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# SEP TECHNICAL EVALUATION

## TOPIC VI-4
## ELECTRICAL, INSTRUMENTATION, AND CONTROL ASPECTS OF THE OVERRIDE OF CONTAINMENT PURGE VALVE ISOLATION

## OYSTER CREEK NUCLEAR GENERATING STATION

Docket No. 50-219

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## 1.0 INTRODUCTION

Based on the information supplied by the Jersey Central Power & Light Company (JCP&L), this report addresses the electrical, instrumentation, and control systems design aspects of the Containment Ventilation Isolation (CVI) system and other related Engineered Safety Feature (ESF) functions for the Oyster Creek Station.

Several instances have been reported where the automatic closure of the containment ventilation or purge isolation valves would not have occurred because the safety actuation signals were manually overridden or blocked during normal plant operations. Lack of proper management controls, procedural inadequacies, and circuit design deficiencies contributed to these instances. These events also brought into question the mechanical operability of the valves themselves. These events were determined by the Nuclear Regulatory Commission (NRC) to be an Abnormal Occurrence (#78-05) and accordingly, were reported to Congress.

The NRC is now reviewing the electrical override aspects of containment purging and venting for all operating reactors. On November 28, 1978, the

NRC issued a letter, "Containment Purging During Normal Plant Operation"[1] to all Boiling Water Reactor and Pressurized Water Reactor licensees. This required a review of these systems by the licensee. JCP&L responded on January 23, 1979[2] stating that the review was in process. On On June 10, 1980[3] and July 31, 1980,[4] JCP&L committed to revise the containment purge and vent system by December 31, 1981. A letter of April 9, 1981,[5] provided details of the proposed modification and telephone conversations of May 5, 1981[6] and June 5, 1981[7] clarified portions of the proposal.

## 2.0 EVALUATION OF THE OYSTER CREEK STATION

2.1 Review Guidelines. The intent of this evaluation is to determine if the actuating signals for the ESF equipment meet the following NRC criteria:

1. Guideline No. 1--In keeping with the requirements of General Design Criteria 55 and 56, the override[a] of one type of safety actuation signal (e.g., radiation) should not cause the blocking of any other type of safety actuation signal (e.g., pressure) for those valves that have no function besides containment isolation.

2. Guideline No. 2--Sufficient physical features (e.g., key lock switches) are to be provided to facilitate adequate administrative controls.

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a. The following definitions are given for clarity of use in this evaluation:

Override: the signal is still present, and it is blocked in order to perform a function contrary to the signal.

3. Guideline No. 3--A system level annunciation of the overridden status should be provided for every safety system impacted when any override is active.

Additionally, this review uses the following NRC design guidelines:

1. Guideline No. 4--Diverse signals should be provided to initiate isolation of the containment ventilation system. Specifically, containment high radiation, safety injection actuation, and containment high pressure (where containment high pressure is not a portion of safety injection actuation) should automatically initiate CVI.

2. Guideline No. 5--The instrumentation and control systems provided to initiate the ESF should be designed and qualified as safety grade equipment.

3. Guideline No. 6--the overriding or resetting[a] of the ESF actuation signal should not cause any valve or damper to change position.

Guideline 6 in this review applies primarily to other related ESF systems because implementation of this guideline for containment isolation will be reviewed by the Lessons Learned Task Force, based on the recommendations in NUREG-0578, Section 2.1.4. When containment isolation is not involved, consideration on a case-by-case basis of automatic valve repositioning upon reset may be considered acceptable. Acceptability would be

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a. The following definitions are given for clarity of use in this evaluation:

Reset: the signal has come and gone, and the circuit is being cleared in order to return it to the normal condition.

dependent upon system function, design intent, and suitable operating procedures.

2.2 Containment Ventilation Isolation Circuits Design Description. The containment purge and vent and the nitrogen isolation valves use solenoid-operated pilot valves. Loss of power or nitrogen pressure will cause the isolation valves to close. Automatic closure of the isolation valves will occur if either the reactor vessel water level low-low setpoint is reached or if the drywell pressure exceeds 2 psig. These signals are the same signals that actuate the emergency core cooling systems. The valves can also be manually closed from the control room, via 3 position, return-to-neutral position control switches.[5]

Additionally, JCP&L will install radiation monitors that are environmentally qualified during the December 1981 refueling outage. These monitors will be connected as additional signals to actuate isolation of the containment purge and vent valves.

Presently a single keylocked switch can override the drywell pressure high and the reactor water level low-low signal for all of the purge and vent valves. This override can only be established if the reactor is not operating, as the override is interlocked with the reactor mode switch.[7] As a result of this review, a second keylocked switch will be added. Each switch will be interlocked with the reactor mode switch, and will affect the override of the isolation signal for three pairs of series connected valves. A signal failure will not disable the ability to purge and vent as necessary, nor will a single failure prevent containment isolation upon an

accident (since the override cannot be established prior to a LOCA, with the interlock of the mode switch).

Modulating valves, which are used for pressure relief of containment, are disabled by the same mode switch when in the run position.

2.3 Containment Ventilation Isolation System Design Evaluation. Guideline 1 requires that no signal override can prevent another safety actuation signal from functioning. The Oyster Creek Station override of the isolation signal for the nitrogen and the purge and vent valves is over two parameters, however, it effects only these valves (no other safety systems are overridden by establishing this override). Additionally, this override is interlocked with the reactor mode switch so that the override cannot occur with the reactor at power. Therefore, the intent of this guideline is satisfied, i.e. no safety system will be unintentionally overridden while the reactor is at power.

Guideline 2 requires that reset and override switches have physical provisions to aid in the administrative control of these switches. The key-locked override switches, previously mentioned, comply with this guideline. The only reset pushbutton switches associated with this topic are the drywell isolation reset pushbuttons. These have ring guards to prevent inadvertent operation.

Guideline 3 requires system level annunciation whenever an override affects the performance of a safety system. The use of the override is annunciated in conformance with this guideline.

Guideline 4 requires that isolation of the CVI valves be actuated by several diverse signals. With the addition of the radiation monitors, this guideline is met. High drywell pressure, low-low reactor vessel water level or high radiation would then isolate, automatically, the containment purge and vent valves. Operator-activated isolation is also possible. From the submitted material, it is not evident that manual operation of the Emergency Core Cooling Systems (ECCS) will directly cause the isolation of the containment purge and vent valves. However, they will probably isolate as a consequence of the manual operation of the ECCS due to the drywell pressure high signal or the radiation signal.

Guideline 5 requires that isolation actuation signals be derived from safety grade equipment. JCP&L indicates that the drywell pressure high and the reactor vessel water level low-low signals are derived from fully qualified safety-grade equipment. The radiation monitors, when described, were said to be qualified to their environment.[7] SEP Topic III-12 will further examine the environmental qualifications of this equipment.

Guideline 6 requires that no reset of isolation logic will automatically open the isolation valves. JCP&L indicates that the changeover to three-position control switches will be complete by July 1, 1981.[5] Operator action to reset all containment isolation circuits will not be necessary to comply with this guideline when this modification is complete.

2.4 Other Related Engineered Safety Feature System Circuits. A review of other related ESF circuits was also made. No other manual overrides in

existing circuits have been identified in the review of the material submitted for this audit. However, a bypass to allow the manual trip of the core spray pumps in the presence of the reactor vessel water level low-low signal has been proposed.[8] This is part of the modification to allow the restart of the core spray. Use of the keylocked switch will be annunciated and is in conformance with the applicable guidelines of this review.

## 3.0 SUMMARY

The NRC issued a letter, "Containment Purging During Normal Plant Operation," which requested JCP&L to review purging requirements, controls, and procedures for purging at the Oyster Creek Station.

The electrical, instrumentation, and control design aspects of the containment ventilation isolation valves for the Oyster Creek Station were evaluated using the design guidelines stated in Section 2.1 of this report. These guidelines are satisfied. However, automatic isolation will not occur for manual operation of the ECCS. The NRC should determine if this is acceptable. Additionally, insufficient details are known about the proposed radiation monitors. JCP&L should verify they are fully qualified as safety instrumentation per IEEE-Std 279.

## 4.0 REFERENCES

1. NRC/DOR letter (A. Schwencer) to JCP&L and all BWR and PWR licensees, "Containment Purging During Normal Plant Operation," dated November 28, 1978.

2. JCP&L letter, I. R. Finfrock to the Director of Nuclear Reactor Regulation, NRC, "Containment Purging During Normal Plant Operation," January 23, 1979.

3. JCP&L letter, I. R. Finfrock to D. G. Eisenhut, NRC, "NUREG 0578 Implementation," June 10, 1980, EAML-80-293.

4. JCP&L letter, I. R. Finfrock to the Director, Nuclear Reactor Regulation, NRC, "Containment Venting and Purging System," July 31, 1980, EAML-80-371.

5. JCP&L letter, I. R. Finfrock to D. M. Crutchfield, NRC, Response to Request for Additional Information Relative to Containment Isolation System, April 9, 1981.

6. Telecon, W. Paulson, J. Lombardo, R. Scholl, NRC, A. Udy, EG&G Idaho, Inc., Yosh Nagai, Jim Nobel, Joe Locamayer, JCP&L, May 5, 1981, 1:00 pm EDT.

7. Telecon, J. Lombardo, R. Scholl, NRC, A. Udy, EG&G Idaho, Inc., Yosh Nagai, Jim Nobel, Joe Locamayer, JCP&L, June 5, 1981, 1:30 pm EDT.

8. JCP&L letter, I. R. Finfrock to D. G. Eisenhut, NRC, "NUREG 0737," February 10, 1981.