i and j have been performed.

l. Verify that Annun 9-6-H-7 COND XFER SYS TROUBLE - CLEAR.

m. Repeat Steps 26.a through l for the remaining instrument.

27. At the CST Instrument Rack perform the following:

a. SHUT the isolation valve and depressurize LI-107-6.

b. Second party verify that Step 27.a has been performed.

c. Connect the pressure source to the test connection.

d. Apply the pressures to the LI-107-6 as specified in Table B-3 below:

TABLE B-3

INPUT PRESSURE	REQUIRED OUTPUT
0 in H_2O	0% (+2/-0%)
195 in H_2O	50% (+/-2%)
390 in H_2O	100% (+0/-2%)

e. Record the As-Found data values.

f. If the As-Found data is in tolerance, skip Step 27.g and record the As-Found" data as "As-Left" data on data sheet Step 27.h, then proceed to Step 27.i.

g. Adjust the gauge as required to meet the acceptance criteria of applied pressure ±2%.

h. Record the As-Left data.

i. Remove the pressure source and SHUT the test valve.

j. Return the instrument to service by OPENING the isolation valve.

k. Second party verify that Steps 27.i and j have been performed.

28. Proceed to Final Conditions.

ACCEPTANCE CRITERIA

1. Successful operation of all instruments, relays, alarms and annunciators.
2. Calibration values shall be within the tolerance as specified on the data sheets:

Comparative Data:

FUNCTION	ELEVATION	PRESSURE LEVEL	TRANSMITTER OUTPUT	TANK ZERO
Inst. Zero	254 ft. 0 in.	4.0 in. H_2O	10.0 mV	0 in.
Inst. Pwr. Trbl. Alarm LSL 107-5A/B	254 ft. 2 in.	6.0 in. H_2O (dec.)	10.2 mV (dec.)	2.0 in.
Vlv. Motion LSH 107-5A/B	256 ft. 1.5 in.	25.5 in. H_2O (dec.) Lo Lvl	12.2 mV (dec.)	21.5 in.
Alarm	263 ft. 9 in.	105 in. H_2O (dec.)	[redacted]	117 in.
Inst. Mid	270 ft. 3 in.	199 in. H_2O	30.0 mV	195 in.
Hi Lvl Alarm	284 ft. 11 in.	359 in. H_2O	[redacted]	371 in.
Overflow	286 ft. 6 in.	394 in. H_2O	50.0 mV	32 ft. 6 in. 390 in.

FINAL CONDITIONS

1. Notify the Shift Manager on completion of the test and of any discrepancies.
2. Return completed forms, VYOPF 4363.03 or .04 to an I/C Supervisor for review (AP 0310) and filing in accordance with AP 6807.

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL FUNCTIONAL TEST DATA SHEETS

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED		
A.1		SM Permission		

By his signature, the Shift Manager acknowledges that performance of this procedure affects instruments contained in TS Table 3.2.1. Entry into the associated LCO and required ACTIONS may be delayed for up to 6 hours when a channel is placed in an inoperable status solely for the performance of a required surveillance provided the associated Trip Function or Redundant Trip Function maintains ECCS initiation capability or Recirculation Pump Trip capability.

A.2		HPCI 57/58 CLOSED HPCI-17 OPEN		
INSTRUMENT NUMBER			LI-107-5	
A.4		Indicator Normal Reading		
INSTRUMENT NUMBER			LT-107-5A	
A.5	a	Record Start Time and Date	Time:__________ Date:__________	
	b	Perf. By		
	c	Verf. By		
A.6	a	Relay DE-ENERGIZED	23A-K15	
	b	Annun 9-3-S-4 ALARM		
	c	HPCI-17 CLOSES		
	d	HPCI-57 OPENS		
	e	HPCI-58 OPENS		
	f	As-Found Trip Value 12.0-12.4 mV		
	g	As-Found Trip Value 3.5-7.5%		
A.7	a	Annun 9-3-T-9 ALARM		
	b	As-Found Trip Value 10.0-10.4 mV		

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL FUNCTIONAL TEST DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED		
INSTRUMENT NUMBER			LT-107-5A	
A.10	a	Perf. By		
	b	Perf. By		
	c.1	Perf. By		
	c.2	Perf. By		
	e	Verf. By		
A.11	a	Ind. Normal		
	b	Relay ENERGIZED	23A-K15	
	c	Annun 9-3-S-4 CLEAR		
	d	Annun 9-3-T-9 CLEAR		
	e	Record Stop Time and Date Calculate OOS Time	Time:______________ Date:______________ OOS:______________	
INSTRUMENT NUMBER			LR-23-73	
A.12		Recorder Normal Reading		
INSTRUMENT NUMBER			LT-107-5B	
A.13	a	Record Start Time and Date	Time:______________ Date:______________	
	b	Perf. By		
	c	Verf. By		
A.14	a	Relay DE-ENERGIZED	23A-K15	
	b	Annun 9-3-S-4 ALARM		
	c	As-Found Trip Value 12.0-12.4 mV		
	d	As-Found Trip Value 4.5-6.5%		

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL FUNCTIONAL TEST DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED	
INSTRUMENT NUMBER			LT-107-5B
A.15	a	Annun 9-3-T-9 ALARM	
	b	As-Found Trip Value 10.0-10.4 mV	
A.18	a	Perf. By	
	b	Perf. By	
	c.1	Perf. By	
	c.2	Perf. By	
	e	Verf. By	
A.19	a	Ind. Normal	
	b	Relay ENERGIZED	23A-K15
	c	Annun 9-3-S-4 CLEAR	
	d	Annun 9-3-T-9 CLEAR	
	e	Record Stop Time and Date Calculate OOS Time	Time:__________ Date:__________ OOS:__________
A.20		V23-57 and V23-58 Fully CLOSED	
A.21		V23-17 Fully OPEN	

M/TE Used (VY SN/Due Date):

Discrepancies/Remarks:

Tested By: Date:

(Print/Sign)

Shift Manager: Date:

(Print/Sign)

I/C Supervisor Review: Date:

(Print/Sign)

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST)
LOW LEVEL INSTRUMENTATION CALIBRATION DATA SHEETS

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP	REQUIRED	
B.1	SM Permission	

By his signature, the Shift Manager acknowledges that performance of this procedure affects instruments contained in TS Table 3.2.1. Entry into the associated LCO and required ACTIONS may be delayed for up to 6 hours when a channel is placed in an inoperable status solely for the performance of a required surveillance provided the associated Trip Function or Redundant Trip Function maintains ECCS initiation capability or Recirculation Pump Trip capability.

B.2	HPCI 57/58 CLOSED HPCI-17 OPEN	

INSTRUMENT NUMBER			LT-107-5A	
B.4	a	Record Start Time and Date	Time:__________ Date:__________	
	b	Perf. By		
	c	Verf. By		
B.5	a	Relay DE-ENERGIZED	23A-K15	
	b	Annun 9-3-S-4 ALARM		
	c	HPCI-17 CLOSES		
	d	HPCI-57 OPENS		
	e	HPCI-58 OPENS		
	f	As-Found Trip Value 12.0-12.4 mV		
	g	As-Found Trip Value 3.5-7.5%		
B.6	a	Annun 9-3-T-9 ALARM		
	b	As-Found Trip Value 10.0-10.4 mV		

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL INSTRUMENTATION CALIBRATION DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED						
INSTRUMENT NUMBER			LOOP A (LT-107-5A)					
			AS-FOUND					
			LI-107-5		F004 (KGAL)		LT-107-5A	
B.8	a	@43.0" H_2O Inc.	8–12%		44.14-51.23		13.8-14.2mV	
		@101.5"H_2O Inc.	23–27%		■		19.8-20.2mV	
		@199.0"H_2O Inc.	48–52%		235.07-242.13		29.8-30.2mV	
		@296.5"H_2O Inc.	73–77%		■		39.8-40.2mV	
		@355.0"H_2O Inc.	88-92%		425.87-432.93		45.8-46.2mV	
		@296.5"H_2O Dec.	73-77%		■		39.8-40.2mV	
		@199.0"H_2O Dec.	48-52%		235.07-242.13		29.8-30.2mV	
		@101.5"H_2O Dec.	23-27%		■		19.8-20.2mV	
		@43.0"H_2O Dec.	8-12%		44.14-51.23		13.8-14.2mV	

INSTRUMENT NUMBER			LOOP A (LT-107-5A)	
			LT-107-5A	
			AS-LEFT OUTPUT	
B.11	a.3	@43.0"H_2O Inc.	13.8 – 14.2mV	
		@101.5"H_2O Inc.	19.8 – 20.2mV	
		@199.0"H_2O Inc.	29.8 – 30.2mV	
		@296.5"H_2O Inc.	39.8 – 40.2mV	
		@355.0"H_2O Inc.	45.8 – 46.2mV	
		@296.5"H_2O Dec.	39.8 – 40.2mV	
		@199.0"H_2O Dec.	29.8 – 30.2mV	
		@101.5"H_2O Dec.	19.8 – 20.2mV	
		@43.0"H_2O Dec.	13.8 – 14.2mV	

INSTRUMENT NUMBER			LOOP A (LT-107-5A)			
			AS-LEFT			
			LI-107-5(%)		F004 (KGAL)	
B.11	b.3	@43.0"H_2O Inc.	8–12%		44.14-51.23	
		101.5"H_2O Inc.	23–27%		■	
		199.0"H_2O Inc.	48–52%		235.07-242.13	
		296.5"H_2O Inc.	73–77%		■	
		355.0"H_2O Inc.	88-92%		425.87-432.93	
		296.5"H_2O Dec.	73-77%		■	
		199.0"H_2O Dec.	48-52%		235.07-242.13	
		101.5"H_2O Dec.	23-27%		■	
		43.0"H_2O Dec.	8-12%		44.14-51.23	

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL INSTRUMENTATION CALIBRATION DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED	
INSTRUMENT NUMBER			LOOP A (LT-107-5A)
			AS-LEFT
B.11	c. 2	Trip Value 12.0-12.4 mV	
		Trip Value 10.0-10.4 mV	
B.12	b	Perf. By	
	c	Perf. By	
	d	Perf. By	
	e	Perf. By	
	f	Verf. By	
B.13	a	Relay ENERGIZED	23A-K15
	b	Annun 9-3-S-4 CLEAR	
	c	Annun 9-3-T-9 CLEAR	
	d	Record Stop Time and Date Calculate OOS Time	Time:_________ Date:_________ OOS:_________
INSTRUMENT NUMBER			LT-107-5B
B.14	a	Record Start Time and Date	Time:_________ Date:_________
	b	Perf. By	
	c	Verf. By	
B.15	a	Relay DE-ENERGIZED	23A-K15
	b	Annun 9-3-S-4 ALARM	
	c	As-Found Trip Value 12.0-12.4 mV	
	d	As-Found Trip Value 4.5-6.5	
B.16	a	Annun 9-3-T-9 ALARM	
	b	As-Found Trip Value 10.0-10.4 mV	

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL INSTRUMENTATION CALIBRATION DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED				
INSTRUMENT NUMBER			LOOP B (LT-107-5B)			
			AS-FOUND LR-23-73		AS-FOUND LT-107-5B Output	
B.18	a	@43.0"H_2O Inc.	9-11%		13.8 – 14.2mV	
		@101.5"H_2O Inc.	24-26%		19.8 – 20.2mV	
		@199.0"H_2O Inc.	49-51%		29.8 – 30.2mV	
		@296.5"H_2O Inc.	74-76%		39.8 – 40.2mV	
		@355.0"H_2O Inc.	89-91%		45.8 – 46.2mV	
		@296.5"H_2O Dec.	74-76%		39.8 – 40.2mV	
		@199.0"H_2O Dec.	49-51%		29.8 – 30.2mV	
		@101.5"H_2O Dec.	24-26%		19.8 – 20.2mV	
		@43.0"H_2O Dec.	9-11%		13.8 – 14.2mV	

INSTRUMENT NUMBER			LT-107-5B	
			AS-LEFT OUTPUT	
B.21	a.3	@43.0"H_2O Inc.	13.8 – 14.2mV	
		101.5"H_2O Inc.	19.8 – 20.2mV	
		199.0"H_2O Inc.	29.8 – 30.2mV	
		296.5"H_2O Inc.	39.8 – 40.2mV	
		355.0"H_2O Inc.	45.8 – 46.2mV	
		296.5"H_2O Dec.	39.8 – 40.2mV	
		199.0"H_2O Dec.	29.8 – 30.2mV	
		101.5"H_2O Dec.	19.8 – 20.2mV	
		43.0"H_2O Dec.	13.8 – 14.2mV	

INSTRUMENT NUMBER			LR-23-73	
			AS-LEFT	
B.21	b.3	@43.0"H_2O Inc.	9-11%	
		101.5"H_2O Inc.	24-26%	
		199.0"H_2O Inc.	49-51%	
		296.5"H_2O Inc.	74-76%	
		355.0"H_2O Inc.	89-91%	
		296.5"H_2O Dec.	74-76%	
		199.0"H_2O Dec.	49-51%	
		101.5"H_2O Dec.	24-26%	
		43.0"H_2O Dec.	9-11%	

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL INSTRUMENTATION CALIBRATION DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED			
INSTRUMENT NUMBER			LT-107-5B		
			AS-FOUND		AS-LEFT
B.21	c.2	Trip Value 12.0-12.4 mV			
		Trip Value 10.0-10.4 mV			
INSTRUMENT NUMBER			LT-107-5B		
			AS-FOUND		AS-LEFT
B.22	b	Perf. By			
	c	Perf. By			
	d	Perf. By			
	e	Perf. By			
	f	Verf. By			
B.23	a	Relay ENERGIZED	23A-K15		
	b	Annun 9-3-S-4 CLEAR			
	c	Annun 9-3-T-9 CLEAR			
	d	Record Stop Time and Date Calculate OOS Time	Time:________ Date:________ OOS:________		
B.24		V23-57 and V23-58 Fully CLOSED			
B.25		V23-17 Fully OPEN			

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL INSTRUMENTATION CALIBRATION DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

STEP		REQUIRED				
INSTRUMENT NUMBER			LSH-107-6		LSL-107-7	
B.26	a	Perf. By				
	b	Verf. By				
	d	Approx. Trip Press.	359.0 in. H_2O inc.		105.0 in. H_2O dec.	
	e	Annun 9-6-H-7 ALARM				
	f	As-Found Trip Press.	356 to 362 in. H_2O inc.		102 to 108 in. H_2O dec.	
	g	Acceptance Criteria	356 to 362 in.H_2O inc.		102 to 108 in. H_2O dec.	
	h	As-Left Trip Press.	356 to 362 in. H_2O inc.		102 to 108 in. H_2O dec.	
	i	Perf. By				
	j	Perf. By				
	k	Verf. By				
	l	Annun 9-6-H-7 CLEAR				
INSTRUMENT NUMBER			LI-107-6			
B.27	a	Perf. By				
	b	Verf. By				
			AS-FOUND		AS-LEFT	
	e, h	0 - 2.0%				
		48 - 52%				
		98 - 100%				
	i	Perf. By				
	j	Perf. By				
	k	Verf. By				

HPCI SUCTION TRANSFER ON CONDENSATE STORAGE TANK (CST) LOW LEVEL INSTRUMENTATION CALIBRATION DATA SHEETS (Continued)

LOCATION: CONTROL ROOM/CST INSTRUMENT RACK

M/TE Used (VY SN/Due Date):	
Discrepancies/Remarks:	
Tested By:	Date:
(Print/Sign)	
Shift Manager:	Date:
(Print/Sign)	
I/C Supervisor Review:	Date:
(Print/Sign)	

VERMONT YANKEE NUCLEAR POWER STATION

ADMINISTRATIVE PROCEDURE

AP 0310

REVISION 20

I&C SURVEILLANCE, PREVENTIVE AND CORRECTIVE MAINTENANCE PROGRAM

USE CLASSIFICATION: **INFORMATION**

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1.0 PURPOSE, SCOPE, AND DISCUSSION

1.1. PURPOSE

This procedure serves as a guideline for properly completing the Surveillance, Preventive and Corrective Maintenance responsibilities assigned to the I/C Department.

1.2. SCOPE

This procedure provides Department Superintendents and Designated Representatives/Supervisors with guidance to assure the I/C personnel maintain the surveillance, preventive and corrective maintenance program.

1.3. DISCUSSION

The performance of surveillance, preventive and corrective maintenance on installed plant equipment requires that a specific work process be followed. This process is covered by procedures, which control the removal and return to service, performance and quality of the work done, in a manner that will ensure that the operational requirements are fulfilled.

This procedure will serve to provide an overall work process guideline, that when used by department personnel, will ensure that steps in the work process have been accomplished in a complete and correct manner and that the work process is thoroughly documented. Additionally job aids are included to provide department personnel with the information needed to properly perform the task assigned.

This procedure is not intended to supplement or short cut the existing work process procedures, but to act as an overview of the existing work process to ensure that all relevant controls are followed.

2.0 DEFINITIONS

2.1. None

3.0 PRIMARY RESPONSIBILITIES

3.1. None

4.0 PROCEDURE

4.1. Surveillance Testing

Periodic testing/inspection of safety-related and other installed plant equipment is required to ensure continued operability within accepted licensing or administrative limits. Procedure AP 4000 provides the mechanism for scheduling, independent verification and documenting completion of surveillance tests through Curator Work List.

The I/C department is responsible for the content of the Curator Surveillance Database for their tests, completion of tests within allotted time, development and maintenance of test procedures, and the collection, review, approval, and retention of test data sheets.

4.1.1. The I&C Department Testing Coordinator (I/C DTC) is a member of the I&C Maintenance Support Group. The I/C DTC will:

> **NOTE**
>
> See Appendix H for surveillance schedule information and Outage Surveillance Basis.

4.1.1.1. Review the Master Test List annually for accuracy and submit corrections in accordance with AP 4000.

4.1.1.2. Be responsible for listing on VYAPF 0310.01, all tests scheduled to be completed each Friday as they appear on the weekly Surveillance Test Requirements List compiled by the Surveillance Test Coordinator (STC) in accordance with AP 4000.

4.1.1.3. Generate a new Shop List by either using the Surveillance Schedule Report (pre-Friday), or using the Friday morning printout of "Alert Report" and "Surveillance Test Report".

4.1.1.4. On the old list, note all carryovers.

4.1.1.5. Perform the Work List item completion for every test completed associated with a completed procedure by entering I/C specialist initials in the Work List item notes.

4.1.1.6. Provide a copy to the I/C Secretary.

4.1.1.7. Place the original Shop List in the completed surveillance section of the I/C Groups I/C DTCs surveillance log.

4.2. Preventive Maintenance (PM)

Preventive Maintenance consists of two types.

- Auto generated time or cycle based.
- Condition based as a result of observation, prediction, OE, etc.

Also, the PM program is designed to detect equipment and performance problems before significant degradation occurs. Through proper implementation this will allow prompt correction, improved outage and maintenance planning, and increased plant power output with improved plant safety and reliability.

4.2.1. Work Orders will be auto generated and scheduled to be performed in accordance with the plant scheduling guideline.

4.2.2. The Department Supervisor will review the WO or Procedure to be used to perform the PM and assure that sufficient qualified personnel are assigned to the task.

4.2.3. Prior to starting the task the assigned individual will:

4.2.3.1. Ensure the procedure is the current revision.

4.2.3.2. Obtain a sufficient number of copies to cover all work locations. Reference procedure section 4.6 for field use of controlled documents.

4.2.3.3. Review the procedure or work order to become familiar with the requirements and get answers to any questions before starting work.

4.2.3.4. Obtain any Measuring and Test Equipment (M&TE) needed in accordance with DP 0301.

4.2.3.5. Obtain any parts required and assure they are the correct ones (safety class, EQ, etc.). Reference ENN-MP-115.

4.2.3.6. Request a Radiation Work Permit in accordance with AP 0502 if required.

4.2.3.7. Review the Safety Requirements and establish any postings and/or obtain any safety equipment as needed.

4.2.4. The assigned individual will perform the task in accordance with the procedure or work order. Reference procedure section 4.4 for methods of conducting maintenance.

4.2.5. The Department Supervisor will review the completed work order or procedure in accordance with section 4.5 of this procedure.

4.2.6. The Program and Component Engineering Department (for assigned components) will trend the PM results for analyzing the component performance history.

4.2.7. Any suggested PM changes will be processed in accordance with AP 0214.

4.3. Corrective Maintenance

Corrective maintenance includes any maintenance activity performed on a piece of plant equipment to correct a malfunction or other nonconforming condition. This section will outline the process from generation to closure as defined in existing procedures and any department specific actions.

4.3.1. Work Requests (WRs) are generated in accordance with AP 0047.

4.3.2. The Department Representatives will review the WR's with the Operations Planning Coordinator (OPC) to assess the validity and assign a priority level in accordance with AP 0047.

4.3.2.1. This review will also consider whether the task meets the Minor Maintenance definition, reference AP 0049, may be performed as Troubleshooting, reference AP 0050, or processed as FIN Team Work, reference AP 0053.

4.3.3. WR's are scheduled/planned per AP 0168 and AP 0048.

4.3.4. The Department Supervisor will review the scheduled WO for any special requirements and assign qualified individuals to perform the work.

4.3.5. Upon assignment of a work order the repair crew shall review all applicable documentation and perform the task in compliance with AP 0021 and applicable sections of this procedure.

4.3.6. Upon completion the Department Supervisor will close out the WO in accordance with AP 0021 and the applicable sections of this procedure.

4.3.7. Work Orders that can not be completed as scheduled due to parts unavailability, the need for engineering assistance, or other reasons will be returned to Planning for resolution through the AP 0168 Work Management process.

4.3.7.1. An explanation of why the WO could not be completed shall be recorded on the WO notes.

4.4. Methods of Conducting Maintenance/Surveillance Activities

During the performance of maintenance and/or surveillance activities specific actions must be performed to ensure the safe and reliable completion of work and the ability of equipment to function properly. To assure consistent performance of work activities the referenced procedures are to be used as applicable and the proceeding processes are to be followed when appropriate. *Safety requirements will be complied with during all work activities.*

4.4.1. Surveillance Test Time Monitoring

During performance of Tech. Spec. surveillances which have a 6-hour allowance for performance of the surveillance without entering the LCO actions, it is the I&C Specialist's responsibility to monitor the performance time and to notify the Shift Manager as soon as it is identified that the 6-hour allowance may be exceeded.

When recording elapsed time (stop-start), rounding up to the next hour is acceptable for times up to 5 hours. For example, 43 minutes can be recorded as <1 hour.

4.4.2. Independent Verifications

When independent verification of a component or condition is required and circumstances require two individuals to work together, the act of independent verification must be completely separate and independent. The verifier must not rely on the observed action (except in Steps 4.4.2.1 and 4.4.2.2 below) of a co-worker to determine component identification, position, or condition. Actual separation of workers is not required, but is recommended when practical. The key element is independent assurance of the described condition.

4.4.2.1. When checking the position of a throttled valve or torquing of a component (for example), it is unreasonable to expect a second manipulation. In these cases, the independent verifier would clearly observe the first checker's manipulation of the device.

4.4.2.2. In cases involving significant radiation exposure, the department supervisor may determine the appropriate form of verification and so note it on the documentation.

4.4.3. Second party verification

Second party verification is when the second individual verifies that the original performer is accomplishing/performing the activity correctly. The normal process for this is as follows.

4.4.3.1. The second party verifier will observe the performer identify the component, position, or condition.

4.4.3.2. If the second party verifier does not agree with the component, position, or condition, this discrepancy will be pointed out for clarification and resolution. No activity should be performed until both parties are in agreement.

4.4.3.3. The second party verifier will actively observe the performer complete the activity.

4.4.3.4. After the activity has been performed, the second party verifier will sign off indicating acceptability.

4.4.4. Procedure Signoffs

When performing a surveillance or calibration it is not always practical to have all persons involved sign one procedure during the activity. In these situations the following protocol shall be followed.

4.4.4.1. All individuals involved with the activity will have a copy of the procedure.

4.4.4.2. Communications will be maintained during the activity.

4.4.4.3. Individuals performing a step will sign the copy in hand.

4.4.4.4. Verification through communication will be made of step completion before proceeding to the next step.

4.4.4.5. Upon completion all signatures will be transferred to one master copy of the procedure.

4.4.5. When performing a multi-component procedure for only one component the person performing test shall place a N/A next to the remaining component numbers with an explanation in the Remarks/Discrepancy section of the Data Sheet.

4.4.6. If during the work activity a problem is encountered with the procedure the requirements of AP 0095 shall be complied with to stop work at a safe point and notify department supervision for assistance to correct the problem. Procedures will always be used in concert with data sheets.

4.4.6.1. At times during the performance of procedures, plant conditions will prevent or mask a response expected in the procedure. When this occurs, the department supervisor is to be contacted. The department supervisor, with concurrence from the Maintenance Support group, may authorize the procedure to continue with an exception taken for the specific response. All exceptions taken and the reason for the exception shall be noted in the Discrepancies/Remarks section of the procedure. An ER shall be generated per AP 0009 for any procedure that can not be completed as written.

4.4.7. When surveillance procedures are to be performed over a number of days the date of actual component completion will be documented in the procedure and the shop surveillance list.

4.4.8. Environmentally Qualified Equipment

When work is performed on EQ equipment it is essential that any changes be documented or that the component is returned to its original qualified condition. The following procedures are established to ensure compliance with the code requirements and must be referenced as applicable.

4.4.8.1. AP 0092, used for changes or supplemental clarification to EQ program manual.

4.4.8.2. AP 0021, describes the process of WO review and actions to take as necessary.

4.4.8.3. AP 0305, provides guidance and establishes a mechanism for the maintenance of equipment qualification files.

4.4.9. Adjustments/Alterations

Tolerances are established based on balancing the necessity to prevent violations of design limits and the reduction of adjustments required. At times it may be prudent to optimize the calibration prior to the instrument exceeding the specified tolerance.

4.4.9.1. Functional Calibrations

If during a functional calibration it is identified that the instrument is in tolerance but may need to be adjusted the supervisor shall be informed. Based on available information the calibration section of the procedure may be entered to optimize the readings. The following shall be used to identify test results.

- AS-FOUND data which is out of tolerance or adjustments made per the above supervisors determination are to be circled in RED.
- AS-LEFT data which is out of tolerance is to be circled in RED and documented in the discrepancy section of the data sheet or on the data page of the PM work order and brought to the attention of the supervisor.
- I/C Supervisor will evaluate As-Left condition and advise the Department Superintendent and Shift Manager of any Out of Service condition.

4.4.9.2. Other Calibrations

NOTE

It is preferred that all instruments are returned to the cardinal point if the adjustment is easily done. Instruments within the tolerance range are considered to meet the minimum requirements. Concerns should be brought to the supervisor's attention.

If not delineated in the procedure or WO, when performing calibrations if the as-found values are near the extremes of their acceptable range they should be adjusted. The following example shall be used to determine if adjustments will be made.

Example:

Input = 10 psig
Output = 10 mA
Tolerance = ±.5
Accuracy Range 9.5 to 10.5
Required Calibration = 1 mA x 10% = .1 mA
Values between 9.5 to 9.6 and 10.4 to 10.5 require recalibration.

4.4.9.3. Temporary electrical jumpers and lifter leads.

NOTE

The instructions contained in AP 0315 are not provided to circumvent the requirements of AP 0140, Vermont Yankee Local Control Switching Rules, or AP 0020, Control of Temporary Modifications. Prior to utilizing AP 0315, it must be determined that these procedures do not apply.

To assure the proper administration and documentation of all temporary electrical jumpers and lifted leads AP 0315 must be used, unless the necessary controls are in the procedure being implemented.

4.4.10. Measuring and Test Equipment (M&TE)

In accordance with the Entergy QA Program controls will be established to assure the proper use and accuracy of M&TE. The I/C Department has established procedure DP 0301 for this purpose.

4.4.11. General Condition Inspections

4.4.11.1. During the performance of all surveillance procedures and maintenance activities, an inspection of the general condition of equipment being tested or worked on is to be accomplished. Also a determination of failure cause must be considered. Discrepancies will be noted on Data Sheets and Work Orders. This inspection is to include but not be restricted to the following:

- Evidence of moisture or oxidation,
- Evidence of overheating,
- Evidence of wear,
- Evidence of leaking (manual instrument valve stem leaks may be adjusted),
- Loose or poorly made connections (process or wiring),
- External damage,
- Security of mounting.

4.4.11.2. The requirements of AP 6024 including Appendix C, "Work Area and Adjacent Equipment Inspection Guideline" shall also be complied with.

4.4.12. Documentation

In addition to the requirements established in the referenced procedures discussing the documentation of WO closeout, Identification of M&TE, Issuance of Event Reports, etc; the following information will be required when performing maintenance or surveillance activities.

4.4.12.1. If not already covered by specific procedure step, WO data sheet, or a tagging order, all plant equipment "removed from" and "returned to" service will have "Performed By" and "Verified By" Sign-Offs in the WO notes. (AUDITRPT9606_01)

4.4.12.2. In the recommendation section of the WO all opportunities for improvement, recommendations to prevent recurrence and/or need for further action shall be documented. To ensure review of recommendations use the 00 (Further Evaluation Recommended) failure code.

4.4.12.3. Complete the Probable Cause portion of the WO by providing what is felt to be the most probable cause of the failure based on observations made during the repair effort.

4.4.12.4. If during the performance of a procedure it is discovered that a Corrective Maintenance WO is needed, the following steps are to be taken:

- If the corrective maintenance WO does not interfere with the completion of the procedure, complete the activity and initiate a WR and note the number in the Discrepancy Section of the Data Sheet.
- If the corrective maintenance WO will interfere with the completion of the procedure, contact the Supervisor and determine the best method of restoring the system to it's pretest condition, notify the Shift Manager of the condition and act upon the recommendations. Initiate a WR and note the number in the Discrepancy Section of the Data Sheet.

4.4.13. Test Equipment Hook-Up To Contaminated Systems

During the performance of routine calibrations of plant instrumentation, I/C Specialists are required to connect test equipment to various potentially contaminated plant systems.

4.4.13.1. Prior to work on instrument racks that are posted as contaminated, RP shall be contacted to determine if any special controls are required.

4.4.13.2. For work on instrument racks or individual instruments which are not posted as contaminated, the following bulleted items can be used to accomplish the connections. In lieu of bulleted items below, RP may be contacted for specific direction and the RP directed actions followed.

- Obtain and wear rubber gloves (except when handling isolation/test valves).
- Place a containment device or absorbent material under the test fitting and open slowly.
- Make connections and perform testing as required.
- After testing, remove connections and wipe all fittings and tools with a cloth. Consider all items to be contaminated and place in a bucket, or other suitable container appropriately marked identifying the contents as potentially contaminated.
- Remove and dispose of gloves as contaminated.
- Perform any required valve manipulations without rubber gloves.
- Return unused or extra tools to the I/C Hot Shop. Treat bucket and contents as contaminated, dispose of unwanted material and wipe down tools and inside of bucket.

- At the end of the day bring all potentially contaminated equipment to the RP Checkpoint for survey. After survey by RP, tools may be stored in the Checkpoint M&TE locker for use the next day.

4.4.14. Permanent and Temporary Labels (INS970502_02_16)

Dymotape labels are permissible for use in lighting panels to identify breaker position, but should not be used for general equipment identification. The following process must be complied with regarding equipment labeling.

4.4.14.1. A WO will be generated when it is identified that a new or replacement label is needed.

4.4.14.2. If a temporary label is required, with the Department Superintendent's permission, make a Dymotape label. Prior to installing the label verify component identification then install it.

4.4.14.3. Upon receipt of the permanent Bakelite label, one individual will affix the tag with appropriate fasteners in accordance with the WO, ensure the component identification and the label contents match. (If required the temporary label may be removed to install the permanent label.)

4.4.14.4. Independent verification will be required to assure component identification, label contents and proper installation.

4.4.14.5. After proper application of the label and independent verification the temporary label shall be removed if one exists. (If not previously removed)

4.4.15. If during the performance of work activities it is required to leave tools or equipment unattended for a period of time, an I/C "Work in Progress" tag shall be hung at the job site with the appropriate information on it, (WO#, Name, Date).

4.5. Work Review and Responsibilities

At the start of any task a preparation review is required and upon completion of all work activities such as corrective/preventive maintenance, surveillance tests or calibration the work performed and results generated must be reviewed and properly addressed. The following are responsibilities assigned to I/C personnel.

4.5.1. Specialist

4.5.1.1. Before starting work

- Review the WO for Permit requirements and obtain any as necessary. (AP 0042, ENN-DC-161, AP 0140, AP 0077, or AP 0502, etc.)
- Review the WO scope and ensure a thorough understanding of the job and boundaries. The scope shall not be exceeded with out compliance to AP 0021, AP 0049, and AP 0050.
- Review documents for any required notifications and make them as necessary.
- Review the Safety Manual for any requirements and take appropriate actions.
- If parts are required, review the WO Safety Classification to assure the "P" tag info is correct for the application.
- Review Procedures including prerequisites and precautions.
- Determine if any housekeeping requirements are necessary in accordance with AP 6024 or AP 6026.
- Review EQ file and obtain any walk down sheets if needed.
- Review Equipment Manuals.
- Review drawings and stamp as necessary for field use, see Section 4.6.
- Review BOP cal data sheets (If Applicable).
- Review M&TE requirements and sign out tools.

4.5.1.2. Upon completing work.

- Review Procedure for completion including all data sheets. Ensure all out of spec data is red circled.
- Review WO to assure scope was met and completed.
- Review WO completion notes to assure description of work is accurate, complete and housekeeping closeout inspection is done.
- Review revision submittals to assure they are accurate as needed.
- Issue Event Reports as necessary.

NOTE

An Event Report will be initiated whenever a component's as-left condition is such that operability has been challenged.

- Return material as required by ENN-MP-116.
- Request a Job Order File if required per AP 6022.
- Enter information to the Work Order Approvers section indicating work completion.
- Perform required steps of AP 0021 for WO closeout.
- Ensure all computer/chart recorder printouts, vendor reports, marked up drawings , copies of stock issue tickets and "P" tags, calibration data sheets and/or any QC reports are turned in with the completed work package.

4.5.2. Supervisor

4.5.2.1. Before assigning work

- Review work activity and personnel training and assign qualified personnel to perform the job,

- Review Work scope for tests or evolutions which may degrade the plant's safety margins. Consideration should be given to notifying the Department Superintendent for the need of additional management oversight (SOER 9101) and implementing AP 6100, Infrequently Performed Tests or Evolutions.

- Review the work scope to determine if temporary electrical jumper and/or lifted leads require implementation of AP 0020, AP 0140, or AP 0315.

- Review the work scope to determine if the activity may create a significant fire hazard or degrade any portion of the fire protection system. Implement AP 0042 and ENN-DC-161 if necessary,

- If work is Minor Maintenance or Troubleshooting (AP 0049 and AP 0050), review scope to ensure the work will not exceed the Minor Maintenance or Troubleshooting definition per AP 0049 or AP 0050.

- Perform a pre-job briefing in accordance with AP 0052 to insure the individual assigned has an understanding of the work scope,

- Review any Safety and Housekeeping AP 6024 or AP 6026 requirement,

- Review the work order for the need to perform Peer Inspections (AP 6025), assign individuals as required,

4.5.2.2. Upon completion of work, review the following:

4.5.2.2.1. Procedures and/or Work Orders

- Review all data sheets for completion and readability.

- Review all data sheet blocks and assure they are filled in or N/A'd with an explanation.

- Ensure all signoffs and dates are entered including housekeeping inspection closeout.

- Ensure the M&TE used has been recorded.

- Ensure all AS-Found/AS-left data out of spec is circled in red. Any surveillance with out-of-spec data will be routed to the applicable Maintenance Support Individual for review.
- Ensure all acceptance criteria had been met.
- Ensure the Surveillance List had been signed off.
- Ensure the I/C Calibration Data Sheet form is complete if applicable.
- Ensure there is documentation of equipment returned to service. (AUDITRPT9606_01)
- Review attached records, graphs, etc. for QA records and note on the WO.
- Assign reconciliation code and failure codes Per AP 0021. If in the recommendation section of the WO there are opportunities for improvement, recommendations to prevent reoccurrence and/or a need for further action identified ensure that a "00" (Further Evaluation Recommended) Failure Code is assigned.
- Disposition all remarks in the WO/Procedure notes. If immediate Maintenance Support review for disposition of technical issued is necessary, contact the appropriate Support group to resolve. If there are opportunities for improvement, recommendations to prevent reoccurrence and/or a need for further action identified ensure that a "00" (Further Evaluation Recommendation) Failure Code is assigned.
- Review all WO feedback forms, add notes to form as necessary and forward to Work Control Department.

4.5.2.2.2. Review for out of tolerance data and noted discrepancies to determine if

- Tech Spec Administrative Limits were exceeded,
- Tech Spec, TRM, or ODCM Limits were exceeded,
- Environmental Qualifications limits expired.

4.5.2.2.3. Initiate an Event Report if:

- The requirements of Step 4.5.2.2.2. above are not met.
- The component's as-left condition is such that operability is challenged (if not previously initiated).

4.5.2.2.4. Review the Post Maintenance Test assuring proper component operation. The PMT shall verify that the work activity corrected the identified discrepancies and did not create any new unresolved issues.

4.5.2.2.5. Determine whether a Failure Cause Analysis is required, reference Appendix C. Failure Code "00" must be assigned to Work Orders.

4.5.2.2.6. All applicable documents are updated such as VYEM's, EQ Files, Equipment History and Procedures, initiate AP 6022 if necessary.

4.5.2.2.7. Peer Inspection Reports are complete and problems addressed.

4.5.2.2.8. If WO involves maintenance on an AOV (Air Operated Valve) forward entire package to the Program/Component AOV Engineer for review.

4.5.3. Department Support Individual/Maintenance Coordinator

4.5.3.1. Department Support Individual/ Maintenance Coordinator review of Work Orders and Surveillance Data will be performed in accordance with the following:

4.5.3.1.1. If in the recommendation section of the WO there are opportunities for improvement, recommendations to prevent recurrence and/or a need for further action identified the following shall be performed:

- Provide an explanation on the WO whether you agree or disagree.
- Identify any action that was or will be taken. If no action will be taken on the recommendation this should be discussed with the individual who made the suggestion so that he will be aware of the reasons.
- Consult the Department Superintendent if a recommendation can not be achieved.

4.5.3.1.2. Review Minor Maintenance WO's to ensure adequate documentation of the work performed.

4.5.3.1.3. Ensure the PMT addresses the WO problem description.

4.5.3.1.4. Review any calibration data associated with the Work Order's or procedures to ensure the:

- As-left data is acceptable and that there is no evidence of a negative trend developing.
- As-found data does not indicate a programmatic problem with past calibrations.

- An Event Report (AP 0009) will be initiated for any negative trend identified, as-left condition where equipment operability is challenged or programmatic problem identified with past calibrations. (If not previously initiated).

4.5.3.1.5. Ensure that calibration data is input into the instrument calibration history.

4.5.3.1.6. Review the reconciliation code and failure code. If any changes are required discuss it with the Supervisor.

4.5.3.1.7. Review the parts list and ensure that the parts were the appropriate safety classification.

4.5.3.1.8. Verify that any special P-Tag requirements have been addressed in the WO notes.

4.5.3.1.9. Ensure all maintenance items have final closure review i.e., if the failure is end of life, should a PM be put in place to preclude failure in the future.

4.5.3.1.10. Maintenance Support individual will assist in developing QC Peer inspections with the Work Control Peer Inspection Coordinator.

4.5.3.1.11. Maintenance Support individual will evaluate unacceptable Peer Inspection results and provide resolution to the Department Supervisor.

4.5.4. I/C Secretary

4.5.4.1. Ensure that the most recent procedure revision is contained in the procedure file and that sufficient quantities of procedure data sheets are available.

4.5.4.2. Transfer all M&TE data to the M&TE tracking forms per DP 0301.

4.5.4.3. Transfer all Calibration Data Sheet Information to the I&C Cal Database. (ER 99-0755_02)

4.5.4.3.1. Obtain and independent verification of data entry.

4.5.4.4. File all required forms and attached QA records per AP 6807.

4.5.4.5. Ensure that all data and other pertinent information is properly maintained per procedures AP 0021, DP 0305, AP 6807.

4.6. Administrative Controls

4.6.1. Field use of Controlled Documents

The use of controlled documents such as P&ID's, CWD's, other Controlled Prints, VYEM's in the field is highly desirable and necessary when performing troubleshooting and repairs. The following process is designed to ensure that the necessary documents are available for use while ensuring that no work is performed with outdated or uncontrolled documents.

This instruction has been developed with the realization that there are differing situations in regard to the use of controlled documents and provides differing directions as to the control of this information.

4.6.1.1. Use of Documents in Clean Non-Contaminated Areas.

- The original document may be used in this situation by signing out the document and inserting the card in the storage location.
- The document must be returned to its storage location upon completion of work in its original condition.

4.6.1.2. Use of Documents in Contaminated Areas or where it could be destroyed or is to be marked-up.

- Make a copy of the document and stamp it with the information below.

  WORKING COPY OF: ____________(P&ID,CWD,VYEM,OTHER)
  TO BE USED FOR (WO # / OTHER)________________
  VALID UNTIL (DATE): ________________

- The "VALID UNTIL" date shall not be more then 14 days from the date of the copy being produced.
- Upon completion of work or expiration of valid date any mark-ups will be addressed and the copy destroyed.

4.6.2. Review and Control of Procedure Change Recommendations.

This section describes the internal review and change process. AP 0096 is the controlling document. The process described below is considered to be an enhancement to the parent document. This process is meant to provide good information to the procedure developers, effect a working communication link between commentor and resolver, and provide a method of resolving any difference.

4.6.2.1. Inter-Department Review and Comment Process

- The "Procedure Change Recommendation Form" (VYAPF 0096.05) will be available to all members of the department for communicating procedure enhancement opportunities.
- This form with comments filled out by the initiator will be forwarded to the Support individual.
- The Maint. Support Manager will assign a member of the Support Group the responsibility for reviewing the suggested change and resolving the comments.
- The individual assigned to review and resolve the comments will meet with the initiator to further clarify the comments and discuss resolutions.
- Unresolved comments may be pursued by the initiator through the management organization.
- Upon resolution of the comments, the individual performing this task will review the results with the Support individual. If procedure changes are required, a plan for making these changes within a proper time frame shall be established.
- The disposition is approved by the Department Superintendent.
- A copy of the completed VYAPF 0096.05 form will be sent to the originator.
- For long term corrective action, a copy of this form will be placed in the shop procedure file for information.

4.6.3. Incorporation of Instrument Uncertainty Calculations into I&C Surveillance Procedures.

4.6.3.1. Instrument Uncertainty Calculations will be incorporated in the discussion section in a table format as follows:

- Channel being monitored (optional).
- Instruments that are being checked by the procedure.
- List the measured parameters.
- List the action that will occur at the setpoint.
- List the required Limiting setpoint/Tech. Spec. value.
- List the setting established as the VY administrative limit.
- Include all factors used in this determination (i.e. Head correction).
- List the allowable As-Found tolerance from the Uncertainty calculation.

5.0 REFERENCES AND COMMITMENTS

5.1. Technical Specifications and Site Documents

- 5.1.1. Section 1.0
- 5.1.2. VOQAM, Vermont Yankee Operational Quality Assurance Manual

5.2. Administrative Limits

- 5.2.1. None

5.3. Codes, Standards, and Regulations

- 5.3.1. None

5.4. Commitments

- 5.4.1. AUDITRPT 9606_01
- 5.4.2. INS 970502-02_16
- 5.4.3. ER 990755_02, Control of I&C Cal Program

5.5. Supplemental References

- 5.5.1. SOER 91-01, Conduct of Infrequently Performed Tests or Evolutions Plant Controlled Drawings
- 5.5.2. VY E&C Preventive Maintenance System Analyzed Maintenance Project (SAM)
- 5.5.3. Reliability Based Maintenance (RBM)
- 5.5.4. ENN-LI-102, Corrective Action Process
- 5.5.5. ENN-MP-115, Material Issues and Staging
- 5.5.6. ENN-MP-116, Material Receiving and Returns
- 5.5.7. ENN-DC-161, Transient Combustible Program
- 5.5.8. ENVY Safety Manual
- 5.5.9. AP 0009, Event Reports
- 5.5.10. AP 0020, Control of Temporary and Minor Modifications
- 5.5.11. AP 0021, Work Orders
- 5.5.12. AP 0042, Plant Fire Prevention and Fire Protection
- 5.5.13. AP 0047, Work Request
- 5.5.14. AP 0048, Work Planning
- 5.5.15. AP 0049, Minor Maintenance
- 5.5.16. AP 0050, Trouble Shooting
- 5.5.17. AP 0052,Pre-Job Brief
- 5.5.18. AP 0053, Fix It Now (FIN) Process
- 5.5.19. AP 0092,Environmental Qualification (EQ) Document Change Notification
- 5.5.20. AP 0095, Plant Procedures
- 5.5.21. AP 0096, Procedure Development, Review, Issuance and Cancellation
- 5.5.22. AP 0140, Vermont Yankee Local Control Switching Rules
- 5.5.23. DP 0210, Tracking and Trending Program
- 5.5.24. AP 0214, Preventive Maintenance Program

5.5.25. AP 0305, I/C Department Environmental Qualification (EQ) Maintenance and Surveillance (M/S) Program
5.5.26. AP 0315, Equipment Alterations
5.5.27. AP 0502, Radiation Work Permits
5.5.28. AP 4000, Surveillance Testing Program
5.5.29. AP 6022, Job Order Files
5.5.30. AP 6024, Plant Housekeeping and Foreign Material Exclusion/Cleanliness Control
5.5.31. AP 6025, Independent Inspection
5.5.32. AP 6026, Refuel Floor Foreign Material Control Procedure
5.5.33. AP 6100, Infrequently Performed Tests or Evolutions
5.5.34. AP 6807, Collection, Temporary Storage and Retrieval of QA Records

6.0 FINAL CONDITIONS

6.1. None

7.0 ATTACHMENTS

7.1.	VYAPF 0310.01	I/C Surveillance
7.2.	VYAPF 0310.02	Deleted
7.3.	VYAPF 0310.03	Deleted
7.4.	Appendix A	Deleted
7.5.	Appendix B	Deleted
7.6.	Appendix C	Failure Cause Analysis
7.7.	Appendix D	Use of Thread Sealant for Fluid/Systems
7.8.	Appendix E	Deleted
7.9.	Appendix F	Lubricant Quick Reference
7.10.	Appendix G	Deleted
7.11.	Appendix H	Surveillance Schedule Information
7.12.	Appendix I	Deleted

8.0 QA REQUIREMENTS CROSS REFERENCE

8.1. None

I/C SURVEILLANCE

Week Beginning____________________

DATE DUE	PROC	TEST NUMBER	DESCRIPTION	TS Y/N	EQ Y/N	QC Y/N	DATE(S)	INITIALS

APPENDIX C

FAILURE CAUSE ANALYSIS

A failure cause analysis should be considered as an adjunct to a corrective maintenance repair when the component that failed is safety or capacity related and any of the following apply:

The cause of the failure was not identified during the repair process.

The failure resulted in an LCO condition or degraded safety system performance.

The failure cannot be attributed to "end of life" with any degree of certainty.

Doubt exists in the mind of the Specialist or Maintenance Support individual that the replaced/repaired component won't fail in the same mode due to installation, design inadequacies.

Past history indicates similar failures of an unacceptable frequency.

The failure resulted in degraded plant system performance.

A cause analysis could be cost beneficial based upon gaining information that might decrease maintenance frequencies, or down time on the equipment.

APPENDIX D
USE OF THREAD SEALANT FOR FLUID/SYSTEMS

MEMORANDUM

TO: DISTRIBUTION VERNON DATE: 6/8/94

FROM: D.C. GIRROIR VERNON FILE: 3.1

SUBJECT: THREAD SEALANT FOR FLUID/AIR SYSTEMS

References:
- a) Memo, J.E. Gardner to T.A. Watson, dated 1/17/86, Use of teflon on primary system fittings
- b) Memo, H. Heilman to P.B. Corbett/G. Cappuccio, dated 4/27/94, Use of liquid thread sealants ....
- c) General Electric RICSIL No. 67, dated 4/1/94, Use of thread sealants on scram solenoid pilot valves

The above references provides guidance for sealing threads on swagelok fittings and small pipe fittings for both liquid and air applications.

The use of teflon tape and liquid sealants provide potential problems for safety related equipment and instrument components.

If teflon tape is not correctly applied to connections it can be dislodged and adversely affect valves, instruments and other vital equipment. This has occurred at least once at Vermont Yankee resulting in the leak rate testing failure of valves CRD-413A and 413B (see LER 92-10).

If liquid thread sealant is not cautiously applied to connections intrusion into the process system is possible and may degrade certain components. Air systems with installed pilot valves using Buna-N and Dupont Viton elastomers are particularly susceptible to degradation when in contact with certain thread sealants. Neolube 100, Locktite PST 580, and Locktite 242 are specifically identified as inappropriate for use in air systems. Vermont Yankee has experienced specific problems with certain transmitter installations due to the use of liquid sealant.

Based upon the above discussion and consideration of the references, ME&C agrees that new guidance for sealing fluid/air systems is warranted.

Therefore:

1) Liquid thread sealant shall not be used in Service Air or Instrument Air system installations. When liquid thread sealant is used, **great care shall be taken to insure that no liquid is applied to the first thread that enters the female thread.** This practice will help to mitigate migration.

2) Teflon Tape thread sealant shall be used for all Service Air and Instrument Air Installations. Great care shall be taken in using

teflon. A minimum of at least one full end thread on the NPT fitting shall be left uncovered to absolutely assure that no tape is left in contact with the process fluid.

3) Teflon tape thread sealant is also the preferred material for fluid connections which involve instruments. For other fluid system applications, the selection of thread sealing material will be decided on a case by case basis and will consider the fluid medium, pressure, temperature and any other environmental affects.

4) Training should be provided to all appropriate* plant and contractor personnel in the proper application of teflon tape thread sealant and the prohibition of use of liquid thread sealant. The training shall also caution personnel to carefully clean both male and female fittings during all repairs or reinstallations.

5) Training should also be provided for all appropriate* plant and contractor personnel in the proper installation procedure for swagelok tube fittings. Experience warrants such training and this memo will serve to provide this recommendation.

See Note *

Approved: ______________ 6/8/94
MES&C Supervisor

Approved: P. B. C. ______________ 6/8/94
EE&C Supervisor

Note: To the Department Coordinator, please see me for the proper work assignments for training purposes.

______________________________ / ______
USER Department Manager or designee Date

distribution:

Bernie Buteau
Greg Maret
Mike Watson
Terry Watson
Mike Trombley
Larry Wood.
Cary Cappuccio
Pat Corbett.

APPENDIX F

LUBRICANT QUICK REFERENCE

Name / Type	Application	VY Stock #	Reference #	Equivalent	NOTES
Dow Corning 55M	Gen Plant Use Except HCUs	2000069022			For General plant use - except HCUs. OQA.
Dow Corning High Vacuum Grease	HCU/CRD	2000058757	GEK-9582C SIL 395	GE 351	This should be used for all HCU O-rings. (not 55M). GE# 209A6805P002. OQA.
Dow Corning 33	IRM/SRMs	4000058902	OP 5302/5333		GE# 213A7170P001
Dow Corning C-20057	LPRMs	See Equivalent	OP 5370 GEK-32384	Dow Corning 33	Equivalent per GE letter DH to TAW 2/14/89. Additional Reference GEK-83439.
Gear Oil, AGMA #8	IRM/SRM Drives	45OB048509	OP 5333 GEK-13962G		GE# 176A1777P001 (Rev 5 or 6)
Texaco Aircraft Hydraulic Oil 15	Feed Rate Valves	40SU156166	OP 5353		Use in Feed Rate Valve Snubber
Thread Lubricant FELPRO N5000	Gen Plant Use HCUs	2000049014	Various GEK-9582C	D50YP5B D50YP5A	Equivalent per PEG/KRS.0028. OQA
Silver Goop		2000078647		D50YP3	Superseded GEK uses
Dow Corning 41		2000069025			
Dow Corning 111	Rosemount Xmtr Flanges	50GE182985	Rosemount Manuals	Dow Corning 55M *	* Equivalent for Rosemount xmtrs only, per letter TJL to RAC of 11/30/92.
Vulcanlube NLGI, Grade 1	Scoop Tube Positioner	40LU152265	OP 5322		Location: I/C hot shop.
GE Silicone Compound 640 (Dielectric)		46GE060724			GE# 175A8251P001
Hydraulic Sealant Locktite # 56931	IRM/SRMs		GEK-32384		GE# 225A4819P001/2
Lubriplate, Fiske Brothers	Eagle Timers			*	* Per vendor to FPL, any good silicone grease is adequate.
Dow Corning 44	DeZurik Valves		Vendor Literature	Dow Corning 55M	Per D. Kohl of DeZurik, 55M is equal to 44 for cylinder and rubber good applications.

This is not intended as an all-inclusive list. Provide feedback for additions to Maintenance Support.

APPENDIX H

SURVEILLANCE SCHEDULE INFORMATION

PRE-STARTUP

OP 4300, 4301, and 43108 are performed within 7 days of a startup.

All I/C operating procedures are performed prior to startup unless plant requirements must be established in order to perform (see below).

OP 0105 STARTUP

The following procedures are tested during startup when plant conditions permit:

Procedure	Function	Requirement
OP 5371	LT-2-3-70 Hot Cal	>212°F
OP 4386	SRV Bellow Venting	Normal Operating Temp
OP 4308	APRM Cal	RMSS in Run
OP 43104	MSIV Isolation	RMSS in Run
OP 4379	Drywell Torus D/P	After D/P Established
OP 43105	TSV Logic	>30% 1st Stage Press
OP 4304	RBM Functional	>30% Power

POST STARTUP

Additionally, logic procedures OP 4332, OP 4343 and OP 4306 are performed within a week after startup.

SYSTEM VS. OPERABILITY CONDITION

RPS:	Need >212°F or critical. If <212°F and subcritical only need 1) Mode switch in S/D, 2) Manual Scram, 3) High Flux IRM, and 4) High SDV.	(3.1.1 Note 1)
RMCS:	Need when RMCS is not in S/D.	
ADS:	Need >100 psi and irr fuel in vessel.	(3.5.F)
RCIC:	Need >150 psi and irr fuel in vessel.	(3.5.G)
HPCI:	Need >150 psi and irr fuel in vessel and prior S/U from cold S/D.	(3.5.E)
CS and LPCI:	Need when irr fuel in vessel and prior Rx S/U from cold S/D. If cold S/D and no work that could drain vessel, all may be relaxed.	(3.5.A, 3.5.H)
Containment Spray:	Need >212°F.	(3.5.B)
Post Accident:	Power operation.	(3.2.G)
Primary Containment:	Need Rx critical or >212°F with fuel in vessel.	(3.7.C)
Secondary Containment:	RMSS in run, S/U or hot S/D; movement of irr fuel or fuel cask; core alts; or OPS which could drain vessel.	(3.7.C)
SGTS:	RMSS in run, S/U or hot S/D with Secondary Containment required.	(3.7.B.1)
Drywell/Torus D/P:	Need within 24 hours of reaching NOT/NOP.	(3.7.A.9)
Rx Bldg/Torus and Drywell/ Torus VAC Breakers:	Need when Primary Containment required.	(3.7.A.5/6)

Test Numbers

1xxx = weekly
2xxx = monthly
3xxx = quarterly
4xxx = semiannual
5xxx = annual
7xxx = 18 month operation (end of outage to end of outage)
8xxx = 18 month refuel outage

Schedule events are from base date (not last performed).

Drop dead dates are from last performed.

Any surveillance can be done late up to drop dead date with no (future or past) effects.

Surveillance done early must be cautious of time till next scheduled surveillance. If 5 weeks lapse until next monthly, you can only perform 3 days earlier than scheduled.

Tech Spec ±25%
Non-Tech Spec ±50%
Weeklies: 8.75 days (8 days rounded) max
Monthlies: 38 days max

SHUTDOWN

The following surveillances should be maintained current during refueling outages to ensure shutdown requirements for NIs, CS, LPCI, and Secondary Containment are satisfied. (SDV required for both RPS and RMCS, but is quarterly.)

NEUTRON MONITORING (Every 7 days when not in S/D)

4300	SRM (for RMCS)
4301	IRM (for RPS and RMCS)

CORE SPRAY & LPCI (Every 30/38 days)

4337	Rx Level (only low needed)
4338	Drywell Press (needed?)
4340	Rx Low Press Permissive
4342	Rx Low Press Permissive
4348	Core Spray Power Monitor
4351	Rx Low Press - RHR S/D Cooling
4353	RHR Power Monitor

SECONDARY CONTAINMENT (Every 30/38 days)

4313	Rx Level
4326	RBV/Refuel Floor Rad
4335	RBV/SGTS Power Monitor
4311	Drywell Press (needed?)