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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 23, 1980

Docket No. 50-338

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 North Anna Nuclear Power Station Unit 1. This evaluation is based on your submitted documentation and the discussions between our staffs on March 26, 1980. A list of participants in the March 26 discussion 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, Chief
Operating Reactors Branch No. 1
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Enclosures:
1. Evaluation of Compliance with Category "A" Lessons Learned Requirements
2. Participants List, Discussion of March 26, 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.
NORTH ANNA NUCLEAR PLANT
UNIT 1

DOCKET NO. 50-338

Date: April, 1980

I. INTRODUCTION

By letters dated October 24[1], November 26[2], December 17[3], 1979, January 10[4], 31[5], February 8[6], and April 1[7], 1980 Virginia Electric and Power Company (the licensee) submitted commitments and documentation of actions taken at North Anna Unit 1 Nuclear Plant to implement staff requirements resulting from TMI-2 Lessons Learned. To expedite review of the licensee's actions, members of the staff had discussions with the licensee on March 26, 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.

II. EVALUATION

Each of the Category "A" requirements applicable to pressurized water reactors (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

The Westinghouse Owner's Group analysis has determined that to maintain natural circulation in a three loop plant with a pressurizer volume of 1400 cubic feet, a heater of 125 kw capacity should be available within one hour. Two backup heater groups rated at 270 kw and their associated controls are energized from redundant emergency buses which are capable of being fed from either offsite power or onsite diesel generators (D-G). The Class IE interfaces for motive and control power are protected by safety grade circuit breakers.

The pressurizer heaters are not automatically loaded on to the bus following the occurrence of a safety injection (SI) actuation signal or loss of offsite power. The continuous rating of the diesel generator indicates that following automatic sequence loading of emergency loads there is insufficient D-G capacity to allow loading of the pressurizer heaters without first load shedding selected loads. Procedures are in force to instruct the operator in load shedding sequences and in the use of pressurizer heaters to establish and maintain 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 nitrogen gas system for each PORV. This high pressure system is seismically qualified 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.

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 narrow range level transmitter instrument channels indicate level in the control room. These three level instrument channels are independently powered from three vital instrument panels which are inverter fed from three of the four station batteries.

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 indications.

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.

The licensee 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.

The licensee has installed acoustical monitors in 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 for determining the position of the valves and are discussed in the emergency procedures.

North Anna Unit 1 is in compliance with the short term Lessons Learned requirements.

OIE will verify that the emergency procedures discussing the backup methods for 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 consist of eight core exit thermocouples (T/Cs), two from each core quadrant, three resistance temperature detectors (RTDs) from the hot and cold legs, and three pressure signals (one narrow range safety grade sensor and two wide range non-safety grade pressure sensors). The wide range pressure sensors will be upgraded to safety grade by January 1, 1981. Each meter is powered from a vital instrument bus and alarms low margin to saturation in the control room.

The subcooling monitor installed at North Anna 1 meets 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

All containment isolation valves (CIVs) in non-essential systems that were originally designed to close upon receipt of an automatic isolation signal meet the Lessons Learned position on diversity. Diversity is provided on these valves (with the exception of main steam isolation valves (MSIVs)) by use of a safety injection signal, which has diverse input. Diverse parameters are used to initiate MSIV closure.

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

The licensee has identified several non-essential systems that are not automatically isolatedby the containment isolation signals. The staff has determined that sufficient isolation provisions have been provided for all non-essential penetrations.

The North Anna Unit 1 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 reopen after reset if a high radiation condition exists in the condenser air ejector. Since the containment isolation system may be reset at any containment pressure, the staff has required modifications to this system to prevent the valve from reopening without deliberate operator action. The licensee has committed to completing the modifications by December, 1980. In the interim, administrative controls require the operator to disable the high radiation interlock on this valve prior to resetting the containment isolation signal if a containment high pressure condition exists.

North Anna, Unit 1 has no valve control switches which control the reopening of more than one valve.

North Anna Unit 1 is in compliance with short term Lessons Learned requirements for containment isolation provisions.

OIE will verify that the condenser air ejector vent line is administratively controlled as discussed above.

2.1.5.a DEDICATED H_2 CONTROL PENETRATIONS

The licensing basis for North Anna, Unit 1 consists of redundant external recombiners which are shared with North Anna, Unit 2.

The licensee has committed to make the same modifications to the Unit 1 recombiner piping systems that were found acceptable by the NRC for the Unit 2 recombiner piping system. These modifications are described in Par. II.E.4.1 of reference 10.

The licensee is in compliance with the short term Lessons Learned requirements.

2.1.5.c RECOMBINER PROCEDURES

The licensee is in full compliance with this position. Recombiner procedures will be required to be updated again, after future modifications have been completed.

2.1.6.a INTEGRITY OF SYSTEMS OUTSIDE CONTAINMENT

A leakage reduction program has been developed and implemented for North Anna. 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 North Anna, Unit 1 is committed to keeping leakage as low as practical. No helium leak testing is planned so no special training is required. North Anna 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 "Radioisotopic" 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 such places as emergency power supplies and sampling stations. 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, North Anna Unit 1 is committed to reporting the study results when they are available. and making any necessary modifications. North Anna 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 is powered from a vital bus. The three vital instrument buses are inverter fed from three of the four station batteries. 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 loops which read out in the control room and are 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 loops 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 Surry. The containment atmosphere sample can be taken with the existing containment monitoring system. A shielded container has been provided for personnel exposure control. North Anna Unit 1 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 releases 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 multi-channel (GeLi) analyzers. North Anna 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. The required procedures are in effect. Thus, the capability exists for accurately monitoring iodine in the presence of noble gases. North Anna 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

The licensee has provided Shift Technical Advisor (STA) 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 detract 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. A 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 Records Building, which is a two-story building inside the Protected Area security fence adjacent to the main facility. The first level of this building contains the record processing and storage area. Records and drawings describing the as-built condition of the facility are available in the records file room. The second level contains an area which has been designated as the assembly area for technical support personnel during an emergency.

The existing Emergency Plan Implementing Procedures (EPIPs) have been revised to include engineering and management support and staffing of the TSC.

Dedicated communications lines have been installed to allow communications between the TSC and the following:

1) Control Room
2) Offsite Emergency Operations Center
3) NRC Emergency Response Center

Procedures have been revised to provide for the installation of portable radiation and airborne radioactivity monitoring equipment in the TSC when it is activated.

A typewriter paralleled with the Unit 1 utility typewriter in the Control Room has been installed in the TSC. This provides direct display of operating parameters necessary for plant evaluation and assessment.

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, along with other emergency team members, will report to the plant assembly room. Health physics technicians and instrument technicians will report to their respective shops. These designated areas are served by adequate communications such as the plant telephone (energized from emergency power) and the station PA system. 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 2/8/80, 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.

10. North Anna Power Station Unit 2 Safety Evaluation Report, Part II, TMI-2 Issues Related to Fuel Load and Low Power Test Program.

ENCLOSURE 2

ATTENDANCE LIST
March 26, 1980 Meeting
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D. Spidel	VEPCO
N. Anderson	NRC/Lessons Learned
L. Engle	NRC
C. Willis	NRC/Lessons Learned
J. Kerrigan	NRC/Lessons Learned
M. Fields	NRC/Lessons Learned
J. F. Burdoin	NRC/Lessons Learned