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NUCLEAR REGULATORY COMMISSION
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DOCKET FILE

April 24, 1980

Docket Nos. 50-280
50-281

Mr. J. H. Ferguson
Executive Vice President - Power
Virginia Electric and Power Co.
Post Office Box 26666
Richmond, Virginia 23261

Dear Mr. Ferguson:

Enclosed for your information is the staff's evaluation of the actions you have taken to satisfy the TMI Lessons Learned Category "A" items on Surry Nuclear Power Station Units 1 and 2. This evaluation is based on your submitted documentation and the discussions between our staffs at a site visit on March 18, 1980. A list of meeting attendees at the site visit is also attached.

We conclude that you have satisfied all Category "A" requirements. Certain items, such as the adequacy of procedures, will be verified by the Office of Inspection and Enforcement. These items are indicated in the evaluation.

This evaluation does not address the Technical Specifications necessary to ensure the limiting conditions for operation and the long-term operability surveillance requirements for the systems modified during the Category "A" review. You should be considering the proposal of such Technical Specifications. We will be in communication with you on this item in the near future.

Sincerely,

A. Schwencer

A. Schwencer, Chief
Operating Reactors Branch No. 1
Division of Operating Reactors

Enclosures:
1. Evaluation of Compliance with Category "A" Lessons Learned Requirements
2. Attendance List, Site Visit March 18, 1980

cc: See Page 2

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ENCLOSURE 1

EVALUATION OF LICENSEE'S COMPLIANCE WITH CATEGORY "A" ITEMS OF NRC RECOMMENDATIONS RESULTING FROM TMI-2 LESSONS LEARNED

VIRGINIA ELECTRIC AND POWER CO.
SURRY NUCLEAR PLANT
UNITS 1 AND 2

DOCKET NOS. 50-280 AND 50-281

Date: April, 1980

I. INTRODUCTION

By letters dated October 24[1], November 26[2], December 17[3], 1979, January 10[4], 31[5], February 4[6], and April 1[7], 1980, Virginia Electric and Power Company submitted commitments and documentation of actions taken at Surry Power Station Units 1 and 2 to implement staff requirements resulting from TMI-2 Lessons Learned. To expedite review of the licensee's actions, members of the staff visited the licensee's facility on March 18, 1980. This report is an evaluation of the licensee's efforts to implement each Category "A" item which was to have been completed by January 31, 1980 for Unit 1 and prior to startup from the steam generator outage for Unit 2.

II. EVALUATION

Each of the Category "A" requirements applicable to PWRs is identified below. The staff's requirements are set forth in reference 8; the acceptance criteria is documented in reference 9. The numbered designation of each item is consistent with the identifications used in NUREG-0578. Lessons Learned items 2.1.7.a, and 2.1.9 are being reviewed separately and are not discussed in this report.

2.1.1 EMERGENCY POWER SUPPLY

Pressurizer Heater

The Westinghouse Owner's Group analysis has determined that the minimum requirements to maintain natural circulation in a three loop plant with a pressurizer volume of 1300 cubic feet is 125 kw of heater capacity. Two backup heater groups rated at 250 and 200 kw and their associated controls are energized from redundant emergency buses H and J which are capable of being fed from either offsite power or emergency power. The Class IE interfaces for motive and control power are protected by safety grade circuit breakers.

The pressurizer heaters are not automatically shed from the emergency power sources upon the occurrence of a safety injection actuation signal. Existing diesel generator loading indicates that with the pressurizer heaters energized at any time following a LOCA with a loss of offsite power each diesel generator will be within its continuous kw rating. Procedures have been implemented to instruct the operator in the use of pressurizer heaters in establishing and maintaining natural circulation.

The licensee has satisfied the short term Lessons Learned requirements for pressurizer heaters.

Pressurizer Relief and Block Valves and Pressurizer Level Indicators

The power-operated relief valves (PORVs) are pneumatically operated from the containment instrument air system upon actuation of solenoid control valves. The containment instrument air system is supplied from two motor driven air compressors which are energized from redundant 480 volt emergency buses. The accumulators for this air system are located inside the containment. This system is backed up by a high pressure air system for each PORV. This high pressure system is seismically supported and is sized for 120 stored valve operations. The solenoid valves for the two PORVs are energized from 125 volt redundant plant batteries. The block valves for the PORVs are motor operated valves and are energized from redundant emergency 480V buses which are automatically energized from diesel generators upon loss of offsite power.

A modification to the high pressure air supply tanks required to provide redundant motive power to the PORVs is complete on Unit 1 and will be completed on Unit 2 prior to startup from the current outage.

The PORVs and their associated block valves are connected to the emergency sources of power through safety grade circuit breakers. The design of the PORVs and block valves are such that they can be opened or closed in the event of loss of offsite power.

Three pressurizer level transmitter instrument channels indicate level in the control room. These three level instrument channels are independently powered from vital instrument panels that are powered from redundant emergency buses.

The licensee has satisfied the short term Lessons Learned requirements of the position on emergency power supply for the pressurizer power operated relief valves/block valves and pressurizer level indicators.

2.1.2 PERFORMANCE TESTING FOR PWR RELIEF AND SAFETY VALVES

NUREG-0578 requires that PWR licensees shall functionally test the reactor coolant system relief and safety valves to demonstrate operability under expected operating conditions. The Category "A" requirement is for the licensee to commit to perform an appropriate test program.

Virginia Electric and Power Co. has referenced the Electric Power Research Institute's (EPRI), "Program Plan for the Performance Verification of PWR Safety/Relief Valves and Systems," as the program description and schedule to meet staff requirements, which is acceptable.

2.1.3.a DIRECT INDICATION OF POWER-OPERATED RELIEF VALVES AND SAFETY VALVES FOR PWRs

NUREG-0578 requires PWR licensees to provide positive position indication for reactor coolant system relief and safety valves. Virginia Electric and Power Co. has installed acoustical monitors on both the power-operated relief valves (PORVs) and the safety valves. The acoustical monitors alarm in the control room when any of the valves open. The acoustical monitoring system is powered from vital buses and will be seismically and environmentally qualified by the vendor, Babcock and Wilcox. The limit switches on the PORVs, and the pressure and temperature sensors downstream of the PORVs and safety valves, provide backup methods of determining the position of the valves and are discussed in the emergency procedures. Surry 1 and 2 are in compliance with the short term Lessons Learned requirements.

OIE will verify that the emergency procedures discussing the backup methods of determining valve position are acceptable.

2.1.3.b INSTRUMENTATION FOR INADEQUATE CORE COOLING

Virginia Electric & Power Co. has installed two primary coolant saturation meters designed by Westinghouse. Each meter consists of a calculator and continuous display in the control room. Inputs to the meters consists of eight core exit thermocouples (T/Cs), two from each core quadrant, three resistance temperature detectors (RTDs) from the hot and cold legs, and two pressure signals, one narrow range safety grade sensor and one wide range non-safety grade pressure sensor. The wide range pressure sensor will be replaced by two wide-range safety grade sensors by January 1, 1981. Each meter is powered from a semi-vital power supply and alarms low margin to saturation in the control room. On loss of offsite power, the power to the saturation meters would be lost for a maximum of 30 seconds which the staff finds acceptable. The licensee has assured us that a momentary loss of power will have no adverse effects on the system.

The subcooling monitors installed at Surry 1 and 2 meet the short term Lessons Learned requirements.

OIE will verify that the procedures to manually calculate subcooling using steam tables are adequate.

2.1.4 CONTAINMENT ISOLATION

Diverse isolation signals are provided on most of the containment isolation valves (CIVs) in non-essential systems. Diversity is provided on these valves by use of a safety injection signal or steam line isolation signal, both of which have diverse input.

Surry currently has some non-essential systems which isolate only upon receipt of a high containment pressure signal (containment leakage monitoring lines, containment vacuum pump suction, air ejector condensor vent). The staff has required these systems to be upgraded to meet the Lessons Learned position on diversity. The licensee has made a commitment to provide diversity on these valves prior to startup of both Units 1 and 2 with one exception. Modifications to the air ejector condenser vent line will be delayed due to equipment procurement difficulties. As an interim control, this line will be manually isolated upon receipt of a valid safety injection signal.

VEPCO has identified all essential and non-essential systems. A basis for selection of each essential system was provided.

VEPCO has identified several non-essential systems that are not automatically isolated by the containment isolation signals. They have submitted justification for all non-essential valves not on automatic isolation. The staff has determined that sufficient isolation provisions have been provided for all non-essential penetrations. Those penetrations with normally closed manual isolation valves will be locked closed and administratively controlled such that at any time they are open during plant operation, a dedicated person will be assigned to close it immediately in the event of an emergency or when the operation is complete.

The Surry design precludes automatic reopening of containment isolation valves upon reset of the isolation signal. However, the automatic isolation valve in the air ejector condenser vent line will re-open after reset if a high radiation condition exists in the condenser air ejector. The staff has not required modifications to this system because this system has an electrical interlock which prevents reset until the containment pressure is sub-atmospheric.

Surry has no valve control switches which control the reopening of more than one valve.

Surry Units 1 and 2 are in compliance with short term Lessons Learned requirements for containment isolation provisions.

OIE will verify that administrative or operating procedures require manual isolation valves to be locked closed and administratively controlled as specified above.

OIE will also verify that administrative or operating procedures require that the air ejector condenser vent line is manually isolated upon receipt of a valid safety injection signal.

2.1.5.a DEDICATED H_2 CONTROL PENETRATION

The licensing basis for Surry 1 and 2 consists of internal recombiners in each containment. Therefore this requirement does not apply since containment penetrations are not required.

2.1.5.c RECOMBINER PROCEDURES

Operation of the internal recombiners is done from the control room. The licensee has reviewed the operational bases and procedures as required by OIE Bulletin 79-06A.

The staff has concluded that the licensee has met the short term Lessons Learned requirements for this item.

2.1.6.a INTEGRITY OF SYSTEMS OUTSIDE CONTAINMENT

A leakage reduction program has been developed and implemented for Surry. The systems included are those expected to contain highly contaminated fluids after an accident (SI, CS, Sampling, containment vacuum, boron recovery and resin waste). A list of systems excluded was provided and justified. Inability to use any of the excluded systems would not preclude any option for cooling the core nor prevent the use of any safety system. Leak rate measurements have been made and reported. A preventive maintenance program, including periodic leak tests, has been established. Implementation of the program is the responsibility of the Performance Engineering Group. No leak rate criteria were established, but Surry is committed to keeping leakage as low as practical. No helium leak testing is planned, so no special training is required. Surry is in compliance with these Lessons Learned requirements.

OIE will review leak rate test and surveillance procedures and verify the implementation of the leakage reduction program.

2.1.6.b DESIGN REVIEW OF PLANT SHIELDING AND ENVIRONMENTAL QUALIFICATION

A design review was conducted by Stone & Webster using their "Activity-2" and "Radioisotope" computer codes. The NRC-specified source terms were used. All systems designed to function after an accident were considered as sources, including SI, CS, sampling, auxiliary building sump and drain lines. The CVCS was excluded because it is isolated and because its use in a post-accident situation would be unacceptable. All vital areas were identified and evaluated. Areas where continuous occupancy is required are the control room, the technical support center, counting room, operational support center and security control center. Limited access is needed to emergency power supplies, sampling stations, etc. The need for modifications in 8 areas was identified. The evaluation of radiation environmental qualification of equipment is proceeding slowly because of the difficulty in obtaining data from vendors on older plants, Surry is committed to reporting the study results when they are available and making any necessary modifications. Surry meets the intent of these Lessons Learned requirements.

OIE will verify that the environmental qualification study is completed and adequately reported.

2.1.7.b AUXILIARY FEEDWATER FLOW INDICATION TO STEAM GENERATORS

Auxiliary feedwater flow to each of the three steam generators is indicated in the control room. The flow loop for each steam generator for unit one is powered from a vital bus. Those flow loops for unit two are presently being transferred from semi-vital to vital buses to satisfy the diversity requirements. This modification will be completed prior to startup of Unit Two. Steam generator level instruments back up the flow instruments to satisfy the single failure criterion. Each steam generator has three narrow range and one wide range level instrument loop which reads out in the control room and is energized from vital instrument buses.

The auxiliary feedwater flow indication is testable from the transmitter back to the indicator. The total accuracy of the auxiliary feed flow loop is approximately $\pm 4\%$ which satisfies the requirement of $\pm 10\%$ accuracy.

The licensee has satisfied the short term Lessons Learned requirements of the position, auxiliary feedwater flow indication to steam generators for PWRs.

2.1.8.a IMPROVED POST-ACCIDENT SAMPLING

A design review has been conducted. Interim procedures have been written and minor modifications have been made to provide sampling capability under post accident conditions. Both the reactor coolant and the containment atmosphere can be sampled. The reactor coolant sample can be taken within one hour of an accident and the sample can be analyzed in one more hour. The RC sample can be analyzed for radioisotopic composition, chloride and boron content and pH. Provisions are included to prevent overexposure. Analysis facilities are being modified to ensure that they remain functional after an accident and backup facilities are available at North Anna. The containment atmosphere sample can be taken with the existing containment monitoring system. A shielded container has been provided for personnel exposure control. Surry meets the intent of these Lessons Learned requirements.

OIE will verify that the modifications to the sampling system have been completed, will review the post-accident sampling and analysis procedures for adequacy and will verify that the containment atmosphere sample can be analyzed for radioisotopic composition and hydrogen content.

2.1.8.b INCREASED RANGE OF RADIATION MONITORS

Interim methods for monitoring high level releases have been developed and implemented. All potential releases are monitored by instrumenting the ventilation vent stack, the process vent stack and the main steam header discharge. (The air ejector discharge is diverted to containment on high radiation.) Noble gas release are monitored by a TA900-TA600 area monitor system installed on each discharge line; this system uses 3 detectors to cover the range from 10^{-5} to 10^{4} R/hr. Readout is in the operational support center and a dedicated telephone is used to communicate information to the control room. The range, power supply and reading frequency requirements are met. Provisions also exist for monitoring iodine and particulate effluents (except for steam line discharges). Samples are collected and the cartridges and filter media are analyzed with multichannel (GeLi) analyzers. Surry is in compliance with these Lessons Learned requirements.

OIE will verify that the equipment is installed and will review the effluent monitoring procedures for adequacy.

2.1.8.c IMPROVED IN-PLANT IODINE MONITORING

Air monitoring is performed with portable air samplers. Cartridges are removed and counted in the shielded counting room with a multi-channel analyzer. To reduce noble gas interference, silver zeolite cartridges have been obtained. To ensure timely analysis of the cartridges in an emergency, a dedicated single channel analyzer has been obtained for use in air monitoring. Procedures are in effect. Thus, the capability exists for accurately monitoring iodine in the presence of noble gases. Surry is in compliance with these Lessons Learned requirements.

OIE will verify that the silver zeolite cartridges and single channel analyzer are available and will review the air monitoring procedures for adequacy.

REACTOR COOLANT SYSTEM VENT

The licensee has provided the design for the reactor coolant system vent and has addressed all of the clarification items in the October 30 letter. We have reviewed the licensee's response and find the design acceptable.

2.2.1.a SHIFT SUPERVISOR RESPONSIBILITIES

The licensee has issued a management directive emphasizing the authority and responsibilities of the shift supervisor. The directive is signed by the Vice President, Power Supply and Production Operations. The licensee has committed to reissuing the directive annually.

Administrative procedure ADM-1.0 has been revised to clarify shift supervisor responsibilities. This procedure emphasizes the command role of the shift supervisor.

The shift supervisor is required to remain in the control room at all times during emergency conditions unless properly relieved by a formal shift turnover procedure. The shift supervisor has been relieved of all administrative duties which could detract from his primary role of assuring plant safety. The licensee is in compliance with all Lessons Learned requirements of this item.

2.2.1.b SHIFT TECHNICAL ADVISOR (STA)

The licensee has provided STAs on shift who can report to the control room within 10 minutes. In the event of an accident, the STA will report to the control room and act in an advisory capacity to the shift supervisor. He has no responsibilities for manipulation of controls or any other responsibilities which could distract him from his primary function.

The licensee has designated an onsite individual (not an STA) to perform the required accident assessment function. The STAs review operating experience assessments and keep the operating shifts informed.

Until the fully trained STAs are on shift on January 1, 1981, the role of STA is being filled both by non-degreed individuals who hold current SRO licenses on the facility, and degreed engineers with at least two years of nuclear power plant experience. The licensee is in compliance with Lessons Learned requirements for this item.

2.2.1.c SHIFT AND RELIEF TURNOVER PROCEDURES

The licensee has developed a shift and relief turnover procedure, ADM-29.3, that contains all requirements of the TMI Lessons Learned position. The checklist is completed and signed by both ongoing and offcoming shift supervisors and control room operators. Equipment operators use logbooks for shift turnover.

A system has been established to review the effectiveness of shift and relief turnover procedures.

The licensee is in compliance with Lessons Learned requirements on this item.

2.2.2.a CONTROL ROOM ACCESS

The licensee has developed an administrative procedure, ADM-6.0, that established specific authority and responsibility of the shift supervisor to control access to the control room. A clear line of authority and responsibility in the control room in the event of an emergency has been established.

The licensee is in compliance with Lessons Learned requirements for this item.

2.2.2.b ONSITE TECHNICAL SUPPORT CENTER

The interim onsite technical support center (TSC) has been established in the control room annex within the control room habitability envelope. This area has a complete set of pertinent plant records and drawings of plant area layouts, systems, and equipment. Activation procedures provide plans for engineering/management support and staffing of the TSC.

Portable radiation equipment for monitoring airborne contamination and direct radiation is available in the TSC. Three communication links exist between the TSC and the control room: the regular station telephone, the plant public address system and six channels of sound powered telephones. Dedicated communication between the TSC and NRC operations center in Bethesda has been established.

Plant operating parameters can be displayed in the TSC on a CRT terminal linked to the plant computer. Approximately twelve channels of eighteen parameters per channel are available. A slave printer for each unit which is connected to the typewriter printer in the control room is also available in the TSC as a source of the plant's operating status.

Administrative procedures have been developed to perform the accident assessment function from the control room should it become necessary to evacuate the TSC.

The licensee has satisfied the short term Lessons Learned requirements of the position, onsite technical support center.

2.2.2.c ONSITE OPERATIONAL SUPPORT CENTER

The onsite operational support center has been established whereby under emergency conditions, off-duty control room operators report to the switchgear room. Health physics technicians and instrument technicians report to their respective offices, and other emergency teams report to the plant assembly room. All of these designated areas are served by adequate communications with the plant telephone (energized from emergency power), station PA system, and sound powered telephones. Procedures which describe the activation, manning and use of the operational support center have been implemented.

The licensee has satisfied the short term Lessons Learned requirements of the position, onsite operational support center.

REFERENCES

1. Letter, C. M. Stallings to Harold R. Denton, dated 10/24/79, transmitting response to NUREG-0578.
2. Letter, C. M. Stallings to Harold R. Denton, dated 11/26/79, transmitting response to NUREG-0578.
3. Letter, W. L. Proffitt to Harold R. Denton, dated 12/17/79, commitment to implement Lessons Learned requirements.
4. Letter, C. M. Stallings to Harold R. Denton, dated 1/10/80, supplemental response to NUREG-0578.
5. Letter, C. M. Stallings to Harold R. Denton, dated 1/31/80, supplemental response to NUREG-0578.
6. Letter, C. M. Stallings to Harold R. Denton, dated 2/4/80, supplemental response to NUREG-0578.
7. Letter, B. R. Sylvia to Harold R. Denton, dated 4/1/80, supplemental response to NUREG-0578.
8. NUREG-0578, "TMI Lessons Learned Task Force Status Report and Short Term Recommendations."
9. Letter, Harold R. Denton to All Operating Nuclear Power Plants, dated 10/30/79, Discussion of Lessons Learned Short Term Requirements.

ENCLOSURE 2

ATTENDANCE

Name	Affiliation
D. Burke	NRC/RI
D. Neighbors	NRC/DOR
J. Kerrigan	NRC/Lessons Learned
J. F. Burdoin	NRC/Lessons Learned
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J. Wilson	VEPCO/Supt. Operations - Surry
T. A. Peebles	VEPCO/Safety Tech - Surry
N. Anderson	NRC/Lessons Learned