

ATTACHMENT

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SAFETY EVALUATION REPORT  
PUMP AND VALVE INSERVICE TESTING PROGRAM  
DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2

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## ABSTRACT

This EG&G Idaho, Inc., report presents the results of our evaluation of the Donald C. Cook Nuclear Plant, Units 1 and 2, Inservice Testing Program for pumps and valves whose function is important to safety.

## FOREWORD

This report is supplied as part of the "Review of Pump and Valve Inservice Testing Programs for Operating Plants" Program being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Engineering, by EG&G Idaho, Inc., NRC Licensing Support Section.

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## SAFETY EVALUATION REPORT

### PUMP AND VALVE INSERVICE TESTING PROGRAM

### DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2

#### 1. INTRODUCTION

Contained herein is a safety evaluation of the pump and valve inservice testing (IST) program submitted by the Indiana and Michigan Electric Company for its Donald C. Cook Nuclear Plant, Units 1 and 2.

The working session with Indiana and Michigan Electric Company and D. C. Cook, Units 1 and 2, representatives was conducted on July 29, 30, and 31, 1980. The licensee's resubmittal dated December 17, 1982, was received by EG&G Idaho, Inc., on January 24, 1983, and was very briefly reviewed to verify compliance of proposed tests of Class 1, 2, and 3 pumps and valves whose function is important to safety with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition; through the summer of 1975 Addenda. In their resubmittal Indiana and Michigan Electric Company has requested relief from the ASME Code testing requirements for specific pumps and these requests have been evaluated individually to determine whether they have significant risk implications and whether the tests, as required, are indeed impractical. However, the licensee has not requested specific relief from the ASME Code testing requirements for any active valves in the IST program and has supplied no acceptable specific technical information for evaluation.

The evaluations in this SER of the D. C. Cook Nuclear Plant, Units 1 and 2, pump and valve inservice testing program and associated relief requests are the recommendations of EG&G Idaho, Inc.

The licensee's pump testing program is discussed in Section 2.

A brief review of the licensee's valve testing program is discussed in Section 3.

Valves that should be reviewed to determine if they are categorized correctly and valves that we feel should be included to the IST program are discussed in Section 4.

General program comments, problem areas, and a discussion of this review are contained in Section 5.

A summary of pump and valve Section XI testing requirements is provided in Appendix A.

## 2. PUMP TESTING PROGRAM

The D. C. Cook, Units 1 and 2, pump testing program was very briefly reviewed for compliance with the ASME, Section XI, Code. The one request for relief from the Section XI pump testing requirements is evaluated below.

### 2.1 All Pumps in the IST Program

#### 2.1.1 Relief Request

The licensee has requested specific relief from testing all pumps in the IST program monthly in accordance with the requirements of Section XI and proposed to test pumps in accordance with Section XI quarterly.

2.1.1.1 Code Requirement. Refer to Appendix A.

2.1.1.2 Licensee's Basis for Requesting Relief.

a. Request that frequency of testing be changed from monthly to quarterly for the following pumps:

- o Auxiliary Feedwater Pumps
- o Centrifugal Charging Pumps
- o Containment Spray Pumps
- o Residual Heat Removal Pumps
- o Safety Injection Pumps

The requirement of the testing of the pumps at monthly intervals causes unnecessary operation of safeguards equipment which could be detrimental to the availability, operability, and useful service life of the equipment.

b. Request that frequency of testing be changed from monthly to quarterly for the following pumps:

- o Boric Acid Transfer Pumps

- o Component Cooling Water Pumps

- o Essential Service Water Pumps

One or more of each of these pumps are generally in operation. However to provide a uniform test program, the frequency of testing should be the same for all pumps involved in the program.

2.1.1.3 Evaluation. We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from the test frequency requirements of Section XI for all pumps in the IST program. We feel the licensee has not provided sufficient technical information to justify an increase in the pump testing interval from monthly to quarterly. We agree that later editions of the Code specify quarterly pump testing intervals, however, the edition utilized by the licensee in preparation of their IST program requires monthly pump tests.

2.1.1.4 Conclusion. We conclude that the licensee should test all pumps in the IST program in accordance with the requirements of Section XI until sufficient information is provided to the NRC staff that demonstrates no reduction in pump reliability because of an increased testing interval.



### 3. VALVE TESTING PROGRAM

The D. C. Cook, Units 1 and 2, valve testing program was very briefly reviewed for compliance with the ASME, Section XI, Code. What appear to be requests for relief from the Section XI valve testing requirements have been evaluated below.

#### 3.1 General Comments

##### 3.1.1 Number of Valves Affected

There are a total of 319 valves addressed in the justifications for exemptions taken from Figure 4 of the licensee's IST program. We have proceeded under the assumption that each justification for exemption constitutes one relief request and have simply totaled the number of valves to which each applies. On this basis, we have recommended that relief from testing not be granted for 274 valves. The remaining 45 valves have been identified in the IST program as passive valves and we have recommended relief be granted from exercising.

#### 3.2 All Systems

##### 3.2.1 Various Valves

3.2.1.1 Relief Request. The licensee has requested relief from exercising 10 valves in various systems in accordance with the requirements of Section XI.

3.2.1.1.1 Code Requirement--Refer to Appendix A.

3.2.1.1.2 Licensee's Basis for Requesting Relief--The exercising of valves whose failure in a nonconservative position during the cycling test would cause a loss of system function.

3.2.1.1.3 Evaluation. We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from the

exercising requirements of Section XI for the 10 valves in the IST program to which this relief request applies. The licensee has supplied insufficient specific technical information to allow evaluation of this request.

3.2.1.1.4 Conclusion--We conclude that the licensee should test these 10 valves in compliance with Section XI requirements or supply the NRC staff with sufficient technical information to allow proper evaluation of this relief request.

3.2.1.2 Relief Request. The licensee has requested relief from exercising 146 valves in various systems in accordance with the requirements of Section XI.

3.2.1.2.1 Code Requirement--Refer to Appendix A.

3.2.1.2.2 Licensee's Basis for Requesting Relief--Valves which cannot be exercised (verification of full stroke) due to their design and their physical location, arrangement, alignment, and orientation in the system.

3.2.1.2.3 Evaluation--We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from the exercising requirements of Section XI for the 146 valves in the IST program to which this relief request applies. The licensee has supplied insufficient specific technical information to allow evaluation of this request.

3.2.1.2.4 Conclusion--We conclude that the licensee should test these 146 valves in compliance with Section XI requirements or supply the NRC staff with sufficient technical information to allow proper evaluation of this relief request.

3.2.1.3 Relief Request. The licensee has requested relief from exercising 118 valves in various systems in accordance with the requirements of Section XI.



3.2.1.3.1 Code Requirement--Refer to Appendix A.

3.2.1.3.2 Licensee's Basis for Requesting Relief--Valves in systems which cannot be tested (exercised) within the required test period. Testing these valves during plant operation could put the plant in an unsafe condition.

3.2.1.3.3 Evaluation--We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from the exercising requirements of Section XI for the 118 valves to which this relief request applies. The licensee has supplied insufficient specific technical information to allow evaluation of this request.

3.2.1.3.4 Conclusion--We conclude that the licensee should test these 118 valves in compliance with Section XI requirements or supply the NRC staff with sufficient technical information to allow proper evaluation of this relief request.

3.2.1.4 Relief Request. The licensee has requested relief from exercising 45 valves in various systems in accordance with the requirements of Section XI.

3.2.1.4.1 Code Requirement--Refer to Appendix A.

3.2.1.4.2 Licensee's Basis for Requesting Relief--Passive valves not required to change position to accomplish a safety related function. Record the position of these valves before operations are performed and after operations are completed.

3.2.1.4.3 Evaluation--We agree with the licensee's basis and, therefore, feel that relief should be granted from the exercising requirements of Section XI for the 45 valves in the IST program identified as passive. These valves are in their safety position and are not required to open or close to mitigate the consequences of an accident or safely shut down the plant. Therefore, the operability of these valves is inconsequential with regard to the safety function which they perform.



3.2.1.4.4 Conclusion--We conclude that the quarterly stroke and stroke time measurements are meaningless for passive valves. Based on the considerations discussed above we conclude that the alternate testing proposed will give reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security of the public.

### 3.2.2 Unspecified Valves

3.2.2.1 Relief Request. The licensee has requested relief from exercising unspecified containment isolation valves in accordance with the requirements of Section XI.

3.2.2.1.1 Code Requirement--Refer to Appendix A.

... 3.2.2.1.2 Licensee's Basis for Requesting Relief--The exercising of valves whose failure to close during a cycle test would result in a loss of containment integrity.

3.2.2.1.3 Evaluation--We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from the exercising requirements of Section XI for any valves to which this relief request may be applied, now or in future amendments to the IST program. The licensee has not applied this relief request to any valves in the present IST program, therefore, we question its inclusion in the program and its ultimate application. In either case, the licensee has supplied insufficient specific technical information to allow evaluation of this request.

3.2.2.1.4 Conclusion--We conclude that the licensee should delete this relief request from the IST program or identify the valves to which it applies and provide the NRC staff with sufficient technical information to allow proper evaluation of the request.

3.2.2.2 Relief Request. The licensee has requested relief from exercising unspecified pressure boundary isolation valves in accordance with the requirements of Section XI.

3.2.2.2.1 Code Requirement--Refer to Appendix A.

3.2.2.2.2 Licensee's Basis for Requesting Relief--The exercising of valves which could subject a system to pressures in excess of its design pressures.

3.2.2.2.3 Evaluation--We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from the exercising requirements of Section XI for any valves to which this relief request may be applied, now or in future amendments to the IST program. The licensee has not applied this relief request to any valves in the present IST program, therefore, we question its inclusion in the program and its ultimate application. In either case, the licensee has supplied insufficient specific technical information to allow evaluation of this request.

3.2.2.2.4 Conclusion--We conclude that the licensee should delete this relief request from the IST program or identify the valves to which it applies and provide the NRC staff with sufficient technical information to allow proper evaluation of the request.

3.2.2.3 Relief Request. The licensee has requested relief from leak testing unspecified valves in accordance with the requirements of Section XI.

3.2.2.3.1 Code Requirement--Refer to IWV-3420(a-g).

3.2.2.3.2 Licensee's Basis for Requesting Relief-- Valves which cannot be seat leak tested due to their design, physical location, arrangement, alignment, and orientation in the system.

3.2.2.3.3 Evaluation--We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from the leak detection testing requirements of Section XI for any valves to which this relief request may be applied, now or in future amendments to the IST program. The licensee has not applied this relief request to any valves in the present IST program, therefore, we question its inclusion in the program and its ultimate application. In either case, the licensee has supplied insufficient specific technical information to allow evaluation of this request.

3.2.2.3.4 Conclusion--We conclude that the licensee should delete this relief request from the IST program or identify the valves to which it applies and provide the NRC staff with sufficient technical information to allow proper evaluation of the request.

### 3.2.3 Radiation Areas

3.2.3.1 Relief Request. The licensee has requested relief from testing unspecified valves in high radiation areas in accordance with the requirements of Section XI.

3.2.3.1.1 Code Requirement--Refer to Appendix A.

3.2.3.1.2 Licensee's Basis for Requesting Relief--Valves whose access may be restricted due to a high radiation area coupled with its physical location and arrangement in the system.

No tests shall be conducted on valves where the radiation level is 1000 mr/hr or greater.

3.2.3.1.3 Evaluation--We do not agree with the licensee's basis and, therefore, feel that relief should not be granted from testing requirements of Section XI for any valves to which this relief request may be applied, now or in future amendments to the IST program. The licensee has not applied this relief request to any valves in the present IST program, therefore, we question its inclusion in the program and its



ultimate application. In either case, the licensee has supplied  
insufficient specific technical information to allow evaluation of this  
request.

3.2.3.1.4 Conclusion--We conclude that the licensee should  
delete this relief request from the IST program or identify the valves to  
which it applies and provide the NRC staff with sufficient technical  
information to allow proper evaluation of the request.

#### 4.1 ADDITIONAL QUESTIONS

We feel the following valves should be reviewed to determine if they are categorized correctly or if they should be included in the IST program and categorized appropriately.

#### 4.1 All Systems

##### 4.1.1 Review of Valve Categories

###### 4.1.1.1 Main Steam Unit 1

MRV-221:

MRV-231: These valves have no category assigned to them.

MRV-241:

###### 4.1.1.2 Essential Service Water Unit 2

WRV-722:

WRV-724: Should these valves be Category B instead of

WRV-726: Category E?

WRV-728:

###### 4.1.1.3 Compressed Air Units 1 and 2

PA-342: Should these valves be Category A/C instead of

PA-343: Category C?

###### 4.1.1.4 WDS Vents and Drains Units 1 and 2

DCR-206: This valve has no category assigned to it.

4.1.1.5 Emergency Core Cooling (SIS) Units 1 and 2

SI-142-L1:

SI-142-L2: Should these valves be Category A/C instead of

SI-142-L3: Category C?

SI-142-L4:

4.1.1.6 Emergency Core Cooling Units 1 and 2

ICM-111: Should these valves be Category A instead of

IMO-128: Category B?

IMO-330:

IMO-331:

IMO-315:

IMO-325:

SI-152-S: Should these valves be Category A/C instead of

SI-152-N: Category C?

SI-151-E:

SI-151-W:

SI-166-1:

SI-166-2:

SI-166-3:

SI-166-4:

SI-158-L1:

SI-158-L2:

SI-158-L3:

SI-158-L4:

SI-161-L1:

SI-161-L2:

SI-161-L3:

SI-161-L4:

SI-170-L1:

SI-170-L2:

SI-170-L3:

SI-170-L4:



#### 4.1.2 Possible IST Program Additions

##### 4.1.2.1 Main Steam, Units 1 and 2

MMO-210

MMO-220

MMO-230

MMO-240

##### 4.1.2.2 Feedwater Units 1 and 2

FW-131-1

FW-131-2

FW-131-3

FW-131-4

FW-137-1

FW-137-2

FW-137-3

FW-137-4

FW-125

FW-126

FW-127

FW-136

FW-129

FW-130

FW-158

##### 4.1.2.3 Essential Service Water Units 1 and 2

ESW-243

ESW-109

ESW-130

ESW-131

ESW-132

ESW-115

ESW-145

ESW-243

ESW-240

ESW-159

ESW-160

ESW-161

4.1.2.4 CVCS--Reactor Charging and Letdown Units 1 and 2

CS-338

CS-300E

CS-300W

CS-307

CS-319

CS-301E

CS-301W

CS-296E

CS-296W

CS-304

CS-305

4.1.2.5 Component Cooling Units 1 and 2

Page 2 of 2 missing from program.

CCW-180E

CCW-180W

CCW-183E

CCW-183W

4.1.2.6 Emergency Core Cooling (SIS) Units 1 and 2

SI-103-S

SI-111-S

SI-106-S

SI-103-N

SI-111-N

SI-106-N

SI-205

SI-206

4.1.2.7 Emergency Core Cooling Units 1 and 2

RH-104-E

RH-104-W

RH-113-E

RH-113-W

RH-116-E

RH-116-W

4.1.2.8 Containment Spray Units 1 and 2

CTS-139-E

CTS-139-W

CTS-116

CTS-106

CTS-119-E

CTS-119-W

CTS-105-E

CTS-105-W

CTS-121-E

CTS-121-W

CTS-122-E

CTS-122-W

SI-181

SI-182

4.1.2.9 Emergency Diesel Generator Units 1 and 2

DF-130-A

DF-130-C

DF-131-A

DF-131-C



## 5. PROBLEM AREAS

This was a very brief review intended to identify general problem areas in the licensee's IST program. Those areas are summarized below.

The P&IDs used for this review were used during the initial review (March 1980) and most are out of date. New P&IDs are needed if a proper program review is to be performed.

There are no specific relief requests in the valve testing program. The licensee has used very general "exemption" explanations and has applied these to large numbers of valves in lieu of a formal technical relief request(s). However, an attempt has been made to explain why a particular valve cannot be exercised in accordance with Section XI in each section of the program (yellow pages).

The plant operational mode number have not been explained. For example; a check valve that is going to be full-stroke exercised during cold shutdowns while in operational modes 1 through 5 is rather confusing because we believe mode 1 is power operation..

It is not clear if pressure boundary isolation valves have been addressed in the program. Four check valves in the residual heat removal system have been categorized A/C and the 1 gpm leakage limit assigned, however, safety injection header check valves and SI accumulator discharge checks are categorized C.

Much of the technical information presented at the working meeting was not included in the revised program. That may have been the result of a 2-1/2 year delay between the working meeting and the resubmittal date.

APPENDIX A.



## APPENDIX A

### 1. CODE REQUIREMENTS-VALVES

Subsection IWV-3410(a) of the 1974 Edition and the Section XI ASME Code (which discusses full-stroke and partial-stroke requirements) requires that Code Category A and B valves be exercised once every three months, with exceptions as defined in IWV-3410(b)(1), (e), and (f). IWV-3520(a) (which discusses full-stroke and partial-stroke requirements) requires that Code Category C valves be exercised once every three months, with exceptions as defined in IWV-3520(b). In the above exceptions, the Code permits the valves to be tested to cold shutdown where:

1. It is not practical to exercise the valves to the position required to fulfill their function or to the partial position during power operation
2. It is not practical to observe the operation of the valves (with fail-safe actuators) upon loss of actuator power.

Subsection IWV-3410(c) requires all Category A and B power-operated valves to be stroke-time tested to the nearest second or 10% of the maximum allowable owner-specified time.

### 2. CODE REQUIREMENTS--PUMPS

An inservice test shall be conducted on all pumps that perform a function important to safety, nominally once each month during normal plant operation. Each inservice test shall include the measurement, observation, and recording of all quantities in Table IWP-3100-1, except bearing temperature, which shall be measured during at least one inservice test each year.

