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

Report Nos.: 50-338/92-11 and 50-339/92-11

Licensee: Virginia Electric Power Company
5000 Dominion Boulevard
Glen Allen, VA 20360

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

Facility Name: North Anna 1 and 2

Inspection Conducted: April 6-10, 1992

Inspectors: R. Crlenjak
J. Shackelford

Accompanying Personnel: M. Janus

Approved by: Curt Rapp for 5/5/92
R. Crlenjak, Chief Date Signed
Operational Programs Section
Division of Reactor Safety

SUMMARY

Scope:

This was a routine unannounced inspection in the area of licensee procedures and controls related to outage management activities. The purpose was to evaluate the licensee's effectiveness in overall outage planning and outage management.

Results:

The inspectors found that the licensee had instituted adequate programmatic controls and had exhibited satisfactory performance in the areas of outage planning and outage management. The inspectors observed that the licensee had put into place a variety of actions which were responsive to recent industry initiatives in the area of outage management. Several licensee initiatives were noteworthy and demonstrated innovative approaches to ensuring and assessing plant safety while under outage conditions. The licensee is in the process of formalizing the policies which proved to be effective.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*P. Kemp, Licensing Supervisor
*M. Whalen, Licensing Engineer
*R. Rafinger, Asst. Station Mgr., O&M
*A. Stall, Asst. Station Mgr, NS&L
G. Kane, Station Manager
*R. Shears, Outage Coordinator
E. Thomas, MOV Coordinator
B. Noesen, MOV Engineer
G. Marshall, Operations Maintenance Support
J. Disosway, Shift Technical Advisor
*J. Smith, Quality Assurance Manager
W. Matthews, Maintenance Superintendent
D. Roberts, Safety Engineering Supervisor
W. Anthes, Outage Coordinator
*E. Harrel, Vice President-Nuclear Services, VEPCO

Other licensee employees contacted included engineers, mechanics technicians, operators, and office personnel.

NRC Representatives

*J. Shackelford, Inspector
*R. Crlenjak, Chief, Operational Programs Section
*M. Janus, Reactor Engineer
*M. Lesser, Senior Resident Inspector

*Attended Exit Interview

A listing of abbreviations used in this report is contained in Appendix A.

2. Outage Scheduling and Outage Management

The inspectors observed that the licensee had performed an independent safety assessment of the overall outage schedule prior to the commencement of shutdown activities. This assessment had been performed by an organization outside of the normal outage planning group and represented an independent perspective of overall outage activities. This type of independent assessment is an example of one of the recommendations being provided to facilities by the nuclear industry in response to concerns over the unique problems associated with shutdown activities. The licensee's assessment included a comprehensive analysis of plant conditions and associated safety system availabilities for the duration of the outage.

In addition to the overall outage assessment, the inspectors found that the licensee had also recently instituted a new program designed to assess the safety risks associated with shutdown activities on a daily basis. This assessment is normally performed twice per day by the on-shift STA. This initiative is responsive to the recommendations made by the nuclear industry in that it provides a vehicle for communicating the various system availabilities and plant status which are associated with shutdown operations. The shutdown assessment form which the licensee had developed provided a general characterization of the overall plant condition in terms of containment integrity, electrical power systems availability, core cooling system status, reactivity control, reactor coolant inventory, and RCS integrity. The inspectors noted that the licensee had aggressively used the methodology in the day-to-day management of outage activities. The tool represented both a positive as well as proactive effort in the area of overall outage management. However, areas of inconsistency were noted in the execution of the daily assessments. In particular, the concepts of operability versus availability were not being consistently interpreted. This led to confusion as to the status of key systems and components on at least one occasion. The licensee acknowledged this problem, and had already instituted measures to strengthen the daily assessment process. These measures included both a more refined set of guidelines in determining system availability as well as an independent review function associated with the daily assessment.

The inspectors observed that the original outage schedule was realistically formulated in terms of the projected scope of activities and availability of resources. The licensee had adhered to the original plan and maintenance activities were on schedule within reasonable expectations. The inspectors concluded that the licensee had demonstrated proactive efforts in the area of outage management, and that facility supervisors were highly cognizant of all ongoing activities. Additionally, it was determined that the licensee had expended significant efforts with regards to responding to recent industry initiatives in the area of outage management.

3. Equipment Availability Guidelines/Philosophies

The inspectors observed that the licensee had implemented conservative guidelines in the area of required equipment availability. The licensee had adopted a "Technical Specifications plus One" approach in that the pertinent systems requirements generally exceeded the minimum technical specifications requirements. In those situations where equipment availabilities were reduced, it was found that the licensee had adopted adequate contingency measures to cope with postulated occurrences. It was also noted that the control room operators had maintained a high level of awareness with regard to the availability of plant systems. This was especially evident in those situations whereby equipment was inoperable from a technical specifications (for modes other than 5 and 6) perspective but retained some measure of functionality for the purposes of accident mitigation.

The licensee had instituted the practice of avoiding maintenance on the RHR systems during periods when fuel was loaded in the reactor vessel. Additionally, the licensee had instituted planning guidelines which minimized any periods of mid-loop operations. The inspectors concluded that the "Technical Specification plus One" and the other maintenance philosophies represented proactive efforts to improve the overall outage planning process.

Some of the policies described above and others are covered informally by several means. One document (informal guidance) which is an indicator of the licensee's priority on safety, North Anna Power Station Outage Conduct Overview of Cold Shutdown Operation, sets important guidelines to the conduct of plant operations while in modes 5 and 6. Areas covered include: Inventory and Boration Control; Decay Heat Removal; Reduced Inventory; Electrical Distribution Systems; and Containment Integrity. Each area suggests additional requirements and systems/back-ups which are not generally required.

The inspectors noted that even though these management philosophies were evident in practice, there was very little formalization of these principles in the form of approved plant procedural guidance. The licensee acknowledged this concern, and stated that progress was already being made to develop approved procedures which would formally state management's expectations with regard to these areas.

4. Control of RCS Level, Temperature, and Water Management

The inspectors reviewed the licensee's practices and procedures for the monitoring and control of reactor vessel level, RCS temperature, and management of sources of make-up water. These areas are of particular importance during shutdown plant conditions. The licensee has developed procedures which are used to handle normal and abnormal events which might occur during these outage conditions, and has trained the operators accordingly.

During outage conditions, reactor vessel level indication is provided to the operators in the control room via a closed circuit video monitoring of the standpipe level instrumentation used during refueling operations. During other modes of operation, the level is maintained at the cold calculated levels; and, as heat-up commences, by the RVLIS system. These actions are covered in the licensee's TSs and procedures; OP-11, Unit Start-up from Modes 5 at 140°F or Less to Mode 5 at Less Than 200°F; OP-41, Controlling Procedure for Refueling; OP-51, Filling and Venting the Reactor Coolant System; and OP-54, Draining the Reactor Coolant System. The licensee also has an abnormal procedure to handle loss of reactor vessel level, specifically, AP-52, Loss of Refueling Cavity Level During Refueling. During discussions with the control room operators, the inspectors noted that the operators were knowledgeable of their operating conditions, precautions associated with these conditions and the appropriate responses to various accident scenarios.

The control room is provided with a number of indications to monitor the temperature of the RCS during various outage stages or conditions. These include incore temperature probes, wide range RTDs, and discharge temperature of the CCW from the RHR heat exchanger when in use. The operators indicated that of these systems, the only one with an alarm associated with it was the CCW from the RHR heat exchanger. This instrument has a fixed alarm setpoint of 150°F, which may not be indicative of temperature increases beyond the 200°F limits of Mode 5 operations. Despite the lack of alarms associated with uncontrolled increases in this range, the operators were very knowledgeable of the appropriate actions to take, having been trained on loss of RHR in the plant simulator. The addition of a specific temperature alarm directly related to RCS temperature in modes 5 and 6 would be an appropriate enhancement for monitoring this parameter.

The area of water management concerns primarily the monitoring and controlling of changes in RCS inventory and levels in the various sources of make-up water. The licensee has an administrative procedure for monitoring during shutdown conditions, NSE-ADM-12, STA Responsibilities. This procedure provides guidance for the STAs in the preparation of the RCS inventory monitoring/calculations which must be performed once per shift while in cold shutdown. The calculations are used to identify sources of in leakage as well as leakage out of the RCS and trend the results. Guidance is provided for dealing with any adverse trends and leakage which might arise. This calculation is separate from the TS required logs maintained by the control room operators on a daily basis.

5. Training

The inspectors conducted a review of operator training conducted in preparation for the outage. The review concentrated on whether the licensee covered outage related issues pertaining to Abnormal Operating Procedures, plant modifications/temporary modifications, past outage lessons learned, and shutdown plant systems.

Abnormal operating procedures related to shutdown plant operations; AP-52, Loss of Refueling Cavity Level During Refueling; AP-10, Loss of Electrical Power; and AP-11, Loss of RHR. The fact that the licensee has procedures which address events which can occur while shutdown is considered a positive initiative. Additionally, the licensee has the capability to set up the site simulator for shutdown plant conditions. They utilize this capability for portions of crew training prior to entering the outage. This training consists of simulations involving events such as loss of RHR and plant conditions such as reduced inventory.

Training conducted prior to entering the outage covering planned modifications is somewhat limited. A review of modification training conducted for the recent unit 1 outage revealed that for modifications performed during the outage the licensee concentrates on training the operating crews prior to startup/recovery of the plant. The focus is on ensuring that crews are familiar with the modifications to ensure safe

operation of the plant at power. The addition of modification/temporary modification training to the licensee's current training in preparation for outage/shutdown operations would be a worthwhile enhancement. Permanent plant modifications which can affect systems/components used during shutdown along with temporary plant modifications made to support outage operations should be covered in training conducted prior to commencing the outage.

The inspectors reviewed the training conducted prior to entering the outage related to previous industry and plant specific events/ experience related to shutdown plant conditions. The licensee does review and conducts training on past outage related events. The events included in the training for the current outages appropriately covered recent industry outage/ shutdown related events such as a September 91 loss of RHR cooling at another Region II facility and past significant events such as a loss of inventory event which occurred at this facility. As part of their pre-outage training the licensee also conducts training on systems/ system alignments which are infrequently used during power operations but are important systems while shutdown in modes 5 and 6.

The inspectors concluded that in the area of outage related training the licensee has been proactive in establishing a worthwhile effort to ensure safe plant operations when shutdown. Establishing abnormal procedures which address shutdown plant conditions, modeling the simulator for shutdown conditions, and maintaining the operating crews current on outage/ shutdown events are considered to be positive indicators of the licensee's emphasis on safety while in an outage.

6. Technical Specifications

The licensee has taken the initiative to develop two TSs which cover systems that are important while shutdown in modes 5 and 6. As of this outage one of the TS changes (SERVICE WATER SYSTEM - SHUTDOWN) has been issued and the other (COMPONENT COOLING WATER SUBSYSTEM - SHUTDOWN) is pending. These new TSs place specific requirements on service water and component cooling water system pumps, power supplies, flow paths, and heat transfer capabilities where none existed in the past for modes 5 and 6. Again, these actions demonstrate the licensee's recognition that a shutdown plant requires additional controls to ensure safe operations.

7. Management/Control of Outage Work and Testing

The inspectors observed that the licensee had adequate procedures, policies, and controls to conduct testing and maintenance activities (outage related work) while making plant safety a priority. In many cases the licensee has initiated standard setting innovations to achieve this objective.

During the inspection, several component and system tests were observed. It was noted that the licensee conducted thorough pre-evolution briefings for all of the principal participants involved in the activities. Additionally, appropriate communications were established and maintained

with the control room operators throughout the duration of the testing evolutions. Formal procedural controls and adequate contingency planning were also evident for all of the observed tests. Additionally, all of the supervisory personnel responsible for the conduct of maintenance and testing evolutions were highly knowledgeable with regards to their particular tasks.

Two plant procedures provide guidance for management of outage work and to control testing. Station Administrative Procedure VPAP-2004, Outage Management and Planning, provides for planning and implementation of an outage. This includes management levels down to Shift and Area Coordinators. The shift coordinator oversees and coordinates the outage from a shift level while the area coordinator facilitates activities in critical or complex areas such as the containment building. The inspectors observed these functions and concluded that outage work was appropriately controlled through these "front line" positions. Additionally, upper levels of management were kept informed of outage status through several mechanisms including: daily updating of outage schedule, issuing daily and weekly outage status and progress reports, and daily meetings. Overall, the inspectors noted that management and supervisors were knowledgeable of plant and outage status; in most cases they easily addressed outage related issues and problems.

Station Administrative Procedure VPAP-1101, Test Control, provides guidance for control of station testing for both operating and shutdown plant conditions. Section 6.2.8 addresses, Tests During Outages, and sets important restrictions for testing when in certain high risk plant configurations. The procedure contained the necessary attributes to control plant testing. The important aspect of maintaining communications is covered in two paragraphs. Paragraph 6.2.4 states "the Shift Supervisor should be notified prior to the start of any testing;" and, for Infrequently Conducted or Complex Tests, paragraph 6.2.6.c.9 requires that two-way communication capability be maintained with the shift supervisor during critical portions of testing.

In addition to the two procedures noted above, the licensee has also developed miscellaneous procedure MISC-37, which requires an assessment of maintenance activities which could result in a loss of reactor coolant inventory while in modes 5 and 6. The development of this procedure is a significant initiative by the licensee to ensure core cooling is not lost due to errors which may occur while performing maintenance. Because r requirements such as job pre-briefings, having an operator accompar maintenance personnel, and establishing communications between the work area and control room, the operator in the control room always maintains some "control" over outage work which could threaten reactor coolant inventory. The development and implementation of this procedure for control of specific types of outage work is a significant safety enhancement to control of this work.

Another method utilized by the licensee to control other outage work not necessarily under the controls described above is the block tagout. This technique isolates all or portions of a system. Work is then allowed within the blocked area. Usually more than one job is released within the blocked boundaries. For this method many of the controls described in the previous paragraphs are suspended. A worthwhile enhancement to this method of work control on safety related systems would be to formalize additional communication requirements between the work site and the control room. This would allow the control room operators to be in a position of direct "control" over this maintenance. For blocked out systems the control room should be aware of certain maintenance milestones such as starting of work, opening of systems, and cycling of valves. This information should be relayed in real-time; communications should be established and the milestones reported to the control room as they occur.

In regards to tagouts the licensee had instituted a new position within the outage organization. This new position was that of a "Tagging SRO" whose responsibilities were to manage all equipment tagging functions as well as to coordinate significant maintenance activities. This position helped to coordinate maintenance and testing while alleviating some of the administrative burden on the control room operators. The inspectors noted that positive benefits in the area of overall maintenance coordination were realized due to the implementation of this new position and that a high degree of cooperation existed between the outage organization and the outage staff. However, the inspectors observed that the licensee had not yet formalized the new Tagging SRO position with any procedural controls. Therefore, some ambiguities existed regarding the exact responsibilities and reporting relationships. The licensee had acknowledged this problem and stated that the facility's intentions were to maintain the Tagging SRO position and that procedural guidance was being considered to further define the position.

A review was also performed by the inspectors on the licensee's control of switchyard activities. The licensee has been proactive in addressing this area. Specifically, modifications have been made to the switchyard; barriers have been erected to protect important equipment from motor vehicle flow and equipment has been labled for ease of identification by plant operators. Additionally, procedure changes have been made to Commercial Operations procedures which require that the shift supervisor be notified prior to performing switchyard related work. A sign has also been erected at the gate to the switchyard which directs anyone entering to notify the shift supervisor prior to performing work. The inspectors noted that there is some confusion as to what constitutes work and when the control room should be notified. One individual who was in the switchyard during the review had not informed the control room because he did not think that he was performing work. He was collecting data which required the opening of a panel. The licensee is reviewing this area and is considering requiring all who enter the switchyard to notify the control room.

Additionally, they are reviewing the need for a means of communicating with the plant at the gate prior to entering the fenced area of the switchyard. The above described initiatives taken by the licensee indicate that the facility is sensitive to the importance of controlling and protecting the switchyard.

8. Exit Interview

The inspection scope and findings were summarized on January 29, 1992, with those persons indicated in paragraph 1. The NRC described the areas inspected and discussed in detail the inspection findings. No proprietary material is contained in this report no dissenting comments were received from the licensee. The inspectors, over the course of the inspection, discussed with licensee management and supervisory personnel several areas to be considered for enhancement of their proactive initiatives. These items, covered in the report, were again discussed in the exit interview.

APPENDIX A

Abbreviations

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| CCW | Component Cooling Water |
| O&M | Operations and Maintenance |
| MOV | Motor Operated Valve |
| NRC | Nuclear Regulatory Commission |
| NS&L | Nuclear Safety and Licensing |
| RCS | Reactor Coolant System |
| RHR | Residual Heat Removal |
| RTD | Resistance Temperature Device |
| RVLIS | Reactor Vessel Level Indications System |
| SRO | Senior Reactor Operator |
| STA | Shift Technical Advisor |
| TS | Technical Specifications |
| VEPCO | Virginia Electric Power Company |