

CONFORMANCE TO REGULATORY GUIDE 1.97
SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

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

The Public Service Electric and Gas Company, the licensee for the Salem Nuclear Generating Station, provided a response to the generic letter on April 15, 1983 (Reference 4). The letter referred to a previous letter dated April 2, 1981 (Reference 5) for a review of the instrumentation provided for Regulatory Guide 1.97. The licensee provided additional information for this review in a letter dated September 21, 1983 (Reference 6).

This 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 the 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 April 2, 1981, which described the licensee's position on post-accident monitoring instrumentation. Additional information was provided on September 21, 1983. This evaluation is based on these submittals.

3.1 Adherence to Regulatory Guide 1.97

The licensee stated that the guidance of Regulatory Guide 1.97 has been implemented as follows. Conformance includes instrumentation that meets the guidance, and instrumentation that was added or modified to meet the guidance. Exceptions on those items where a generic (to Westinghouse) issue remains to be resolved, instrumentation that is not fully in compliance, but where the licensee views it as appropriate for the variable, and items which are not part of the station design were noted. 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. Reactor coolant system hot leg water temperature
2. Reactor coolant system pressure
3. Degrees of subcooling
4. Containment pressure
5. Effluent radioactivity--noble gas effluent from condenser air removal system exhaust
6. Refueling water storage tank level
7. Pressurizer level
8. Steam generator pressure

9. Auxiliary feedwater flow² ~~instrumentation or generator~~ 1.2

10. Condensate storage tank water level

11. Steam generator blowdown radiation

All of the above variables, except number 11, are also included as Type B, C or D variables. All meet Category 1 requirements consistent with the requirements for Type A variables.

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

The licensee has provided instrumentation for this variable that meets the Category 1 recommendations except that the detectors are not environmentally or seismically qualified as specified in the regulatory guide.

Environmental qualification has been clarified since Revision 2 of Regulatory Guide 1.97 was issued. The clarification is in the environmental qualification rule, 10 CFR 50.49. It is concluded that the guidance of Regulatory Guide 1.97 has been superseded by a regulatory requirement. Any exception to this rule is beyond the scope of this review and should be addressed in accordance with 10 CFR 50.49.

The licensee has indicated that the detectors are not seismically qualified and that this item is an issue that is generic to Westinghouse neutron flux instrumentation. We find the licensee's justification for this deviation unacceptable.

During the regional meetings in February and March, 1983, the NRC indicated that the seismic portion of instrumentation qualification, for

operating reactors, should comply with the seismic qualification program which was the basis for plant licensing. This requirement is plant specific for operating reactors and is not generic.

The licensee should provide justification for this deviation in the form of an analysis that shows the detectors conform to the seismic qualification program, or provide a commitment to upgrade the detectors.

3.3.2 Reactor Coolant System Cold Leg Water Temperature

The licensee has provided instrumentation for this variable that satisfies the recommendations of Regulatory Guide 1.97 except that the range is 0° to 700°F rather than the 50° to 750°F recommended by Revision 2 of the regulatory guide.

The licensee indicates that the range supplied covers all accidents except where the reactor coolant becomes superheated. Revision 3 of Regulatory Guide 1.97 (Reference 7) recommends a range of 50° to 700°F, which is met by the supplied instrumentation. Therefore, there is no deviation from the current revision of the regulatory guide.

3.3.3 Reactor Coolant System Hot Leg Water Temperature

The licensee has provided instrumentation for this variable that satisfies the recommendations of Regulatory Guide 1.97 except that the range is 0° to 700°F rather than the 50° to 750°F recommended by Revision 2 of the regulatory guide.

The licensee indicates that the range supplied covers all accidents except where the reactor coolant becomes superheated. Revision 3 of the regulatory guide recommends a range of 50° to 700°F, which is met by the supplied instrumentation. Therefore, there is no deviation from the current revision of the regulatory guide.

3.3.4 Radiation Level in Circulating Primary Coolant

Regulatory Guide 1.97 recommends instrumentation for this variable for the detection of a breach. The licensee has not provided instrumentation for this variable. There is, however, radiation monitoring on the letdown line. The letdown line is isolated with an accident and the monitor is then ineffective.

The licensee's post-accident sampling system can provide some information to compliment this variable, however, it is not continuous on-line instrumentation.

Instrumentation that is suitable for this variable has been under research and development. We find that use of the post-accident sampling system is acceptable on an interim basis, on the conditions that the licensee (a) commit to evaluate systems for the variable as they become available and (b) commit to installation of a satisfactory system within a reasonable time frame.

3.3.5 Radiation Exposure Rate

The regulatory guide specifies a range of 10^{-1} to 10^4 R/hr for this variable. The licensee has supplied instrumentation for this variable in Unit 2 that has a range of 1 to 10^7 R/hr. While the upper limit of the supplied range is inclusive of the recommended range, the lower limit is not.

The licensee has not justified this deviation. Further, they state that this instrumentation will not be installed in Unit 1. We find both of these positions unacceptable. The licensee should provide justification showing why these deviations are acceptable, or commit to complying to the Regulatory Guide recommendations for the variable within a reasonable time frame.

3.3.6 Effluent Radioactivity-Noble Gases From Electrical and Mechanical Penetration Areas and Fuel Handling Building

The licensee has not provided instrumentation for this variable, nor provided the justification for not supplying this instrumentation. The licensee should provide satisfactory justification showing why this exception is acceptable, or commit to complying to the Regulatory Guide recommendations for this variable within a reasonable time frame.

3.3.7 Residual Heat Removal Heat Exchanger Outlet Temperature

The licensee indicates that the instrumentation for this variable has no seismic or environmental qualification test data available. Our review of the requirements of Regulatory Guide 1.97 for Category 2 instrumentation shows that seismic qualification is not required.

Environmental qualification has been subsequently clarified by the environmental qualification rule, 10 CFR 50.49. It is concluded that the guidance of Regulatory Guide 1.97 has been superseded by a regulatory requirement. Any exception to this rule is beyond the scope of this review and should be addressed in accordance with 10 CFR 50.49.

3.3.8 Accumulator Tank Level

Regulatory Guide 1.97 recommends a range for this variable of 10 to 90% of volume. The licensee has supplied instrumentation for this variable that covers a range of 52.65 to 70.29% of volume. The licensee's justification for this deviation is that the present range is needed to meet the instrument accuracies required by technical specifications. We find the licensee's justification for this deviation unacceptable.

The technical specifications provide the limiting conditions for operation and surveillance requirements for system variables (volumes, pressures, levels, temperatures and etc.) that are required to be operational and available for pre-accident conditions. The technical specifications do not identify specific instrumentation ranges that must be

available in post-accident conditions. The licensee should provide an analysis that shows his existing accumulator level instrumentation will adequately cover the maximum expected range, or provide instrumentation with the range recommended by Regulatory Guide 1.97.

3.3.9 Refueling Water Storage Tank Level

The licensee has supplied instrumentation for this variable that covers a range of 2.5 to 45.24 ft of the 48 ft tank height. The regulatory guide specifies a span of top to bottom. The licensee indicates that the tank overflow is at 45.24 ft. Therefore, the upper limit of the span is the effective top of the tank. We were unable to determine where 2.5 ft is in relation to the tank discharge to the emergency core cooling pump suction. The licensee states that the range "adequately covers" the technical specification requirement. We find the licensee justification for this deviation unacceptable.

The technical specifications provide the limiting conditions for operation and surveillance requirements for system variables (volumes, pressures, levels, temperatures and etc.) that are required to be operational and available for pre-accident conditions. The technical specifications do not identify specific instrumentation ranges that must be available in post-accident conditions. The licensee should provide an analysis that shows his existing refueling water storage tank level instrumentation will adequately cover the maximum expected range, or provide instrumentation with the range recommended by Regulatory Guide 1.97.

3.3.10 Pressurizer Level

The licensee has supplied instrumentation for this variable with a range of 3 ft. 4 in. to 47 ft. 2 in. Regulatory Guide 1.97 specifies a range of top to bottom. The licensee justifies the deviation in the range requirements by saying it is needed to meet the technical specification requirements. Our review of the FSAR (Reference 7) shows that if the water were at the 3 ft. 4 in. level, the pressurizer heaters would be partially uncovered. If the water level is much above 47 ft. 2 in. the safety and

relief valve nozzles could have water in them. Neither condition is desirable, but could occur during an accident. The licensee has not demonstrated that the range adequately covers these levels in the pressurizer. Therefore, we find that the justification supplied by the licensee is inadequate and unacceptable.

The technical specifications provide the limiting conditions for operation and surveillance requirements for system variables (volumes, pressures, levels, temperatures and etc.) that are required to be operational and available for pre-accident conditions. The technical specifications do not identify specific instrumentation ranges that must be available in post-accident conditions. The licensee should provide an analysis that shows his existing pressurizer level instrumentation will adequately cover the maximum expected range, or provide instrumentation with the range recommended by Regulatory Guide 1.97.

3.3.11 Pressurizer Heater Status

The licensee has supplied instrumentation for this variable that satisfactorily complies with the recommendations of the regulatory guide except the instrumentation is not environmentally qualified. Environmental qualification has been subsequently clarified by the environmental qualification rule, 10 CFR 50.49. It is concluded that the guidance of Regulatory Guide 1.97 has been superseded by a regulatory requirement. Any exception to this rule is beyond the scope of this review and should be addressed in accordance with 10 CFR 50.49.

3.3.12 Quench Tank Level

The licensee has provided instrumentation for this variable with a range of 7 in. to 8 ft. 11 in. out of a total height of 9 ft. 6 in. Regulatory Guide 1.97 recommends that the full height be covered by the instrument range. The licensee indicates that the range adequately covers the technical specification requirements. We find the licensee's justification for this deviation unacceptable.

The technical specifications provide the limiting conditions for operation and surveillance requirements for system variables (pressures, levels, temperatures and etc.) that are required to be operational and available for pre-accident conditions. The technical specifications do not identify specific instrumentation ranges that must be available in post-accident conditions. The licensee should provide an analysis that shows his existing quench tank level instrumentation will adequately cover the maximum expected range, or provide instrumentation with the range recommended by Regulatory Guide 1.97.

3.3.13 Quench Tank Temperature

The licensee has supplied instrumentation for this variable that has a range of 50 to 350°F instead of the recommended 50 to 750°F. The licensee states that the tank rupture disk has a design pressure of 85 psig, and that this restricts the temperature of the saturated steam to 328°F. The pressure would have to reach 134 psig for the temperature to exceed the range of 350°F. We concur with the licensee's analysis and find that this deviation is acceptable.

3.3.14 Steam Generator Level

The licensee has supplied non-redundant instrumentation for this variable that measures from 0 to 500 in. out of a total height of 812 in. There is redundancy for a portion of this range provided by redundant narrow range instrumentation. Regulatory Guide 1.97 recommends redundant instrumentation with a range from the tube sheet to the separators.

The licensee has not shown the correlation between the 0 to 500 in. range supplied and the recommended range from the tube sheet to the separators. The licensee has stated that the auxiliary feedwater flow can be used as a backup indication of level. However, they have not shown a positive correlation between the two variables. For a given flow of auxiliary feedwater, the steam generator level will vary depending on the type and severity of the accident. Thus, we cannot conclude that the auxiliary feedwater flow is indicative of the steam generator level under all accident conditions. Therefore, we find that the justification

supplied by the licensee for deviations in range and redundancy for this variable are inadequate. The licensee should provide (a) the correlation between the steam generator level and the auxiliary feedwater flow, (b) the correlation between the 0 to 500 inch range supplied and the range from tube sheet to separators recommended, and (c) either provide redundancy for the entire recommended range or provide satisfactory justification for not having this redundancy.

3.3.15 Containment Spray Flow

Regulatory Guide 1.97 recommends instrumentation for this variable to monitor operation of the containment spray. It recommends Category 2 instrumentation with a range from 0 to 110% of design flow. The licensee has not provided a direct measurement of containment spray flow. Instead they use a measurement of the spray additive flow. The licensee has not provided information on this instrumentation to show that it is qualified to Category 2 recommendations, nor shown that the additive flow is proportional to the containment spray flow. Further the licensee has not shown that this alternative is viable after the additive is used up. Therefore, we cannot conclude that this deviation is acceptable. The licensee should show the relation between the spray additive flow rate and the containment spray. The licensee should also show that the instrumentation is Category 2 and address the impact of when the spray additive flow is gone.

3.3.16 Heat Removal by the Containment Fan Heat Removal System

Regulatory Guide 1.97 recommends plant specific Category 2 instrumentation for this variable to monitor operation of this system. The licensee senses the flow of cooling water (0 to 3000 gallons per minute) through the containment fan cooling coils with Category 2 instrumentation. This by itself does not show that the fans are operating or that heat is actually being removed by the containment fan heat removal system. It assumes that flow alone is indicative of heat removal. The licensee has not provided justification for not monitoring the difference in temperature across the cooling coils or the operation of the fans by Category 2 instrumentation. Either of these in combination with the cooling water

flow conclusively shows whether heat is being removed. The licensee should show how either the temperature difference across the fan coils or the fan operation is monitored by Category 2 instrumentation to conclusively demonstrate heat removal.

3.3.17 Containment Sump Water Temperature

Regulatory Guide 1.97 recommends instrumentation for this variable to monitor operation of the containment cooling systems. The licensee is not supplying instrumentation for this variable. The licensee justifies not monitoring this variable by stating that "emergency core cooling and containment heat removal system pumps, specifically the residual heat removal pumps which take suction from the containment sump when the refueling water storage tank is empty, were designed to meet the criteria in Safety Guide 1." Safety Guide 1 (Regulatory Guide 1.1), when followed, provides adequate net positive suction head to the pumps that draw suction from the containment sump, assuming maximum expected temperature of the sump contents with normal (i.e., minimum) ambient containment pressure. We find this justification unacceptable. The licensee's justification does not address the purpose of this instrumentation as stated in the regulatory guide (monitoring the operation of the containment cooling systems with a range from 50 to 250°F). The licensee should provide specific information showing why compliance cannot be accomplished, or provide instrumentation with the range specified by the regulatory guide.

3.3.18 Volume Control Tank Level

Regulatory Guide 1.97 recommends instrumentation for this variable to monitor operation of the chemical volume and control system. The licensee provides instrumentation for this variable that measures from 16.5% to 85% of total volume instead of the regulatory guide recommended top to bottom. The tank overflow line is at a level equivalent to 85% of total volume. Thus the upper limit of the range is at full volume. The licensee states that the range is adequate for the requirements of their technical specifications, and that this instrumentation is not required for an accident. Section 9.2.3.1 of the FSAR (Reference 8) confirms this--the

volume control tank is automatically valved off with an accident signal. Based on this, we concur that the licensee's justification for this deviation is acceptable.

3.3.19 Component Cooling Water Flow to ESF System

Regulatory Guide 1.97 recommends instrumentation for this variable to insure that the ESF equipment is supplied with adequate cooling water. Category 2 instrumentation with a range of 32° to 200°F is recommended. The licensee indicates that this instrumentation satisfies the specifications of Regulatory Guide 1.97 except that it provides useful information only "during periods of recirculation." The component cooling water system is an intermediate system between the reactor coolant and the engineered safety feature (ESF) systems and the service water system. It is operated in a closed loop mode. It is manually aligned to the ESF equipment. Therefore, we find that the licensee's instrumentation is suitable for post-accident monitoring of this variable.

3.3.20 Radioactive Gas Holdup Tank Pressure

The licensee indicates that this variable is directly measured by Category 3 instrumentation. They did not show that the instrument range is 0 to 150% of design pressure as recommended by Regulatory Guide 1.97. Since the range of the instrumentation was not indicated in the licensee's submittals (Reference 6), a judgement cannot be made on the adequacy of the instrumentation under a post-accident condition. The licensee should provide the range as recommended in the regulatory guide or provide justification that the existing range is adequate for post-accident conditions.

3.3.21 Emergency Ventilation Damper Position

The emergency ventilation damper position is monitored by Category 2 instrumentation as specified in Regulatory Guide 1.97, except for the dampers in the auxiliary building and the fuel handling building. These

dampers do not have position indication in the control room. The licensee did not indicate in his submittals where this instrumentation is located. Thus we have no basis on which to determine the acceptability of any deviation. The licensee should identify where the damper position indicators are located and justify not having this indication in the control room.

3.3.22 Common Plant Vent Flow Rate

Regulatory Guide 1.97 recommends instrumentation for this variable for the detection of significant releases, assessment of any release and long term surveillance. The licensee has not shown that this variable is instrumented from 0 to 110% of design flow as recommended in the regulatory guide. The licensee should provide information that verifies the instrument range is as recommended or justify any deviation from the recommended range.

3.3.23 Noble Gas Vent From Steam Generator Safety Relief Valves or Atmospheric Dump Valves

Regulatory Guide 1.97 recommends instrumentation for this variable for the detection of significant releases, assessment of any release and long term surveillance. Besides the radiation level, the duration of the release and mass of steam per unit of time are recommended as parameters to be measured. The licensee does not have instrumentation for this variable. However, alternate instrumentation is installed to measure the main steamline radiation. The monitors are located between the steam generators and the corresponding safety relief and atmospheric dump valves. Thus, any release through the safety relief or atmospheric dump valves will pass through a main steamline monitor.

The licensee has stated that this instrumentation meets the Category 1 requirements. The licensee did not supply information to show the equivalence to the range specified by Regulatory Guide 1.97 (10^{-1} to

10^3 $\mu\text{Ci/cc}$ and duration of the release in seconds and the mass of steam per unit time). The licensee should supply this information so it can be determined if their alternate instrumentation is adequate.

4. CONCLUSIONS

Based on our review we find that the licensee either conforms to or is justified in deviating from the guidance of Regulatory Guide 1.17 with the following exceptions:

1. Neutron flux--the issue of seismic qualification of the neutron detectors is not a generic issue. The licensee should provide justification for this deviation in the form of an analysis that addresses the qualification of the detectors (in accordance with the qualification program which was the basis for plant licensing) or provide a commitment to upgrade the detectors; environmental qualification should be addressed in accordance with 10 CFR 50.49 (Section 3.3.1).
2. Radiation level in circulating primary coolant--the licensee should commit to install instrumentation for this variable as it becomes available (Section 3.3.4).
3. Radiation exposure rate--the licensee should adequately justify not covering the lowest decade of the range recommended by the regulatory guide for this variable; the licensee should also justify not providing instrumentation for this variable in Unit 1 (Section 3.3.5).
4. Effluent radioactivity--noble gases from electrical and mechanical penetration areas and fuel handling buildings--the licensee should provide the appropriate instrumentation for this variable or provide justification for this deviation (Section 3.3.6).

5. RHR heat exchanger outlet temperature--environmental qualification should be applied in accordance with Section (g) to 10 CFR 50.49 (Section 3.3.7).
6. Accumulator tank level--the instrumentation for this variable does not cover the range recommended by the regulatory guide. The licensee should provide an analysis that shows his existing monitoring instrumentation will adequately cover the maximum expected range, or provide instrumentation with the range as recommended by Regulatory Guide 1.97 (Section 3.3.8).
7. Refueling water storage tank level--the licensee should provide an analysis that shows his existing monitoring instrumentation will adequately cover the maximum expected range, or provide instrumentation with the range as recommended by Regulatory Guide 1.97 (Section 3.3.9).
8. Pressurizer level--the licensee should provide an analysis that shows his existing monitoring instrumentation will adequately cover the maximum expected range, or provide instrumentation with the range as recommended by Regulatory Guide 1.97 (Section 3.3.10).
9. Pressurizer heater status--environmental qualification should be applied in accordance with Section (g) to 10 CFR 50.49 (Section 3.3.11).
10. Quench tank level--the licensee should provide additional information in support of the deviation from the recommended range (Section 3.3.12).
11. Steam generator level--the licensee should provide redundant instrument channels for this variable or provide satisfactory justification for not providing this redundancy; the licensee

should show that the supplied range satisfies the regulatory guide recommendation for a range from the tube sheet to the separators (Section 3.3.14).

12. Containment spray flow--the licensee should provide additional information to justify use of the spray additive flow in lieu of this variable (Section 3.3.15).
13. Heat removal by the containment fan heat removal system--the licensee should provide additional information on the alternate instrumentation proposed for use with this variable, showing that Category 2 requirements are met (Section 3.3.16).
14. Containment sump water temperature--the licensee should provide specific information showing why compliance cannot be accomplished, or provide the range specified in the regulatory guide (Section 3.3.17).
15. Radioactive gas holdup tank pressure--the licensee should show the instrument range meets the 0 to 150% of design pressure recommended by Regulatory Guide 1.97 or provide justification showing that the existing range is adequate for post-accident conditions (Section 3.3.20).
16. Emergency ventilation damper position--the licensee should justify not having control room indication for this variable for the auxiliary building and the fuel handling building dampers (Section 3.3.21).
17. Common plant vent flow--the licensee should show the instrument range meets the 0 to 110% of design flow recommended by Regulatory Guide 1.97 (Section 3.3.22).
18. Noble gas-vent from steam generator safety relief valves or atmospheric dump valves--the licensee should show that the main

steamline radiation monitors used for this variable meet the range recommendations of Regulatory Guide 1.97 (Section 3.3.23).

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. Public Service Electric and Gas Company letter, E. A. Liden to Director of Nuclear Reactor Regulation, NRC, "Requirements for Emergency Response Capability, Supplement 1 to NUREG 0737, Preliminary Status Report and Schedule," April 15, 1983.
5. Public Service Electric and Gas Company letter, R. L. Mittl to Director of Nuclear Reactor Regulation, NRC, "Compliance with Regulatory Guide 1.97, No. 2 Unit," April 2, 1981.
6. Public Service Electric and Gas Company letter, E. A. Liden to Director of Nuclear Reactor Regulation, NRC, "Compliance with Regulatory Guide 1.97, NRC Request for Additional Information," September 21, 1983.
7. Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident, Regulatory Guide 1.97, Revision 3, NRC, Office of Nuclear Regulatory Research, May 1983.
8. Salem Nuclear Generating Station, Units 1 and 2, Final Safety Analysis Report, Public Service Electric and Gas Company, Newark, NJ, August 27, 1971, Amendment 10.