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CONFORMANCE TO REGULATORY GUIDE 1.97
INDIAN POINT UNIT NO. 2

A. C. Udy

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EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

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ABSTRACT

This EG&G Idaho, Inc., report reviews the submittal for Regulatory Guide 1.97, Revision 2, for Indian Point Unit No. 2. Any exceptions to Regulatory Guide 1.97 are evaluated and those areas where sufficient basis for acceptability is not provided are identified.

Docket No. 50-247
TAC No. 51098

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 PWR Licensing-A by EG&G Idaho, Inc., NRR and I&E Support Branch.

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CONTENTS

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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).

Consolidated Edison Company of New York, Inc., the licensee for Indian Point Unit No. 2, provided a response to Section 6.2 of the generic letter on August 30, 1985 (Reference 4).

This report provides an evaluation of that submittal.

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 with 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

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. Where licensees or applicants explicitly state that instrument systems conform to the regulatory 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 submittal based on the review policy described in the NRC regional meetings.

3. EVALUATION

The licensee provided a response to Item 6.2 of NRC Generic Letter 82-33 on August 30, 1985. The response describes the licensee's position on post-accident monitoring instrumentation. This evaluation is based on that material.

3.1 Adherence to Regulatory Guide 1.97

The licensee has provided a review of their post-accident monitoring instrumentation that compares the instrumentation characteristics against the recommendations of Regulatory Guide 1.97, Revision 2. The licensee has identified where the post-accident monitoring instrumentation conforms to Regulatory Guide 1.97 and where deviations exist. The licensee states that a schedule will be submitted that identifies the implementation dates of the modifications identified to bring Indian Point Unit No. 2 into compliance with the regulatory guide. This schedule was to have been submitted in December 1985. Therefore, we conclude that the licensee has provided an explicit commitment on conformance to Regulatory Guide 1.97. Exceptions to and deviations from the regulatory guide are 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 the 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. Reactor coolant system pressure - wide range

2. Reactor coolant system hot leg water temperature

3. Reactor coolant system cold leg water temperature

4. Pressurizer level

5. Containment pressure - wide range

6. Steam generator level - wide range

7. Containment water level

8. Steamline pressure

9. Auxiliary feedwater flow

10. Containment radiation - hi range

11. Condensate storage tank level

12. Refueling water storage tank level

13. Core exit temperature

14. Reactor coolant system subcooling

15. Steam generator blowdown radiation

This instrumentation meets the Category 1 recommendations consistent with the requirements for Type A variables, with the exceptions as listed in Section 3.3.

3.3 Exceptions to Regulatory Guide 1.97

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

3.3.1 Neutron Flux

Regulatory Guide 1.97 recommends Category 1 instrumentation for this variable to monitor reactivity control. The licensee's instrumentation is Category 3. The licensee states the following reasons for this deviation.

1. Indication of a shutdown condition after a reactor trip will occur before a harsh environment develops,

2. Boron sample analysis indicates shutdown conditions in the long term,

3. Core exit temperature is the key variable to monitor the core, and

4. The emergency operating procedures direct core cooling with borated water that provides additional shutdown margin.

The measurement of neutron flux is the key variable for detecting a post-accident uncontrolled approach to criticality and for determination that an accident has been successfully mitigated. Since key variables are classified Category 1, the licensee should commit to the installation of instrumentation for this variable that is in accordance with Regulatory Guide 1.97.

3.3.2 Reactor Coolant System Soluble Boron Concentration

Regulatory Guide 1.97 recommends instrumentation for this variable with a range of 0 to 6000 parts per million. The licensee's instrumentation has a range of 60 to 6000 parts per million.

The licensee deviates from Regulatory Guide 1.97 with respect to the range of this post-accident sampling capability. This deviation goes beyond the scope of this review and is being addressed by the NRC as part of their review of NUREG-0737, Item II.B.3.

3.3.3 Reactor Coolant System Cold Leg Water Temperature
Reactor Coolant System Hot Leg Water Temperature

Revision 2 of Regulatory Guide 1.97 recommends instrumentation for these variables with a range of 50 to 750°F. The licensee's cold leg water temperature instrumentation will be modified to provide a range of 0 to 700°F. The licensee's hot leg water temperature has a range of 0 to 700°F.

Regulatory Guide 1.97, Revision 3 (Reference 5), recommends a range of 50 to 700°F for these variables. The instrumentation supplied by the licensee meets this range. Therefore, the range supplied by the licensee is acceptable.

3.3.4 Degrees of Subcooling

The licensee has identified this as a Type A variable. As such, Category 1 instrumentation is required. The licensee's overall subcooling margin monitor is Category 2. The licensee notes that while the inputs to the subcooling monitor are qualified and redundant with independent readouts, the monitor and computer are not. The licensee states that the subcooling margin monitor was installed to meet NUREG-0578 requirements.

We find this deviation unacceptable for Type A variables. NUREG-0578 does not require this instrumentation to be Type A. The licensee has determined that this instrumentation is Type A. Therefore, the licensee should provide Category 1 instrument channels for this variable.

3.3.5 Containment Sump Water Level

Revision 2 of Regulatory Guide 1.97 recommends wide range instrumentation for this variable with a range of 0 to 600,000 gallons and narrow range instrumentation with a range covering the sump itself. The licensee's wide range instrumentation covers from the bottom of the sump to the design basis flood level.

The Category 1 instruments cover the entire range of expected water levels for post-accident conditions. Based on this, we conclude that (a) the range is sufficient to monitor the sump operation for any anticipated condition and (b) the sump level is adequately monitored by the wide range instrumentation to preclude the need for narrow range instrumentation. The licensee has shown a plant specific range that exceeds the maximum expected water level. This is in accordance with Revision 3 of Regulatory Guide 1.97. Therefore, we find that the instrumentation provided for this variable is acceptable.

3.3.6 Containment Isolation Valve Position

From the information provided, we find that the licensee deviates from a strict interpretation of the Category 1 redundancy recommendation. Only the active valves have position indication (i.e., check valves have no position indication). Since redundant isolation valves are provided, we find that redundant indication per valve is not intended by the regulatory guide. Position indication of check valves is specifically excluded by Table 2 of Regulatory Guide 1.97. Therefore, we find that the instrumentation for this variable is acceptable.

3.3.7 Radiation Level in Circulating Primary Coolant

The licensee indicates that radiation level measurements to indicate fuel cladding failure are provided by a delayed neutron gamma monitor and by the post-accident sampling system, which is being reviewed by the NRC as part of their review of NUREG-0737, Item II.B.3.

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

3.3.8 Radiation Exposure Rate

Revision 2 of Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable. The licensee's instrumentation is Category 3. As Revision 3 of the regulatory guide recommends Category 3 instrumentation, we find the instrumentation acceptable in this regard.

Regulatory Guide 1.97 recommends a range of 10^{-1} to 10^{4} R/hr for this instrumentation. The licensee's instrumentation has a range of 10^{-4} to 10 R/hr. The licensee states that this range covers all anticipated accident and post-accident conditions. Areas analyzed to have a potential exposure rate in excess of 1 R/hr are locked to prevent entry. Portable instrumentation will be used to access re-entry.

From a radiological standpoint, if the radiation levels reach or exceed the upper limit of the range, personnel would not be permitted into the areas without portable monitoring (except for life saving). Based on this and the portable instrumentation used by the licensee for this variable, we find the range for the radiation exposure rate monitors acceptable.

3.3.9 Residual Heat Removal Heat Exchanger Outlet Temperature

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable with a range of 32 to 350°F. The licensee's instrumentation, except for environmental qualification, is Category 2, with a range of 75 to 400°F.

The licensee states that the range is inclusive of all anticipated accident and post-accident temperatures. Based on the licensee's statement, we find this range adequate to monitor this variable during post accident conditions.

The licensee states that this instrumentation is not called out in the emergency operating procedures, that heat exchanger heat removal can also be verified by the Category 2 component cooling water temperature as it enters and leaves the residual heat removal heat exchangers, and that this instrumentation is used as a backup to the variable residual heat removal system flow.

Environmental qualification has been clarified by the Environmental Qualification Rule, 10 CFR 50.49. The licensee should therefore provide instrumentation that is environmentally qualified in accordance with the provisions of 10 CFR 50.49 and Regulatory Guide 1.97.

3.3.10 Accumulator Tank Level and Pressure

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable with ranges of 10 to 90 percent of tank volume and 0 to 750 psig. The licensee's instrumentation, except for environmental qualification, is Category 2 with ranges of 0 to 100 percent of span and 0 to 700 psig.

The licensee states that the level and pressure ranges cover all expected accident and post-accident conditions. Based on this statement, we find that the ranges of the instrumentation supplied for this variable are adequate to determine that the accumulator have discharged. Therefore, the ranges of this instrumentation are acceptable for this variable.

The licensee states that this variable is used as a backup for the high pressure injection flow, the refueling water storage tank level, and the accumulator isolation valve position (these variables have Category 2 instrumentation) in determining the condition of the reactor coolant system.

The existing instrumentation is not acceptable. An environmentally qualified instrument is necessary to monitor the status of these tanks. The licensee should designate either level or pressure as the key variable to directly indicate accumulator discharge and provide instrumentation for that variable that meets the requirements of Regulatory Guide 1.97 and 10 CFR 50.49.

3.3.11 Boric Acid Charging Flow

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable with a range of 0 to 110 percent of design flow. The licensee does not have instrumentation for this variable.

The licensee states that this system is not used as a post-accident safety injection system (removal of the boron injection tank and associated equipment has been proposed). The refueling water storage tank level and discharge valve position and the high and the low pressure injection system flow indications are the safety injection system variables monitored.

Because this is not a safety injection system flow, we find that this variable is not applicable at this station.

3.3.12 Pressurizer Level

Regulatory Guide 1.97 recommends instrumentation for this variable with a range covering from the top to the bottom of the vessel. The instrumentation provided for this variable does not indicate the volume in the hemispherical ends of the vessel. The level indication is provided for the cylindrical portion of the pressurizer.

Outside of the supplied instrument range, in the hemispherical vessel ends, the volume to level ratio is not linear (approximately 15 percent of the total volume is not monitored). We find this deviation minor and, therefore, acceptable.

3.3.13 Quench Tank Level

Regulatory Guide 1.97 recommends instrumentation for this variable with a range from the top to the bottom. The licensee identified a deviation from this recommendation in that the instrument range is 0 to 100 inches. The licensee states that this range covers all anticipated vessel levels.

The low limit of this instrumentation is adequate to insure that the sparger is covered and that sufficient fluid volume exists to quench the design basis pressurizer release. The high limit of this instrumentation is adequate to indicate sufficient gas volume to accept a pressurizer release without becoming overpressurized and to indicate in-leakage from the relief discharge system. Based on this, we find this instrumentation adequate. Therefore, this is an acceptable deviation.

3.3.14 Quench Tank Temperature

Regulatory Guide 1.97 recommends instrumentation for this variable with a range of 50 to 750°F. The licensee is modifying the range of this instrumentation to read 50 to 350°F. This range encompasses the saturation temperature corresponding to the rupture disk relief pressure that prevents the pressure from exceeding the tank design pressure of 100 psig.

The rupture disk limits the temperature of the tank contents to saturated steam conditions under 350°F. Thus, we find this deviation from the regulatory guide acceptable.

3.3.15 Main Steam Flow

Regulatory Guide 1.97 recommends Category 1 instrumentation for either the safety/relief valve position or the main steam flow. The licensee indicates that the main steam flow (both low and full range) are used for this variable; however, the licensee has not provided the information required by Section 6.2 of Supplement No. 1 of NUREG-0737.

The licensee should provide the required information, identify any deviation from Regulatory Guide 1.97 and provide supporting justification or alternatives for those deviations.

3.3.16 Auxiliary Feedwater Flow

The licensee has identified this as a Type A variable. As such, Category 1 instrumentation is required. The licensee's instrumentation is Category 2. It does not have the seismic qualification or the redundancy recommended for Category 1 instrumentation.

The licensee states that the instrumentation meets the requirements of NUREG-0737, Section II.E.1 and that backup information for monitoring the steam generator heat removal capability is provided by the steam generator narrow range level instrumentation.

We find these deviations unacceptable for Type A variables. NUREG-0737 does not require this instrumentation to be Type A. The licensee has determined that this instrumentation is Type A. Therefore, the licensee should provide Category 1 channels of instrumentation for this variable.

3.3.17 Condensate Storage Tank Water Level

Regulatory Guide 1.97 recommends Category 1 instrumentation for this variable. As such, seismic qualification should be provided. The licensee states that one of the two transmitters will be upgraded to meet the seismic qualification criteria.

The modification proposed does not result in Category 1 channels that are fully redundant. No justification was provided for this deviation. We conclude that the second channel of instrumentation should be seismically qualified.

3.3.18 Containment Spray Flow

Regulatory Guide 1.97 recommends instrumentation for this variable with a range of 0 to 110 percent of design flow. The licensee identifies a deviation in that the instrumentation has a range of 0 to 2400 gpm.

The licensee states that this range encompasses all anticipated post-accident conditions and that it covers the maximum expected flow during recirculation. Based on this statement, we find the range acceptable for this variable during all accident and post-accident conditions.

3.3.19 Containment Atmosphere Temperature

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable with a range of 40 to 400°F. The licensee's instrumentation is Category 3, and has a range of 50 to 150°F.

The licensee states that the emergency operating procedures do not utilize this variable and that containment heat removal is verified by other key variables, i.e., service water and component cooling water flow and inlet and outlet water temperatures and the temperature difference across the heat exchangers of these systems. The licensee also states that a downward trend in the containment pressure also verifies heat removal. Based on its use as backup instrumentation, we find the Category 3 instrumentation acceptable.

The licensee has not shown that the instrumentation will remain on scale during all post-accident conditions. Therefore, we conclude that the licensee should rescale the instrumentation to cover the recommended range of 40 to 400°F.

3.3.20 Containment Sump Water Temperature

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable with a range of 50 to 250°F. The licensee is not supplying instrumentation for this variable, stating that saturated sump water was assumed in the net positive suction head design requirements for those pumps that recirculate the sump contents.

This is insufficient justification for this exception. The licensee should provide the recommended instrumentation for the functions outlined in Regulatory Guide 1.97 or identify other instruments that provide the same information (such as the residual heat removal heat exchanger inlet temperature) and satisfy the regulatory guide.

3.3.21 Makeup Flow-In
Letdown Flow-Out
Volume Control Tank Level

Regulatory Guide 1.97 recommends Category 2 instrumentation for these variables. The licensee's instrumentation is Category 3. The licensee indicates that these variables, part of the chemical and volume control system (CVCS) are not required for post-accident recovery. This is because

the CVCS is not a safety system and the charging pumps are shed from the Class 1E buses after a concurrent loss of offsite power and safety injection signal. The safety systems are used for post-accident recovery.

As these variables are not utilized in conjunction with a safety system, we find that the instrumentation provided is acceptable.

3.3.22 Component Cooling Water Temperature to Engineered Safety Feature System

Revision 2 of Regulatory Guide 1.97 recommends instrumentation for this variable with a range of 32 to 200°F. The licensee's instrumentation has a range of 50 to 200°F.

The licensee states that this range satisfies the unit operating requirements. Revision 3 of the regulatory guide changes the recommended range to 40 to 200°F. The deviation of 10° out of a maximum span of 200° is 5 percent. We consider this deviation minor and acceptable.

3.3.23 Component Cooling Water Flow to Engineered Safety Feature System

Regulatory Guide 1.97 recommends instrumentation for this variable with a range of 0 to 110 percent of design flow. The licensee's instrumentation has a range of 2,000 to 12,000 gallons per minute.

The licensee states that this range satisfies the unit operating requirements. The instrumentation will be on scale for any one or a number of component cooling water pumps in operation. Therefore, we find the range provided for this instrumentation acceptable.

3.3.24 High Level Radioactive Liquid Tank Level

Regulatory Guide 1.97 recommends instrumentation for this variable with a range of top to bottom. The licensee identifies a deviation in that

the 0 to 150 inch range encompasses all analyzed post-accident conditions, and the readout is on the waste disposal system control panel.

Based on the licensee's statement that the range is adequate to indicate the storage volume during all accident and post-accident conditions, we find the range acceptable.

The licensee has not shown that this instrumentation is accessible post-accident. Therefore, we are unable to determine its adequacy. The licensee should either submit additional justification for this deviation or provide the recommended instrumentation in the control room.

3.3.25 Radioactive Gas Holdup Tank Pressure

Regulatory Guide 1.97 recommends instrumentation for this variable with a range of 0 to 150 percent of design pressure. The licensee's instrumentation indicates from 0 to 150 psig, the design pressure of the tank. The readout is on the waste disposal system control panel rather than in the control room.

The licensee states that this range covers all the anticipated pressures in the tank. There are safety valves that limit the tank pressure to 110 psig. Based on this, we find that the deviation from the recommended range is acceptable.

The licensee has not shown that this instrumentation is accessible post-accident. Therefore, we are unable to determine its adequacy. The licensee should either submit additional justification for this deviation or provide the recommended instrumentation in the control room.

3.3.26 Status of Standby Power

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable. The licensee complies for this variable except for the Category 3 ammeter that is used to monitor the current supplied from the 13.8 kV grid. This is a backup source of power, not one of the two

redundant preferred power supplies that are required by General Design Criterion 17.

Based on the infrequent use of this alternate source of offsite power, we find this deviation acceptable.

3.3.27 Common Plant Vent Flow Rate

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable. The licensee monitors the vent flow rate with Category 3 instrumentation. Should this instrumentation fail, the licensee will use a predetermined conservative flow rate to calculate stack releases. This assigned flow rate will encompass the expected flow rate for all modes of system operation. Based on this alternate method of determining stack releases, we find the instrumentation provided for this variable acceptable.

3.3.28 Steam Generator Blowdown Radiation

The licensee has identified this as a Type A variable. As such, Category 1 instrumentation is required. The licensee has only a single channel of instrumentation that, other than redundancy, is Category 1.

The licensee states that for a steam generator tube rupture, backup information can be obtained via the main steamline radiation monitors and the condenser air ejector radiation monitor.

We find this deviation unacceptable for a Type A variable. The licensee has determined that this instrumentation is Type A. Therefore, the licensee should provide Category 1 channels of instrumentation for this variable.

3.3.29 Vent from Steam Generator Safety Relief Valves

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable. The licensee does not have instrumentation dedicated to this

variable, but estimates releases by sampling upstream of the main steam isolation valves and analyzing, in the onsite laboratory, the amount of entrapped noble gases. The quantity of the release is determined from this in combination with the total steam flow. The licensee also states that the Final Safety Analysis Report, Section 14.2, determines that the public and plant workers will not receive a significant radiation exposure as a result of a steam generator tube rupture.

We find this arrangement unacceptable for this variable. First, the licensee should verify that the sampling and analysis frequency and accuracy is adequate. Second, the licensee should indicate how the duration of the release is determined. Third, the licensee should show that the results derived from this method are within an acceptable tolerance from the actual release.

3.3.30 Estimation of Atmospheric Stability

Regulatory Guide 1.97 recommends instrumentation for this variable with a range of -9 to +18°F or an analogous range for alternative stability analysis. The licensee has supplied instrumentation with a range of -10 to +10°F. The licensee states that this range encompasses all expected atmospheric conditions, and that historically, the supplied range has not been exceeded.

Table 1 of Regulatory Guide 1.23 (Reference 6) provides seven atmospheric stability classifications based on the difference in temperature per 100 meters elevation change. These classifications cover from extremely unstable to extremely stable. Any temperature difference greater than +4°C or less than -2°C does nothing to the stability classification. The licensee's instrumentation includes this range. Therefore, we find that this instrumentation is acceptable to determine 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 should provide Category 1 instrumentation for this variable (Section 3.3.1)

2. Degrees of subcooling--the licensee should provide Category 1 instrumentation for this variable (Section 3.3.4).

3. Residual heat removal heat exchanger outlet temperature--the licensee should provide instrumentation that is environmentally qualified in accordance with 10 CFR 50.49 (Section 3.3.9).

4. Accumulator tank level and pressure--the licensee should provide Category 2 instrumentation for this variable (Section 3.3.10).

5. Main steam flow--the licensee should provide the information required by Section 6.2 of NUREG-0737, Supplement No. 1, identify any deviations from the regulatory guide and justify those deviations (Section 3.3.15).

6. Auxiliary feedwater flow--the licensee should provide Category 1 instrumentation for this variable (Section 3.3.16).

7. Condensate storage tank water level--seismically qualified transmitters should be provided for both channels (Section 3.3.17).

8. Containment atmosphere temperature--the instrument range should be rescaled to correspond with the range recommended by the regulatory guide (Section 3.3.19).

9. Containment sump water temperature--the licensee should supply the recommended instrumentation or identify alternate instrumentation that performs the same function and satisfies the regulatory guide (Section 3.3.20).

10. High level radioactive liquid tank level--the licensee should either submit additional justification for local readout only, or provide the recommended instrumentation (Section 3.3.24).

11. Radioactive gas holdup tank pressure--the licensee should either submit additional justification for local readout only, or provide the recommended instrumentation (Section 3.3.25).

12. Steam generator blowdown radiation--the licensee should provide Category 1 instrumentation for this variable (Section 3.3.28).

13. Vent from steam generator safety relief valves--the licensee should provide additional justification for this exception (Section 3.3.29).

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, 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. Consolidated Edison Company of New York, Inc., letter, J. D. O'Toole to H. L. Thompson, Jr., NRC, August 30, 1985.

5. 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.

6. Onsite Meteorological Programs, Regulatory Guide 1.23 (Safety Guide 23), NRC, February 17, 1972 or Meteorological Programs in Support of Nuclear Power Plants, Proposed Revision 1 to Regulatory Guide 1.23, NRC, Office of Standards Development, September 1980.