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SUBJECT: LER 88-010-01: on 881011, unit shutdown after determination
 that electrical cables not configured per design drawings.
W/8 ltr.

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May 26, 1989

United States Nuclear Regulatory Commission
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Washington, D.C. 20555

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Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73
entitled Licensee Event Reporting System, the following
report is being submitted:

88-010-01

Sincerely,

W. G. Smith, Jr.
Plant Manager

WGS:clw

Attachment

cc: D. H. Williams, Jr.
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LICENSEE EVENT REPORT (LER)

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| FACILITY NAME (1) D. C. COOK NUCLEAR PLANT - UNIT 1 | | | | | | DOCKET NUMBER (2) 0 5 0 0 0 3 1 5 | | | PAGE (3) 1 OF 15 | |
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TITLE (4) UNIT SHUTDOWN TO INSPECT ENVIRONMENTAL QUALIFICATION CONFIGURATION OF ELECTRICAL CABLES OF THE REACTOR HEAD VENT VALVES AND PRESSURIZER STEAM SPACE VENT VALVES

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | | | | |
|----------------|-----|------|----------------|-------------------|-----------------|-----------------|-----|------|-------------------------------|---|------------------|------------------------|-----------------|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAMES | | DOCKET NUMBER(S) | | |
| 1 | 0 | 1 | 1 | 8 | 8 | 8 | 8 | 8 | 0 | 1 | 0 | D.C. COOK PLANT-UNIT 2 | 0 5 0 0 0 3 1 6 |
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|---------------------------|-----------|--|------------------|-------------------|------------------|-----------------|-----------|-----------|-----------------|----------------|-----------------|---------------------|---------------------|-----------------|----------|----------|--|--|
| OPERATING MODE (9) 1 | | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11) | | | | | | | | | | | | | | | | |
| POWER LEVEL (10) 0 9 0 | 20.402(b) | 20.406(a)(1)(i) | 20.406(a)(1)(ii) | 20.406(a)(1)(iii) | 20.406(a)(1)(iv) | 20.406(a)(1)(v) | 20.406(b) | 20.406(c) | 60.73(a)(2)(iv) | 60.73(a)(2)(v) | 60.73(a)(2)(vi) | 60.73(a)(2)(vii)(A) | 60.73(a)(2)(vii)(B) | 60.73(a)(2)(ix) | 73.71(b) | 73.71(c) | OTHER (Specify in Abstract below and in Text, NRC Form 366A) | |
| | | | | | | | | | X | | | | | | | | | |
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LICENSEE CONTACT FOR THIS LER (12)

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| NAME T. P. BEILMAN INSTRUMENTATION AND CONTROL DEPARTMENT SUPERINTENDENT | | TELEPHONE NUMBER AREA CODE 6 1 6 4 6 5 - 5 9 0 1 | |
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUF. TURER | REPORTABLE TO NPRDS | | CAUSE | SYSTEM | COMPONENT | MANUF. TURER | REPORTABLE TO NPRDS | |
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SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)

| MONTH | DAY | YEAR |
|-------|-----|------|
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

This revision is being submitted to update the event analysis and corrective action taken and to include preventive action being taken to preclude similar events.

On October 4, 1988 during routine Unit Two refueling activities, a Quality Assurance Environmental Qualification (EQ) Surveillance determined that the electrical cables of the Reactor Head Vent Valves and Pressurizer Steam Space Vent Valves were not physically configured per current design drawings. The conditions found on Unit Two rendered the configuration of the equivalent valves on Unit One suspect. However, configuration of the vent valve cable conduits for Unit One could not be determined while at power. As a precautionary measure, Unit One was shut down for visual inspection on October 11, 1988 which revealed similar configuration discrepancies to those found in Unit Two. The cause of the vent valve discrepancies was that configuration requirements relative to EQ of the valves evolved over a period of years following their actual installation and this aspect was not reverified as part of our EQ inspections performed in 1985. Additional inspections performed during shutdown revealed installation discrepancies with the electrical cable junction boxes of the pressurizer PORV position limit switches. All configuration discrepancies were corrected in Unit One. The Unit was returned to service on October 14, 1988. Corrections were completed on Unit Two prior to the restart after refueling.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 308A's) (17)

This revision is being submitted to update the event analysis and corrective action taken and to include preventive action being taken to preclude similar events.

Conditions Prior To Occurrence

Unit One in Mode One, at the administrative limit of 90 percent Reactor Thermal Power.

Unit Two in Mode Six, with the fuel out of core for planned maintenance.

Description of Event

During a routine Quality Assurance (QA) Surveillance on October 4, 1988 at approximately 2000 hours, it was discovered that the electrical cables of the Unit Two Reactor Head Vent Valves (EIIS/AB-VTV) and Pressurizer Vent Valves (EIIS/AB-VTV) were not physically configured as described on current design drawings. These valves are required to function following a design basis accident, and they would be subjected to a harsh environment should a high energy line break occur inside the containment building.

An evaluation of the installed configuration, concluded on October 11, 1988 at 1000 hours, indicated that a potential for submerging the cables connected to the vent valves had been created. Because of the configuration, steam released from the high energy line could condense in the conduit surrounding the cable, eventually submerging the cable. The cables were not qualified in the submerged condition.

Because the conditions found on Unit Two rendered the configuration of the equivalent valves on Unit One suspect, Unit One commenced shut down for inspection on October 11, 1988 at 1045 hours.

At 1140 hours, the 1 hour notification of the Unit One T.S. shutdown was made to the NRC via the ENS. At 1146, the vent valves in question were de-energized. At 1400 hours the NRC 4-hour notification was made via the ENS, regarding the Environmental Qualification (EQ) concerns on the vent valves for Unit Two. Power reduction continued until Hot Standby condition was reached at 2152 hours. On October 12, 1988 at 0930 hours, additional information was given to the NRC via the ENS regarding the EQ concerns of the vent valves.

During inspections of similarly qualified cabling in Unit One containment, the configuration of the electrical cable junction boxes for Pressurizer Power Operated Relief Valves (PORV) (EIIS/AB-RV) limit switches (EIIS/AB-33) were also found to be discrepant relative to the installation requirements in that the junction boxes did not have the required drain holes.

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TEXT (If more space is required, use additional NRC Form 305A's) (17)

Cause of the Event

During a documentation review performed in 1983, prior to EQ operability declaration, the configuration of the Pressurizer and Reactor Head Vent Valves as installed in 1981 were found not to be in accordance with the EQ test configuration. For corrective measures, a design change to add a water-tight (Conax) connector at the valves' solenoids was initiated. However, an additional configuration requirement developed during design activities (slope direction of the conduit, venting/drain ports in junction boxes) was not effectively communicated to the installation organization. As a result, the installation completed in 1985 did not reconfigure prior installation work done to meet the EQ configuration displayed in design documents at that time.

A separate requirement to have drain holes in the limit switch junction boxes for the PORV's was correctly communicated to the installation organization but was not performed (cognitive error) as required.

Both of the above design were documented as Plant Design Standards for specific design changes.

Analysis of Event

This report is being submitted under 10CFR50.73(a)(2)(i) as the completion of plant shutdown required by Technical Specifications, and 10CFR50.73(a)(2)(v) as a condition that alone could have prevented the fulfillment of the safety function of a system that is needed to mitigate the consequences of an accident.

The vents are designed to mitigate a possible condition of inadequate core cooling, inadequate natural circulation, or an inability to depressurize the system. These conditions would result from the accumulation of non-condensable gases or steam in the reactor coolant system.

Electrical cables provide power to the vent system's solenoid operated valves. In the event of a high energy line break inside the containment building, a steam environment is created in the lower compartment. Condensation of steam inside the conduits containing the cables could potentially submerge them in a pool of water. The cables are not qualified for submergence.

The vent valves are included in the emergency operating procedure for inadequate core cooling. Their use is prescribed if operation of the emergency core cooling system, operation of the reactor coolant pumps, and the opening of the pressurizer power operated relief valves fail to maintain the core exit fluid temperature below 1200 degrees Fahrenheit. Because of

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TEXT (If more space is required, use additional NRC Form 308A's (17))

the installed configuration, the vent system which provides additional capability may not have been available. The RCS vent system is not assumed to operate for any accident analyzed in the Final Safety Analysis Report, and their use would be anticipated only if ECCS operation, reactor coolant pump operation and pressurizer PORV operation were unable to mitigate the consequences of an accident and, as a result, non-condensable gases were to accumulate in the reactor vessel or pressurizer. Only one safety train of this system is required operable by Technical Specifications. During the time that the valves were in the unqualified configuration, they were not subjected to a harsh environment, and their use was not required.

The unqualified configuration of the PORV limit switches would not have prevented the PORV's from performing their intended function. Also, it would not impair the capability to close the isolation valve upstream of a PORV. Thus, should procedures have required an operator to open a PORV, he would have been able to do so. Should a PORV have stuck open, isolation capability would have existed.

The purpose of the limit switches is generally to let the operator know if the PORV is opened or closed. In addition to the position indicator, this function can be accomplished by either the acoustic monitor or the RTD located downstream of the PORV's. Either of these would provide an indication of an open PORV, and the lack of indication would indicate that the PORV's were closed. They would not, however, provide information on the number of open PORV's.

The operation of the PORV indication would have potentially been impaired only if it were exposed to a harsh environment. During the time that the condition existed, they were not exposed to a harsh environment.

During the precautionary shutdown due to vent valve concerns, attempts to borate the Reactor Coolant System (EIIS/AB) through the Normal Boration (EIIS/CB) flowpath were unsuccessful, and this flowpath was declared inoperable at 1048 hours. Attempts to borate through the Emergency Boration (EIIS/CB) flowpath also appeared at first to be unsuccessful, and this flowpath was declared inoperable at 1107 hours. Reactor power was held at 90 percent power until 1136 hours when the Emergency Boration flowpath was confirmed to be operable. With the Refueling Water Storage Tank (EIIS/BP-TK) remaining operable, T.S. 3.1.2.2 requires a flowpath be restored to operable status within 72 hours or the unit to be in Hot Standby within 6 hours. Therefore, no violation of Technical Specification occurred for the flowpath problem. Power reduction at 10 percent per hour then began.

Partial failure of heat trace tape, combined with a delay in replacing insulation associated with maintenance activities, resulted in solidification of borated water in the normal boration flow path.

Partial blockage in the emergency boration path was freed by pump and valve manipulations.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO 3150-0104
EXPIRES: 8/31/88

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TEXT (If more space is required, use additional NRC Form 306A-1 (17))

Corrective Action

The configuration discrepancies of the vent valves and the junction boxes have been corrected in Unit One. Unit Two corrections were completed prior to restart after refueling. Restoration of proper heat tracing and insulation resolved the flow blockage condition on the normal boration flow path. Unit One was restarted on October 14, 1988.

A total of 23 Plant Design Standards were identified as being developed for specific design changes. Inspections were performed on 14 of the resulting installed configurations with only one minor discrepancy found. Based on this inspection, it has been determined that this was an isolated case, thus requiring no further corrective action.

As a result of this investigation, procedure enhancements to preclude similar events are in progress and will be completed by August 1, 1989.

Because this event resulted from an unusual (unexpected) form of design which, in each case, did not become implemented due to isolated failures, no further preventive action is intended at this time.

Failed Component Identification

There were no specific component failures during this event.

Previous Similar Events

None.