CONFORMANCE TO REGULATORY GUIDE 1.97
WASHINGTON PUBLIC POWER SUPPLY SYSTEM, NUCLEAR PROJECT NO. 2

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ABSTRACT

This EG&G Idaho, Inc., report provides a review of the submittals for Regulatory Guide 1.97 for the Washington Public Power Supply System, Nuclear Project No. 2. Any exceptions to these guidelines are evaluated and those areas where sufficient basis for acceptability is not provided are identified.

FOREWORD

This report is supplied as part of the "Program for Evaluating Licensee/Applicant Conformance to RG 1.97," being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Systems Integration, by EG&G Idaho, Inc., NRC Licensing Support Section.

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1. INTRODUCTION

On December 17, 1982, Generic Letter No. 82-33 (Reference 1) was issued by D. G. Eisenhut, Director of the Division of Licensing, Nuclear Reactor Regulation, to all licensees of operating reactors, applicants for operating licenses and holders of construction permits. This letter included additional clarification regarding Regulatory Guide 1.97, Revision 2 (Reference 2) relating to the requirements for emergency response capability. These requirements have been published as Supplement No. 1 to NUREG-0737, "TMI Action Plan Requirements" (Reference 3).

The Washington Public Power Supply System, the licensee for Nuclear Project No. 2, provided a response to the generic letter on April 15, 1983 (Reference 4). The letter referred to Section 7.5.2.3e of the Final Safety Analysis Report (Reference 5) for a review of the instrumentation provided for Regulatory Guide 1.97.

This report provides an evaluation of this material.

2. REVIEW REQUIREMENTS

Section 6.2 of NUREG-0737, Supplement No. 1, sets forth the documentation to be submitted in a report to the NRC describing how the licensee complies to Regulatory Guide 1.97 as applied to emergency response facilities. The submittal should include documentation that provides the following information for each variable shown in the applicable table of Regulatory Guide 1.97.

1. Instrument range

2. Environmental qualification

3. Seismic qualification

4. Quality assurance

5. Redundance and sensor location

6. Power supply

7. Location of display

8. Schedule of installation or upgrade.

Furthermore, the submittal should identify deviations from the regulatory guide and provide supporting justification or alternatives.

Subsequent to the issuance of the generic letter, the NRC held regional meetings in February and March 1983, to answer licensee and applicant questions and concerns regarding the NRC policy on this subject. At these meetings, it was noted that the NRC review would only address exceptions taken to Regulatory Guide 1.97. Furthermore, where licensees or applicants explicitly state that instrument systems conform to the provisions of the guide, it was noted that no further staff review would be necessary.

Therefore, this report only addresses exceptions to Regulatory Guide 1.97. The following evaluation is an audit of the licensee's submittals based on the review policy described in the NRC regional meetings.

3. EVALUATION

The licensee provided a response to the NRC Generic Letter 82-33 on April 15, 1983. This response referred to the Final Safety Analysis Report (FSAR) which describes the licensee's position on post-accident monitoring instrumentation. This evaluation is based on these materials.

3.1 Adherence to Regulatory Guide 1.97

The licensee states, in Section 7.5.2.2.3e of the FSAR, that the FSAR provides an item by item discussion on the instrumentation used to conform to the guidance of Regulatory Guide 1.97. Therefore, it is concluded that the licensee has provided an explicit commitment on conformance to Regulatory Guide 1.97, except for those exceptions that are justified as noted in Section 3.3.

3.2 Type A Variables

Regulatory Guide 1.97 does not specifically identify Type A variables, i.e., those variables that provide information required to permit the control room operator to take specific manually controlled safety actions. The licensee classifies the following instrumentation as Type A.

1. Neutron flux
2. Coolant level in reactor
3. Reactor coolant system pressure
4. Primary containment pressure

All of the above variables meet the Category 1 requirements consistent with the requirements for Type A variables.

3.3 Exceptions to Regulatory Guide 1.97

The licensee identified the following deviations and exceptions to Regulatory Guide 1.97. These are discussed in the following paragraphs.

3.3.1 Neutron Flux

The instrumentation supplied by the licensee for this variable complies with the range and the Category 1 recommendations except that the four source and the eight intermediate range detector drive units that are not qualified to Category 1 requirements. These drive units remove the detector from the core when operating at power. They are only required post-accident to drive the detectors into the core. The source range detectors cover a range of 10^{-3} to 10 percent of full power in the fully withdrawn position, 10^{-7} to 10^{-3} percent of full power when fully inserted. This, according to the licensee, is sufficient to insure that the reactor is subcritical. There are eight similar intermediate range drive units and detectors which cover higher core power levels. The licensee states that if all the drive units failed, and the source range monitors remained out of core, the indicated range (minimum of 10^{-3} percent of full power) is sufficient to insure the sub-criticality of the reactor.

In the process of our review of the neutron flux instrumentation for boiling water reactors (BWRs), we note that the mechanical drives of the detectors have not satisfied the environmental qualification requirements of Regulatory Guide 1.97. A Category 1 system that meets all the criteria of Regulatory Guide 1.97 is an industry development item. Based on our review, we conclude that the existing instrumentation is acceptable for interim operation. The licensee should follow industry development of this equipment, evaluate newly developed equipment, and install Category 1 instrumentation when it becomes available.

3.3.2 Coolant Level in Reactor

Regulatory Guide 1.97 recommends instrumentation with a range from the bottom of the core support plate to either the top of the vessel or the centerline of the main steamline. The instrumentation supplied by the licensee covers a range from 150 in. below the top of active fuel to +60 in. above the dryer skirt. We have insufficient information to determine if the bottom of the core support plate or if the centerline of the main steamline is included in the supplied range. The licensee has not justified this deviation from the range recommendations.

The licensee should provide the correlation between the supplied and the recommended ranges, identify any deviation and justify any deviation.

3.3.3 Drywell Sump Level
Drywell Drain Sumps Level

Regulatory Guide 1.97 recommends instrumentation for this variable. The licensee has not supplied instrumentation for this variable. The licensee indicates that in a post-accident situation the sump drain lines are isolated and the sump overflow goes to the suppression pool via downcomers.

The licensee has not provided acceptable justification for not providing instrumentation for these variables. The sump level instrumentation is the primary means to determine identified and nonidentified leakage rates. Operator actions are based on the source and extent of the leakage. The licensee should provide information describing how the level of the drywell and the drywell drain sumps are ascertained during and following an accident.

3.3.4 Radioactivity Concentration

The licensee indicates that radiation level measurements to indicate fuel cladding failure are provided in the pre-isolation condition by the condenser

off-gas radiation monitors and by the main steamline radiation monitors; in the post-accident condition by the post-accident sampling system.

Based on the alternate instrumentation provided by the licensee, we conclude that the instrumentation provided for this variable is adequate, and therefore, acceptable.

3.3.5 Suppression Pool Water Level

The instrumentation supplied by the licensee for this variable covers a range of ±25 in. of normal water level. This does not conform to the recommended range from the bottom of ECCS suction line to five feet above normal water level (for a Type C variable) or from the top of vent to top of weir well (for a Type D variable). The licensee has not justified this deviation from the range recommendations.

The licensee should provide the correlation between the supplied and the recommended range and satisfactorily justify the deviations identified or provide the recommended range.

3.3.6 Suppression Chamber Spray Flow

The residual heat removal (RHR) system flow is used for this variable. The suppression pool spray derives its flow from the RHR system, with a throttling valve proportioning the flow between the suppression pool spray and the drywell spray. The position of the throttling valve is controlled from the control room. Pressure and temperature changes in the suppression pool determine the effectiveness of the spray.

The licensee concludes that RHR flow and suppression chamber pressure accurately and reliably measure the effectiveness of the suppression chamber spray. Additionally, the RHR system valves positions are known is the control room. We find that this instrumentation is adequate for this variable.

3.3.7 Drywell Atmosphere Temperature

The instrumentation supplied by the licensee for this variable covers a range of 50 to 400°F. Regulatory Guide 1.97 recommends a range of 40 to 440°F for this variable. This deviation in range has not been justified. The licensee should justify the deviation from the range recommendations, or re-span the instrumentation to provide the range recommended by Regulatory Guide 1.97.

3.3.8 Drywell Spray Flow

The residual heat removal (RHR) system flow is used for this variable. The drywell spray derives its flow from the RHR system, with a throttling valve proportioning the flow between the suppression pool spray and the drywell spray. The position of the throttling valve is controlled from the control room. Pressure changes in the drywell determine the effectiveness of the spray.

The licensee concludes that RHR flow and drywell pressure accurately and reliably measure the effectiveness of the drywell spray. Additionally, the RHR system valves positions are known in the control room. We find that this instrumentation is adequate for this variable.

3.3.9 Residual Heat Removal Heat Exchanger Outlet Temperature

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable. The licensee has provided Category 3 instrumentation for this variable.

The licensee states that the supplied instrumentation is adequate for monitoring this variable, however, they have not included the basis for this conclusion. The licensee should provide justification for this deviation from the Category 2 recommendations, or upgrade the instrumentation to Category 2.

3.3.10 Cooling Water Temperature to ESF System Components

Regulatory Guide 1.97 recommends a range of up to 200°F for this variable. The instrumentation supplied by the licensee for this variable has an upper limit of 150°F. The licensee has not justified this deviation from the range recommendations. The licensee should supply adequate justification for this deviation.

3.3.11 Plant and Environs Radioactivity (Portable Instrumentation)

Regulatory Guide 1.97 recommends a multichannel gamma-ray spectrometer for this variable. The licensee has not provided instrumentation for this variable, nor justification for not providing this instrumentation. The licensee should provide this instrumentation.

3.3.12 Estimation of Atmospheric Stability

The instrumentation supplied by the licensee for this variable covers a range of ±15°F instead of the range recommended by the regulatory guide, -9 to 18°F. The licensee has not justified this deviation from range recommendations between +15 to 18°F.

Table 1 of Regulatory Guide 1.23 provides seven atmospheric stability classifications based on the difference in temperature per 100 meters elevation change. These classifications range from extremely unstable to extremely stable. Any temperature difference greater than +4 or less than -2°C does nothing to the stability classification. Therefore, we find that this instrumentation is acceptable to determine the atmospheric stability.

4. CONCLUSIONS

Based on our review, we find that the licensee either conforms to or is justified in deviating from Regulatory Guide 1.97, with the following exceptions:

1. Neutron flux--the licensee's present instrumentation is acceptable on an interim basis until Category 1 instrumentation is developed and installed (Section 3.3.1).

2. Coolant level in reactor--the licensee should provide additional information for this variable and justify any deviation (Section 3.3.2).

3. Drywell sump level--the licensee should provide additional justification for not supplying this instrumentation (Section 3.3.3).

4. Drywell drains sump level--the licensee should provide additional justification for not supplying this instrumentation (Section 3.3.3).

5. Suppression pool water level--the licensee should justify the existing range or should provide the recommended range (Section 3.3.5).

6. Drywell atmosphere temperature--the licensee should justify a deviation from the recommended range or supply the recommended range (Section 3.3.7).

7. Residual heat removal heat exchanger outlet temperature--the licensee should provide justification for deviating from Category 2 recommendations for this variable, or supply instrumentation that is Category 2 (Section 3.3.9).

8. Cooling water temperature to ESF system components--the licensee should justify the deviation from the recommended range (Section 3.3.10).

9. Plant and environs radioactivity (portable instrumentation)--the licensee should provide instrumentation for ;this variable (Section 3.3.11).

5. REFERENCES

1. NRC letter, D. G. Eisenhut to all Licensees of Operating Reactors, Applicants for Operating Licenses, and Holders of Construction Permits, "Supplement No. 1 to NUREG-0737--Requirements for Emergency Response Capability (Generic Letter No. 82-33)," December 17, 1982.

2. Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident, Regulatory Guide 1.97, Revision 2, U.S. Nuclear Regulatory Commission (NRC), Office of Standards Development, December 1980.

3. Clarification of TMI Action Plan Requirements, Requirements for Emergency Response Capability, NUREG-0737, Supplement No. 1, NRC, Office of Nuclear Reactor Regulation, January 1983.

4. Washington Public Power Supply System (WPPSS) letter, G. D. Ouchey to Director of Nuclear Regulatory Regulation, NRC, "Emergency Response Capability," April 15, 1983, G02-83-346.

5. WPPSS Nuclear Project No. 2, Final Safety Analysis Report, Amendment No. 23, February 1982.