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SUBJECT: Forwards addl justification for deletion of requirement to perform erosion & scour bed studies from proposed revision to ETS..

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January 18, 1982
AEP:NRC:0055E

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
ENVIRONMENTAL TECHNICAL SPECIFICATIONS

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

Dear Mr. Denton:

This letter responds to a request for information from your Staff to provide additional justification for the deletion of the requirement to perform Erosion and Scour Bed studies from the proposed revision to the Donald C. Cook Nuclear Plant Environmental Technical Specifications, submitted in our letter No. AEP:NRC:0055C, dated November 4, 1981.

Attachment 1 to this letter provides the basis for our request to delete these requirements. Attachment 2 identifies information pertinent to the reports that contain studies performed as part of our current surveillance program and is submitted as an annotated bibliography for reference purposes.

This document has been prepared following Corporate Procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

R. F. Hering
Vice President

RFH/sg

cc: Attached

A002
B 1/1

cc: John E. Dolan
R. S. Hunter
W. G. Smith - Bridgman
R. C. Callen
G. Charnoff
Joe Williams, Jr.
NRC Region III Resident Inspector - Bridgman

ATTACHMENT 1 to AEP:NRC:0055E
Erosion and Scour Studies
in Lake Michigan Near the
Donald C. Cook Nuclear Plant

The Appendix B, Environmental Technical Specifications, Sections 4.1.1.3, Erosion and 4.1.1.4, Scour Studies have been part of the annual studies by the University of Michigan for 12 years. A brief summary of the studies is presented below to demonstrate that the Objectives have been achieved and that the Bases for the studies have been satisfied.

The erosion study objective was to determine the effect of the Plant's circulating water, rip-rap scour bed, and shore pilings on the erosional and depositional processes affecting the stability of beaches in the vicinity of the site. The basis of the beach erosion monitoring program was to verify the contention that ice building mechanisms operate to repair any ice melt caused by the thermal plume.

Studies were conducted by photographing the beach area from the air and from the ground. Pictures were taken during seasons when ice was present and when the ice was absent. Photographs taken from the air during non-ice conditions were compared from year-to-year to determine if the beaches north and south of the plant were stable, in other words, that sand erosion and accumulation rates were equal and unaltered by the construction and operation of Cook Nuclear Plant. Photographs of the ice accumulation and destruction were taken and studied over the fall and winter ice season. Each season the photographs were studied to determine whether or not the thermal plume had melted the beach ice ridge, allowing the waves to erode sand from the unprotected beach.

The scour studies were to verify that there are no scour problems resulting from the Plant's high velocity discharge and to verify the short-term and long-term integrity of the scour bed placed around the cooling water discharge structures.

Monitoring of the scour bed performance has been completed in accordance with the environmental technical specifications. Our studies revealed that modifications to the Unit 1 scour bedwere required and subsequently completed. Modifications to the Unit 2 scour bed were also made and completed. Information concerning the modifications made to the areas surrounding the discharge structure were submitted to the NRC in our letters AEP:NRC:0170 and AEP:NRC:0243, dated April 6, 1979 and September 13, 1979, respectively. Monitoring continued on the performance of these modifications for one year after completion of the work.

Results of the studies have been reported in scientific journals in the Great Lakes Research Division of the University of Michigan Special Reports and in the Environmental Operating Reports to the NRC. The conclusions of all the reports clearly demonstrate that the construction and operation of the Cook Nuclear Plant has not caused a significant change in the beach configuration near the Plant, the thermal plume does not cause significant shore ice melting and subsequent beach erosion, and the high velocity jet discharges do not cause scouring of the Lake bottom.

Future modifications to the scour beds resulting from any future studies performed by the licensee or requested by the appropriate federal or state agency will be submitted for approval to said agencies having jurisdiction over this work. The appropriate federal agency is the United States Corps of Engineers under Section 10, Rivers and Harbors (R&H) Act, 1899, and Section 404, Federal Water Pollution Control Act (FWPCA), 1972. The appropriate state agency is the State of Michigan, Department of Natural Resources under Act 346, P.A. 1972, and Act 247, P.A. 1955.

Attachment 2 to AEP:NRC:0055E

NRC Submittal
Source Document List

Annotated Bibliography

Anon. 1975. Environmental Operating Report. October 25 through December 31, 1974. Donald C. Cook Nuclear Plant Unit 1. Indiana & Michigan Power Company. 15 pp. + appendices.

Aerial surveys were made monthly of ten miles of beach, north and south of the plant. All erosion observed was due to natural processes. Three one-foot interval contour maps of the Lake Michigan shoreline were made during 1974 and none of these maps showed any unusual erosion patterns.

Lake bottom profiles by sounding were made during 1974 on a grid 3,000 ft. x 13,000 ft. The bottom profile showed no scour due to plant operation. Semiannual soundings of the intake and discharge areas, which covered an area 1,400 ft. x 2,400 ft., also showed no signs of scour.

Anon. 1975. Environmental Operating Report, January 1 through June 30, 1975, Donald C. Cook Nuclear Plant Unit 1. Indiana & Michigan Power Company. 27 pp. plus appendices.

Aerial photographs from one mile north of the plant to one mile south of the plant were taken monthly and the analyses of the photographs from September 1974 through March 1975 showed no appreciable changes in beach profile during this time. A map was prepared from the March 1975 photographs and compared with earlier maps. An area 2,000 ft. to 2,500 ft. south of the plant no longer showed the various mounds and channel-like depressions which remained after the safe harbor was removed in 1973.

Two bottom profiles were made by sounding a 3,000 ft. x 13,000 ft. grid during April and May. These soundings indicated only minor lake bottom movement and slight deviations from the August 1974 soundings. There appeared to be normal seasonal shifting of sand bar position. Semiannual soundings of the intake and discharge scour beds showed no significant changes.

Anon. 1976. Environmental Operating Report, July 1 through December 31, 1975, Donald C. Cook Nuclear Plant, Unit 1. Indiana & Michigan Power Company. pp. + appendices.

Aerial photographic surveys of the beach north (one mile) and south (five miles) of the plant indicate that no appreciable change in the beach front since the March, 1975 survey.

The lake bottom profiles determined by sounding in the 3,000 ft. x 13,000 ft. area showed some minor shifting of the bottom, but the overall trend was toward stabilization. The more detailed sounding of the 1,400 ft. x 2,400 ft. grid over the intake and discharge also showed only minor changes in the lake bottom. SCUBA diver observation of the scour beds near the intake and discharge structures found the rip-rap was covering the two scour beds and the three intake pipes.

Anon. 1976. Environmental Operation Report, January 1, 1976 through June 30, 1976, Donald C. Cook Nuclear Plant, Unit 1. Indiana & Michigan Power Company. 24 pp. + appendices.

The shoreline aerial photographic survey also showed no changes since the September 1975 survey. Shore ice studies of Winter 1973-74 were reported in Special Report No. 55 of the University of Michigan, Great Lakes Research Division. All studies showed there were no significant changes

to the shoreline profile or lake bottom profile due to the construction and operation of the plant.

Monthly soundings beginning in April, 1976, of the 3,000 x 13,000 ft. grid adjacent to the plant showed very little change had occurred in the bottom profile since October 1975. Similar results were obtained from soundings taken on the 1,400 ft. x 2,400 ft. grid encompassing the intake and discharge structures.

Anon. 1977. Environmental Operating Report, July 1, 1976 through December 31, 1976, Donald C. Cook Nuclear Plant, Unit 1. Indiana & Michigan Power Company. 25 pp. + appendices.

Aerial photographs of the shoreline indicated the beaches were stable and not eroding.

Bottom profile studies within the 3,000 ft. x 13,000 ft. grid were conducted monthly from April through October, however, weather conditions did not allow soundings after August. No soundings were taken within the 1,400 ft. x 2,400 ft. study area. The data showed the bottom profiles to continue to stabilize.

Anon. 1978. Annual Environmental Operating Report, January 1 through December 31, 1977, Donald C. Cook Nuclear Plant, Unit 1. Indiana & Michigan Power Company. 29 pp. + appendices.

Ice studies during 1976-77 showed that the ice melt hole caused by the thermal plume had no effect on the most lakeward ice ridge. Therefore, the beach was protected the entire winter from the erosion by open waters caused by the plant.

During 1977 depth profile data were collected using electronic digital depth sounding equipment wired to a microprocessor which recorded the

real-time depth readings from the depth sounder and boat position supplied by an electronic ranging system. Data collection cruises were made on July 29, and September 22, 1977. Bathymetric maps of Lake Michigan adjacent to the plant were prepared and presented in the annual report (pages 8 and 9). Comparisons of the maps produced by the two surveys show very little change occurred between the two surveys.

Anon. 1979. Annual Environmental Operating Report, January 1 through December 31, 1978, Donald C. Cook Nuclear Plant Units 1 & 2. Indiana & Michigan Power Company. 42 pp. + appendices.

Shore ice photographs taken from the ground and from the air during Winter 1977-78 were examined for the effects of the thermal plume. Unlike the previous winter, the plume did melt the third ice ridge during Winter 1977-78. The ridge was reformed shortly after the melt and on no occasion did the plume melt the ice completely shoreward. Therefore, no beach erosion occurred due to plant operation.

Lake bottom profiles were determined from data collected on June 20 and October 20, 1978. Depth data, boat location, and data recording were all accomplished with the same electronic depth sounding, ranging system, and microprocessor and recorder used in the 1977 surveys. Bathymetric maps were prepared and presented in the report. Comparisons of the two maps show little difference between the June and October surveys and no significant changes from the 1977 maps.

Anon. 1980. Annual Environmental Operating Report, January 1 through December 31, 1979, Donald C. Cook Nuclear Plant Units 1 & 2. Indiana & Michigan Electric Company. 30 pp. + appendices.

Beach erosion was studied by photographing the ice melt caused by the

plant thermal discharge. Aerial and ground level photographs were taken and analyzed to determine thermal plume impacts. Ice was melted from the shoreline out to the hole melted by the thermal plume. The melting was limited to a narrow strip immediately in front of the plant above the discharge tunnels and at no time exceeded the width of the plant property. This melting of ice was due primarily to water leaks in the discharge tunnels and not due to two-unit operation. The shore ice melting may have been enhanced by salt used to melt ice and snow from plant parking lots which runs off the lots into the lake. Except for the area in front of the plant, the melted first lagoon and bared beach were protected from erosion by ice ridges.

Scour studies required by the Technical Specifications had been completed in 1978, therefore, no scour studies were conducted in 1979.

Anon. 1981. Annual Environmental Operating Report, January 1 through December 31, 1980, Donald C. Cook Nuclear Plant Units 1 & 2. Indiana & Michigan Electric Company. 33 pp. + appendices.

Shore ice studies continued the same as previous years. Ice formation occurred in late January 1980, somewhat later than previous years. Once formed, the shore ice complex effectively protected the beach from erosion for many miles north and south of the plant. The melting due to leaks in the discharge tunnels was not clearly demonstrated by ice melt patterns, but ice melting in the first ice lagoon in front of the plant was more extensive than areas north and south of the plant indicating some leakage may have occurred.

Scour studies were continued in 1980. Placement of concrete scour bed pads around the Unit 1 and Unit 2 discharge structure was considered a major repair implementing the Technical Specification requirement that

one full year of surveys conducted at six month intervals be completed. The first of the two surveys was completed November 7, 1980 with the second one planned for April 1981. A bathymetric map was prepared and presented on page 9 of the Annual EOR. Comparisons of this map with maps from earlier surveys, July 1977, September 1977, April 1978, and October 1978, showed that there has been very little change in the bottom profiles.

Ayers, J. C., N. W. O'Hara, and W. L. Yocum. 1971. Benton Harbor Power Plant Limnological Studies: Part VIII. Winter Operations 1970-1971. Special Report No. 44. Great Lakes Research Division, University of Michigan, Ann Arbor, MI. 37 pp.

This report is a summary of the analysis of the 1970-1971 ice study at the Cook Nuclear Plant site. Ice formation, ice accumulation, ice destruction, and the effects of weather on these processes are extensively discussed in this report. Data during this winter were collected to compare with ice formation and destruction during the winters after Cook Nuclear Plant began operation.

Ayers, J. C. and W. L. Yocum. 1972. Benton Harbor Power Plant Limnological Studies: Part XI. Winter Operations 1971-1972. Special Report No. 44, Great Lakes Research Division, University of Michigan, Ann Arbor, MI. 22 pp.

This report describes the sequence of ice formation and ice destruction at Cook Nuclear Plant during the ice season of Winter 1971-1972. Cook Nuclear Plant was not operational during the winter. These data will be useful for comparing with data collected during plant operation. Ice began forming in early January and lasted until early April.

Ayers, J. C., W. L. Yocum, and E. Seibel. 1973. Benton Harbor Power Plant Limnological Studies: Part XIV. Winter Operations 1972-1973. Special Report No. 44, Great Lakes Research Division, University of Michigan, Ann Arbor, MI. 22 pp.

This report describes the sequence of ice formation and destruction during the Winter of 1972-1973 near the Donald C. Cook Nuclear Plant. Ice first began to form in mid-December 1972 and disappeared in early March 1973. During January 1973 a pronounced thaw occurred. The high water levels caused severe erosion of the beach before the ice season began. Cook Nuclear Plant was not operating during Winter 1972-1973.

O'Hara, N. W. and J. C. Ayers. 1972. Stages of Shore Ice Development. Proc. 15th Conf. Great Lakes Research Internat. Assoc. Great Lakes Res. 521-535.

Field observations and aerial and ground level photographic surveys were conducted throughout the winters of 1969-70 and 1970-71 to determine the sequence of events and processes involved in the development of the shore ice complex in fresh water. The study was carried out along the eastern Lake Michigan shoreline with the major effort concentrated on the beaches adjacent to the Donald C. Cook Nuclear Power Plant south of Benton Harbor, Michigan.

The shore ice complex first produces an icefoot composed of two ridges of onshore ice, followed by the formation of a frozen lagoon of brash ice and an outer barrier of ice. A second frozen lagoon and outer barrier develop during the coldest part of winter. Finally a field of floe ice may form for a limited time reaching offshore to a distance of at least 17 km.

The developmental stages of ice ridge and lagoon formation and destruction are dynamic and changing. The exterior ice field, second

outer ice barrier and lagoon are transient and apt to be carried away as the result of wave flexing, wind and current movements. Ice ridges and lagoons can be broken and breached by stream and wave action and reduced in height by sand-melting. However, as long as the weather and water remain sufficiently cold, the rejuvenating processes will restore ridge and lagoon continuity when exposed to the open lake.

Seibel, E., C. T. Carlson, and J. W. Mareca, Jr. 1975. Lake and Shore Ice Conditions on Southeastern Lake Michigan in the Vicinity of the Donald C. Cook Nuclear Plant: Winter 1973-74. Special Report No. 55, Great Lakes Research Division, University of Michigan, Ann Arbor, MI. 62 pp.

This study reported on the shore ice studies near the Cook Nuclear Plant during 1973-1974. Cook Nuclear Plant was not operating during this winter. Considerable analyses were completed on the ice study data since this was the fifth consecutive winter of the shore ice study. Some of the conclusions of this study were:

1. The stages of ice development are not controlled by any single climatic variable but instead there exists a complex interrelationship between the two.

2. Easterly winds coupled with rising air temperatures appear to consistently produce significant deterioration of the ice complex.

3. Onshore northwesterly winds coupled with increase in wind speed and a drop in air temperature initiate accretive sequences.

4. Large quantities of sediment are incorporated in the nearshore ice complex during accretionary stages and are transported landward, lakeward or alongshore at the time of breakup.

5. Since the ice ridges are grounded, as the data indicate, they may serve to modify the nearshore topography in the proximity

of the offshore bars sufficiently to influence the wave regime capable of reaching and acting on the shoreline and bluffline. The exact influence of this modification of the shoreline and bluffline is not yet established.

Seibel, E., C. T. Carlson, and J. W. Mareca, Jr. 1976. Ice Ridge Formation: Probable Control by Nearshore Bars. J. Great Lakes Res. Internat. Assoc. Great Lakes Res. 2(2): 384-392.

During the 1973-1974 winter season a time-lapse photographic system was used to provide a nearly continuous record of ice conditions along a segment of the southeastern Lake Michigan shoreline. By analysis of the photographs, a typical sequence of nearshore ice formation through break-up was identified. From the record of nearshore ice formation, a three-element mechanism for the development of the nearshore ice ridges in the vicinity of the study site was formulated.

Observations reveal that large quantities of sediment are incorporated into the nearshore ice and that the nearshore ice ridges are grounded on the nearshore bottom in the proximity of the offshore bars. We believe that the grounded nearshore ice ridges simultaneously modify the nearshore topography and protect the shoreline and bluffline from erosion by winter storms. The degree to which the nearshore is protected or modified has not yet been established.

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- ☐ Draft/Final Environmental Statement, dated _____.
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- ☐ Construction Permit No. CPPR-_____, Amendment No. _____ dated _____.
- ☐ Facility Operating License No. _____, Amendment No. _____ dated _____.
- ☐ Order Extending Construction Completion Date, dated _____.
- ☒ Monthly Operating Report for October 1986 transmitted by letter dated 11/6/86.
- ☐ Annual/Semi-Annual Report- _____ _____ transmitted by letter dated _____.

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☐ Safety Evaluation Report, or Supplement No. _____, dated _____.

☐ Notice of Hearing on Application for Construction Permit, dated _____.

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☒ Other *(Specify)* Monthly Operating Report for December 1985

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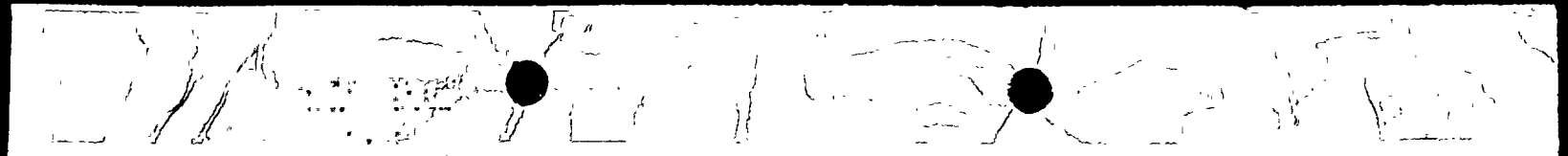

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