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 DENTON, H. R. Office of Nuclear Reactor Regulation

SUBJECT: Forwards info re scour bed mod program in response to  
790713 NRC request. Oversize drawing encl.

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# INDIANA & MICHIGAN POWER COMPANY

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September 13, 1979  
AEP:NRC:00243

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74  
Scour Bed Modification Program

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Denton:

In his letter dated July 13, 1979, Mr. A. Schwencer requested information on four specific items related to the Cook Plant's Scour Bed Modification Program. Attached is our response to the above request.

Very truly yours,

*John E. Dolan*  
John E. Dolan  
Vice President

JED:em

cc: R. C. Callen  
G. Charnoff  
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ATTACHMENT  
AEP:NRC:00243

Item 1:

Descriptions of the condition of the scour beds prior to implementation of corrective actions. Include a description of the procedures used to assess the bed condition.

Response:

The condition of the scour bed prior to the implementation of corrective actions was presented to your office in Drawing No. 12-3721, part of our submittal No. AEP:NRC:00170 dated April 6, 1979. This drawing showed the disruption of the scour bed as well as a hole in the grout apron within the limits of the iceguards. Attached is a revised drawing which identifies clearly the disrupted areas in front and underneath of the discharge structure. The cross hatched section represents the disrupted areas. The scour was identified during a routine underwater visual inspection of the discharge structure and the surrounding area. The magnitude of the scour was established by reviewing the underwater photographs taken during the above inspection. It was also established that the scour was caused by the high velocities associated with the discharge jets.

Item 2:

A description of the alternatives considered for correcting the scour problem and bases for the solution chosen.

Response:

A detailed study, consisting of a number of alternatives, was conducted to correct the then existing condition as well as to prevent future occurrences. A summary of the methods studied are given below.

The first method considered was to replace the existing riprap with larger stone to prevent erosion. The riprap's calculated size proved to be not feasible, as riprap is not readily available in the area. This alternative proved to be impractical.

The second method investigated was to construct the scour bed using interlocking concrete blocks. This method was not chosen since it requires a considerable amount of labor, material and time for placement.

A third alternative was to install steel facing. This method would require the welding of steel sheets together to form a continuous unit. This scheme requires extensive diver time for the installation and has potential for corrosion.

The method decided upon was to pour tremie concrete within a steel frame work. A cross-sectional thickness of two feet was used with no reinforcing steel as no shear forces are expected. This surface, being continuous, will prevent entrainment of any of the surrounding water as well as surface wear and erosion associated with the discharge velocity. This method was chosen since it was easy to fill the voids under the structure as the concrete is very fluid. Pouring concrete on the lake bottom was not as costly as placing prefabricated concrete elements and the contractor expressed confidence in the final product if tremie concrete was used. It was also decided to reconstruct the disrupted area shown in Section A<sub>1</sub> - A<sub>1</sub> of the attached drawing, using tremie concrete to prevent similar occurrences in the future.



Item 3:

A description of the scour monitoring program including the reasons why the scour problem was not identified earlier.

Response:

Since late 1974, approximately two scour studies were conducted per year to meet the requirements set forth in Section 4.1.1.4 of the Plant's Appendix 'B' Technical Specifications. In addition to this study the University of Michigan has done some diving inspections in the vicinity of the discharge structures, however, not in the immediate area of the discharge jets. During all the above studies through the present time no scour was detected by either of the above two procedures. The operation of the circulating water system since initial criticality prevented any diving inspections of the area immediately in front of the discharge jets until late 1977, and the Technical Specification scour study is not sensitive enough to detect scour of the magnitude which has existed in the past. The Annual Environmental Reports discussed the results of the studies required by the Appendix 'B' Technical Specifications.

On September 2, 1977 a commercial diving company visually inspected the Unit 1 discharge structure and the area immediately in front of the discharge jets. During this inspection it was discovered that scour was present in front of the discharge jets. After an engineering review it was recommended that stone be placed back into the scoured out area. This recommendation was given on December 12, 1977. The procedure would require a plant shutdown and good lake conditions for its implementation. The two conditions were met during the Unit 1 refueling of April, 1978. After Unit 1 returned to service, and the circulating water system was operational, the discharge area was watched more closely by sounding the immediate area and observation whenever possible. By the Fall of 1978, it was determined that scour of the immediate area in front of the Unit 1 discharge had again taken place.

Item 4:

The proposed program to monitor the rebuilt discharge scour bed.

Response:

Periodic underwater visual inspections will be made, weather permitting, on all underwater structures such as the discharge lines, structures and scour beds to check the damage that may arise from settling, ice accumulation, wear, etc. The discharge area will be watched more closely by conducting sounding studies in the immediate area in front of the discharge jet. Written reports of the studies and photographs will be made available at the plant for future reference.