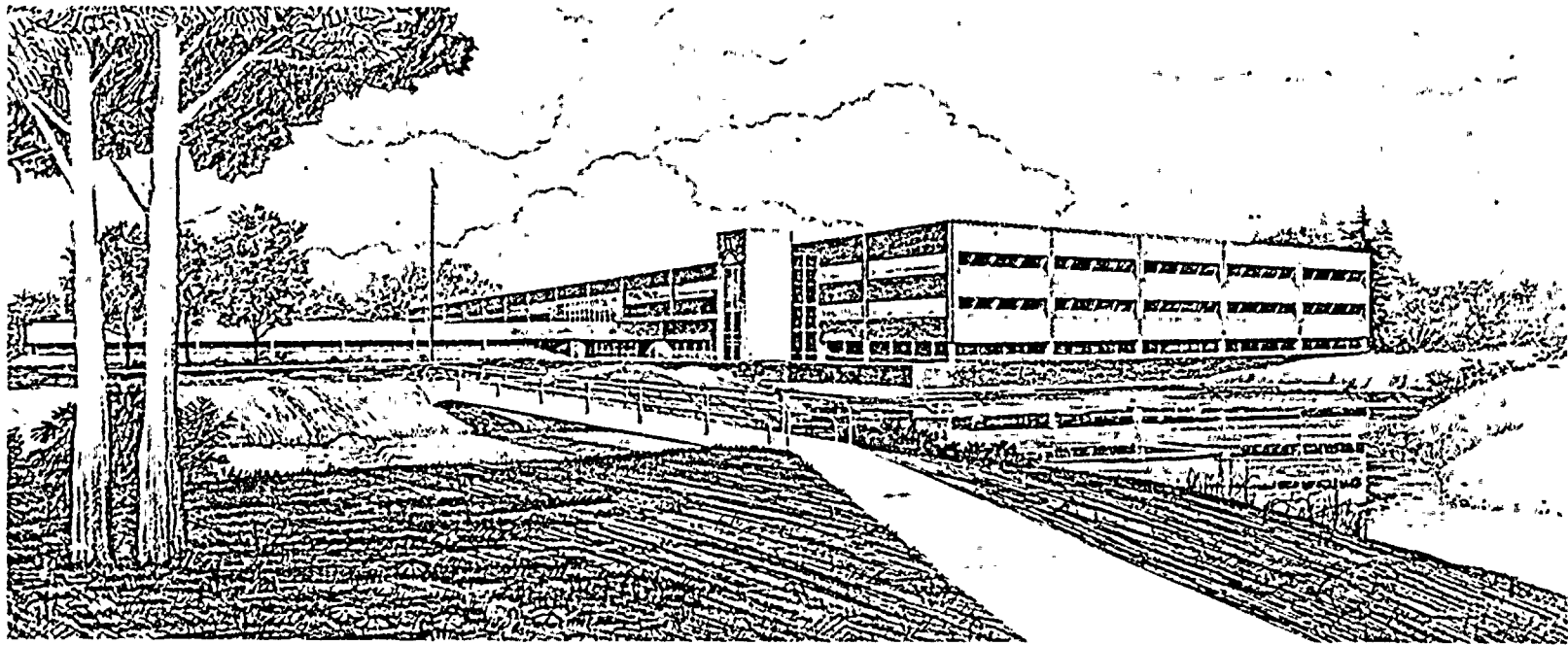


CONFORMANCE TO REGULATORY GUIDE 1.97, SUSQUEHANNA
STEAM ELECTRIC STATION, UNIT NOS. 1 & 2

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Operated by the U.S. Department of Energy



This is an informal report intended for use as a preliminary or working document

Prepared for the
U.S. NUCLEAR REGULATORY COMMISSION
Under DOE Contract No. DE-AC07-76ID01570
F-IN Nos. A6483 & A6493

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CONFORMANCE TO REGULATORY GUIDE 1.97
SUSQUEHANNA STEAM ELECTRIC STATION, UNIT NOS. 1 AND 2

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Published October 1984

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Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Under DOE Contract No. DE-AC07-76ID01570
FIN Nos. A6483 and A6493

ABSTRACT

This EG&G Idaho, Inc., report reviews the submittals for the Susquehanna Steam Electric Station, Unit Nos. 1 and 2, and identifies areas of full conformance to Regulatory Guide 1.97, Revision 2. Any exceptions to these guidelines are evaluated and those areas where sufficient basis for acceptability is not provided are also 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.

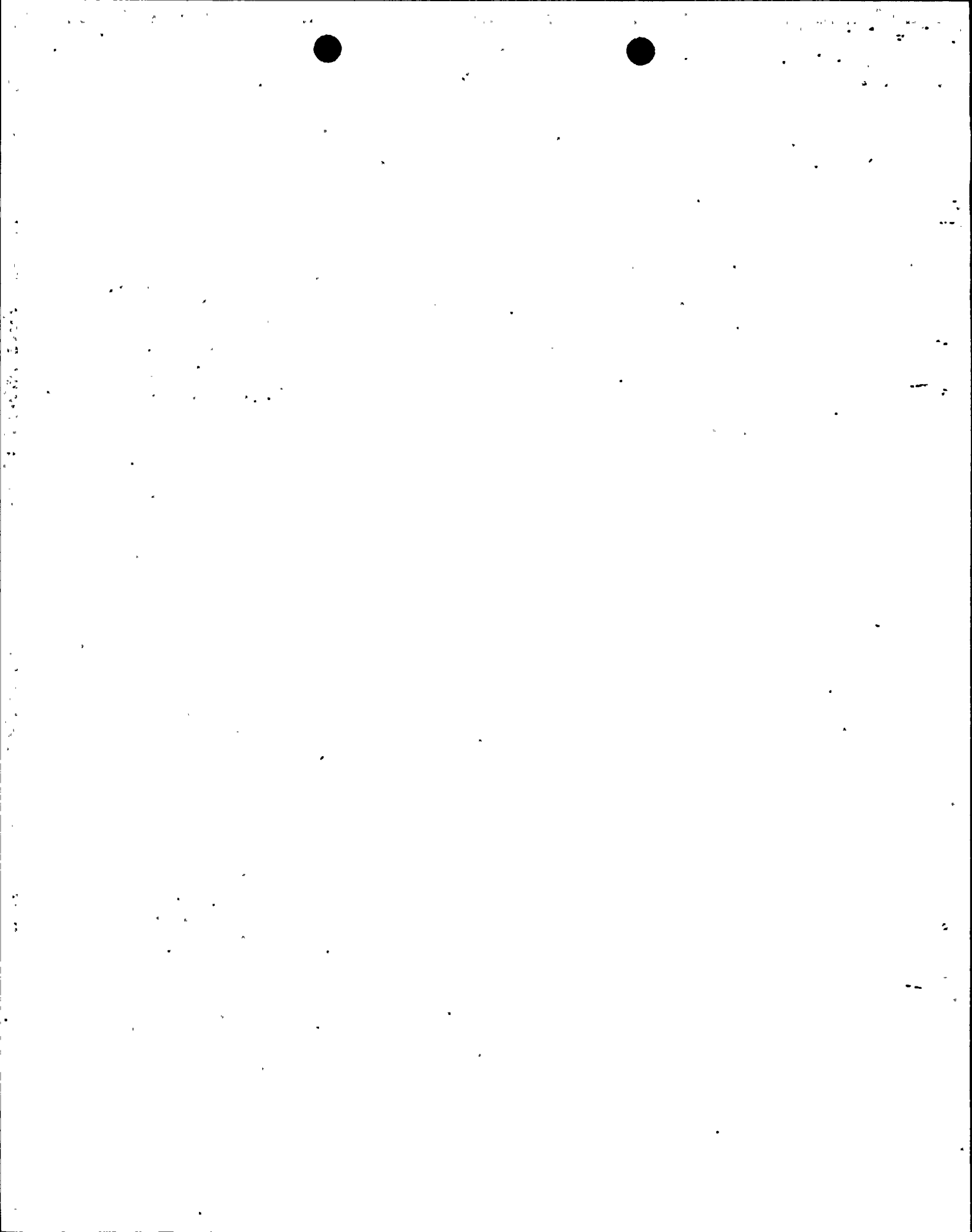
The U.S. Nuclear Regulatory Commission funded the work under authorizations B&R 20-29-10-11-3 and 20-19-40-41-3.

Docket Nos. 50-387 and 50-388

TAC No. 51360

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CONFORMANCE TO REGULATORY GUIDE 1.97
SUSQUEHANNA STEAM ELECTRIC STATION, UNIT NOS. 1 AND 2

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 1 to NUREG-0737, "TMI Action Plan Requirements" (Reference 3).

The Pennsylvania Power and Light Company, the licensee for the Susquehanna Steam Electric Station, provided a response to the generic letter on April 15, 1983 (Reference 4). The letter referred to a previous letter dated November 13, 1981 (Reference 5) for a review of the instrumentation provided for Regulatory Guide 1.97. Additional information was submitted on March 13, 1984 (Reference 6) and May 31, 1984 (Reference 7).

This interim report provides an evaluation of these submittals.

2. REVIEW REQUIREMENTS

Section 6.2 of NUREG-0737, Supplement 1, sets forth the documentation to be submitted in a report to NRC describing how the licensee meets the guidance of 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.

Further, the submittal should identify deviations from the guidance in 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 matter. At these meetings, it was noted that the NRC review would only address exceptions taken to the guidance of Regulatory Guide 1.97. Further, 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 the guidance of 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 an earlier submittal of November 13, 1981, which described the licensee's position on post-accident monitoring instrumentation. Additional information was submitted on March 13, 1984, and May 31, 1984. This evaluation is based on these submittals.

3.1 Adherence to Regulatory Guide 1.97

The licensee stated that the regulatory guide shall be adhered to except where technical justification exists to deviate from the letter of the guide while maintaining adherence to its intent. Therefore, it is concluded that the licensee has provided an explicit commitment on conformance to the guidance of Regulatory Guide 1.97, except for those exceptions that were justified as noted in Section 3.3.

3.2 Type A Variables

In that Regulatory Guide 1.97 does not specifically identify Type A variables, i.e., those variables that provide information required for operator controlled safety actions, the licensee classified the following instrumentation channels as Type A variables.

1. Oxygen concentration
2. Hydrogen concentration
3. Reactor pressure vessel pressure
4. Reactor pressure vessel water level
5. Suppression pool water temperature
6. Suppression pool water level
7. Drywell pressure

All of the above variables are also identified as Type B, C or D variables which meet Category 1 requirements.

3.3 Exceptions to Regulatory Guide 1.97

The licensee identified the following exceptions to the requirements of Regulatory Guide 1.97.

3.3.1 Neutron Flux

This ex-core instrumentation complies with Category 1 requirements. The instrument range is not known to be as recommended by Regulatory Guide 1.97 (10^{-6} to 100 percent of full power). The installed instrumentation covers a range of from approximately 10^{-5} to 100 percent of full power. The licensee states that "the actual low end range will not be known until the Unit 2 power test program allows calibration of the neutron flux measuring system." The licensee has committed that "if the actual range should be less than the range required by (Regulatory Guide) 1.97, Rev. 2, PP&L will provide a quantitative analysis justifying the actual range.

We concur with the licensee, that this instrumentation is acceptable, on an interim basis, until the instrumentation receives its power test calibration. The instrumentation is acceptable on a permanent basis should the calibrated range be found to comply with the regulatory guide or if the licensee provides satisfactory justification for not fully complying.

3.3.2 Drywell and Drywell Drains Sump Level

The licensee has given the following reasons for not providing this variable as part of their post-accident monitoring variables (Regulatory Guide 1.97) at the Susquehanna Station:

1. The sumps are shallow (6 inches deep with 316 gallon capacity) and designed for small leakage
2. The drain lines are isolated on an accident signal
3. The sumps would overflow to the suppression pool via the drywell downcomers following an accident.
4. The level in the sumps is measured by existing instrumentation to identify small leakages in accordance with Regulatory Guide 1.45.

Sump level detection is a method of determining leakage from the reactor coolant system that is specified in Regulatory Guide 1.45. Once the sump is full, no useful post-accident information would be available for instruments qualified to either Regulatory Guide 1.45 or 1.97. The sump drains are isolated on an accident signal, and the operator is able to tell that the sump is full by using the existing instrumentation.

Based on the above, the lack of instrumentation recommended by Regulatory Guide 1.97 is acceptable.

3.3.3 Radiation Level in Circulating Primary Coolant

This instrumentation is recommended by the regulatory guide to indicate damage to fuel cladding. A direct measurement of this variable is not provided. The licensee indicates that radiation level measurements to indicate fuel cladding failure are provided by the following instruments:

1. Off-gas pretreatment radiation monitor
2. Main steamline radiation monitor
3. Containment area radiation monitor
4. Containment hydrogen monitor
5. Post-accident sample station (manual sample analysis)
6. Post-accident sample station sample line radiation monitor.

We concur with the justification submitted by the licensee for this deviation. Their existing instrumentation is adequate to monitor post accident reactor coolant activity. Further, a continuous post accident reactor coolant activity monitor is not a requirement of NUREG-0737. Therefore, this is an acceptable deviation from Regulatory Guide 1.97.

3.3.4 Secondary Containment Area Radiation

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable with a range of 10^{-1} to 10^4 R/hr for the Mark II containment. The purpose of this variable, as stated in the regulatory guide is: "Detection of significant releases; release assessment; long term surveillance." The licensee has ten instruments with a range of 0.1 to 10^6 mR/hr (10^{-4} to 10^3 R/hr), three instruments with a range of 0.1 to 10^3 mR/hr (10^{-4} to 1 R/hr) and two instruments with a range of 0.01 to 100 mR/hr (10^{-5} to 10^{-1} R/hr). All these instruments are Category 3 rather than the recommended Category 2 and are also utilized for the variable radiation exposure rate.

The licensee reports the use of local radiation exposure rate monitors to detect breach or leakage through primary containment penetrations resulted in ambiguous indications. This is due to the radioactivity in the primary containment and the radioactivity in the fluids flowing in emergency core coolant system piping and equipment. Additionally, the licensee reports that the emergency plan implementing procedures do not direct emergency personnel to utilize this variable for release assessments. The licensee does utilize this variable for long term surveillance and for monitoring the accessibility to various areas in secondary containment. The ranges were chosen by analysis of expected post-accident radiation levels for the given locations.

The licensee concludes that the existing Category 3 instrumentation for this variable is adequate. Based on the above, we concur that the existing Category 3 instrumentation and ranges are acceptable.

3.3.5 Suppression Pool Water Temperature

Regulatory Guide 1.97 recommends instrumentation for this variable with a range from 30 to 230°F. The licensee has instrumentation for this variable with a range from 50 to 250°F. Temperatures between 30 and 50°F are not monitored. The licensee has not provided justification for this deviation.

Investigation of material available to us shows that the suppression pool water temperature is manually controlled to less than 90°F except for when heat is being added to the suppression pool (for example, during testing of the high pressure coolant injection system). Cooling is accomplished through the residual heat removal (RHR) system by either the suppression pool spray or the suppression pool cooling modes of operation. As the RHR heat exchanger outlet temperature is monitored to 32°F, and this would be active in decreasing the suppression pool temperature, we find the deviation in the lower limit of the range of the variable suppression pool water temperature acceptable.

3.3.6 Main Steamline Isolation Valves (MSIV) Leakage Control System Pressure

Regulatory Guide 1.97 recommends instrumentation for this variable with a range from 0 to 15 in. H₂O or 0 to 5 psid. The licensee has provided actual MSIV leakage flow (0 to 130 SCFM) instrumentation for the inboard valves. This is an acceptable alternative to the recommendations of the regulatory guide. The outboard valves have instrumentation with a range of -30 in. of mercury (vacuum) to 10 psig. This is an acceptable alternative to 0 to 5 psid.

3.3.7 Noble Gas and Vent Flow Rates

Regulatory Guide 1.97 recommends Category 2 instrumentation for these variables. The licensee has supplied Category 3 instrumentation that has been reviewed by the NRC and found acceptable.

This instrumentation is not a part of a safety-related system and is not required to monitor the course of an accident. The instrumentation takes air samples from exhaust vents and is located outside of containment in a non-harsh environment.

Therefore, we find this Category 3 instrumentation to be a good faith attempt, as defined in NUREG-0737, Supplement No. 1, Section 3.7 (Reference 3), to meet NRC requirements and is, therefore, acceptable.

4. CONCLUSIONS

Based on our review, we find that the licensee either conforms to, or is justified in deviating from, the guidance for each variable of Regulatory Guide 1.97.

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. Pennsylvania Power & Light Company (PP&L) letter, N. W. Curtis to Director of Nuclear Reactor Regulation, NRC, "Response to Generic Letter 82-33," April 15, 1983, PLA-1621.
5. PP&L letter, N. W. Curtis to A. Schwencer, NRC, "SER Issue No. 39 (R.G. 1:97)," November 13, 1981, PLA-965.
6. PP&L letter, N. W. Curtis to Director of Nuclear Reactor Regulation, NRC, "Conformance to Regulatory Guide 1.97," March 13, 1984, PCA-2099.
7. PP&L letter, N. W. Curtis to Director of Nuclear Reactor Regulation, NRC, "Conformance to Regulatory Guide 1.97, Rev. 2," May 31, 1984, PLA-2222.
8. Clarification of TMI Action Plan Requirements, NUREG-0737, NRC, Office of Nuclear Reactor Regulation, November 1980.

NRC FORM 335 (2-84) NRCM 1102, 3201, 3202	U.S. NUCLEAR REGULATORY COMMISSION	1 REPORT NUMBER (Assigned by TIDC, add Vol. No., if any)				
BIBLIOGRAPHIC DATA SHEET		EGG-EA-6357				
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7. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)		8. PROJECT/TASK/WORK UNIT NUMBER				
EG&G Idaho, Inc. Idaho Falls, ID 83415		9. FIN OR GRANT NUMBER				
EG&G Idaho, Inc.		A6483 & A6493				
10. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)		11a. TYPE OF REPORT				
Division of Licensing Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Washington, DC 20555		Technical Evaluation Report				
b. PERIOD COVERED (Inclusive dates)						
12. SUPPLEMENTARY NOTES						
13. ABSTRACT (200 words or less)						
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14. DOCUMENT ANALYSIS • KEYWORDS/DESCRIPTORS		15. AVAILABILITY STATEMENT				
b. IDENTIFIERS/OPEN-ENDED TERMS		Unlimited				
		16. SECURITY CLASSIFICATION				
		<i>(This page)</i>				
		Unclassified				
		<i>(This report)</i>				
		Unclassified				
		17. NUMBER OF PAGES				
		18. PRICE				

