



Entergy

SR

Arkansas Nuclear One
1448 SR 333
Russellville, AR 72822

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No

Please have your
staff review and
respond by letter
over my signature

Went 10-5-06

September 25, 2006

Mr. Martin Maner
Chief, Water Division
Arkansas Department of Environmental Quality
8001 National Drive
Little Rock, AR 72209

Subject : Arkansas Nuclear One – NPDES Permit No. AR0001392
CWA Section 316(b) Compliance Information

ANO-2006-00101

Dear Mr. Maner:

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In our letter dated April 19, 2005, information was submitted regarding the compliance of Arkansas Nuclear One (ANO) with the CWA Section 316(b) "Phase II" rule. The submitted information demonstrated that Arkansas Nuclear One (ANO) is utilizing the Best Technology Available (BTA) for reducing fish impingement mortality at the ANO cooling water intake structure (CWIS). The use of BTA has resulted in the facility meeting the applicable 316(b) performance standard of reducing impingement mortality losses by 80 to 95%.

The Arkansas Department of Environmental Quality (ADEQ) staff and Mr. Isaac Chen, Environmental Protection Agency (EPA), Region VI 316(b) Coordinator, responded with four comments on our April 19, 2005 letter. These comments were received in an email message dated July 14, 2005 from Mr. Shane Bynum (ADEQ) to Mr. Dennis Calloway (Entergy). Enclosed is a response to these comments.

We believe the enclosed information provides additional support to our conclusion that the CWIS at this facility is utilizing BTA and no further action is required. Your concurrence with this conclusion is requested.

Please contact Mr. Dennis Calloway at (479) 858-5487 if you have any additional questions.

Sincerely,

Jeff Forbes,
Vice President, Operations

JF:JDC/vs
Enclosure

cc: Shane Byrum (ADEQ)
Isaac Chen (EPA)
Rick Buckley
Denis Calloway
Teresa Madeley
ANO-DCC

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**Arkansas Nuclear One
NPDES Permit No. AR0001392**

**Responses to EPA/ADEQ comments on Entergy letter ANO-2005-00036 to Mr.
Martin Maner dated April 19, 2005**

- 1.0 EPA Comment No. 1:** Per 122.21(r)(1)(ii), ANO still needs to submit information required under 40CFR122.21(r)(2), (3), and (5).

Entergy Response: The referenced sections of 40CFR122.21(r) address three issues:

1. Source water physical data,
2. Cooling water intake structure data, and
3. Cooling water system data.

The requested information is outlined below in Sections 1.1 through 1.3.

1.1 Source Water Body Description [40CFR122.21(r)(2)]

ANO is located on Lake Dardanelle approximately 6 miles upstream from Dardanelle Lock and Dam (Figure 1). Lake Dardanelle was created as part of the multi-purpose project for improvement of the Arkansas River by the construction of the Dardanelle Lock and Dam in 1967 by the United States Army Corps of Engineers. Lake Dardanelle is one of the largest reservoirs in Arkansas with a surface area of 34,300 acres and a shoreline over 300 miles in length. Lake Dardanelle extends over 50 miles upstream to the Ozark Lock & Dam. The Dardanelle Lock and Dam facilitates navigation on the river and provides for generation of hydroelectric power, as well as recreation and fish and wildlife resources. Lake Dardanelle is one of 17 impoundments built along the Arkansas River to provide a 450-mile navigable channel from the Mississippi River to Catoosa, Oklahoma.

Lake Dardanelle is over 60 feet deep at its lower end and has an overall average depth of 10 feet. Lake Dardanelle has a storage capacity of 486,000 acre-feet, with the lake level fluctuating between 336 feet (minimum pool) and 338.2 ft (maximum flood control pool) above mean sea level. The Arkansas River's drainage area above Dardanelle Lock and Dam includes about 49,600 mi². Based on a period of record from 1969 through 1994, Lake Dardanelle has an average annual through flow of 41,790 cfs (1.32×10^{12} ft³/year) as measured at the Dardanelle Lock and Dam.

1.1.1 Water Quality

Lake Dardanelle serves a variety of uses. The lake's water quality has been designated by the Arkansas Department of Environmental Quality (ADEQ) as suitable for the propagation of fish and wildlife, primary and secondary contact recreation, and public and industrial water supplies. Water-based recreation activities, such as boating and fishing, are a focal point of local interest.

Additionally, the environs of the lake are used for camping, picnicking, sightseeing, photography, and nature studies. Lake Dardanelle also has a small commercial fishing industry.

Water temperatures in the lake show typical annual cycles for shallow reservoirs in the southeastern US. The water quality standard for temperature in Lake Dardanelle is 95°F. The highest surface temperatures typically occur in August when values exceed 90°F. The lowest water temperatures during the winter are typically above freezing, although ice has occurred on many areas of the lake. Few areas of the lake exhibit any significant thermal stratification. ANO has not exceeded thermal discharge limits established in the facility National Pollutant Discharge Elimination System (NPDES) permit, and operations at ANO have not caused exceedances of established water quality criteria in Lake Dardanelle.

1.1.2 Plankton and Benthos

The various trophic communities of Lake Dardanelle have been surveyed and monitored since the late 1960's. Phytoplankton populations are diverse and fluctuate seasonally. Green algae (Chlorophyta) are the dominant algal group throughout the year. Diatoms (Chrysophyta) are secondary in abundance and the bluegreens (Cyanophyta) and dinoflagellates (Pyrrhopyta) are minor constituents. Zooplankton in Lake Dardanelle vary seasonally. Rotifers dominate during the early summer. Other zooplankton species occurring at Lake Dardanelle include *Kellicottia bostoniensis*, *Platytias patulus*, *Brachiomus spp.*, *Keratela cochlearis*, *Polyarthra sp.*, and *Leptodora kindti*.

The benthic community of Lake Dardanelle near ANO includes Chironomidae, Oligochaeta, and Spheriidae. Additional benthic organisms that have been introduced into Lake Dardanelle include the Asian clam (*Corbicula fluminea*) and Zebra mussel (*Dreissena polymorpha*).

1.1.3 Fish Communities

The fish community of the lake varies with the current. Flathead catfish (*Pylodictis olivaris*), channel catfish (*Ictalurus punctatus*), and blue catfish (*I. furcatus*) occur where there is a current. Also present are largemouth bass (*Micropterus salmoides*), spotted bass (*M. punctulatus*), green sunfish (*Lepomis cyanellus*), bluegill sunfish (*L. macrochirus*), black crappie (*Pomoxis nigromaculatus*), white crappie (*P. annularis*), and warmouth (*L. gulosus*). These fish species occupy slack water areas and in the Illinois Bayou area of the lake where ANO cooling water is withdrawn.

The fish community near ANO also changes seasonally. Striped bass (*Morone saxatilis*), and white bass (*M. chrysops*) are generally more abundant in the spring. Rough or commercial fishes are generally abundant throughout the year. These fish include European carp (*Cyprinus carpio*), bigmouth buffalo (*Ictiobus cyprinellus*), black buffalo (*I. niger*), smallmouth buffalo (*I. bubalus*), carpsuckers (*Carpoides spp.*), freshwater drum (*Aplodinotus grunniens*), and redhorses (*Moxostoma spp.*). The most important forage fish species in the lake are gizzard shad (*Dorosoma cepedianum*) and threadfin shad (*D. petenense*). Gizzard and threadfin shad are the most abundant fish impinged at ANO.

1.2 Cooling Water Intake Structure (CWIS) Data [40CFR122.21(r)(3)]

ANO cooling water is withdrawn from the Illinois Bayou arm of Lake Dardanelle and flows through a 4,400-ft long canal to the CWIS (Figure 2). The depth of the lake near the intake canal ranges from 12 to 18 feet. The intake canal is approximately 15 feet deep and 50 feet wide. Near the CWIS, the intake canal is approximately 135 feet wide and 23 feet deep. The highest water velocity in the intake canal is at a narrow point located 3,000 feet east of the CWIS where the velocity is approximately 3 ft/s.

The main features of the CWIS include bar grates, stop logs, traveling screens, and several pumping systems that provide water for cooling and fire protection. The bar grates and stop log structures are made of heavy steel and have 3-inch openings to prevent large debris from entering the intake structure. Inside the bar grates, water passes through the traveling screens. The traveling screens are designed to remove smaller debris and are made of stainless steel panels with 3/8-inch openings. When there is a buildup of debris on the screens, they are rotated vertically and sprayed with high-pressure water. Debris washed from the screens is collected in large steel baskets that are removed and emptied using an overhead crane.

Because ANO Units 1 and 2 have significantly different water needs, the CWIS and pumping systems downstream of the traveling screens are different. On the ANO Unit-1 (ANO-1) side of the CWIS, the maximum water velocity through the eight traveling screens is 2.2 feet/second. After passing through the traveling screens, the water enters condenser cooling water pump bays. ANO-1 has four condenser cooling water pumps that have a rated capacity of almost 200,000 gpm each. Behind the condenser cooling water pumps are three service water bays. Typically, only two of the three service water pumps are used. These pumps are rated at 6,500 gpm each.

The ANO Unit-2 (ANO-2) side of the CWIS has an average water velocity of approximately 0.34 feet/second through the two traveling screens. After passing through the traveling screens, the water flows into three service water bays where it is pumped to ANO-2. The three service water pumps on ANO-2 are rated at 12,000 gpm each. The water is approximately 15 feet deep in the service water bays and the inlet to the pumps is 2 feet above the bottom.

1.3 Cooling Water System Data [40CFR122.21(r)(5)]

ANO withdraws water from Lake Dardanelle at a maximum rate of 1,200 MGD (1,850 ft³/s), with almost all of this water used for cooling purposes. The facility has three separate cooling water systems: Service Water System, Auxiliary Cooling Water System, and Condenser Cooling Water System.

Service Water Systems

The service water system provides essential cooling for some of the nuclear cooling components. ANO-1 and ANO-2 have their own separate service water systems, and each is rated at a maximum capacity of approximately 20,000 gpm. Each unit normally has two service water pumps in operation and one in standby. The systems are designed to provide sufficient flow and

head characteristics to meet the requirements of normal operations, shutdown cooling, and emergency conditions.

Auxiliary Cooling Water Systems

The auxiliary cooling water system is a subsystem of the service water system that provides cooling to non-nuclear heat exchangers, chillers, and other components. Flow to the system is provided by the service water pumps.

Condenser Cooling Water Systems

After high temperature steam passes through the turbine-generator, it then passes into the main steam condenser that removes the unusable heat and condenses the exhausted steam into water (condensate). The condensate is then pumped to the steam generators to make more steam. During full power operations, the main steam condenser can produce approximately 1,000,000 gallons/hour of condensate from exhausted steam.

Condenser cooling water at ANO is provided by a once-through system for ANO-1 and a recirculating system (cooling tower) for ANO-2. The ANO-1 once-through design removes heat from the condenser and discharges it to Lake Dardanelle. The ANO-1 condenser contains over 50,000 titanium tubes that are approximately 1-inch in diameter and 50 feet long. During this single pass through the condenser, the cooling water temperature increases approximately 10-15°F. The ANO-1 condenser cooling system requires the withdrawal of approximately 750,000 gpm (1100 MGD or 1700 ft³/s) of water from Lake Dardanelle.

ANO-2 was constructed with a recirculating system that rejects heat from the main steam condenser to the atmosphere using a hyperbolic, natural-draft cooling tower. The system contains over 7 million gallons of water that is pumped from the condenser to the cooling tower and back at the rate of approximately 500,000 gpm via a 132-inch diameter pipe. The cooling water temperature increases approximately 30°F as it passes through the condenser. The ANO-2 recirculating condenser cooling system requires approximately 16,000 gpm (23 MGD or 36 ft³/s) of water from Lake Dardanelle to offset losses due to cooling tower evaporation, drift and blowdown.

Although ANO-1 and ANO-2 are similar in electric generating capacity, they have significantly different condenser cooling water system designs. Approximately 98% of the water withdrawn from Lake Dardanelle is used for the ANO-1 once-through condenser cooling water system, while only 2% is used for the ANO-2 recirculating condenser cooling water system.

2.0 EPA Comment No. 2

Because ANO deploys barrier net only during cold season (from mid-October to early March), ANO needs to provide historical impingement data to show the percentage of fish impinged during this period of time prior to deployment of barrier net. This information is necessary to calculate the reduction rate.

Entergy Response: Outlined below in Sections 2.1 and 2.2 is information regarding the results and conclusions from historical fish impingement monitoring at ANO.

2.1 Impingement Monitoring

2.1.1 Background

The 316 (b) Phase II Rule provides several compliance alternatives by which ANO may demonstrate that the CWIS meets Best Technology Available (BTA) by showing that the existing intake structure design and construction technologies, operational measures, and/or restoration measures reduce impingement mortality 80 to 95% from a calculated baseline. The calculated baseline is the impingement loss that would occur with a shoreline CWIS, once-through cooling, and minimal controls. The historical impingement mortality conditions at ANO that occurred between 1974 and 2000 provide an accurate description of baseline conditions. Based on years of studies conducted at ANO, sufficient quantitative and qualitative baseline impingement data already exist and, therefore, the collection of additional baseline information is not required for this facility.

ANO has performed extensive environmental monitoring of its surrounding ecosystem. From 1974 to 1994, in particular, ANO conducted an impingement mortality monitoring program in order to provide sufficient information for the accurate determination of impingement mortality impacts by the plant on fish populations in Lake Dardanelle. ANO reported the summary results of the monitoring annually to both state and federal agencies. During the period of study, data regarding species composition, relative abundance, and length/weight for impinged fish were typically collected twice a week from April to September and three times a week from September to April.

In early 2000, a fish barrier net was installed at the mouth of the intake canal which dramatically reduced impingement mortality. This net and its use are described in Section 2.2.

2.1.2 Impingement Data Collection and Analysis

Data Collection

Most of the historical ANO impingement monitoring records (field data sheets, monthly and annual summaries, reports, and correspondence documents) for the period from 1974 through 1994 were recovered from facility archives and reviewed for completeness. The baseline period was limited to only those years in which complete records, especially daily field data sheets, were available. Records for the 11-year period from 1977 to 1988 were determined to be complete and this period was used to calculate baseline impingement conditions at the facility. This period was determined also to be representative of impingement conditions that occurred over the 20-year period of monitoring.

Impingement monitoring data collected at ANO consisted of total counts of fish that accumulated on the intake screens during 24-hour periods. The number of screens sampled varied from four to eight depending on the number of condenser cooling water pumps in operation. During the summer, when all four pumps were used, eight traveling screens were

sampled. During the winter months, when the number of pumps was reduced to two or three, only four to six traveling screens were sampled. Monitoring involved fish counts on up to five consecutive days depending on the season. All fish collected were identified to species, when possible, and the length and weight of fish were recorded. Impingement samples were collected on a total of 805 days during the 11-year period of 1977 to 1988.

For each sampling event, ANO biologists also recorded information regarding the total weight of debris (leaves, trash, etc.) in the sample, inlet water temperature, number of cooling water pumps in operation, and number of traveling screens washed. Representative samples of impinged fish were collected over a 24-hour period only from the ANO-1 traveling screens. Due to the low-flow conditions on the ANO-2 traveling screens, very few fish were impinged and routine monitoring was not performed on this portion of the CWIS. Overall, monitoring data was statistically sufficient to provide accurate estimates of weekly, monthly, and annual impingement mortality trends at the ANO CWIS for the 11-year baseline period.

Data Analysis

Impingement data collected at the CWIS was interpreted using the conservative assumption that all fish impinged at ANO were assumed to have been alive and relatively healthy prior to impingement. It has been shown, however, that many of the fish impinged during the monitoring program were already dead or moribund due to natural ambient cold stresses that affect fish throughout the lake from late fall through the late winter months.

Impingement monitoring results were compiled in Excel spreadsheets to produce a data matrix that included total fish counts by species on each day of sampling for each year. Fish counts were then compiled into consecutive 10-day averages beginning on September 1. That is, the average count across all years was compiled for September 1–10, September 11–20, September 21–30, and so on for the entire year. The counts were not adjusted for the number of pumps in operation or the volume of water withdrawn daily from the lake. Therefore, the average count for each 10-day period represents the average daily number of fish impinged under operating plant conditions. Accordingly, a comparison of total counts among 10-day periods allows a comparison of the average number of fish impinged among any combination of 10-day periods.

Based on records from 805 daily samples, the average number of fish impinged for each successive 10-day period averaged across all years is shown in Figure 3. Peak impingement occurred during the period from mid to late February. The mid-February histogram in Figure 3 shows that during this 10-day period, an average of 120,000 fish were impinged. To evaluate the total number of fish impinged during any set of 10-day periods, the totals at the top of each histogram are summed for the desired period. For example, to determine the total impingement in any month, the totals at the top of the histograms are summed for each time period. For example, $1.1 + 1.4 + 1.2 = 3.7 \times 10^4$ fish were impinged in November.

Figure 4 allows similar comparisons to be made with respect to the percent of fish impinged during any particular 10-day period. The period in mid-February (discussed above) shows that 14.9 % of all fish impingement occurred during this 10-day period. Summing the values at the top of selected histogram bars in Figure 4 allows an estimate of the percentage of the total annual

impingement occurring, on average, during the baseline period of 1977 to 1988. For example, to calculate the percentage of impingement that occurs in December, the values at the top of the histograms are summed for each 10-day period. For example, $3.3 + 4.5 + 8.4 = 16.2\%$ of impingement mortality occurs in December.

2.1.3 Impingement Monitoring Results

During the 11-year monitoring period, the total number and biomass of fish impinged at ANO was variable from year to year, although the trends in the species impinged and their relative abundance were similar. Impingement changes from year to year were previously shown to be in response to cold stresses during the winter and natural variations in Lake Dardanelle fish populations. Most impingement mortality losses within any year occurred during the late fall and winter. Approximately 94% of all fish impingement occurred during the 5-month period from November through March.

The results also showed that over 96% of the total number of fish impinged annually at ANO were composed of threadfin shad (*Dorosoma petenense*), gizzard shad (*Dorosoma cepedianum*), and freshwater drum (*Aplodinotus grunniens*). The remaining 4% was composed of low numbers of skipjack herring (*Alosa chrysochloris*), silversides (*Atherinidae*), catfish (*Ictaluridae*) and several other species. Threadfin shad was the most abundant species and made up 51% of all fish impinged, followed by gizzard shad (38%) and freshwater drum (7%). Threadfin shad numbers increased significantly in November and December samples and gizzard shad numbers increased significantly in samples collected in late January to early February.

2.1.4 Impingement Conclusions

Data analysis provided three major conclusions regarding baseline impingement dynamics at ANO:

1. 94% of impingement occurs between November 1 and April 1.
2. 96% of impingement fish were threadfin shad, gizzard shad, and freshwater drum.
3. The majority of impingement mortality was in response to ambient cold-stress conditions in the lake. No significant impingement mortality occurs during the summer.

Entergy concluded through these studies that the major cause of fish impingement mortalities was the direct result of natural cold-stressed mortality of both threadfin shad and gizzard shad populations during the winter. Threadfin shad is a warm-water, non-native species that exhibits cold shock stress behavior at water temperatures below 54°F. Water temperatures in Lake Dardanelle normally drop below 35°F each winter season, well below the lethal threshold temperature of 38 to 42°F for threadfin shad. Although gizzard shad are native to the region, they also exhibit cold shock stress behavior but at a lower temperature range. The lower lethal temperature threshold for gizzard shad is reported to be about 33°F. (NRC 1979)

Because Lake Dardanelle is a shallow reservoir, its temperature can change quickly in response to changes in ambient weather and inflow conditions. A sudden decrease in water temperature during the winter (even at temperatures above the species lower threshold) appears to adversely

affect both threadfin and gizzard shad as much as the water temperature falling below their respective lower temperature thresholds.

2.2 Fish Barrier Net

Due to periods of unusually high impingement mortality during the winter season of 1999 to 2000, ANO began deploying a fish barrier net at the mouth of the cooling water intake canal (Figure 2). The barrier system is made up of continuous sections of 20-foot-deep by approximately 250-foot-long lengths of 3/8-inch to 1/2-inch mesh netting. The barrier net is supported by flotation buoys and is well marked for area boaters. There are six sections of net creating a total length of 1500 feet. The netting is secured to the north and south shores and along the bottom of the lake. It is deployed in an arc extending into the Illinois Bayou area of the lake. During its deployment, the net is routinely checked by boat to ensure it hasn't been moved or damaged.

The barrier net has proven to be very effective in reducing impingement at ANO. During the 316(b) Rule making process, EPA concluded that similar nets are up to 90% effective in reducing impingement mortality at a CWIS (EPA 2004). During its deployment at ANO, the net is effective in preventing both live and dead fish from entering the intake canal area and being pulled toward the CWIS. This action not only reduces impingement mortality, it also reduces maintenance requirements at the CWIS, and improves overall plant cooling water system operations.

The average water velocity through the net is very low. Based on a maximum cooling water flow rate (Q) and the surface area of the net (A), the average water velocity (V) through the net was calculated to be 0.06 feet/sec, according to the equation $V = Q/A$. This value is very conservative and does not take into account the significant reduction in cooling water flow that normally occurs at ANO during the winter. With the continued approval of the U.S. Army Corps of Engineers, who regulates on-shore and off-shore structures in the lake, ANO will continue to deploy this system during the winter months each year.

As shown in Figures 3 and 4, most fish impingement occurred between October and April. Therefore, a fish barrier net deployed during this time period can be expected to reduce fish impingement accordingly. However, because of the large amount of leaves, logs, and other debris present in the lake during October and early November, it is desirable from a practical standpoint to deploy the net as late in the fall as possible to avoid damage to the net. When the net is deployed after mid-November, Entergy has found that major debris fouling of the net is minimized and a significant reduction in impingement is provided.

Without the barrier net in place, ANO baseline monitoring data from 1977 to 1988 show that 91% of impingement mortality occurs between December 1 and May 1. This analysis indicates that if the ANO fish barrier net is deployed during this period (December 1 to May 1), and the net is 90% effective in reducing impingement mortality, then impingement has been reduced at the ANO CWIS by at least 82% ($0.90 \times 0.91 = 0.819 \times 100$). This reduction meets the 316(b) Phase II Rule performance standard of reducing impingement mortality by 80 to 95%.

In addition to the 82% reduction in impingement mortality demonstrated for ANO above, the plant also qualifies for several compliance credits that show ANO far exceeds the Phase II performance standard. Allowable compliance credits include a 50% reduction credit because ANO-2 already uses a recirculating condenser cooling water system and a 25% reduction credit because the intake water flow is reduced during the winter months. Although there are several other credits which apply to the design and operation of the ANO CWIS, the two compliance credits discussed above, in addition to the use of a fish barrier net during the winter months, clearly demonstrates ANO meets the applicable 316(b) impingement reduction performance standard established by EPA for a CWIS located on a freshwater reservoir.

3.0 EPA Comment No. 3: Intake flow rates for ANO-1 and ANO-2, and projected flow rate for ANO-2 if it were a once-through cooling system.

Response: As discussed above in Section 1.3 (Cooling Water System Data), ANO is composed of two similar generating units that withdraw cooling water from Lake Dardanelle at a common intake structure. ANO-1 has a once-through condenser cooling water system with an intake flow rate of approximately 750,000 gpm. ANO-2 has a recirculating condenser cooling water system with a natural-draft cooling tower, and the intake flow rate is approximately 16,000 gpm. If ANO-2 had been constructed with a once-through condenser cooling water system, the intake flow rate would have been approximately 750,000 gpm.

4.0 EPA Comment No 4: Provide a copy of the referenced March 8, 1995 letter from Arkansas Game and Fish Commission.

Response: A copy of the requested letter is enclosed as Attachment 1.

List of Attachments:

Attachment 1 - Letter from Allen Carter (AGFC) to Jerry Yelverton (Entergy) dated March 8, 1995.

List of Figures:

Figure 1 – Location of Arkansas Nuclear One (ANO)

Figure 2 - The ANO cooling water intake structure, intake canal, and fish barrier net

Figure 3 - Bar graph of average 10-day total fish impingement counts at ANO during 1977 - 1988

Figure 4 - Bar graph of 10-day total fish impingement counts as a percentage of total impingement counts at ANO during 1977 – 1988

References:

USEPA 2004. National Pollutant Discharge Elimination System--Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, Final Rule. Federal Register, Vol. 69, No. 131, Friday, July 9, 2004, page 41599. US Environmental Protection Agency, Washington, D.C.

USNRC 1979. Impingement dynamics and age and growth of selected species at Lake Dardanelle, a southcentral reservoir. NUREG Report Number 0601, October 1979. US Nuclear Regulatory Commission, Washington, D.C.

ATTACHMENT 1

**Letter from Allen Carter (AGFC) to Jerry Yelverton (Entergy) dated March 8,
1995.**

Arkansas Game & Fish Commission
2 Natural Resources Drive Little Rock, Arkansas 72205

Steve N. Wilson
Director

Scott Henderson
Asst. Dir. Finance



to: Director's Office
Bob Lintini
Joe Stoekel (ATU)
Fisheries File

March 8, 1995

Jerry Yelverton, Vice President
Operations ANO
Entergy Operations, Inc.
Route 3, Box 137G
Russellville, AR 72801

Dear Mr. Yelverton:

I am writing in regards to your correspondence of 25 January advising Entergy's decision to terminate components of the Lake Dardanelle ecological survey project. Specifically, I am wanting to convey our regret that the long-term fish community monitoring performed by Arkansas Tech University (ATU) will no longer be funded.

The Arkansas Game and Fish Commission has long appreciated the financial support and spirit of cooperation that Arkansas Power and Light, and more recently, Entergy, Inc. has exhibited towards environmental responsibility in the operation of Arkansas Nuclear One. Baseline fish community monitoring has demonstrated that despite the loss of fish life due to impingement and entrainment at the plant's intake and the impact of the thermal effluent, a quality recreational fishery has been maintained and can co-exist with the operation of ANO. We agree that past monitoring has satisfied our concerns and need not continue as the sole objective of the project. However, we feel that Entergy, Inc. may be overlooking the tremendous benefits the project provides through its educational opportunities provided to the students at ATU who work directly on the project.

The Lake Dardanelle ecological survey project has provided students with invaluable hand-on experience both in the direct field experience associated with the various sampling methodologies employed and data analysis, but also in the relevant situation of how the state and private industry have cooperated to strike a balance between industrial development and sustained resource use. ATU is the only school in the state that offers a fish and wildlife management degree at the bachelor's level. Nearly half of this agency's professional fisheries staff obtained their degree from ATU and "cut their teeth" on the Lake Dardanelle project. We believe the experience made for a more qualified employee. For the relatively small funding required to perform the project, we have tended to view the educational and training benefits generated by the project as suitable compensation for the loss of fish life caused by the plant operation.

Jerry Yelverton
Page Two
March 8, 1996

In closing I ask that Entergy, Inc. reconsider its decision to terminate the fish sampling components of the Lake Dardanelle ecological survey. We feel that the project provides excellent educational opportunities that is provided no where else in Arkansas, is a unique opportunity to continue long-term baseline monitoring of Lake Dardanelle, and will complement the zebra mussel assessment work that is scheduled to continue. I, or members of my staff, will be glad to discuss this matter with you further.

Sincerely,

A handwritten signature in cursive script that reads "Allen Carter".

Allen Carter, Chief
Fisheries Division

AC:MA:pm-399

Figure 1. Location of Arkansas Nuclear One (ANO)

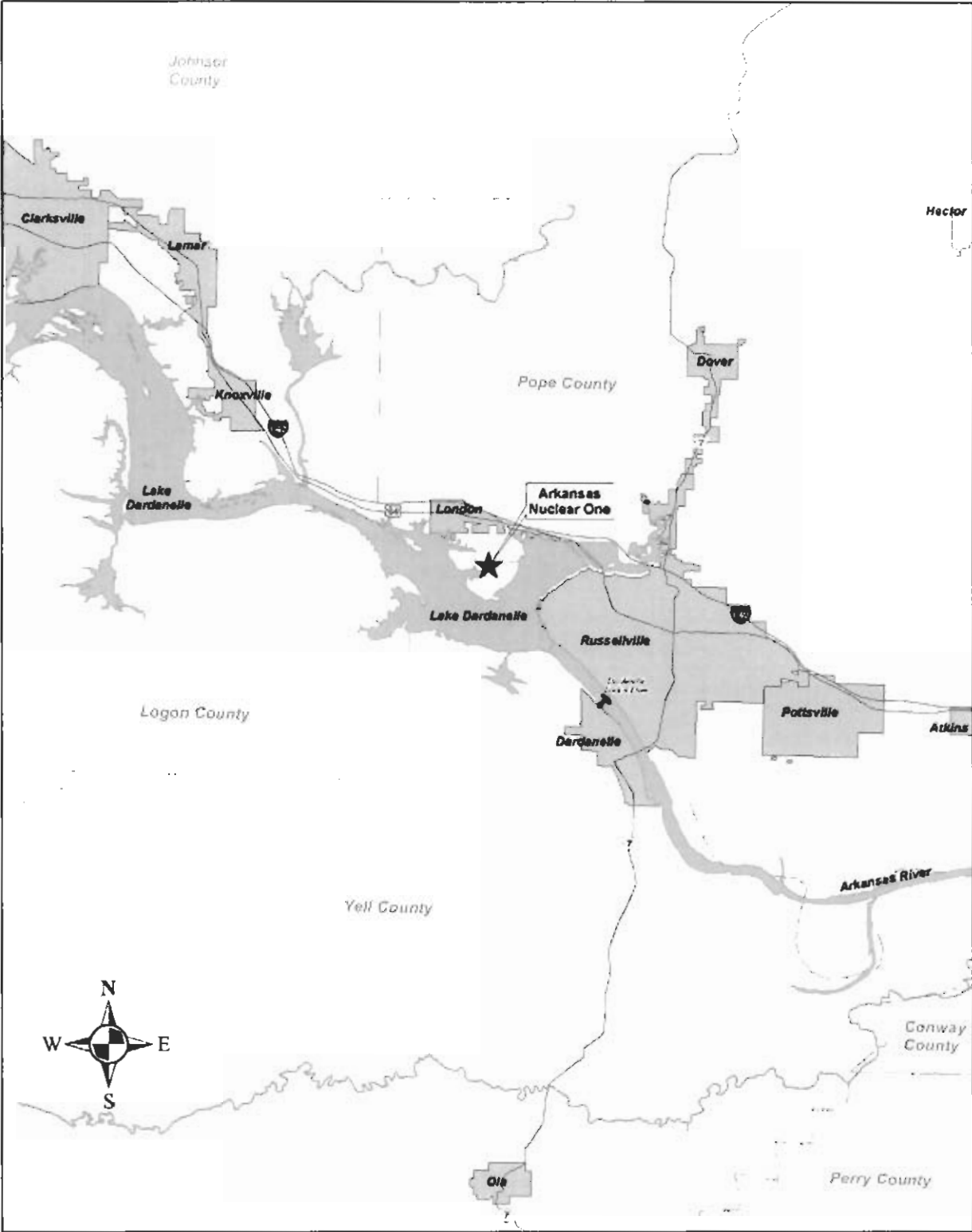
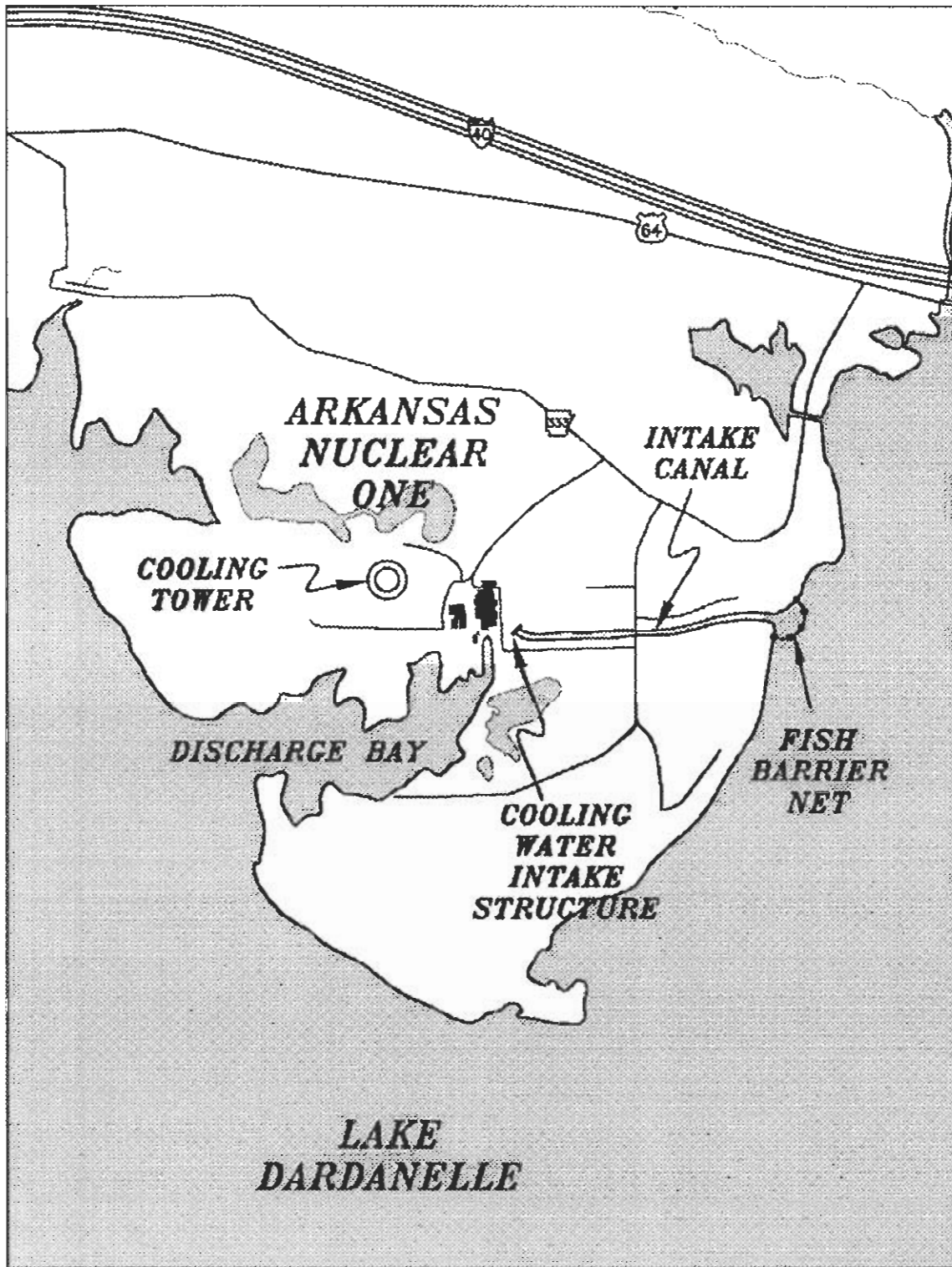


Figure 2. The ANO Cooling Water Intake Structure, Intake Canal, and Fish Barrier Net



Average 10-day Fish Count x 10000

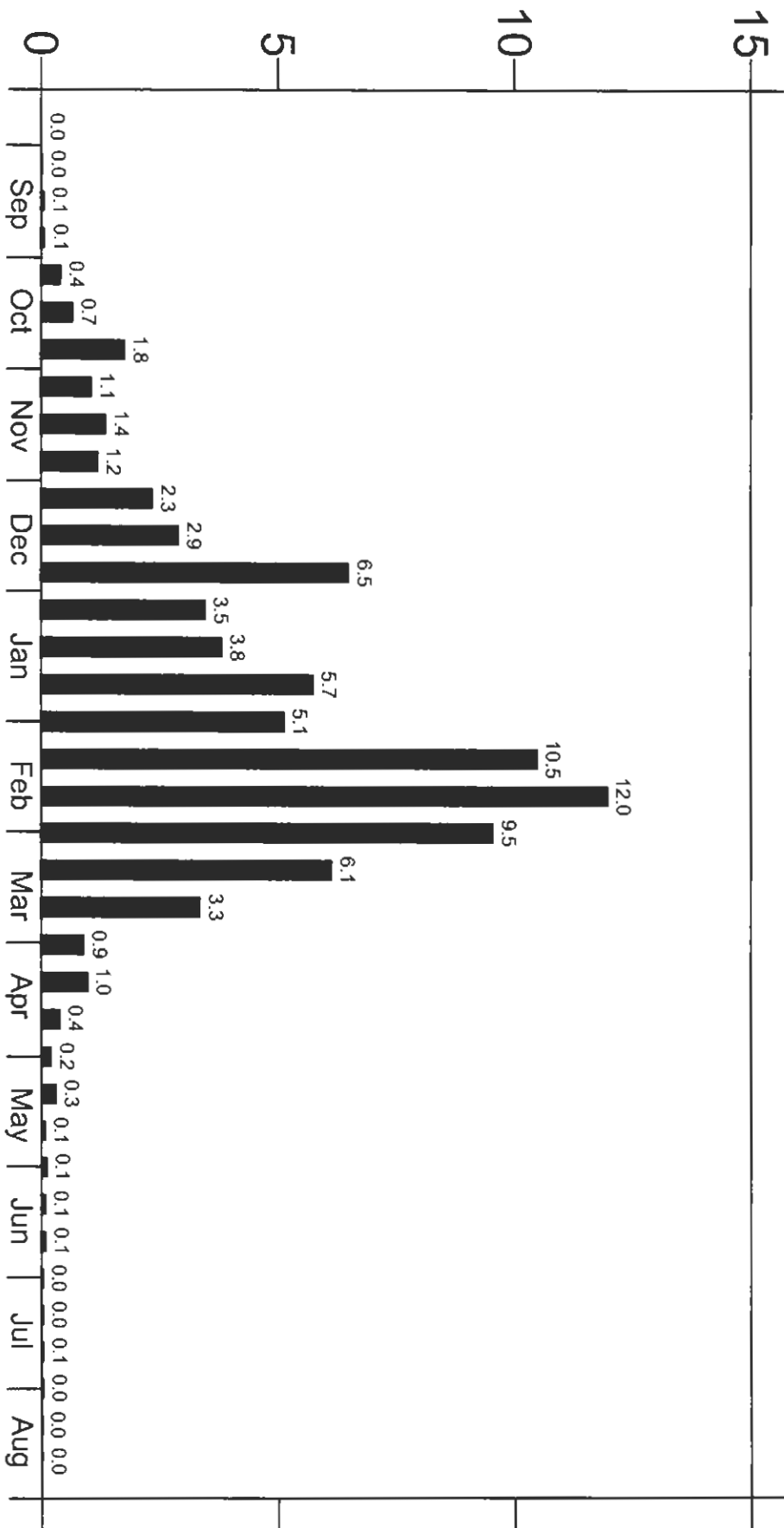


Figure 3. Bar graph of average 10-day total fish impingement counts at ANO during 1977 - 1988.

Figure 4. Bar graph of 10-day total fish impingement counts as a percentage of total impingement counts at ANO during 1977 through 1988.

