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February 16, 1982

Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station, Unit 2
SEP Topic III-3.C, Inservice Inspection of Water Control Structures

NRC Docket 50-237

Reference: (1) T.J. Rausch letter to D.G. Eisenhut dated August 14, 1981

Mr. Crutchfield:

Reference (1) committed Commonwealth Edison to devote additional resources to completion of SEP. CECo committed to develop several topic Safety Assessment Reports (SAR) which would be submitted for Staff review. In accordance with this committment, CECo hereby provides as Attachment 1, the SAR for SEP Topic III-3.C, Inservice Inspection of Water Control Structures.

Please address any questions you may have concerning this matter to this office.

One (1) signed original and thirty-nine (39) copies of this transmittal have been provided for your use.

Very truly yours,

T.J. Rausch
Nuclear Licensing Administrator
Boiling Water Reactors

SPPJ:sb
1547D*
Attachment
cc: RIII Resident Inspector, Dresden

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Docket No. 50-237

Attachment 1

SEP TOPIC III-3C

INSERVICE INSPECTION OF WATER-CONTROL STRUCTURES

DRESDEN NUCLEAR POWER STATION

UNIT 2

COMMONWEALTH EDISON COMPANY

February 16, 1982

DRESDEN 2

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Tables

1.0 INTRODUCTION

The objective of this topic is to assure that adequate and timely inspections of water-control structures, systems and components are accomplished to minimize the risk to public health and safety resulting from operation of a nuclear power plant. This topic specifically pertains to water-control structures (e.g., dams, reservoirs, conveyance facilities) built for use in conjunction with a nuclear power plant and whose failure could cause radiological consequences adversely affecting the public health and safety. In general, to be included under this topic, the structure must have been built, wholly or in part, for the purpose of controlling or conveying water for either emergency cooling operations or flood protection of a nuclear power plant.

1.1 Current Review Critiera

US NRC Regulatory Guide 1.127

1.2 Related Safety Topics and Interfaces

The slope stability aspect of water-control structures will be reviewed under topic II-4.D. Settlement of water-control structures will be reviewed under Topic II-4.F. Other interface topics include: II-4.E, Dam Integrity; II-3.A, Hydrologic Description; II-3.C, Ultimate Heat Sink; III-3.A, Effects of High Water on Structures; III-4.A, Tornado Missiles; IX-3, Station Service and Cooling Water Systems; III-6, Seismic Design Considerations; XVI, Technical Specifications; and III-3.B, Structure and Other Consequences of Failures of Underdrain Systems.

2.0 TOPIC EVALUATION

2.1 Site Description and Water Supply

The site for Dresden Nuclear Power Station consists of a tract of land of approximately 953 acres located in the northeast quarter of the Morris 15' quadrangle (United States Geological survey Designation) Goose Lake Township, Grundy County, Illinois. The site boundaries generally follow the Illinois River to the north, the Kankakee River to the east, a country road from Divine extended eastward to the Kankakee River on the south and the Elgin, Joliet and Eastern Railway right-of-way on the west.

Unit 1 is located on the northeast corner of the site with an intake canal extending from the kankakee River to the east and a discharge canal extending north to the Illinois River.

Unit 2 is located on the site immediately to the west of Unit 1. Unit 2 is situated approximately 0.5 mile from the south boundary of the site, 0.5 mile from the centerline of the Kankakee River to the east, 0.5 mile south of the center of the navigation channel in the Illinois River, and approximately one mile from the west boundary of the site.

A paved county road extends south from the gate to Dresden Nuclear Power Station and intersects several other paved county roads which connect with several state highways. Lorenzo Road, which runs in an eastwest direction approximately 3-1/2 miles south of the site, provides access to Interstate Route 55 approximately 4 miles east of the site. Interstate Route 55 is a limited access highway between Chicago and St. Louis. Another limited access east/west highway, Interstate Route 80, lies approximately five miles north of the site and is accessible from either Interstate Route 55 or state highway Illinois 47, at a point approximately two miles north of Morris, Illinois.

The Dresden site is at the confluence of the Des Plaines and Kankakee Rivers which divides the upper and lower parts of the Illinois River system. The normal pool elevation controlled at the adjacent Dresden island Lock and Dam is 505 feet, with a maximum historical flood elevation of 506.4 feet. Nominal ground elevation is about 516 feet at the location of the principal structures of Unit 2, which renders the probability of site flooding extremely remote. Spillway capacity at the Dresden Island Lock and Dam is well in excess of the estimated maximum instantaneous flow of the Illinois River (100,000 cfs, based on the assumption that maximum flows for all contributory streams occur simultaneously). The site elevation is well above the vast valley storage area upstream from the dam.

The Des Plaines and Kankakee Rivers provide the normal heat sink for the three Dresden reactors. For Dresden Units 1, 2 and 3, these rivers also provide the principal source of cooling water for removal of the residual decay heat following a unit shutdown. In addition to the main condenser circulating water system, there are four systems on Units 2 and 3 which depend on the use of river water. These systems are 1) LPCI in the containment cooling mode, 2) service water system 3) fire water system, and 4) cooling water for diesels. For Unit 1, the containment cooling and fire water system are combined into one system.

The normal pool water level above the Dresden Island Lock and Dam is 505 feet 0 inch MSL (Mean Sea Level). The pool level can vary from a low of 503 feet 0 inch to a high of 506 feet 5 inches MSL. The pool level below the Dresden Dam is 483 feet 4 inches MSL. The top of the next dam downstream, approximately 25 miles at Marseilles, is 486 feet 6 inches MSL.

Units 2 and 3 share a common intake canal approximately 1800 feet long: Unit 1 has a separate intake canal of the same length. The high point on the floor of both intake canals is 495 feet and is located 123 feet downstream of the floating booms which protect the entrance to both canals from floating debris. The canal floors then decrease in elevation until a low point of 482 feet 6 inches is reached at forebay of the crib houses.

There are two discharge canals each approximately 2000 feet in length. One canal serves Unit 1 and the second serves both Units 2 and 3. The high point of 498 feet 0 inch, on the floor of the discharge canals, is located near the discharge flume, the point where the canals join the river. Between this high point and the discharge head works, the floor of the canal decreases to an elevation of 489 feet 0 inch.

An 8-foot diameter deicing line connects the discharge head works of Units 2 and 3 and the forebay of Units 2 and 3 crib house. The bottom of deicing line in the head works has an elevation of 495 feet 0 inch. A slide gate valve is used to isolate this line when not in use. Low point of deicing line in forebay is 489 feet 0 inch.

2.2 Foundations and Engineering Characteristics of the Site

The generalized geologic column for the site consists of an upper layer of Pennsylvanian Pottsville sandstone of variable thickness of 40 to 50 feet. The next layer below is about 15 to 35 feet of Ordovician Maquoketa Divine limestone based on a 65 foot layer of Maquoketa dolomitic shale. The Ordovician system has a total thickness approaching 1000 feet, with the Cambrian system next below. Brecciated rock is found on some cross sections and is indicative of ancient faulting. The geologic evidence indicates that these faults are inactive. (FSAR).

Laboratory tests showed that unconfined ultimate compressive strength on boring samples ranged from 2,000 to 15,000 pounds per square inch on most samples. Laboratory wave velocity propagation tests showed 4,000 to 15,000 feet per second, and the field testing in the two borings was generally consistent with the laboratory findings (FSAR).

In summary, the geological characteristics of the site are suitable for Dresden Unit 2. The load bearing capacity of the rock formation is significantly in excess of that necessary for the support of the Unit 2 structures. The topographic (elevations) characteristics of the Dresden Station, particularly that of the Unit 2, preclude possible movements (slides), either of the plant structures into the Illinois River or earth slides from adjacent higher elevations onto the Unit 2 structures.

2.3 Description of Water-Control Structures

The following structures and components associated with Dresden 2 have been identified as requiring surveillance in accordance with Regulatory Guide 1.127.

2.3.1 Cooling Water System Structures

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.

2.3.2. Flood Water Control Structures

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

2.4 Engineering Data Compilation on Water Control Structures

General site data, hydrologic data and hydrologic features, geotechnical data, foundation and soils data/drawings, geologic features information, geo-technical data, seismic analysis data, inspection data/reports, and drawings are available onsite and in the Chicago Office of Commonwealth Edison Company for ready accessibility.

3.0 Onsite Water-Control Structure Inspection Program and Reports

An inspection program was established in 1979 for the water-control structures and associated features at Dresden 2. Normal surveillances, periodic inspections and routine preventive maintenance performed on the water-control structures, systems and components would detect in a timely manner any signs of deterioration that could result in failure.

Dresden Station has several surveillances for water-control structures.

3.1 A biyearly inspection is performed by Harza Engineering Company of Chicago. The inspection covers a general inspection along with some specifics:

1. Slope stability
2. Structural stability
3. Hydraulic features (drainage and erosion)
4. Geotechnical features.

3.2 A monthly inspection is performed by personnel assigned to Dresden. This inspection is a more general inspection.

The nature, frequency and responisble group for the inspection of the water control structures covered above are tabulated in Table 1.

3.3 The electrical components in the cribhouse and lift station have no set surveillance schedule. They are inspected or repaired as required or when mechanical work is being performed on a component.

3.4 Mechanical components are on a regular preventive maintenance schedule. Major component overhaul is not on a regular schedule but is monitored as part of the preventive maintenance system. Major component overhaul is not on a regular schedule but is monitored as part of the preventive maintenance system.

4.0 Cooling Water System Structures

In 1979 Commonwealth Edison Company initiated a formal onsite water control structures inspection program. The purpose of this inspection prog;ram is to comply with the intent of the Regulatory Guide 1.127. The following paragraphs describe the inspection program for the Dresden 2 water-control structures.

DRESDEN 2
TABLE 1

PRESENT INSPECTON PROGRAM CONDUCTED BY
DRESDEN STATION STAFF AND CONSULTANTS

Structure	Frequency	Performed By
All doors at Grade Level	Every six months	Security
Water Level Gauge at Cribhouse	Every time flow regulation gates are operated	Operations
Intake & Discharge Canals:		
1) Sounding	Last Sounding 1979 (every 5 years)	Technical Staff
2) Canal Erosion	Monthly (A)	Technical Staff
3) Slope Stability	Monthly (A)	Technical Staff
4) Weed Growth in Canals	Monthly During Summer (A)	Technical Staff
Forebay, Cribhouse & Discharge Structure:		
1) Soundings	Last Sounding 1979	Technical Staff
2) Slope Stability	Monthly (A)	Technical Staff
3) Structural Integrity	Every 2 years	Harza Engineering
Deicing Line:		
1) Structural Integrity	Every 2 years	Harza Engineering
2) Blockage	Whenever operated, at least yearly	Operations
3) Gate Valve	Whenever operated, at least yearly	Operations
Flow Regulation Station:		
1) Soundings	Last Sounding 1979	Technical Staff
2) Blockage of Gate Opening	Whenever operated, at least yearly	Operations
3) Trouble Free Operations	Whenever operated, at least yearly	Operations

(A) Covered under Monthly Lake Inspection

4.0.1 Intake Canal, Discharge Canal, and Return Intake Canal:

Soundings of the bottoms of these canals are obtained and checked with the as-built conditions. If the soundings indicate that there is two feet or more of sediment and debris accumulated at the bottom of these canals, then the sediment and debris will be dredged out. Visual inspection of the banks of the canals are made to locate any areas of excessive erosion or slope instability. If the inspection shows any damaged areas, they will be repaired. The canals are also inspected for any weed growth, and, if necessary, weeds will be controlled.

4.0.2 Forebay, Cribhouse and Discharge Outfall Structure:

These structures are inspected for sediment, debris accumulation, and slope stability as outlined above. In addition, these structures are checked for structural stability by inspecting the condition of their concrete surfaces to evaluate the extent of any deterioration and continued service ability of the concrete. The structures are examined for structural cracking resulting from overstress due to applied loads, shrinkage, and temperature effects of differential movements. All water passages and other concrete surfaces subject to running water are examined for erosion, cavitation, obstructions, leakage, or significant structural cracks. Any defects found as a result of the inspection will be rectified.

4.0.3 Deicing Line:

The 8 foot diameter deicing line is inspected for its structural integrity and for freedom from any blockage by debris.

4.0.4 Gate Valve on the Deicing Line:

The gate valve is inspected/tested for its operability.

4.0.5 Intake and Discharge Conduits:

These conduits are inspected for their structural stability and for freedom from blockage by debris.

4.0.6 Flow Regulation Station:

The bottom is sounded for detecting any excessive sediment and debris accumulation. The gate openings are inspected for any blockage by debris. The gates are inspected/tested for their easy operability.

4.1 Flood Water Control Structures

4.1.1 All doors at grade level:

All doors at grade level are inspected for free access without any obstructions and will be verified for trouble free operation of the doors.

4.1.2 Water Level Gage at Cribhouse:

The gage is verified for its availability and readability of the water level indication.

4.2 Technical Evaluation

When the engineering data review findings and the proposed onsite inspection indicate that significant changes have occurred from design conditions, an evaluation of the existing conditions of the water-control structures will be made to determine the effect on the safe operation of the power plant. The evaluation will include the assessment of the hydraulic capacities of the canals and the structural stability of the structures based on the observed changes and/or affected parameters.

Frequency of Inspections

Table 2 summarizes the structures inspected and the frequency of inspection.

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TABLE 2

DRESDEN INSPECTION PROGRAM

Water Control Structures	Nature of Inspection	Time of Inspection	Frequency Of Inspection
All doors at grade level	Trouble free Operation	Any time	Yearly
Water level gage at cribhouse	Availability and readability	Any time	Yearly
Intake discharge & return intake canals	Soundings	Summer or fall	Once a year for first 2 years and 1 to 5 years and thereafter depending on observed sedimentation rate
	Erosion, slope stability	Early spring or late fall	Yearly
	Weed growth	Summer	Yearly
Forebay, cribhouse & discharge structure	Soundings	Summer or fall	Once a year for first 2 years and 1 to 5 years thereafter depending on observed sedimentation rate
	Slope stability	Early spring or late fall	Yearly
	Structural integrity	Any time when ice does not exist	Once a year for first 2 years and 1 to 5 years thereafter depending on observed sedimentation rate

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TABLE 2 Cont'd

	Blockage	Any time when ice does not exist	Yearly
Gate Valve on deicing line	Trouble free operation	Any time	Yearly
Intake and discharge conduits	Structural integrity	Any time	Once a year for first 2 years and 1 to 5 years thereafter depending on observed sedimentation rate
	Blockage	Any time	Yearly
Flow regulation station	Soundings	Summer or fall	Once a year for first 2 years and 1 to 5 years thereafter depending on observed sedimentation rate
	Blockage of gate openings	Any time when ice does not exist	Yearly
	Trouble free operation	Any time	Yearly
Electrical & mechanical equipment		INPUT FROM STATON MAINTENANCE	

4.2 Inspection Report

A technical report is prepared to present the results of each of the above mentioned inspections. These documents will be kept at the project site for reference purposes and will be available for inspection by regulatory authorities. Any abnormal conditions observed during the inspection will be reported by Commonwealth Edison Company immediately to the NRC staff in accordance with the requirements of Regulatory guide 1.16, "Reporting of Operating Information - Appendix A, Technical Specifications."

5.0 Conclusions

5.1 Appropriate water-control structures associated with Dresden Unit 2 site which come under the regulatory positions of Regulatory Guide 1.127 have been identified.

5.2 Engineering data related to the site and the structures are available at the site, and at the Commonwealth Edison Company's office in Chicago.

5.3 There is an existing inspection program for water control structures which would detect in a timely manner any signs of deterioration that could result in failure.

6.0 References

1. U.S. NRC Regulatory Guide 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants, March, 1978.

2. Final Safety Analysis Report, Dresden Unit 2, Commonwealth Edison Company, Chicago.