Enclosure 2

TECHNICAL EVALUATION REPORT

HYDROLOGICAL CONSIDERATIONS (SEP, II-3A, B, B.1, C; III-3B) - INSERVICE INSPECTION OF WATER CONTROL STRUCTURES

CONSUMERS POWER COMPANY

BIG ROCK POINT PLANT

NRC DOCKET NO. 50-155

NRC TAC NO. 41550

NRC CONTRACT NO. NRC-03-79-118

FRC PROJECT C5257

FRC ASSIGNMENT 16

FRC TASK 542

Prepared by

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Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: G. Staley

June 23, 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.

Mr. J. S. Scherrer and Ms. S. L. Roberts 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 Consumers Power Company (CPCo) for Systematic Evaluation Program (SEP) Topic III-3.C (Inservice Inspection of Water Control Structures) for the Big Rock Point Plant. It includes independent analyses by the 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 establisned 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. The Licensee (CPCo) 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 December 21, 1981 [2], CPCo submitted an evaluation of Topic III-3.C comparing the water control structure inspection program for the Big Rock Point Plant 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

In the following evaluation, pertinent elements of the inservice inspection program for water control structures at the Big Rock Point Plant are compared with the positions set forth in Regulatory Guide 1.127.

3.1 SAFETY-RELATED WATER CONTROL STRUCTURES

3.1.1 Licensee Identification

The following water control structures and components associated with the Big Rock Point 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 cooling water system structures identified are those relating to the availability and protection of the ultimate heat sink (UHS). They include the offshore intake structure, the offshore intake line, the screenhouse/diesel generator room/discharge structure, the discharge canal, and the buried fire main piping system.

B. Flood Protection Structures

The Licensee has not identified any flood control structures at the Big Rock Point Plant [2].

3.1.2 Conclusion

A. Cooling Water System Structures

Independent review corrborates the Licensee's selection of appropriate cooling system structures, with two exceptions:

- The failure of the discharge canal will not prevent water from passing into the lake, and therefore will have no effect on the ability of the plant to shutdown. Further, although a riprap breakwater was constructed on the west side of the discharge canal, its failure would result only in gradual siltation of the discharge canal, and therefore it is not safety-related.

- The buried fire main piping system need not be inspected under this specific inservice inspection program. Although this system may be safety-related and may provide an overview for transfer of emergency cooling water in some emergency situations, it does not fall under the guidelines of Regulatory Guide 1.127. The intent of Regulatory Guide 1.127 is to include water control structures (dams, levees, breakwaters, and conveyance facilities), the failure of which would cause:

  a. flooding of the site and safety-related equipment, or

  b. loss of the ultimate heat sink, such as the emergency service water.

  Since failure of the buried fire main piping system would cause neither of the above, it need not be inspected under this program.

B. Flood Protection Structures

Independent evaluation for this report confirms that no structures built for the purpose of flood protection exist at the Big Rock Point plant site. However, certain site drainage features (the site drainage system) can prevent flooding of the site area.

3.2 DETAILS TO BE INSPECTED

3.2.1 Licensee Identification

The following elements of the previously identified structures were identified by the Licensee [2] as appropriate inspection items:

A. Cooling Water System Structures

Structures	Element(s) to be Observed	Inspection Frequency (proposed)
Offshore Intake Structure	Integrity of wood vanes and steel structure	5 years
Offshore Intake Line	Siltation or blockage checked by water level in forebay	3 times a day

Structures	Element(s) to be Observed	Inspection Frequency (proposed)
Forebay of Screenhouse	Integrity of the concrete structure	5 years
Opening of Offshore Intake Line	Integrity of the opening of the offshore intake line	None identified
Trash Rack Grating	Integrity of the grating	None identified
	Accumulation of loose objects	None identified
Traveling Screens and Components	Accumulation of loose objects	Annually
	Condition of concrete	None identified
Warm Water Recirculation Line	Integrity	None identified
Screenhouse Foundation	Settlement or cracks in concrete	None identified
Discharge Canal	Accumulation of sand or silt	None identified (Has been done twice in 5 years)

B. Flood Protection Structures

No flood protection structures exist at the Big Rock Point plant.

3.2.2 Conclusion

A. Inspection of Cooling Water System Structures and Components

It is concluded:

1. The offshore intake structure should be inspected for settlement and tilt, in addition to integrity of the wooden vanes and steel structure.

2. The interior of the offshore intake structure should be inspected for deterioration and damage or structural integrity.

3. The offshore intake line should be inspected internally for damage, siltation, and buildup of sand and debris at least once every five years.

4. The trash rack and traveling screens are features of safety-related water conveyance structures which prevent the buildup of debris which could otherwise preclude the flow of cooling water. Since failure of the trash racks and traveling screens to perform their protection function could cause a loss of UHS, these features should be inspected. The trash rack grating and the traveling screen should be subject to inspections, in addition to bi-hourly surveillances which are less specific than inspections and may be oriented toward other purposes than condition of safety-related equipment.

5. The forebay of the screenhouse should be inspected for siltation.

6. The discharge canal need not be inspected since its failure will not preclude successful operation of the cooling water system.

7. For all elements, a formal inspection program should be developed which defines the inspection frequency.

8. Screenhouse should be inspected for excessive settlement, cracks, and structural integrity.

B. Flood Protection Structures

No flood protection structures exist at the Big Rock Point plant [8]. Should construction of any flood control structures be required during the integrated assessment process, those structures must be included in this inspection program.

3.3 INSPECTION PROGRAM

The Licensee has stated [2] that there is no formalized inspection program for water control structures incorporating the methods identified in Regulatory Guide 1.127 for the Big Rock Point plant. The Licensee has not stated that the preventive maintenance and periodic inspection programs are conducted or overseen by qualified engineering personnel.

3.3.1 Inspection Report

Regulatory Guide 1.127 identifies the need to prepare inspection reports following the inspection of safety-related water control structures. These documents should be maintained on the site, for reference purposes. The Licensee has stated, and the site visit confirms, that drawings and inspection data or reports are available on the site. The Licensee has further stated that no formal inspection program for water control structures which satisfies Regulatory Guide 1.127 is underway at the Big Rock Point plant.

3.3.2 Frequency of Inspection

The Licensee's informal inspections do not meet the intent of the inspection criteria identified in Regulatory Guide 1.127. The Licensee should develop formal inspections to be conducted at a frequency which takes into consideration the consequences of failure of the structure and the frequency of the initiating event. Special inspections should be performed immediately after the occurrence of an event which challenges the integrity of the safety-related water control structure. For the UHS, this implies that an inspection is necessary following significant buildup of ice or other debris, or an earthquake of specified intensity.

3.3.3 Conclusion

Based on the preceding evaluation, it is concluded that:

1. The Licensee should formalize an inspection program for water control structures.

2. The Licensee should develop comprehensive report forms to convey inspection information obtained by the field inspector to the appropriate inspection program manager.

3. The Licensee should develop criteria by which "special inspections" are initiated for the purpose of ascertaining the integrity of structures jeopardized by extreme environmental events.

4. The Licensee should define the appropriate inspection frequency for all water control structures with consideration given to the consequences of failure of those structures and the frequency of the events which jeopardize the integrity of those structures.

5. Inspections should be conducted under the supervision of a qualified engineer.

4. CONCLUSIONS

The Licensee has identified pertinent water control structures at the plant but has not developed a formal inspection program that conforms to Regulatory Guide 1.127.

The Licensee should formalize its present informal inspection program and incorporate the comments and criticisms contained in this report. Special consideration should be given to the following:

- The offshore intake structure should be inspected for settlement or movement.
- The interior of the offshore intake structure and the intake line should be inspected.
- The screenhouse should be inspected for settlement.
- The Licensee should develop comprehensive report forms to convey information obtained by the field inspector to the appropriate inspection program manager.
- The Licensee should develop criteria to initiate "special inspections" to ascertain the integrity of structures jeopardized by extreme environmental events.
- The License should define inspection frequencies.
- Inspections should be made under the supervision of a qualified engineer.

Following initiation of these recommended changes, the inservice inspection for water control structures underway at the Big Rock Point plant will satisfy the intent of Regulatory Guide 1.127.

5. REFERENCES

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2. R. A. Vincent (CPCo)
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3. "Inspection of Water-Control Structures Associated with Nuclear Power Plants"
   NRC, March 1978
   Regulatory Guide 1.127

4. "Ultimate Heat Sink for Nuclear Power Plants"
   NRC, January 1976
   Regulatory Guide 1.27

5. "Quality Assurance Program Requirements (Design and Construction)"
   NRC, March 1978
   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
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8. Big Rock Point Plant, Final Safety Analysis Report
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