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Proposed Change to Technical Specifications
to Remove the Main Steam Line Radiation
Monitor Scram and Isolation Functions

Boston Edison Company proposes changes to the Pilgrim Nuclear Power Station Technical Specifications regarding the Main Steam Line Radiation Monitor scram and isolation functions.

The requested changes are described in Attachment A, the revised technical specification pages are in Appendix B, and Attachment C provides the existing pages marked-up to show the proposed changes.

With NRC approval, this change will be implemented coincidental with the corresponding plant design change, currently scheduled for February, 1994 or within 90 days following receipt of the Amendment.

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ETB/GGW/nas/MSLRM

1 signed original and 37 copies

cc: see next page

Commonwealth of Massachusetts)
County of Plymouth)

Then personally appeared before me, E. T. Boulette, who being duly sworn, did state that he is Senior Vice President - Nuclear of Boston Edison Company and that he is duly authorized to execute and file the submittal contained herein in the name and on behalf of the Boston Edison Company and that the statements in said submittal are true to the best of his knowledge and belief.

My commission expires: March 25, 1999 James J. Keys
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A001

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Attachment A
Removal of the Main Steam Line Radiation Monitor
Scram and Isolation Functions

Description of Change:

The proposed Technical Specification change removes the scram and the Group 1 isolation valve closure functions associated with the Main Steam Line Radiation Monitors (MSLRMs) at Pilgrim Nuclear Power Station (PNPS). Elimination of these functions will improve the availability of PNPS by reducing any spurious scrams or isolations associated with the MSLRMs. The alarm and trip signal for the mechanical vacuum pump associated with the MSLRMs will remain functional.

Justification for removal of the MSLRM Scram and MSIV isolation functions was described in Licensing Topical Report NEDO-31400A, "Safety Evaluation for Eliminating the Boiling Water Reactor Main Steam Line Isolation Valve Closure Function and Scram Function on the Main Steam Line Radiation Monitor". NEDO-31400A was approved by the NRC staff on May 15, 1991. Justification for removing the additional Group 1 isolation functions (steam line drain valves and reactor water sample valves) is provided as part of this submittal.

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 large transient on the vessel and results in safety-related system actuations. Subjecting the reactor system to unnecessary vessel isolations diminishes plant reliability, complicates scram recovery and is adverse to maximizing plant safety. Eliminating the main steam line isolation and scram functions from the MSLRM will help avoid undue vessel isolations during normal plant evolutions, such as switching condensate demineralizer beds.

Also, removal of these functions permits continued use of the augmented offgas system to process radioactivity during transients that may occur. Thus, the operator maintains control over the release pathway.

Offsite Doses for a CRDA

General Electric prepared NEDO-31400A at the request of the BWR Owners Group. This document provided analysis to prove that the elimination of the MSIV closure and scram function of the main steam line radiation monitors, in conjunction with use of the augmented offgas system (AOG), results in offsite radiological exposures that are a small fraction of 10CFR100 guidelines, even when utilizing very conservative source terms. Specifically, this analysis addressed the Control Rod Drop Accident (CRDA) because it is a Design Basis Accident (DBA) taking credit for main steam line closure on high radiation. The current PNPS analysis (FSAR Appendix R3.2 and Chapter 14.5.1) states that during a Control Rod Drop Accident, the MSIV closure function is relied upon to limit release of radioactivity to the environment. The noble gases and iodines that are transported to the condenser leak to the environment through

the turbine building exhausters at a rate of 0.5% condenser volume per day. This release is considered a ground level release.

In the NEDO-31400A analysis for removing the MSIV isolation function, input values were collected from all participating utilities (including PNPS) to consider the most bounding case of the effects of removing the MSIV isolation function. The analysis considered the offsite dose consequences for the following 2 release scenarios.

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

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

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 significantly lower assuming AOG hold up times of 22 days for Xenon and 29 hours for Krypton. The thyroid dose was 0 Rem and the whole body dose was 0.18 Rem. The purpose of the GE safety evaluation was to compute the most bounding case that would envelope all utilities.

A site-specific analysis, PNPS-1-ERHS-XIII.T-49-0, was performed by Pilgrim personnel. It demonstrates offsite doses for a CRDA are bounded by the values in NEDO-31400A. The results of this calculation for both scenarios were less than the offsite doses in the worst case of the NEDO-31400A (MSIV closure with condenser leakage). A comparison between the NEDO results and the PNPS site-specific results is provided in Tables 1, 2, and 3, (enclosed at the end of Attachment A). These tables do not include other release trips at PNPS as discussed below.

Because of the variety of trip functions from the participating utilities, the NEDO-31400A safety evaluation, and the above referenced comparison, did not include an offsite dose impact of other trip functions of the Main Steam Line Radiation Monitors. The other PNPS trip functions from Main Steam Radiation Monitoring are as follows:

1) Mechanical Vacuum Pump Trip.
2) Close the Main Steam Line Drain Isolation Valves.
3) Close the Reactor Sample Isolation Valves.

- The discharge of the Mechanical Vacuum Pump is released to the main stack with no filtration treatment and only a 2 minute holdup pipe. The trip function for the Pilgrim mechanical vacuum pump will not be changed.

- Removal of the trip function for the Main Steam Line Drain Valves is bounded by the NEDO-31400A evaluation. There is no effect on the off-site dose resulting from these drain valves remaining open during a CRDA since the piping is also routed to the condenser. The source term in the condenser is unaffected because no plate out or condensation of the source term from the reactor to the condenser is assumed in the NEDO-31400A analysis.

- The offsite dose assessment for removing the Reactor Water Sample Valve isolation was done by using conservative conditions and assuming operators manually isolate the sample line within 2 hrs after the CRDA. The sample enters the Reactor Building as a 1" line in the Reactor Water Cleanup Heat Exchanger Room. The line splits off to a 1/2" line to the Crack Arrest Verification System (CAVS) a 1/2" line to the Reactor Water Sample Panel. There is a 1/4" line from the CAVS that goes to a sample panel and drains to the Reactor Water Sample panel drain. This drain path was assessed for its contribution to offsite dose during a CRDA. The estimated added contribution from this flow path to the CRDA offsite dose is significantly lower than the Standard Review Plan (SRP) limits of 75 Rem, thyroid and 6 REM, whole body. Since the combined offsite dose is well below the SRP limits, conservative estimates are considered acceptable. The estimated contributing doses are 1.3 Rem thyroid and 3.2E-04 whole body. The conservative assumptions used are as follows:

- The valves are assumed to be open for 2 hours before action is taken by the operator. The actual time for operator action will be shorter because procedures will be revised to ensure manual action is taken if high radiation is present in the steam tunnel.

- The same fraction of halogens get vented to the atmosphere as in the condenser. This assumes no condensation occurs. However, the process stream that goes to the drain first goes to a sample panel cooler and has an outlet temperature of approximately 77°F. Therefore, the actual fraction of halogens that get vented to the atmosphere will be very small.

Another contribution to offsite dose during a CRDA is from the Turbine Gland Seal Condenser Exhausters. This source draws steam from the steam chest of the Main Steam System and supplies it to the gland seals of the turbine. There is a separate condenser for this steam that is mixed with air and then exhausted to the same effluent path as the mechanical vacuum pump. The amount of steam exiting through this path depends on the clearances of the packing on the turbine seals. The maximum seal clearance was assumed when considering the offsite dose contribution during a CRDA. This assessment also assumes there is no condensation of the steam after it leaves the exhausters and is released to the environment. The actual process flow is through piping that contains 2 loop seals to collect condensation before being released to the stack. Since iodine is soluble in water, the steam condensation will remove this radionuclide from the process flow. Thus the actual dose contribution from I-131 will be significantly lower than calculated. The estimated dose contributions from this source are 8.9 Rem thyroid and 8.6E-02 Rem whole body (BECo Memo RTS93-12).

According to the present FSAR for PNPS, the design basis CRDA occurs at hot conditions with reactor power below 10% of rated. For this condition, it is possible that the mechanical vacuum pump will be in service. If the CRDA occurs at this time, the mechanical vacuum pump will isolate on a Main Steam Line high radiation signal and the radionuclides will be confined in the condenser. Therefore, the most limiting release scenario for PNPS is the leakage from the condenser.

The resulting offsite doses are totaled below:

Reference	Source	Thyroid	WB
Calc. PNPS-1-ERHS-XIII.T-49-0	Condenser	0.45	$2.3.10^{-3}$
Memo RTS93-12	RX Sample Line	1.3E00	3.2E-04
Memo RTS93-12	Gland Seals	8.9E00	8.6E-02
	TOTAL	10.7E00	8.86E-2

Thus, the whole body dose for PNPS is less than the NEDO-31400A value of 0.31 Rem. The PNPS thyroid dose is greater than the NEDO-31400A value of 4.3 Rem because of the added contributions from the gland seals and the reactor sample Line. However, the total offsite dose for a CRDA at PNPS is below the SRP limits of 75 Rem thyroid and 6 Rem whole body.

PNPS Conformance to the NRC SER Guidance

The NRC issued a Safety Evaluation Report (SER) accepting the BWROG report for use as a reference in licensee applications, provided the following guidance in the SER for those licensees wanting to make changes suggested in the GE Licensing Topical Report is satisfied.

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

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.

3. The applicant standardizes the MSLRM and offgas radiation monitor alarm setpoint at 1.5 times the background dose rate at the monitor locations and commits to sample promptly 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.

For PNPS the NRC SER guidance of NEDO 31400A is addressed as follows:

1) The NRC item to demonstrate that the site is bounded by the generic analysis is satisfied by Calculation PNPS-1-ERHS-XIII.T-49-0, (see Tables 1,2, and 3).

2) The NRC item to provide assurance that increased radioactivity in the main steam lines will be controlled expeditiously will be satisfied by implementing the following:

a) The present alarm for the MSL Hi Rad Scram will be changed to a Hi Hi Rad Alarm. This will provide an additional alarm to alert personnel of increasing activity in the steam tunnel. The setpoint for the Hi Hi Alarm is the same as the trip point for the Mechanical Vacuum Pump.

This setpoint was recalculated as part of the change to a 24 month fuel cycle for PNPS, supplied to the NRC under separate correspondence.

b) In addition to existing procedures that address increased coolant activity, a new off-normal condition procedure for abnormal transients (2.4.XX series) will be developed to include operator actions for assessing and controlling increased activity in the main steam, reactor sample, and offgas systems.

c) The present alarm response procedures for high radiation in the offgas and main steam system will be revised to reference the new 2.4.XX procedure.

3) The NRC item to adjust the MSLRM high alarm setpoint at 1.5 times the background dose rate will initially be set at 1.5 times full power background. However, if spurious or nuisance alarms result from this setpoint it will be adjusted slightly higher to avoid control room interruptions.

Setpoints for the offgas monitors are currently required by Sections 3/4.8.E and F of the PNPS Technical Specifications and are based on 10CFR Part 20 limits. The following are quotes from the Technical Specifications Bases:

Radioactive Gaseous Process and Effluent Monitoring Instrumentation

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with NRC approved methods in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The process monitoring instrumentation includes provisions for monitoring (and controlling) the concentrations of potentially explosive gas mixtures in the main condenser offgas treatment system. The operability and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63 and 64 of Appendix A to 10 CFR Part 50.

Gaseous Effluent Treatment

The requirement that the appropriate portions of these systems be used when specified provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and design

objective Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the guide set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

Therefore, the setpoints for the offgas pre-treatment monitors will continue to be set by the methodology described in the ODCM, as approved by the NRC, and as required by PNPS Technical Specifications.

The NRC item to sample the coolant if the MSLRM and/or pre-treatment off-gas monitors exceed setpoint will be addressed by the new off-normal procedure to be developed (2.4.XX) and present procedures will be revised accordingly.

Determination of No Significant Hazards Considerations

The proposed change removes the main steam line radiation monitor (MSLRM) scram and containment isolation functions and associated surveillance requirements. Justification for removal of the MSLRM trip function was described in Licensing Topical Report 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". It was approved by the NRC staff on May 15, 1991.

The Code of Federal Regulations (10CFR50.91) requires licensees requesting an amendment to provide an analysis, using the standards in 10CFR50.92, to determine whether a significant hazards consideration exists.

In accordance with 10 CFR 50.92, Boston Edison Company ,(BECo) reviewed the attached proposed changes and concluded that the changes do not involve a significant hazards consideration. The basis for this conclusion is the three criteria of 10 CFR 50.92(c) are not compromised. The proposed changes do 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 technical specification changes associated with removal of the isolation and the reactor scram functions of the MSLRM do not involve a significant increase in the probability of an accident previously-evaluated. The trip function was in place only to react to a previously-evaluated accident, the CRDA [Control Rod Drop Accident], and as such, cannot increase the probability of occurrence of previously evaluated accidents.

The consequences of a previously evaluated accident are not significantly increased. There is no accident analysis that relies on the high radiation scram of the

reactor protection system. The Pilgrim design basis accident analysis currently takes credit for the MSIV closure function to mitigate a CRDA. The NEDO-31400A analysis assumes that all activity calculated to be available for release is transported to the condenser before the closing of the MSIVs. The increase in dose for this scenario is considered not significant because the results for PNPS are bounded by the NEDO and Standard Review Plan results. For PNPS, it is possible that the Mechanical Vacuum Pump will be in service. However, the offsite doses for the release from the condenser are bounded by the SRP and NEDC. These dose rates are still signficantly below the 10CFR Part 100 limits.

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

The proposed changes do not involve any plant hardware changes which could introduce any new failure modes or effects. The MSLRM monitors will remain active and will still alarm in the control room. The direct impact on the plant is that this particular trip function (i.e., isolation valve closure and reactor scram) will no longer actuate. The new design basis accident analysis, per NEDO-31400A, does not take credit for this trip function to demonstrate acceptable radiological consequences. The proposed changes were evaluated specifically for PNPS and are enveloped by the NEDO analysis. In the CRDA, all activity available for release from failed fuel rods is assumed to be immediately transported to the condenser and is available for leakage from the condenser. Thus, the removal of the isolation and scram functions 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 affect the 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 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 MSLRM scram and isolation valve closure functions does not significantly increase the consequences of any design basis accident, including CRDA. Other trip signals for the RPS and isolation valves remain unaffected. Therefore, there is no significant reduction in the margin of safety as a result of this Technical Specification change.

Summary

The proposed changes do not pose any significant hazards considerations as discussed above. This change was reviewed and recommended to the Station Director for approval by the Operations Review Committee and reviewed by the Nuclear Safety Review and Audit Committee.

Schedule of Change

With NRC approval, this change will be implemented coincidental with the corresponding plant design change, currently scheduled for February, 1994, or within 90 days following receipt of the Amendment.

Attachment A*

TABLE 1

COMPARISON OF NEDO-31400A AND PNPS PARAMETER VALUES
FOR THE CONTROL ROD DROP ACCIDENT ANALYSIS

Parameter	NEDO Value	PNPS Value
Power Level (MW/rod)	0.12	0.083**
Number of fuel rods damaged	850	850
Melted fuel fraction	0.0077	0
Fraction of activity released from damaged rods:		
Halogens	0.10	0.10
Noble gases	0.10	0.10
Fraction of activity released which reaches condenser and turbines (%):		
Halogens	10	10
Noble gases	100	100
Plateout in turbine and condenser (%):		
Halogens	90	90
Noble gases	0	0
Augmented Offgas System charcoal delay beds holdup times:		
Kryptons (hrs)		29
Xenons (days)		22
X/Q (s/m^3):		
Ground level release (Condenser)	2.5×10^{-3}	7.24×10^{-4}
Elevated release (AOG)	3.0×10^{-4}	1.74×10^{-4}

* Does not include additional PNPS release paths.
**Based on core thermal power = 1998 MW, 580 bundles, 62 rods/bundle, and peaking factor = 1.5 for damaged rods

Attachment A*

TABLE 2

SUMMARY OF PNPS CRDA OFFSITE DOSES

SCENARIO I - CONDENSER LEAKAGE

	Thyroid Dose (Rem)	Whole Body Dose (Rem)	Beta Skin Dose (Rem)
EAB (Exclusion Area Boundary)	0.45	2.3×10^{-3}	1.9×10^{-2}
LPZ (Low Population Zone)	2.5×10^{-2}	9.5×10^{-5}	6.3×10^{-4}

SCENARIO II - AOG SYSTEM RELEASE

	Thyroid Dose (Rem)	Whole Body Dose (Rem)	Beta Skin Dose (Rem)
EAB	0.0	8.3×10^{-3}	8.2×10^{-2}
LPZ	0.0	2.6×10^{-4}	4.3×10^{-3}

TABLE 3

COMPARISON OF NEDO-31400A AND PNPS PARAMETER VALUES
FOR THE CONTROL ROD DROP ACCIDENT

Parameter	NEDO Value	PNPS Value
EAB Doses (Rem):		
Scenario I - Condenser leakage:		
Thyroid	4.3	0.45
Whole Body	0.31	0.0023
Scenario II - Offgas System release:		
Thyroid	0	0
Whole Body	0.18	0.0083

Note: The limiting dose values from the Standard Review Plan are 75 Rem for Thyroid and 6 Rem for the Whole Body

* Does not include additional PNPS release paths.