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BVY 02-18

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

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
Technical Specification Proposed Change No. 250
Scram and Isolation Valve Closure Functions of the
Main Steam Line Radiation Monitors

Pursuant to 10CFR50.90, Vermont Yankee (VY) hereby proposes to amend its Facility Operating License, DPR-28, by incorporating the attached proposed change into the VY Technical Specifications. This proposed change eliminates the reactor scram and main steam isolation valve closure requirements associated with the main steam line radiation monitors (MSLRMs) and modifies other requirements related to MSLRM trip functions.

Attachment 1 to this letter contains supporting information and the safety assessment of the proposed change. Attachment 2 contains the determination of no significant hazards consideration. Attachment 3 provides the marked-up version of the current Technical Specification pages. Attachment 4 is the retyped Technical Specification pages.

VY has reviewed the proposed Technical Specification change in accordance with 10CFR50.92 and concludes that the proposed change does not involve a significant hazards consideration.

VY has also determined that the proposed change satisfies the criteria for a categorical exclusion in accordance with 10CFR51.22(c)(9) and does not require an environmental review. Therefore, pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment needs to be prepared for this change.

Upon acceptance of this proposed change by the NRC, VY requests that a license amendment be issued no later than 180 days from the date of this letter for implementation within 60 days of its effective date. Issuance of an amendment by this date will support plant changes that are scheduled to be implemented prior to the next refueling outage.

A001

If you have any questions on this transmittal, please contact Mr. Gautam Sen at (802) 258-4111.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Michael A. Balduzzi
Senior Vice President and Chief Nuclear Officer

STATE OF VERMONT)
)ss
WINDHAM COUNTY)

Then personally appeared before me, Michael A. Balduzzi, who, being duly sworn, did state that he is Senior Vice President and Chief Nuclear Officer of Vermont Yankee Nuclear Power Corporation, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Vermont Yankee Nuclear Power Corporation, and that the statements therein are true to the best of his knowledge and belief.

SALLY A. SANDSTRUM NOTARY WINDHAM COUNTY, VERMONT

Sally A. Sandstrum, Notary Public
My Commission Expires February 10, 2003

Attachments

cc: USNRC Region 1 Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS
Vermont Department of Public Service

Attachment 1

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 250

Scram and Isolation Valve Closure Functions of the Main Steam Line Radiation Monitors

Supporting Information and Safety Assessment of Proposed Change

INTRODUCTION

Description of Change

The proposed changes to the Vermont Yankee Nuclear Power Station (VYNPS) Technical Specifications (TSs) eliminates the automatic reactor scram and main steam isolation valve (MSIV) closure functions of the main steam line radiation monitors (MSLRMs) and modifies other requirements related to MSLRM trip functions. Conforming changes are also being made to the Bases for these TSs. The proposed changes include the following TSs:

Table 3.1.1	Reactor Protection System (Scram) Instrument Requirements
Table 4.1.1	Scram Instrumentation and Logic Systems Functional Tests – Minimum Functional Test Frequencies for Safety Instrumentation, Logic Systems and Control Circuits
Table 4.1.2	Scram Instrument Calibration – Minimum Calibration Frequencies for Reactor Protection Instrument Channels
Specification 4.2.F	Mechanical Vacuum Pump Isolation
Table 3.2.2	Primary Containment Isolation Instrumentation
Table 4.2.2	Minimum Test and Calibration Frequencies – Primary Containment Isolation Instrumentation
Table 4.7.2	Primary Containment Isolation Valves

The proposed changes are consistent with the methodology of the NRC-approved BWR Owners Group Licensing Topical Report (LTR), NEDO-31400A[1] (NRC safety evaluation dated May 15, 1991). Elimination of the trip functions identified in the LTR will result in a reduced potential for inadvertent reactor shutdowns and plant transients caused by spurious MSLRM actuation signals. This change also offers increased plant operational flexibility and reliability without compromising plant safety. In addition, based on plant-specific analysis, all Group 1 isolation valve trip signals originating from the MSLRM are being eliminated. Other trip functions associated with the MSLRMs, including the alarm function and signals that trip and isolate the mechanical vacuum pump (MVP) are unchanged. Surveillance requirements for the MSLRM are also unchanged.

The following Table 1 describes the specific TS changes and provides the basis for each change.

Purpose of the Change

The most significant operational impact caused by existing MSLRM trip functions is the unnecessary scram and isolation of the reactor vessel. This action isolates the primary heat sink, imposes a significant transient on the vessel and results in safety-related system actuations. Subjecting the primary coolant pressure boundary to unnecessary vessel isolations diminishes plant reliability, complicates scram recovery and is adverse to plant safety. Eliminating the main steam line isolation, other Group 1 valve isolations, and scram functions from the MSLRM will help avoid undue vessel isolations during plant evolutions. Certain extenuating circumstances, such as instrument failures, chemistry excursions, and radiation monitor maintenance errors also have the potential for causing unnecessary MSLRM trips. The elimination of these trips would reduce the risk of the high radiation trip occurring from these operational situations, thereby increasing plant safety.

[1] NEDO-31400A, "Safety Evaluation for Eliminating the Boiling Water Reactor Main Steam Line Isolation Valve Closure Function and Scram Function of the Main Steam Line Radiation Monitor," October 1992.

In addition, as discussed in the referenced LTR, removal of trip functions permits continued use of the augmented offgas (AOG) system to process radioactive fission products following a design basis control rod drop accident (CRDA). Under these conditions, the plant operator maintains control over the release pathway and may, because of longer holdup times and offgas treatment, reduce levels of radioactivity released to the environs.

BACKGROUND

NEDO-31400A

This proposed change is based on the analysis provided in NEDO-31400A. That study demonstrated that removal of the MSLRM scram and isolation features would not exacerbate the consequences of the previously evaluated CRDA. General Electric prepared NEDO-31400A at the request of the BWR Owners Group to provide a bounding safety analysis that forms the basis for the elimination of the MSIV closure and scram functions of the MSLRMs. In NEDO-31400A, a reevaluation of the role of the MSLRM in the CRDA analysis confirmed that removal of the MSLRM scram/isolation features would not compromise CRDA consequences. NEDO-31400A has been evaluated for applicability to the Vermont Yankee Nuclear Power Station, and together with plant-specific analyses, support the Safety Assessment that follows.

The NEDO-31400A analysis considers the offsite dose consequences for two bounding accident sequences:

1) A CRDA where the source term is not reduced, even though the MSIVs close, and the radionuclides enter the condenser at atmospheric pressure to leak at a rate of 1% volume/day.

2) A CRDA where the MSIVs do not close and the radioactivity is processed through the AOG and released via the main stack.

The evaluation demonstrated that the radiological consequences of these accident sequences would remain below a fraction (25 percent) of the 10CFR100 limits without the scram and MSIV closure functions of the MSLRMs. The resulting offsite doses for the first case were 4.3 rem thyroid, and 0.31 rem whole body. For the second case, the doses were comparable assuming AOG hold up times of 15days for Xenon and 20 hours for Krypton. The thyroid dose was 0 rem and the whole body dose was 0.55 rem. The LTR concluded that the reactor pressure vessel isolation function and scram function of the MSLRM are not required to ensure compliance with 10CFR100. Additionally, it demonstrates that use of the AOG is an effective and acceptable method of controlling accident source terms.

The LTR also evaluated the potential effect on occupational exposure in the event of a sudden release of radioactive material from the fuel and concluded that the elimination of the scram/isolation features would have no adverse effect.

In a NRC Safety Evaluation dated May 15, 1991, and later incorporated into NEDO-31400A, the NRC staff concluded that removal of the MSLRM trips that automatically shut down the reactor and close the MSIVs was acceptable for referencing in plant-specific license amendment requests, provided that certain conditions were met. VYNPS's compliance with those conditions is discussed in the following section entitled, "Safety Assessment."

VYNPS Design Features

The VY MSLRMs consists of four redundant radiation detectors located on the outside of the main steam lines and external to the primary containment. The MSLRMs are designed to provide an early indication of gross fuel cladding failures. The original design basis of these monitors was to mitigate the release of radioactivity from failed fuel by providing a scram signal to terminate the initiating event and a MSIV closure signal to assure containment of the release. When a significant increase in the main steam line radiation level is detected, trip signals generated by the monitors are used to initiate a reactor scram and isolation of radioactive material released from the fuel.

For VY, the MSLRMs currently provide one of several possible signals (set at $\leq$ 3 times background radiation at rated thermal power) to close "Group 1" primary containment isolation valves. At this same trip setting, the MSLRMs provide signals to trip the MVP, close its suction valve, and scram the reactor. In addition, the MSLRMs provide an alarm (set at a nominal 1.5 times normal background radiation at rated thermal power) to alert the plant operators to off-normal conditions and take actions prescribed in plant procedures. The MSLRMs also provide trip signals to certain non-safety-related equipment.

The MVP is used to establish initial condenser vacuum or maintain partial vacuum when steam pressure is not adequate to operate the steam jet air ejector units. When employed during startup, the MVP takes suction on the main condenser and discharges air and the non-condensible gases to the vent stack via a discharge pipe. The MVP and its suction valve are designed to automatically de-energize and close, respectively, when radiation levels in the main steam lines exceed the MSLRM high setpoint.

VYNPS Accident Analysis

The only design basis accident for which either the MSIV closure function or scram function of the MSLRMs is credited is the CRDA. The VYNPS UFSAR provides analyses of the CRDA in sections 14.6.2 and 14.9.2.4. The latter section analysis uses a TID-14844 source term and is essentially the same as the accident sequences of NEDO-31400A. In these scenarios no credit is taken for automatic reactor shutdown from the MSLRMs, and automatic isolation of the MSIVs is assumed to provide no benefit. However, the MVP is assumed to trip and isolate. In conformance with NEDO-31400A, VY has re-analyzed the CRDA, eliminating closing of all Group 1 isolation valves from a MSLRM actuation signal.

Comparison to Standard Technical Specifications

Standard Technical Specifications (NUREG-1433) do not contain requirements for either the MSIV closure function or the reactor scram function of the MSLRMs. Requirements for the MVP are not included in the base specifications, but are handled on a supplemental, case-by-case basis.

Updated Final Safety Analysis Report (UFSAR)

The following VYNPS UFSAR sections provide additional background information:

- 1.6.2.20 – Main Steam Line Radiation Monitoring System
- 7.12.1 – Main Steam Line Radiation Monitoring System
- 7.12.2 – Off-Gas Radiation Monitoring System
- 9.4 – Gaseous Radwaste System
- 14.6.2 – Control Rod Drop Accident
- 14.9.2.4 – Control Rod Drop Accident

SAFETY ASSESSMENT

The following Table 1 provides a detailed description of each change, including the basis for the change and a safety assessment as necessary to supplement the analysis provided by NEDO-31400A. The Change Numbers in the table's left-hand column correspond to the boxed (□) annotation numbers in Attachment 3, "Marked-Up Version of the Current Technical Specifications."

The basis for elimination of the reactor scram function and MSIV closure function of the MSLRMs is the analysis contained in NEDO-31400A; therefore, all the supporting bases contained in that LTR are not repeated here. The analysis of NEDO-31400A is applicable to and bounds VYNPS analysis of the CRDA. VY has performed a detailed comparison of the VYNPS CRDA analysis with the assumptions and conditions made in the bounding generic analysis. That evaluation is summarized in Table 2. Furthermore, VY has expanded its analysis of the CRDA to include elimination of the automatic closure of all Group 1 isolation valves on an actuation signal from the MSLRM. In addition to the eight MSIVs, the only other VY Group 1 isolation valves are the two main steam line drain valves and the two recirculation loop sample line valves. TS Table 4.7.2 identifies primary containment isolation valves by isolation group.

With the elimination of the Group 1 isolation valves closure function of the MSLRM, in addition to the MSIVs, the other Group 1 isolation valves that currently receive a high main steam line radiation closure trip are the two main steam line drain valves (designated as valves 2-74 and 2-77) and the two reactor water sample valves (also known as "recirculation loop sample line" valves and designated as valves 2-39 and 2-40). TS Table 4.7.2 identifies these valves as being in isolation Group 1, being normally closed, and staying closed upon receipt of a Group 1 initiation signal. Group 1 initiation signals are listed in Note 1 of TS Table 4.7.2.

Table 1

Change #	Current Technical Specifications	Proposed Change
1	Current Technical Specifications (CTS) 3.1.A requires plant operation in accordance with Table 3.1.1, "Reactor Protection System (Scram) Instrument Requirements." Trip Function #9 in Table 3.1.1 specifies requirements for a reactor scram initiated by a main steam line high radiation signal. Notes 7 and 8 of Table 3.1.1 are only applicable to this trip function.	Delete Trip Function #9 and associated requirements from Table 3.1.1. Notes 7 and 8 of Table 3.1.1, which only pertain to this trip function, are also deleted. Insert the word "deleted" in place of Trip Function #9 in Table 3.1.1 and in place of its Notes 7 and 8.

Table 1
(continued)

Change #	Basis / Safety Assessment:	
1	The basis and safety assessment for elimination of the reactor scram trip function from main steam line radiation monitors are discussed in NEDO-31400A. Elimination of the scram trip function includes elimination of associated limiting conditions for operation (i.e., Trip Function #9 in Table 3.1.1). Notes 7 and 8 of Table 3.1.1 have no applicability when Trip Function #9 is deleted from Table 3.1.1. Note 7 does not impose any operational requirements and is only informational in explaining circuitry design. Therefore, Note 7 can also be deleted since is imposes no requirements and is only applicable to the trip function being eliminated. Note 8 does impose operational requirements beyond the scope of the reactor trip function being eliminated in that it requires a MSLRM alarm set at a nominal 1.5 times normal background at rated power. This alarm requirement, however, is redundant to current TS Table 3.2.2, Note 9, which is unchanged. Therefore, Note 8 can be deleted with no change in operability requirements, other than those associated with elimination of the scram function.	
Change #	**Current Technical Specifications**	**Proposed Change**
2	CTS 4.1.A requires that scram instrumentation systems be functionally tested in accordance with Table 4.1.1, "Scram Instrumentation and Logic Systems Functional Tests – Minimum Functional Test Frequencies for Safety Instrumentation, Logic Systems and Control Circuits." Table 4.1.1 specifies an instrument channel for "High Main Steam Line Radiation" with associated surveillance requirements. Several Notes of Table 4.1.1 are applicable to this instrument channel.	Remove Instrument Channel, "High Main Steam Line Radiation" and associated requirements from Table 4.1.1. The Table 4.1.1 Notes that are applicable to this Instrument Channel are also applicable to one or more of the other Instrument Channels specified in this table, and are therefore retained. However, Note 2 is modified because of the elimination of the High Main Steam Line Radiation instrument channel of the reactor protection system. Note 2 is changed to: *An instrument check shall be performed on reactor water level and reactor pressure instrumentation once per day.* This change to Note 2 of Table 4.1.1 deletes the existing phrase, "...and on streamline radiation monitors once per shift."

Table 1
(continued)

2	**Basis / Safety Assessment:** The basis and safety assessment for elimination of the reactor scram trip function from main steam line radiation monitors are discussed in NEDO-31400A. Elimination of the scram trip function includes elimination of associated surveillance requirements (i.e., the high main steam line radiation instrument channel in Table 4.1.1). Note 2 is being revised because the high main steam line radiation trip function is being eliminated and all surveillance requirements (SRs) related to this function will no longer be applicable. Therefore, revising Note 2 to delete a SR for a function that is being eliminated is acceptable. A similar SR for the primary containment isolation function of the MSLRM will remain in TS Table 4.2.2.	
Change #	**Current Technical Specifications**	**Proposed Change**
3	CTS 4.1.A requires that scram instrumentation systems be calibrated in accordance with Table 4.1.2, "Scram Instrument Calibration – Minimum Calibration Frequencies for Reactor Protection Instrument Channels." Table 4.1.2 specifies an instrument channel for "High Main Steam Line Radiation" with associated surveillance requirements. Note 3 of Table 4.1.2 is applicable to this instrument channel.	Delete Instrument Channel, "High Main Steam Line Radiation" and associated requirements from Table 4.1.2. Note 3 of Table 4.1.2 only pertains to this instrument channel and is also being eliminated from this table. Insert the word "deleted" in place of Note 3 of Table 4.1.2.
	Basis / Safety Assessment: The basis and safety assessment for elimination of the reactor scram trip function from main steam line radiation monitors are discussed in NEDO-31400A. Elimination of the scram trip function includes elimination of associated surveillance requirements (i.e., the high main steam line radiation instrument channel in Table 4.1.2). Note 3 is being deleted because no SRs applicable to a scram function from high main steam line radiation will remain in Table 4.1.2. SRs for the MSLRM trip function will remain in TS Table 4.2.2.	

Table 1
(continued)

Change #	Current Technical Specifications	Proposed Change
4	CTS Surveillance Requirement 4.2.F, Mechanical Vacuum Pump," currently does not explicitly require periodic instrument check, functional testing and calibration of the high main steam line trip function of the MVP.	SR 4.2.F is restructured into two parts. The existing SR 4.2.F will become SR 4.2.F.2 and a new requirement is added as SR 4.2.F.1. Proposed SR 4.2.F.1 states: *The High Main Steam Line Radiation trip function of the mechanical vacuum pump shall be functionally tested and calibrated in accordance with Table 4.2.2.* A Note 12 is added to the High Main Steam Line Radiation trip function in Table 4.2.2 to state: *This trip function is applicable to the mechanical vacuum pump; however, it is not applicable to the primary containment Group 1 isolation valves (i.e., main steam isolation, main steam line drain, and recirculation loop sample line isolation valves).*

Table 1
(continued)

4	**Basis / Safety Assessment:** SR 4.2.B requires that instrumentation and logic that provides primary containment isolation be functionally tested and calibrated in accordance with TS Table 4.2.2. Although the High Main Steam Line Radiation trip function identified in TS Table 4.2.2 is tested and calibrated as specified, with the elimination of this actuation signal for primary containment Group 1 isolation valves, this SR for the high main steam line radiation monitor might otherwise also be eliminated. However, these testing requirements are necessary to assure operability of the MVP trip logic when it is in service. Therefore, the surveillance requirement for the high main steam line radiation trip is retained in Table 4.2.2, but made applicable only to the MVP. The restructuring of SR 4.2.F to add an explicit requirement for periodic functional test and calibration of the High Main Steam Line Radiation trip function of the MVP is acceptable because these requirements maintain operability of the MVP trip function. This change makes it explicit. The High Main Steam Line Radiation trip function currently isolates Group 1 primary containment isolation valves (identified in TS Table 4.7.2). This change eliminates the Group 1 isolation valve closure function of the MSLRMs. The addition of Note 12 to Table 4.2.2 clarifies the applicability of the High Main Steam Line Radiation trip function. New Note 12 provides design information to the operator that there are no longer any Group 1 isolation valve trips associated with the MSLRMs. This Note is acceptable because it is informational and does not impose a change to operating requirements. With the elimination of the MSLRM actuation signal to all Group 1 isolation valves, this change is acceptable since it clarifies that this trip function is applicable to the MVP and not Group 1 containment isolation valves. The basis and safety assessment for the elimination of the Group 1 closure trip function of the MSLRM are supported by NEDO-31400A and plant-specific analyses.

Table 1
(continued)

Change #	Current Technical Specifications	Proposed Change
5	CTS 3.2.B requires that when primary containment integrity is required, in accordance with Specification 3.7, the instrumentation that initiates primary containment isolation shall be operable in accordance with Table 3.2.2, "Primary Containment Isolation Instrumentation." Trip Function "High Main Steam Line Radiation" in Table 3.2.2 specifies requirements for a primary containment isolation initiated by high main steam line radiation. For this trip function, the column, "Required ACTION When Minimum Conditions For Operation Are Not Satisfied (Note 2)," specifies Action "B" from Note 2.	The Action specified under the column "Required ACTION When Minimum Conditions For Operation Are Not Satisfied (Note 2)," for the High Main Steam Line Radiation trip function is changed from "B" to "B or C." A new Action "C" is added to Note 2 of Table 3.2.2. New Action "C" requires: *The actions required by Specification 3.2.F.1 shall be taken immediately.*
	Basis / Safety Assessment: This change adds an alternative protective action to be taken in the event that minimum conditions for operation are not satisfied for the High Main Steam Line Radiation trip function. Since this trip function will no longer apply to Group 1 containment isolation valves, the only remaining applicable TS equipment is the MVP. TS LCO 3.2.F addresses the operability requirements of the MVP. LCO 3.2.F.1 requires that whenever the MSIVs are open, the MVP shall be capable of being automatically isolated and secured by a signal of high radiation in the main steam line tunnel or shall be manually isolated and secured. Since this trip function is no longer applicable to the Group 1 isolation valves, manually isolating and securing the MVP is the appropriate action to close this potential release pathway. New Action "C" is acceptable because immediately taking action to manually isolate a potential discharge pathway accomplishes the safety function provided by the High Main Steam Line Radiation instrumentation because the safety function of this instrumentation is to limit fission product release during and following postulated design basis events. Isolating the affected line completes the protective function of this instrumentation. Therefore, this is an acceptable alternative to initiating an orderly load reduction and placing the reactor in "Hot Standby" (i.e., taking the actions prescribed by Action "B" of Note 2, Table 3.2.2).	

Table 1
(continued)

Change #	Current Technical Specifications	Proposed Change
6	CTS 3.2.B requires that when primary containment integrity is required, in accordance with Specification 3.7, the instrumentation that initiates primary containment isolation shall be operable in accordance with Table 3.2.2, "Primary Containment Isolation Instrumentation." Trip Function "High Main Steam Line Radiation" in Table 3.2.2 specifies requirements for a primary containment isolation initiated by high main steam line radiation. Note 8 of Table 3.2.2 is applicable to this trip function.	Note 8 of Table 3.2.2 is changed from: *Channel shared by the Reactor Protection and Primary Containment Isolation Systems.* To: *This trip function is applicable to the mechanical vacuum pump; however, it is not applicable to the primary containment Group 1 isolation valves (i.e., main steam isolation, main steam line drain, and recirculation loop sample line isolation valves).*
	Basis / Safety Assessment: This change involves the elimination of the MSLRM closure function for the MSIVs and other Group 1 isolation valves. With the elimination of the scram trip function and Group 1 isolation valve closure function of the MSLRM, current Note 8 is no longer correct, since the MSLRMs will no longer provide an input signal to the reactor protection system (RPS) or primary containment isolation systems. Therefore, current Note 8 is being deleted and replaced with a new Note 8 as specified above. New Note 8 clarifies for the operator that the High Main Steam Line Radiation trip function exists for the MVP and that there is no Group 1 isolation valve closure trip associated with the MSLRM. This change is acceptable because it imposes no change to operating requirements, but merely adds clarification for the benefit of the operator in recognizing the design change modifying this circuitry. The basis and safety assessment for the elimination of the MSIV closure and RPS trip functions of the MSLRM are discussed in NEDO-31400A. Plant-specific analysis of the CRDA also supports elimination of the MSLRM trip function for all Group 1 isolation valves.	

Table 1
(continued)

Change #	Current Technical Specifications	Proposed Change
7	CTS 4.7.D requires that certain primary containment isolation valves be tested in accordance with Table 4.7.2, "Primary Containment Isolation Valves," at least once per operating cycle. Table 4.7.2 identifies the eight Main Steam Line Isolation valves (2-80A-D & 2-86A-D), two Main Steam Line Drain (2-74, 2-77), and two Recirculation Loop Sample Line (2-39, 2-40) as Group 1 isolation valves and specifies associated surveillance requirements. Note 1 of Table 4.7.2 specifies six types of initiation signals applicable to Group 1 isolation valves. In this Note, Group 1, item 2 includes "high main steam line radiation."	Note 1 of Table 4.7.2 is revised to delete the high main steam line radiation signal from the list of signals that initiate closure of Group 1 isolation valves. Item 2 in the listing of Group 1 signals in Table 4.7.2 is changed to: *2. Deleted*
	Basis / Safety Assessment: This change eliminates the closure function of the MSLRMs for the Group 1 isolation valves. By deleting the MSLRM actuation signal, it is recognized that the Group 1 isolation valves no longer automatically close upon receipt of a main steam line high radiation trip signal. The basis and safety assessment for the elimination of the Group 1 primary containment isolation valve closure trip function of the MSLRM are discussed in NEDO-31400A and plant-specific analyses.	
Change #	**Current Technical Specifications**	**Proposed Change**
8	The TS Bases provide explanation and rationale for associated TS requirements, and in some cases, how they are to be implemented.	Associated changes to the TS Bases are being made to conform to the changed TS and to add clarity to existing requirements.
	Basis / Safety Assessment: This proposed change revises the Bases of the VYNPS TSs to incorporate supporting information for the proposed TS changes. Bases changes are made for clarity purposes and to conform to the changes being made to the associated Specifications. Bases do not establish actual requirements, and as such do not change technical requirements of the TS. The Bases changes are therefore acceptable, since they administratively document the reasons and provide additional understanding for the associated TSs.	

Conformance to NRC Safety Evaluation Conditions

The NRC issued a Safety Evaluation accepting NEDO-31400A for use as a reference in license amendment applications, provided the following three conditions are satisfied.

Condition 1:

> The applicant demonstrates that the assumptions with regard to input values (including power per assembly, Chi/Q, and decay times) that are made in the generic analysis bound those for the plant.

Condition 2:

> The applicant includes sufficient evidence (implemented or proposed operating procedures, or equivalent commitments) to provide reasonable assurance that increased significant levels of radioactivity in the main steam lines will be controlled expeditiously to limit both occupational doses and environmental releases.

Condition 3:

> The applicant standardizes the MSLRM and offgas radiation monitor alarm setpoint at 1.5 times the nominal nitrogen-16 background dose rate at the monitor locations, and commits to promptly sample the reactor coolant to determine possible contamination levels in the plant reactor coolant and the need for additional corrective actions, if the MSLRM or offgas radiation monitors or both exceed their alarm setpoints.

The following discussion addresses how VYNPS satisfies each of the above three conditions.

NEDO-31400A vs. VYNPS-Specific Comparison Table

An evaluation was performed by VY to compare the input parameters used in NEDO-31400A against VYNPS site-specific values. The evaluation demonstrates that VYNPS off-site doses for a CRDA are bounded by the values in NEDO-31400A. The results of this evaluation show that calculated VY off-site doses would be less than the off-site doses in the conservative analysis presented in NEDO-31400A. The comparison between the NEDO and the VYNPS site-specific results is summarized in Table 2 below.

Table 2 presents the critical input parameters that were used by General Electric in NEDO-31400A for the analyses of the CRDA. NEDO-31400A demonstrated that the Standard Review Plan (SRP) dose criteria could be met with the MSIV closure and reactor trip functions removed from the MSLRMs. The SRP dose criteria for this event are 6 rem whole body and 75 rem thyroid, or 25% of the 10CFR100 criteria[2].

The CRDA was analyzed in two scenarios in the LTR. The first scenario assumed that the fission products released from the failed fuel and the reactor coolant were isolated in the condenser, and were subsequently leaked to the environment via a ground level release from the turbine building. This scenario is essentially the same as is presented in the VYNPS UFSAR (Section 14.9.2.4), and was intended to cover the case of a manual isolation of the MSIVs and the SJAE. The MVP was assumed to be automatically isolated by the MSLRMs. The second scenario assumed no MSIV or SJAE isolation

[2] The SRP criteria are only being used as one acceptable method of evaluating risk. Use of this method is not a commitment to the SRP and does not incorporate SRP criteria or methodology into VYNPS' licensing basis.

and assumed that the fission products were released after appropriate holdup and processing in the AOG system. This scenario results in a release from the primary vent stack.

Table 2 compares the VYNPS site-specific input parameters to the NEDO-31400A values. In all cases the NEDO values are either bounding or equivalent to the VYNPS values.

The parameters presented in Table 2 are discussed below.

- The power level of a single rod determines the fission product inventory of that rod. A peaking factor of 1.5 is applied to the average rod. The value used in NEDO-31400A was 0.12 MW/rod. The VYNPS UFSAR (Section 14.9.2) uses a power level of 1665 MWt for the analysis of the CRDA. The power level per rod is 0.0754 MW for 8x8 assemblies and 0.0611 MW for 9x9 assemblies. When multiplied by a peaking factor of 1.5 the results are values of 0.113 and 0.0917 MW/rod for 8x8 and 9x9 assemblies, respectively, which are within the NEDO values.

- The number of fuel rods failed due to the control rod drop will determine the quantity of fission products released from the fuel gaps to the reactor coolant. NEDO-31400A assumed that 850 rods in 8x8 assemblies failed. The VYNPS UFSAR (Section 14.6.2) reports that 850 rods in 8x8 assemblies would fail or 1000 rods in 9x9 assemblies. When multiplied by the power level per rod above, the 8x8 assembly results in the highest equivalent MW for the failed rods (850 x 0.113 > 1000 x 0.0917). The 8x8 assemblies result in 96.05 MW of equivalent fission product inventory in the failed rods. This can be compared to the NEDO result if the 850 rods failed is multiplied by the 0.12 MW/rod. This results in 102 MW of equivalent fission product inventory in the failed rods. The NEDO value is therefore bounding by a factor of 1.06.

- The fraction of fuel melted due to the control rod drop will also add to the fission products released to the reactor coolant. NEDO-31400A assumed that 0.77% of the failed rods contained melted fuel (i.e. the equivalent of 0.0077 x 850 = 6.54 rods melted). The VYNPS UFSAR reports no fuel rod melts for VYNPS. Since the NEDO assumed that 100% of the noble gases (i.e., 10 times the release from a failed rod) and 50% of the iodines (i.e., 5 times the release from a failed rod) would be released from melted fuel, the 6.54 melted rods would be equivalent to 65.4 failed rods for the noble gases and 32.7 failed rods for the iodines. NEDO-31400A bounds the VYNPS analysis in this regard by a factor of 1.08 [i.e. (850 + 65.4) / 850] for whole body doses from noble gases, and by a factor of 1.04 [i.e. (850 + 32.7) / 850] for thyroid doses from iodines.

- The atmospheric dispersion parameter (X/Q) used in NEDO-31400A for Scenario 1 was 2.5×10^{-3} s/m^3. This was based on a ground level release from the turbine building with the receptor at the exclusion area boundary (EAB). The VYNPS value for a turbine building release is 1.7×10^{-3} s/m^3 and was determined based on actual site meteorology. The NEDO value is bounding by a factor of approximately 1.5.

- The holdup time of the off-gas system will determine the fraction of the noble gas fission products that enter the condenser that are subsequently released from the primary vent stack in Scenario 2. NEDO-31400A determined that 8 hours of holdup for krypton and 6 days for xenon gases would result in a dose that met the 6 rem whole body criterion (3.5 rem from Kr and 1 rem from Xe for a total of 4.5 rem). The VY design holdup times are 24 hours for krypton and 16.6 days for xenon based on 6 charcoal beds in operation and a 30 scfm condenser air inleakage rate. These holdup times result in a total whole body dose of 0.35 rem (0.1 rem from Kr and 0.25 rem from Xe) when evaluated based on the same input parameters as used in NEDO-31400A. The NEDO doses due to

off-gas system holdup are bounding by a factor of 12.8. No credit was taken for the fact that VY normally operates with seven charcoal beds in series and at condenser inleakage rates which usually range below 20 scfm. These two factors will extend the holdup in the VYNPS system by a factor of 1.75 for both krypton and xenon. There is no thyroid dose to consider from Scenario 2 since all of the iodine would be trapped in the charcoal delay beds.

- The atmospheric dispersion factor used in the NEDO report for Scenario 2 was 3×10^{-4} s/m^3. This was based on a stack release with the receptor at the EAB. The VYNPS value determined from site-specific meteorological data is 2.0×10^{-4} s/m^3. The NEDO value is bounding by a factor of 1.5.

Combining the factors above, VYNPS is conservatively bounded by the NEDO input assumptions by approximately a factor of 1.7 for both CRDA scenarios.

TABLE 2
CONTROL ROD DROP ACCIDENT
COMPARISON OF KEY INPUT PARAMETERS
NEDO-31400A VS. VERMONT YANKEE-SPECIFIC

Input Parameter	NEDO-31400A Value	Vermont Yankee Value
Power Level (MW/rod)	0.12 (includes peaking factor of 1.5)	8x8 fuel = 0.113[a] 9x9 fuel = 0.0917[a] (values include peaking factor of 1.5)
Number of Rods Failed	850 (8 x 8 fuel)	850 (8 x 8 fuel) 1000 (9 x 9 fuel)[b]
Melted Fuel Fraction	0.0077 (based on failed rods)	0
Scenario 1 – MSIV Closure		
Dispersion Parameter, X/Q (s/m^3)	2.5×10^{-3}	1.7×10^{-3}
Scenario 2 – No MSIV Closure		
Off gas System Holdup Time	8 hours for Kr[c] 6 days for Xe[c]	24 hours for Kr[d] 16.6 days for Xe[d]
Dispersion Parameter, X/Q (s/m^3)	3.0×10^{-4}	2.0×10^{-4}[e]

a. Based on a power level of 1665 MWt, 368 assemblies in the core, and 60 fuel rods in 8x8 assemblies and 74 fuel rods in 9x9 assemblies.
b. 1000 rods of 9 x 9 fuel would have a slightly lower fission product inventory than 850 rods of 8 x 8 fuel.
c. These holdup times resulted in a whole body dose of less than 6 rem. A Kr holdup time of 20 hours was required to produce a whole body dose equivalent to Scenario 1.
d. Based on a condenser air inleakage rate of 30 scfm and 6 charcoal beds in operation.
e. Value based on fumigation condition existing.

CRDA – Recirculation Loop Sample Lines

The elimination of the automatic closure of Group 1 isolation valves would add a potential release pathway from a CRDA that was not included in the LTR. This pathway includes release from the recirculation loop sample lines in the reactor building. These sample lines contain cold reactor coolant which is released to a sample sink contained in a ventilation hood. The hood is exhausted via the reactor building ventilation system to the primary vent stack. The potential doses from this pathway were analyzed assuming no credit for manual isolation of the sample lines or for iodine removal by the standby gas treatment system. The resulting doses at the EAB were 3.0 rem to the thyroid and 0.015 rem to the whole body. Even when added to the doses which result from Scenario 1 or 2 in Table 2, these results are well below the SRP criteria of 75 rem thyroid and 6 rem whole body.

Occupational Doses and Environmental Releases

The NRC Safety Evaluation for NEDO-31400A included a condition (identified as Condition #2 above) to limit both occupational doses and environmental releases. VY's response to this condition follows:

Occupational Doses

VYNPS has design features, programs and procedures in place that will provide reasonable assurance that significantly increased levels of radioactivity in the main steam lines will be controlled expeditiously to limit occupational doses.

During reactor power operations, radioactive materials in the main steam lines are routed through the main condenser and SJAEs to the AOG system. The recombiners and charcoal delay tanks of this system are in a separate shielded building that is designed to keep occupational doses ALARA (FSAR Section 9.4). In addition, important equipment is located in shielded compartments for isolation and maintenance.

The VYNPS programmatic and procedural controls include implementing procedures PP-7401 "Fuel Reliability Program," PP-7500 "Radiation Protection Program," OP-3140 "Alarm Response," ON-3152 "Off Gas High Radiation," and OT- 3112, "Main Steam Line High Radiation." These (and other procedures as necessary) will be revised as appropriate to incorporate specific considerations needed to change isolation of the main steam lines from an automatic action to a manual action for a condition involving high main steam line radiation. These actions will limit potential exposures to radioactive materials.

The recirculation loop sampling lines flow into a sample sink enclosed in a ventilation hood. Gases released from the liquid are collected by the ventilation hood and are exhausted to the primary vent stack. It is likely that any significant increase in gaseous releases will be detected by the reactor building ventilation radiation monitoring system and the reactor building area airborne monitoring system before concentrations in the reactor building become an occupational dose issue. In addition, area monitors in the reactor building will detect significant airborne concentrations of radioactivity and provide warning to occupants in that building.

Environmental Releases

VYNPS has installed and currently operates an AOG system for processing the fission product gases from the condenser via the SJAE (FSAR Section 9.4). The AOG contains approximately 90,000 lbs. of charcoal distributed in seven equivalent tanks. The design basis holdup is 24 hours for krypton and 16.6 days for xenon during normal operation. This design basis is based on the use of six of the seven charcoal tanks and a condenser air inleakage flow rate of 30 scfm. The actual holdup is normally greater than these design values since all seven tanks are normally used and the air inleakage rate usually averages less than 20 scfm (charcoal holdup time is directly proportional to the air flow rate). In addition, the charcoal tanks are configured such that either of the first two tanks may be valved out of service without impacting the operation of the system. Use of the AOG system provides operators with greater flexibility and extended time periods over which decisions may be made regarding the release of fission gases to the environment.

During normal operation, the VYNPS TSs limit the off-gas rate into the AOG to 160,000 uCi/s (30 minute decay equivalent). Procedures PP-7401 "Fuel Reliability Program," and ON-3152 "Off Gas High Radiation" require that actions be taken to limit off-gas rates to one-half of this value, or 80,000 uCi/s. The SJAE monitor, which is located between the condenser and the AOG system, measures these off-gas rates. These rates would be well below any applicable limits of 10CFR20 by the time the gas has passed through the AOG.

The AOG post-treatment (noble gas) monitors are located downstream of the charcoal delay tanks and monitor the noble gas levels between the tanks and the final section of delay pipe before release to the main stack. It takes the gas over an hour to pass through this final section of delay pipe. These monitors automatically isolate the off-gas line to the stack within 30 minutes if the off-gas activity exceeds the isolation setpoint. This setpoint is determined by the ODCM based on an instantaneous dose rate of 500 mrem/y (0.057 mrem/h) to the whole body or 3000 mrem/y to the skin of an off-site receptor.

The recirculation loop sampling lines flow into a sampling sink in the reactor building. The liquid released to the sink is below 212° and there will be no flashing of steam. Iodine and particulates from the recirculation loop sampling lines will remain with the liquid, which flows from the sink to a contained sump in the reactor building. The ventilation exhaust hood surrounding the sink will capture any noble gas or iodine that is released into the air. Any significant quantities of airborne radioactivity will be detected by the reactor building ventilation radiation monitoring system, the reactor building area airborne monitoring system, and the primary vent stack radiation monitoring system. The reactor building ventilation radiation monitoring system will automatically isolate normal reactor building exhaust if the trip level is reached, and will initiate operation of the standby gas treatment system (SBGT). The SBGT contains high efficiency particulate and charcoal filters, which will remove particulate and iodine radioactivity before release to the environment.

The combination of off-gas processing systems, process radiation monitors, and plant procedures provides significant flexibility in controlling environmental releases from VYNPS. These features will continue to provide adequate control of environmental releases. Manual isolation of the main steam lines will remain as one possible operator action to limit releases. Existing procedures related to gaseous waste processing will be

reviewed and revised as necessary to support the change from automatic to manual isolation of the main steam lines.

Radiation Monitor Setpoint and Additional Corrective Actions

The NRC Safety Evaluation for NEDO-31400A included a condition (identified as Condition #3 above) to standardize MSLRM and off-gas radiation monitor alarm settings at 1.5 times background; and to commit to promptly sample the reactor coolant to determine activity levels in reactor coolant and determine the need for additional corrective actions, if the MSLRMs or off-gas monitors (or both) exceed their alarm septoints. VY's response to this condition follows:

The MSLRM alarm setpoint is currently a nominal 1.5 times the normal, full power background radiation level from N-16 (OP-4617, "Calculation of Chemistry Controlled Setpoints"). The setpoint will remain at that level as required by Note 9 of TS Table 3.2.2 . VYNPS procedures (OT-3112 "Main Steam Line High Radiation") presently require that a reactor coolant sample for I-131 be obtained if this alarm setpoint is reached.

The SJAE pre-treatment high radiation alarm is currently set to satisfy VYNPS TS 3.8.K, and the ODCM Section 8.2.2, which limit the gross radioactivity release rate from the SJAE to 160,000 uCi/s (after 30 minutes of decay). As stated in the Bases of the TS, "Restricting the gross radioactivity release rate of gases from the main condenser SJAE provides reasonable assurance that the total body exposure to an individual at the exclusion area boundary will not exceed a small fraction of the limits of 10CFR100 in the event this effluent is inadvertently discharged directly to the environment without treatment." Additionally, this setpoint serves to limit buildup of fission product activity within station systems which would result if high fuel leakage were to be permitted over extended periods.

The SJAE pre-treatment radiation monitor is much more sensitive than the MSLRMs due to the decay of the short half-life N-16 (~7 seconds) and other activation gases. The total delay time from the MSLRMs to the SJAE pre-treatment off-gas monitors is approximately 3 minutes (OP-2613 "Sampling and Analysis of Off Gas System"). This delay allows almost all of the N-16 and most of the other activation gases to decay before reaching the SJAE pre-treatment off-gas monitors. Therefore, the background radiation level at the off-gas monitors is very low, and setting these monitors to alarm at 1.5 times the background dose rate is not reasonable and would lead to numerous alarms at the very low off-gas rates currently experienced during normal operations.

VYNPS procedures currently require that an off-gas sample and a reactor coolant sample be taken and analyzed within four hours whenever the off-gas rate shows an increase of 5,000 uCi/s or 25% whichever is greater (OP-2150 "Advanced Off Gas System," OP-2613 "Sampling and Analysis of Off Gas System," ON-3152 "Off Gas High Radiation," PP-7410 "Fuel Reliability Program"). The VYNPS TSs also require an off-gas sample at the same off-gas rate increase and within the same four hour time limit (TS 4.8.K.2). The SJAE off-gas monitor has an ERFIS alarm setpoint that supports this sampling requirement (OP-2613 "Sampling and Analysis of Off Gas System").
A SJAE pre-treatment off-gas monitor alarm setpoint based on an off-gas release rate increase of 5,000 uCi/s is very conservative. It is a factor of 32 below the TS LCO and is much more limiting than the MSLRM alarm setpoint of a nominal 1.5 times normal background at rated thermal power. The normal background reading on the SJAE off-gas monitors is in the range of 6-9 mR/h. This is based on operation with very low off-gas rates of approximately 200-300 uCi/s. Based on actual data, the monitor reading for an off-gas rate of 5,000 uCi/s would be approximately 70 mR/h, or about a factor of 10 higher than the background value. The actual setpoint value will depend on the radionuclide mix and the off-gas flow rate and is determined by a plant procedure (OP-2613 "Sampling and Analysis of Off Gas System"). An

off-gas monitor that is set to alarm at a 5,000 uCi/s or 25% increase, whichever is greater, will ensure that even minor fuel performance changes are readily detected. Therefore, VY proposes to maintain its SJAE off-gas monitor alarm setting at a 5,000 uCi/s or 25% increase, whichever is greater. This is acceptable because these settings will ensure that even minor fuel performance changes are readily detected.

Conclusion/Summary

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 requested license amendment will not be inimical to the common defense and security or to the health and safety of the public.

Attachment 2

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 250

Scram and Isolation Valve Closure Functions of the Main Steam Line Radiation Monitors

Determination of No Significant Hazards Consideration

Description of amendment request:

The proposed change removes requirements from the Technical Specifications (TSs) regarding main steam line radiation monitor (MSLRM) trips that automatically scram the reactor and close Group 1 isolation valves. Associated surveillance requirements would also be removed from TSs. In addition, conforming changes are being made to the Bases for these TSs.

Justification for removal of the MSLRM trip function is described in Licensing Topical Report (LTR) NEDO-31400A, "Safety Evaluation For Eliminating the Boiling Water Reactor Main Steam Line Isolation Valve Closure Function and Scram Function of the Main Steam Line Radiation Monitor." The subject LTR was accepted for referencing by the NRC staff in a Safety Evaluation dated May 15, 1991. Plant-specific analysis of the design basis control rod drop accident (CRDA) supports elimination of all Group 1 isolation signals from the MSLRM.

Basis for No Significant Hazards Determination:

Pursuant to 10CFR50.92, Vermont Yankee has reviewed the proposed change and concludes that the change does not involve a significant hazards consideration since the proposed change satisfies the criteria in 10CFR50.92(c). These criteria require that the operation of the facility in accordance with the proposed amendment will not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. The discussion below addresses each of these criteria and demonstrates that the proposed amendment does not constitute a significant hazard.

The proposed change does not involve a significant hazards consideration because the changes would not:

1) Involve a significant increase in the probability or consequences of an accident previously evaluated.

   The proposed change involves the removal of the existing scram function and Group 1 isolation valve closure functions of the MSLRM. The purpose of the MSLRM reactor scram and Group 1 isolation signals is to mitigate the radiological consequences of gross fuel failures. These functions do not serve as initiators for any of the accidents evaluated in the Updated Final Safety Analysis Report (UFSAR).

   The MSLRM scram function is not credited in the UFSAR, and the Group 1 isolation trip function of the MSLRMs was only assumed in one design basis event—the control rod drop accident. Because these functions are not initiators of accidents, their removal does not increase the probability of occurrence of previously evaluated accidents.

   Using the revised methodology of NRC-accepted NEDO-31400A and plant-specific analysis, it can be demonstrated that the consequences of a previously evaluated accident are not significantly increased by the proposed changes. Also, because there is no accident analysis that relies on the high radiation scram of the reactor protection system, its removal has no impact on the consequences of accidents previously evaluated. The results of the Vermont Yankee Nuclear Power Station's design basis control rod drop analysis are bounded by the NEDO-31400A results, which are well within the exposure guideline values in 10CFR Part 100.

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

2) Create the possibility for a new or different kind of accident from any previously evaluated.

The proposed changes to the plant involve limited changes to protective circuitry, but do not involve any plant hardware changes that could introduce any new failure modes. The changes will not affect non-MSLRM scram and isolation functions. In addition, the MSLRMs will remain active for other trip/isolation functions, and these monitors will still alarm in the control room to alert operators to off-normal conditions. The direct impact on the plant is that these particular trip functions (i.e., Group 1 closure and reactor scram) will no longer actuate. In demonstrating acceptable radiological consequences, the reconstituted design basis control rod drop accident analysis (performed in accordance with the methodology of NEDO-31400A) does not rely upon those trip functions being eliminated. The proposed changes were evaluated specifically for VYNPS and are enveloped by the NEDO-31400A analysis.

Therefore, the removal of the Group 1 isolation valve closure and scram functions of the MSLRMs does not create the possibility of a new or different kind of accident than those previously evaluated.

3) Involve a significant reduction in a margin of safety.

The proposed changes do not significantly increase calculated off-site dose consequences. Furthermore, the changes will improve the overall reliability of the plant when compared to the existing system, since the proposed changes will reduce the chances of an unnecessary plant transient occurring as a result of an inadvertent MSLRM scram or MSIV closure.

A reliability assessment of the elimination of the MSLRM scram function on reactivity control failure frequency and core damage frequency was performed in NEDO-31400A. The results of this analysis indicate a negligible increase in reactivity control failure frequency with the deletion of the MSLRM trip function. However, this increase is offset by the reduction in the transient initiating events (inadvertent scrams). This reduction in transient initiating events represents a reduction in core damage frequency and, thus, results in a net improvement to safety.

Removal of the Group 1 closure and scram functions of the MSLRMs does not significantly increase the consequences of any design basis accident, including CRDA. Other trip signals for the reactor protection system and primary containment isolation valves are unaffected. Therefore, there is no significant reduction in the margin of safety as a result of this Technical Specification change.

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

Conclusion

On the basis of the above, VY has determined that operation of the facility in accordance with the proposed change does not involve a significant hazards consideration as defined in 10CFR50.92(c), in that it: (1) does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) does not involve a significant reduction in a margin of safety.

Docket No. 50-271
BVY 02-18

Attachment 3

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 250

Scram and Isolation Valve Closure Functions of the
Main Steam Line Radiation Monitors

Marked-up Version of the Current Technical Specifications

TABLE 3.1.1
(Cont'd)
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT REQUIREMENTS

1

Deleted

	Trip Function	Trip Settings And Allowable Deviations	Modes in Which Functions Must be Operating: Refuel (1)	Startup	Run	Minimum Number Operating Instrument Channels Per Trip System (2)	Required ACTIONS When Minimum Conditions For Operation Are Not Satisfied (3)
9.	Main steamline high radiation (7) (RM-17-251(A-D))	3x normal background at rated power(8)	X	X	X	2	A or C
10.	Main steamline isolation valve closure (POS-2-80A-A1,B1 POS-2-86A-A1,B1 POS-2-80B-A1,B2 POS-2-86B-A1,B2 POS-2-80C-A2,B1 POS-2-86C-A2,B1 POS-2-80D-A2,B2 POS-2-86D-A2,B2)	≤10% valve closure			X	4	A or C
11.	Turbine control valve fast closure (PS-(37-40))	(9)(10)			X	2	A or D
12.	Turbine stop valve closure (SVOS-5-(1-4))	≤10% valve(10) closure			X	2	A or D

TABLE 3.1.1 NOTES (Cont'd)

3. When the requirements in the column "Minimum Number of Operating Instrument Channels Per Trip System" cannot be met for one system, that system shall be tripped. If the requirements cannot be met for both trip systems, the appropriate ACTIONS listed below shall be taken:

   a) Initiate insertion of operable rods and complete insertion of all operable rods within four hours.
   b) Reduce power level to IRM range and place mode switch in the "Startup/Hot Standby" position within eight hours.
   c) Reduce turbine load and close main steam line isolation valves within 8 hours.
   d) Reduce reactor power to less than 30% of rated within 8 hours.

4. "W" is percent rated two loop drive flow where 100% rated drive flow is that flow equivalent to 48×10^6 lbs/hr core flow. ΔW is the difference between the two loop and single loop drive flow at the same core flow. This difference must be accounted for during single loop operation. $\Delta W = 0$ for two recirculation loop operation.

5. To be considered operable an APRM must have at least 2 LPRM inputs per level and at least a total of 13 LPRM inputs, except that channels A, C, D, and F may lose all LPRM inputs from the companion APRM Cabinet plus one additional LPRM input and still be considered operable.

6. The top of the enriched fuel has been designated as 0 inches and provides common reference level for all vessel water level instrumentation.

7. ~~Channel shared by the Reactor Protection and Primary Containment Isolation Systems.~~

8. ~~An alarm setting of 1.5 times normal background at rated power shall be established to alert the operator to abnormal radiation levels in primary coolant.~~

Deleted.

9. Channel signals for the turbine control valve fast closure trip shall be derived from the same event or events which cause the control valve fast closure.

1

10. Turbine stop valve closure and turbine control valve fast closure scram signals may be bypassed at $\leq$30% of reactor Rated Thermal Power.

11. Not used.

12. While performing refuel interlock checks which require the mode switch to be in Startup, the reduced APRM high flux scram need not be operable provided:

    a. The following trip functions are operable:

       1. Mode switch in shutdown,
       2. Manual scram,
       3. High flux IRM scram
       4. High flux SRM scram in noncoincidence,
       5. Scram discharge volume high water level, and;

    b. No more than two (2) control rods withdrawn. The two (2) control rods that can be withdrawn cannot be face adjacent or diagonally adjacent.

TABLE 4.1.1

SCRAM INSTRUMENTATION AND LOGIC SYSTEMS FUNCTIONAL TESTS

MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTRUMENTATION, LOGIC SYSTEMS AND CONTROL CIRCUITS

Instrument Channel	Group[3]	Functional Test[7]	Minimum Frequency[4]
Mode Switch in Shutdown	A	Place Mode Switch in Shutdown	Each Refueling Outage
Manual Scram	A	Trip Channel and Alarm	Every 3 Months
IRM			
High Flux	C	Trip Channel and Alarm[5]	Before Each Startup & Weekly During Refueling[6]
Inoperative	C	Trip Channel and Alarm	Before Each Startup & Weekly During Refueling[6]
APRM			
High Flux	B	Trip Output Relays[5]	Every 3 Months
High Flux (Reduced)	B	Trip Output Relays[5]	Before Each Startup & Weekly During Refueling[6]
Inoperative	B	Trip Output Relays	Every 3 Months
Flow Bias	B	Trip Output Relays[5]	Every 3 Months
High Reactor Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
High Drywell Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
Low Reactor Water Level[2][8]	B	Trip Channel and Alarm[5]	Every 3 Months
High Water Level in Scram Discharge Volume	B	Trip Channel and Alarm[5]	Every 3 Months
2 High Main Steam Line Radiation[2]	B	Trip Channel and Alarm[5]	Every 3 Months
Main Steam Line Iso. Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Con. Valve Fast Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Scram Test Switch (5A-S2(A-D))	A	Trip Channel and Alarm	Once each week (9)
First Stage Turbine Pressure - Permissive (PS-5-14(A-D))	A	Trip Channel and Alarm	Every 6 Months

TABLE 4.1.1 NOTES

1. Not used

2. An instrument check shall be performed on reactor water level and reactor pressure instrumentation once per day and on streamline radiation monitors once per shift.

2

3. A description of the three groups is included in the basis of this Specification.

4. Functional tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.

5. This instrumentation is exempted from the Instrument Functional Test Definition (1.G.). This Instrument Functional Test will consist of injecting a simulated electrical signal into the measurement channels.

6. Frequency need not exceed weekly.

7. A functional test of the logic of each channel is performed as indicated. This coupled with placing the mode switch in shutdown each refueling outage constitutes a logic system functional test of the scram system.

8. The water level in the reactor vessel will be perturbed and the corresponding level indicator changes will be monitored. This test will be performed every month.

9. The automatic scram contactors shall be exercised once every week by either using the RPS channel test switches or performing a functional test of any automatic scram function. If the contactors are exercised using a functional test of a scram function, the weekly test using the RPS channel test switch is considered satisfied. The automatic scram contactors shall also be exercised after maintenance on the contactors.

TABLE 4.1.2

SCRAM INSTRUMENT CALIBRATION

MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration Standard (4)	Minimum Frequency (2)
High Flux APRM			
Output Signal	B	Heat Balance	Once Every 7 Days
Output Signal (Reduced) (7)	B	Heat Balance	Once Every 7 Days
Flow Bias	B	Standard Pressure and Voltage Source	Refueling Outage
LPRM (LPRM ND-2-1-104(80))	B (5)	Using TIP System	Every 2,000 MWD/T average core exposure (8)
High Reactor Pressure	B	Standard Pressure Source	Once/Operating Cycle
Turbine Control Valve Fast Closure	A	Standard Pressure Source	Every 3 Months
High Drywell Pressure	B	Standard Pressure Source	Once/Operating Cycle
High Water Level in Scram Discharge Volume	B	Water Level	Once/Operating Cycle
Low Reactor Water Level	B	Standard Pressure Source	Once/Operating Cycle
Turbine Stop Valve Closure	A	(6)	Refueling Outage
3 High Main Steam Line Radiation	B	Appropriate Radiation Source (3)	Refueling Outage
First Stage Turbine Pressure Permissive (PS-5-14(A-D))	A	Pressure Source	Every 6 Months and After Refueling
Main Steam Line Isolation Valve Closure	A	(6)	Refueling Outage

TABLE 4.1.2 NOTES

1. A description of the three groups is included in the bases of this Specification.

2. Calibration tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.

3. ~~A current source provides an instrument channel alignment every 3 months.~~

4. Response time is not part of the routine instrument check and calibration, but will be checked every operating cycle.

5. Does not provide scram function.

6. Physical inspection and actuation.

7. The IRM and SRM channels shall be determined to overlap during each startup after entering the STARTUP/HOT STANDBY MODE and the IRM and APRM channels shall be determined to overlap during each controlled shutdown, if not performed within the previous 7 days.

8. The specified frequency is met if the calibration is performed within 1.25 times the interval specified, as measured from the previous performance.

Deleted.

3

8

BASES: 3.1 (Cont'd)

~~High radiation levels in the main steam line tunnel above that due to the normal nitrogen and oxygen radioactivity is an indication of leaking fuel. A scram is initiated whenever such radiation level exceeds three times normal background. The purpose of this scram is to reduce the source of such radiation to the extent necessary to prevent release of radioactive materials to the turbine. An alarm is initiated whenever the radiation level exceeds 1.5 times normal background to alert the operator to possible serious radioactivity spikes due to abnormal core behavior. The Augmented Off-Gas (AOG) monitors provide further assurance against the release of radioactive materials to the site environs by isolating the AOG stack valve.~~

The main steam line isolation valve closure scram is set to scram when the isolation valves are 10 percent closed from full open in 3-out-of-4 lines. This scram anticipates the pressure and flux transient, which would occur when the valves close. By scramming at this setting, the resultant transient is insignificant.

A reactor mode switch is provided which actuates or bypasses the various scram functions appropriate to the particular plant operating status.

The manual scram function is active in all modes, thus providing for manual means of rapidly inserting control rods during all modes of reactor operation.

The IRM system provides protection against short reactor periods and, in conjunction with the reduced APRM system provides protection against excessive power levels in the startup and intermediate power ranges. A source range monitor (SRM) system is also provided to supply additional neutron level information during startup and can provide scram function with selected shorting links removed during refueling. Thus, the IRM and the reduced APRM are normally required in the startup mode and may be required in the refuel mode. During some refueling activities which require the mode switch in startup; it is allowable to disconnect the LPRMs to protect them from damage during under vessel work. In lieu of the protection provided by the reduced APRM scram, both the IRM scram and the SRM scram in noncoincidence are used to provide neutron monitoring protection against excessive power levels. In the power range, the normal APRM system provides required protection. Thus, the IRM system and 15% APRM scram are not required in the run mode.

If an unsafe failure is detected during surveillance testing, it is desirable to determine as soon as possible if other failures of a similar type have occurred and whether the particular function involved is still operable or capable of meeting the single failure criteria. To meet the requirements of Table 3.1.1, it is necessary that all instrument channels in one trip system be operable to permit testing in the other trip system.

Thus, when failures are detected in the first trip system tested, they would have to be repaired before testing of the other system could begin. In the majority of cases, repairs or replacement can be accomplished quickly. If repair or replacement cannot be completed in a reasonable time, operation could continue with one tripped system until the surveillance testing deadline.

3.2 LIMITING CONDITIONS FOR OPERATION

D. Off-Gas System Isolation

During reactor power operation, the instrumentation that initiates isolation of off-gas system shall b operable in accordance with Table 3.2.4.

E. Control Rod Block Actuat

During reactor power operation the instrumentatio that initiates control rod block shall be operable in accordance with Table 3.2.5.

F. Mechanical Vacuum Pump Isolation

1. Whenever the main steam line isolation valves are open, the mechanical vacuum pump shall be capable of being automatically isolated and secured by a signal of high radiation in the main steam line tunnel or shall be manually isolated and secured.

2. If Specification 3.2.F.1 is not met following a routine surveillance check, the reactor shall be in the cold shutdown within 24 hours.

G. Post-AccidentInstrumentation

During reactor power operation, the instrumentation that displays information in the Control Room necessary for the operator to initiate and control the systems used during and following a postulated accident or abnormal operating condition shall be operable in accordance with Table 3.2.6.

4.2 SURVEILLANCE REQUIREMENTS

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1. The High Main Steam Line Radiation trip function of the mechanical vacuum pump shall be functionally tested and calibrated in accordance with Table 4.2.2.

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Table 4.2.5.

F. Mechanical Vacuum Pump Isolation

During each operating cycle, automatic isolation and securing of the mechanical vacuum pump shall be verified while the reactor is shutdown.

G. Post-AccidentInstrumentation

The post-accident instrumentation shall be functionally tested and calibrated in accordance with Table 4.2.6.

TABLE 3.2.2

PRIMARY CONTAINMENT ISOLATION INSTRUMENTATION

Minimum Number of Operable Instrument Channels per Trip System	Trip Function	Trip Setting	Required ACTION When Minimum Conditions For Operation Are Not Satisfied (Note 2)
2 (Notes 11,12)	Low-Low Reactor Vessel Water Level (LT-2-3-57A/B(S2), LT-2-3-58A/B(S2))	≥82.5" above the top of enriched fuel	A
2 of 4 in each of 2 channels (Notes 11,12)	High Main Steam Line Area Temperature (TS-2-(121-124)(A-D))	≤212°F	B
2/steam line (Notes 11,12)	High Main Steam Line Flow (DPT-2-(116-119)(A-D)(M))	≤140% of rated flow	B
2 (Notes 1,11,12)	Low Main Steam Line Pressure (PS-2-134(A-D))	≥800 psig	B
2 (Notes 6,11,12)	High Main Steam Line Flow (DPT-2-116A,117B, 118C,119D(S1))	≤40% of rated flow	B
2 (Notes 11,12)	Low Reactor Vessel Water Level (LT-2-3-57A/B(M), LT-2-3-58A/B(M))	Same as Reactor Protection System	A
2 (Notes 11,12)	High Main Steam Line Radiation (7) (8) (RM-17-251(A-D))	≤3 x background at rated power (9)	~~B~~ B or C 5
2 (Notes 11,12)	High Drywell Pressure	Same as Reactor Protection System	A
2 (Notes 10,11,12)	Condenser Low Vacuum	≤12" Hg absolute	A
1	Trip System Logic	--	A

TABLE 3.2.2 NOTES

1. The main steam line low pressure need be available only in the "Run" mode.

2. If the minimum number of operable instrument channels are not available for one trip system, that trip system shall be tripped. If the minimum number of operable instrument channels are not available for both trip systems, the appropriate actions listed below shall be taken:

   A. Initiate an orderly shutdown and have reactor in the cold shutdown condition in 24 hours.

   B. Initiate an orderly load reduction and have reactor in "Hot Standby" within 8 hours.

3. Close isolation valves in system and comply with Specification 3.5.

4. [illegible]

   C. The actions required by Specification 3.2.F.1 shall be taken immediately.

   logic.

   the "Refuel,"

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7. This signal [illegible] the mechanical vacuum pump suction line isolation valves.

8. ~~Channel shared by the Reactor Protection and Primary Containment Isolation Systems.~~

9. An alarm setting of 1.5 times normal background at rated power shall be established to alert the operator to abnormal radiation levels in the primary coolant.

10. A key lock switch [illegible] permit the bypass of this trip function to [illegible] vacuum is greater than [illegible] bypass valves are [illegible]

    This trip function is applicable to the mechanical vacuum pump; however, it is not applicable to the primary containment Group 1 isolation valves (i.e., main steam isolation, main steam line drain, and recirculation loop sample line isolation valves).

    [illegible]lve, is [illegible]ions [illegible]rs [illegible]ability.

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12. Whenever [illegible] by Specification 3.7.A.2, there shall be two operable or tripped trip systems for each Trip Function, except as provided for below:

    A. With one or more automatic functions with isolation capability not maintained restore isolation capability in 1 hour or take the ACTION required by Table 3.2.2.

    B. With one or more channels inoperable, place the inoperable channels (s) in the tripped condition within:

       1) 12 hours for trip functions common to RPS instrumentation, and
       2) 24 hours for trip functions not common to RPS instrumentation,

       or, initiate the ACTION required by Table 3.2.2.

TABLE 4.2.2

MINIMUM TEST AND CALIBRATION FREQUENCIES

PRIMARY CONTAINMENT ISOLATION INSTRUMENTATION

Trip Function	Functional Test(8)	Calibration(8)	Instrument Check
Low-Low Reactor Vessel Water Level	Every Three Months	Once/Operating Cycle	Once Each Day
High Steam Line Area Temperature	Every Three Months	Each Refueling Outage	--
High Steam Line Flow	Every Three Months	Once/Operating Cycle	Once Each Day
Low Main Steam Line Pressure	Every Three Months	Every Three Months	--
Low Reactor Vessel Water Level	Every Three Months	Once/Operating Cycle	--
High Main Steam Line Radiation	Every Three Months (Note 7)	Each Refueling Outage	Once Each Day
High Drywell Pressure	Every Three Months	Once/Operating Cycle	Once Each Day
Condenser Low Vacuum	Every Three Months	Every Three Months	--
Trip System Logic	Once/Operating Cycle (Note 2)	Once/Operating Cycle (Note 3)	--

(Note 12)

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TABLE 4.2 NOTES

1. Not used.

2. During each refueling outage, simulated automatic actuation which opens all pilot valves shall be performed such that each trip system logic can be verified independent of its redundant counterpart.

3. Trip system logic calibration shall include only time delay relays and timers necessary for proper functioning of the trip system.

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

5. Deleted.

6. Functional tests, calibrations, and instrument checks are not required when these instruments are not required to be operable or are tripped. Functional tests shall be performed before each startup with a required frequency not to exceed once per week. Calibration shall be performed prior to or during each startup or controlled shutdown with a required frequency not to exceed once per week. Instrument checks shall be performed at least once per day during those periods when instruments are required to be operable.

7. This instrumentation is excepted from the functional test definitions and shall be calibrated using simulated electrical signals once every three months.

8. Functional tests and calibrations are not required when systems are not required to be operable.

9. The thermocouples associated with safety/relief valves and safety valve position, that may be used for back-up position indication, shall be verified to be operable every operating cycle.

10. Separate functional tests are not required for this instrumentation. The calibration and integrated ECCS tests which are performed once per operating cycle will adequately demonstrate proper equipment operation.

11. Trip system logic functional tests will include verification of operation of all automatic initiation inhibit switches by monitoring relay contact movement. Verification that the manual inhibit switches prevent opening all relief valves will be accomplished in conjunction with Section 4.5.F.1.

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12. **This trip function is applicable to the mechanical vacuum pump; however, it is not applicable to the primary containment Group 1 isolation valves (i.e., main steam isolation, main steam line drain, and recirculation loop sample line isolation valves).**

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BASES:

Main steam line radiation monitors are located in the main steam tunnel downstream from the MSIVs and provide an early indication of gross fuel failures. This instrumentation initiates alarms and trips/isolations assumed in the analysis of the design basis control rod drop accident (CRDA). Based on NEDO-31400A, "Safety Evaluation for Eliminating the Boiling Water Reactor Main Steam Line Isolation Valve Closure Function and Scram Function of the Main Steam Line Radiation Monitor," and plant-specifc analysis of the CRDA, this instrumentation is no longer required to automatically cause closure of the MSIVs and other Group 1 isolation valves to ensure compliance with the radiation dose limits of 10CFR100. The mechanical vacuum pump trip/isolation setting of ≤ 3 times normal background at rated thermal power is as low as practicable without consideration of spurious trips from nitrogen-16 spikes, instrument instabilities and other operational occurrences. With an alarm setting of a nominal 1.5 times normal background at rated thermal power, the control room operator is alerted to off-normal conditions and to determine the need for corrective actions in accordance with plant procedures.

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Temperature monitoring instrumentation is provided in the main steam line tunnel to detect leaks in this area. Trips are provided on this instrumentation and when exceeded cause closure of Group 1 isolation valves. Its setting of ambient plus 95°F is low enough to detect leaks of the order of 5 to 10 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, it is a backup to high steam flow instrumentation discussed above, and for small breaks, with the resultant small release of radioactivity, gives isolation before the limits of 10CFR100 are exceeded.

~~High radiation monitors in the main steam line tunnel have been provided to detect gross fuel failure resulting from a control rod drop accident. This instrumentation causes closure of Group 1 valves, the only valves required to close for this accident. With the established setting of 3 times normal background and main steam line isolation valve closure, fission product release is limited so that 10CFR100 limits are not exceeded for the control rod drop accident. With an alarm setting of 1.5 times normal background, the operator is alerted to possible gross fuel failure or abnormal fission product releases from failed fuel due to transient reactor operation.~~

Pressure instrumentation is provided which trips when main steam line pressure drops below 800 psig. A trip of this instrumentation results in closure of Group 1 isolation valves. In the refuel, shutdown, and startup modes, this trip function is provided when main steam line flow exceeds 40% of rated capacity. This function is provided primarily to provide protection against a pressure regulator malfunction which would cause the

TABLE 4.7.2 NOTES

1. Isolation signals are as follows:

Group 1: The valves in Group 1 are closed upon any one of the following conditions:

1. Low-low reactor water level
2. ~~High main steam line radiation~~ Deleted 7
3. High main steam line flow
4. High main steam line tunnel temperature
5. Low main steam line pressure (run mode only)
6. Condenser low vacuum

Group 2: The valves in Group 2 are closed upon any one of the following conditions*:

1. Low reactor water level
2. High drywell pressure

Group 3: The valves in Group 3 are closed upon any one of the following conditions:

1. Low reactor water level
2. High drywell pressure
3. High/low radiation - reactor building ventilation exhaust plenum or refueling floor

Group 4: The valves in Group 4 are closed upon any one of the following conditions:

1. Low reactor water level
2. High drywell pressure
3. High reactor pressure

Group 5: The valves in Group 5 are closed upon low reactor water level.

Group 6: The valves in Group 6 are closed upon any signal representing a steam line break in the HPCI system's or RCIC system's respective steam line. The signals indicating a steam line break for the respective steam line are as follows:

1. High steam line space temperature
2. High steam line flow
3. Low steam line pressure
4. High temperature in the main steam line tunnel (30 minute delay for the HPCI and the RCIC)

2. The closure time shall not be less than 3 seconds.

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* Valves V10-39A/B, V10-34A/B, V10-26A/B, V10-31A/B and V10-38A/B are closed upon either 1) low-low reactor water level and low reactor pressure or 2) high drywell pressure.

Attachment 4

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 250

Scram and Isolation Valve Closure Functions of the
Main Steam Line Radiation Monitors

Retyped Technical Specification Pages

Listing of Affected Technical Specifications Pages

Replace the Vermont Yankee Nuclear Power Station Technical Specifications pages listed below with the revised pages included herein. The revised pages contain vertical lines in the margin indicating the areas of change.

Remove	Insert
22	22
24	24
25	25
26	26
27	27
28	28
31	31
35	35
45	45
48	48
-	48a
64	64
74	74
76	76
162	162

TABLE 3.1.1
(Cont'd)
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT REQUIREMENTS

	Trip Function	Trip Settings And Allowable Deviations	Modes in Which Functions Must be Operating: Refuel (1)	Startup	Run	Minimum Number Operating Instrument Channels Per Trip System (2)	Required ACTIONS When Minimum Conditions For Operation Are Not Satisfied (3)
9.	Deleted						
10.	Main steamline isolation valve closure (POS-2-80A-A1,B1 POS-2-86A-A1,B1 POS-2-80B-A1,B2 POS-2-86B-A1,B2 POS-2-80C-A2,B1 POS-2-86C-A2,B1 POS-2-80D-A2,B2 POS-2-86D-A2,B2)	≤10% valve closure			X	4	A or C
11.	Turbine control valve fast closure (PS-(37-40))	(9) (10)			X	2	A or D
12.	Turbine stop valve closure (SVOS-5-(1-4))	≤10% valve (10) closure			X	2	A or D

TABLE 3.1.1 NOTES (Cont'd)

3. When the requirements in the column "Minimum Number of Operating Instrument Channels Per Trip System" cannot be met for one system, that system shall be tripped. If the requirements cannot be met for both trip systems, the appropriate ACTIONS listed below shall be taken:

   a) Initiate insertion of operable rods and complete insertion of all operable rods within four hours.
   b) Reduce power level to IRM range and place mode switch in the "Startup/Hot Standby" position within eight hours.
   c) Reduce turbine load and close main steam line isolation valves within 8 hours.
   d) Reduce reactor power to less than 30% of rated within 8 hours.

4. "W" is percent rated two loop drive flow where 100% rated drive flow is that flow equivalent to 48 x 10^6 lbs/hr core flow. ΔW is the difference between the two loop and single loop drive flow at the same core flow. This difference must be accounted for during single loop operation. $\Delta W = 0$ for two recirculation loop operation.

5. To be considered operable an APRM must have at least 2 LPRM inputs per level and at least a total of 13 LPRM inputs, except that channels A, C, D, and F may lose all LPRM inputs from the companion APRM Cabinet plus one additional LPRM input and still be considered operable.

6. The top of the enriched fuel has been designated as 0 inches and provides common reference level for all vessel water level instrumentation.

7. Deleted.

8. Deleted.

9. Channel signals for the turbine control valve fast closure trip shall be derived from the same event or events which cause the control valve fast closure.

10. Turbine stop valve closure and turbine control valve fast closure scram signals may be bypassed at $\leq$30% of reactor Rated Thermal Power.

11. Not used.

12. While performing refuel interlock checks which require the mode switch to be in Startup, the reduced APRM high flux scram need not be operable provided:

    a. The following trip functions are operable:

       1. Mode switch in shutdown,
       2. Manual scram,
       3. High flux IRM scram
       4. High flux SRM scram in noncoincidence,
       5. Scram discharge volume high water level, and;

    b. No more than two (2) control rods withdrawn. The two (2) control rods that can be withdrawn cannot be face adjacent or diagonally adjacent.

TABLE 4.1.1

SCRAM INSTRUMENTATION AND LOGIC SYSTEMS FUNCTIONAL TESTS

MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTRUMENTATION, LOGIC SYSTEMS AND CONTROL CIRCUITS

Instrument Channel	Group[3]	Functional Test[7]	Minimum Frequency[4]
Mode Switch in Shutdown	A	Place Mode Switch in Shutdown	Each Refueling Outage
Manual Scram	A	Trip Channel and Alarm	Every 3 Months
IRM			
High Flux	C	Trip Channel and Alarm[5]	Before Each Startup & Weekly During Refueling[6]
Inoperative	C	Trip Channel and Alarm	Before Each Startup & Weekly During Refueling[6]
APRM			
High Flux	B	Trip Output Relays[5]	Every 3 Months
High Flux (Reduced)	B	Trip Output Relays[5]	Before Each Startup & Weekly During Refueling[6]
Inoperative	B	Trip Output Relays	Every 3 Months
Flow Bias	B	Trip Output Relays[5]	Every 3 Months
High Reactor Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
High Drywell Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
Low Reactor Water Level[2][8]	B	Trip Channel and Alarm[5]	Every 3 Months
High Water Level in Scram Discharge Volume	B	Trip Channel and Alarm[5]	Every 3 Months
Main Steam Line Iso. Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Con. Valve Fast Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Scram Test Switch (5A-S2(A-D))	A	Trip Channel and Alarm	Once each week (9)
First Stage Turbine Pressure - Permissive (PS-5-14(A-D))	A	Trip Channel and Alarm	Every 6 Months

TABLE 4.1.1 NOTES

1. Not used

2. An instrument check shall be performed on reactor water level and reactor pressure instrumentation once per day.

3. A description of the three groups is included in the basis of this Specification.

4. Functional tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.

5. This instrumentation is exempted from the Instrument Functional Test Definition (1.G.). This Instrument Functional Test will consist of injecting a simulated electrical signal into the measurement channels.

6. Frequency need not exceed weekly.

7. A functional test of the logic of each channel is performed as indicated. This coupled with placing the mode switch in shutdown each refueling outage constitutes a logic system functional test of the scram system.

8. The water level in the reactor vessel will be perturbed and the corresponding level indicator changes will be monitored. This test will be performed every month.

9. The automatic scram contactors shall be exercised once every week by either using the RPS channel test switches or performing a functional test of any automatic scram function. If the contactors are exercised using a functional test of a scram function, the weekly test using the RPS channel test switch is considered satisfied. The automatic scram contactors shall also be exercised after maintenance on the contactors.

TABLE 4.1.2

SCRAM INSTRUMENT CALIBRATION

MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group(1)	Calibration Standard(4)	Minimum Frequency(2)
High Flux APRM			
Output Signal	B	Heat Balance	Once Every 7 Days
Output Signal (Reduced) (7)	B	Heat Balance	Once Every 7 Days
Flow Bias	B	Standard Pressure and Voltage Source	Refueling Outage
LPRM (LPRM ND-2-1-104(80))	B(5)	Using TIP System	Every 2,000 MWD/T average core exposure (8)
High Reactor Pressure	B	Standard Pressure Source	Once/Operating Cycle
Turbine Control Valve Fast Closure	A	Standard Pressure Source	Every 3 Months
High Drywell Pressure	B	Standard Pressure Source	Once/Operating Cycle
High Water Level in Scram Discharge Volume	B	Water Level	Once/Operating Cycle
Low Reactor Water Level	B	Standard Pressure Source	Once/Operating Cycle
Turbine Stop Valve Closure	A	(6)	Refueling Outage
First Stage Turbine Pressure Permissive (PS-5-14(A-D))	A	Pressure Source	Every 6 Months and After Refueling
Main Steam Line Isolation Valve Closure	A	(6)	Refueling Outage

TABLE 4.1.2 NOTES

1. A description of the three groups is included in the bases of this Specification.

2. Calibration tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.

3. Deleted.

4. Response time is not part of the routine instrument check and calibration, but will be checked every operating cycle.

5. Does not provide scram function.

6. Physical inspection and actuation.

7. The IRM and SRM channels shall be determined to overlap during each startup after entering the STARTUP/HOT STANDBY MODE and the IRM and APRM channels shall be determined to overlap during each controlled shutdown, if not performed within the previous 7 days.

8. The specified frequency is met if the calibration is performed within 1.25 times the interval specified, as measured from the previous performance.

BASES: 3.1 (Cont'd)

The main steam line isolation valve closure scram is set to scram when the isolation valves are 10 percent closed from full open in 3-out-of-4 lines. This scram anticipates the pressure and flux transient, which would occur when the valves close. By scramming at this setting, the resultant transient is insignificant.

The main steam line isolation valve closure scram is set to scram when the isolation valves are 10 percent closed from full open in 3-out-of-4 lines. This scram anticipates the pressure and flux transient, which would occur when the valves close. By scramming at this setting, the resultant transient is insignificant.

A reactor mode switch is provided which actuates or bypasses the various scram functions appropriate to the particular plant operating status.

The manual scram function is active in all modes, thus providing for manual means of rapidly inserting control rods during all modes of reactor operation.

The IRM system provides protection against short reactor periods and, in conjunction with the reduced APRM system provides protection against excessive power levels in the startup and intermediate power ranges. A source range monitor (SRM) system is also provided to supply additional neutron level information during startup and can provide scram function with selected shorting links removed during refueling. Thus, the IRM and the reduced APRM are normally required in the startup mode and may be required in the refuel mode. During some refueling activities which require the mode switch in startup; it is allowable to disconnect the LPRMs to protect them from damage during under vessel work. In lieu of the protection provided by the reduced APRM scram, both the IRM scram and the SRM scram in noncoincidence are used to provide neutron monitoring protection against excessive power levels. In the power range, the normal APRM system provides required protection. Thus, the IRM system and 15% APRM scram are not required in the run mode.

If an unsafe failure is detected during surveillance testing, it is desirable to determine as soon as possible if other failures of a similar type have occurred and whether the particular function involved is still operable or capable of meeting the single failure criteria. To meet the requirements of Table 3.1.1, it is necessary that all instrument channels in one trip system be operable to permit testing in the other trip system.

Thus, when failures are detected in the first trip system tested, they would have to be repaired before testing of the other system could begin. In the majority of cases, repairs or replacement can be accomplished quickly. If repair or replacement cannot be completed in a reasonable time, operation could continue with one tripped system until the surveillance testing deadline.

3.2 LIMITING CONDITIONS FOR OPERATION

D. Off-Gas System Isolation

During reactor power operation, the instrumentation that initiates isolation of the off-gas system shall be operable in accordance with Table 3.2.4.

E. Control Rod Block Actuation

During reactor power operation the instrumentation that initiates control rod block shall be operable in accordance with Table 3.2.5.

F. Mechanical Vacuum Pump Isolation

1. Whenever the main steam line isolation valves are open, the mechanical vacuum pump shall be capable of being automatically isolated and secured by a signal of high radiation in the main steam line tunnel or shall be manually isolated and secured.

2. If Specification 3.2.F.1 is not met following a routine surveillance check, the reactor shall be in the cold shutdown within 24 hours.

G. Post-AccidentInstrumentation

During reactor power operation, the instrumentation that displays information in the Control Room necessary for the operator to initiate and control the systems used during and following a postulated accident or abnormal operating condition shall be operable in accordance with Table 3.2.6.

4.2 SURVEILLANCE REQUIREMENTS

D. Off-Gas System Isolation

Instrumentation and logic systems shall be functionally tested and calibrated as indicated in Table 4.2.4.

E. Control Rod Block Actuation

Instrumentation and logic systems shall be functionally tested and calibrated as indicated in Table 4.2.5.

F. Mechanical Vacuum Pump Isolation

1. The High Main Steam Line Radiation trip function of the mechanical vacuum pump shall be functionally tested and calibrated in accordance with Table 4.2.2.

2. During each operating cycle, automatic isolation and securing of the mechanical vacuum pump shall be verified while the reactor is shutdown.

G. Post-AccidentInstrumentation

The post-accident instrumentation shall be functionally tested and calibrated in accordance with Table 4.2.6.

TABLE 3.2.2

PRIMARY CONTAINMENT ISOLATION INSTRUMENTATION

Minimum Number of Operable Instrument Channels per Trip System	Trip Function	Trip Setting	Required ACTION When Minimum Conditions For Operation Are Not Satisfied (Note 2)
2 (Notes 11,12)	Low-Low Reactor Vessel Water Level (LT-2-3-57A/B(S2), LT-2-3-58A/B(S2))	≥82.5" above the top of enriched fuel	A
2 of 4 in each of 2 channels (Notes 11,12)	High Main Steam Line Area Temperature (TS-2-(121-124)(A-D))	≤212°F	B
2/steam line (Notes 11,12)	High Main Steam Line Flow (DPT-2-(116-119)(A-D)(M))	≤140% of rated flow	B
2 (Notes 1,11,12)	Low Main Steam Line Pressure (PS-2-134(A-D))	≥800 psig	B
2 (Notes 6,11,12)	High Main Steam Line Flow (DPT-2-116A,117B, 118C,119D(S1))	≤40% of rated flow	B
2 (Notes 11,12)	Low Reactor Vessel Water Level (LT-2-3-57A/B(M), LT-2-3-58A/B(M))	Same as Reactor Protection System	A
2 (Notes 11,12)	High Main Steam Line Radiation (7) (8) (RM-17-251(A-D))	≤3 x background at rated power (9)	B or C
2 (Notes 11,12)	High Drywell Pressure	Same as Reactor Protection System	A
2 (Notes 10,11,12)	Condenser Low Vacuum	≤12" Hg absolute	A
1	Trip System Logic	--	A

TABLE 3.2.2 NOTES

1. The main steam line low pressure need be available only in the "Run" mode.

2. If the minimum number of operable instrument channels are not available for one trip system, that trip system shall be tripped. If the minimum number of operable instrument channels are not available for both trip systems, the appropriate actions listed below shall be taken:

   A. Initiate an orderly shutdown and have reactor in the cold shutdown condition in 24 hours.

   B. Initiate an orderly load reduction and have reactor in "Hot Standby" within 8 hours.

   C. The actions required by Specification 3.2.F.1 shall be taken immediately.

3. Close isolation valves in system and comply with Specification 3.5.

4. Deleted.

5. One trip system arranged in a one-out-of-two twice logic.

6. The main steam line high flow is available only in the "Refuel," "Shutdown," and "Startup" modes.

7. This signal also automatically closes the mechanical vacuum pump suction line isolation valves.

8. This trip function is applicable to the mechanical vacuum pump; however, it is not applicable to the primary containment Group 1 isolation valves (i.e., main steam isolation, main steam line drain, and recirculation loop sample line isolation valves).

9. An alarm setting of 1.5 times normal background at rated power shall be established to alert the operator to abnormal radiation levels in the primary coolant.

10. A key lock switch is provided to permit the bypass of this trip function to enable plant startup and shutdown when the condenser vacuum is greater than 12 inches Hg absolute provided that both turbine stop and bypass valves are closed.

11. When a channel, and/or the affected primary containment isolation valve, is placed in an inoperable status solely for performance of required instrumentation surveillances, entry into associated Limiting Conditions for Operation and required ACTIONS may be delayed for up to 6 hours provided the associated Trip Function maintains isolation capability.

12. Whenever Primary Containment integrity is required by Specification 3.7.A.2, there shall be two operable or tripped trip systems for each Trip Function, except as provided for below:

    A. With one or more automatic functions with isolation capability not maintained restore isolation capability in 1 hour or take the ACTION required by Table 3.2.2.

TABLE 3.2.2 NOTES (Cont'd)

B. With one or more channels inoperable, place the inoperable channels (s) in the tripped condition within:

1) 12 hours for trip functions common to RPS instrumentation, and
2) 24 hours for trip functions not common to RPS instrumentation,

or, initiate the ACTION required by Table 3.2.2.

13. Whenever the High Pressure Cooling Injection System and Reactor Core Isolation Cooling System are required to be operable in accordance with Specification 3.5, the low steam supply pressure automatic isolation trip system shall be operable, except as provided below:

A. With the automatic isolation trip function not maintained, restore isolation capability in 1 hour or take the ACTION required by Table 3.2.2.

B. With one or more required channels inoperable, place the inoperable channel(s) in the tripped condition within 24 hours or take the ACTION required by Table 3.2.2.

TABLE 4.2.2

MINIMUM TEST AND CALIBRATION FREQUENCIES

PRIMARY CONTAINMENT ISOLATION INSTRUMENTATION

Trip Function	Functional Test (8)	Calibration (8)	Instrument Check
Low-Low Reactor Vessel Water Level	Every Three Months	Once/Operating Cycle	Once Each Day
High Steam Line Area Temperature	Every Three Months	Each Refueling Outage	--
High Steam Line Flow	Every Three Months	Once/Operating Cycle	Once Each Day
Low Main Steam Line Pressure	Every Three Months	Every Three Months	--
Low Reactor Vessel Water Level	Every Three Months	Once/Operating Cycle	--
High Main Steam Line Radiation (Note 12)	Every Three Months (Note 7)	Each Refueling Outage	Once Each Day
High Drywell Pressure	Every Three Months	Once/Operating Cycle	Once Each Day
Condenser Low Vacuum	Every Three Months	Every Three Months	--
Trip System Logic	Once/Operating Cycle (Note 2)	Once/Operating Cycle (Note 3)	--

TABLE 4.2 NOTES

1. Not used.

2. During each refueling outage, simulated automatic actuation which opens all pilot valves shall be performed such that each trip system logic can be verified independent of its redundant counterpart.

3. Trip system logic calibration shall include only time delay relays and timers necessary for proper functioning of the trip system.

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

5. Deleted.

6. Functional tests, calibrations, and instrument checks are not required when these instruments are not required to be operable or are tripped. Functional tests shall be performed before each startup with a required frequency not to exceed once per week. Calibration shall be performed prior to or during each startup or controlled shutdown with a required frequency not to exceed once per week. Instrument checks shall be performed at least once per day during those periods when instruments are required to be operable.

7. This instrumentation is excepted from the functional test definitions and shall be calibrated using simulated electrical signals once every three months.

8. Functional tests and calibrations are not required when systems are not required to be operable.

9. The thermocouples associated with safety/relief valves and safety valve position, that may be used for back-up position indication, shall be verified to be operable every operating cycle.

10. Separate functional tests are not required for this instrumentation. The calibration and integrated ECCS tests which are performed once per operating cycle will adequately demonstrate proper equipment operation.

11. Trip system logic functional tests will include verification of operation of all automatic initiation inhibit switches by monitoring relay contact movement. Verification that the manual inhibit switches prevent opening all relief valves will be accomplished in conjunction with Section 4.5.F.1.

12. This trip function is applicable to the mechanical vacuum pump; however, it is not applicable to the primary containment Group 1 isolation valves (i.e., main steam isolation, main steam line drain, and recirculation loop sample line isolation valves).

BASES: 3.2 (Cont'd)

For the complete circumferential break of 28-inch recirculation line and with the trip setting given above, ECCS initiation and primary system isolation are initiated in time to meet the above criteria. The instrumentation also covers the full range of spectrum breaks and meets the above criteria.

The high drywell pressure instrumentation is a backup to the water level instrumentation, and in addition to initiating ECCS, it causes isolation of Group 2, 3, and 4 isolation valves. For the complete circumferential break discussed above, this instrumentation will initiate ECCS operation at about the same time as the low-low water level instrumentation, thus, the results given above are applicable here also. Certain isolation valves including the TIP blocking valves, CAD inlet and outlet, drywell vent, purge and sump valves are isolated on high drywell pressure. However, since high drywell pressure could occur as the result of non-safety-related causes, such as not venting the drywell during startup, complete system isolation is not desirable for these conditions and only certain valves are required to close. The water level instrumentation initiates protection for the full spectrum of loss of coolant accidents and causes a trip of certain primary system isolation valves.

Venturis are provided in the main steam lines as a means of measuring steam flow and also limiting the loss of mass inventory from the vessel during a steam line break accident. In addition to monitoring steam flow, instrumentation is provided which causes a trip of Group 1 isolation valves. The primary function of the instrumentation is to detect a break in the main steam line, thus only Group 1 valves are closed. For the worst case accident, main steam line break outside the drywell, this trip setting of 140 percent of rated steam flow in conjunction with the flow limiters and main steam line valve closure limit the mass inventory loss such that fuel is not uncovered, cladding temperatures remain less than 1295°F and release of radioactivity to the environs is well below 10CFR100.

Temperature monitoring instrumentation is provided in the main steam line tunnel to detect leaks in this area. Trips are provided on this instrumentation and when exceeded cause closure of Group 1 isolation valves. Its setting of ambient plus 95°F is low enough to detect leaks of the order of 5 to 10 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, it is a backup to high steam flow instrumentation discussed above, and for small breaks, with the resultant small release of radioactivity, gives isolation before the limits of 10CFR100 are exceeded.

Main steam line radiation monitors are located in the main steam tunnel downstream from the MSIVs and provide an early indication of gross fuel failures. This instrumentation initiates alarms and trips/isolations assumed in the analysis of the design basis control rod drop accident (CRDA). Based on NEDO-31400A, "Safety Evaluation for Eliminating the Boiling Water Reactor Main Steam Line Isolation Valve Closure Function and Scram Function of the Main Steam Line Radiation Monitor," and plant-specific analysis of the CRDA, this instrumentation is no longer required to automatically cause closure of the MSIVs and other Group 1 isolation valves to ensure compliance with the radiation dose limits of 10CFR100. The mechanical vacuum pump trip/isolation setting of ≤3 times normal background at rated thermal power is as low as practicable without consideration of spurious trips from nitrogen-16 spikes, instrument instabilities and other operational occurrences. With an alarm setting of a nominal 1.5 times normal background at rated thermal power, the control room operator is alerted to off-normal conditions and to determine the need for corrective actions in accordance with plant procedures.

Pressure instrumentation is provided which trips when main steam line pressure drops below 800 psig. A trip of this instrumentation results in closure of Group 1 isolation valves. In the refuel, shutdown, and startup modes, this trip function is provided when main steam line flow exceeds 40% of rated capacity. This function is provided primarily to provide protection against a pressure regulator malfunction which would cause the

TABLE 4.7.2 NOTES

1. Isolation signals are as follows:

   Group 1: The valves in Group 1 are closed upon any one of the following conditions:

   1. Low-low reactor water level
   2. Deleted
   3. High main steam line flow
   4. High main steam line tunnel temperature
   5. Low main steam line pressure (run mode only)
   6. Condenser low vacuum

   Group 2: The valves in Group 2 are closed upon any one of the following conditions*:

   1. Low reactor water level
   2. High drywell pressure

   Group 3: The valves in Group 3 are closed upon any one of the following conditions:

   1. Low reactor water level
   2. High drywell pressure
   3. High/low radiation - reactor building ventilation exhaust plenum or refueling floor

   Group 4: The valves in Group 4 are closed upon any one of the following conditions:

   1. Low reactor water level
   2. High drywell pressure
   3. High reactor pressure

   Group 5: The valves in Group 5 are closed upon low reactor water level.

   Group 6: The valves in Group 6 are closed upon any signal representing a steam line break in the HPCI system's or RCIC system's respective steam line. The signals indicating a steam line break for the respective steam line are as follows:

   1. High steam line space temperature
   2. High steam line flow
   3. Low steam line pressure
   4. High temperature in the main steam line tunnel (30 minute delay for the HPCI and the RCIC)

2. The closure time shall not be less than 3 seconds.

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* Valves V10-39A/B, V10-34A/B, V10-26A/B, V10-31A/B and V10-38A/B are closed upon either 1) low-low reactor water level and low reactor pressure or 2) high drywell pressure.