GULF STATES UTILITIES COMPANY

RIVER BEND STATION POST OFFICE BOX 220 ST. FRANCISVILLE, LOUISIANA 70775

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

Gentlemen:

River Bend Station - Unit 1
Docket No. 50-458

Gulf States Utilities (GSU) Company hereby files an amendment to the River Bend Station Unit 1 Facility Operating License NPF-47, pursuant to 10CFR50.90. This application is filed to revise License Condition 2.C.14, Attachment 5, Item 3, which addresses Regulatory Guide 1.97 modifications. The attachment to this letter includes proposed revisions to the license and justifications for this change.

Pursuant to 10CFR170.12, GSU has enclosed a check in the amount of one hundred fifty dollars ($150.00) for the license amendment application fee. Your prompt attention to this application is appreciated.

Sincerely,

J. C. Deddens
Senior Vice President
River Bend Nuclear Group

JCD/LAE/RJK/RMB/ch

Attachments

cc: U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

Mr. Walt P. lson, Project Manager
U.S. Nuclea. Regulatory Commission
Washington, D.C. 20555

NRC Resident Inspector
Post Office Box 1051
St. Francisville, LA 70775

Mr. William H. Spell, Administrator
Nuclear Energy Division
Louisiana Dept. of Environmental Quality
P.O. Box 14690
Baton Rouge, LA 70398

A003 1/1 w/check $150 # 707143

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

STATE OF LOUISIANA	)	
PARISH OF WEST FELICIANA	)	
In the Matter of	)	Docket No. 50-458 50-459
GULF STATES UTILITIES COMPANY	)	

(River Bend Station,
Unit 1)

AFFIDAVIT

J. C. Deddens, being duly sworn, states that he is a Senior Vice President of Gulf States Utilities Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

J. C. Deddens

Subscribed and sworn to before me, a Notary Public in and for the State and Parish above named, this 25 day of May, 1988.

Joan W. Middlebrooks
Notary Public in and for
West Feliciana Parish,
Louisiana

My Commission is for Life.

ATTACHMENT

GULF STATES UTILITIES COMPANY
RIVER BEND STATION
DOCKET 50-458/LICENSE NO. NPF-47
REGULATORY GUIDE 1.97 - Neutron Flux Monitoring

LICENSING DOCUMENT INVOLVED: Facility Operating License NPF-47

ITEM: License Condition 2.C.14
Emergency Response Capabilities
Attachment 5, Item 3

Reason For Request

A change is being requested in accordance with 10CFR50.90 to revise the implementation date for modifications to the River Bend Station (RBS) neutron flux monitoring system (NMS) as currently required in item 2.C(14) Attachment 5, Item 3 of Facility Operating License NPF-47. This proposed change revises the implementation date for NMS modifications from prior to startup following the second refueling outage to a refueling outage following the NRC Staff safety evaluation of the Boiling Water Reactor Owner's Group (BWROG) licensing topical report (NEDO-31558). Approval of this change will allow operation with the current system until this issued is resolved. The proposed change is required to allow start-up following the second refueling outage currently scheduled to begin during March 1989. The BWROG submitted a report to the Staff on April 1, 1988 regarding implementation of Category 1 neutron flux monitors as addressed in Regulatory Guide (RG) 1.97. The Staff's review and safety evaluation report (SER) is scheduled to be completed by the fourth quarter of 1988. GSU finds it desirable to await issuance of the NRC's SER until installation of any revised NMS is pursued further at RBS. Installation of a modification without due consideration of the technical arguments forwarded by the BWROG would be inconsistent with the Commission policy encouraging common solutions. GSU believes the BWROG letter to be technically sound and likely to persuade the Staff that alternatives to the Regulatory Guide 1.97 guidance are practicable.

In addition, RBS found its current license condition to be significantly in excess of those incurred by others similarly situated. RBS has initiated reviews of other design alternatives and followed industry activities in a goodfaith effort to fulfill its current license condition. However, GSU believes that implementation of a revised NMS at this time could result in undue hardship diversion of resources and potentially unnecessary costs in excess of those contemplated when the license condition was issued.

Description

Attachment 5, Item 3 to NPF-47 requires that GSU modify systems as required to meet RG 1.97 guidance prior to startup following the second refueling outage. An alternative allowed by this condition is to obtain NRC approval of an alternate design. The intent of RG 1.97 is to ensure that all light-water-cooled nuclear power plants are instrumented as necessary to

measure certain prescribed variables and systems during and after an accident. RG 1.97 provides design and qualification guidance for NMS instrumentation.

On April 1, 1988, the BWROG provided Licensing Topical Report (LTR), NEDO-31558 (Enclosure III), to the NRC which described functional design criteria for the post accident neutron monitoring system (NMS) and provided appropriate justification. In support of this position, GSU conducted a plant specific evaluation using the criteria provided in NEDO-31558 which is included in this submittal as Enclosure II. As discussed in the enclosure, the present RBS design meets all criteria provided in the LTR.

In addition to the BWROG LTR and an RBS plant specific comparison, GSU has followed industry development of equipment designed to meet stringent RG 1.97 requirements in this area for several years. Several options have been reviewed from which concerns have been identified on the ability of the systems to comply with all criteria of RG 1.97 or installation and operational considerations. GSU is continuing to pursue resolution to these concerns to establish an acceptable alternate system installation but delivery constraints will require a purchase order to be placed in June to September, 1988, depending on the option, to ensure delivery and final design for installation during the second refueling outage.

To procure, design and install a NMS prior to receiving the final NRC position on the BWR Owners Group LTR could result in undue hardship and unnecessary costs if implementation of the current License Condition begins prior to the Staff's final SER on the owner's group position. A delay in installation would not increase the risk to the public's health and safety.

In conclusion, it is GSU's position based on alternate criteria presented in the BWROG letter dated April, 1988 that the present NMS meets the functional safety intent of RG 1.97. Continued operation with the currently installed system is acceptable based on the plant specific evaluation which indicated the existing system will continue to provide appropriate information to the operator to assure the proper actions to respond to events addressed by the Emergency Operating Procedures. GSU will continue to work with the BWROG and NRC Staff to resolve this issue.

No Significant Hazards Considerations

As discussed in 10CFR 50.92, the following discussions are provided to the NRC Staff in support of "No Significant Hazards Considerations."

1. No significant increase in the probability or the consequences of an accident previously evaluated results from this change because:

   There is no change in system design or operation. The license condition currently requires upgrade of NMS during the second refueling outage. This license condition proposed change will allow operation with the currently installed system which has been found to comply with all criteria proposed in the BWROG letter. This system is required to provide neutron flux indication and is not postulated to initiate any accidents. The neutron monitoring system is used to verify reactor shutdown as part of the Emergency Operating Procedures (EOPs). The use of neutron monitoring in the EOPs is conservative in that, if it is not

available, actions are specified which will lead to safe shutdown without the system. The requirements of RG 1.97 concerning neutron monitoring are additions to the existing system abilities. Therefore, delay in upgrade to RG 1.97 requirements will not significantly increase the probability of an accident and would not lead to an increase in the consequences of an accident as defined in the safety analysis because of the conservative EOP actions.

2. This change would not create the possibility of a new or different kind of accident from any accident previously evaluated because:

   The current system has been evaluated using alternate criteria proposed in NEDO-31558 and found acceptable for continued operation. This change does not involve any changes to design or operation. In addition, the neutron monitoring system is not postulated as the initiator of any accidents. Therefore, no new or different accidents are created.

3. This change would not involve a significant reduction in the margin of safety because:

   Design, function, and operation of the existing neutron monitoring system remain the same. There is no specified "margin of safety" associated with this system as used in RG 1.97 other than to assure reactor shutdown following a transient or accident. EOP actions are conservative with respect to the use of neutron monitoring for verification that the reactor is shutdown. When not available during an accident or transient scenario, actions are specified which will lead to reactor shutdown. Because these actions lead to a safe plant condition (reactor shutdown), the margin of safety is not reduced. In addition, this request does not result in a reduction to the margin of safety as defined in the bases of the RBS Technical Specifications.

Because the present RBS design meets all criteria provided in the BWROG License Topical Report, NEDO-31558, which was submitted to the NRC April 1, 1988, as supported by the plant-specific evaluation attached, extension of the implementation date for a neutron monitoring system meeting Reg. Guide 1.97 guidance is justified. This extension allows the NRC to complete their evaluation of the License Topical Report, which provides an alternative design as allowed by the license condition to comply with the Reg. Guide 1.97 requirements. In addition, GSU will be able to better plan its resource utilization to address the NMS pursuant RG 1.97 after the Staff's SER is received.

Revised License Condition

The requested revision is provided in the Enclosure I.

Schedule For Attaining Compliance

RBS is currently in compliance with the applicable section of the license condition. As discussed in the amendment request, the proposed change is required prior to startup following the second refueling outage scheduled to begin during March 1989. If the change is not granted, delivery constraints on equipment required to modify the plant require a purchase order to be placed in June to September, 1988 depending on the option considered.

Notification of State Personnel

A copy of the amendment application and this submittal has been provided to the state of Louisiana, Department of Environmental Quality - Nuclear Energy Division.

Environmental Impact Appraisal

Revision of this License Condition does not result in an environmental impact beyond that previously analyzed. Therefore, the approval of this amendment does not result in a significant environmental impact nor does it change any previous environmental impact statements for River Bend Station.

ENCLOSURE I

ATTACHMENT 5
TO NPF 47
EMERGENCY RESPONSE CAPABILITIES

GSU shall complete the following requirements of NUREG-0737 Supplement #1 on the schedule noted below:

1. Actions and schedules for correcting all human engineering discrepancies (HEDs) identified in the "Detailed Control Room Design Review Summary Report" dated October 31, 1984 and Supplements dated May 14, June 12, 1985, and July 31, 1985, shall be implemented in accordance with the schedule committed to by GSU in the summary report and supplements and accepted by the NRC staff in Section 18.1 of SSER 3.

2. Prior to startup following the first refueling outage, GSU shall implement modifications (installation or upgrade) for those items listed below consistent with the guidance of Regulatory Guide 1.97, Revision 2 unless prior approval of an alternate design of these items is granted by the NRC staff. These items as listed in GSU's letter of June 24, 1985 are:

   a) coolant level in the reactor;
   b) suppression pool water level;
   c) drywell atmosphere temperature;
   d) primary system safety relief valve position;
   e) standby liquid control system storage tank level;
   f) emergency ventilation damper position; and
   g) airborne radiohalogens and particulates.

3. ~~Prior to startup following the second refueling outage~~, GSU shall implement modifications (installations or upgrade) for neutron flux monitoring consistent with the guidance of Regulatory Guide 1.97, Revision 2 ~~unless prior approval of an alternate design is granted by the NRC staff,~~ or the NRC Staff's Safety Evaluation Report of the BWR Owners Group Licensing Topical Report (NEDO-31558 Position on NRC Regulatory Guide 1.97, Revision 3, Requirements for Post Accident Neutron Monitoring System). Modifications, if required, shall be completed before restart from the next refueling outage starting after 10 months from the date of receipt of the NRC Staff Safety Evaluation Report on NEDO-31558.

ENCLOSURE II

RIVER BEND STATION NEUTRON MONITORING
PLANT SPECIFIC DESIGN CONSIDERATIONS

This evaluation provides the plant specific information relative to the existing neutron monitoring system (NMS) capabilities at River Bend Station as it applies to the alternative design requirements stated in NEDO-31558, "Position on NRC Regulatory Guide 1.97, Revision 3, Requirements for Post Accident Neutron Monitoring System."

The topics of discussion in the following sections of this evaluation can be directly correlated with subsections 5.2.1 through 5.3 of NEDO-31558. The individual NEDO-31558 subsection headings and requirements are stated followed by a discussion of existing capabilities as they apply to River Bend. The basis for the alternative requirements are not restated as they can be obtained from NEDO-31558.

The discussion provided under each subsection applies primarily to the average power range monitoring (APRM) subsystem. When appropriate, information will also be provided for other NMS subsystems to show the capability to provide backup or confirmatory support function to the APRM's when at the lower end of the operating range.

Because the position of NEDO-31558 is based on operator actions stated in the Emergency Operating Procedures (EOP's) and the utilization of NMS for these actions, a discussion of the applicable River Bend Emergency Operating Procedure and comparison to the generic BWR Emergency Procedure Guidelines (EPG's) is included in the following section.

River Bend EOP Overview

The River Bend EOP's were developed from Revision 4 of the EPG's with minor deviations resulting from plant unique design differences. Because core power (neutron flux) is the parameter of interest, discussion will be limited to the EOP which is concerned with the maintenance and control of this parameter. The EOP which deals directly with core power is EOP-0001, "Emergency Procedure-RPV Control" and the associated flowcharts, EOP-1 "RPV Control" and EOP-1A "Anticipated Transients Without Scram" (ATWS).

Consistent with the intent of the EPG's, the RPV control flowchart provides the operator with direction to control reactor power under conditions where it can be determined that the reactor will remain subcritical under all conditions without Boron while the anticipated transient without scram flowchart provides instructions under conditions where Boron injection may be required. The entry conditions for EOP-0001 are any condition requiring an automatic or manual reactor scram, or drywell or primary containment temperature above 212°F or 185°F respectively. The scram condition encompasses the condition where the operator may not be able to determine reactor power. The basis document for the EPG's discusses the fact that loss of electrical power to the APRM's does not, in itself, require that reactor power is indeterminate. The ensuing discussion provided by the Bases document further supports the variables/methods used to determine

reactor power that were described in NEDO-31558 section 6.3. The general guidance provided by EOP-0001 regarding control of reactor power is as follows:

If all control rods are not inserted to or beyond position 02 (maximum subcritical banked withdrawal position) ARI is initiated. If reactor power is above 5% or indeterminate, recirculation pumps are tripped, all other methods to insert control rods implemented, and if required, Boron injection is initiated prior to the suppression pool reaching 110°F (Boron injection initiation temperature).

If at any time during the performance of EOP-0001, all control rods are inserted to or beyond position 02, terminate Boron injection (if previously initiated), perform the scram recovery procedure, and exit EOP-0001.

The injection of Boron into the RPV for the above listed action is instituted by a limiting suppression pool temperature of 110°F (suppression pool temperature is a Category I variable as defined in RG.1.97). Action is conservatively taken at this temperature to ensure suppression pool heat capacity is adequate to provide pressure suppression during reactor shutdown. Once Boron has been injected operator actions are those which will ensure that the hot shutdown Boron weight is injected and that preferential injection systems are utilized to promote the Boron effectiveness as a shutdown agent.

5.2.1 Range

Alternate Requirement: 1 to 100% (RBS downscale alarm is 5%)

RG 1.97 Requirement: 10^{-6}% to 100%

The operating range associated with the APRM subsystem at River Bend is 2.8×10^{13} nv to 2.8×10^{14} nv or 1 to 100% core thermal power. This range satisfies the alternate requirement stated above.

In addition, the RBS IRM instrumentation has an operating range of 1×10^{8} nv to 1.5×10^{13} nv or approximately 10^{-4}% to at least 15% power.

5.2.2 Accuracy

Alternate Requirement: $\pm$2% of Rated Power

RG 1.97 Requirement: None stated

The loop accuracy of the RBS APRM subsystem is $\pm$2% (for normal operations) based on G.E. setpoint methodology calculations. To maintain this degree of accuracy the LPRM subsystem is calibrated every 1000 MWD/T using the TIP subsystem for sensitivity degradation due to depletion of the uranium coating of the detectors with increased exposure. In addition, relative sensitives are determined corresponding to the increased exposures on approximately a six month frequency. Whenever power is greater than 25%, each APRM channel is checked weekly against power as determined by a heat balance and the APRM channel is adjusted as required to produce a deviation of no more than 2%. Due to the exhaustive measures taken

to assure loop accuracy the APRM subsystem meets the alternate requirements as stated in NEDO-31558.

5.2.3 Response Characteristics

Alternate Requirement: 5 Sec/10% Change

RG 1.97 Requirement: None Specified

For the APRM subsystem this characteristic has been previously stated in NEDO-31558.

5.2.4 EQUIPMENT QUALIFICATION

Alternate Requirement: Operate in ATWS Environment
RG 1.97 Requirement: RG 1.89 and 1.100

RBS expected environmental conditions from an ATWS event

As discussed in NEDO-31558, the bounding events for determination of design basis requirements for NMS as it applies to RG 1.97 are the lesser ATWS events in which partial control rod insertion occurs or the plant is not isolated from the main condenser. The event selected to be bounding for this category of events is "Inadvertent SRV opening with partial scram failure". This event, therefore, establishes the environmental conditions and function time requirements for the NMS as it applies to post accident event monitoring.

The above identified event has been analyzed in NEDO-24222 assuming complete scram failure (including ARI failure) which would result in harsher (more conservative) environmental conditions than the partial scram failure scenario presented in NEDO-31558. As the case of complete scram failure is bounding for the special case of partial scram failure, a site specific evaluation based on NEDO-24222 was performed to determine the enveloping environmental conditions. The conservative environmental conditions determined by the evaluation is a peak suppression pool temperature of 177°F and peak containment pressure of 8.5 psig reached at 67 minutes into the event, indicative that the event produces a gradual increase in both parameters during the event. If it is conservatively assumed that these same conditions then translate to the conditions in the drywell, this identifies the worst case conditions existing in the drywell during this event. No degradation of environmental conditions is expected to occur within areas of the Auxiliary and Fuel Buildings during this event. The NEDO-24222 analysis of this event also assumes the unlikely failure of the ARI system currently installed at RBS. In cases where ARI is accomplished, maximum suppression pool temperature would be considerably less that the pool temperature determined assuming ARI failure.

Other Environmental Conditions

The analysis of Large Break LOCA, Small Break LOCA and Control Rod Drop Accident presented in section 4.3.2 of NEDO-31558 parallel RBS operator actions, environmental impact and impact of NMS failure. As stated in NEDO-31558, the LOCA events will produce a harsher environment in containment and drywell than the ATWS events.

RBS Environmental Design Considerations

The following information provided for environmental qualification is based upon review of the RBS environmental qualification files.

LPRM/APRM

The components of the LPRM/APRM are currently qualified to 10CFR50.49 for normal, abnormal, and accident conditions. Specific qualification is contained within the RBS equipment qualification files which demonstrates operability for 12 hours into a small high energy pipe in the drywell or containment. The bases for environmental qualification of the equipment considers testing of the detector assemblies to 608°F for normal plant operations, and the fact that design basis events result in negligible changes in the environments of the detectors, which are mounted in dry tubes in the core. All other components (e.g. cable, penetrations) located in a harsh environment have been qualified as Class 1E components capable of operating during and following a design basis event. The lesser environmental conditions postulated for an ATWS event are enveloped by the existing qualification bases.

Intermediate Range Monitors

The components within the IRM neutron monitoring subsystem located in a harsh environment (with the exceptions of the drives/motor modules) are presently qualified to 10CFR50.49 for normal, abnormal, and accident conditions. The only design basis event for which the IRM subsystem is required to be operable is a small high energy line break inside or outside of drywell. The IRM subsystem has been demonstrated to be environmentally qualified for 12 hours into this event. The cable, connectors, and penetrations used in IRM subsystem have been demonstrated to be qualified for a design basis event where conditions are postulated to consist of 330°F in a steam environment. The lesser environmental conditions postulate for an ATWS event are enveloped by the existing qualification bases.

5.2.5 Function Time

Alternate Requirement: 1 hour

RG 1.97 Requirement: None Specified

Both the APRM/LPRM and the IRM subsystem (with the exception of the IRM drives/motor modules) have been environmentally qualified for 12 hours in small break LOCA conditions which envelope the ATWS conditions determined for RBS. Thus, as the equipment is qualified for 12 hours in a harsher environment than that for which the function time requirement is based, the RBS NMS meets the alternate requirement specified.

5.2.6 Seismic Qualification

Alternate Requirement: Seismic Qualification Not Required

RG 1.97 Requirement: Seismically Qualify Category I Equipment As Important to Safety Per RG-1.100 and IEEE-344

Since the event which has been determined to set the design basis requirements for the NMS is an ATWS event, seismic requirements for the NMS should be consistent with the ATWS rule (10CFR50.62). This rule specifies ATWS environmental conditions which do not require seismic qualification.

However, the APRMs and certain portions of the IRM subsystem are designed to operate during the design basis earthquake. This capability exceeds the alternate requirement of NEDO-31558. Seismic qualification for all components (except the drive/motor modules for IRMs) located outside of the control room is available from either the RBS equipment qualification files or General Electric files.

The IRM/APRM recorders are Bailey Model 771 series. This particular recorder is not seismically qualified; however, this model of recorder (Bailey 771 series) has been previously qualified for use in other applications/systems.

Based on the above, the IRM subsystem would meet the seismic qualification requirements of RG 1.97 except in the case of a seismic event that disabled the eight IRM drives and motors.

Therefore, for all cases except for motor and drive disablement, the IRMs would also be available to provide additional supporting information to the operator after a seismic event for monitoring power at or around the 5% downscale alarm.

5.2.7 Redundancy & Separation

Alternate Requirement: Redundancy to Assure Reliability

RG 1.97 Requirement: Redundant in Division Meeting RG 1.75

The APRM subsystem consists of eight independent channels, each channel consisting of inputs from up to twenty-four LPRM detectors, and the necessary signal conditioning equipment to provide an output signal directly reflecting average power in the core. The eight channels are divided into four separate divisions with each division consisting of two APRM channels. Because of the redundancy in detector inputs, the practices of power and equipment separation, and the total number of channels, the APRM subsystem satisfies the alternate redundancy and separation criteria. The methods used for identification of power cable, signal cable and cable trays as safety related components and the identification scheme used to distinguish between redundant cable, cable trays and instrument panels is in accordance with regulatory guide 1.75. The IRM subsystem is near identical in design to the APRM subsystem with respect to redundancy and separation.

5.2.8 Power Sources

Alternate Requirement: Uninterruptible and Reliable Power Sources

RG 1.97 Requirement: Standby Power Source (RG 1.32)

The four divisions of the APRM subsystem are normally powered from the RPS bus. Backup power is supplied by Class 1E divisional power via manual control in the event normal RPS power supplies fail. The recorders located on the operators control console are supplied power from a separate UPS power source with non-divisional battery backup. This power source arrangement for the APRM subsystem satisfies the alternate requirement specified above.

The IRM divisional arrangement and recorder power supplies are the same as the APRM subsystem (NOTE: APRM's and IRM's share recorders). IRM drive motors and associated control logic circuits are not supplied with uninterruptible power.

5.2.9 Channel Availability

Alternate Requirement: Available Prior to Accident

RG 1.97 Requirement: Available Prior to Accident

As discussed in NEDO-31558, the power range instrumentation is available and in service while the plant is operating; therefore, the existing design satisfies this requirement.

5.2.10 Quality Assurance

Alternate Requirement: Limited QA Requirements on Generic Letter 85-06 (Reference 3)

RG 1.97 Requirement: Application of Specific Reg. Guides

The entire APRM subsystem is safety related with the exception of the APRM recorders located on the operators control console. The

APRM subsystem was constructed in accordance with 10CFR50 Appendix B. As can be expected, the quality requirements associated with non-safety related components and for this reason the recorders were not designed, procured, and installed to the same quality level requirements as those associated with the remainder of the APRM equipment. Nonetheless, the eighteen criteria of Appendix B to 10CFR50 and the guidance provided under NRC Generic Letter 85-06 for non-safety related ATWS equipment have been fully satisfied by the procurement, design, installation, and ongoing operational quality assurance program, for the APRM subsystem. Based on the above, the APRM subsystem satisfies the alternate requirement stated above.

The IRM subsystem shares the same safety class levels as does the APRM subsystem with the exception of the IRM drives/motor modules; however, since the alternate requirements above specify compliance with Generic Letter 85-06 and all IRM equipment was installed to the requirements of 10CFR50 Appendix B, even though the drives/motor modules are non-safety class components, this requirement is satisfied by the IRM subsystem.

5.2.11 Display and Recording

Alternate Requirement: Continuous Recording

RG 1.97 Requirement: Continuous Recording

Every NMS channel has a built-in neutron flux meter provided with it's instrument drawer located on the Control Room backpanels and continuous recording capability provided by strip chart recorders located on the operators control console. In addition, the individual LPRM detector readings showing local power information can be displayed on a digital meter on the operators control console with the use of the RCIS system.

5.2.12 Equipment Identification

Alternate Requirement: Identify in Accordance with CRDR

RG 1.97 Requirement: Identify as Post-Accident Monitors

The NMS recorders are all clearly marked and labeled by division, and signal input. These recorders are located on operators control console along with the other plant parameters which are of primary significance to the operator. Located between the four APRM recorders are the APRM status indicators, clearly identifying alarm levels. IRM channel status indication and annunciation is near identical to that of the APRM's. This instrumentation was reviewed from a Human Factors standpoint for both useability and identification during performance of the DCRDR effort. Based on the above, the identification of the equipment satisfies the requirement of NEDO-31558.

5.2.13 Interfaces

Alternate Requirement: No Interference with RPS Trip Functions

RG 1.97 Requirement: Isolators to be used for Alternate Functions

At River Bend the non IE portions of the NMS are isolated and separated as required from the IE portions of the system. The NMS; therefore, satisfies the alternate requirement as stated above.

5.2.14 Service, Test, and Calibration

Alternate Requirement: Establish In Plant Procedures

RG 1.97 Requirement: Establish In Plant Procedures

The NMS is tested and calibrated on the frequencies as specified in the RBS Technical Specifications. Channel checks are generally performed every 12 hours and channel functionals performed weekly when the particular instrumentation is required to be in service (depends on plant operational conditions). The IRM's (trips, alarms, recorders, power supplies, regulators, etc.) are calibrated every 18 months while these same functions on the APRM's are calibrated semi-annually. On a weekly basis (with core power 25%) each APRM is checked against core thermal power as indicated by heat balance and adjustments made when the APRM output deviated by more than 2% from power as indicated by the heat balance. Every 1000 MWD/T the LPRM detectors are calibrated using the TIP system. In addition, LPRM sensitivities are trended to determine expected detector lifetimes and, on a periodic basis computer programs are run to verify consistency between calculated core thermal power and NMS indicated core power.

Plant section procedures, cover the above described items. The control of the frequency of performance of these procedures is performed in the same manner as all other Technical Specification surveillance procedures. Based on the above discussion, this requirement as specified in NEDO-31558 is satisfied.

5.2.15 Human Factors

Alternate Requirement: Incorporate HFE Principles

RG 1.97 Requirement: Incorporate HFE Principles

The DCRDR effort has been performed for the instrumentation and controls located on the operators control console. Human factors engineering principles were incorporated into this review process; therefore, the NMS satisfies this criteria.

5.2.16 Direct Measurement

Alternate Requirement: Direct Measurement of Neutron Flux

RG 1.97 Requirement: Direct Measurement of Neutron Flux

The NMS utilizes fission detectors and as such directly monitor neutron flux in the core. This criteria is satisfied.

5.3 Conclusion

In all cases the APRM subsystem of the NMS meets or exceeds the alternate requirements established by NEDO-31558 and in many cases complies with RG 1.97 requirements. Because the only operator actions that are predicated based on a known power level are those actions taken as a result of core power being above or below the APRM downscale alarm value of 5%, the acceptance of a reduced monitoring range for RG 1.97 is considered justified. In the event that core power is indeterminate, the operator has actions delineated such that the requirement to monitor core power becomes unnecessary (although not undesirable) and only serves as an enhancement to the operator.

The APRM subsystem incorporates acceptable range, acceptable environmental and seismic survival and class 1E power capability with redundancy, channel accuracy and availability and multiple indications providing the operator with adequate means to determine reactor power during both normal operations and accident conditions where core power indication would be most useful. In addition, the IRM subsystem would probably be available during events analyzed by NEDO-31558 and in this attachment as the drive unit function time is approximately 3 minutes (operator action to insert following a scram), thus providing supporting monitoring capabilities to the APRM's for core power below 1%.