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SUBJECT: Application for amend to license NPF-21,reflecting replacement of existing GE integrated nuclear measurement & control - main steam line logarithmic radiation monitor analog type instrument.

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November 30, 1993
G02-93-278

Docket No. 50-397

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

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NO. NPF-21 REQUEST FOR AMENDMENT TO OPERATING LICENSE, MAIN STEAM LINE RADIATION MONITOR UPGRADE**

Reference:
1) Licensing Topical Report NEDO-30883-A, "The Nuclear Measurement Analysis and Control Logarithmic Radiation Monitor (NUMAC-LRM)," General Electric Company, January 1987
2) Letter dated June 11, 1986, D.J. Robare (GE) to M. Srinivasan (NRC), "Response to Request for Additional Information on NEDO-30883"
3) Letter dated August 7, 1986, D.J. Robare, (GE) to M. Srinivasan (NRC), "Supplemental Information on NUMAC-LRM"
4) Letter G02-89-038, dated March 8, 1989, GC Sorensen (SS) to NRC, "Request for Amendment to Technical Specification Table 4.3.2.1-1, Isolation Actuation Instrumentation Surveillance Requirements"
5) Letter G02-93-252, dated October 14, 1993, JV Parrish (SS) to NRC, "Implementation of Operating License Amendment 112 Regarding Removal of Main Steam Line Radiation Monitor Scram and Isolation Valve Closure Functions From Technical Specifications (TAC No. M82061)"

In accordance with the Code of Federal Regulations, Title 10 Parts 50.90 and 2.101, the Supply System hereby submits a request for amendment to the WNP-2 Operating License.

The proposed amendment revises the Operating License to reflect the replacement of the existing General Electric (GE) Integrated Nuclear Measurement and Control (INMAC) - Main Steam Line (MSL) Logarithmic Radiation Monitor (LRM) analog type instrument with the GE Nuclear Measurement Analysis and Control (NUMAC) MSL LRM digital type instrument. The proposed amendment does not require revision of the WNP-2 Technical Specifications. The

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Supply System verified the NUMAC-LRM instrument design specifications by comparison against the original INMAC-LRM specifications and found that this instrument meets or exceeds plant requirements. The NUMAC-LRM incorporates a microcomputer based monitor using microprocessor technology. As such, it introduces new electronic circuits that the NRC Staff has identified could be susceptible to failure modes that were not evaluated by the NRC as part of the existing licensing basis (see Draft Generic Letter entitled "Analog-to-Digital Replacement Under the 10 CFR 50.59 Rule," 57 Fed. Reg. 36680 dated August 14, 1992). The failure modes identified by the Staff include software common-mode failures and EMI/RFI induced failures. Although the NUMAC system has been designed and tested to significantly reduce, if not eliminate, the potential for these failure modes, the Supply System recognizes that these potential failure modes create the possibility of new types of equipment malfunctions that may not have been fully evaluated in the existing WNP-2 licensing basis. Therefore, in accordance with 10 CFR 50.59 and pursuant to 10 CFR 50.90, the Supply System requests an amendment to the operating license to reflect the installation of the NUMAC digital system.

Appendix A details the reasons for the design change, functional objective, and design description.

Appendix B provides the bases, in accordance with 10 CFR 50.91(a), for the Supply System's determination that the proposed change does not involve a significant hazards consideration.

In addition to concluding that the change does not involve a significant hazards consideration, the Supply System has also concluded that there is no potential for a significant change in the types or increase in the amount of any effluents that may be released offsite, nor does the change involve a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(C)(9), and therefore, in accordance with 10 CFR 51.22(b), an environmental assessment of this change is not required.

This Operating License amendment request has been reviewed and approved by the WNP-2 Plant Operating Committee and the Supply System Corporate Nuclear Safety Review Board. In accordance with 10 CFR 50.91, the State of Washington has been provided a copy of this letter.

The modification to replace the INMAC-LRM instrument with the NUMAC-LRM instrument is scheduled during WNP-2 Refueling Outage R-9, which is currently planned to begin on April 15, 1994. Therefore, the Supply System requests that the proposed license amendment be issued by March 15, 1994.

Sincerely,

J. V. Parrish (Mail Drop 1023)
Assistant Managing Director, Operations

Attachments

cc: BH Faulkenberry - NRC RV
NS Reynolds - Winston & Strawn
JW Clifford - NRR
W Bishop - EFSEC
DL Williams - BPA/399
NRC Site Inspector - 927N

APPENDIX A

DESIGN DESCRIPTION

REASONS FOR CHANGE

This design change replaces the existing INMAC MSL LRM analog type instrument (Type 238X660G005) with the NUMAC-LRM digital type instrument (Type 304A3700G033). The particular INMAC-LRM type presently installed at WNP-2 is no longer manufactured by GE, thus the availability of future spares is uncertain. The NUMAC-LRM is a member of the NUMAC family of nuclear instruments whose prime purpose is to replace installed equipment nearing obsolescence with equipment containing present-day state of the art technology and features. The Supply System performed a design specifications comparison and found the NUMAC-LRM to be an exact physical and functional replacement for the INMAC-LRM. Moreover, its modern design incorporates enhancements not previously available. NUMAC Leak Detection (LD) instrumentation was installed at WNP-2 in 1989 affording enhanced capabilities and reliability. Installation of NUMAC-LRM instrumentation is expected to provide similar beneficial results.

Past performance of the existing INMAC-LRM instrument has shown that the INMAC-LRM is susceptible to output signal drift, spiking, and inaccuracy. In addition, there has been a high incidence of various types of instrument channel drawer failures. These problems have resulted in a high frequency of spurious trips and alarms, instrument channel inoperability, and associated "emergency" maintenance activities. By contrast, the NUMAC-LRM instrument provides the following valuable improvements over the INMAC-LRM:

1. Instrument drift rate reduction by at least a factor of four.

2. Instrument accuracy and resolution improved by a factor of two.

3. MSL LRM instrument reliability and availability improvements because of the microprocessor controlled Self-Test System.

4. Calibration and testing features which simplify maintenance.

5. Enhanced operator/equipment interface through the use of a digital display, menu-driven software, and human-factor engineered front panel design.

In addition, the NUMAC-LRM is expected to significantly reduce maintenance time since the internal electronic modules provide self-diagnostics, calibration and setting checks, and error messages available to the operator through the keypad and monitor display.

FUNCTIONAL OBJECTIVE

The objective of this design change is to replace the four existing INMAC-LRM instrument assemblies, located in the Main Control Room back-panel drawers, with four NUMAC-LRM instrument assemblies. The NUMAC-LRM assemblies are fully compatible with existing mounting hardware, input/output signals, and power requirements. Therefore, the existing ion chamber detectors and associated in-plant cabling (from the detectors and within the panel cabinets) will remain unchanged and will continue to be used. There will be no impact on penetrations, supports, cable trays, or any other physical component in the plant.

Each monitoring channel consists of the existing gamma-sensitive ion chamber detector and a new LRM assembly to process the detector current signals into corresponding millirem per hour (mR/hr) readings. The functional input and output requirements of each monitor will remain identical to the present design. This consists of two inputs, three outputs, and a visual screen display (see Figure 1).

The internal diagnostics and automatic calibration features of the replacement NUMAC-LRM electronic module will greatly enhance the MSL LRM accuracy and system reliability. The NUMAC-LRM module incorporates an operator display into the faceplate graphics that assists the operator in determining module and loop status and maintenance requirements. Through the keypad, the operator may verify the loop calibration, set and verify trip points and detector exciter voltage levels, as well as display the operational status. Setting the trip points and exciter voltage levels requires a user password to prevent unauthorized access. Appropriate procedures will be revised to incorporate the NUMAC-LRM operational and maintenance changes.

DESIGN DESCRIPTION

Except as noted, the following general design description applies to both the existing INMAC-LRM and the replacement NUMAC-LRM.

There are four safety-related channels with each channel monitoring one of the four MSLs.

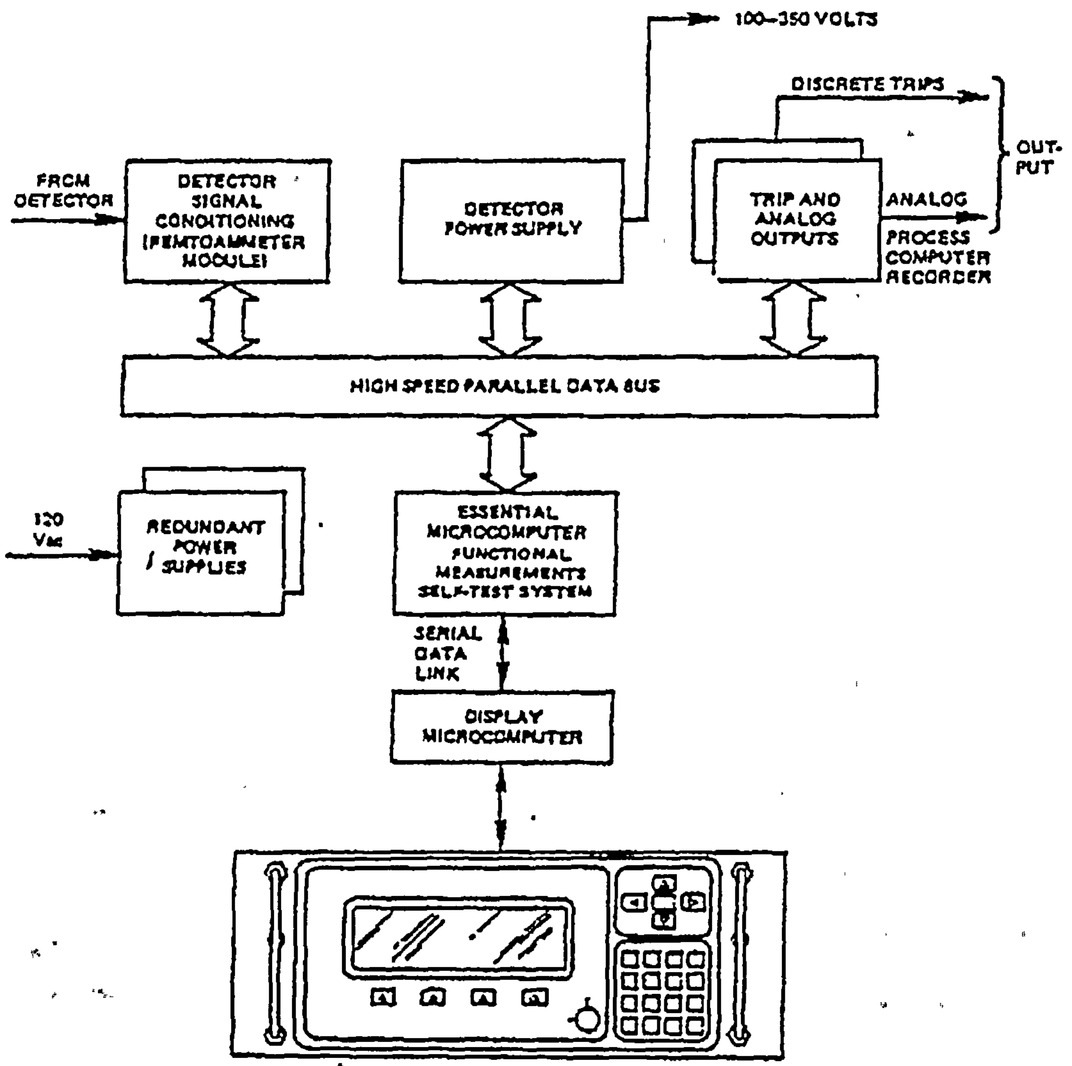

Figure 1. NUMAC FUNCTIONAL BLOCK DIAGRAM

Each channel consists of an ion chamber detector mounted in the vicinity of the main steam outlet piping, the associated signal cabling and power cables, and a LRM assembly located in the Main Control Room. The monitor assemblies for Channels A and C are Division I, powered from Reactor Protection System (RPS) Power Panel RPS-PP-C72/P001, Breaker 6A, and are located in Main Control Room Panel E-CP-H13/P606. Channels B and D are Division II, powered from RPS Power Panel RPS-PP-C72/P001, Breaker 6B, and are located in Main Control Room Panel E-CP-H13/P633. The existing INMAC-LRM uses 115 VAC, 91 W, whereas the NUMAC-LRM uses 120 VAC, 75 W. The nominal bus voltage and existing breaker design are acceptable for the new power supply load requirement.

Each LRM accepts two inputs: an analog current signal from the ion chamber detector and a 120 VAC power supply. It processes the input signal, based on logarithmic mR/hr readings, and develops internal voltages to drive outputs. The monitor's outputs are as follows: four solid state contact output trip signals, an analog Transient Data Acquisition System (TDAS) signal (Channels A & B only), and a 230 VDC output to excite the ion gas in the detector chamber.

Presently, there are four solid state contact output trip signals: HI-HI, HI, LO, and inoperative (INOP-HVPS). The following improved trip related features are provided in the replacement NUMAC-LRM digital monitoring drawer. Each trip is visually indicated on the monitor screen display, which replaces the annunciator lights on the INMAC-LRM faceplates. Three of the trip circuits are driven from the femtoammeter module amplifier, which sends the trip signals to the essential computer. The computer then makes a trip decision and processes the input trip current signals to output trip voltage signals for the input-output (I-O) contact module. Each circuit will actuate independently of the other if the level of the signal, representing the activity of the process being monitored, falls outside of its acceptable band. The trip circuits can be preset to trip at any desired limit. The fourth circuit trip actuates on any of the following inoperative indicators: keylock position other than OPER, internally generated exciter voltage level (HVPS) +/-10% outside of the voltage setpoint, functional microprocessor watchdog timer timed out, or an essential module card dislodged. The NUMAC-LRM also incorporates dual low voltage power supplies to reduce the probability of failure. The two power supplies are designed to allow parallel operation.

A HI-HI or INOP-HVPS trip results in a channel trip signal in the I-O contact module which provides an output to trip the main condenser mechanical vacuum pump and close the vacuum pump discharge valve. Credit is taken for this trip to limit the main condenser leakage to less than 1 percent per day for the Control Rod Drop Accident (FSAR 15.4.9). With the exception of the mechanical vacuum pump trip and associated discharge valve isolation, the MSL radiation monitors do not provide trips, isolations, or actuations of equipment relied on in the WNP-2 accident analysis for accident detection or mitigation. However, as discussed in Reference 5, the Supply System is retaining the RPS trip and MSIV isolation functions of the MSL LRM until issues addressed in that reference are resolved. No credit is taken for the RPS trip or MSIV isolation in WNP-2 accident analyses.

A HI trip from any MSL channel actuates a MSL high radiation alarm at Main Control Room Panel E-CP-H13/P602. A LO trip from any channel actuates a MSL monitor downscale alarm at E-CP-H13/P602. HI and LO trips do not result in a channel trip signal to the main condenser mechanical vacuum pump or a closure signal to the associated discharge valve. These trips provide only alarm functions. The HI-HI, HI, and LO trips reset automatically, but the memory must be manually reset from the module display. The INOP-HVPS trip and memory are automatically reset. The solid state contact ratings are 15 V (max) at 50 ma, which is compatible with existing relay design load.

The physical installation of the NUMAC-LRM assemblies in the panel (E-CP-H13/P606 and E-CP-H13/P633) drawers will be identical to the existing INMAC-LRM assembly. The dimensions of the NUMAC-LRM assembly are identical to the INMAC-LRM assembly and are as follows: approximately 19 inches wide, 7 inches high, and 16 inches deep. The new assembly will be mounted in the same drawer as the original assembly using existing hardware slides, slidelocks, and brackets.

The external cable connections to the NUMAC-LRM drawer assembly utilize jack and pin connectors; there are no hardwire terminations. The existing external signal cables and panel power feed cables will be reused. All five external connections will be made in the rear of the assembly as before, although two of the connection points are located differently. The two low voltage power supply cables, which connect entirely at the rear of the assembly, will be supplied with the new NUMAC-LRM modules.

The instrument ranges and time constants of the NUMAC-LRM instrument modules are the same as the existing INMAC-LRM instrument modules. The setpoint calculation will be updated to include the new instrument characteristics and will be documented in the design change package. WNP-2 Technical Specifications and Final Safety Analysis Report (FSAR) are not affected by this design change.

APPENDIX B

DESIGN SAFETY EVALUATION

1. Background

The NUMAC-LRM instrument has previously been evaluated and accepted for use in Nuclear Power Plants by the NRC. On May 17, 1985, GE submitted Licensing Topical Report NEDO-30883, "The Nuclear Measurement Analysis and Control Logarithmic Radiation Monitor (NUMAC-LRM)" to the NRC for review. The NRC evaluated the topical report based on applicable regulations and guidance, including 10 CFR Part 50.55.a.(h) (endorses the requirements of IEEE Standard 279, "Criteria for Protection Systems for Nuclear Power Generating Stations"), Regulatory Guide 1.152, "Criteria for Programmable Digital Computer System Software in Safety-Related Systems of Nuclear Power Plants," and the Standard Review Plan Section 7.1, Table 7-1, "Acceptance Criteria and Guidelines for Instrumentation and Control Systems Important to Safety." On September 16, 1986, the NRC staff issued a Safety Evaluation Report (SER) for the topical report. The SER concluded that the topical report, with supplemental information provided by GE (References 2 and 3), demonstrated that the NUMAC-LRM will perform safety-related functions in a reliable manner. The NRC cover letter with the SER declared that the topical report is acceptable for referencing in license applications. Subsequently, GE issued the topical report as NEDO-30883-A (Reference 1). Hence, the topical report was utilized in this design safety evaluation. In addition, the NRC has approved similar instruments of the GE NUMAC product line at Brown's Ferry and Brunswick. These reviews were considered, where applicable, in the development of the Supply System's EMI/RFI testing specifications.

2. Software Design and Quality Assurance

The following is a description of the NUMAC-LRM instrument software design process and verification and validation (V & V) methodology utilized by GE:

An overall Requirement Specification, which lists all functional and technical requirements for the NUMAC-LRM instrument was prepared. The Requirement Specification was verified by GE and independently by the Supply System by comparison against the design specification for the INMAC-LRM instrument it replaces and by a review of its intended application. Required hardware-software integration testing was specified in the Software Validation Plans and Procedures, which were prepared and verified with the Requirement Specification. The software was developed in accordance with a Software Management Plan. A design specification was prepared for each software component module, and after coding, each module was tested. The developed

software was then entered in Programmable Read Only Memory (PROM) and installed in a NUMAC-LRM chassis for testing in accordance with Self-Test Integration and Software Validation Test Plans and Procedures. The developed software can only be modified by total physical replacement of the PROM. The software code for any revisions will be controlled under the existing GE Software Management Plan.

Regulatory Guide 1.152 was not available at the time NUMAC-LRM development began. However, the NRC SER for References 1, 2 and 3 concluded that an effective design verification and validation program was used in the development of the NUMAC-LRM instrument. In addition, GE has recently updated GE 23A5163, "Software Verification and Validation Plan," to better describe actual V & V practices. This action was intended to address NRC comments contained in the April 13, 1993 Brown's Ferry SER for a similar NUMAC instrument design change. This software V & V plan and associated procedures are common to the entire NUMAC product line. Hence, any software V & V program enhancements identified in one NUMAC product SER were incorporated into all NUMAC applications. The NRC staff found the NUMAC software V & V program met the overall intent of Regulatory Guide 1.152.

3. Common Mode Failures and Defense in Depth

The potential for a software common mode failure was considered during NUMAC-LRM development because the same software code is used for each instrument channel. The following NUMARC-LRM design methods and techniques, design attributes, and industry experience demonstrate defense in depth and minimize the potential for common mode failures.

- The software was developed and tested in accordance with an NRC approved software V & V program that meets the intent of Regulatory Guide 1.152. This was documented in NEDO-11209-04A, "Nuclear Energy Business Group Boiling Water Reactor (BWR) Quality Assurance Program Description (Revision 4)."

- The system has two computers, but only the essential (functional) computer is required to, or can, perform critical (safety-related) tasks.

- The display computer (nonsafety-related) is designed to run an "executive loop" with hardware timers so that the potential for traps is minimized and depends on the integrity of the hardware.

- The isolation between the safety and nonsafety-related portions of the NUMAC-LRM conform to IEEE Standard 279-1971.

- The functional computer runs with a small, simple operating system which is started and re-entered by a hardware timer. Initiation of the operating system depends on hardware, and any endless loop in the application software will be escaped via the hardware restart.

- Total combined run-in time for the operating system in the LRM product line (plus the other instruments) is in excess of 40,000 hours. Structured and unstructured testing of the operating system is in excess of 2000 hours. Testing of the operating system logic included monitoring software timers to assure that task times are correct, thereby confirming that software paths are as expected.

- The NUMAC-LRM functional software is structured in tasks with all of the critical functions included in one task, which has the highest priority. A hardware watchdog timer is refreshed by software logic that requires the main operating system and the main task to be running at the predefined frequency. Failure of the main task to run at the required rate will result in time out of the watchdog timer and an inoperative trip.

- NUMAC LD instrumentation has been in operation at WNP-2 since its installation 1989. No software errors or common mode failures have occurred in this system. Moreover, 175 NUMAC-LRMs have been installed worldwide with over 11,244 in-service operating months. To date, GE has not received any reports of software related problems or common mode type failures.

Based on the NUMAC-LRM operating system, the software structure and V & V program, and the operating history defense in depth has been established. In addition, the NRC staff concluded in the topical report SER that the design measures and test procedures were reasonable to prevent the software program from cycling in a continuous loop and to defend against common mode failures.

4. Temperature, Radiation, and EMI/RFI Qualification

The methodology of Institute of Electrical and Electronic Engineers (IEEE) Standard 323-1974, "Standard for Qualification of Class 1E Equipment for Nuclear Power Generating Stations," was used for NUMAC-LRM instrument qualification. The NUMAC-LRM was qualified to the same temperature limits specified for the INMAC-LRM being replaced. The qualification procedure used for the NUMAC-LRM, including the aging process, represents an improvement in GE product testing over the older LRMs. The NUMAC-LRM was designed for use in control room or similar environments, not "harsh" environments, which includes a total integrated radiation dose of 175 Rads and a maximum operating temperature of 50°C (122°F) for the location where it is installed.

The NUMAC-LRM equipment will be installed in the WNP-2 Main Control Room where the Technical Specification 3/4.7.8 temperature limit is 104°F and the WNP-2 FSAR Appendix J, Section 6.0, 40 year normal operation integrated radiation dose is 35.0 Rads. The internal airspace heat rise within panels is generally assumed in equipment qualification calculations to be 18°F above room ambient. Thus, the maximum design basis temperature expected inside the panels where the NUMAC-LRM equipment is to be installed is 122°F. Based on this design basis comparison, WNP-2 total integrated radiation dose and maximum operating temperature values are in accordance with NUMAC-LRM environmental design requirements and no Control Room panel requalification is required. The numerous conservative margins already factored into the computer models and analyses used to generate the temperature transient profiles make any additional margin unnecessary and ensure that there is adequate temperature margin for the NUMAC-LRM application.

The NUMAC-LRM has been designed to be unsusceptible to EMI or RFI sources within an energy and frequency envelope defined by GE. This design is in accordance with GE EMI Susceptibility Test Guide 249A1238. A survey of the WNP-2 Main Control Room environment will be conducted with the reactor at power by December 31, 1993. The survey will use MIL-STD 461 and 462 as the bases to determine the level of EMI/RFI interference present and to confirm that the EMI/RFI levels are within the GE design envelope. The results of the survey will be available by January 31, 1994 and the Supply System will notify the NRC if the Main Control Room EMI/RFI environment is marginal or falls outside of the GE design envelope. The Supply System fully expects the WNP-2 Main Control Room EMI/RFI environment to be acceptable for NUMAC-LRM installation based on the fact that NUMAC LD instrumentation has been in operation for over four years in the Main Control Room without any EMI problems. Furthermore, a review of EMI/RFI test results from other plants provides a high degree of confidence that the Control Room environment will be within the GE design envelope.

5. Electrostatic Discharge (ESD)

GE designed and tested the NUMAC-LRM instrument to be an exact replacement for the existing instrument. Since system grounding and isolation have proven to be acceptable for the existing INMAC-LRM instrument, the Supply System considers ESD not to be of concern if proper maintenance and servicing procedures are followed. The NUMAC-LRM maintenance and operation manuals provide information on how to avoid ESD voltage damage to the modules while servicing instrument cards. In addition, appropriate maintenance procedures currently contain precautionary information on the servicing of electrical and electronic devices susceptible to ESD, with maintenance personnel having received formal training on the subject.

6. Seismic Qualification

GE seismically qualified the NUMAC-LRM instrument in accordance with IEEE Standard 344-1975, "Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations." The seismic response spectra are shown in Figure 4-1 of Reference 1. The Supply System reviewed the NUMAC-LRM seismic qualification package and compared it against the seismic qualification of the Main Control Room, where it is to be installed. Analysis of the mass of the instrument and the response spectra showed that installation of the NUMAC-LRM would maintain the qualification of the instrument and the Main Control Room panels.

7. Impact on Plant Operations

This design change will not impact plant operations, nor does it require special operator actions or additional surveillance requirements. The internal calibration and diagnostic features of the NUMAC-LRM reduce the need for an instrument drawer to be removed for service, thereby reducing the potential for loss of redundant instrument availability. Spare parts will be available from a complete spare module stored onsite. Applicable operational and maintenance procedures will be revised and appropriate plant staff will be trained on the new procedural requirements for the NUMAC-LRM instrumentation prior to startup from the R-9 outage. WNP-2 maintenance and operations staff are familiar with NUMAC instrumentation since very similar NUMAC LD instrumentation has been in operation at WNP-2 since 1989.

8. Construction Impact

All installation work associated with this modification is planned to be accomplished during the WNP-2 Refueling Outage R-9 (Spring 1994). The work area is confined to the Main Control Room. The physical installation of the NUMAC-LRM equipment will be completed by GE technicians, with support from Supply System technicians. Pre-operational and startup tests of the final system configuration will be performed by GE personnel under the direction of Supply System staff.

9. License Basis Documents (LBDs)

The main condenser mechanical vacuum pump trip and isolation functions are briefly discussed in WNP-2 FSAR, Section 7.3.1.1.2, "Primary Containment and Reactor Vessel Isolation Control System (PCRVICS) - Instrumentation and Controls." The description of these instruments in the LBDs is not affected. This design change does not change the intent of the original INMAC-LRM design specifications or reduce the features incorporated into the INMAC-LRM instrument. The NUMAC-LRM replacement system envelopes the original features and incorporates additional features to enhance the overall monitoring accuracy and system reliability.

10. Interface Requirements

There are no interface requirements for this design change. The NUMAC-LRM replacement module is a microcomputer monitor with solid state logic for monitoring the MSL process radiation. As previously described, it is a direct physical and electrical retrofit for the existing INMAC-LRM equipment, and is identical in its sensitivity and function. The existing mounting hardware slides and jack and pin connectors will be reused and need no modification for use with the NUMAC-LRM.

11. Quality and Seismic Classification

In accordance with WNP-2 FSAR, Section 3.2, "Classification of Structures, Components, and Systems," this design change is Quality Class I and Seismic Category I. The design, installation, and testing associated with this modification will meet the provisions of 10 CFR Part 50, Appendix B.

12. 10 CFR 50.92 Evaluation

The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated because:

The functions performed by the existing INMAC-LRM instrument will be performed by the replacement NUMAC-LRM instrumentation. The MSL radiation monitors are installed for the purpose of detecting fuel element failures and providing a main condenser mechanical vacuum pump trip and associated discharge valve isolation. Credit is taken for the vacuum pump trip and associated discharge valve closure functions (accident mitigation features) in the WNP-2 accident analysis. However, no credit is taken in WNP-2 accident analysis for operation of the INMAC-LRM instrumentation to detect the onset of, or the precursors to, a design bases accident. Hence, the replacement of the INMAC-LRM with the NUMAC-LRM instrumentation will not increase the probability of a previously evaluated accident.

The NUMAC-LRM instrumentation has been shown to be as reliable as the INMAC-LRM instrumentation. NEDO-30883-A documented that the NUMAC-LRM instrumentation would perform safety-related functions in a reliable manner. Hence, the NUMAC-LRM instrumentation is capable of providing design trip and alarm signals reliably and there is no decrease in the capability of the plant to mitigate the consequences of previously evaluated accidents. Therefore, although the INMAC-LRM instrumentation provides an accident mitigating effect by tripping the mechanical vacuum pump and isolating the associated discharge valve, the replacement with NUMAC-LRM instrumentation will not result in an increase in the consequences of previously evaluated accidents.

With the exception of the main condenser mechanical vacuum pump trip and associated discharge valve isolation, the MSL radiation monitors do not provide trips, isolations, or actuations of equipment relied on in the WNP-2 accident analysis for accident detection or mitigation. Therefore, even if the replacement NUMAC-LRM instrumentation suffered spurious actuations, such actuations would not challenge the capability of plant equipment to respond to, or mitigate the consequences of, a previously evaluated accident.

For these reasons the replacement of the INMAC-LRM instrumentation with the NUMAC-LRM instrumentation will not increase the probability or consequences of a previously evaluated accident.

The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated because:

No new accidents or events, or any unacceptable conditions will occur as a result of this modification. The new NUMAC-LRM equipment will not create any new interfaces with equipment that is important to safety or introduce any new operating modes. The requirements imposed on the design of the new NUMAC-LRM instrument assure that the quality will be at least as good as the existing INMAC-LRM instrument. The modification will be performed within existing commitments for such programs as seismic qualification, environmental qualification, and separation requirements.

The potential for new failure modes resulting from the NUMAC-LRM being a microcomputer based instrument was addressed by the development and implementation of a structured V & V program by GE. This program met the intent of Regulatory Guide 1.152 and provides assurance that the functional and technical requirements for the design were properly incorporated and verified. The potential for an EMI/RFI interference failure is minimized by design features internal to the LRM chassis. In addition, the NUMAC-LRM instrument was tested in accordance with GE EMI Susceptibility Test Guide 249A1238 to establish a reliable operating envelope. The V & V program and EMI/RFI susceptibility testing for the NUMAC-LRM instrument were submitted to the NRC for review as part of GE Licensing Topical Report NEDO-30883. The NRC subsequently found the topical report acceptable for referencing in licensing applications. As noted in the topical report SER, although the factory EMI/RFI testing was acceptable, installation location testing is required to ensure that actual EMI levels are enveloped by the NUMAC-LRM certified levels. Prior to actual NUMAC-LRM equipment installation during Refueling Outage R-9, the NUMAC-LRM chassis location areas in the WNP-2 Main Control Room will be tested to ensure that the actual EMI levels are bounded by the specified qualification limits. Therefore, no new failure modes that could initiate accidents will be introduced and this modification will not create the possibility of a new or different type of accident than previously evaluated in the LBDs.

The proposed amendment does not involve a significant reduction in the margin of safety because:

The requirements imposed on the design of the new NUMAC-LRM instrument assure that the quality will meet or exceed that of the existing INMAC-LRM instrument. Instrument ranges and time constants remain the same. The NUMAC-LRM instrument's reduced drift rate and increased accuracy are expected to enhance MSL LRM response. In addition, the improved calibration and testing techniques and the incorporation of a Self-Test System are expected to reduce the potential for inadvertent or spurious trips and alarms. The system-level actuation design is not affected by this change; hence, the system-level functions will remain the same. The modification will be performed within existing commitments for such programs as seismic qualification, environmental qualification, and separation requirements. The margin of safety created by the INMAC-LRM instrumentation is that provided by the trip of the main condenser mechanical vacuum pump and isolation of the associated discharge valve. As shown in the analysis provided in NEDO 30883-A, the NUMAC-LRM instrumentation is capable of providing safety-related trip features reliably. Furthermore, as discussed above, instrument ranges and response times will remain the same for the NUMAC-LRM instrumentation. The NUMAC-LRM instrumentation will perform reliably providing the required trip signals over the same instrumentation ranges and with the same response times. Hence, the margin of safety created by the INMAC-LRM instrumentation is not decreased by replacement with the NUMAC-LRM instrumentation. Therefore, this modification does not involve a significant reduction in the margin of safety.

For the above reasons, the Supply System has concluded that there are no significant hazards associated with this proposed change.