

TECHNICAL EVALUATION REPORT

HYDROLOGICAL CONSIDERATIONS

INSERVICE INSPECTION OF WATER CONTROL STRUCTURES
COMMONWEALTH EDISON
DRESDEN NUCLEAR POWER STATION UNIT 2

NRC DOCKET NO. 50-237

NRC TAC NO. 41554

NRC CONTRACT NO. NRC-03-79-118

FRC PROJECT 0257

FRC ASSIGNMENT 16

FRC TASK 539

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May 27, 1982

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FOREWORD

This Technical Evaluation Report was prepared by Franklin Research Center under a contract with the U.S. Nuclear Regulatory Commission (Office of Nuclear Reactor Regulation, Division of Operating Reactors) for technical assistance in support of NRC operating reactor licensing actions. The technical evaluation was conducted in accordance with criteria established by the NRC.

Ms. S. Roberts and Mr. J. Scherrer contributed to the technical preparation of this report through a subcontract with WESTEC Services, Inc.

1. INTRODUCTION

1.1 PURPOSE OF REVIEW

The purpose of this review is to evaluate the assumptions, conclusions, and completeness of documentation in responses by the Commonwealth Edison Company for Systematic Evaluation Program (SEP) Topic III-3.C (Inservice Inspection of Water Control Structures) for the Dresden Nuclear Power Station Unit 2. It includes independent analyses by Franklin Research Center (FRC) needed to clarify or resolve issues. The Nuclear Regulatory Commission (NRC) is reviewing this and other safety topics within the SEP and intends to coordinate an integrated assessment of plant safety after completion of the review of all applicable safety topics and design basis events (DBEs).

1.2 GENERIC BACKGROUND

The SEP was established to evaluate the safety of 11 of the older nuclear power plants. An important element of the evaluation is to judge the plants by current licensing criteria with respect to 137 selected topics, several of which relate to hydrologic assessments of the site.

In a letter dated January 14, 1981 [1], the NRC agreed to the SEP Owners Group's proposed redirection of the SEP whereby each licensee would select any 60% of the SEP topics and submit evaluations of these in time for a review by the NRC staff to be completed by June 1981. Evaluations of topics not selected by a licensee were the NRC's responsibility. Commonwealth Edison chose to submit an evaluation for Topic III-3.C in accordance with the SEP guidelines.

1.3 PLANT-SPECIFIC BACKGROUND

In a letter to the NRC dated February 16, 1982 [2], the Licensee submitted an evaluation of Topic III-3.C, comparing the water control structure inspection program for the Dresden Nuclear Power Station Unit 2 with

criteria currently used by the NRC staff for licensing new facilities. In this report, the submitted documentation is reviewed and the adequacy of the Licensee's evaluation is assessed.

2. REVIEW CRITERIA

The reference criteria used for this topic were based on the Code of Federal Regulations, Title 10, Part 50 (10CFR50), Section 50.36 and Appendix A (General Design Criteria 1, 2, and 44), and 10CFR100, including Appendix A. Pertinent regulatory positions are identified in the following Regulatory Guides:

- 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants [3]
- 1.27 Ultimate Heat Sink for Nuclear Power Plants [4]
- 1.28 Quality Assurance Program Requirements (Design and Construction) [5]
- 1.132 Site Investigations for Foundations of Nuclear Power Plants [6]
- 1.59 Design Basis Floods for Nuclear Power Plants [7].

The specific criteria against which the Licensee's submittal was evaluated are given in Regulatory Guide 1.127.

3. TECHNICAL EVALUATION

3.1 SAFETY-RELATED WATER CONTROL STRUCTURES

3.1.1 Licensee Identification

The following water control structures and components associated with the Dresden Unit 2 site were identified by the Licensee [2] as requiring surveillance in accordance with applicable NRC rules and Regulatory Guide 1.127:

A. Cooling Water System Structures

The identified cooling water system structures are those relating to the availability and protection of the ultimate heat sink (UHS) and are shown in Figure 1. These include:

1. Intake canal, discharge canal, and return intake canal
2. Forebay, crib house, and discharge outfall structure
3. Deicing line and gate valve on deicing line
4. Flow regulation station.

B. Flood Protection Structures

1. Doors at grade level
2. Water level gage.

3.1.2 Evaluation

The following evaluation of the Licensee-identified water control structures and components is provided.

A. Cooling Water System Structures

The Licensee has adequately described those water control structures which are necessary for maintaining control of the UHS.

B. Flood Protection Structures

The Licensee presents two items under flood control structures which are not necessarily flood water control structures. The doors at plant grade are not flood-proofed and will not act to preclude flood waters from entering the buildings and thus should not be considered flood water control structures.

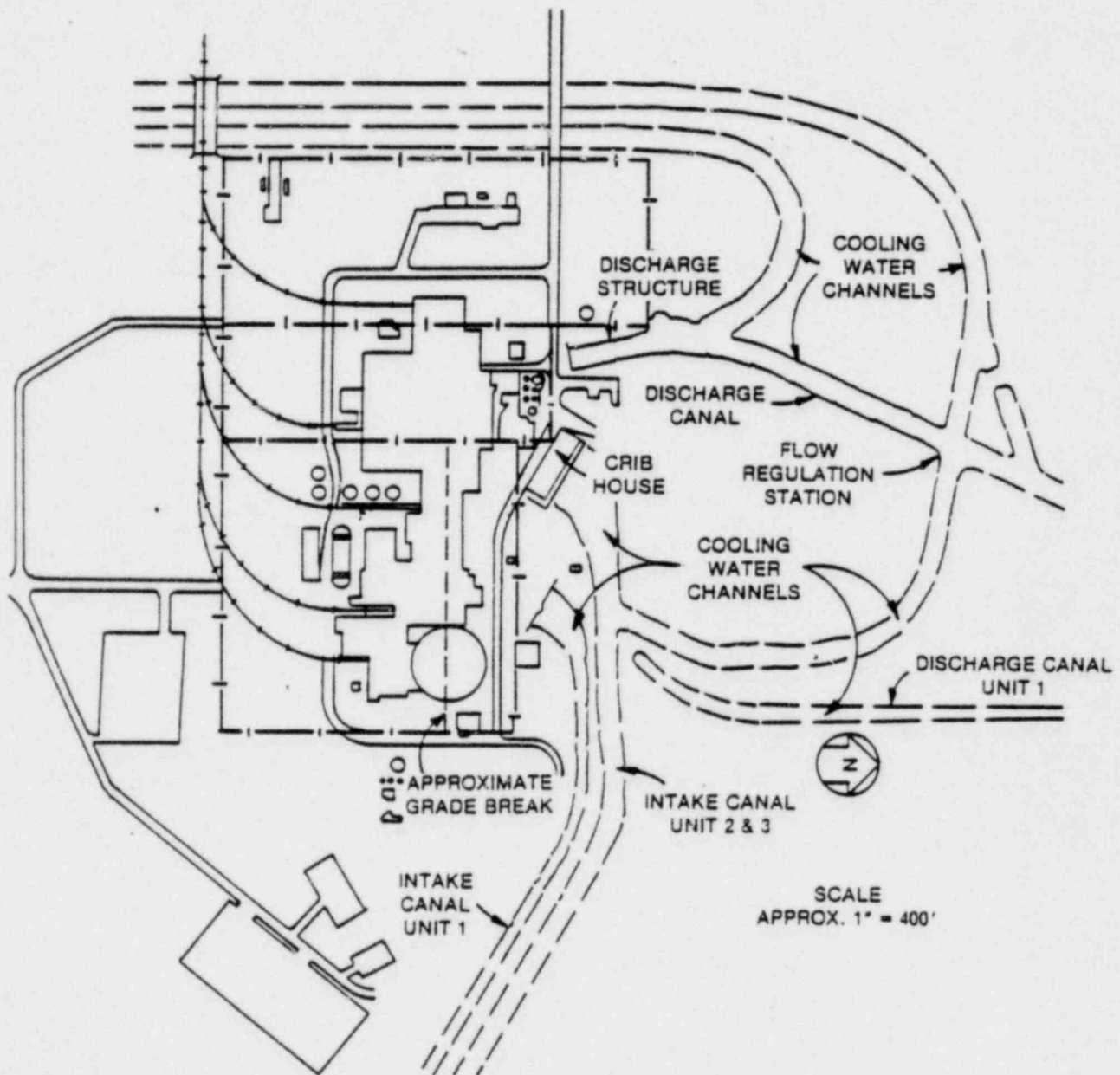


Figure 1. Water Control Structure Location

The water level gage is not used to control floods, but to monitor them. The issue of whether the canal water level gage should be inspected is not disputed; however, its placement under the category of flood water control structures is unnecessary.

The roof drainage system was identified in SEP Topic II-3.B (Flooding Potential and Protection Requirements) as a water control structure and could be included in the Licensee's inservice inspection program for water control structures. During integrated assessment, other water control features may be identified which should also be included in the Licensee's formal inservice inspection program.

3.1.3 Conclusion

On the basis of a review of the Licensee's submittal [2] and other site drawings and documents, it is concluded that the Licensee has adequately identified all cooling water system structures now present at the site. Further, the flood protection structures identified by the Licensee are not appropriate to this inspection program as their successful operation does not protect plant structures and safety-related components from flooding.

3.2 DETAILS TO BE INSPECTED

3.2.1 Licensee Identification

The following elements of the previously identified structures (as shown in Figure 1) were named by the Licensee [2] as appropriate inspection items:

A. Cooling Water System Structures

<u>Element</u>	<u>Feature(s) to be Observed</u>	<u>Frequency</u>
Intake, discharge, and return intake canals	Sounding	Once a year for first 2 years and every 1 to 5 years thereafter depending on observed sedimentation rate
	Erosion, slope stability	Yearly

<u>Element</u>	<u>Feature(s) to be Observed</u>	<u>Frequency</u>
	Weed growth	Yearly
Forebay, cribhouse, and discharge structure	Soundings	Once a year for first 2 years and every 1 to 5 years there- after depending on observed sedimenta- tion rate
	Slope stability	Yearly
	Structural integrity	Once a year for first 2 years and every 1 to 5 years there- after depending on observed sedimenta- tion rate
	* Blockage	Yearly
Gate valve on deicing line	Trouble-free operation	Yearly
Intake and discharge conduits	Structural integrity	Once a year for first 2 years and every 1 to 5 years there- after depending on observed sedimenta- tion rate
	Blockage	Yearly
Flow regulation station	Soundings	Once a year for first 2 years and every 1 to 5 years thereafter depending on observed sedimentation rate
	Blockage of gate openings	Yearly

<u>Element</u>	<u>Feature(s) to be Observed</u>	<u>Frequency</u>
	Trouble-free operation	Yearly
Electrical and mechanical equipment	Input from station maintenance	Undefined

B. Flood Protection Structures

All doors at grade level	Trouble-free operation	Yearly
Water level gage at cribhouse	Availability and readability	Yearly

3.2.2 Conclusion

Review of the Licensee's submittal [2], site drawings, and other documents shows that the Licensee has adequately identified all features of safety-related water control structures. Using historic failure rates as a guide, the Licensee should define the period of inspection frequencies for electrical and mechanical equipment associated with the flow regulation station.

The frequency of inspecting the intake and discharge structures for structural integrity should depend on considerations other than "depending on observed sedimentation rate," as specified. Frequency of inspection should be based on historic occurrences of settlement, cracking, sinking, or other movement which may influence the stability of these structures.

3.3 INSPECTION PROGRAM

Regulatory Guide 1.127 [3] states that "the inspection should be conducted under the direction of qualified engineers experienced in the investigation, design, construction, and operation" of water control structures. It also specifies that "inspection personnel should be selected carefully. The inspector and the analyst should be practical, dedicated diagnosticians." Security and operations personnel do not meet these criteria. Technically

trained staff members or consultants should perform all inspections and should be directed and reviewed by an experienced engineer.

3.3.1 Inspection Report

Regulatory Guide 1.127 identifies the need to prepare inspection reports following inspection of safety-related water control structures. These documents should be maintained onsite for reference purposes. The Licensee has stated that (1) a technical report is prepared following each inspection, and (2) when significant changes are reported, an evaluation will be performed to determine the effects of the changes, and a report will be made to the NRC staff. This procedure is in keeping with the positions identified in Regulatory Guide 1.127. Inspection data and reports are maintained onsite and available for comparison.

3.3.2 Frequency of Inspection

The frequency of routine inspections stated by the Licensee is adequate with the exception of those items for which the frequency of inspection depends on the observed sedimentation rate. Low rates of sediment deposition in one year do not imply low rates in another year. The Licensee should use, as a guideline in defining inspection frequency, the most extreme rate of sedimentation recorded at the site.

The inspection program established by the Licensee should be modified to include special inspections after extreme events that challenge the integrity of any water control structures. For the UHS, significant buildup of ice or other debris would be such an event.

3.3.3 Conclusion

On the basis of the preceding evaluation, it is concluded:

1. The Licensee should comply with the requirement that all items in the inspection program be conducted or overseen by qualified engineering personnel.

2. The inspection reporting system identified by the Licensee meets the intent of Regulatory Guide 1.127.
3. The frequencies of routine inspections conform with guidelines provided in Regulatory Guide 1.127.
4. Special inspection initiation criteria should be developed so that special inspections will be performed at the termination of extreme events (such as floods) that may jeopardize the integrity of water control structures. The formal inspection program to be initiated at the Dresden Unit 2 plant should incorporate such special inspections.

4. CONCLUSIONS

The Licensee's present inservice inspection program for water control structures at Dresden Nuclear Power Station Unit 2 should be modified to conform more fully to the intent of Regulatory Guide 1.127.

Specifically, the following are recommended:

- o Special inspections should be performed to assess the consequences of severe flood phenomena. To ensure that the future formal inservice inspection program contains provisions for special inspections, the Licensee should develop some initiation criteria which will prompt a special inspection, such as the occurrence of a rainfall event of greater than 3 inches in 24 hours.
- o The Licensee should ensure that all inspections are undertaken by qualified personnel and are reviewed and overseen by suitably qualified engineers.
- o Plant doors and the water level gage on the canals should be deleted from the list of flood control structures inspected under Regulatory Guide 1.127 since they perform no flood protection function.

Following the initiation of the changes recommended in this technical evaluation report, the inservice inspection for water control structures at Dresden Unit 2 will meet the criteria of Regulatory Guide 1.127.

5. REFERENCES

1. D. G. Eisenhut (NRC)
Letter to all SEP Licensees
January 14, 1981
2. T. J. Rausch (CECO)
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3. "Inspection of Water-Control Structures Associated with Nuclear Power Plants"
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Regulatory Guide 1.127
4. "Ultimate Heat Sink for Nuclear Power Plants"
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5. "Quality Assurance Program Requirements (Design and Construction)"
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Regulatory Guide 1.28
6. "Site Investigation for Foundations of Nuclear Power Plants"
NRC, March 1979
Regulatory Guide 1.132
7. "Design Basis Floods for Nuclear Power Plants"
NRC, August 1977
Regulatory Guide 1.59
8. Final Safety Analysis Report (FSAR)
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