

WOLF CREEK

NUCLEAR OPERATING CORPORATION

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April 18, 1997

WO 97-0044

U. S. Nuclear Regulatory Commission
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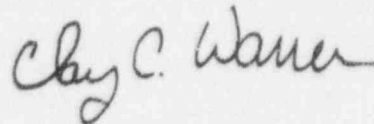
Subject: Docket No. 50-482: Annual Environmental Operating Report

Gentlemen:

Enclosed is the Annual Environmental Operating Report which is being submitted pursuant to Wolf Creek Generating Station (WCGS) Facility Operating License NPF-42, Appendix B. This report covers the operation of WCGS for the period of January 1, 1996 to December 31, 1996.

If you have any questions concerning the above issues, please contact me at (316) 364-8831, extension 4485, or Mr. Richard D. Flannigan at extension 4500.

Very truly yours,



Clay C. Warren

CCW/jad

Attachment

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WOLF CREEK GENERATING STATION
ANNUAL ENVIRONMENTAL OPERATING REPORT
1996

ENVIRONMENTAL MANAGEMENT SECTION
WOLF CREEK NUCLEAR OPERATING CORPORATION
P.O. BOX 411
BURLINGTON, KANSAS 66839

APRIL 1997

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1.0 INTRODUCTION

Wolf Creek Nuclear Operating Corporation (WCNOC) has committed to minimizing the impact on the environment from operating Wolf Creek Generating Station (WCGS). The 1996 Annual Environmental Operating Report is being submitted in accordance with the objectives of the Environmental Protection Plan (EPP) as required by Facility Operating License NPF-42. The purpose of this report is to demonstrate that the plant operated during 1996 in an environmentally acceptable manner.

2.0 ENVIRONMENTAL MONITORING

2.1 AQUATIC [EPP Section 2.1]

2.1.1 Impacts of Water Withdrawal on the Neosho River

The owners of WCGS have contracted with the Kansas Water Resources Board to pump 9.672 billion gallons per calendar year from the tailwaters of the John Redmond Reservoir (JRR) to Wolf Creek Lake (WCL). A total of 5.030 billion gallons or 52 percent of the contracted allotment was pumped during 1996. Of the total, 0.380 billion gallons or eight percent of the total pumped were used for auxiliary raw water. The remainder was transferred via the make-up pumps operated from April 27 through May 10 and from August 22 through October 23, 1996. Measurements taken during 1996 by the United States Geological Survey indicate that downstream flows in the Neosho River at Burlington were maintained at rates similar to past makeup pumping activities. Adverse impacts to the Neosho River attributable to 1996 pumping activities were not observed.

The Final Environmental Statement/Operating License Stage (FES/OLS) postulated that make-up water withdrawal of 41 cfs during drought conditions would extend the duration and severity of low-flow conditions below JRR. This, in turn, was expected to reduce riffle habitat which would adversely affect Neosho madtom populations, federally listed as a threatened species. The combination of make-up water withdrawal during very low river flows did not occur during 1996.

2.1.2 Oxidizing Biocide Discharges to Wolf Creek Lake

Circulating Water System Discharge:

During 1996, Betz Bio-Trol 88P Microbiocide was used to control biological fouling in WCGS cooling water systems. The Betz product is a halogenated oxidizing biocide which replaced gaseous chlorine at WCGS. An evaluation completed by WCNOC demonstrated that the Bio-Trol 88P impacts to the cooling lake environment would not be greater than that expected from chlorine use. The expected impact from biocide use was derived from a postulated level (FES/OLS, Section 4.2.6.1) of between 0.68 and 1.08 mg/l of total residual chlorine at the Circulating Water System (CWS) discharge. Three 30-minute doses per day of 411 pounds of chlorine per dose were projected to produce these concentrations. These concentrations were expected to cause periodic, appreciable mortality in a conservatively estimated 40 acres of the discharge area of WCL (FES/OLS, Section 5.5.2.2).

The WCGS National Pollutant Discharge Elimination System (NPDES) permit was changed to allow the use of oxidizing biocides, other than exclusively chlorine. This NPDES change was transmitted to the NRC per EPP Section 3.2 on August 8, 1994. This permit is administered by the Kansas Department of Health and Environment (KDHE). The permit limits the concentration of total residual oxidant (TRO) to be 0.2 mg/l in the circulating water effluent. Biocide dose duration is limited to two hours per day. In practice, WCGS has kept TRO well below the NPDES allowable limits. Actual oxidizing biocide dosages to the CWS averaged approximately 22 pounds per day during 1996. The daily average TRO concentration was <0.1 mg/l. Compliance with the permit for daily maximum TRO and dose duration was 100 percent.

In Section 5.5.2.2 of the FES/OLS, the proposed biocide treatments were not expected to meaningfully affect the overall biological productivity of WCL. Because the actual values during CWS biocide treatments were well below the evaluated levels and no fish mortality attributable to oxidizing biocides was observed, permitted biocide discharges during 1996 were not considered to have had appreciable effects on the cooling lake environment.

Essential Service Water System Discharge:

During 1996, a continuous diversion of approximately 17,000 gpm of Service Water System (SWS) flow to the Essential Service Water System (ESWS) was completed to provide microbiologically induced corrosion protection and sedimentation control. The KDHE established a 1.0 mg/l TRO limit for the SWS flow diversion through the ESWS. Measurements of TRO averaged <0.1 mg/l and compliance with the NPDES limit in 1996 was 100 percent. No fish mortality or water quality changes attributable to ESWS biocide discharges were observed.

2.1.3 Cold Shock

In the event of a rapid decline in plant power level during winter, fishes attracted to the WCGS heated discharge could experience mortality due to a quick reduction in body temperature (cold shock). In reference to licensing document evaluations, the WCGS EPP Section 2.1 (c) states, "Cold shock effects on fish due to reactor shutdowns could cause significant mortality to aquatic species in the cooling lake." One cold-shock mortality event occurred following a plant trip on January 30, 1996. The fish kill event was not considered detrimental. Section 3.0 below summarizes this fish kill event.

2.1.4 Impingement and Entrainment

Impacts of entrainment and impingement were projected to be significant in the WCGS EPP. Condenser mortality for entrained organisms was expected to approach 100 percent. Because of this, sampling efforts to monitor entrainment impacts were not required by the NRC and have not been implemented at WCGS. Through casual observations, fish impingement at the WCL circulating water intake was considered

minimal during 1996, thus no sampling efforts to monitor impingement impacts have been initiated.

2.1.5 Impacts of Wolf Creek Lake Discharges to the Neosho River

Discharges from WCL were regulated by NPDES permit limitations. NPDES permit sampling was completed on the first day of each discharge and weekly thereafter until the end of each respective discharge. Lake discharges typically come from periodic testing of the blowdown spillway and from stormwater runoff at the service spillway. Discharge limits were set for sulfates, chlorides, and pH. In 1996, no NPDES violations at the lake's discharge were observed. Considering past monitoring studies, there have been no detrimental effects to the Neosho River water quality due to lake discharges.

2.1.6 Other Non-EPP Aquatic Issues

An aquatic issue not specified in the EPP involved Asiatic clam (Corbicula) distribution monitoring in the Neosho River and WCL. Monitoring commitments were specified in WCNO's response to NRC Generic Letter 89-13. Asiatic clam monitoring has been completed as committed and the results are summarized in the attachment to this report.

2.2 TERRESTRIAL [EPP Section 2.2]

2.2.1 Control of Vegetation in the Exclusion Zone

The composition and structure of vegetation in the 453 ha (1120 acre) exclusion zone were selectively controlled to be compatible with the function and security of station facilities. Most areas in the immediate vicinity of the power block have been planted and maintained in a lawn-type condition. Other areas within the exclusion area have been mowed for security and aesthetic purposes.

2.2.2 Vegetation Buffer Zone Surrounding Wolf Creek Lake

To create a 500 acre buffer zone around WCL, agricultural production activities were curtailed in 1980 below an approximate elevation of 1095' MSL, eight feet above WCL normal operating surface water elevation (1087' MSL). This border ranges from approximately 200 to 400 feet adjacent to the lake shoreline. Previously grazed or hayed native tallgrass areas were left undisturbed. Previously cultivated lands were allowed to advance through natural successional stages or native grasses were reestablished. Land management activities specified in an annual land management plan included controlled burning to enhance and/or maintain the designated buffer zone with a naturally occurring biotic community. There were no management changes to this zone in 1996.

2.2.3 Herbicide Use for Maintenance of WCGS Structures

A soil sterilant was applied on selected gravel areas of WCGS. These included the protected area boundary, various lay-down storage yards, meteorological tower, support building borders, storage tank berms, switchyard, hazardous waste and waste oil storage areas, and on-site railroad beds. The herbicides applied consisted of a Karmex (EPA Reg. No. 352-247) and Oust (EPA Reg. No. 352-401) mix. Application rates followed label instructions. These herbicides were registered by the Kansas Department of Agriculture. No environmental impacts from herbicide treatment of WCGS facilities were identified.

The transmission line right-of-ways associated with the power plant were not sprayed during 1996, except for the 69 Kv line. Trees in this right-of-way were clipped and stump treated with Garlon 4 (EPA Reg. No. 464-554).

2.2.4 Waterfowl Disease Contingency Plan and Monitoring

A waterfowl disease contingency plan was maintained to provide guidance for station biologists in the event of suspected or actual disease outbreaks. The contingency plan lists appropriate federal and state wildlife agency contacts to be made by WCNOG in the event of such problems. During routine wildlife monitoring and surveillance activities taking place over this reporting period, no waterfowl mortality attributable to disease pathogens was identified.

2.2.5 Fog Monitoring Program [EPP Subsection 4.2.1]

Visibility monitoring was initiated in December 1983 and continued through 1987. The purpose of this study was to evaluate the impact of waste heat dissipation from WCL on fog occurrence along U. S. 75 near New Strawn, Kansas. The program was required through one year of commercial operation that started in September, 1985. Upon conclusion of 1987 data collection, it was determined that sufficient information was available to evaluate cooling lake fogging and that all commitments relevant to fog monitoring had been satisfied. The fog monitoring study concluded that operation of WCGS did not appreciably increase fogging incidents from that measured before operation. In 1996, there were no reports of such incidents from individuals or local agencies responsible for traffic safety. Implementation of mitigative actions or further monitoring was not warranted.

2.2.6 Wildlife Monitoring Program [EPP Subsection 4.2.2]

A wildlife monitoring program was initiated to monitor and assess wildlife populations or parameters most likely to be impacted by the operation of WCGS. As outlined in the 1995/1996 annual wildlife study plan, specific objectives of the wildlife monitoring program were to assess waterfowl, waterbird, and bald eagle usage of WCL. Because these annual monitoring programs target each migration season (autumn through early spring), this EPP reporting period overlaps with part of the 1996/1997 monitoring period.

The wildlife monitoring program was modified from the previous years' format during the fall of 1996. An abstract of the wildlife monitoring program and results is presented in the attachment to this report. Program changes are also presented in the attachment.

2.2.7 Land Management Program [EPP Subsection 4.2.3]

Land management activities on all company-owned lands except within the 453 ha (1120 acre) WCGS exclusion area were designed to achieve balances between agricultural production and conservation values. An annual management plan addressed needs and accepted techniques for land maintenance, soil conservation, and wildlife management. These included the construction or establishment of fences, terraces, waterways, wetland areas, and permanent vegetative covers. An environmental education area was improved and maintained. A summary of the 1996 land management activities appears in the attachment to this report.

3.0 ENVIRONMENTAL PROTECTION PLAN REPORTING REQUIREMENTS

3.1 PLANT DESIGN OR OPERATIONAL CHANGES [EPP Section 3.1]

Proposed plant design and operational changes which have the potential to affect the environment must receive an environmental evaluation prior to implementation. A summary of each modification or operating change which required an environmental evaluation in 1996 is presented. There were no changes in station design or operation nor were there tests or experiments that involved an unreviewed environmental question during 1996. There were no events identified that required changes to the EPP.

Evaluation: Ice Prevention Activities in the Essential Service Water Screenhouse Bay

This evaluation investigated potential environmental impacts from the temporary injection of heated water and bubbling of compressed air into the ESWS pump bays to prevent ice formation in the bay, on the trash racks, and/or the traveling screens. The water and air was pumped through existing warming lines and through temporary piping. Heated water was produced with boiler trucks and the air from air compressors. This project was initiated due to the icing event that caused the January 30, 1996 plant trip.

The evaluation concluded that no adverse environmental impacts would occur. The supplemental water flows and/or air addition were confined to the pump bay area. The thermally altered area was not expected to be larger than during normal warming line operation. It was estimated that flow would be 300 gpm. A maximum of 200 degrees F water from the boiler trucks was not expected to raise the pump bay water temperatures more than a maximum of about 40-50 degrees F. The bubbling air was to be used to circulate existing water. Increased attraction of fish to the warmer water was not expected because of the small area affected. This decreased the potential for an isolated cold-shock induced fish kill if the warm water was abruptly stopped. No adverse impacts were observed.

Evaluation: Lake Access Park Construction and Angling Impacts

This evaluation addressed potential environmental impacts due to access park construction and public fishing on WCL. The park was constructed during the summer of 1996 and public angling on the lake started on October 1, 1996.

Environmental impacts related to the cooling lake and associated structures were previously evaluated in licensing documents and considered acceptable. A portion of the proposed access site had been previously disturbed by lake construction and thus was exempt from EPP concerns. The EPP allows additional construction activities on areas not previously disturbed as long as potential impacts are evaluated and do not significantly affect the environment (EPP Section 3.1). This evaluation fulfilled this requirement and demonstrated that no significant impacts over those previously evaluated should be expected.

This evaluation covered four main areas of potential impact. These were water quality concerns, impact of construction outside previously disturbed areas, angler harvest impact to the fishery, and human disturbance impacts to the bald eagle. In Section 2.1 of the EPP, the NRC relies on the State of Kansas for permit needs related to aquatic issues. These issues were addressed in the U.S. Corps of Engineers (USCOE) review of the lake access park project, which determined that dredge and fill activities were authorized under nationwide permit (NWP) No. 26. Conditions of NWP No. 26 require state water quality certification and responses from the Kansas Department of Health and Environment (KDHE) address compliance with on-site waste water disposal and stormwater pollution control requirements. To comply with these conditions, WCNOG constructed a sewage disposal system for the restroom facilities in accordance with the Coffey County Sanitary Code. In addition, a stormwater pollution prevention plan was implemented to ensure water quality was not affected.

It was expected that any impacts due to the park's construction activities outside areas previously disturbed by plant construction would be insignificant or nonexistent. This expectation was based on similar conclusions in an Environmental Assessment for the Development of Public Fishing at WCGS completed by the Kansas Department of Wildlife and Parks (KDWP).

Public recreation access was assessed in the Section 2.8.2 of the Environmental Report - Operating License Stage (ER-OLS) and no adverse environmental impacts to the fishery were identified. No significant adverse impacts were expected from the current proposal, either. In the original ER-OLS review, the greatest economic benefit would be from joint fishery development by WCGS and KDWP (then Kansas Fish and Game Commission). It was expected that this relationship would promote a trophy fishery, the biology of which would reduce roughfish numbers. The expected fishery was also credited with reducing the plant's adverse fish impingement impacts to the fishery simply by keeping gizzard shad numbers lower in the lake. Gizzard shad typically are vulnerable to impingement at power plant intakes.

WCGS funded and developed the fishery with technical assistance from the KDWP. It was desirable to enhance a fishery high in predator numbers and diversity to keep shad numbers down to prevent the operational problems that could be caused by excessive impingement and clogging of the intake screens. Consequently, angler harvest impacts to the existing fishery were analyzed

extensively when creel and length limits were set for the lake. In general, the limits were to prevent adverse impacts by allowing only harvest of the largest and oldest fish.

Adverse disturbance of bald eagles by increased human activity was a potential impact. This issue was also addressed in the U.S. Fish and Wildlife Service response to the USCOE dredge and fill permit application. However, operation of lake access was expected to minimize this potential impact. First, only 50 boats per day will initially be allowed on the lake thus reducing eagle disturbance, especially in the winter. Second, the heated discharge area of the lake will remain closed for fishing. Wintering eagles tend to congregate in the heated area. Third, shoreline anglers will be limited to 50 per day and will be restricted to the access park shoreline only, which is about 3/4 mile. This shoreline is greater than 500 yards from the nearest established eagle nest. Finally, plans were to follow U.S. Fish and Wildlife Service recommendation and exclude, via buoys, boat access to within approximately 300 yards from active eagle nests. In addition, monitoring and reporting of angler disturbance of the bald eagle will be completed and any necessary mitigative actions to reduce disturbance will be taken. These are conditions of the NWP No. 26 authorization.

Evaluation: Refuel VIII Steam Generator Chemical Cleaning Process

This evaluation covered potential environmental issues associated with chemical cleaning of the steam generators. This process was completed during Refuel VIII in February, 1996. No process wastes were released to the lake. In addition, potential water quality and hazardous waste issues involved are regulated by the KDHE. As such, the NRC relies on the State of Kansas for monitoring or permit limitations (EPP Section 2.1). WCGS consulted with the KDHE and since the process was to be completed without waste discharge to the environment, no monitoring or permit limitations were required. A hazardous waste exclusion was requested from and authorized by the KDHE. No adverse environmental impacts were expected nor did any occur.

Evaluation: Outlet Throttle Valve Post Maintenance Test

This evaluation demonstrated that no adverse environmental impacts would occur due to post maintenance throttle valve testing. The testing procedure determined the proper throttle position for the B train valve. Make-up flow rates to the Auxiliary Feed Water System, the Spent Fuel Pool, and the Component Cooling Water System were simulated using lake water via the ESWS. Most of the flow was to be returned to the lake via the permitted ESWS discharge (NPDES Outfall 006). Approximately 1220 gpm was to be by-passed to the storm drain system (NPDES Outfall 002). This by-pass represented a change in effluent flow path and potential environmental impact.

In EPP Section 2.1 the NRC relies on the State of Kansas to regulate such issues. The KDHE and WCNOG addressed the water quality issues involved. Since no biocide or chemical treatments were to take place during the bypass, no permit or monitoring limitations were required. No adverse impacts resulted from the valve testing.

Evaluation: Fish Mortality Due to Plant Trip

This evaluation addressed the impact of the cold-shock fish kill event following the January 30, 1996 plant trip due to ice formation on the CWS traveling screens. Quantification of this event revealed that less than two percent of the total fish killed (19,763) were game fish, rough fish killed represented less than one fish per acre, and the majority of shad killed (80% of total fish) were young-of-year fish. Shad of this age usually succumb to winter temperatures or are consumed by the high predator numbers in the lake.

The evaluation concluded that the plant trip did not adversely impact the WCL fishery. This conclusion was reached because the event was confined to the cooling lake and there were no threatened or endangered species involved. Additionally, similar events in the past resulted in no measurable impact to the WCL fishery.

Evaluation: Siren Placement for Public Access of Wolf Creek Lake

This evaluation demonstrated that there would not be adverse environmental impacts associated with placement and operation of two emergency sirens close to WCL. These sirens were required to fulfill emergency evacuation needs due to public access to the lake. Two potential issues were addressed. First, the sirens were to be placed in areas not previously disturbed by plant construction. The Environmental Assessment for the Development of Public Fishing at WCGS (by KDWP) concluded that these activities, including installation of a warning system, would not adversely impact areas not previously disturbed. The area involved was also small (<1/4 acre). Because of these reasons, impact due to site disturbance was not considered adverse.

Disturbance of bald eagles using the lake was the second impact assessed. Little impact was expected due to most siren tests being "growl" tests where little sound is produced and full siren sound tests are of short duration. Discussions with the U.S. Fish and Wildlife Service came to similar conclusions. Preliminary observation in 1997 indicate that the nesting eagles are not adversely affected by siren testing.

Evaluation: Development of the Wolf Creek Employees Association Park

This evaluation concluded that no adverse impacts would occur from developing the Wolf Creek Employee's Association park. Improvements included a shelter house, parking lot, picnic tables, utilities, and a sewage lagoon. The primary park area was previously disturbed by plant construction and the total area was small (<0.1% of total site area). No adverse impacts were observed.

3.2 NONROUTINE ENVIRONMENTAL REPORTS

3.2.1 Submitted Nonroutine Reports

There were no nonroutine environmental reports involving significant impacts submitted to the NRC during 1996.

3.2.2 Unusual or Important Environmental Event Evaluations

No unusual or important environmental events reportable according to specifications in the EPP were identified during 1996.

3.3 ENVIRONMENTAL NONCOMPLIANCES [EPP Subsection 5.4.1]

At WCGS in 1996, nonradiological environmental noncompliances or noteworthy events were documented and evaluated in accordance with WCNO's Performance Improvement Request (PIR) program. The PIR program is WCNO's administrative vehicle for corrective action. Events evaluated included monitoring plan deviations, refrigerant leak regulation review discrepancies, discovery of fuel oil contaminated soil, qualified procedure reviewer discrepancies, and state laboratory certification omissions. All the documented events were determined not to be reportable pursuant to EPP criteria.

ATTACHMENT

SUMMARY OF
ENVIRONMENTAL INVESTIGATIONS
AT WOLF CREEK GENERATING STATION, 1996

Wolf Creek Nuclear Operating Corporation

Environmental Management

P. O. Box 411

Burlington, Kansas 66839

Contents

1. 1996 Land Management Activities
2. 1996 Water Quality Monitoring Activities
3. 1996 Asiatic Clam and Zebra Mussel Monitoring Activities
4. 1996 Fishery Monitoring Activities
5. Wildlife Monitoring Activities

1. 1996 LAND MANAGEMENT ACTIVITIES

This document presents the 1996 activities for the WCGS land management program. The EPP requires a land management program that will implement conservation and wildlife management techniques to attempt to balance production and conservation values (EPP Section 4.2.3). Procedure AI 07D-001, "Resource Management Program," implements this requirement via a land management report and plan. The program objectives are:

- a. to maximize rent income from agricultural lands,
- b. to conserve or improve both agricultural and natural resources,
- c. to foster good relations with local agricultural and natural resource communities,
- d. to satisfy licensing requirements,
- e. to improve the appearance of the company's lands,
- f. to enhance the natural resources on the Environmental Education Area (EEA).

Grasslands at WCGS consist of areas leased for grazing and hay production and unleased areas maintained for regulatory compliance, soil conservation, and wildlife. Grass areas adjacent to WCL shorelines exceed the 500 acre buffer zone of "naturally occurring biotic communities" referenced in the EPP. Approximately 1,238 acres of native rangeland were leased for grazing in 1996. Leases specified rotation programs, season lengths, and maximum grazing rates. By controlling these variables, range quality was maintained at levels which provided optimum wildlife value and long term rent generation.

Approximately 336 acres were leased for hay production in 1996. Hay meadows were managed for high quality production by requiring hay to be cut by July 31 and bales removed by August 31. Compliance with these specifications was good in 1996. No late cutting was observed.

Fire has always been an integral part of the prairie and controlled burning was used on Wolf Creek land to control woody brush invasion, control less desirable cool-season grasses or weeds, increase wildlife value, and to increase prairie vigor and production. It is a relatively inexpensive and environmentally compatible method of obtaining these objectives.

Management of Wolf Creek cropland has strived to reduce soil erosion, maintain rent income, and increase wildlife benefits. A total of 1,349 acres of cropland was leased in 1996. Consistent with past years, the cropland lease contracts specified that common conservation practices be followed. On fields with appropriate terraces to follow, contour farming was required. Double-cropping, producing two crops on the same acreage during the same season, was generally prohibited because this practice usually increases soil loss. Fall tillage of crop residues was prohibited except for certain instances. These generally include tillage necessary for fall planting of wheat, plowing of terraces and deep tillage practices to improve productivity.

Existing weed and grass strips as well as the practice of leaving edge grain, all of which provide wildlife benefits, were continued. A two acre food plot was established in a predominately brome grass area. This area was not used for agricultural production and was lacking in habitat diversity.

Land management activities on the EEA were designed with natural resource education in mind. Improvement of wildlife habitat in the area to increase the public's chances of viewing a greater variety of wildlife was an objective. Tree and shrub planting, native prairie grass planting, wildlife food plots, and

controlled burning were a few of the techniques employed. The EEA has drawn a large amount of attention and lends itself very well for educational purposes. Continued modifications and habitat improvements are ongoing which will constantly change the area keeping it attractive for wildlife and interesting for visitors.

2. 1996 WATER QUALITY MONITORING ACTIVITIES

Water quality in the Neosho River and WCL was not monitored in 1996, except for NPDES requirements. The original monitoring program's objectives since plant construction were to satisfy licensing requirements and assess plant impacts. This monitoring began in the Neosho River during 1973 and was initiated in WCL after impoundment to fulfill regulatory commitments (KG&E 1981, NRC 1982). The monitoring was to continue through at least two years of plant operation, which was satisfied in 1987. No adverse impacts greater than evaluated in licensing documents were identified. Since 1987, the scope was greatly reduced to target key water quality indicators chosen to either add to baseline data or to reflect long-term operational impacts beyond monitoring commitments. With these objectives being met in 1993, monitoring frequency and scope were further reduced. Frequency was changed to a biennial schedule beginning in 1995 with the program scope focusing on long term trends associated with plant operation. After analyses of 1995 data, it was determined that further water quality monitoring was not necessary and discontinued.

Past results have demonstrated that no impacts to the Neosho River have resulted from plant operation. Past monitoring in the WCL has shown general increases in parameters associated with plant operation, but the trends were also influenced by rainfall dilutions. No parameters were measured above levels forecasted in licensing evaluations (KG&E 1981, NRC 1982).

Literature Cited

Kansas Gas and Electric Company. 1981. Wolf Creek Generating Station Environmental Report (Operating License Stage). Wichita, Kansas. 2 Vols.

Nuclear Regulatory Commission. 1982. Final Environmental Statement Related to the Operation of Wolf Creek Generating Station, Unit No. 1, NUREG-0989.

3. 1996 ASIATIC CLAM AND ZEBRA MUSSEL MONITORING ACTIVITIES

ASIATIC CLAMS

Monitoring for Asiatic clams (Corbicula) in the Neosho River and WCL was discontinued in 1996. The 1995 monitoring determined that the clams had dispersed throughout most of the lake. In addition, juvenile clam monitoring in 1995 detected a fall spawning period in the lake. Consequently, all commitments and needs for monitoring Asiatic clams were satisfied, thus no monitoring was necessary in 1996 and no further environmental monitoring for Corbicula is planned.

Asiatic Clam Commitments:

Prior to any monitoring commitments, Corbicula expanded in 1986 in the vicinity of WCGS and monitoring effort for adults and sub-adults was increased at WCGS. Since makeup water for WCL would be pumped from the Neosho River via the Makeup Screenhouse (MUSH), Corbicula movement into the lake was considered inevitable. However, immediate transport to the lake in this manner was not likely given that no Corbicula were present at the MUSH or upstream. Nevertheless, an extensive annual effort was initiated during the fall of 1986 to determine the densities and track the upstream expansion of the river's Corbicula population. At the same time, efforts in WCL were stepped up to identify early colonization and assess potential impacts to the operation of WCGS.

Industry incidences of bivalve macro-fouling prompted the NRC in 1989 to issue Generic Letter 89-13 (NRC 1989). This letter required power plants without an established Corbicula population in their cooling water source to monitor for initial presence. The scope of the required monitoring included visual inspections of intake structures for Corbicula each refueling cycle, and annual surveys of water and substrate.

At the time of Generic Letter 89-13, WCL did not have an established Corbicula population, but the company was already monitoring for possible Corbicula establishment. This monitoring included intake structure inspections and substrate sampling, two of the three requirements specified in 89-13. WCNOB responded to 89-13 by formalizing Corbicula inspections at the Circulating Water Screenhouse (CWSH), ESWS, and MUSH intake structures. Annual substrate sampling in the lake was continued.

Monitoring of the water column for juvenile Corbicula, the last of the 89-13 requirements, was not being performed at the time. Juvenile monitoring was not considered efficient for detecting initial colonization in WCL due to low anticipated densities, but it was considered valuable in determining spawning cycles once presence was known. Consequently, in its response to 89-13, WCNOB justified not initiating juvenile sampling until after Corbicula was known to exist in the lake. In lieu of this, WCNOB continued distribution monitoring in the Neosho River and WCL. After Corbicula was found in WCL during June 1991, juvenile monitoring was initiated. Documentation of spring and fall juvenile release periods in 1995 fulfilled all commitments related to distribution monitoring of Asiatic clams. Further Corbicula monitoring in WCL is no longer necessary and has been discontinued.

ZEBRA MUSSELS

Zebra mussel monitoring was increased in 1996 in an attempt to ensure early detection of their presence in the WCGS area. No zebra mussels were detected in 1996 at the five sampling locations in the Neosho River and WCL. Each sampler was checked every two months between June and October for attached adult zebra mussels and the immediate river bank or lake shore at each location was searched for zebra

mussel shells. Zebra mussels have not been reported in Kansas and have not been reported closer to Kansas than navigation locks in the Verdigris River in northeastern Oklahoma (Benson, 1997). Because zebra mussels can be dispersed by overland transport of recreational boats, monitoring for the presence of zebra mussels near WCGS will likely continue in 1997.

Literature Cited

Benson, Amy J., Biological Resources Division, U.S. Geological Survey. "An Overview of Non-Indigenous Aquatic Organisms," Presentation at Seventh International Zebra Mussel and Aquatic Nuisance Species Conference (January 28-31, 1997, New Orleans, Louisiana).

Nuclear Regulatory Commission, Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," to all holders of operating licenses or construction permits for nuclear power plants (July 18, 1989).

4. 1996 FISHERY MONITORING ACTIVITIES

Fishery monitoring of the WCL during 1996 was completed to assess gizzard shad densities and the status of the predator species that have kept shad numbers low. Operational problems that are routinely experienced at some power plants due to excessive shad impingement and clogging of cooling water intake screens have been avoided at WCGS. The dynamics of the fishery in the lake have kept shad numbers low enough to prevent this, but monitoring has revealed subtle increases in shad numbers. With angler harvest beginning in 1996, the data also provided valuable information used to determine size and creel limits that would be compatible with shad control efforts.

Most predator species responded to the slight shad increases by improving their average body conditions. The success of wiper stockings in 1995 and 1996 was limited, based on 1996 sampling. These stockings should support the existing wiper population which have approached the end of their expected life span. Predator densities were good for all species except largemouth. Data showed that predator fish responsible for keeping shad numbers down generally had good densities, were large on average, and had improved body conditions.

Shad control should not be sacrificed in lieu of angler harvest, but with the catch-and-release philosophy being stressed at WCGS, limited harvest and continued shad control should be compatible. Size limits were set high so that only the oldest fish would be harvested. Low creel limits should spread available harvest among more people. Both should promote catch-and-release. Creel census results were unavailable, but preliminary review indicates that angler success and harvest were moderate in 1996. The lake was only open for public access a short while in 1996, starting on October 1, 1996.

In summary, gizzard shad showed signs of increasing, but the predator populations were able to maintain control of shad numbers. Wipers were stocked in 1996 to help maintain the predator numbers. Angler harvest length and creel limits were designed to protect high numbers of predator fish capable of maintaining shad control benefits. Moderate harvest occurred in 1996.

5. WILDLIFE MONITORING ACTIVITIES

The wildlife monitoring activities targeted possible impacts from station operation to migratory and wintering waterbirds in the vicinity of WCGS. The results presented here cover the 1995/1996 winter monitoring season. The general objectives of the program were to document and assess any trends or impacts that may be caused by station operation to migrating or wintering populations of waterbirds, waterfowl, and threatened or endangered species. Use of the cooling lake may expose birds to transmission line collision mortality or to disease outbreaks. Damage to local agricultural crops by large waterfowl concentrations using the lake was also a concern. To document and assess such occurrences or increased potential for such, specific objectives of the program were to monitor how many and where waterbirds, waterfowl, and threatened and endangered species used the lake during the winter migration season and compare these to the norm observed since station operation began.

During the 1995/1996 season, thirty-four species of waterbirds and waterfowl were observed with mallard, snow goose, and Canada goose being most abundant. During operational winters, the heated effluent provided previously unavailable open water habitat on WCL. This, in combination with a lack of hunting pressure and close, abundant food supplies, has usually kept wintering birds on WCL longer than during preoperational seasons. Mallard and Canada goose usage has indicated preferences for areas of the cooling lake providing these conditions, although these preferences were not usually significant ($p \leq 0.05$). No disease or crop depredation problems were observed during the 1994/1995 season or the first half of the 1995/1996 season. No significant transmission line collision events nor the increased potential for such were observed.

The bald eagle was the only threatened or endangered species that was consistently observed using the cooling lake. During operational winters, the cooling lake does not normally attract a disproportionate number of area bald eagles. The seasons of highest usage were associated with plant trips or power reductions causing cold-shock fish kills resulting in a food resource not typically available in such quantity at WCL. Even then, the eagles utilized JRR nearly as much or more than they did WCL. Recent trends seem to indicate that area bald eagles prefer JRR over WCL even when JRR is ice-covered and WCL is largely ice-free. Thus, WCL does not appear to be affecting the area bald eagle population so as to attract such high numbers that transmission line mortality could be a problem.

A pair of bald eagles has nested at WCL each spring since 1994. A total of five eaglets have been fledged at WCL during the first three nesting seasons. All five eaglets have been banded by the U.S. Fish and Wildlife Service prior to fledging. The pair of adults has remained in the WCL area year-round since the initial successful nesting. This pair began incubating eggs at WCL again in March of 1997, and it is expected that they will continue to nest at WCL in the future.

Beginning with the winter of 1996/1997, the wildlife monitoring program was modified from the previous years' format. WCGS staff are no longer conducting routine waterfowl/bald eagle surveys. Kansas Department of Wildlife and Parks (KDWP) staff will conduct two surveys/month from September through March, consistent with KDWP monitoring of other reservoirs. Results of these surveys will be forwarded to WCGS staff. Atypically high concentrations of waterfowl or bald eagles identified from the KDWP surveys or by other means such as casual observations by WCGS staff may initiate supplemental monitoring to determine if any new concerns may exist in regard to transmission line collisions, disease outbreaks, or crop depredation.