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

Report Nos.: 50-280/92-12 and 50-281/92-12

Licensee: Virginia Electric and Power Company
5000 Dominion Boulevard
Glen Allen, VA 23060

Docket Nos.: 50-280 and 50-281 License Nos.: DPR-32 and DPR-37

Facility Name: Surry 1 and 2

Inspection Conducted: May 11 through 18, 1992

Inspectors: _____ 5/21/92
M. W. Branch, Senior Resident Inspector Date Signed

_____ 5/21/92
J. W. York, Resident Inspector Date Signed

_____ 5/21/92
S. G. Tingen, Resident Inspector Date Signed

Approved by: _____ 5/22/92
P. E. Fredrickson, Section Chief Date Signed
Division of Reactor Projects

SUMMARY

Scope:

This special inspection was conducted on site to review the reported inoperability of the A CH/HHSI pump under certain pump configurations, and to evaluate the effectiveness of corrective actions that were implemented as a result of a similar event that occurred in August, 1991 which resulted in escalated enforcement.

Results:

One apparent violation was identified for ineffective corrective actions (failure to comply with 10 CFR 50, Appendix B Criterion XVI) that resulted in exceeding Technical Specification 3.3.B.2 time constraints.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*W. Benthall, Supervisor, Licensing
*R. Bilyeu, Licensing Engineer
H. Blake, Superintendent of Site Services
*R. Blount, Superintendent of Engineering
*M. Bowling, Manager, Nuclear Licensing - Corporate
*D. Christian, Assistant Station Manager
J. Downs, Superintendent of Outage and Planning
A. Fletcher, Assistant Superintendent of Engineering
*G. Flowers, Manager, Nuclear Electrical Engineering
R. Gwaltney, Superintendent of Maintenance
*L. Hartz, Manager, Nuclear Quality Assurance - Corporate
*M. Kansler, Station Manager
*J. Long, System Engineer
*J. McCarthy, Acting Assistant Plant Manager
*G. Miller, Senior Staff Engineer, Nuclear Licensing
*D. Modlin, Supervisor, Shift Operations - Acting
*J. O'Hanlon, Vice President, Nuclear - Corporate
*R. Shore, Station Nuclear Safety
*E. Smith, Site Quality Assurance Manager

NRC Personnel

*M. Branch, Senior Resident Inspector
*S. Tingen, Resident Inspector
J. York, Resident Inspector

* Attended exit interview.

Other licensee employees contacted included control room operators, shift technical advisors, shift supervisors and other plant personnel.

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Review of Charging Pump Operability

a. Background Information

On May 11, the licensee made a 10 CFR 50.72 report regarding operation of Unit 1 without complying with the requirements of TS 3.3.B.2 (Safety Injection System) for alignment of the CH/HHSI pumps. This condition existed since the startup on May 1. The

control switches for the CH/HHSI pumps were aligned such that the A CH/HHSI pump would trip on an undervoltage condition. This CH/HHSI pump configuration was identical to the condition that resulted in escalated enforcement action in September 1991. A review of the 1991 event as well as the details of the May, 1992, event are discussed in the following paragraphs.

In August 1991, the CH/HHSI pumps' control switch configuration was questioned by the NRC. After a detailed review of the configuration by the licensee, it was determined that since 1980, the typical alignment of having the C CH/HHSI pump in PTL violated TS 3.3.B.2. Inspection Report 50-280,281/91-24 documented the NRC review of this issue which resulted in escalated enforcement. This report also described the prior 1980 design and the licensee immediate corrective actions to comply with TS requirements.

There are three CH/HHSI pumps in each unit. The A pump is powered from the H emergency bus, the B pump is powered from the J emergency bus, and the C pump is a swing pump that can be powered from the H or J bus. TSs require that two CH/HHSI pumps be available for a unit when critical, one pump powered from the H bus and the other pump powered from the J bus. In the alignment where the A and B pumps' control switches are in the run or automatic start positions, the C pump control switch is in PTL, and the C pump's J bus supply breaker is racked-out, on initiation of an ECCS signal, coincident with an H bus undervoltage condition, the A pump would have locked out and not started automatically. Operator action would be required to manually start the A pump.

Upon discovery of the inadequate CH/HHSI pump configuration on May 11, operations initiated the following immediate actions. The A pump was declared inoperable and the TS action requirement to be in hot shutdown within 24 hours was entered. The pumps were realigned such that the A control switch was in the PTL position, B pump control switch in run, and C pump control switch in the automatic start position. The TS shutdown action statement was then exited. The Unit 2 CH/HHSI pump control switches were verified to be correctly aligned. Previous Unit 1 CH/HHSI pump configurations since unit startup were reviewed and Deviation Report S-92-0866 was issued. The deviation report stated that during a design basis accident which includes a undervoltage on the H bus, the inadequate CH/HHSI pump configuration concurrent with a single failure of the B pump would result in the unit not having a CH/HHSI pump available for automatic start. At approximately 2:28 p.m. the licensee made a one-hour nonemergency report in accordance with 10 CFR 50.72. Since automatic CH/HHSI initiation assumed in the design basis accident in coincidence with a single active failure, the units would be outside the design bases in certain pump configurations if credit for manual operator could not be taken.

The licensee's CNS event review team was established and on May 12 review of the event was initiated. Additionally, operations reissued a standing order describing the requirement for lifting the UV interlock lead if the A pump was included as one of the two required operable pumps for unit operation. The MEL was also modified to provide more detailed information on pump operability requirements for unit operation.

b. Evaluation of Causes

During the spring 1992 Unit 1 refueling outage, the licensee performed the necessary engineering reviews to allow reestablishment of the pre-1980 configuration alignment of the CH/HHSI pumps. Upon receipt of an ECCS signal without an undervoltage on the H bus, all three CH/HHSI pumps would automatically start. DC 91-021, Charging Pump Auto Start Evaluation/Surry/1&2, dated November 1, 1991, required that all three CH/HHSI pumps be normally aligned to automatically start upon receipt of an ECCS initiation signal. If an undervoltage condition developed on the H bus, the A pump would lockout and the B and C pumps would continue to operate. As previously discussed, the licensee initially planned to operate Unit 1 following the RFO with two CH/HHSI pumps aligned for automatic start and the third charging pump operating. Step 5.3.6 of 1-GOP-1.3 originally required that the CH/HHSI pumps be placed in this configuration when RCS temperature passed through 350 degrees F. During the Unit 1 startup assessment, the licensee reevaluated this configuration and changed CH/HHSI pump configuration to one pump operating, one pump aligned for auto start and the third pump in PTL. Because of the change in CH/HHSI pump configuration, Step 5.3.6 of 1-GOP-1.3, was changed by PAR 92-557 to align the CH/HHSI pumps as directed by the shift supervisor. This procedure change was approved by SNSOC. When operators subsequently performed this step they incorrectly aligned the A CH/HHSI pump for auto start, the B pump in operation, and the C pump in PTL. With the C pump in PTL a temporary modification to lift the lead for the A pump UV interlock that was necessary to keep the A pump operable (i.e. able to automatically start on SI and remain running under an under voltage condition) was not performed.

The inspectors reviewed procedures 1-OP-CH-002, Charging Pump A Operations, dated January 14, 1992, and 1-OP-004, Charging Pump C Operations, dated March 26, 1992 and concluded that these procedures contained adequate instructions to ensure that CH/HHSI pumps are properly configured. These procedures are routinely performed during normal plant operation but do not establish required conditions prior to changing modes of plant operation. The inspectors identified one opportunity where operators could have identified that the CH/HHSI pumps were improperly aligned during the performance of one of these routine procedures. On May 9, C CH/HHSI pump was started in accordance with 1-OP-CH-004 to perform

PT 1-PT-18.7, Charging Pump Operability And Performance Test. The inspectors reviewed the PT test results and concluded that operators could have identified the incorrect CH/HHSI pump alignment during the performance of step 5.2.6 of 1-OP-CH-004. This step required that operators verify the status of the A CH/HHSI pump UV interlock prior to starting the C CH/HHSI pump. During the performance of this step, operators acknowledged that the A CH/HHSI pump UV interlock was enabled. However, operators failed to realize that the CH/HHSI pumps were in an alignment not allowed when the A CH/HHSI pump UV interlock was enabled. When 1-PT-18.7 stopped the operating C pump the procedure only stated to stop the pump and did not contain precautions associated with the A CH/HHSI pump UV interlock.

c. Previous Corrective Actions

The licensee's November 20 and December 20, 1991, responses to the previous enforcement action and also LER 91-020 committed to the following corrective actions:

- Complete a review to determine if other critical plant components require manual operator action which was inconsistent with design basis operation.
- Develop a consistent policy for acceptable operator manual intervention consistent with Technical Specification definition for operability.
- Train station operating and engineering personnel on the policy for use of manual operator actions.
- Perform engineering evaluation to determine if changes in the operating methods of the CH/HHSI pumps can be made to eliminate concerns associated with the A pump UV lockout.
- Make procedure changes as necessary to ensure the CH/HHSI pumps are aligned in a configuration where automatic capability is maintained.

The inspectors reviewed the licensee corrective actions described above and the results of that review are discussed in the conclusion section below.

d. Conclusions

The procedures that were modified by the licensee as part of the corrective actions for the August 1991 event were not inclusive in that they did not address all cases where pump realignment is specified. When the CH/HHSI pumps were aligned per 1-GOP-1.3 or stopped in accordance with 1-PT-18.7 there were no references to

cautions associated with the A pump interlocks. This lack of administrative control in 1-GOP-1.3 was a major contributor to the improper CH/HHSI pump control switch alignment. Procedure 1-GOP-1.3 revision 2, which implemented the requirements of DC-91-21 would have resulted in an acceptable alignment since it originally required all three CH/HHSI pumps be operable for the 350 degree F mode change. However, the procedure as originally written did not address situations when only two pumps would be available (as allowed by TS) and would eventually have needed to be modified in the event of testing or maintenance of one CH/HHSI pump.

One of the commitments discussed above involved an engineering evaluation to determine if changes in the operating methods for the CH/HHSI pumps could be made to eliminate the concern associated with the A pump UV interlock. Item CTS#1552, from the licensee's commitment tracking system, was assigned for this engineering evaluation and indicated that it had been accomplished by implementation of DC 91-021. The inspector's review of DC 91-021 determined that the removal of the UV lockout interlock was not addressed as part of the design change. DC 91-021 only addressed the reevaluation of the pre-1980 design and a return to the automatic three-pump-start configuration. The inspectors also reviewed previous opportunities to correct the design. The inspectors noted that as part of the enforcement conference for Inspection Report 91-24 the licensee had identified two engineering reviews that could have corrected the condition, however the licensee appeared to focus on the acceptability of operator actions and procedures versus correcting the hardware. Had the licensee modified the hardware after the 1991 violation the May 11 event would not have occurred.

Prior to the Unit 1 startup following the RFO, operators were trained on the proposed new method of CH/HHSI pump operation described in DC 91-21. This training was documented in Training Synopsis, RQ-92.3-TS-5, Charging Pump Operation, dated April 6, 1992. The inspectors reviewed the training synopsis and concluded that operators were instructed that procedural controls were in place to defeat the UV interlock on the A CH/HHSI pump if the C pump was taken out of service. The inspectors also concluded that this training contributed to the occurrence of the event in that it misled operators into believing that procedural controls would control CH/HHSI pump configuration. However, operators had opportunities to identify that the CH/HHSI pumps were improperly aligned and failed to do so. During review of the temporary modification log, and also during performance of 1-OP-CH-004 as previously discussed, operators could have identified that the A CH/HHSI pump UV interlock was not defeated.

TS 3.3.B.2 states that two of the three CH/HHSI pumps in a unit may be out of service, provided immediate attention is directed to making repairs and one of the inoperable pumps be restored to an

operable status within 24 hours. If one of the inoperable pumps is not restored to an operable status within 24 hours, then the reactor shall be placed in the shutdown condition. If one of the inoperable pumps is not restored within an additional 48 hours, the reactor shall be placed in a cold shutdown condition. The failure to configure Unit 1's CH/HHSI pump prior to plant startup on May 1 such that the A pump would automatically operate during a design basis accident resulted in a condition not allowed by TS 3.3.B.2. Unit 1 operated at power in an improper CH/HHSI pump configuration for the periods of May 1 through May 7 at 10:06 am, from 5:55 p.m. on May 7 through 9:22 p.m. on May 9, and from 10:29 p.m. on May 9 to discovery and correction at 9:30 am on May 11.

10 CFR 50, Appendix B, Criterion XVI, as implemented by Operational Quality Assurance Program Topical Report (VEP 1-5A, Section 17.2.16), requires, in part, that measures be established to assure that conditions adverse to quality be promptly identified and corrected and in the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The failure to preclude repetition of the August 1991 event because of ineffective corrective actions was identified as Apparent Violation 50-280/92-12-01, Ineffective Corrective Actions Associated With CH/HHSI Pump Switch Configuration.

Within the areas inspected, one apparent violation was identified.

3. Exit Interview

The inspection scope and results were summarized on May 18, 1992, with those individuals identified in paragraph 1. The following summary of inspection activity was discussed by the inspectors during this exit.

Item Number	Description and Reference
Apparent VIO 50-280/92-12-01	Ineffective Corrective Actions Associated With CH/HHSI Pump Switch Configuration

The licensee acknowledged the inspection conclusions with no dissenting comments. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

4. Index of Acronyms and Initialisms

CFR - CODE OF FEDERAL REGULATIONS
CH/HHSI- CHARGING/HIGH HEAD SAFETY INJECTION
CNS - CORPORATE NUCLEAR SAFETY
ECCS - EMERGENCY CORE COOLING SYSTEM
EOP - EMERGENCY OPERATING PROCEDURE

HSD	-	HOT SHUTDOWN
MEL	-	MINIMUM EQUIPMENT LIST
NPSH	-	NET POSITIVE SUCTION HEAD
NRC	-	NUCLEAR REGULATORY COMMISSION
PTL	-	PULL TO LOCK
RCS	-	REACTOR COOLANT SYSTEM
RFO	-	REFUELING OUTAGE
SNSOC	-	STATION NUCLEAR SAFETY AND OPERATING COMMITTEE
TS	-	TECHNICAL SPECIFICATION
UV	-	UNDER VOLTAGE