



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA ST., N.W., SUITE 3100  
 ATLANTA, GEORGIA 30303

Report Nos. 50-338/82-18 and 50-339/82-18

Licensee: Virginia Electric and Power Company  
 P. O. Box 26666  
 Richmond, VA 23261

Facility Name: North Anna Units 1 and 2

Docket Nos. 50-338 and 50-339

License Nos. NPF-4 and NPF-7

Inspection at North Anna site near Mineral, Virginia

Inspectors: C. Julian for  
 D. F. Johnson

8/31/82  
 Date Signed

C. Julian for  
 M. B. Shymlock

8/31/82  
 Date Signed

Approved by: C. Julian  
 C. Julian, Section Chief, Division of Project  
 and Resident Programs

8/31/82  
 Date Signed

SUMMARY

Inspection on July 9 - August 5, 1982

Areas Inspected

This routine inspection by the resident inspectors involved 202 inspector hours on-site in the areas of licensee event reports, refueling activities, outage activities, surveillance and maintenance activities, plant operations, and followup on significant events.

Results

Of the seven areas inspected, no violations were identified.

## DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*W. R. Cartwright, Station Manager
- E. W. Harrell, Assistant Station Manager
- J. A. Hanson, Superintendent - Technical Services
- J. R. Harper, Superintendent - Maintenance
- D. L. Benson, Superintendent - Operations
- G. Paxton, Superintendent - Administrative Services
- J. M. Mosticone, Operations Coordinator
- J. P. Smith, Engineering Supervisor
- F. Terminella, Engineering Supervisor
- P. T. Knutsen, Engineering Supervisor
- R. A. Bergquist, Instrument Supervisor
- J. R. Stratton, Mechanical Maintenance Supervisor
- D. E. Thomas, Electrical Supervisor
- A. H. Stafford, Health Physics Supervisor
- A. L. Hogg, Jr., Site QC Manager
- F. P. Miller, QC Supervisor
- M. E. Fellows, Staff Assistant
- K. A. Huffman, Clerk

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

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on August 10, 1982, with those persons indicated in paragraph 1 above.

### 3. Licensee Action on Previous Inspection Findings

(Closed) Violation 339/82-08-01. Failure to adhere to Technical Specification limiting condition for operation, in that all three safety injection accumulator isolation valves were closed simultaneously for approximately two minutes for testing purposes. A 24-hour report was made and a subsequent 14 day licensee event report (LER-N2-82-08) were submitted to the NRC. Corrective actions were reviewed by the resident inspector and found to be adequate.

(Closed) Violation 339/82-08-02. Failure to adequately review a temporary change to a test procedure. The company has embarked on a program that emphasizes adherence to procedures. The Vice President, Nuclear Operations has personally held meetings with employees on site to stress the importance of following procedures.

(Closed) Violation 338/82-08-02 and 339/82-08-03. Failure to adhere to Technical Specification 6.12.1 requirements for entry into a high radiation area. The individuals involved were counseled as to correct procedures for entry into high radiation areas and were disciplined accordingly.

(Closed) Violation 339/82-08-04. Failure to follow procedures in accordance with Technical Specification 6.8.1. Appropriate disciplinary action was taken by the licensee.

#### 4. Unresolved Items

Unresolved items were not identified during this inspection.

#### 5. Plant Status

##### Unit 1

The scheduled refueling and maintenance outage continued during this inspection period. The following items relate to specific unit 1 activities.

##### (1) Foreign objects found in Steam Generators A and C.

(Open) 338/82-21-01. The upper internals package has been placed in the reactor cavity area. Further inspection of the control rod guide tube support pins will continue when the guide tubes are removed. At the end of this inspection period only one guide tube had been removed, however, it has not been removed from the cavity.

##### (2) Guide Tube Support Pin Replacement following Westinghouse's identification of the loose parts in the 'C' steam generator. The licensee developed a Design Change package (DC-82-S17) to replace the support pins. This package will be followed by the resident and will be identified as followup item (338/82-18-01).

The two support pins in the bottom end of each guide tube assembly align into the core plate. The support pins provide lateral support for the guide tube at the core plate.

These support pins are made of Inconel X-750, hot rolled, solution treated and age hardened. There have been previous instances of support pin failures at other reactors. Westinghouse's analysis of the support pin failure (cracking) indicated the cause to be stress corrosion cracking.

The method chosen by the licensee to correct this problem is to remove all 61 guide tubes and replace them with new guide tubes and support

pins. The new support pins are identical in design to the original equipment except for:

- a. The increased temperature of solution heat treatment of the split pins. This temperature increase in solution heat treatment increases the pins resistance to stress corrosion cracking, thereby increasing the structural integrity of the split pins.
- b. The nut torque requirement has been decreased to reduce the resultant stress and susceptibility to stress corrosion cracking.
- c. The bolt shaft design was modified to reduce areas of stress concentration.

It should be noted that all Unit 2 support pins were replaced prior to commercial operation with the new design support pins.

Current Status: The guide tube at position H-6 has been removed from the upper internals. However, due to a higher radiation dose rate than expected it was still in the cavity area (under water).

The 61 upper guide tubes will be removed and placed in shielded boxes and transferred to the fuel building. Then each of the 61 remaining lower guide tubes will be placed in a transfer cask one at a time and transferred to the fuel building for storage in the spent fuel pool.

(3) Steam Generator Tube Damage

(Open) 338/82-21-02. Westinghouse is continuing their evaluation of the extent of damage and needed repair.

(4) Reactor Coolant System Flow Splitter

(Open) 338/82-21-03. A Design Change package (DC-82-S15) Removal of Flow Splitters in Reactor Coolant Loops has been issued. The plans currently are to remove the flow splitter in loop A and return to service with the flow splitters in loop B and C.

Operation with one loop's flow splitter removed and the other loop's flow splitter still in place will be followed as inspector followup item (338/82-18-02). Westinghouse is to provide the analysis.

The design change package calls for removal of the 'A' loop reactor coolant pump and then have PCI (Precision Cutting Inc.) install the cutting unit. The splitter plate will be removed using a plasma cutting system that will ride on the plate.

At the end of this report period the reactor coolant pump had been removed and the cutting equipment is on site. The planned date for the cut is August 11, 1982.

(5) A Loop Reactor Coolant Pump

While removing the reactor coolant pump on the A loop, several stud and nut pieces were found on a ledge area in the pump casing. Further review indicated that seven of the twelve 0.75 - 10x2.5LG stainless steel socket head cap screws holding the diffuser adapter to the turning vane-diffuser had failed. Each of the cap screw heads had broken off the stud part of the screw. All of the fourteen pieces were recovered. Westinghouse and the licensee are reviewing this problem.

This is identified as inspector followup item (338/82-18-03).

(6) Loop Stop Valve Guide Missing

On July 16, 1982 during disassembly of the loop A cold leg stop valve MOV-1591 it was discovered that one of the valve guides was missing.

The slot where the guide is housed was burred. It was filed smooth and a new guide installed. This repair work was accomplished under MR #N1-82-0709-1331.

On August 3, 1982 the valve guide was located in the bottom of the reactor vessel on the core internals secondary support plate. Another piece of the guide was subsequently found later near the same location. The valve guide is a channel shaped item constructed of AISI 410 stainless steel with dimension of 39 inches X 4 inches X 2.5 inches and weighs 58 pounds.

Recovery of the guide from the reactor vessel and further evaluation of this problem will be followed by the resident inspector. This is an inspector followup item (338/82-18-04).

(7) Thermal Sleeves in Reactor Coolant Piping

(Open) 338/82-21-04, The following data are the final results from the radiographic examination of the thermal sleeves on Unit 1.

<u>Nozzle</u>	<u>Results</u>
2" loop fill/A	All sleeves appear intact, no indications of any cracks in welds
2" loop fill/B	
2" loop fill/C	
3" charging line/B	Sleeve at proper elevation, welds cracked

6" safety injection/A	Sleeve appears to be missing, welds cracked
6" safety injection/B 6" safety injection/C	Sleeves appear to be intact, no indication of cracks in welds
12" accumulator discharge/A 12" accumulator discharge/B 12" accumulator discharge/C	All sleeves appear intact, no indications of cracks in weld
14" surge/C	Sleeve intact, no indication of cracks in weld

The licensee is currently attempting to locate the missing thermal sleeve from loop A. Loop access was obtained by removing the cover to the 6" check valve and inspection will be performed by video camera. The 3" charging line sleeve will be removed during this present outage. This remains an inspector follow item.

(8) Steam Generator Tube Lane Blocking Device (TLBD)

(Open) 338/82-18-05. On July 13, 1982 with Unit 2 in cold shutdown an investigation was conducted to determine the source of a low level noise detected by the acoustic monitors in the "A" steam generator. Upon removal of the handhole covers on each side of the generator it was discovered that the TLBD split plate on the manway side was loose. Further investigation revealed that the split plate had not been fitted properly into the tube lane blocking channel when reinstalled recently during the refueling outage. The licensee concluded that the loose device was the source of the detected noise.

In the addition to the loose plate, it was also observed upon removing the set screws from the set screw nuts on the TLBD sleeve that the weld on one of the nuts had failed, and that welds on two of the other set screw nuts were cracked. There are three set screw nuts in each TLBD sleeve. These weld failures create the possibility of loose parts in the secondary side of the steam generators, with a potential for entry into the tube area. The welds have been repaired and strengthened on both units.

Unit 2

The outage following the unit shutdown on July 7, 1982 to investigate a noise detected by the installed acoustic monitors and examination of thermal sleeves in the reactor coolant system continued during this inspection period. The following items relate to specific Unit 2 activities:

(1) Neoprene Washers in Reactor Vessel

A special tool was manufactured to remove the 3" normal charging line thermal sleeve on the B loop. This tool had 24 1/4" thick x 1 7/8" diameter neoprene washers stacked on a 1/2" threaded shaft, with a metal plate on each end of the stacked washers. When the plates are tightened together the washers expand. This tool was placed inside the thermal sleeve and tightened causing the washer to expand to a tight fit on the inside diameter of the sleeve. The tool was then pulled to withdraw the thermal sleeve. However, the sleeve was tightly held in the pipe, and as the tool was withdrawn 18 of the neoprene washers fell into the open 3" pipe. The residual heat removal system was in operation at the time, and the washers were swept into the reactor vessel.

This problem is being evaluated by the licensee and Westinghouse. These evaluations will be reviewed by the resident inspectors and the Region II Office prior to reactor startup. This is identified as inspector followup item (339/82-18-01).

(2) Unit 2 License Conditions

- a. License Condition 2.C.(15)(h)(2). The lube oil system shall be modified to the manufacturer's recommendations for providing continuous lubrication of the lower portions of the engine. The modifications shall further provide for partial filling of the upper lube oil supply header and a lube oil booster/accumulator system which will force oil into the upper lube oil header during engine startup. The modifications shall be completed no later than the October 1982 Fall Maintenance outage.

(Open) 339/82-08-18: The licensee plans are not to have a fall maintenance outage. Therefore they are trying to complete these activities prior to startup. This modification consists of an external and internal modification to the engine lube oil system.

The external modification consists of utilizing the existing 10 gpm lube oil keep-warm pump to provide a steady flow in the lubricating system when the diesel generator is idle. This is achieved by redirecting the heated lube oil flow to a point downstream of the engine driven lube oil pump and continuously lubricating all of the bearings on the engine lower crankshaft line.

The internal modification consists of inverting the upper lube oil header on the upper crankline and installing a 2 gallon capacity booster/accumulator to tie into the upper lube oil header. The booster system fills with oil during normal engine operation. During the next start, the lube oil accumulated in the booster cylinder assembly is forced, by starting air pressure acting on the opposite side of the piston, to be fed into the bearings along the upper crankline. This package is being worked as Design

Change 81-S05B: Emergency Diesel Generator Lube Oil Modification. This package is being followed by the resident inspector.

- b. License Condition 2.C.(15)(h)(4): The fuel oil storage and transfer system shall be modified to include the installation of a separate high level alarm for each day tank, the installation of independent pressure switches for each pump which will be set to stop the pumps on high day tank level, and the submittal of a Technical Specification verifying proper operation of all transfer pump control switches and day tank high level alarms. The modifications shall be completed no later than the October 1982 Fall maintenance outage.

(Open) 339/82-08-20. The package Design Change has been completed. It contains the day tank high level alarms. The pressure switches have not been installed and the design change package is being developed. This work will be followed by the resident inspector.

(3) Problems Related to Unit 1

Two of the problems identified in Unit 1 (loop stop valve guide missing and failed RCP diffuser screws) will be evaluated by the licensee for applicability to Unit 2. These evaluations will be reviewed by the resident inspectors and the regional office prior to reactor startup.

The loop stop valve problem will be identified as inspector followup item (339/82-18-02). The RCP diffuser screws failure problem will be identified as inspector followup item (339/82-18-03).

(4) Thermal Sleeves in Reactor Coolant Piping

(Open) 339/82-21-01. The following data are the final results of the radiographic examination of the thermal sleeves on Unit 2.

<u>Nozzle</u>	Results
2" loop fill/A	All sleeves appear intact no indication of any cracks in welds
2" loop fill/B	
2" loop fill/C	
3" charging/B	Cracked weld, sleeve intact but rotated about 40°
6" safety injection/A	Sleeves appear intact, no indication of cracks in welds
6" safety injection/B	
6" safety injection/C	Cracks in weld, sleeve intact slightly rotated



12" accumulator discharge/A	Sleeve intact, no indication of cracks in weld
12" accumulator discharge/B	Welds cracked, sleeve dropped about 5"
12" accumulator discharge/C	Welds cracked sleeve dropped about 1/8"
14" surge/C	Sleeve intact, no indication of cracks in welds

The four thermal sleeves that have defective welds have been removed. Ultrasonic inspections of the remaining sleeves will be performed to provide baseline data for future inspections. Examinations will be performed during subsequent refueling outages to determine if the welds on the remaining sleeve have been degraded.

Extensive evaluations were performed to determine the effects of loose reactor coolant pipe thermal sleeves. These evaluations assumed all thermal sleeves become loose and are transported in the reactor coolant system as single units or fragments. The evaluations considered nozzle integrity without thermal sleeves, the mechanical effects of loose sleeves in the reactor coolant system, and flow blockage effects of loose sleeves during normal operation and transient conditions.

The Office of Nuclear Reactor Regulation is currently reviewing the licensee's submitted evaluation to determine the safety significance of operating the facility under these conditions.

The licensee has initiated a program of increased operator training and awareness as well as a program of increased surveillance to address the potential concerns of loose parts in the reactor coolant system. The resident inspector will followup on licensee actions relative to the above programs.

No violations were identified in these areas.

#### 6. Steam Generator Tube Lane Blocking Device (TLBD)

(Open) 339/82-18-04: On July 13, 1982 with Unit 2 in cold shutdown an investigation was conducted to determine the source of a low level noise detected by the acoustic monitors in the "A" steam generator. As discussed in paragraph 5 above, the TLBD was determined to be the source of the noise. Appropriate repairs have been made.

#### 7. Followup of Previously Identified Items

(Closed) 338/80-38-10 and 339/80-36-13: Out-of-Phase Transfer of Emergency Buses. As an interim fix, a two second time delay was placed in the Emergency Diesel Generator breaker closure circuit. This allowed the emergency bus voltage to collapse and prevent out-of-phase transfer. However design change DC-80-S71 has been completed. This design change

added type 27H solid state voltage sensing relays in the existing under-voltage circuit. These relays will sense when the residual voltage on the emergency buses has dissipated to approximately 35VAC and then drop out at this setting to allow automatic closure of the diesel generator output breaker. This will ensure the transfer of power from the offsite source to the emergency diesel generator without damaging motors or driven equipment.

(Closed) 338/79-01-07: Non-seismically qualified instantaneous contacts on control circuits for MOV-QS-102A and MOV-QS-102B. Design change 78-78 was completed which removed the instantaneous contacts from the agastat timers. The circuits were modified such that the logic remained the same.

(Closed) 339/82-08-06. Degradation analysis of the RCS RTDs. The final report of the aging analysis for materials of the narrow and wide range RTD's was completed. The report concluded the RTD materials evaluated will perform their intended function for at least a 40 month time period.

(Closed) 339/82-08-05: Replacement of Rosemont and Barton lot I pressure transmitters and differential pressure transmitters. This change out was accomplished under design change 81-S08B and completed June 14, 1982.

#### 8. Licensee Event Report (LER) Followup

The following LER's were reviewed and closed. The inspector verified that reporting requirements had been met, causes had been identified, corrective actions appeared appropriate, generic applicability had been considered, and the LER forms were complete.

338/82-045      Fire door S54-5 was found blocked open.

339/82-025      Individual Rod position indication for one rod deviated from group demand by greater than 12 steps.

#### 9. Review of Plant Operations

Containment entries were made during the current Unit 1 refueling outage. These entries were made to observe work in progress, overall housekeeping, adherence to health physics requirements and witnessing of fuel handling activities.

By observation during the inspection period, the inspector verified the control manning requirements of 10 CFR 50.54 (k) and that Technical Specifications were being met. In addition, the inspector observed shift turnovers to verify that continuity of system status was maintained. The inspector periodically questioned shift personnel relative to their awareness of plant conditions.

Through log review and direct observation during tours, the inspector verified compliance with selected Technical Specification Limiting Conditions for Operation.

During the course of these inspections, observations relative to protected and vital area security were made, including access controls, boundary integrity, search, escort, and badging.

On a regular basis radiation work procedures (RWP's) were reviewed and the specific work activity was monitored to assure the activities were being conducted per the RWP's. Radiation protection instruments were verified operable and calibration/check frequencies were reviewed for completeness.

The inspectors kept informed on a daily basis of overall status of both units and of any significant safety matter related to plant operations. Discussions were held with plant management and various members of the operation staff on a regular basis. Selected portions of operating logs and data sheets were reviewed daily.

The inspectors conducted various plant tours and made frequent visits to the control room. Observations included: witnessing work activities in progress, status of operating and standby safety systems and equipment, confirming valve positions, instrument readings and recordings, annunciator alarms, housekeeping and vital area controls.

No violations were identified in these areas.