UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-280/95-20 and 50-281/95-20

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

Docket No.: 50-280 and 50-281

License No.: DPR-32 and DRP-37

Facility Name: Surry 1 and 2

Inspection Conducted: September 14 through October 4, 1995

Lead Inspector:

M. W. Branch, Senior Resident Inspector — Date Signed: 10/18/95

Other Inspectors: W. K. Poertner, Resident Inspector
M. E. Ernstes, Regional Inspector
D. R. Taylor, Resident Inspector (North Anna)

Approved by:

G. A. Belisle, Chief — Date Signed: 10/18/95
Reactor Projects Branch 5
Division of Reactor Projects

SUMMARY

Scope:

This special inspection was conducted on site to review and evaluate the circumstances associated with the September 13 and 14, 1995 reduction of Unit 1 reactor vessel inventory. Inspections of backshift and weekend activities were conducted.

Results:

Three apparent violations associated with failure to follow procedures were identified. Weaknesses in training and fundamental understanding of equipment performance were also noted. The apparent violations are grouped into the following three categories: a) administrative controls of operating activities, b) control of maintenance, and c) control of pressurizer relief tank venting activities. The root cause evaluation was thorough, probing and self-critical. Operations personnel interviewed were straightforward and candid.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*W. Benthall, Supervisor, Licensing
H. Blake, Jr., Superintendent of Nuclear Site Services
R. Blount, Superintendent of Maintenance
*M. Bowling, Manager, Nuclear Licensing and Operations Support
*B. Bryant, Licensing
*D. Christian, Station Manager
J. Costello, Station Coordinator, Emergency Preparedness
*R. Cross, Procedures
D. Erickson, Superintendent of Radiation Protection
*B. Garber, Licensing
*D. Hayes, Supervisor of Administrative Services
C. Luffman, Superintendent, Security
*H. McCallum, Nuclear Training
*J. McCarthy, Assistant Station Manager
*F. McConnell, Materials
*G. Miller, Corporate Licensing
*S. Sarver, Superintendent of Operations
*R. Saunders, Vice President, Nuclear Operations
*R. Scanlan, Station Nuclear Safety
*B. Shriver, Assistant Station Manager
K. Sloane, Superintendent of Outage and Planning
*E. Smith, Site Quality Assurance Manager
*D. Sommers, Corporate Licensing
*T. Sowers, Superintendent of Engineering
B. Stanley, Supervisor, Procedures
*J. Swientoniewski, Supervisor, Station Nuclear Safety
N. Urquhart, Supervisor, Training

Other licensee employees contacted included plant managers and supervisors, operators, engineers, technicians, mechanics, security force members, and office personnel.

NRC Personnel

*M. Branch, Senior Resident Inspector
M. Ernstes, Region II
K. Poertner, Resident Inspector
D. Taylor, Resident Inspector (North Anna)
*G. Belisle, Region II

*Attended Exit Interview

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

2. Unit 1 Loss of Inventory Event (71707)

2.1 Licensee's Identification and Evaluation of Event

On September 14, 1995, while shutdown for refueling, the RVWL standpipe indication for Surry Unit 1 experienced an unexpected drop from approximately 18 feet to 13.3 feet. The cause of the event was due to the isolation of the RHV with a nitrogen bubble trapped in the head. As pressure was relieved from the top of the RVWL standpipe due to depressurizing the PRT, indicated level increased in the RVWL standpipe. A control room operator increased letdown rate in order to maintain RVWL standpipe level stable at 18 feet. The letdown continued for approximately three and a half hours until the bubble in the reactor head expanded and reached equilibrium. Approximately eleven hours later, detentioning of the reactor vessel head allowed a vent path for the bubble in the reactor head. This caused the RVWL standpipe level to drop to the actual reactor vessel water level of 13.3 feet. Based on personnel interviews, log reviews, and discussions with the licensee's RCE team, the following sequence of events and summary of the root cause analysis was developed. For clarity, times are specified in a 24 hour format.

<u>September 8, 1995</u>

0241 Surry Unit 1 shutdown for refueling.

<u>September 13, 1995</u>

0325 RHV and RVWL standpipe placed in service.

1131 Draindown commenced to 18 foot level as indicated by the RVWL standpipe.

1300 Draindown to 18 feet completed. PRT pressure was 11 psig. This pressure was also the pressure in the reactor vessel head region.

~1330 WOs released to remove PZR safety valves and to work on flux thimbles.

1500 RHV isolated and tagged out in order to remove spool piece to support installation of the reactor cavity seal ring and to remove the RVLIS bracket.

1630 Workers reported leakage at the seal table as the flux thimble work began. The SS realized that the RCS was still at approximately 11 psig and stopped work on the flux thimbles and PRZ safety valves.

1710 PRT venting commenced to establish acceptable plant conditions to release flux thimble and PZR safety valve WOs. As the PRT was vented, pressure was relieved from the top of the RVWL standpipe and PZR. The trapped bubble in the reactor head region began to expand, forcing water up in the stand pipe and PZR surge line. The reactor operator increased his rate of letdown from the reactor vessel in order to maintain RVWL standpipe indication at 18 feet. Actual reactor vessel water level was decreasing. VCT water level was increasing. The Unit Supervisor and SS were focused on problems with the Primary Drain Transfer Tank pump and were not sensitive to the fact that the reactor operator was letting down coolant from the vessel.

1800 Head vent spool piece reinstalled. Maintenance workers signed off the WOs to remove and reinstall the spool piece. The third WO to remove and reinstall the RVLIS bracket was not signed off since RVLIS was not reinstalled. Therefore, the tagout of the reactor head vent remained active.

1830 Shift turnover conducted. Other than the Annex SRO, the night shift did not recall receiving information that the reactor head vent was tagged out. There was no mention of the reactor head vent in the operator logs or plant status logs.

1900 Just after night shift assumed the watch, the VCT began automatically diverting to the holdup tank due to high water level.

2200 PRT fully depressurized.

2230 Automatic VCT divert stopped. Approximately 4500 gallons drained from the reactor vessel over a three and a half hour period.

2301 Crew initiated make up to the VCT.

2316 STA inventory calculations showed a 4.6 gpm leak.

<u>September 14, 1995</u>

0311 Reactor vessel water level was increased to 20 feet to check for seal table leaks and subsequently drained to 18 feet. Approximately 600 gallons were added and drained. However, this change in reactor vessel water level should have required a 1600 gallon inventory change.

0547 Reactor vessel head detentioning commenced.

0630 Shift turnover occurred. Day shift assumed that the reactor head vent had been returned to service.

0906 RCS makeup initiated.

0917 Unrelated to the draindown event, flooding was reported in the Turbine Building.

0920 RVWL standpipe level dropped rapidly to 13.3 feet. Operators secured letdown and increased charging.

1036 RVWL standpipe level at 18 feet after adding approximately 4500 gallons.

1100 RHV identified to be isolated and tagged.

2.2 Immediate Corrective Actions

Subsequent to the step change in RVWL standpipe level, and after discovering that the RHV was tagged closed, the licensee initiated several immediate actions. The RHV valves were tagged open, a review of important safety system equipment configuration was conducted to verify current status and a Category 1 RCE was initiated. Additional corrective actions based on RCE recommendations are described later in this report.

2.3 Licensee's Root Cause Analysis

A Category 1 RCE was initiated in accordance with Virginia Power's Root Cause Program Manual. Licensee team members began conducting interviews on September 14. The RCE problem statement was to investigate the unexpected reduction in reactor vessel water level. The team identified that the root causes of the event were training and qualification weaknesses. Operating personnel and STAs did not consider the RVWL standpipe to be inoperable with the head vent isolated. Shift personnel believed that the RVWL standpipe would continue to provide reliable indication as long as RCS level changes were not made.

The RCE was thorough, probing and self-critical. Operations personnel interviewed were straightforward and candid.

Contributing causes to the event were:

Work practices: Personnel did not display a questioning attitude. Proper assessment of available indications would have identified the loss of RCS inventory and the isolation of the head vent. Additionally, the SS and STA did not maintain an overview of unit activities focusing on core safety.

Written Communications: The mass balance procedure did not provide for reconciliation of individual inventory changes nor did it account for all sources of inventory changes. Additionally, isolation of the reactor vessel head vent was

not documented in the unit log nor included on the written turnover documents.

Contributing factors to the event included:

Work Practices: Status control of the reactor head vent was lost. Neither the RO nor Unit SRO recorded the isolation of the head vent in the unit log. Shift turnover was ineffective. Key members of the shift operating team were not made aware that the reactor vessel head vent was isolated.

Supervisory methods: Command and control of shift activities by the Unit SRO and SS were inadequate to ensure that equipment status and plant conditions were known and understood by shift personnel and that plant conditions and the main control room environment were appropriate for shift turnover. The Unit SRO and SS did not integrate the STA into shift activities.

Written communications: There were no procedural controls to remove and return the head vent to service when the head vent spool piece was removed for cavity seal ring installation.

3. Inspectors Review and Assessment of Causes (40500, 71707)

An NRC inspector was an observer on the RCE team. The inspectors independently identified causal factors related to the draindown event as the investigation developed. The licensee's root cause analysis team had effectively identified these areas as well. The inspectors concluded that the team members were conducting their investigation in an independent and objective manner and that the team utilized the procedures in their Root Cause Analysis Manual.

The inspectors determined that at 1500 on September 13, the reactor head vent was isolated and tagged out to accommodate setting the reactor cavity seal ring. This was done at a time when the RVWL standpipe was the only method of level indication. The head vent remained tagged out until 1100 on September 14. There was no procedural guidance to alert the operator of the status of the RVWL standpipe upon removing the reactor head vent from service. A review of the Reactor Operator's Log, shift turnover sheet and Plant Status Log determined that these processes failed to indicate the removal of this system from service. Interviews with the September 13 night shift indicated that only the Annex SRO was aware that the RHV had been isolated. This lack of configuration control caused the inoperability of the RVWL standpipe to remain unidentified for approximately 16 hours.

A lack of knowledge about the relationship between the reactor head vent and the RVWL standpipe prevented identifying the inoperability of the

RVWL standpipe. The operators and STA interviewed did not consider the RVWL standpipe inoperable with the reactor head vent isolated.

The RO who initiated the letdown did not understand the expected response of the plant for the given conditions. Interviews indicated that he did not find the need to drain from the vessel unusual. He concluded that excess inventory was being supplied from the steam generator tubes as they drained. However, in this instance, all reactor coolant loops were isolated and reactor vessel water level should not have increased.

As a result of the inaccurate RVWL standpipe indication, the Unit 1 RO increased the rate of letdown from the reactor vessel. This continued from approximately 1710 to 2200 on September 13. The increase in letdown caused VCT water level to increase and automatically divert to the holdup tank. This resulted in draining approximately 4500 gallons from the vessel. Actual reactor vessel water level was five feet lower than the operators thought.

From the review of the administrative controls associated with the conduct of operating activities, several weaknesses relating to operator performance were identified. These weaknesses were associated with SS and SRO command and control of shift activities, communications, plant status control, and shift turnover. Specifically on September 13:

a. The SS and the unit SRO failed to maintain a broad perspective of operational conditions affecting the facility. RCS coolant inventory was reduced by approximately 4500 gallons over about a three and one half hour period without their knowledge of the activity and its affects on unit safety.

b. The RO was not aware that reactor vessel water level was being lowered during letdown operations to maintain RVWL standpipe indication. Additionally, shift supervision did not properly monitor the operator performing this evolution which could affect station safety.

c. The departing day shift failed to make remarks on the required shift relief checklist to inform the oncoming shift of important inoperable equipment. The reactor coolant head vent was isolated rendering the only means of reactor vessel water level indication inoperable. Members of the departing and relieving shifts did not discuss this important item affecting plant operations.

d. The SS and unit SRO failed to enforce compliance with procedure 1-OP-RC-011, Pressurizer Relief Tank Operations, revision 1, for venting the PRT.

In addition to administrative controls, the inspectors reviewed controls for PRT venting and WO release. Section 5.5 of 1-OP-RC-011 establishes the method for venting the PRT to the vent vent system. Through interviews, and review of logs and completed

procedures, the inspectors determined that on September 13, the PRT was vented to the containment without the use of this procedure. The PRT was vented by opening 1-RC-ICV-5025 which established a vent path from the PRT through pressure transmitter PT-1472 to containment. A review of the release permits for that day showed that there was no Gaseous Group Release Permit for venting the PRT to the vent vent system as required by step 5.5.4. Interviews determined that there was no poly hose connected from the vent tap 1-RC-ICV-5025 to the nearest containment purge exhaust as required by step 5.5.5. Operator interviews indicated that the PRT was also being vented to the process vent in accordance with Section 5.6 of the same procedure. Venting to the process vent requires that 1-RC-HCV-1549, PRT Vent, be open whereas, step 5.5.6.a required this valve to be closed.

At 1445 on September 13, Operations released WO 00316472, Retract/Install Flux Thimbles, to disconnect the high pressure fittings at the seal table. This work activity required that reactor vessel water level be maintained at or below the reactor vessel flange level per the controlling procedure. During disconnection of the high pressure seals, maintenance personnel identified leakage from the connection and retightened the loosened connection and contacted Operations. The SS realized that the RCS was pressurized with approximately 11 psig nitrogen pressure from the PRT and stopped work at the seal table and recalled the WO to the control room annex. Operations had signed but not released WO 00315444, PM: Remove, Ship, Test, Reinstall PRZ Safety Valves. The SS also stopped work on this WO and held the WO in the control room annex. Subsequent to the stop work being issued, Operations commenced venting the PRT at 1710 to establish suitable plant conditions to allow release of the two WOs. The fact that the reactor vessel head vent was isolated and its effect on reactor vessel water level indication was apparently not considered when the decision to vent the PRT was made.

VPAP-2002, Work Request and Work Order Task, Section 5, Responsibilities, step 5.7, states that the SS is responsible for reviewing and approving work request and WO tasks on permanent plant structures, equipment and components and aligning plant systems as required to support WO task activities. Step 5.7 further instructed that approval of a WO states that the SS acknowledges and approves that the equipment is prepared for maintenance. These requirements were not met when WO 00316472 and 00315444 were signed on September 13.

4. Review of Safety Significance (71707)

The inspectors reviewed the safety implications of this event. During the event, RHR cooling was not jeopardized or lost as indicated by constant RCS temperatures and RHR flow rates. Discussions with operations personnel revealed that pump amps remained stable throughout the event indicating that vortexing did not occur. As a result of the event the licensee unknowingly entered reduced inventory conditions (defined as less than 15.7 feet in the reactor vessel) but did not enter

mid-loop conditions (defined as less than 12.5 feet in the reactor vessel).

The inspectors reviewed the potential consequences associated with reactor vessel water level being below the band identified in the controlling procedure. The PZR surge line connects to the centerline of the C hot leg between the reactor vessel and the loop stop valve. Procedure 1-OP-RC-004, Draining the RCS to Reactor Flange Level, revision 6, defines mid-loop as 11.8 feet. The surge line connection is a 10.5-inch ID pipe. This would place the top of the surge line at elevation 12.23 feet.

The inspectors concluded that had actual reactor vessel water level dropped to less than approximately 12.23 feet the reactor vessel head region would have vented through the C RCS hot leg to the PZR and then to the PRT. Venting of the reactor vessel head would have made indicated vessel water level drop to actual vessel water level.

Review of Abnormal Procedure 1-AP-27.00, Loss of Decay Heat Removal Capability, revision 6, determined that the operating RHR pump would not have been secured unless vortexing, as determined by pump amp and flow oscillations, was indicated. The AP would have directed that reactor vessel water level be increased to the acceptable band as determined by Attachment 2 to the AP. Attachment 2 would require that reactor vessel water level be increased to greater than 12.63 feet for an RHR flow of 4000 gpm or 12.37 feet for an RHR flow of 1000 gpm.

The inspectors determined that minor vortexing might have occurred if actual reactor vessel water level had dropped to the point of self venting through the C RCS hot leg and PZR. However, assuming operator action to restore reactor vessel water level in accordance with 1-AP-27.00, RHR flow would not have been lost. Additionally, the operators would have been alerted to the low level condition by a low level alarm in the control room. This conclusion was based on review of licensee calculations, isometric drawings, a physical walkdown of the PZR surge line inside containment, and discussions with licensee personnel.

5. Regulatory Issues (71707)

In summary, the inspectors and the RCE team determined that there were multiple examples of failure to follow procedures that contributed to the event. Weaknesses in training and fundamental understanding of equipment performance were also noted. These failures to follow procedures are grouped into the following three categories: a) administrative controls of operating activities, b) control of maintenance, and c) control of PRT venting activities.

a. 10 CFR Part 50, Appendix B, Criterion V, as implemented by the Surry Operational Quality Assurance Program Topical Report (VEP-1-5A), section 17.2.5, Instructions, Procedures, and Drawings, requires that activities affecting quality of systems and components be prescribed by and accomplished in accordance with

documented instructions, procedures or drawings of a type appropriate to the circumstances.

For operational activities affecting quality these requirements are implemented, in part, by VPAP-1401, Conduct of Operations, revision 1; OPAP-0005, Shift Relief and Turnover, revision 4; and OPAP-0002, Operations Department Procedures, revision 3.

VPAP-1401 Section 6.1.12.b.1 requires that the SS and the Unit SRO maintain, as a matter of highest priority, the broadest perspective of operational conditions affecting the facility.

VPAP-1401 Section 6.1.12.c.2 requires that all shift team members be aware of station status at all times and that supervisory personnel monitor the performance of shift personnel who could affect station safety.

OPAP-0005 Section 6.1.4 requires that the departing shift shall make checks and remarks on the required shift relief checklist in a way that informs the relieving shift of information including significant or important inoperable equipment including instrumentation. Section 6.1.5 requires that the departing and relieving personnel shall discuss important items affecting plant operations.

OPAP-0002 Section 5.3.5 states that the SS and unit SRO are responsible for enforcing compliance with procedures as written.

Operational activities affecting quality were not accomplished on September 13 in accordance with prescribed procedures as evidenced by the following examples:

(1) The SS and the Unit SRO failed to maintain a broad perspective of operational conditions affecting the facility. RCS coolant inventory was reduced by approximately 4500 gallons over an approximate three and one half hour period without knowledge of the activities affect on unit safety.

(2) A Unit Control Room Operator was not aware that reactor vessel water level was being lowered during letdown operations to maintain RVWL standpipe indication. Additionally, shift supervision did not properly monitor the operator performing this evolution which could affect station safety.

(3) The departing day shift failed to make remarks on the required shift relief checklist to inform the oncoming shift of important inoperable equipment. The reactor coolant head vent was isolated rendering the only means of reactor vessel water level indication inoperable. Members of the departing

and relieving shifts did not discuss this important item affecting plant operations.

(4) The SS and Unit SRO failed to enforce compliance with procedure 1-OP-RC-011 for venting the PRT.

This item is identified as an Apparent Violation, EEI 50-280/95-20-01, Failure to Follow Operations Administrative Procedures.

b. Technical Specification 6.4 require that detailed written procedures and instructions shall be provided for maintenance activities which would have an effect on nuclear safety and that they be followed.

VPAP-2002 partially implements these requirements for maintenance activities.

VPAP-2002 Section 5.7.1 requires that the SS review and approve WOs on permanent plant structures, equipment, and components.

VPAP-2002 Section 5.7.2 requires that the SS align plant systems, as required, to support WO task activities.

VPAP-2002 Section 5.7.4 requires that equipment be prepared for maintenance prior to approval of a WO.

VPAP-2002 instructions for maintenance activities were not followed for WO 00316472, Retract/Install Flux Thimbles, which was approved by the SS on September 13 without the plant system aligned or the equipment prepared for maintenance to support the work activity, in that, the RCS was not depressurized.

This item is identified as an Apparent Violation, EEI 50-280/95-20-02, Failure to Properly Control Maintenance Activities.

c. Technical Specification 6.4 require that detailed written procedures and instructions shall be provided for activities which would have an effect on nuclear safety and that they be followed.

Section 5.5 of procedure 1-OP-RC-011 establishes the method for venting the PRT to the vent vent system.

However, on September 13 at approximately 1830 hours, approved detailed written procedures were not used to perform venting of the Unit 1 PRT as evidenced by the following:

(1) No Gaseous Group Release Permit was obtained for venting the PRT to the vent vent System as required by procedure 1-OP-RC-011 step 5.5.4.

(2) A poly hose was not connected from valve 1-RC-ICV-5025 to the nearest containment purge exhaust as required by procedure 1-OP-RC-011 step 5.5.5.

(3) 1-RC-HCV-1549, PRT Vent was not closed as required by procedure 1-OP-RC-011 step 5.5.6.a.

This item is identified as an Apparent Violation, EEI 50-280/95-20-03, Failure to Follow PRT Venting Procedure.

Within the areas inspected, three apparent violations were identified.

6. Review of Continuing Outage Activities

The inspectors observed control room activities between September 16 and 18 to assess operations shift performance. Shift turnovers and briefings were monitored and plant status was reviewed. During the observation period, operators were completing the necessary prerequisites for refueling operations. The following procedures were reviewed and their implementation were observed:

- 1-OP-FH-001, Refueling Operations, revision 5.
- 1-OP-RC-007, Isolation and Drain of RCS Loops with RHR in Service, revision 3.
- 1-OSP-SI-002, Charging Pump Head Curve Verification, revision 0.
- 1-OP-RL-001, Putting the Reactor Cavity Purification System in Service, revision 1.
- 1-OP-VS-001, Containment Ventilation, revision 7
- 1-OPT-CT-210, Refueling Containment Integrity, revision 5.

In general, plant operations were adequately controlled. However, several procedures were difficult to implement and resulted in one or more operators being distracted. For example, operators desired to establish containment purge through the HEPA/Iodine filters with no other plant areas lined up through the filters. This was necessary to increase the air flow from containment in order to reduce the activity levels in the containment to below the radiation monitor high setpoint for gaseous activity. This was also a prerequisite for refueling. Several procedures had to be entered and the ventilation fans secured and restarted to accomplish the lineup. A second example involved placing the RL system into service. A backflush of the reactor cavity return line to the PRT was delayed because of inadequate driving head to perform the flush. The SS became directly involved in determining the resolution to the problem. Other observations included:

a. During the performance of 1-OP-FH-001, a reference procedure was not in-hand for filling the reactor cavity to the 1 foot 6-inch level. Operators were not aware of the procedure until questioned by the inspectors. After reviewing the procedure, it was determined that the method used for filling the cavity was one of the two methods specified.

b. A review of the Plant Status Log identified that the RHR system status was not up to date. Specifically, the status log incorrectly indicated that the A RHR pump was inoperable. These observations were discussed with the SS for corrective action.

In addition to the above, the inspectors noted several positive observations. During shift briefings the SSs emphasized command and control, chain of command, shift responsibilities, and minimizing distractions. Operators were attentive to the evolutions in progress and knowledgeable of plant and system status. The inspectors concluded that prerequisites for refueling were proceeding in a safe and cautious manner.

7. Exit Interview

The inspection scope and findings were summarized on October 6, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results addressed in the Summary section and those listed below.

Item Number	Status	Description/(Paragraph No.)
EEI 50-280/95-20-01	Open	Failure to Follow Operations Administrative Procedures (paragraph 5).
EEI 50-280/95-20-02	Open	Failure to Properly Control Maintenance Activities (paragraph 5).
EEI 50-280/95-20-03	Open	Failure to Follow PRT Venting Procedure (paragraph 5).

Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

8. Index of Acronyms

CFR	CODE OF FEDERAL REGULATIONS
EEI	ESCALATED ENFORCEMENT ITEM
GPM	GALLONS PER MINUTE
HEPA	HIGH EFFICIENCY PARTICULATE AIR-FILTER
ID	INNER DIAMETER
NRC	NUCLEAR REGULATORY COMMISSION
OPAP	OPERATIONS DEPARTMENT ADMINISTRATIVE PROCEDURE
PRT	PRESSURIZER RELIEF TANK
PZR	PRESSURIZER
PSIG	POUNDS PER SQUARE INCH GAGE
RCE	ROOT CAUSE EVALUATION
RCS	REACTOR COOLANT SYSTEM
RHR	RESIDUAL HEAT REMOVAL
RHV	REACTOR HEAD VENT

RL	REACTOR CAVITY PURIFICATION
RO	REACTOR OPERATOR
RVLIS	REACTOR VESSEL LEVEL INDICATION SYSTEM
RVWL	REACTOR VESSEL WATER LEVEL
SRO	SENIOR REACTOR OPERATOR
SS	SHIFT SUPERVISOR
STA	SHIFT TECHNICAL ADVISOR
VCT	VOLUME CONTROL TANK
VPAP	VIRGINIA POWER ADMINISTRATIVE PROCEDURE
WO	WORK ORDER