

# NRC Research and/or Technical Assistance Rept

EGG-EA-5947

July 1982

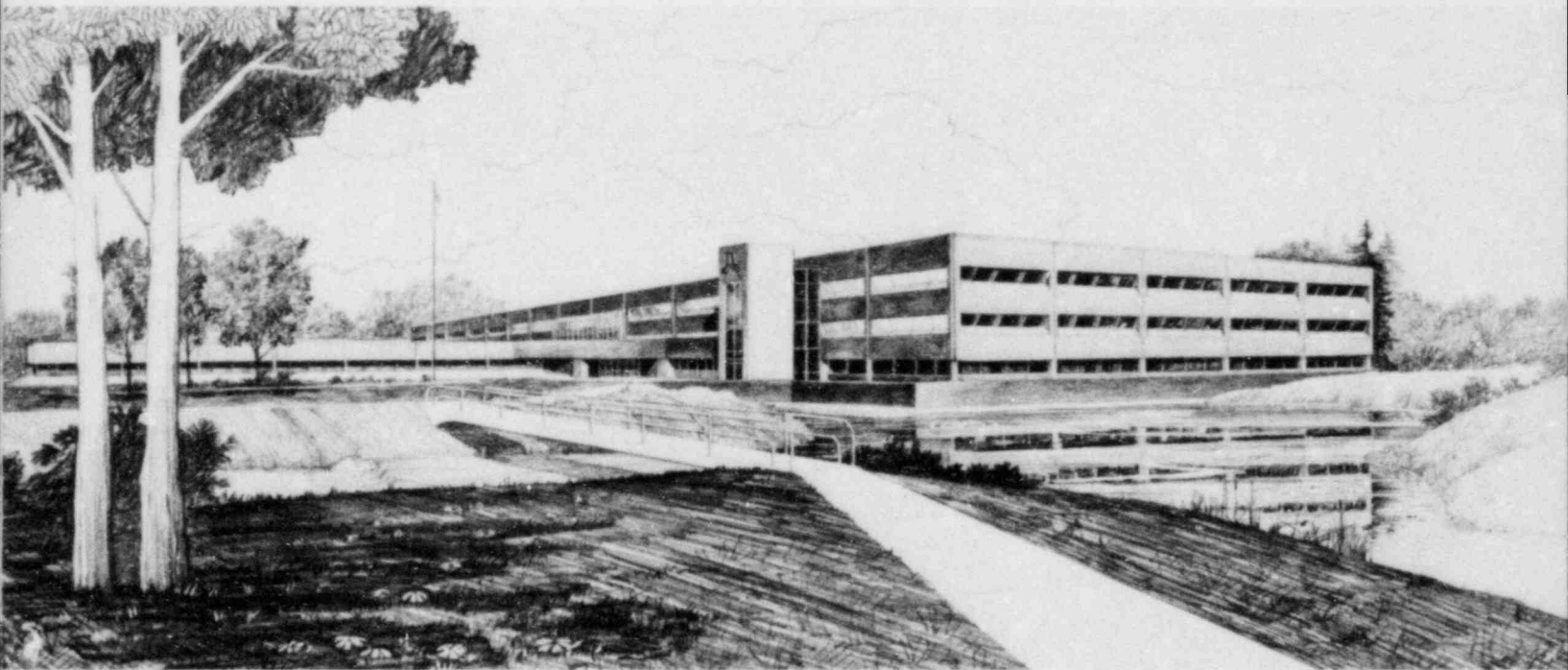
RESTART OF CORE SPRAY AND LOW PRESSURE COOLANT  
INJECTION SYSTEMS, NUREG 0737, ITEM II.K.3.21  
OYSTER CREEK NUCLEAR GENERATING STATION

PDR  
LPPR  
NSIC  
NTIS  
CF

D. J. Morken

## U.S. Department of Energy

Idaho Operations Office • Idaho National Engineering Laboratory



This is an informal report intended for use as a preliminary or working document

Prepared for the  
U.S. Nuclear Regulatory Commission  
Under DOE Contract No. DE-AC07-76ID01570  
FIN No. A6427

8211030227 820731  
PDR RES  
3211030227 PDR





FORM EG&G-398  
(Rev. 03-82)

## INTERIM REPORT

Accession No. \_\_\_\_\_

Report No. EGG-EA-5947

**Contract Program or Project Title:**

Operating Reactors TMI Lessons Learned, NUREG 0737, Response Evaluation

**Subject of this Document:**

Restart of Core Spray and Low Pressure Coolant Injection Systems,  
NUREG 0737, Item II.K.3.21, Oyster Creek Nuclear Generating Station

**Type of Document:**

Informal Report

**Author(s):**

D. J. Morken

**Date of Document:**

July 1982

**Responsible NRC Individual and NRC Office or Division:**

D. McDonald, Division of Systems Integration

This document was prepared primarily for preliminary or internal use. It has not received full review and approval. Since there may be substantive changes, this document should not be considered final.

EG&G Idaho, Inc.  
Idaho Falls, Idaho 83415

Prepared for the  
U.S. Nuclear Regulatory Commission  
Washington, D.C.  
Under DOE Contract No. DE-AC07-76ID01570  
NRC FIN No. A6427

## INTERIM REPORT

0118j

RESTART OF CORE SPRAY AND LOW PRESSURE COOLANT INJECTION SYSTEMS  
NUREG 0737, ITEM II.K.3.21  
OYSTER CREEK NUCLEAR GENERATING STATION

Docket No. 50-219

D. J. Morken  
Reliability and Statistics Branch  
Engineering Analysis Division  
EG&G Idaho, Inc.

July 1982

TAC No. 45744

## ABSTRACT

In response to D. G. Eisenhower's letter, dated October 31, 1980, which transmitted the requirements of NUREG 0737, Jersey Central Power and Light Company submitted their assessment of the restart of the core spray system on low reactor water level at Oyster Creek Nuclear Generating System.

This report contains an evaluation of the Jersey Central Power and Light Company's proposed modifications and changes to their technical specifications that were submitted in response to the NRC position on NUREG 0737, Section II.K.3.21.

## FOREWORD

This report is submitted as a part of the "Operating Reactors TMI Lessons Learned, NUREG 0737, Response Evaluation" being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by EG&G Idaho, Inc., Reliability and Statistics Branch.

The U.S. Nuclear Regulatory Commission funded the work under authorization B&R 20 19 01 06, FIN No. A6427.

## CONTENTS

1.0 INTRODUCTION .....	1
2.0 DESIGN BASE CRITERIA .....	1
3.0 DISCUSSION AND EVALUATION .....	1
3.1 Evaluation .....	2
4.0 CONCLUSIONS .....	2
5.0 REFERENCES .....	2

## TECHNICAL EVALUATION REPORT

### RESTART OF CORE SPRAY AND LOW PRESSURE COOLANT INJECTION SYSTEMS

#### NUREG 0737, ITEM II.K.3.21

### OYSTER CREEK NUCLEAR GENERATING STATION

## 1.0 INTRODUCTION

On May 7, 1980, the NRC requested the Jersey Central Power and Light (JCP&L) Company to assess the capability of the Oyster Creek Nuclear Generating Station's core spray system to restart automatically on loss of reactor water level after the coolant flow had been stopped by the operator.<sup>1</sup> JCP&L was also requested to propose design modifications as needed to meet the requirements of NUREG 0737, Item II.K.3.21,<sup>2</sup> describe how the modification will comply with IEEE Standards 279-1971, Sections 4.12, 4.13, and 4.16,<sup>3</sup> and provide logic and schematic drawings, test procedures, changes to technical specifications and sufficient documentation to demonstrate that the system, as modified, will not degrade proper system functions.

## 2.0 DESIGN BASE CRITERIA

The design base criteria that were applied for this task are contained in NUREG 0737, Section II.K.3.21. The NRC position states "the core spray and low pressure coolant injection system will not restart automatically on loss of water level if system flow has been stopped by the reactor operator and an initiation signal is still present. The core spray and the low pressure coolant injection system should be modified so that these systems will restart automatically, if required, to assure adequate core cooling." Further, the system design modifications should be in accordance with IEEE Standard 279-1971, Sections 4.12, 4.13, and 4.16, with regard to protective function bypasses and completion of protective action once initiated.

## 3.0 DISCUSSION AND EVALUATION

Oyster Creek Nuclear Generating Station as presently configured utilizes only one core spray cooling system, namely, the low pressure core spray system.

The existing core spray system is comprised of two redundant loops with two core spray pumps, two booster pumps, and the essential piping, valves and control logic for each loop.<sup>4</sup>

Initiation of the core spray is from either reactor Lo-Lo water level or from high containment pressure. These two initiating functions are also part of the initiation logic for other engineered safety feature (ESF) systems. The core spray valves are aligned when the reactor pressure drops to a preset value.

Core spray initiation is automatic or it may be started manually. Core spray pump trip is by operator action by remotely tripping the pump breakers. If either core spray initiation signal (Lo-Lo reactor water level or high containment pressure) is still present after a core spray pump has been tripped, the pumps cannot be restarted without physically



racking out the breaker or disconnecting the initiation signal wiring to the breaker due to the anti-pump and spring charging design of the breaker. Reinstallation of the breaker or reconnection of the signal wiring while an initiation signal is still present will automatically restart the pumps. The redundant core spray valves cannot be closed as long as either core spray initiation signal is present.

The manual pump control switch is spring loaded to return to the normal (automatic) position when released. Indication of pump status is from indicating lights actuated by contacts on the pump motor breakers.

### 3.1 Evaluation

A letter from D. B. Waters, Chairman of the BWR Owners' Group, to Darrel G. Eisenhut, NRC,<sup>5</sup> evaluated the advantages and disadvantages of automatic restart following manual termination of Core Spray/Low Pressure Coolant Injection. It was their determination that because of the complexity of the modification it would result in a net decrease in system reliability and a severe restriction of operator flexibility for dealing with unforeseen but credible conditions.

On September 8, 1981, Mr. J. T. Carroll Jr., acting director of Oyster Creek, in a letter to Mr. Dennis Crutchfield, NRC,<sup>6</sup> stated that because of the findings of the BWR Owners' Group, "We have come to the same conclusion, that this modification may have negative impact on safety. We, therefore, are changing our proposed modification<sup>7</sup> to only allow for remote/manual restart of core spray."

In a subsequent memorandum from Themis P. Speis, NRC, to Gus Lainas, Thomas Novak and Robert Tedesco,<sup>8</sup> NRC, Mr. T. P. Speis discussed an evaluation made by the NRC Division of Systems Integration (DSI) of the BWR Owners' Group response to NUREG 0737, Item II.K.3.21. In this memorandum, the DSI agrees with the BWR Owners' Group Position that control logic modifications for LPCI and core spray are unwarranted.

### 4.0 CONCLUSIONS

Based on the analysis by the BWR Owners' Group and the memorandum from T. P. Speis agreeing with the BWR Owners' Group decision, the modification of the Oyster Creek Nuclear Generating Station's Core Spray System is not required. However, because of the inability to restart the core spray following manual termination, by manual or other means due to the breaker anti-pump and spring charging system, the modification proposed in Reference 6 to provide remote/manual restart should be incorporated into the core system for enhanced system control.

### 5.0 REFERENCES

1. NRC Letter, D. G. Eisenhut to all operating reactors, dated May 7, 1980.
2. NUREG 0737, "Clarification of TMI Action Plan Requirements," Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, dated October 31, 1980.

3. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."
4. General Electric Elementary Diagram 718E644, Sheets 1 and 2, Revision 12, Core Spray Control; Drawings 0223R0173, Sheets 18 and 24, Revision 8, Sheets 25 and 26, Revision 11, Core Spray Pump Power Control; and Drawings 0116B8328 Sheets A, B, C, and D, Revision 11, Core Spray Booster Pump Power Control.
5. Letter, David B. Waters, BWR Owners' Group, to D. G. Eisenhut, NRC, subject, "BWR Owners' Group Evaluation of NUREG-0737 Requirements," BWROG 80-12, dated December 29, 1980.
6. Letter, J. T. Carrol, JCP&L, to D. Crutchfield, NRC, subject, "NUREG 0737 Clarification," dated September 8, 1981.
7. Letter, I. R. Finfrock, Jr. JCP&L, to D. G. Eisenhut, NRC, subject, "NUREG 0737," dated February 10, 1981.
8. Memorandum, T. P. Speis, NRC-DSI, to Gus Lainas, Safety Assessment, DL, Thomas Novak, Operating Reactors, DL, Robert Tedesco, Licensing, DL, subject, "Evaluation of BWR Owners' Group Generic Response to Item II.K.3.21 of NUREG 0737, Core Spray and Low Pressure Coolant Injection Systems Low Level Initiation " dated April 14, 1982.