UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-338/89-11 and 50-339/89-11

Licensee: Virginia Electric and Power Company
Glen Allen, VA 23060

Docket Nos.: 50-338 and 50-339 License Nos.: NPF-4 and NPF-7

Facility Name: North Anna 1 and 2

Inspection Conducted: April 3-7, 1989

Inspectors: J E Gordon for 6/7/89
P. Fillion Date Signed

J E Gordon for 6/7/89
M. Miller Date Signed

Approved by: J E Gordon 6/7/89
T. Conlon, Section Chief Date Signed
Plant Systems Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was in the area of the licensee's conformance to Regulatory Guide (RG) 1.97, Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident.

Results:

With the exception of two URI's and one deviation the plant is in compliance with RG 1.97. There were no major weakness or strengths identified in the areas inspected.

- URI 89-11-01, Possible unreviewed deviation from RG 1.97 in the area of process computer isolation (paragraph 2.C).

- URI 89-11-02, Specific identification of RG 1.97 Indicators (paragraph 2.C).

- Deviation 89-11-03, Deviation from RG 1.97 (neutron flux) paragraph 2.c).

- Violation 89-11-04, Failure to identify deficient conditions (not related to RG 1.97) (paragraph 2. c)

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   *D. Blankenship, I&C Engineer
   *G. Kane, Station Manager
   *P. Kemp, Supervisor of Licensing
   P. Knutsen, Supervisor of Nuclear Engineering
   *H. V. Le, Systems Engineer
   M. Marino, Systems Engineer
   G. Mocarski, Loss Prevention Coordinator
   *R. Woodall, III, Systems Engineer

   Other licensee employees contacted during this inspection included engineers, operators, security force members, technicians, and administrative personnel.

   *Attended exit interview

2. Inspection of Licensee's Implementation of Multiplant Action A-17: Instrumentation for Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97) (25587).

   Criterion 13, "Instrumentation and Control," of Appendix A to 10 CFR Part 50 includes a requirement that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety. Regulatory Guide 1.97 (RG 1.97) describes a method acceptable to the NRC staff for complying with the Commission's regulations to provide instrumentation to monitor plant variables and systems during and following an accident.

   The purpose of this inspection was to verify that the licensee has an instrumentation system for assessing variables and systems during and following an accident, as discussed in RG 1.97. Under accident conditions it is necessary that the operating personnel have (1) information that permits the operator to take preplanned actions to accomplish a safe plant shutdown; (2) determine whether the reactor trip, Engineered Safety-Feature System (ESFS), and that other manually initiated safety systems important to safety are performing their intended functions; and (3) provide information to the operators that will enable them to determine the potential for causing a gross breach of the barriers to radioactivity release and to determine if a gross breach of barrier has occurred. For this reason multiple instruments with overlapping ranges may be necessary. The required instrumentation must be capable of surviving the accident environment for the length of time its operability is required. It is desirable that components continue to function following seismic events.

As a result, five types of variables have been specified that serve as guides in defining criteria and the selection of accident-monitoring instrumentation. The types are: Type A - Those variables that provide information needed to permit the control room operating personnel to take specified manual actions for which no automatic control is provided and that are required for safety systems to accomplish their functions for design basis accident events; Type B - Those variables that provide information to indicate whether plant safety functions are being accomplished; Type C - Those variables that provide information to indicate the potential for barriers being breached or the actual breach of barriers to fission product release; Type D - Those variables that provide information to indicate operation of individual safety systems and other systems important to safety; Type E - Those variables to be monitored in determining the magnitude of the release of radioactive materials and for continuously assessing such release.

The design and qualification criteria are separated into three separate categories that provide a graded approach to requirements depending on the importance to safety of the measurement of a specific variable, Category 1 provides the most stringent requirements and is intended for key variables. Category 2 provides less stringent requirements and generally applies to instrumentation designated for indicating systems operating status. Category 3 is intended to provide requirements that will ensure that high-quality off-the-shelf instrumentation is obtained and applies to backup and diagnostic instrumentation. A key variable is that single accomplishment of a safety function (Types B and C), or the operation of a safety system (Type D), or radioactive material release (Type E). Type A variables are plant specific and depends on the operations that the designer chooses for planned manual actions. Inspection of Categories 1 and 2 equipment was performed as described below.

a. Category 1 Instrumentation

The instrumentation listed in the Category 1 Table, of this section, was examined to verify that the design and qualification criteria of RG 1.97 had been satisfied. The instrumentation was inspected by reviewing drawings, procedures, data sheets, other documentation, and performing walkdowns for visual observation of the installed equipment. The following areas were inspected:

(1) Equipment Qualification - The EQ Master Equipment List and the Q-List were reviewed for confirmation that the licensee had addressed environmental qualification requirements for class 1E equipment.

(2) Redundancy - Walkdowns were performed to verify by visual observations the specified instruments were installed and separation requirements were met. In addition, drawings were reviewed to verify redundancy and channel separation.

(3) Power Sources - Drawings were reviewed to verify the instrumentation is energized from a safety-related power source.

(4) Display and Recording - Walkdowns were performed to verify by visual observation that the specified display and recording instruments were installed. Drawings were reviewed to verify there was at least one recorder in a redundant channel and two indicators, one per division (channel) for each measured variable.

(5) Range - Walkdowns were performed to verify the actual range of the indicator/recorders was as specified in RG 1.97 or the SER. Review of calibration procedures verified sensitivity and overlapping requirements of RG 1.97 for instruments measuring the same variable.

(6) Interfaces - The drawings and Q-List were reviewed to verify that safety-related isolation devices were used when required to isolate the circuits from non-safety systems.

(7) Direct Measurement - Drawings were reviewed to verify that the parameters are directly measured by the sensors.

(8) Service, Testing, and Calibration - The maintenance program for performing calibrations and surveillances was reviewed and discussed with the licensee. Calibration and surveillance procedures and the latest data sheets for each instrument were reviewed to verify the instruments have a valid calibration.

CATEGORY 1 TABLE

Variable	Instrument No. (Loop)	Drawings
Steam Generator Narrow Range Level	LT-1474	6007D07
	LI-1474	L-1474
	MUX	
	Computer	
	LT-1475	6007D23
	LI-1475	L-1475
	MUX	
	Computer	
	LT-1476	6007D41
	LI-1476	L-1476
	FR-1478	
	MUX	
	Computer	
	LT-1484	6007D07
	LI-1484	L-1484
	MUX	
	Computer	

Variable	Instrument No. (Loop)	Drawings
	LT-1485	6007D23
	LI-1485	L-1485
	MUX	
	Computer	
	LT-1486	6007D42
	LI-1486	L-1486
	FR-1488	
	MUX	
	Computer	
	LT-1494	6007D08
	LI-1494	L-1494
	MUX	
	Computer	
Steam Generator Narrow Range Level	LT-1495	6007D42
	LI-1495	L-1495
	MUX	
	Computer	
	LT-1496	6007D43
	LI-1496	L-1496
	FR-1498	
	MUX	
	Computer	
RCS Cold Leg Temperature	TE-1410	6007D13
	TR-1410	T-1410
	MUX	
	Computer	
	TE-1420	6007D2°
	TR-1420	T-1420
	MUX	
	Computer	
	TE-1430	6007D46
	TR-1430	T-1430
	MUX	
	Computer	
Refueling Water Storage Tank Level	LT-QS-100A	7383D29
	LI-QS-100A	LQS-100A
	MUX	
	LT-QS-100B	7383D33
	LI-QS-100B	LQS-100B
	MUX	

Variable	Instrument No. (Loop)	Drawings
	LT-QS-100C	7383D39
	LI-QS-100C	LQS-100C
	MUX	
RCS Wide Range Pressure	PT-1402	6007D89
	PI-1402A & B	P-1402
	MUX	
	Computer	
	PT-1403	6007D70
	PI-1403A & B	6008D39
	MUX	P-1403
	Computer	
Containment Intermediate Range Pressure	PT-LM-100A	7382D10
	PI-LM-100A	
	MUX	
	Computer	
	PT-LM-100B	7382D21
	PI-LM-100B	
	MUX	
	Computer	
	PT-LM-100C	7382D26
	PI-LM-100C	
	MUX	
	Computer	
	PT-LM-100D	7382D31
	PI-LM-100D	
	MUX	
	Computer	
Neutron Flux	NFD-190 Channel 1	NF-NM190
	NFI-190A	NF-NM290
	NFI-190B	
	MUX	
	NFD-1270 Channel 2	NF-NH1270
	NFI-1270A	NF-NH2270
	NFI-1270B	
	MUX	
Core Exit Temperature	TE-1E	TESK-RC022
	TE-51E	TESK-RC023
	MUX A	TESK-RC024
	MUX B	
	ICCM A	
	ICCM B	

Variable	Instrument No. (Loop)	Drawings
Pressurizer PORV	ZS-PCV-1455C A1, A2, B1, B2	11715-ESK-6ON 11715-ESK-6NR
Position Indicator	ZS-PCV-1456 A1, A2, B1, B2	PVC-1456 PVC-1455
Containment Hydrogen Concentration	H_2A-HC-101-1 H_2I-HC-101-1 & 2 H_2R-HC-101-1	A-HC101-1
	H_2A-HC-201-1 H_2I-HC-201-1 & 2 H_2R-HC-201-1	A-HC201-1

Notes: (1) MUX is multiplexer input for SPDS and computers other than the plant process computer.

(2) Computer is plant process computer.

(3) The instruments listed are for Unit 1, the same Unit 2 instruments were reviewed.

b. Category 2 Instrumentation

The instrumentation listed in the Category 2 Table, of this section, was examined to verify that the design and qualification criteria of RG 1.97 had been satisfied. The instrumentation was inspected by reviewing drawings, procedures, data sheets, other documentation, and performing walkdowns for visual observation of the installed equipment. The following areas were inspected:

(1) Equipment Qualification - The EQ Master Equipment List and the Q-List were reviewed for confirmation that the licensee had addressed environmental qualification requirements for Class 1E equipment.

(2) Power Sources - Drawings were reviewed to verify the instrumentation is energized from a high quality or safety-related power source.

(3) Display and Recording - Walkdowns were performed to verify by visual observation that the specific display and recording instruments were installed. Drawings were reviewed to verify there was at least one recorder, where required by RG 1.97, in a redundant channel and two indicators, one per division (channel) for each measured variable.

(4) Range - Walkdowns were performed to verify the actual range of the indicators/recorders was as specified in RG 1.97 or the SER. Also calibration procedures were reviewed to verify sensitivity and overlapping requirements of RG 1.97 for instruments measuring the same variable.

(5) Interfaces - The drawings and Q-list were reviewed to verify that safety-related isolation devices are used when required to isolate the circuits from computer systems (not safety-related).

(6) Direct Measurements - Drawings were reviewed to verify that the parameters are directly measured by the sensors.

(7) Service, Testing, and Calibration - The maintenance program for performing calibrations and surveillances was reviewed and discussed with the licensee. Calibration and surveillance procedures and the latest data sheets for each instrument were reviewed to verify the instruments have a valid calibration.

CATEGORY 2 TABLE

Variable	Instrument No. (Loop)	Drawings
HPSI Flow	FT-1940	7392D08
	FI-1940	SI-036
	FT-1940-1	7392D18
	FI-1940-1	SI-053
	FT-1943	7392D18
	FI-1943	SI-037
	FT-1943-1	7392D08
	FI-1943-1	SI-054
	Computer	
LPSI Flow	FT-1945	6008D08
	FI-1945	F-1945
	MUX	
	FT-1946	6008D37
	FI-1946	F-1946
	MUX	
Boric Acid Charging Flow	FT-1110	6007D90
	FI-1110	F-1110
	MUX	
Component Cooling Water Temperature	TE-SW-111	7382D53
	TI-SW-111	
	MUX	
Containment Sump Water Temperature	TE-RS-150A	7382D11
	TI-RS-150A	T-RS150A
	MUX	
	TE-RS-150B	T-RS150B
	TI-RS-150B	
	MUX	

Variable	Instrument No. (Loop)	Drawings
Accumulator Tank Pressure	PT-1921	6008D06
	PI-1921	
	PT-1923	6008D41
	PI-1923	
	PT-1925	6008D08
	PI-1925	
	PT-1927	6008D41
	PI-1927	
	MUX	
Accumulator Tank Pressure	PT-1929	6008D07
	PI-1929	
	PT-1931	6008D42
	PI-1931	
	MUX	
4160 VAC BUS 1H and 1J Voltage	0-5KV Voltmeter	11715-FE-1D

Notes: (1) MUX is multiplexer input for SPDS and computers other than the plant process computer.

(2) Computer is the plant process computer.

(3) The instruments listed are for Unit 1, the same Unit 2 instruments were reviewed.

c. Discussion

In RG 1.97, Rev. 3, the design and qualification criteria for instrumentation include the following three requirements:

(1) Redundant channels should be electronically independent and physically separated from each other and from equipment not classified important to safety in accordance with RG 1.75, "Physical Independence of Electric Systems," up to and including any isolation device.

(2) No single failure within the accident-monitoring instrumentation should prevent the operators from being presented the information necessary for them to determine the safety status of the plant etc.

(3) The transmission of signals for other use should be through isolation devices that are designated as part of the monitoring instrumentation and that meet the provisions of this document.

In the North Anna design, qualified isolation devices located at the Reactor Protection System process racks isolate the protection portion of the circuitry from the indication portion. The indication portion of the circuitry includes the transmission of signals to instruments on the main control board and the plant process computer. Since the computer is not electrically isolated from the instrument signal, the computer is, in effect, part of the accident-monitoring instrumentation. Wiring from each of the process cabinets, for the four redundant channels, to instruments on the main control board was designated as non-safety-related in the original plant design. Therefore, physical separation was not required, and does not exist between redundant channels in the indication portion of the circuitry. The NRC does not require "back-fitting" of accepted original plant designs to meet the requirements of RG 1.75 for physical separation.

Criteria (2) and (3) stated above are violated by virtue of the fact that the plant process computer is connected to the accident-monitoring instrumentation. The computer represents a potential common mode failure. All computer input cards are powered from a common power supply which means that a voltage surge appearing on the computer power supply could propagate to all redundant channels. In such a scenario, the surge could damage the isolator at the protection system/indication interface for multiple redundant channels. Damage to the isolators would result in loss of indication. The issue reduces to whether or not isolation devices are required at the computer input points.

Neither the licensee's RG 1.97 submittal nor the NRC's Safety Evaluation Report address the apparent deviation from RG 1.97 described above, i.e., plant process computer not isolated from accident-monitoring instrumentation. Therefore, the inspector concluded that the particular design at North Anna may not have been reviewed in relation to RG 1.97 at the time the SER was written. This matter is called an Unresolved Item pending further review by the NRC. Unresolved Item 89-11-01, Possible Unreviewed Deviation from RG 1.97 (process computer isolation).

RG 1.97 Revision 3 states that the instruments designated as Types A, B, and C and Categories 1 and 2 should be specifically identified on the control panels so that the operator can easily discern that they are intended for use under accident conditions. Examples of acceptable methods for accomplishing this requirement are identification labels having a different background color than other labels or instrument bezels color coded to indicate RG 1.97 instruments. The licensee's RG 1.97 correspondence does not address specific identification of instruments on the control panels, nor is specific identification of RG 1.97 instruments incorporated into the control panels. The licensee stated during the inspection that: "The Virginia Power approach for compliance with EQ requirements was to provide qualified signals to the instrumentation racks for all channels associated with each variable. Accordingly, all instrument

channels for each variable met the same criteria, and special demarcation for RG 1.97 compliance was not necessary. The Control Room Design Review performed in response to NUREG-0737 Supplement 1 evaluated control room labels for human factors considerations. A [internal] memo requested that CRDR evaluate the specific criteria of RG 1.97. The response to that memo was that this would be further evaluated and addressed by Corrective Action CA29E identified as an commitment in letter SN 85-268C dated June 30, 1986." This matter is identified as an unresolved item pending the completion of CA29E and subsequent NRC review. Unresolved Item 338, 339/89-11-02, Specific Identification of RG 1.97 Indicators.

The design and qualification criteria for Category 1 variables requires that recording of instrumentation readout information should be provided. Where direct and immediate trend or transient information is essential for operator information or action, the recording should be continuously available on dedicated recorders. Otherwise, it [recording information] may be continuously updated, stored in computer memory, and displayed on demand. Intermittent displays such as scanning recorders may be used in some cases. The RG defines neutron flux as a Type B, Category 1 variable and, therefore, at least one channel should be recorded. The licensee's submittal dated January 31, 1984, also defines neutron flux as a Type B, Category 1 variable, and states that the control room display requirements are met. The submittal also states that a new excore flux monitoring system will be installed to meet the environmental qualification criteria. This new system was installed and, since it does not include a dedicated (strip chart) recorder, apparently the intention was to rely on the safety parameter display system to provide the recording function. The NRC inspector asked the Software Analyst Engineer to demonstrate the recording function for the neutron flux qualified channels, but he was not able to do so. The neutron flux qualified channel signals were transmitted to the SPDS; however, the SPDS was not programmed to record this input data for display on demand.

The conclusion reached during the inspection was that trend information for the neutron flux channel was not available on dedicated recorders nor stored in computer memory for display on demand. Furthermore, it was not determined whether or not this variable is an isolated case of that problem.

The failure to provide recording for neutron flux constitutes a deviation from RG 1.97 and, therefore, a deviation from the licensee's commitment to comply with the regulatory guide. Deviation 338, 339/89-11-03, Deviation from RG 1.97 (neutron flux).

RG 1.97 defines component cooling water temperature to ESF system as a Type D, Category 2 variable. The licensee, in his RG 1.97 submittal dated January 31, 1984, stated that the instrumentation for component cooling water temperature to ESF systems did not meet RG 1.97 with respect to range, environmental qualification, power source nor control room display. The submittal also indicated that

they would install a temperature channel to monitor operation at the charging pump cooling system. In a supplementary submittal dated May 10, 1985, the licensee stated the following:

> "The Service Water System provides cooling water to Engineered Safety Feature (ESF) systems. Therefore, service water temperature is the North Anna equivalent variable for the 'component cooling water temperature to ESF system' variable specified in Regulatory Guide 1.97.
>
> "Service water temperature instrument channels will be modified to meet the requirements of Regulatory Guide 1.97. These modifications are now in the design stage and will provide Service Water Temperature information to the TSC and EOF in addition to the existing temperature indicating meter on the main control board. Replacement of the existing RTD's will not be necessary because they are located in the Turbine Building and the Service Water Pump House and were originally specified to function in the areas in which they are located."

The Safety Evaluation Report found this commitment acceptable. In providing indication for this variable, qualified temperature transmitters were installed to monitor temperature of the auxiliary service water pump discharge.

Telephone conversation with the licensee on June 1 and 2, 1989, disclosed that qualified temperature and flow elements are installed in the Servie Water System that meet the intent of RG 1.97. These instruments are as follows:

- TE-SW-111 and -211 on discharge of Aux Service Water Pumps
- FE-SW-100A, -100B, -100C, and -100D on discharge flow of RSHX. The power supply meets requirements for type D variable.
- TE-SW-108 and 109 on discharge from main Service Water Pumps.
- FT-SW-109A and 109B from charging pump gear box and seal cooler
- FT-SW-108A and 108B from charging pump lube oil cooler.

In the course of performing plant walkdowns related to RG 1.97 equipment, the following deficient conditions were identified:

(1) In the main control room, the control board on which most of the RG 1.97 indicators were mounted is an open-back type of panel. The panel is about 20 feet long and seven feet high for each Unit. Because of previous events that involved workers inadvertently short-circuiting wiring terminal points, a decision was made by the responsible manager to not allow cleaning and vacuuming work to take place in the area behind the

main control board. Consequently, the interior of the main control panel, including the terminal blocks, had not been cleaned for several years. The amount of dust buildup had reached the point where it could affect the integrity of the wiring.

(2) The Nuclear Instrumentation System Cabinets which contain the excore neutron flux instruments were opened for inspection after finding condition (1). Two of these NIS cabinets per Unit contained an un-terminated, un-taped multiconductor cable. One of these cables was tagged 1NMS2WX110. It was later determined that the cable was actually a spare cable. To have an un-terminated, un-taped, improperly tagged cable in the NIS cabinet represents a deficient condition, and a departure from plant procedures.

(3) The control room floor is a false floor or computer floor type construction which provides a cable routing space. Behind the main control panel at a point where the Units 1 and 2 panels meet, one of the removable floor boards was loose or not properly supported. This constituted a deficient condition because a person could fall on the loose board and injure himself or fall into the open-back control board.

(4) Panels located at the opposite side of the control room from the main control board were also inspected. The NRC inspector noticed that the bottom of the panel was not properly sealed. The panels themselves had large openings in the bottom to allow cable entry from the raised floor cable routing space (as defined by NFPA Std 75). According to the original design, fire retardent boards had been installed at the bottom of these panels, after the cable work was complete. The purpose of the boards may be to help maintain halon gas concentrations discharged from the halon fire suppession system installed in the raised floor cable routing space. In nine of these panels, the bottom sealing boards were badly broken or missing.

The four deficient conditions described above (i.e., the heavy dust in the control panel, the improperly spared cables, the loose floor boards and the broken sealing boards, had sufficient safety significance to constitute a violation of NRC requirements in the area of identifying and correcting deficient conditions. It is identified as Violation 338, 339/89-11-04, Failure to Identify Deficient Conditions.

The licensee made several plant modifications or equipment upgrades in order to comply with RG 1.97. Part of the work of the NRC inspection was to determine the scope of these plant modifications for the audit sample. The relevant modification packages were reviewed to the extent of verifying the scope of work and status. The inspector was satisfied that the necessary work had been accomplished. The plant modifications for the audit sample are summarized below:

SUMMARY OF MODIFICATIONS

Variable	Package No.	Scope	U1 * Completed
Accumulator Tk Pres	86-11 & 12	Upgrade to EQ	10/2/87
HPSI Flow	84-55 & 56 82-14	Upgrade to EQ and relocate	12/20/87
Component Cooling Water	84-49 & 50	Replace equipment	12/5/88
Core Exit Temp	85-07 & 08	Entire System upgrade to meet range, EQ, seismic, redundancy	6/14/87
RCS Cold Leg Temp	81-54	Replace RTD to make EQ	4/10/87
RCS Wide Range Pres.	82-14	Upgrade to EQ	5/27/87
RWST Level	84-47 & 48	Upgrade transmitters to seismic	12/19/85
PORV Position	84-17 & 18	Replace limit switches to meet EQ, seismic, redundancy	6/14/87
Cont Inter-mediate Pres.	82-14	Upgrade to EQ	5/27/87
Neutron Monitoring	83-30 & 31	New system installed	6/24/88
LHSI Flow	82-14	Upgrade to EQ	5/27/87

*Date that Station Manager signed package for Unit 1 as being essentially complete.

3. Corrective Action Program

With respect to URI 338, 339/89-11-01, Electrical Independence of RG 1.97 Instrumentation, the licensee's official position is that their design meets the intent of RG 1.97 and, therefore, any internal audits would not have identified problems in this area. URI 338, 339/89-11-02, Specific Identification of RG 1.97 Indicators, is being addressed by the licensee under their control room design review effort. The licensee deviated from

the RG for one variable (Deviation 338, 339/89-11-03). This is attributed to personnel error and inattention to detail. The problems described in Violation 338, 339/89-11-04, Failure to Identify Deficient Conditions, should have been identified by the licensee in the course of performing plant walkdowns. Three of the conditions had probably existed for at least a year. The improperly spared cables should also have been identified at the time the modification work was performed.

4. Exit Interview

The inspection scope and results were summarized on April 7, 1989, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

338, 339/89-11-01 Unresolved Item - Possible unreviewed deviation from RG 1.97 (Process Computer Isolation)

338, 339/89-11-02 Unresolved Item - Specific Identification of RG 1.97 Indicators

338, 339/89-11-03 Deviation - Deviation from RG 1.97

338, 339/89-11-04 Violation - Failure to Identify Deficient Conditions

The Station Manager commented on the violation. He stated that failure to remove dust from the control panel did not represent a shortcoming of their program but, rather, a failure to implement Procedure ADM-20.48, Station Material Condition and Housekeeping (dated November 23, 1988). The Station Manager also stated that corrective actions for each of the deficiencies had already been initiated. "The control panel was cleaned last evening, but not to my satisfaction. It will be vacuumed again," he said. It was also stated that they determined the halon system would have performed its function even though the sealing boards were broken or missing.

5. Acronyms and Initialisms

EQ - Environmental Qualification
FI - Flow Indicator
FT - Flow Transmitter
HPSI - High Pressure Safety Injection
H_2 - Hydrogen Analyzer
H_2I - Hydrogen Analyzer Indicator
H_2R - Hydrogen Analyzer Recorder
ICCM - Inadequate Core Cooling Monitor
LI - Level Indicator
LPSI - Low Pressure Safety Injection
LT - Level Transmitter
MUX - Multiplexor
NFD - Nuclear Flux Detector

NFI - Nuclear Flux Indicator
PCV - Pressure Control Valve
PI - Pressure Indicator
PORV - Power Operated Relief Valve
PT - Pressure Transmitter
RCS - Reactor Cooling System
RTD - Resistance Type Temperature Detector
SER - Safety Evaluation Report
TE - Temperature Element
TI - Temperature Indicator
TR - Temperature Recorder
PS - Position Switch