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June 22, 1983  
LIC-83-148

Mr. Richard H. Vollmer, Director  
U. S. Nuclear Regulatory Commission  
Office of Nuclear Reactor Regulation  
Division of Engineering  
Washington, D.C. 20555

Reference: Docket No. 50-285

Dear Mr. Vollmer:

Omaha Public Power District's  
Comments on NUREG/CR-2337

During interoffice review of the Omaha Public Power District's letter to the Commission dated June 6, 1983, which addressed the subject NUREG, it was discovered that a draft version of Appendix A, "Mechanical Errors from NUREG/CR-2337, Vol. 1, 'Aquatic Impacts from Operation of Three Midwestern Nuclear Power Plants,'" had inadvertently been included in place of the final copy. The correct version of Appendix A is attached to this letter and replaces Appendix A in the June 6, 1983 letter.

Sincerely,



W. C. Jones  
Division Manager  
Production Operations

WCJ/TLP:jmm  
Attachment

cc: LeBoeuf, Lamb, Leiby & MacRae  
1333 New Hampshire Avenue, N.W.  
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Mr. R. A. Clark, Chief  
U. S. Nuclear Regulatory Commission  
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Mr. E. G. Tourigny, Project Manager  
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## APPENDIX A

Mechanical errors from NUREG/CR-2337 Vol. 1, "Aquatic Impacts From Operation of Three Midwestern Nuclear Power Stations"

### Summary of Findings

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
1	3	Contrary to the author's statement, the Recruitment Study data base allows the estimate of the number of fish eggs entrained (Ref. No. 33 in NUREG and Middle Missouri River: Chpt. 8, Pg. 187).

#### 1.0 Introduction

##### 1.2 Approach and Rationale

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
1-4	1	The classification of gizzard shad as "exotic" is not correct. The Nebraska Game and Parks Commission in 1886 reported gizzard shad as a native species.
1-4	1	The author contradicts himself. He points out invasion and establishment of non-indigenous species in the river, then presumes a balanced indigenous community of fish prior to plant operation.

#### 2.0 Station Description

##### 2.1 Introduction

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
2-1	2	The design power rating is 1500 megawatts thermal for Fort Calhoun, not 1500 megawatts.

### 3.0 Environmental Impact Assessment

#### 3.1 Potential Impacts of Intake and Discharge

##### 3.1.1 Potential Direct Effects

##### 3.1.1.1 Thermal Tolerance and Threshold

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-2	1	Maximum $\Delta t$ of 31°F occurred 9 Jan. 1975, not July (Ref. No. 8 in NUREG: Section II, Pg. 1).

##### 3.1.1.2 Plant Shutdown

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-2	4	The greatest potential for relatively rapid temperature reduction is during winter months when a plant trip occurs. The dates listed are not trips, but plant shutdowns. On none of the dates listed was the 2.0°F/hr. $\Delta t$ Tech. Spec. limit exceeded.

#### 3.2 Preoperational Final Environmental Statement Projections of Impacts

##### 3.2.2 Entrainment and Impingement

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-6	Item 1.	In the summary of arguments and projections of impacts of entrainment and impingement at the Fort Calhoun Station the author fails to acknowledge the importance of the unchannelized reach of the Missouri River above Sioux City for its major contribution of larvae to the drift (Middle Missouri River: Chpt. 8, Pgs. 204-209 and Ref. No. 33 in NUREG: Pg.9).

### 3.3 Operational Impacts

#### 3.3.1 Thermal Impacts

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-13	1, Item 2.	The average $\Delta t$ in the vicinity of the the discharge is 14.8°F, not the reported 46.8°F.

#### 3.3.2 Entrainment and Impingement

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-13 3-14	Items 5 and 6	Instead of reporting actual estimated entrainment losses in the summary and conclusion of entrainment impacts at the Fort Calhoun Station the author reports the percent range of larvae entrained. The key issue that needs to be addressed is entrainment losses. Estimated entrainment losses ranged from 2.6-5.3% of the total larval assemblage (Ref. No. 8 in NUREG: Chpt. 3, Pg. 62). In 1977, an average of 3.22% of the living ichthyoplankton population was permanently removed on a daily basis by condenser passage (Middle Missouri River: Chpt. 8, Pg. 220).

### 3.4 Evaluation of Observed Impacts

#### 3.4.1 Thermal Discharge

##### 3.4.1.2 Zooplankton

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-22	4	The Fort Calhoun Station does not have a discharge canal, but a discharge tunnel.
3-25	Table 3-5	Wrong source quoted. Table 3-5 is from Ref. No. 5 in NUREG not Ref. No. 8.

##### 3.4.1.4 Fish

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-41	3	Post-operational seining was accomplished on the Iowa side, not the Nebraska side.

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-42	Table 3-7	Wrong source. This Table is from Ref. No. 8 in NUREG not Ref. No. 5.
3-45	2	Table 3-7 indicates fish are not attracted to the heated effluent in November as stated by the author.
3-45	Item 2	There is no steady increase of gizzard shad at Station 5, but a slight decrease in 1976 and 1977.

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-45	Item 3	Station 6 is on the Iowa shoreline, not the Nebraska shoreline and therefore not in the plume.
3-45	3	There is not an attraction of gizzard shad to the heated effluent (Station 5) because the same pattern observed at Station 5 was observed at Station 4 (non-heated).
3-48	1	Monthly data is available (Ref. No. 8 in NUREG: Chpt. 1, Pg. 21).
3-48	2	Goldeye were not feeding primarily on plants and aquatic insects as stated, but fed primarily on terrestrial (45.5%) and aquatic (10.4%) insects. Plant matter (14.8%) usually is not an important food item for goldeye. (Ref. No. 8 in NUREG: Chpt. 1, Pg. 7).
3-49	1	The author states that a sudden decline in water temperature during a cold month due to plant shutdown will result in a fish kill. A reactor shutdown during a cold period (7 Feb. 1975) was monitored by OPPD. No dead fish were observed as far as 110 yards downstream of the discharge tunnel, nor were there any reports from the public in the days that followed of any fish kill. (Final Environmental Statement, Nebraska City Station Unit No. 1, July 1976: Pg. 4-20).

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-50	1	The large number of fish impinged in the Jan-April, 1976 period occurred from the end of February to almost mid-March (Ref. No. 8 in NUREG: Pg. 41, in Fish Population Study). Projected monthly impingement was also highest the month of March, 1976 (Ref. No. 8 in NUREG: Pg. 52, in Fish Population Study). The Fort Calhoun Station was non-operational from the 21 Feb. 1976, until startup began late in the day on the 26 March 1976. This data would indicate fish were not attracted to the heated effluent and subsequently impinged as indicated by the author.

#### 3.4.1.5 Commercial and Recreational Fisheries

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-51	4	Section III goes to Rulo, Nebraska, not Kansas City.
3-52	Fig. 3-13	Sections I and II on this map are misdrawn.

#### 3.4.2 Entrainment of Fish Eggs and Larvae

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-59	1	The author mistakenly confused the District's 1978 Recruitment Study Effort (Ref. No. 33 in NUREG) with an effort to predict entrainment mortality. This has resulted in misuse of a figure from this study (Fig. 3-15).
3-59	2	OPPD entrainment estimates were not based on average larval densities across the Missouri River as stated by the author but were based on the density of larvae along the Nebraska bank and the amount of cooling water withdrawn in comparison to the total living population passing the Station (Ref. No. 34 in NUREG: Pgs. 12 and 13).
3-61	Table 3-12	Wrong authors and year stated for Ref. No. 33. Correct authors are Harrow and Schlesinger, correct year is 1980.

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-62	3	Table 3-8 and Figure 3-12 do not support the conclusions made using Table 3-13. The 43.7% larval freshwater drum collected in 1974 as shown in Table 3-13 is inaccurate. Biotest sampled an average of only once every 14 days and thus missed the peak larval fish activity that occurred between 19 June and the 5 July (Ref. No. 34 in NUREG: Pg. 10). The more accurate estimate is 78.1% (Ref. No. 34 in NUREG: Table 2, Pg. 7).
3-62	3 Sentence 4.	The author incorrectly refers to adult relative density instead of adult relative abundance, which is more conventional fisheries terminology.
3-64	2 Sentence 2.	Station 2 is mistakenly designated and should be changed to Station 3 (mid-river).

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-64	3	Freshwater drum is a recreational fish not a commercial species as stated by the author. (U.S. Nuclear Regulatory Commission 1976. Environmental Report for Fort Calhoun Station Unit No. 2, NRC Docket No. 50-548. Table 2.2-19). The author also incorrectly states that carp are pelagic spawners. Carp lay small demersal adhesive eggs in shallow water containing scattered plants (Breder and Rosen, 1966. Modes of Reproduction in Fishes, Pg. 221).
3-66	1	Commercial fishes do not make up the bulk of the larval collections. Freshwater drum are recreational fish and not commercially sought in this portion of the Missouri River as stated by the author on page 3-72.
3-66	2	The majority of the ichthyoplankton collected in the vicinity of the Fort Calhoun Station are not from Lewis and Clark Lake, but the unchannelized reach above Sioux City (Middle Missouri River: Chpt. 8, Pgs. 191, 204 and Ref. No. 33 in NUREG: Pg. 9). This unchannelized reach is a major contributor, not a minor contributor as stated.

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-66	2	Cada (Ref. No. 8 in NUREG: Chpt. 3, Pg. 57) stated that 400-500 million larvae pass the Fort Calhoun Station each day, he doesn't state they were discharged from the Gavins Point Dam as stated by the author.
3-67	2	<p>Again, plant-induced larval mortality figures do not tend to be underestimated:</p> <p>(1) OPPD estimates of mortality were based on densities of the A sample location (intake, Nebraska side) and the calculated river cross sectional larval drift rate (no./sec.) which was based on the density and flow rate in 3 cross-sectional compartments established by the District and not from average cross-channel density as stated (Middle Missouri River: Chpt. 8, Pgs. 219-220 and Ref. No. 33 in NUREG: Pg. 9).</p> <p>(2) Triple-depth studies accomplished in 1977 demonstrated a significant (<math>P &lt; 0.05</math>) decrease in larval fish density from surface to bottom by a factor greater than 3. Water is withdrawn from the lower portion of the water column at Fort Calhoun (Middle Missouri River: Chpt. 8, Pgs. 194-196 and Ref. No. 8 in NUREG: Chpt. 3, Pg. 58).</p> <p>(3) Larvae in some years were collected as early as mid-March (Ref. No. 8 in NUREG: Chpt. 3, Pg. 56) but in numbers so low as to be of no use in estimates. The fact is, 99.0% of the larvae collected occurred from early May to late July (Middle Missouri River: Chpt. 8, pgs. 204-205 and Ref. No. 33 in NUREG: Pg. 6 and Table 2).</p>
3-71	1	Those species most likely to be entrained at Fort Calhoun would be considered highly prolific, not nonprolific as stated.

PagesParagraphsComments

Author ignores data (Middle Missouri River: Chpt. 8, and Ref. No. 8 in NUREG: Chpt. 3, Pgs. 58-61) on natural mortality that would not support the conclusion of a 0.1% survival rate from larvae to adult.

3-73

2

The assumption of 100% mortality due to entrainment is contrary to evidence provided by OPPD and others (Middle Missouri River: Chpt. 8, Pgs. 219-220 and Ref. No. 8 in NUREG: Chpt. 3, Pgs. 58-61).

3-73

4

The 1973 data includes only Oct. and Nov. sampling when the average CPE for freshwater drum is highest (Ref. No. 8 in NUREG: Chpt. 1, Pg. 21). This negates the author's statement of a "dramatic decline" of adult and juvenile freshwater drum from 1973 (preoperational) to postoperational years from 1974 to 1977.

3-74

5

The problem of comparing estimates of entrainment by OPPD to the author's method is compounded by the fact that OPPD utilized data from Table 3.5, Ref. No. 8 in NUREG: Chpt. 3, Pg. 74 which contains 29 sample dates compared to the author's utilization of data from Table 3.2, pg. 71 in the same document which contains only 27 sample dates. The two dates in question, 6 May 1976, and 12 May 1977 were two dates of relatively low entrainment. When these dates are dropped by OPPD, the following comparisons can be made:

	<u>OPPD</u>	<u>Author</u>
Total No. entrained	$8.223 \times 10^7$	$7.993 \times 10^7$
Average/day (N=27)	$3.046 \times 10^6$	$2.960 \times 10^6$
Average/season (N=77)	$2.345 \times 10^8$	$2.279 \times 10^8$

The bottom line is, OPPD methods do not underestimate entrainment losses as previously stated by author.

3-77

Table 3-17

Intake rate should be constant not variable as found in Table 3-17 in the NUREG document. Intake rate is 365,000 gpm which includes raw water pump usage ( $1.990 \times 10^6$  m<sup>3</sup>/day).

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-79	1	Spawning does not occur earlier in Lewis and Clark Lake. Lewis and Clark Lake receives the cold bottom water from the Ft. Randall Dam and has a 7-10 day exchange rate. The spawning season in the lake is usually 2-4 weeks later than the river downstream. (Ref. No. 33 in NUREG: Table 2, Pg. 28).
3-80	Table 3-18	Wrong authors and year for Ref. No. 33. Correct authors are Harrow and Schlesinger, correct year is 1980.

3.4.3 Impingement of Juvenile and Adult Fishes

<u>Pages</u>	<u>Paragraphs</u>	<u>Comments</u>
3-82	3	That is OPPD's <u>North Omaha Station</u> not Omaha Station.
3-95	1	Each of six screens at Fort Calhoun was sampled <u>twice</u> every six days May thru September and once every six days the remaining months and not just once every six days as stated by the author.
3-100	2	Two 1-hour samples per day (noon and midnight) were taken for <u>five</u> months (May-September) not six months as stated by author, and one 1-hour sample per day (noon) was taken the remainder of the year.