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10 CFR 50.90

2CAN121702

December 14, 2017

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

SUBJECT: License Amendment Request
Post-Accident Instrumentation Technical Specification Revision
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

Pursuant to 10 CFR 50.90, Entergy Operations, Inc. (Entergy), hereby requests NRC approval of a proposed change to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specification (TS) 3.3.3.6, "Post-Accident Instrumentation." The change is intended to provide greater consistency with NUREG 1432, Revision 4, "Standard Technical Specifications for Combustion Engineering Plants," and ensures that both Category 1 and Type A Regulatory Guide (RG) 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," instrumentation is included in the specification (unless already addressed within another specification). Condition Report CR-ANO-2-2017-5789 identified the current TS to be non-conservative in that not all Category 1 and Type A instrumentation, as designated in the ANO-2 Safety Analysis Report (SAR), is included in the associated TS table, while some instrumentation in the TS table does not meet the Category 1 and/or Type A criteria for inclusion in the TS. Entergy has revised procedures to ensure all SAR-designated Category 1 and Type A variables are controlled as RG 1.97 instrumentation in accordance with TS 3.3.3.6.

This license amendment request (LAR) is required to correct a non-conservative TS. Currently plant operations are administratively controlled as described in NRC Administrative Letter (AL) 98-10, "Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety." In accordance with the guidance in AL 98-10, this LAR is required to resolve a non-conservative TS and is not a voluntary request from a licensee to change its licensing basis. Therefore, this request is not subject to 'forward fit' considerations as described in the letter from S. Burns (NRC) to E. Ginsberg (NEI), dated July 14, 2010 (ML01960180).

In preparing this amendment request, a comparison of the current TS Table 3.3-10 with the list of RG 1.97 instrumentation in Table 7.5-3 of the ANO-2 SAR was completed, along with a comparison of the TS table to NUREG 1432. As a result, the TS table is being revised to clarify

the intended “range” (narrow or wide) of some of the instrumentation listed. Current TS instruments that are not designated as Category 1 or Type A are removed. Category 1 and/or Type A instruments listed in SAR Table 7.5-3 that are not included or clearly identified in TS Table 3.3-10 are added (unless already addressed within another specification).

The proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c).

No new regulatory commitments are included in this amendment request.

The Enclosure provides a description and assessment of the proposed change. The Enclosure also provides a listing of those instruments designated as Category 1 and/or Type A in the ANO-2 SAR, along with a description of procedural controls which verify instrument operation. The ANO-2 SAR was most recently submitted on April 28, 2016, and was docketed under ML16132A517, where SAR Table 7.5-3 may be viewed in full. Attachment 1 of the enclosure provides the existing TS pages marked to show the proposed changes. Attachment 2 of the enclosure includes a markup of the associated TS Bases pages, for information only. Attachment 3 of the enclosure provides the retyped (revised) TS pages.

Approval of the proposed amendment is requested by January 1, 2019. Once approved, the amendment shall be implemented within 90 days.

In accordance with 10 CFR 50.91, Entergy is notifying the State of Arkansas of this amendment request by transmitting a copy of this letter and enclosure to the designated State Official.

If there are any questions or if additional information is needed, please contact Stephenie Pyle at 479-858-4704.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on December 14, 2017.

Sincerely,

ORIGINAL SIGNED BY JOHN KIRKPATRICK FOR RICHARD L. ANDERSON

RLA/dbb

Enclosure: Evaluation of the Proposed Change

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Enclosure to

2CAN121702

Evaluation of the Proposed Change

EVALUATION OF THE PROPOSED CHANGE

1.0 SUMMARY DESCRIPTION

The proposed amendment would modify Technical Specification (TS) 3.3.3.6, "Post-Accident Instrumentation," associated with Arkansas Nuclear One, Unit 2 (ANO-2) Renewed Operating License NPF-6, to ensure that both Category 1 and Type A Regulatory Guide (RG) 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," instrumentation is included in the specification (unless already addressed within another specification) and gain greater consistency with NUREG 1432, Revision 4, "Standard Technical Specifications for Combustion Engineering Plants."

2.0 DETAILED DESCRIPTION

2.1 System Design and Operation

ANO-2 is designed with installed post-accident monitoring (PAM) instrumentation of the various types and categories referred to in Revision 3 of RG 1.97. This instrumentation is listed in Table 7.5-3 of the ANO-2 Safety Analysis Report (SAR). RG 1.97 includes discussion of instrumentation design and redundancy, depending on the associated "type" and "category" of a particular instrument variable. The ANO-2 PAM instrumentation is designed consistent with the recommendations contained in RG 1.97 as described in the SAR (reference ANO-2 SAR Section 7.5.2.5 and associated subsections).

2.2 Current TS Requirements

A historical review was inconclusive whether the original ANO-2 PAM TS was developed to include both Category 1 and Type A RG 1.97 instrumentation. The following 14 line items are included in the current ANO-2 PAM TS Table 3.3-10. Historical references to applicable TS amendment numbers are also denoted. Those line items designated with a "*" are not considered Category 1 or Type A variables in Table 7.5-3 of the ANO-2 SAR.

Original TS

1. Containment Pressure
2. Containment Radiation Monitors
3. Pressurizer Pressure
4. Pressurizer Water Level
5. Steam Generator Pressure
6. Steam Generator Water Level
7. Refueling Water Tank Water Level
8. Containment Water Level – Wide Range

TS Amendment 20 (1980) (References 1 and 2)

9. Emergency Feedwater Flow Rate
10. Reactor Coolant System Subcooling Margin Monitor*
11. Pressurizer Safety Valve Acoustic Position Indication*
12. Pressurizer Safety Valve Tail Pipe Temperature*

TS Amendment 63 (1985) (References 2 and 3)

2. Containment Pressure (High Range)

The original Item 2, Containment Radiation Monitors, was relocated to TS 3.3.3.1, Table 3.3-6, Instrument 1.b (discussed in Section 3.0 below).

TS Amendment 89 (1989) (References 5 and 6)

13. In Core Thermocouples (Core Exit Thermocouples)

TS Amendment 123 (1991) (References 7 and 8)

14. Reactor Vessel Level Monitoring System (RVLMS)

Similar to the Containment radiation monitors, neutron flux indication was not included in the PAM table (a Category 1, Type B variable). This is likely because neutron flux indication was (and is) required to be operable in accordance with various other ANO-2 TSs. Detailed discussion of this variable is included in Section 3.0 below.

2.3 Reason for the Proposed Change

ANO Regulatory Assurance identified that the list of PAM instruments in the current ANO-2 TS does not directly coincide with the ANO-2 SAR with respect to Category 1 and Type A RG 1.97 variables. Condition Report CR-ANO-2-2017-5789 was initiated to capture the potential non-conservative status of the TS.

In accordance with NRC Administrative Letter (AL) 98-10, non-conservative TSs are required to be corrected in a timely manner and administrative controls must be established to ensure nuclear safety is maintained until the TS is amended. This submittal meets the timeliness intent of AL 98-10 and acts to initiate correction of the non-conservative TS. Procedures have been revised to contain all Category 1 and Type A RG 1.97 instrumentation and to ensure these variables are controlled in accordance with TS 3.3.3.6. Administrative controls are further discussed in Section 3.0 of this letter.

In light of the above, Entergy proposes to revise the subject TS to both resolve the non-conservative aspect previously described and to gain greater consistency with the NUREG 1432 standard TS (STS).

2.4 Description of the Proposed Change

The proposed change would delete those instruments from the ANO-2 TSs which are not designated as either RG 1.97 Category 1 or Type A in accordance with Table 7.5-3 of the ANO-2 SAR, "R.G. 1.97 Post Accident Monitoring Variables." Conversely, the proposed change will add instrument variables to the ANO-2 TSs (unless already addressed within another specification) that are designated as RG 1.97 Category 1 or Type A in accordance with Table 7.5-3 of the ANO-2 SAR. Since SAR Table 7.5-3 has been identified as containing RG 1.97 Category 1 or Type A instrumentation not currently listed in TS Table 3.3-10, ANO-2 TS 3.3.3.6 is considered non-conservative at present. The proposed change would resolve the non-conservative nature of the subject TS and provide greater consistency with NUREG 1432.

A list of the current ANO-2 TS PAM instruments is included in Section 2.2 above. When considering those instruments designated as RG 1.97 Category A or Type 1 in Table 7.5-3 of the ANO-2 SAR, the following instruments currently listed in the PAM TS do not meet either criteria and are proposed to be removed from the TS:

1. Containment Pressure (Normal Design Range)
10. Reactor Coolant System Subcooling Margin Monitor
11. Pressurizer Safety Valve Acoustic Position Indication
12. Pressurizer Safety Valve Tail Pipe Temperature

Likewise, the following ANO-2 SAR Table 7.5-3 instruments do meet the specified RG 1.97 criteria and are proposed to be added to the current TS table using the above numbering:

1. Penetration Flow Path Containment Isolation Valve Position
10. Reactor Coolant System Hot Leg Temperature (Narrow Range)
11. Reactor Coolant System Hot Leg Temperature (Wide Range)
12. High Pressure Safety Injection Flow Rate

Although the ANO-2 TSs have not been converted to the STS, the associated ANO-2 TS 3.3.3.6 Bases is significantly modified to include detail consistent with the corresponding NUREG 1432 Bases.

3.0 TECHNICAL EVALUATION

The primary purpose of the PAM instrumentation is to display key variables that provide information required by the control room operators during accident situations. This information provides the necessary support for the operator to monitor and take the manual actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for Design Basis Accidents (DBAs). The operability of the PAM instrumentation ensures that there is sufficient information available on selected unit parameters to monitor and to assess unit status and behavior following an accident.

The availability of PAM instrumentation is important so that responses to corrective actions can be observed, and so that the need for and magnitude of further actions can be determined. These essential instruments are identified in Table 7.5-3 of the ANO-2 SAR, which addresses the recommendations of RG 1.97 as required by Supplement 1 to NUREG-0737, "Clarification of TMI Action Plan Requirements."

In accordance with NUREG 1432, the instrument channels required to be operable as designated in the associated TS equate to two classes of parameters: Type A and Category 1 variables. Type A variables are specified because these instruments provide the primary information that permits the control room operator to take specific manually controlled actions that are required when no automatic control is provided and that are required for safety systems to accomplish the respective safety functions for DBAs.

Category 1 variables are the key variables deemed risk significant because these instruments are needed to:

- Determine whether systems important to safety are performing intended functions
- Provide information that will enable operators to determine the potential for causing a gross breach of the barriers to radioactivity release
- Provide information regarding the release of radioactive materials to allow for early indication of the need to initiate action necessary to protect the public and to estimate the magnitude of any impending threat

Category 1 instrumentation provides for full environmental qualification, redundancy, and continuous real-time display, and also requires onsite power (remains available following a loss of offsite power event).

The ANO-2 SAR was most recently submitted on April 28, 2016, and was docketed under ML16132A517, where SAR Table 7.5-3 may be viewed in full. The following variables are extracted from Table 7.5-3, which are subject to inclusion in ANO-2 TS 3.3.3.6. The numerical ranges are included below; however, a generic designation of "narrow" or "wide" range is added (as used in the ANO-2 TS PAM table), consistent with the SAR table numerical values. The specific instruments that support these ranges are listed in the revised PAM TS Bases in Attachment 2 of this submittal.

	Variable	**Type**	**Cat**
1	Containment Isolation Valve Position	B	1
2	Containment Pressure – Wide Range (0 – 225 psia)	B	1
3	Reactor Coolant System (RCS) Pressure – Wide Range (0 – 3000 psia)	A	1
4	Pressurizer Level	D	1
5	Steam Generator (SG) Pressure	A	1
6	SG Level – Wide Range (17.4" – 498.4" above tube sheet)	A	1
7	Refueling Water Tank (RWT) Level	D	1
8	Containment Water Level – Wide Range (0 – 144")	B	1

	Variable	Type	Cat
9	Emergency Feedwater (EFW) Flow	D	1
10	RCS Hot Leg Temperature – Narrow Range (525 – 625 °F, 525 – 675 °F)	A	1
11	RCS Hot Leg Temperature – Wide Range (125 – 625 °F, 150 – 750 °F)	A	1
12	High Pressure Safety Injection (HPSI) Flow – Wide Range (0 – 1000 gpm)	A	1
13	Core Exit Temperature	C	1
14	RVLMS	B	1

As identified previously, there are two other variables that meet the RG 1.97 criteria for inclusion in the TSs which are not currently included in TS 3.3.3.6, but controlled by other specifications:

TS	Variable	Type	Category
TS Table 3.3-6, Instrument 1.b	Neutron Flux	B	1
TS Table 3.3-1, Functions 2 & 3 TS Table 3.3-9, Instrument 1	Containment Radiation Monitors	E	1

Containment area radiation is a Type E, Category 1, variable provided to monitor for the potential of significant radiation releases and to provide release assessment for use by operators in determining the need to invoke site emergency plans. The high range containment area radiation function consists of two redundant channels providing indication over a range of $1 – 10^8$ R/hr. The two channels are monitored in the control room on indicators, recorder, and the Safety Parameter Display System (SPDS).

As shown above, two containment radiation monitoring channels were (and are) required to be operable in accordance with ANO-2 TS 3.3.3.1, Table 3.3-6, in Modes 1, 2, 3, and 4. The modes of applicability for PAM instrumentation are Modes 1, 2, and 3. TS Table 3.3-6, Action 18, requires a single inoperable channel to be restored to an operable status within 7 days or a special report be submitted. With both channels inoperable, alternate means of monitoring containment radiation must be established within 72 hours and a special report submitted (if both channels are not restored within 7 days). This is more restrictive to PAM TS Table 3.3-10 Actions which generally allow up to 30 days to restore a single inoperable channel of instrumentation and, where containment entry is required for repair, alternate means may be used for monitoring purposes, thus avoiding an unnecessary unit shutdown in some cases. The containment radiation monitors were removed from PAM TS 3.3.3.6 in Amendment 123 to the ANO-2 TSs (refer to Section 2.2 above).

Wide range neutron flux indication is a Type B, Category 1 variable provided to verify reactor shutdown. The wide range neutron flux function consists of a minimum of two redundant channels of qualified fission chamber based instrumentation (Log Power or Startup channels). Four Log Power channel control board indicators provide indication over a range of 10^{-8} to 200% full power. Startup Channel 1 control board indication and recorder provide indication over a range of 0.1 to 10^6 cps (counts per second). Log Power Channels 1 and 2 are available on the SPDS. Log Power Channel 2 and Startup Channel 1 indications are also available on the Remote Shutdown Panel. ANO-2 TS 3.3.3.5, “Remote Shutdown Instrumentation,” requires

Log Power and Startup channel neutron flux indications to be operable in Modes 1, 2, and 3, the same mode of applicability required by the PAM TS 3.3.3.6. The instrument range stated in TS 3.3.3.5 envelopes the range required in SAR Table 7.5-3 (shown above).

Similar to the Containment radiation monitors, neutron flux indication was not included in the original PAM TS table. This is likely because neutron flux indication was (and is) required to be operable in accordance with other ANO-2 TSs. In addition to the above TS controls, ANO-2 TS Table 3.3-1, "Reactor Protective Instrumentation," requires three log power neutron flux channels to be operable in Mode 2, and also in Mode 3 when reactor trip circuit breakers (RTCBs) are closed. The RTCBs are closed during plant heat-up in order to establish cocked rod protection (withdrawal of the two shutdown banks of control element assemblies). Even with three of four neutron flux channels operable in Modes 1 and 2 at the onset of a DBA, at least two channels are expected to remain available post-trip (when the RTCBs automatically open) given a single failure of one channel. Because the required neutron flux channels are controlled in accordance with other TSs, this variable is not included in PAM TS 3.3.3.6.

Major Changes to ANO-2 TS Table 3.3-10

In accordance with Table 7.5-3 of the ANO-2 SAR, the following instruments currently listed in the PAM TS are not RG 1.97 Category 1 or Type A instruments and, therefore, are proposed to be removed from the PAM TS table:

1. Containment Pressure (Normal Design Range)
10. Reactor Coolant System Subcooling Margin Monitor
11. Pressurizer Safety Valve Acoustic Position Indication
12. Pressurizer Safety Valve Tail Pipe Temperature

The above items will be replaced as follows:

1. Penetration Flow Path Containment Isolation Valve Position~~Pressure (Normal Design Range)~~
10. Reactor Coolant System ~~Subcooling Margin Monitor~~Hot Leg Temperature (Narrow Range)
11. ~~Pressurizer Safety Valve Acoustic Position Indication~~Reactor Coolant System Hot Leg Temperature (Wide Range)
12. ~~Pressurizer~~High Pressure Safety Injection Flow Rate~~Valve Tail Pipe Temperature~~

While the four variables proposed for removal from the PAM TS establishes consistency with ANO-2 SAR Table 7.5-3 and NUREG 1432, 10 CFR 50.36(c)(2)(ii) requires certain structures, systems, or components (SSCs) to be included in the TSs:

Criterion 1: Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

Criterion 2: A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 3: A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 4: A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

With respect to Item 1, "normal" range containment pressure was included in the original ANO-2 TSs. However, as documented in letter dated April 13, 1984 (Reference 10), the containment pressure instruments credited for RG 1.97 compliance were those with a range of 0 – 210 psia (today referred to as "wide" range). Containment pressure instruments referred to as "narrow" range originally were scaled to indicate 0 – 70 psia, but were modified in the early 1990s to a scale of 0 – 27 psia in order to provide operators a pressure display with smaller increments for verification of proper actuation of reactor trip or engineered safety features (all of which occur at a pressure less than 24 psia). The original 0 – 70 psia scaling led to confusion during this time frame with respect to which instruments were credited for RG 1.97 compliance. A condition report was initiated which resolved this issue (CR-ANO-2-2000-0242) by clarifying, based on the April 13, 1984 letter (Reference 10) and ANO-2 SAR Table 7.5-3, that the wide range containment pressure instruments were those credited for RG 1.97 compliance.

Note that the narrow range containment pressure instruments are not contained in ANO-2 SAR Table 7.5-3. Therefore, instead of adding the Containment Pressure – High Range variable (Item 2) to ANO-2 TS Table 3.3-10 in TS Amendment 63 (References 2 and 3), the nomenclature for Item 1, Containment Pressure (Normal Design Range) should have been revised to clarify the actual RG 1.97 range credited in the ANO-2 SAR. In light of this historical progression, Entergy proposes to remove Item 1 (Containment Pressure (Normal Design Range) from ANO-2 TS Table 3.3-10 to eliminate potential confusion.

Notwithstanding the above, narrow range containment pressure satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii) by performing the following functions at specified setpoints: 1) reactor trip, 2) containment isolation actuation signal, 3) containment spray actuation signal, 4) containment cooling actuation signal, and 4) safety injection actuation signal. The narrow range containment pressure instruments are required to be operable in Modes 1 and 2 in accordance with ANO-2 TS 3.3.1.1, "Reactor Protective Instrumentation," and Modes 1, 2, and 3 in accordance with ANO-2 TS 3.3.2.1, "Engineered Safety Feature Actuation System Instrumentation." Because this variable is controlled by other ANO-2 TSs and is not a Type A or Category 1 RG 1.97 variable, it is acceptable to remove the narrow range containment pressure instrument from the PAM TS.

The normal range containment pressure indication is replaced with penetration flow path containment isolation valve position indication, which is designated as a Category 1, Type A, RG 1.97 variable in SAR Table 7.5-3. Consistent with NUREG 1432, two position indications will be required to be operable in each penetration flow path. The associated NUREG 1432 Notes associated with this line item are also adopted, which provide exceptions for those penetrations which are isolated or having only one automatic containment isolation valve (CIV):

(a) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(b) Only one position indication channel is required for penetration flow paths with only one installed Control Room indication channel.

These Notes are justified as stated in respective NUREG 1432 Bases and adopted as part of this amendment request:

The LCO requires one position indicator for each automatic CIV. This is sufficient to redundantly verify the isolation status of each isolable penetration either via indicated status of the active valve and prior knowledge of the passive valve or via system boundary status. If an automatic CIV is known to be closed and deactivated, position indication is not needed to determine status. Therefore, the position indication for valves in this state is not required to be OPERABLE.

The margin-to-saturation (MTS) monitors (Item 10) were added in Amendment 20 of the ANO-2 TSs in response to NRC letter dated September 13, 1979 (Reference 9). Enclosure 4 of the NRC letter required installation of a subcooling meter, but did not designate the RG 1.97 category or type for this instrument. This monitor is designated as a Category 2, Type B variable in SAR Table 7.5-3. The MTS monitors receive RCS pressure and hot leg temperature inputs to determine the margin that exists to saturated conditions. However, RCS pressure and hot leg temperature is currently designated in SAR Table 7.5-3 as meeting the Category 1 and Type A RG 1.97 criteria for inclusion in the TSs. RCS pressure is also currently included in PAM TS Table 3.3-10 and RCS hot leg temperature is proposed to be added to the table.

MTS provides information to the operators related to satisfying one of the safety injection termination criteria following an accident. However, operators are well trained in the use of steam tables, which permit rapid determination of MTS using any of the numerous RCS pressure and hot leg temperature indications available in the control room. Note that the SPDS includes RCS pressure-temperature curves with real time display of current RCS conditions in graphic form. In addition, ANO-2 TS 3.4.6.1, “Leakage Detection Systems,” requires RCS leak detection instruments to aid in alerting operators to a breach in the RCS pressure boundary.

With RCS pressure currently listed in PAM TS Table 3.3-10, the MTS entry is removed and replaced with RCS hot leg temperature. Table 7.5-3 of the ANO-2 SAR includes both narrow and wide range hot leg temperatures as meeting RG 1.97 Category 1 and Type A criteria; therefore, Item 10 will include the narrow range hot leg temperature variable and Item 11 will include the wide range indication. Consistent with most other PAM functions, two narrow range and two wide range hot leg temperature indications will be required to be operable in each RCS loop (note that ANO-2 is a two-loop plant). Based on the above, the MTS monitors are not required to be included in the TSs as a PAM variable and do not satisfy the 10 CFR 50.36(c)(2)(ii) inclusion criteria as described below:

1. The MTS monitors are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary since numerous TS required RCS pressure and temperature indicators provide equivalent information, in addition to TS required RCS leak detection instruments. This is consistent with the, the Commission’s "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" published on July 22, 1993 (58 FR 39132).

2. The MTS monitors are not a process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

3. The MTS monitors are not part of the primary success path which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. Both the SPDS and manual steam tables are available to operators for verification of appropriate RCS pressure and inventory control prior to throttling or terminating safety injection.

4. The MTS monitors are not a SSC which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

RCS Pressurizer safety valve acoustic monitors (Item 11) and tail pipe temperatures (Item 12) were added in Amendment 20 of the ANO-2 TSs. These variables can provide information to the operator that a Pressurizer safety valve has lifted. It appears these additions were in response to the aforementioned NRC letter, Enclosure 4, table section number 2.1.3.a, which required direct indication of valve position. Again, the NRC letter did not designate the RG 1.97 category or type for these instruments. The acoustic monitors and tail pipe temperatures are designated as Category 2, Type D, RG 1.97 variables in Table 7.5-3 of the ANO-2 SAR. These indications are not vital to operator response or event mitigation since required RCS pressure and level indications will provide the needed identification of a loss of RCS inventory, whether through a Pressurizer safety valve or any other leak path. With the key focus being to maintain the core covered at all times, the location of any RCS leak is not immediately critical to operator response. Operators are also trained with respect to potential RCS indicated level anomalies that can be observed related to Pressurizer steam space or safety valve leakage. The response to Pressurizer safety valve leakage will require matching RCS makeup from the Chemical and Volume Control System (CVCS) or, for significant leakage, high pressure injection from the Emergency Core Cooling System (ECCS), which is the case regardless of leak location. Because the Pressurizer safety valves relieve to the Quench Tank, Quench Tank level, temperature, and pressure can also be used to identify safety valve leakage. While none of the Quench Tank indications meet RG 1.97 criteria for inclusion in the TSs, the instruments are included in Table 7.5-3 of the ANO-2 SAR and designated as Category 3, Type D, RG 1.97 variables.

Based on the above, the Pressurizer safety valve acoustic monitors (Item 11) and tail pipe temperatures (Item 12) are not required to be included in the TSs as PAM variables and do not satisfy the 10 CFR 50.36(c)(2)(ii) inclusion criteria as described below:

1. The Pressurizer safety valves are credited as a mitigating SSC in certain accident scenarios (reference ANO-2 SAR Sections 15.1.2.1, 15.1.7.3, and 15.1.14.2.1) and are, therefore, required to be operable in accordance with ANO-2 TS 3.4.3, “Safety Valves – Operating.” However, Pressurizer safety valve position indication does not detect or indicate a significant abnormal degradation of the reactor coolant pressure boundary, as required by Criterion 1.

2. The Pressurizer safety valves are not a process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

3. While the function of the Pressurizer safety valves is part of the primary success path in the ANO-2 SAR, valve position indication is not part of the primary success path. The ANO-2 SAR accident analysis assumes that the Pressurizer safety valves open as designed to reduce reactor pressure and no operator action based on valve position indication is required. Therefore, Pressurizer safety valve position indication is not part of the primary success path as indicated in Criterion 3.

4. The loss of Pressurizer safety valve position indication instrumentation has no effect on the probabilistic safety assessment, and has not been shown to be significant to health and safety as considered in Criterion 4.

Based on the foregoing discussion, both the Pressurizer safety valve acoustic monitors and tail pipe temperatures are proposed for removal from the TSs.

As stated previously, the Pressurizer safety acoustic monitors (Item 11) are replaced with the RG 1.97 Category 1, Type A, wide range RCS hot leg temperature variable. The Pressurizer safety valve tail pipe temperature is replaced with a new variable, HPSI flow rate.

HPSI flow is a Type A, Category 1, variable provided to enable the balancing of flow between the cold and hot leg injection paths, and may be required to ensure sufficient HPSI pump net positive suction head (NPSH) if, for example, the HPSI orifice bypass valve fails to close when required to align for hot leg injection. Hot leg injection is initiated more than three hours following a loss of coolant accident (LOCA) to minimize boron precipitation in the reactor core. Each HPSI train has one header flow instrument with a range of 0 - 1000 gpm. Because only one indicator is available on each train, the proposed addition of the HPSI flow indicators into PAM TS Table 3.3-10 will require only one channel per train to be operable. This is consistent with the single temperature indication per Pressurizer safety valve currently listed as Item 12 in the current TS table.

While most PAM functions include a two channel provision, it is acceptable to permit just one channel per train of HPSI flow indications because:

- There is only one flow instrument installed on each of the two HPSI train main headers.
- The flow indication is not required for initial safety injection at the onset of an accident. Each HPSI header splits into four cold leg injection headers, each of which contain an installed flow instrument used during initial accident response verifications.
- Hot leg injection is required only for leaks that result in long term recirculation cooling (via the containment sump) such that shutdown cooling cannot be placed in service and Pressurizer level cannot be restored. Note that break flow is minimized as RCS pressure is significantly reduced in response to a LOCA. Therefore, a scenario requiring hot leg injection post-LOCA is reasonably unlikely.
- The time permitted to restore one or more inoperable HPSI flow channels permits a temporary means of flow indication to be installed, which would be described in the report required in accordance with TS 6.6.4.

Major Changes to the Actions associated with TS Table 3.3-10

Note that the ANO-2 TSs have not been converted to the improved standard of NUREG 1432 and, therefore, formatting, wording, and references may differ somewhat (such as the use of mode noun-names instead of numerical values). However, these differences do not prevent obtaining consistency with the NUREG or result in failure to meet the intent of the associated NUREG Actions.

For clarity, the NUREG 1432 PAM TS Note which specifies that separate Action entry is allowed for each Function is adopted and placed at the beginning of the Actions section of the ANO-2 TS. This adoption does not change the way in which the TS Actions are currently applied.

Action 1 is revised to be consistent with Conditions A and B of the NUREG 1432 PAM TS. While the current ANO-2 Action allows up to 30 days to restore an inoperable channel for a given function to operable status (consistent with NUREG 1432), failure to do so would require the unit to be placed in Mode 3 in the next 12 hours. NUREG 1432 does not require a unit shutdown in this event, but instead requires a report be submitted to the NRC in accordance with specification 5.6.5 of the NUREG. The NUREG reporting requirement states:

> *When a report is required by Condition B or F of LCO 3.3.[11], "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.*

The NUREG reporting requirement is similar to that contained in ANO-2 TS Table 3.3-10, Actions 3.b and 4.b. The reporting requirement, in lieu of a unit shutdown, is applicable to all Functions listed in the respective NUREG 1432 PAM table. The revised ANO-2 Action is appropriate in lieu of a shutdown requirement, given the likelihood of plant conditions that would require information provided by this instrumentation. Also, alternative Actions are identified (and specified in the required report). In support of adopting the NUREG 1432 requirements associated with Action 1 of the ANO-2 TS PAM table, this new report is added as TS 6.6.4 (currently an unused specification number) of the ANO-2 TSs, consistent with NUREG 1432, TS 5.6.5 (and stated above) with only reference to the associated ANO-2 specific PAM TS changed. Note that section 6.6.x is the reporting section of the ANO-2 TSs, similar to section 5.6.x of NUREG 1432.

Because the above 30-day Action followed by a required report is applicable to all Functions listed in the NUREG PAM table, reference to the revised ANO-2 PAM Action 1 is added to each of the Functions listed in the ANO-2 table where not already listed (see the 3rd column of the table). Effectively, this adds Action 1 applicability to the containment pressure and containment water level variables. Action 2 of the ANO-2 TS PAM table, which applies only to the containment pressure and water level variables, is similar to Action 1. Action 2 contained a provision where an inoperable channel associated with either of these variables need not be restored if containment entry would be required. With the adoption of the NUREG 1432 PAM TS version of Action 1, Action 2 is no longer necessary (Action 1 will permit continued operation). Action 2, therefore, is revised to address conditions where no channel is operable for a given Function (described below).

Application of the revised Action 1 is less restrictive in that continued operation is permitted, given submittal of the required report, when the inoperable channel is not restored within 30 days. This is consistent with the discussion included in the respective NUREG 1432 TS Bases:

> *This Required Action specifies initiation of actions in accordance with Specification 5.6.5, which requires a written report to be submitted to the Nuclear Regulatory Commission. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative Required Actions. This Required Action is appropriate in lieu of a shutdown requirement, given the likelihood of plant conditions that would require information provided by this instrumentation. Also, alternative Required Actions are identified before a loss of functional capability condition occurs.*

Action 2 of the ANO-2 TS PAM table is revised to permit 7 days to restore at least one channel of a given Function to operable status when both channels of that Function are inoperable. If at least one channel for the given Function is not restored in 7 days, the unit must be shutdown. This is consistent with NUREG 1432 PAM Conditions C, D, and E, and is applicable to all table Functions (applicability to the RVLMS variable is discussed later). Note that the current ANO-2 wording of Actions 1 and 2 state "With the number of…channels less than required…", indicating any number of channels may be inoperable for a given Function. Therefore, the adoption of the 7-day restoration allowance governing two channel inoperability is more restrictive than the 30 days permitted by the existing ANO-2 TSs. The requirement for unit shutdown if at least one channel is not restored to an operable status remains consistent with the current ANO-2 TSs and NUREG 1432.

Because the above 7-day Action followed by a unit shutdown is applicable to all Functions listed in the NUREG PAM table, reference to Action 2 is added to each of the Functions listed in the ANO-2 table where not already listed (see the 3rd column of the table). This brings the ANO-2 TS into alignment with NUREG 1432. Again, this is a more restrictive change with respect to the time allowed to restore at least one inoperable channel of a given function (with the exception of the RVLMS variable which is discussed later).

Action 2 of the ANO-2 TS PAM table is also modified to adopt the NUREG 1432 requirement to reach Mode 3 (Hot Standby) in 6 hours. Currently, the ANO-2 action requires the unit to be placed in Mode 4 (Hot Shutdown) in 12 hours with no restriction on the time to reach Mode 3. The ANO-2 action will continue to require shutdown to Mode 4 within a total of 12 hours following failure to restore an inoperable channel within 7 days, by restating the Mode 4 requirement as "…be in Hot Shutdown within the following 6 hours" (after reaching Mode 3). This is consistent with Condition E of the NUREG 1432 PAM TS and is a more restrictive change since the current ANO-2 TS does not restrict the time to reach Mode 3 conditions.

The RVLMS provides a direct measurement of the collapsed liquid level above the fuel alignment plate. The collapsed level represents the amount of liquid mass that is in the reactor vessel above the core. Measurement of the collapsed water level is selected because it is a direct indication of the water inventory. The collapsed level is obtained over the same temperature and pressure range as the saturation measurements, thereby encompassing all operating and accident conditions where it must function. The level range extends from the top of the vessel down to the top of the fuel alignment plate.

The current ANO-2 PAM TS table Actions 3 and 4 are associated with the RVLMS variable. The current restoration times permitted by these actions are more restrictive (7 days for one inoperable channel, 48 hours for two inoperable channels) than those contained in NUREG 1432. However, restoration is only required if "repairs are feasible without shutting down." Where repairs are not feasible, a report must be submitted to the NRC containing information consistent with the reporting requirements described earlier in this letter. To gain consistency with NUREG 1432, Action 3 of the ANO-2 PAM TS table is deleted in favor of the revised Action 1. This will permit 30 days to restore a single inoperable RVLMS channel to an operable status, followed by the submittal of the aforementioned report if restoration is not completed within 30 days.

While the adoption of the 30-day restoration time for single RVLMS channel inoperable is less restrictive than the current ANO-2 PAM TS requirement, this change is justified consistent with the discussion included in the related NUREG 1432 TS Bases:

> *The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channel (or in the case of a Function that has only one required channel, other non-Regulatory Guide 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.*

Application of the revised Action 1 to the RVLMS is also less restrictive in that continued operation is permitted, with submittal of the required report, even where repair of the single inoperable channel is feasible. This is consistent with all other PAM Functions and is justified consistent with the respective NUREG 1432 TS Bases as described previously.

Action 4 of the ANO-2 PAM TS table is applicable to conditions where both RVLMS channels are inoperable and requires restoration of at least one RVLMS channel within 48 hours. Because Action 1 will now replace the existing Action 3, Action 4 is proposed for deletion and Action 3 will be revised to address scenarios involving the loss of both RVLMS channels. Where repairs are feasible, the revised Action 3 will require application of the revised Action 2 such that one channel must be restored within 7 days or unit shutdown will be required. Where repairs are not feasible, the existing allowance to submit a report in lieu of unit shutdown is maintained and modified to be consistent with revised Action 1 and NUREG 1432 PAM TS, Condition F. To differentiate between which Action is applicable to the RVLMS channels, a Note is added to Action 2 which describes when a shutdown is required, or not required, depending upon RVLMS repair feasibility. Reference to Action 2 is also added to the 3rd column of the ANO-2 TS PAM table RVLMS Function such that a unit shutdown will be required if at least one RVLMS channels is not restored to an operable status within 7 days, assuming repairs are feasible. This is consistent with the remaining PAM Functions and the restoration time of 7 days (in lieu of the current 48-hour limit for the RVLMS Function) is justified consistent with the discussion included in the related NUREG 1432 TS Bases:

> *The Completion Time of 7 days is based on the relatively low probability of an event requiring PAM instrumentation operation and the availability of alternate means to obtain the required information. Continuous operation with two required channels inoperable in a Function is not acceptable because the alternate indications may not fully meet all performance qualification requirements applied to the PAM instrumentation. Therefore, requiring restoration of one inoperable channel of the Function limits the risk that the PAM Function will be in a degraded condition should an accident occur.*

With both RVLMS channels inoperable and repairs are not feasible, the revised Action 3 will permit continued plant operation, provided a report is submitted to the NRC as described in new ANO-2 TS 6.6.4. Action 3 remains applicable only to the RVLMS variable and is consistent with the current ANO-2 TS requirements for the RVLMS variable and Condition F of the NUREG 1432 PAM TS. The associated NUREG 1432 TS Bases associated with application of this change to the RVLMS states (this information is bracketed and is dependent on the individual plant design/availability of vital instrumentation):

> *[At this plant, alternate means of monitoring Reactor Vessel Water Level and Containment Area Radiation have been developed and tested. These alternate means may be temporarily installed if the normal PAM channel cannot be restored to OPERABLE status within the allotted time. If these alternate means are used, the Required Action is not to shut down the plant, but rather to follow the directions of Specification 5.6.5. The report provided to the NRC should discuss whether the alternate means are equivalent to the installed PAM channels, justify the areas in which they are not equivalent, and provide a schedule for restoring the normal PAM channels.]*

With respect to alternate means of monitoring, the RVLMS channels importance centers around LOCAs where RCS inventory is severely challenged. The RVLMS is the only instrument capable of providing a relatively direct measurement of RCS level once inventory has been lowered below the range of RCS Pressurizer level instrumentation. Such conditions would normally be a result of insufficient RCS makeup capability, at least for a period of time.

Passive RCS makeup capability at ANO-2 includes four Safety Injection Tanks, the contents of which are delivered to the reactor vessel by means of gravity alone (no active component is required to reposition) when RCS pressure lowers below 600 psia. The ANO-2 design also includes two independent and vital powered high pressure and low pressure inject trains, all of which must be lost or deemed ineffective (possibly due to elevated RCS pressure above the shutoff head of the pumps) to significantly challenge the ability to maintain the core covered. Whenever Pressurizer level is below 29%, procedures require HPSI injection and also provide instructions for lowering RCS pressure, as necessary, to ensure HPSI injection is established. Therefore, a scenario requiring critical use of the RVLMS is of reasonably likelihood.

Assuming a scenario where the RCS Pressurizer is emptied and RCS makeup is insufficient, and in the absence of an operable RVLMS channel, the following sequence is likely to follow.

- RCS hot leg temperatures will indicate saturated conditions once RCS level is reduced below the top of the hot legs.
- RCS natural circulation will continue provided sufficient SG feedwater inventory is maintained and sufficient level in the RCS hot legs is maintained. As RCS level continues to decrease, natural circulation will subside as indicated by reduced temperature difference between the hot leg and cold leg temperature instruments and decreasing SG pressure, and hot leg temperature will no longer be decreasing. RCS temperature and pressure (the latter depending on the size of the RCS boundary breach) will begin to rise.
- Following the loss of natural circulation and depending on the rate in which RCS level is decreasing, reflux boiling may commence. The symptoms of a loss of reflux boiling are similar to those associated with a loss of natural circulation, but more pronounced.

In all scenarios, full HPSI flow is required until Pressurizer level is restored, regardless of the availability of RVLMS indication. If RCS pressure is sufficiently low, low pressure safety injection (LPSI) will also occur until the plant can be stabilized.

All of the above indications are required to be available by either the ANO-2 PAM TS or other TSs, similar to those previously described. In addition, operators are well trained in response to potential core uncovery events as required by post-Three Mile Island guidance and regulation related to such events. Core uncovery is indicated by superheated conditions on various RCS temperature indicators and, if available, the core exit thermocouples (the latter can be affected by the loss of RVLMS in some cases). However, procedures do not rely on the RVLMS alone to invoke action to restore RCS inventory. For example, HPSI flow is not permitted to be throttled or secured unless Pressurizer level has been restored to > 29%, margin to saturation is ≥ 30 °F, and at least one SG is available. Therefore, the unavailability of RVLMS channels will not prevent conservative action to maintain the core covered.

In light of the above, Entergy believes the NUREG 1432, Condition F, PAM TS Bases is applicable to ANO-2 and, therefore, a unit shutdown should not be required when both RVLMS channels are inoperable and repairs are not feasible.

Other Changes

- The Limiting Condition for Operation of TS 3.3.3.6 is modified to include reference to "each Function" shown in TS Table 3.3-10, consistent with NUREG 1432. This change does not affect any requirement of the PAM TS.
- Information redundant to TS Table 4.3-10 is removed from Surveillance Requirement (SR) 4.3.3.6 on TS Page 3/4 3-39. The subject table already defines what testing is required and the required frequency of the testing. This change does not affect any requirement of the PAM TS.
- The number of EFW flow instrument channels required to be operable (Item 9) is changed from one per SG to two per SG. ANO-2 has two EFW pumps, both of which can feed each of the two SGs via separate feedwater piping. Since it is unknown which of the two EFW pumps may remain available post-accident (assuming a single failure) and the accident initiator may involve the loss of a SG, it is appropriate to require two channels of EFW flow indication per SG (one from each EFW train). With only one flow indication required, the remaining three flow instruments could conceivably be inoperable pre-accident such that a single failure of the remaining flow instrument would eliminate the ability of operators to monitor flow. Although SG level is the key indicator in most accident events (i.e., EFW flow indication is not critical initially), a loss of feedwater accident could require re-initiating feedwater flow to a SG that has had the feed nozzle uncovered for some time. In such a case, feedwater flow must be initially minimized to avoid a thermal transient on the SG feedwater nozzle. This change is consistent with NUREG 1432 is conservative with respect to the current TS requirements.
- Note (c) of the NUREG 1423 PAM table, which defines that a core exit thermocouple (CET) "channel" consists of two or more CETs, is not adopted. ANO-2 TS Amendment 89 (Reference 6) added the CETs to the PAM TS. The current TS table, in addition to the supporting documentation, required only two CETs per quadrant, such that a "channel" was considered one CET (per quadrant). Thus, the current ANO-2 TS

requirement is for two channels, or two CETs per quadrant (not four CETs per quadrant as would be required by the NUREG 1432 Note). The NRC stated in the associated TS Amendment 89 Safety Evaluation:

> "…require 2 thermocouples per quadrant as the minimum number of operable channels of operation for Unit 2. … These changes are in conformance with the sample provided in Enclosure 3 to Generic Letter 83-87, pages 15 and 16."

The ANO-2 system is designed with 42 CETs, with half powered from red train and half powered from green train vital inverter-backed 120 VAC buses. Note the associated ANO-2 TS Bases requires that the 2 CETs in each quadrant to be powered from vital independent power supplies. Based on the previous NRC-approved requirements for the CETs, the number of CETs normally available in each quadrant, and because at least one CET is expected to remain available in all four quadrants assuming a single failure of a vital power supply train, it is not necessary to adopt the subject NUREG 1432 Note in order to assure nuclear safety.

Cosmetic Changes

The following are administrative changes which do not alter the requirements of the current or proposed amendments to TS 3.3.3.6.

- Acronyms are defined and used where appropriate (i.e., Steam Generator = SG) along with general administrative changes for consistency (such as deletion of a hyphen where not needed). These changes do not affect any requirement of the PAM TS.
- The Action stated in TS 3.3.3.6 is modified to state "in accordance with" in lieu of "as shown" with reference to TS Table 3.3-10. This is a change in preferred English and does not affect any requirement of the PAM TS.
- "Instrument" is replaced with "function" in the title of the first column of TS Tables 3.3-10 and 4.3-10 to be consistent with NUREG 1432. Likewise, the title of the second column is change from "minimum channels operable" to "required channels", for consistency with NUREG 1432. These changes do not affect any requirement of the PAM TS.
- The single CET line entry in the current TS Tables 3.3-10 and 4.3-10 is expanded into a single entry for each core quadrant. Therefore, "core quadrant" is removed from the second column of TS Tables 3.3-10 as this designation would now be redundant. This change provides consistency with NUREG 1432 and does not affect any requirement of the PAM TS.
- Function numbering is revised as necessary to accommodate the changes to TS Tables 3.3-10 and 4.3-10. This change does not affect any requirement of the PAM TS.
- Reference to TS Amendment 89, the applicability of which is discussed previously in this letter, is added to footer of ANO-2 TS Page 34 3-40 as this is the amendment that added the CETs to TS Tables 3.3-10 and 4.3-10. The amendment reference already exists on the TS Table 4.3-10 page. This changes permits historical tracking of amendments to the relevant TS requirements and does not affect any requirement of the PAM TS.

- The CET and RVLMS functions relative to TS Table 4.3-10 are relocated from TS Page 3/4 3-41a to Page 3/4 3-41 (renumbered as Page 3/4 3-42 in the attached TS markup and revised pages). Affected TS page numbers are changed as necessary to eliminate use of sub-numbering (such as 40a, 41a). These changes do not affect any requirement of the PAM TS.

Administrative Controls

With respect to the variables being added to the ANO-2 PAM TS, the CIV open/close indications are verified by various procedures. The overall procedure for PAM instrumentation (OP-2305.026) includes all RG 1.97 Type A and Category 1 variables along with RG 1.97 variables of lesser classification. The procedure also refers to other procedures that may perform separate operability verifications (such as channel checks or functional testing) and ensures all instruments are verified as having a "green dot" on the control room indicator in order to readily identify the instrument as associated with RG 1.97. In some cases, CIV position indications are verified in separate stroke-test procedures associated with a specific system. The RG 1.97 procedure and associated Operation's logs have been revised to require response equivalent to Action 1 of the current ANO-2 PAM TS for these valve indications. Action 1 currently requires restoration within 30-days, followed by a unit shutdown if indication is not restored. Note that a copy of OP-2305.026 is available upon request.

Certain RCS hot leg temperatures are used as input to the MTS calculators (Item 10 of current TS) which have historically been controlled in accordance with the PAM TS. The remaining RCS hot leg temperature indications (see listing in the markup of the TS Bases provided in Attachment 2 of this enclosure) have been treated as PAM-related instruments, but procedures did not specifically require response similar to the PAM TS Actions. The RG 1.97 procedure and associated Operation's logs have been revised to require response equivalent to Action 1 of the current ANO-2 PAM TS for these temperature indications.

HPSI flow is a Type A, Category 1, variable provided to ensure maintenance of sufficient HPSI pump NPSH during the post-accident hot leg injection mode of operation. Hot leg injection is initiated more than three hours following a LOCA to minimize boron precipitation in the reactor core. HPSI flow must be throttled sufficiently when aligning for hot leg injection to balance flow between the cold and hot leg injection paths, and may be required to ensure HPSI pump NPSH requirements are maintained if, for example, the HPSI orifice bypass valve fails to close when required to align for hot leg injection. Each HPSI train has one header flow indicator with a range of 0 - 1000 gpm. Note that each HPSI train splits into four respective RCS cold leg injection headers, each having a flow indicator with a range of 0 – 350 gpm, which are included in OP-2305.026, along with the aforementioned HPSI header flow indicators. However, the hot leg injection path does not have installed flow indication.

The exception to the two channel requirement of most PAM functions is acceptable because hot leg injection is only required when a LOCA is of sufficient size that SDC cannot be placed in service. This means that the break size expended the entire contents of the RWT, Pressurizer level could not be restored, and the only present means of cooling is via the long-term recirculation mode via HPSI and Containment Spray. A LOCA of this size is of reasonably low likelihood based on historical performance of the commercial nuclear power industry. In addition, the time permitted to restore an inoperable channel also permits time to install a temporary means of flow indication, which would be described in the report required in accordance with TS 6.6.4.

The HPSI header flow indications proposed for addition to the ANO-2 PAM TS have also been historically controlled by OP-2305.026, which requires a 30-day administrative restoration period (equivalent to the current and revised Action 1 of the proposed ANO-2 PAM TS). If indication is not restored within 30 days, a condition report is initiated. The RG 1.97 procedure and associated Operation's logs have been revised to require response equivalent to Action 1 of the current ANO-2 PAM TS for these two flow instruments.

Summary

The changes described herein ensure appropriate PAM instrumentation will be controlled by the station TSs and that specified remedial action will be taken when required instrumentation is inoperable. The revised TS requirements will continue to support the operator's ability to monitor and control vital systems during post-accident conditions.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

Pursuant to 10 CFR 50.36(c), TS are required to include items in the following categories: (1) safety limits, limiting safety system settings, and limiting control settings, (2) limiting conditions for operation (LCOs), (3) surveillance requirements (SRs), (4) design features, and (5) administrative controls. 10 CFR 50, Appendix A, General Design Criteria (GDC) 13 states that instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. In addition, appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

The proposed change to the ANO-2 TS 3.3.3.6 continues to support the intent of the rule and does not invalidate the PAM instrumentation capability with respect to compliance with GDC 13.

4.2 Precedent

This amendment request is similar to that submitted by PSEG Nuclear LLC for Salem Generating Station Units 1 and 2 on November 16, 2016 (ML16323A279). The NRC issued a request for additional information (RAI) on July 18, 2017 (ML17199A112). The response was submitted on August 7, 2017 (ML17219A160). The RAI requested Salem provide the location (within the site licensing or technical documents) of PAM instrumentation being removed from the associated TS and the controls established for these instruments.

As discussed previously, Entergy proposes to remove the variables listed below from the ANO-2 PAM TS. These variables (with the exception of Containment Pressure – Normal Design Range) are listed in the ANO-2 SAR, Table 7.5-3, "R.G. 1.97 Post Accident Monitoring Variables," and are therefore controlled in accordance with 10 CFR 50.59.

Reactor Coolant System Subcooling Margin Monitor (2XI-4612-3, 2XI-4612-4)

Pressurizer Safety Valve Acoustic Position Indication (2VYI-4633-1, 2VYI-4634-1)

Pressurizer Safety Valve Tail Pipe Temperature (2TIS-4630, 2TIS-4631)

Containment Pressure (Normal Design Range) is not a RG 1.97 variable and, therefore, is not associated with the above procedures or listed in SAR Table 7.5-3. However, as noted previously, narrow range containment pressure is required by other TSs associated with the Reactor Protective System and the Engineered Safety Features Actuation System.

Salem received a second RAI on September 11, 2017 (ML17254A738) which required further discussion of not including the Penetration Flow Path Containment Isolation Valve Position in the Salem amendment request. Salem added this variable to the associated TS amendment request in response to the RAI in letter dated October 18, 2016 (ML17291A766). Entergy has included this variable in the ANO-2 amendment request.

The aforementioned Salem Unit 1 and 2 changes to the related PAM TS were approved by the NRC in letter dated November 14, 2017 (TS Amendments 320 and 301, respectively).

4.3 No Significant Hazards Consideration Analysis

Entergy Operations, Inc. (Entergy) has evaluated the proposed change to Technical Specification (TS) 3.3.3.6, "Post-Accident Instrumentation," using the criteria in 10 CFR 50.92 and has determined that the proposed change does not involve a significant hazards consideration.

Entergy proposes a change to the Arkansas Nuclear One, Unit 2 (ANO-2) TS 3.3.3.6 which removes instrumentation that does not meet Regulatory Guide (RG) 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," criteria for inclusion in the TSs, and adds instrumentation that does meet the subject criteria, as so designated in the ANO-2 Safety Analysis Report (SAR). Generic modifications to the TS are also made to improve consistency with NUREG 1432, "Standard Technical Specifications for Combustion Engineering Plants," Revision 4 In accordance with the associated NUREG 1432 TS Bases, RG 1.97 instrumentation that is designated as Type A and/or Category 1 variables should be included within the TSs.

The primary purpose of the post-accident monitoring (PAM) instrumentation is to display unit variables that provide information required by the control room operators during accident situations. This information provides the necessary support for the operator to monitor and take the manual actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for Design Basis Accidents (DBAs). The operability of the PAM instrumentation ensures that there is sufficient information available on selected unit parameters to monitor and to assess unit status and behavior following an accident.

Basis for no significant hazards consideration determination:

As required by 10 CFR 50.91(a), Entergy analysis of the issue of no significant hazards consideration is presented below.

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The PAM instrumentation is not an initiator of any design basis accident or event and, therefore, the proposed change does not increase the probability of any accident previously evaluated. The proposed change ensures required instrumentation is included in and controlled by the station TSs and does not change the response of the plant to any accidents.

   The proposed change does not adversely affect accident initiators or precursors, nor alter the design assumptions, conditions, and configuration of the facility or the manner in which the plant is operated and maintained. The removal and addition of specific instrumentation within ANO-2 TS 3.3.3.6 is consistent with the ANO-2 SAR, Table 7.5-3 RG 1.97 variables classified as Type A or Category 1 variables. Modifications to the TS Actions associated with inoperable instrumentation are consistent with the current ANO-2 licensing basis or act to improve consistency with NUREG 1432. The proposed change does not adversely affect the ability of structures, systems, and components (SSCs) to perform the associated intended safety function to mitigate the consequences of an initiating event within the assumed acceptance limits. The proposed change does not affect the source term, containment isolation, or radiological release assumptions used in evaluating the radiological consequences of any accident previously evaluated. Further, the proposed change does not increase the types and amounts of radioactive effluent that may be released offsite, nor significantly increase individual or cumulative occupational/public radiation exposures.

   Instrumentation that does not meet the RG 1.97 inclusion criteria as established in NUREG 1432 are removed from the TS; however, the instrumentation remains applicable to other RG 1.97 criteria and is maintained accordingly. Instrumentation added to the ANO-2 PAM TS does not change the manner in which the instrumentation is currently maintained since these instruments are currently designated as Type A and/or Category 1 variables in the ANO-2 SAR. However, including these instruments within the TSs will now require different mitigating actions during periods of inoperability, which may include a plant shutdown, establishment of alternate monitoring methods, and/or submittal of a special report to the NRC.

   Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed change does not result in a change in the manner in which the plant is operated during post-accident conditions and does not change the established mitigating actions associated with any necessary response to a DBA. The proposed change continues to ensure important instrumentation remains available to station operators such that currently established mitigating actions are not impacted. The change does not involve

a physical alteration of the plant (i.e., no new or different type of equipment will be installed) or a change in the methods governing normal or post-accident plant operation. The change does not alter assumptions made in the safety analysis.

Therefore, this change does not create the possibility of a new or different kind of accident from an accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No

The proposed change does not alter the manner in which safety limits, limiting safety system settings, or limiting conditions for operation are determined. The safety analysis acceptance criteria and assumptions are not impacted by the proposed change. The proposed change will not result in plant operation in a configuration outside the design basis. The proposed change ensures appropriate PAM instrumentation is controlled by the station TSs and that specified remedial action will be taken when required instrumentation is inoperable. The proposed change continues to support the operator ability to monitor and control vital systems during post-accident conditions.

Therefore, this change does not involve a significant reduction in a margin of safety.

Based upon the reasoning presented above, Entergy concludes that the requested change involves no significant hazards consideration, as set forth in 10 CFR 50.92(c), “Issuance of Amendment.”

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission’s regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

The proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR Part 20, and would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

6.0 REFERENCES

1. Entergy (Arkansas Power & Light Company) letter dated October 31, 1980, "*Proposed Technical Specifications for Lessons Learned Category "A" Items*" (ANO Letter 2-100-25) (NRC Microfiche 8011130197)

2. NRC letter dated March 3, 1981, "*Issuance of Amendment No. 20 to Facility Operating License No. NPF-6 - Arkansas Nuclear One, Unit No. 2*" (2CNA038102) (ML021490279)

3. Entergy (Arkansas Power & Light Company) letter dated March 16, 1984, "*NUREG-0737 Technical Specifications – Generic Letter 83-39*" (0CAN038401) (NRC Microfiche 8403260051)

4. NRC letter dated January 31, 1985, "*Issuance of Amendment Nos. 94 and 63 to Facility Operating License Nos. DPR-51 and NPF-6 for Arkansas Nuclear One, Units 1 and 2*" (0CNA018532) (ML021220628)

5. Entergy (Arkansas Power & Light Company) letter dated May 27, 1988, "*NUREG-0737 Generic Letter 83-37 Technical Specification Change Request*" (2CAN058809) (NRC Microfiche 8806030161)

6. NRC letter dated March 8, 1989, "*Issuance of Amendment Nos. 116 and 89 to Facility Operating License Nos. DPR-51 and NPF-6 - Arkansas Nuclear One, Units 1 and 2*" (TAC Nos. 69053 and 69054) (0CNA038911) (ML021230564)

7. Entergy (Arkansas Power & Light Company) letter dated October 26, 1989, "*Additional ICC Technical Specifications*" (0CAN108909) (NRC Microfiche 8911060413)

8. NRC letter dated September 9, 1991, "*Issuance of Amendment Nos. 151 and 123 to Facility Operating License Nos. DPR-51 and NPF-6 - Arkansas Nuclear One, Units 1 and 2*" (TAC Nos. 75293 and 75294) (0CNA099108) (NRC Microfiche 9109200350)

9. NRC letter dated September 13, 1979, "*Followup Actions Resulting from the NRC Staff Reviews Regarding the Three Mile Island Unit 2 Accident*" (0CNA097915) (ML073520999)

10. Entergy (Arkansas Power & Light Company) letter dated April 13, 1984, "*NUREG 0737 Supplement 1 – Regulatory Guide 1.97*" (2CAN948404)

ATTACHMENTS

1. Technical Specification Page Markups

2. Technical Specification Bases Page Markups

3. Retyped Technical Specification Pages

Enclosure Attachment 1 to

2CAN121702

Technical Specification Page Markups

INSTRUMENTATION

POST-ACCIDENT INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.6 The post-accident monitoring (PAM) instrumentation channels for each Function shown in Table 3.3-10 shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

In accordance with~~As shown in~~ Table 3.3-10.

SURVEILLANCE REQUIREMENTS

4.3.3.6 Each post-accident monitoring instrumentation channel shall be demonstrated OPERABLE ~~by performance of the CHANNEL CHECK and CHANNEL CALIBRATION operations at the frequencies shown~~ in accordance with Table 4.3-10.

TABLE 3.3-10

POST-ACCIDENT MONITORING INSTRUMENTATION

	FUNCTIONINSTRUMENT	REQUIREDMINIMUM CHANNELS OPERABLE	ACTION
1.	Penetration Flow Path Containment Isolation Valve PositionPressure (Normal Design Range)	2 per Penetration Flow Path[(a)(b)]	1, 2
2.	Containment Pressure (WideHigh Range)	2	1, 2
3.	Pressurizer Pressure (Wide Range)	2	1, 2
4.	Pressurizer Water Level	2	1, 2
5.	Steam Generator (SG) Pressure	2 per SG/steam generator	1, 2
6.	SGteam Generator Water Level (Wide Range)	2 per SG/steam generator	1, 2
7.	Refueling Water Tank Water Level	2	1, 2
8.	Containment Water Level —(Wide Range)	2	1, 2
9.	Emergency Feedwater Flow Rate	21 per SG/steam generator	1, 2
10.	Reactor Coolant System Hot Leg TemperatureSubcooling Margin Monitor (Narrow Range)	2 per Loop1	1, 2
11.	Reactor Coolant System Hot Leg TemperaturePressurizer Safety Valve Acoustic Position Indication (Wide Range)	2 per Loop1/Valve	1, 2
12.	Pressurizer Safety Valve Tail Pipe TemperatureHigh Pressure Safety Injection Flow Rate	1 per Train/Valve	1, 2
13.	In Core Thermocouples (Core Exit Thermocouples) (CETs) – Quadrant 1	2/core quadrant	1, 2
14.	CETs – Quadrant 2	2	1, 2
15.	CETs – Quadrant 3	2	1, 2
16.	CETs – Quadrant 4	2	1, 2

17	Reactor Vessel Level Monitoring System (RVLMS)	2	1, 2, 3~~, 4~~ 4.

(a) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(b) Only one position indication channel is required for penetration flow paths with only one installed Control Room indication channel.

TABLE 3.3-10 (cont'd)

POST-ACCIDENT MONITORING INSTRUMENTATION

ACTIONs[1]~~ction~~

1)~~:~~ With one or more Table 3.3-10 Functions with one required channel inoperable~~the number of OPERABLE post-accident monitoring channels less than required by Table 3.3-10~~, ~~either~~ restore the required~~inoperable~~ channel to OPERABLE status within 30 days~~, or be in HOT SHUTDOWN within the next 12 hours~~. If not restored to an OPERABLE status within 30 days, immediately initiate action in accordance with Specification 6.6.4.

~~Action~~ 2)[2]~~:~~ With one or more Table 3.3-10 Functions with no required channel ~~the number of~~ OPERABLE~~ post-accident monitoring channels less than required by Table 3.3-10~~, ~~either~~ restore at least one~~the~~ inoperable channel to OPERABLE status within 7~~30~~ days, or be in HOT STANDBY within the next 6 hours and HOT SHUTDOWN within the following~~next 12~~6 hours.

~~If only one channel is inoperable and containment entry is required to restore the inoperable channel, the channel need not be restored until the following refueling outage.~~

~~Action~~ 3)~~:~~ With no required Table 3.3-10 RVLMS Function channel ~~the number of~~ OPERABLE and ~~channels one less than the minimum number of channels required to be OPERABLE:~~

~~a. If repairs are feasible, restore the inoperable channel to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours.~~

~~b. If~~ repair is not feasible without shutting down, immediately initiate action in accordance with Specification 6.6.4~~operations may continue and a special report shall be submitted to the NRC within 30 days following the failure; describing the action taken, the cause of the inoperability, and the plans and schedule for restoring the channel to OPERABLE status during the next scheduled refueling outage~~.

~~Action 4: With the number of OPERABLE channels two less than the minimum channels required to be OPERABLE:~~

~~a. If repairs are feasible, restore at least one inoperable channel to OPERABLE status within 48 hours or be in at least HOT SHUTDOWN within the next 12 hours.~~

Note 1 – Separate ACTION entry is allowed for each Table 3.3-10 Function.

Note 2 – ~~b.~~ Action 2 is applicable to the RVLMS Function only when~~If~~ repair is ~~not~~ feasible without shutting down. Where RVLMS channel repair is not feasible, Action 3 shall be applicable~~, operation may continue and a special report shall be submitted to the NRC within 30 days following the failure; describing the action taken, the cause of the inoperability, and the plans and schedule for restoring the channels to OPERABLE status during the next scheduled refueling outage~~.

TABLE 4.3-10

POST-ACCIDENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTION~~INSTRUMENT~~	CHANNEL CHECK	CHANNEL CALIBRATION
1. Penetration Flow Path Containment Isolation Valve Position~~Pressure (Normal Design Range)~~	M	R
2. Containment Pressure (Wide~~High~~ Range)	M	R
3. Pressurizer Pressure (Wide Range)	M	R
4. Pressurizer ~~Water~~ Level	M	R
5. Steam Generator (SG) Pressure	M	R
6. SG~~team Generator~~ Water Level (Wide Range)	M	R
7. Refueling Water Tank Water Level	M	R
8. Containment Water Level ~~–~~(Wide Range)	M	R
9. Emergency Feedwater Flow Rate	M	R
10. Reactor Coolant System Hot Leg Temperature~~Subcooling Margin Monitor~~ (Narrow Range)	M	R
11. Reactor Coolant System Hot Leg Temperature~~Pressurizer Safety Valve Acoustic Position Indication~~ (Wide Range)	M	R
12. ~~Pressurizer Safety Valve Tail Pipe Temperature~~High Pressure Safety Injection Flow Rate	M	R
13. ~~In Core Thermocouples (~~Core Exit Thermocouples~~)~~ (CETs) – Quadrant 1	M	R
14. CETs – Quadrant 2	M	R
15. CETs – Quadrant 3	M	R
16. CETs – Quadrant 4	M	R

14 7.	Reactor Vessel Level Monitoring System (RVLMS)	M	R

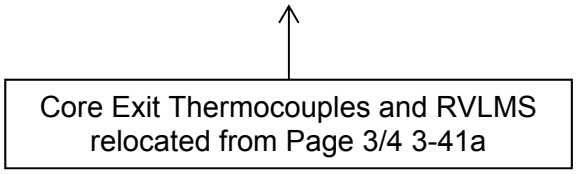

TABLE 4.3-10 (con't)

POST-ACCIDENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

	INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION
13.	In Core Thermocouples (Core Exit Thermocouples) (CETs) – Quadrant 1	M	R
14 7.	Reactor Vessel Level Monitoring (RVLMS)	M	R

Move to previous page

6.6 REPORTING REQUIREMENTS

6.6.1 DELETED

6.6.2 Annual Radiological Environmental Operating Report

(Note: A single submittal may be made for ANO. The submittal should combine sections common to both units.)

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

6.6.3 Radioactive Effluent Release Report

(Note: A single submittal may be made for ANO. The submittal shall combine sections common to both units. The submittal shall specify the releases of radioactive material from each unit.)

The Radioactive Effluent Release Report covering the operation of the unit in the previous year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

6.6.4 Post Accident Monitoring Report~~DELETED~~

When a report is required by TS Table 3.3-10, “Post-Accident Monitoring Instrumentation,” Action 1 or Action 3, a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

Enclosure Attachment 2 to

2CAN121702

Technical Specification Bases Page Markups

These Actions are modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 4. This Note prohibits the use of LCO 3.0.4.a to enter MODE 4 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 4, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

3/4.3.3.5 REMOTE SHUTDOWN INSTRUMENTATION

The OPERABILITY of the remote shutdown instrumentation ensures that sufficient capability is available to permit shutdown and maintenance of HOT STANDBY of the facility from locations outside of the Control Room. This capability is required in the event Control Room habitability is lost and is consistent with General Design Criteria 19 of 10 CFR 50. With regard to CST level, the required Remote Shutdown panel indication is that CST level indication associated with the CST aligned to the EFW system.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION

BACKGROUND

The primary purpose of the Post Accident Monitoring (PAM) instrumentation is to display plant variables that provide information required by the Control Room Operators during accident situations. This information provides the necessary support for the Operator to take the manual actions, for which no automatic control is provided, that are required for safety systems to accomplish their safety functions for Design Basis Events. The OPERABILITY of the PAM~~post-accident~~ instrumentation ensures that sufficient information is available on selected plant parameters to monitor and assess plant status and behavior~~these variables~~ following an accident. The availability of PAM instrumentation is important so that responses to corrective actions can be observed and the need for, and magnitude of, further actions can be determined. This capability is consistent with the recommendations of Regulatory Guide (RG) 1.97, "Instrumentation for Light-Water-Cooled Nuclear Plants to Assess Plant Conditions During and Following an Accident," December 1975 as required by Supplement 1 to NUREG-0737, "TMI Action Items," and NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations."

Type A variables are included in this LCO because they provide the primary information required to permit the Control Room Operator to take specific manually controlled actions, for which no automatic control is provided, that are required for safety systems to accomplish their safety functions for Design Basis Accidents (DBAs).

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

BACKGROUND (continued)

Category 1 variables are the key variables deemed risk significant because they are needed to:

- Determine whether other systems important to safety are performing their intended functions,
- Provide information to the Operators that will enable them to determine the potential for causing a gross breach of the barriers to radioactivity release, and
- Provide information regarding the release of radioactive materials to allow for early indication of the need to initiate action necessary to protect the public and for an estimate of the magnitude of any impending threat.

These key variables are identified by plant specific RG 1.97 analyses. These analyses identified the plant specific Type A and Category 1 variables and provided justification for deviating (if necessary) from the NRC proposed list of Category 1 variables. The ANO-2 RG 1.97 instruments are listed in SAR Table 7.5-3 along with the relevant Type and Category designations for each instrument. Environmental Qualifications (EQ) are based on 10 CFR 50.49, “Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants,” and IEB 79-01B, Enclosure 4, “Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors”

APPLICABLE SAFETY ANALYSES

The PAM instrumentation ensures the OPERABILITY of RG 1.97 Type A variables, so that the Control Room operating staff can:

- Perform the diagnosis specified in the emergency operating procedures. These variables are restricted to preplanned actions for the primary success path of DBAs, and
- Take the specified, preplanned, manually controlled actions, for which no automatic control is provided, that are required for safety systems to accomplish their safety functions.

The PAM instrumentation also ensures OPERABILITY of Category 1, non-Type A variables. This ensures the Control Room operating staff can:

- Determine whether systems important to safety are performing their intended functions,
- Determine the potential for causing a gross breach of the barriers to radioactivity release,
- Determine if a gross breach of a barrier has occurred, and
- Initiate action necessary to protect the public as well as to obtain an estimate of the magnitude of any impending threat.

PAM instrumentation that satisfies the definition of Type A in RG 1.97 meets Criterion 3 of 10 CFR 50.36(c)(2)(ii).

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

APPLICABLE SAFETY ANALYSES (continued)

Category 1, non-Type A PAM instruments are retained in the Specification because they are intended to assist Operators in minimizing the consequences of accidents. Therefore, these Category 1 variables are important in reducing public risk.

LCO

LCO 3.3.11 requires two OPERABLE channels for all but two Functions to ensure no single failure prevents the Operators from being presented with the information necessary to determine the status of the plant and to bring the plant to, and maintain it in, a safe condition following an accident. Two OPERABLE channels ensure that no single failure within the PAM instrumentation or its auxiliary supporting features or power sources, concurrent with failures that are a condition of or result from a specific accident, prevents the Operators from being presented the information necessary for them to determine the safety status of the plant and to bring the plant to and maintain it in a safe condition following that accident. Furthermore, provision of two channels allows a CHANNEL CHECK, in most cases, during the post-accident phase to confirm the validity of displayed information.

The two exceptions are the Penetration Flow Path Containment Isolation Valve (CIV) Position and the High Pressure Safety Injection (HPSI) Flow. Listed below are discussions of the RG 1.97 Type A and Category 1 instrumentation listed in Table 7.5-3 of the ANO-2 SAR.

Penetration Flow Path Containment Isolation Valve Position Indication

Penetration Flow Path Containment Isolation Valve (CIV) Position is provided for verification of containment OPERABILITY. In the case of CIV position, the important information is the isolation status of the containment penetration. The LCO requires one channel of valve position indication in the Control Room to be OPERABLE for each active CIV (does not apply to check valves) in a containment penetration flow path, i.e., two total channels of CIV position indication for a penetration flow path with two active valves. For containment penetrations with only one active CIV having Control Room indication, Note (b) requires a single channel of valve position indication to be OPERABLE. This is sufficient to redundantly verify the isolation status of each isolable penetration via indicated status of the active valve, as applicable, and prior knowledge of passive valve or system boundary status. If a penetration flow path is isolated (active valve deactivated closed or via other isolation), position indication for the CIV(s) in the associated penetration flow path is not needed to determine status. Therefore, the position indication for valves in an isolated penetration flow path is not required to be OPERABLE.

The exception to the two channel requirement of the Penetration Flow Path CIV Position is because the important information is the status of the containment penetrations. The LCO requires one position indicator for each automatic CIV. This is sufficient to redundantly verify the isolation status of each isolable penetration either via indicated status of the active valve and prior knowledge of the passive valve or via system boundary status. If an automatic CIV is known to be closed and deactivated, position indication is not needed to determine status. Therefore, the position indication for valves in this state is not required to be OPERABLE.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

LCO (continued)

Containment Pressure (Wide Range)

Wide range containment pressure is a Type B, Category 1, variable provided for verification of Reactor Coolant System (RCS) and containment integrity. The wide range containment pressure function consists of two redundant channels (2PI-5605-1 and 2PI-5606-2) providing indication over a range of 0 – 225 psia. The two channels are indicated on Control Room panel with Channel 1 also displayed on a Control Room panel chart recorder (2PR-5605-1N). Both channels may be displayed on the Safety Parameter Display System (SPDS).

Pressurizer Pressure (Wide Range)

Wide range Pressurizer pressure is a Type A, Category 1, variable provided for verification of core cooling and RCS integrity long term surveillance. Wide range Pressurizer pressure is measured by pressure transmitters with a span of 0 – 3000 psia. The pressure transmitters are located outside the containment. Redundant monitoring capability is provided by at least two trains of instrumentation. There are four redundant channels (2PI-4624-1B, 2PI-4624-2, 2PI-4624-3N, 2PI-4624-4N) providing indication over the required range. The channels are indicated on Control Room panel, the SPDS, and the Plant Monitoring System (PMS). Channel 1 is also displayed on a Control Room panel chart recorder (2PR-4624-1N) and on the remote shutdown panel. The four channels interface with the Plant Protection System (PPS).

Pressurizer pressure is a Type A variable because the Operator uses this indication to monitor cooldown of the RCS following a steam generator tube rupture (SGTR) or small break loss of coolant accident (LOCA). Operator actions to maintain a controlled cooldown, such as adjusting SG pressure or level, would use this indication. Furthermore, Pressurizer pressure is one factor that may be used in decisions to terminate Reactor Coolant Pump (RCP) operation.

Pressurizer Level

Pressurizer level is a Type D, Category 1, variable provided for safety injection termination/ reestablishment determination and aids in the verification of natural circulation. The Pressurizer water level function consists of two redundant channels (2LI-4627-1 and 2LI-4627-2B) providing indication over a range of 0 – 100%. The channels are indicated on Control Room panel, chart recorder (2LR-4628 – not RG 1.97 qualified), the SPDS, and the PMS. The two channels interface with the Pressurizer level control system.

Steam Generator (SG) Pressure

SG pressure is a Type A, Category 1, variable provided to monitor operation of decay heat removal via the SGs. The SG pressure function consists of four redundant channels (2PI-1041-1, 2PI-1041-2, 2PI-1041-3N, 2PI-1041-4N and 2PI-1141-1, 2PI-1141-2, 2PI-1141-3N, 2PI-1141-4N) on each SG providing indication over a range of 0 – 1200 psia. The channels are indicated on Control Room panel, the SPDS, and the PMS. Channel 1 of each SG feeds a Control Room panel chart recorder (2PR-1041-1N). SG pressure is one indication that can be used to verify RCS cooldown is controlled, that appropriate automatic actuations have occurred at pre-established setpoints, and to limit leakage during a SGTR event.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

LCO (continued)

SG Water Level (Wide Range)

Wide range SG water level is a Type A, Category 1, variable provided to monitor operation of decay heat removal via the SGs. The SG water level function consists of two redundant wide range channels (2LI-1079-1, 2LI-1079-2, 2LI-1179-1, 2LI-1179-2) on each SG. The lower level tap is at 17.4" above the tube sheet and the upper level tap is 498.4" above the tube sheet. The channels are indicated on Control Room panel, the SPDS, and the PMS. Wide range Channel 1 of each SG feeds a Control Room chart recorder (2LR-1079-1 / 2LR-1179-1). Wide range SG level can be used to assess inadequate core cooling (ICC) conditions and to verify sufficient level to support natural circulation or reflux boiling.

Refueling Water Tank Level

Refueling Water Tank (RWT) level is a Type D, Category 1, variable provided to aid Operators in verifying that the water level in the containment building meets or exceeds the minimum established level credited in accident analysis following a Recirculation Actuation Signal (RAS). The RWT level function consists of safety-related channels, 2LI-5636-1 and 2LI-5637-2, providing indication over a range of 0 – 100%. The channels are indicated on Control Room panel with Channel 1 also displayed on a Control Room panel chart recorder (2LR-5636-1N). The channels may also be displayed on the SPDS (average) and the PMS.

Containment Water Level (Wide Range)

Containment sump level is a Type B, Category 1, variable provided for verification and long term surveillance of RCS integrity. The wide range containment water level function consists of two redundant channels (2LI-5645-1 and 2LI-5646-2) providing indication over a range of 0 - 144 inches starting at 5.5 inches above the containment building floor. The two channels are indicated on Control Room panel with Channel 1 also displayed on a Control Room panel chart recorder (2LR-5645-1N). Both channels may be displayed on the SPDS, the PMS, and on transmitters located in the Upper North and Upper South Electrical Penetration Rooms. Containment flood level indication is used by the Operators to verify that the water level in containment meets or exceeds the minimum net positive suction head (NPSH) established level credited in accident analysis to support High Pressure Safety Injection (HPSI) pump and Containment Spray pump operation following a RAS.

Emergency Feedwater Flow Rate

The specification requires two~~one~~ Emergency Feedwater (EFW) flow indications per SG. EFW flow is a Type D, Category 1, variable provided to aid Operators in verifying decay heat removal via~~is used by the operator to verify that~~ the ~~EFW system is delivering flow to each~~ SGs. However, the primary indication used by the O~~o~~perator to ensure ~~an~~ adequate decay heat removal~~inventory~~ is SG level (see Item 6 above). Redundant monitoring capability is provided by two independent trains of instrumentation for each SG~~steam generator~~ having a range of 0 – 750 gpm:~~.~~

2FIS-0718-2 (2P-7A Flow to 'A' SG) 2FIS-0710-1 (2P-7B Flow to 'A' SG)

2FIS-0713-2 (2P-7A Flow to 'B' SG) 2FIS-0717-1 (2P-7B Flow to 'B' SG)

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

LCO (continued)

Emergency Feedwater Flow Rate (continued)

Each EFW pump supply~~feed line~~ to each SG contains one flow instrument, for a total of four indications. Each of these indications is required to be OPERABLE for the purposes of this specification.

Reactor Coolant System Hot Leg Temperature (Narrow and Wide Range)

RCS Hot Leg Temperature (T_{HOT}) instrumentation is a Type A, Category 1, variable provided for verification and long term surveillance of core cooling. Reactor outlet temperature inputs are provided by a minimum of two fast response resistance elements and associated transmitters in each loop. Channels are indicated on Control Room panel, SPDS, or PMS. Available narrow range indications include 2TI-4606-1, 2TI-4606-2, 2TI-4606-3N, and 2TI-4606-4N, having a range of 525 °F – 675 °F. Control Room panel chart recorder (2TR-4614-1N / 2TR-4714-2N) also provides narrow range indication from 525 °F to 625 °F.

One control channel wide range T_{HOT} indicator (2TIS-4614-1A or 2TIS-4714-2A) is available from each RCS loop providing indication over a range of 125 °F – 625 °F. Two safety channel T_{HOT} indicators (associated with PPS channels 3 and 4) may be displayed on the Margin-to-Saturation calculators or the SPDS, having an indicated range of 150 °F – 750 °F (fed from 2TE-4610-3B, 2TE-4610-4B, 2TE-4710-3B, and 2TE-4710-4B). All channels may be displayed on the PMS. Control channels are indicated on Control Room panel and control channel 2TIS-4714-2A may be displayed on the SPDS.

High Pressure Safety Injection Flow

HPSI flow is a Type A, Category 1, variable provided to ensure maintenance of sufficient HPSI pump NPSH during the post-accident hot leg injection mode of operation. Hot leg injection is initiated more than three hours following a LOCA to minimize boron precipitation in the reactor core. HPSI flow must be throttled sufficiently when aligning for hot leg injection to balance flow between the cold and hot leg injection paths, and may be required to ensure HPSI pump NPSH requirements are maintained if, for example, the HPSI orifice bypass valve fails to close when required to align for hot leg injection (reference CR-ANO-2-2002-0978). Each HPSI train has one flow indicator (2FI-5101-1 and 2FI-5102-2) with a range of 0 - 1000 gpm.

The exception to the two channel requirement of most PAM functions is acceptable because hot leg injection is only required when a LOCA is of sufficient size that SDC cannot be placed in service. This means that the break size expended the entire contents of the RWT, Pressurizer level could not be restored, and the only present means of cooling is via the long-term recirculation mode via HPSI and Containment Spray. A LOCA of this size has not occurred in the U.S. commercial nuclear industry and is of low likelihood. In addition, the time permitted to restore an inoperable channel also permits time to install a temporary means of flow indication, which would be described in the report required in accordance with TS 6.6.4.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

LCO (continued)

Core Exit Thermocouples

Core Exit Thermocouples (CETs) are a Type C, Category 1, variable provided for verification of and long term surveillance of core cooling. Two CETs are required to be OPERABLE~~operable~~ in each quadrant of the reactor core. The CETs relied upon in each core quadrant for OPERABILITY~~operability~~ must be powered from redundant trains to meet single failure criteria. This restriction is consistent with Category I instrumentation requirements of R~~Gegulatory Guide~~ 1.97. The two CETs/quadrant requirement accounts for core non-uniformities including incore effects of the radial decay power distribution, and excore effects of condensate runback in the hot legs and non-uniform inlet temperatures.

The design of the Incore Instrumentation System includes a Type K (chromel alumel) thermocouple within the incore instrument detector assemblies. The junction of each thermocouple is located a few inches above the fuel assembly, inside a structure that supports and shields the incore instrument detector assembly string from flow forces in the outlet plenum region. These CETs monitor the temperature of the reactor coolant as it exits the fuel assemblies. There are 42 CETs located in the upper head region of the reactor vessel, six inches above the active fuel region, having a range of 0 – 2300 °F. The CET output can be obtained from the RVLMS channels or the SPDS.

Reactor Vessel Level Monitoring System (RVLMS)

RVLMS is a Type B, Category 1, variable provided for verification and long term surveillance of core cooling. The R~~eactor~~ V~~essel~~ L~~evel~~ M~~Sonitor~~ consists of two instrument channels and is provided as a means of indicating level in the reactor vessel during accident conditions. A minimum of two operable level sensors in the upper plenum region and one operable level sensor in the dome region are required for RVLMS channel operability. When Reactor Coolant Pumps (RCPs) are running, all except the dome sensors are interlocked to read "invalid" due to flow induced variables that may offset the sensor outputs. ~~If the equipment is inaccessible due to health and industrial safety concerns (for example, high radiation area, low oxygen content of the containment atmosphere) or due to physical location of the fault (for example, probe failure in the reactor vessel), then operation may continue until the next scheduled refueling outage and a report filed.~~

The RVLMS provides a direct measurement of the collapsed liquid level above the fuel alignment plate. The collapsed level represents the amount of liquid mass that is in the reactor vessel above the core. Measurement of the collapsed water level is selected because it is a direct indication of the water inventory. The collapsed level is obtained over the same temperature and pressure range as the saturation measurements, thereby encompassing all operating and accident conditions where it must function. Also, it functions during the recovery interval. Therefore, it is designed to survive the high steam temperature that may occur during the preceding core recovery interval.

The level range extends from the top of the vessel down to the top of the fuel alignment plate. The response time is short enough to track the level during small break LOCA events. The resolution is sufficient to show the initial level drop, the key locations near the hot leg elevation, and the lowest levels just above the alignment plate. This provides the Operator with adequate indication to track the progression of the accident and to detect the consequences of its mitigating actions or the functionality of automatic equipment.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

LCO (continued)

RG 1.97 Instrumentation Referenced In Other LCOs

Neutron Flux (Wide Range)

NOTE – Log Power Channel OPERABILITY is governed by LCO 3.3.1.1, "Reactor Protective Instrumentation." Log Power and Startup Channel OPERABILITY requirements are governed by LCO 3.3.3.5, "Remote Shutdown Instrumentation."

Wide range neutron flux indication is a Type B, Category 1, variable provided to verify reactor shutdown. The wide range neutron flux function consists of a minimum of two redundant channels of qualified fission chamber based instrumentation (Log Power or Startup channels). Four Log Power channel control board indicators (2JI-9007-1, 2JI-9007-2B, 2JI-9007-3, 2JI-9007-4) provide indication over a range of 10^{-8} to 200% full power (STM 2-67-1, Step 2.3.7). Startup Channel 1 control board indication and recorder (2JIS-9000-1/2JITS-9000-1, 2JR-9000 red pin) provide indication over a range of 0.1 to 10^{6} cps. Log Power Channels 1 and 2, along with Startup Channel 2, are available on the SPDS. However, Startup Channel 2 is no longer qualified for harsh environments and, therefore, is not relied upon to meet RG 1.97 instrumentation requirements. Log Power Channel 2 and Startup Channel 1 indications are also available on the Remote Shutdown Panel.

Containment Area Radiation (High Range)

Containment area radiation is a Type E, Category 1, variable provided to monitor for the potential of significant radiation releases and to provide release assessment for use by Operators in determining the need to invoke site emergency plans. The high range containment area radiation function consists of two redundant channels (2RITS-8925-1 and 2RITS-8925-2) providing indication over a range of 1 – 10^{8} R/hr. The two channels are monitored in the Control Room on indicators, recorder (2RR-8925), and the SPDS.

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1, 2, and 3. These variables are related to the diagnosis and preplanned actions required to mitigate DBAs. The applicable DBAs are assumed to occur in MODES 1, 2, and 3. In MODES 4, 5, and 6, plant conditions are such that the likelihood of an event occurring that would require PAM instrumentation is low; therefore, PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

Note 1 specifies that the ACTIONs may be entered independently for each Function listed in Table 3.3.11-1. The allowable outage time (AOT) of the inoperable channel(s) of a Function will be tracked separately for each Function starting from the time the ACTION was entered for that Function.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

ACTIONS (continued)

ACTION 1

When one or more Functions with one required channel inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30-day AOT is based on operating experience and takes into account the remaining OPERABLE channel (or in the case of a Function that has only one required channel, other non-RG 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments that are not governed by other Specifications), and the low probability of an event requiring PAM instrumentation during this interval.

When the required inoperable channel is not restored to an OPERABLE status within 30 days, actions in accordance with Specification 6.6.4 must be initiated immediately, which requires a written report to be submitted to the NRC. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative actions. This ACTION is appropriate in lieu of a shutdown requirement, given the likelihood of plant conditions that would require information provided by this instrumentation. Also, alternative actions are identified before a loss of functional capability condition occurs.

ACTION 2

When one or more Functions having two required channels inoperable (i.e., two channels inoperable in the same Function), one channel in the Function must be restored to OPERABLE status within 7 days. The 7-day AOT is based on the relatively low probability of an event requiring PAM instrumentation operation and the availability of alternate means to obtain the required information. Continuous operation with two required channels inoperable in a Function is not acceptable because the alternate indications may not fully meet all performance qualification requirements applied to the PAM instrumentation. Therefore, requiring restoration of one inoperable channel of the Function limits the risk that the PAM Function will be in a degraded condition should an accident occur.

If at least one channel of a required channel of a given Function is not restored to an OPERABLE status within 7 days, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least HOT STANDBY within 6 hours and to HOT SHUTDOWN within the following 6 hours. The time to reach these MODES are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

ACTION 2 is modified by Note that applies this ACTION to the RVLMS Function only when repair of an RVLMS channel is feasible. If RVLMS channel repair is not feasible, the ACTION 3 is applicable (assuming both RVLMS channels are inoperable).

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

ACTIONS (continued)

ACTION 3

When at least one inoperable RVLMS channel cannot be restored because repairs are not feasible, actions in accordance with Specification 6.6.4 must be initiated immediately, which requires a written report to be submitted to the NRC. With respect to this specification, an example of when repair is not feasible is a condition that would require access to the reactor vessel to effect repairs. An example that does not meet the intent of this ACTION is a failure in the associated Control Room cabinet which cannot be restored due to the unavailability of parts. The required report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative actions. This ACTION is appropriate in lieu of a shutdown requirement, given the likelihood of plant conditions that would require information provided by this instrumentation. Also, alternative actions are identified before a loss of functional capability condition occurs.

SURVEILLANCE REQUIREMENTS

Performance of the CHANNEL CHECK ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit. If the channels are within the criteria, it is an indication that the channels are OPERABLE. If the channels are normally off scale during times when surveillance is required, the CHANNEL CHECK will only verify that they are off scale in the same direction. Off scale low current loop channels are verified to be reading at the bottom of the range and not failed downscale.

The Frequency of 31 days is based upon plant operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 31-day interval is a rare event. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel during normal operational use of the displays associated with this LCO's required channels.

A CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies the channel responds to the measured parameter within the necessary range and accuracy. A Note allows exclusion of the neutron detectors from the CHANNEL CALIBRATION.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION (continued)

SURVEILLANCE REQUIREMENTS (continued)

Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of the T_{HOT} resistance temperature detectors (RTD) sensors and the CET sensors is accomplished by an in-place cross calibration that compares the other sensing elements with the recently installed sensing element.

The Frequency of 18 months is based upon operating experience and consistency with the typical industry refueling cycle and is justified by the assumption of an 18-month calibration interval for the determination of the magnitude of equipment drift.

Enclosure Attachment 3 to

2CAN121702

Retyped Technical Specification Pages

INSTRUMENTATION

POST-ACCIDENT INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.6 The post-accident monitoring (PAM) instrumentation channels for each Function shown in Table 3.3-10 shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

In accordance with Table 3.3-10.

SURVEILLANCE REQUIREMENTS

4.3.3.6 Each post-accident monitoring instrumentation channel shall be demonstrated OPERABLE in accordance with Table 4.3-10.

TABLE 3.3-10

POST-ACCIDENT MONITORING INSTRUMENTATION

FUNCTION		REQUIRED CHANNELS	ACTION
1.	Penetration Flow Path Containment Isolation Valve Position	2 per Penetration Flow Path[(a)(b)]	1, 2
2.	Containment Pressure (Wide Range)	2	1, 2
3.	Pressurizer Pressure (Wide Range)	2	1, 2
4.	Pressurizer Level	2	1, 2
5.	Steam Generator (SG) Pressure	2 per SG	1, 2
6.	SG Water Level (Wide Range)	2 per SG	1, 2
7.	Refueling Water Tank Water Level	2	1, 2
8.	Containment Water Level (Wide Range)	2	1, 2
9.	Emergency Feedwater Flow Rate	2 per SG	1, 2
10.	Reactor Coolant System Hot Leg Temperature (Narrow Range)	2 per Loop	1, 2
11.	Reactor Coolant System Hot Leg Temperature (Wide Range)	2 per Loop	1, 2
12.	High Pressure Safety Injection Flow Rate	1 per Train	1, 2
13.	Core Exit Thermocouples (CETs) – Quadrant 1	2	1, 2
14.	CETs – Quadrant 2	2	1, 2
15.	CETs – Quadrant 3	2	1, 2
16.	CETs – Quadrant 4	2	1, 2
17.	Reactor Vessel Level Monitoring System (RVLMS)	2	1, 2, 3

(a) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(b) Only one position indication channel is required for penetration flow paths with only one installed Control Room indication channel.

TABLE 3.3-10 (cont'd)

POST-ACCIDENT MONITORING INSTRUMENTATION

ACTIONs[1]

1) With one or more Table 3.3-10 Functions with one required channel inoperable, restore the required channel to OPERABLE status within 30 days. If not restored to an OPERABLE status within 30 days, immediately initiate action in accordance with Specification 6.6.4.

2)[2] With one or more Table 3.3-10 Functions with no required channel OPERABLE, restore at least one inoperable channel to OPERABLE status within 7 days, or be in HOT STANDBY within the next 6 hours and HOT SHUTDOWN within the following 6 hours.

3) With no required Table 3.3-10 RVLMS Function channel OPERABLE and repair is not feasible without shutting down, immediately initiate action in accordance with Specification 6.6.4.

Note 1 – Separate ACTION entry is allowed for each Table 3.3-10 Function.

Note 2 – Action 2 is applicable to the RVLMS Function only when repair is feasible without shutting down. Where RVLMS channel repair is not feasible, Action 3 shall be applicable.

TABLE 4.3-10

POST-ACCIDENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTION		CHANNEL CHECK	CHANNEL CALIBRATION
1.	Penetration Flow Path Containment Isolation Valve Position	M	R
2.	Containment Pressure (Wide Range)	M	R
3.	Pressurizer Pressure (Wide Range)	M	R
4.	Pressurizer Level	M	R
5.	Steam Generator (SG) Pressure	M	R
6.	SG Water Level (Wide Range)	M	R
7.	Refueling Water Tank Water Level	M	R
8.	Containment Water Level (Wide Range)	M	R
9.	Emergency Feedwater Flow Rate	M	R
10.	Reactor Coolant System Hot Leg Temperature (Narrow Range)	M	R
11.	Reactor Coolant System Hot Leg Temperature (Wide Range)	M	R
12.	High Pressure Safety Injection Flow Rate	M	R
13.	Core Exit Thermocouples (CETs) – Quadrant 1	M	R
14.	CETs – Quadrant 2	M	R
15.	CETs – Quadrant 3	M	R
16.	CETs – Quadrant 4	M	R
17.	Reactor Vessel Level Monitoring System (RVLMS)	M	R

6.6 REPORTING REQUIREMENTS

6.6.1 DELETED

6.6.2 Annual Radiological Environmental Operating Report

(Note: A single submittal may be made for ANO. The submittal should combine sections common to both units.)

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

6.6.3 Radioactive Effluent Release Report

(Note: A single submittal may be made for ANO. The submittal shall combine sections common to both units. The submittal shall specify the releases of radioactive material from each unit.)

The Radioactive Effluent Release Report covering the operation of the unit in the previous year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

6.6.4 Post Accident Monitoring Report

When a report is required by TS Table 3.3-10, “Post-Accident Monitoring Instrumentation,” Action 1 or Action 3, a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.