WOLF CREEK GENERATING STATION

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ANNUAL ENVIRONMENTAL OPERATING REPORT

1986

ENVIRONMENTAL MANAGEMENT GROUP

WOLF CREEK NUCLEAR OPERATING CORPORATION

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WOLF CREEK NUCLEAR OPERATING CORPORATION
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1.0 INTRODUCTION

Wolf Creek Generating Station has committed to minimizing the impact of facility operation on the environment. The 1986 Annual Environmental Operating Report (AEOR) is being submitted in accordance with the objectives of the Environmental Protection Plan (EPP) as required by Facility Operating License NPF-42. The report is to demonstrate that the plant is operating 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 have contracted with the Kansas Water Resources Board to remove 9.692 billion gallons per calendar year from the tailwaters of the John Redmond Reservoir (JRR) to Wolf Creek Cooling Lake (WCCL). During 1986, only 465,388,931 gallons or 4.8 percent of this allotment was used. Based on monitoring studies completed during the year, no changes attributable to these withdrawals have been witnessed in river water quality or populations of phytoplankton, macroinvertebrates or fishes.

2.1.2 Chlorine Discharges to Wolf Creek Cooling Lake

Total residual chlorine (TRC) was postulated in Section 4.2.6.1 of the Final Environmental Statement/Operating License Stage (FES/OLS) to range between 0.68 and 1.08 mg/l at the circulating water discharge. Three 30-minute doses per day at 411 pounds of chlorine per dose were projected to produce these concentrations. These chlorine doses were expected to cause periodic, appreciable mortality among aquatic organisms in a conservatively estimated 40 acres of the discharge area of WCCL (Section 5.5.2.2, FES/OLS).

Administered by the Kansas Department of Health and Environment (KDHE), the WCGS National Pollutant Discharge Elimination System (NPDES) permit allows circulating water TRC effluent to be a maximum of 0.2 mg/l and chlorine dose time to two hours per day. In practice, WCGS has fallen well below the NPDES allowable limits. Actual chlorine hourly dosages have averaged about 26 pounds each during 1986. Compliance with the daily TRC permit allowances during the year was 100 percent. Chlorination time period compliance was achieved greater than 99 percent of the time. Permit monitoring of TRC at the discharge detected an average of less than 0.1 mg/l during 1986, well below

the 0.2 mg/l allowed. In Section 5.3.1 of the Environmental Report/Operating License Stage (ER/OLS), the postulated overall effects on the aquatic populations within the cooling were expected to be minimal. Because the actual monitored values were well below the evaluated levels and no fish mortalities due to chlorination were observed, permitted chlorine discharges during 1986 did not have appreciable effects on the cooling lake environment.

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 "cold shock", a quick reduction in body temperature. In reference to licensing document evaluations, the WCGS EPP Section 2.1 (c) stated, "Cold shock effects on fish due to reactor shutdowns could cause significant mortality to aquatic species in the cooling lake". In 1986, no cold shock mortality events due to plant shutdowns were observed. However, a fish kill associated with a series of temperature transients (~10°F) caused by circulating water pump maintenance was observed and documented. This event was confined to the WCCL and was not considered to have significantly impacted the fisheries. This event was documented and evaluated as described in Section 3.3.

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% [ER(OLS) Section 5.1.3.3]. Because of this, sampling efforts to monitor entrainment impacts were not required by the NRC and have not been implemented. Through casual observations, fish impingement at the WCCL circulating water intake was considered minimal, thus no sampling efforts to monitor impingement impacts have been implemented.

2.1.5 Impacts of Wolf Creek Cooling Lake Discharges to the Neosho River

Cooling lake discharges into the Neosho River are regulated by WCGS NPDES permit limitations. Since discharges are sporadic, water is sampled on the first day of each discharge and weekly until the end of each respective discharge. Effluent parameters measured include a flow rate estimate, temperature, pH, TDS, sulfate, and chloride concentration. Wolf Creek additions to the Neosho River are regulated to maintain a zone of passage for aquatic organisms at the confluence. Consequently, the flows

allowable from Wolf Creek may range from zero to unrestricted, depending upon the similarity between Wolf Creek and Neosho River water quality and temperature, with a maximum of 90°F allowable in the Neosho River downstream of the mixing zone. In 1985, no NPDES violations at the dam (Outfall 004) were recorded. Based on monitoring studies completed, there have been no apparent deleterious effects to Neosho River water quality or phytoplankton, macroinvertebrate or fish populations.

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. Landscaping and grass establishment have not been entirely completed to date, however all areas have been mowed at least once annually for security and aesthetic purposes. One restoration area (area not to be mowed) was established within the exclusion zone. Although a small portion of this area is still used as a topsoil source most of it (approximately 15 acres) was used to store topsoil during construction. This area is south of the powerblock along the lake shoreline. The permanent native grass restoration is to provide a maintenance-free cover, wildlife habitat, increase aesthetics, and reduce wind-blown dust in the site environs.

2.2.2 Vegetation Buffer Zone Surrounding Wolf Creek Cooling Lake

To create a buffer zone around WCCL, all agricultural production activities were curtailed in 1980 below elevation 1095' MSL, eight feet above WCCL 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 allowed to return to a natural state. Cultivated lands were allowed to advance through natural successional stages. Land management activites specified in an annual land management plan included controlled burning and native tallgrass seeding to enhance and/or maintain the designated buffer zone with a naturally occurring biotic community.

2.2.3 Herbicide Use for Maintenance of Wolf Creek Generating Station Structures

Herbicide was not applied on the transmission line corridors or switchyard associated with WCGS during 1986.

Herbicide was applied on the gravel areas of the Protected Area Boundary fence and on a graveled lay-down storage area. This sprayed area of the storage yard was less than two acres. A soil sterilant consisting of 8 pounds of Karmex (EPA Reg. No. 352-247) and 4 to 6 pounds of Oust (EPA Reg. No. 352-401) per 100 gallons of water was applied at a rate of 20-50 gallons per acre. Both Karmex and Oust were approved for use in Kansas. Application was completed by a contractor commercially licensed by the Kansas Department of Agriculture.

2.2.4 Waterfowl Disease Contingency Plan and Monitoring

A waterfowl disease contingency plan involving both state and federal personnel has been formulated to provide guidance for station biologists in the event of suspected or actual disease outbreaks. During routine wildlife monitoring and surveillance activities taking place over this reporting period, no avian 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 1986. The purpose of this study has been to evaluate the impact of waste heat dissipation from WCCL on fog occurrence along U.S. 75 near New Strawn, Kansas. A summary of fog monitoring activities is included in Attachment 1 of this report.

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. This monitoring included a general survey program for waterfowl collision events. As outlined in the 1985/1986 annual wildlife study plan, specific objectives of the wildlife monitoring program were to assess waterfowl, waterbird, and Bald Eagle usage of WCCL, to assess transmission line collision mortality of waterfowl using WCCL, to maintain a wildlife species list, and to develop an annual wildlife report. Wildlife monitoring activities are summarized in Attachment 1 of this report.

2.2.7 Land Management Program [EPP Subsection 4.2.3]

Land management activities on all company-owned lands except the 453 ha (1120 acre) WCGS exclusion area were designed to achieve balances between agricultural production and conservation values. An annual management plan

was formulated to address needs and propose accepted techniques for land maintenance, soil conservation, and wildlife management. These included construction or repair of livestock fences and ponds, and construction or establishment of terraces, waterways, and permanent vegetative cover. A summary of the 1986 Land Management report appears in Attachment 1 of this report.

3.0 ENVIRONMENTAL PROTECTION PLAN REPORTING REQUIREMENTS

3.1 Plant Design or Operating 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 Plant Modification Request (PMR) or operating change which received an environmental evaluation prior to implementation in 1986 is presented. There were no changes in station design or operation nor were there tests or experiments which involved an unreviewed environmental question during 1986.

Evaluation 86-01 - Discharge Routing Change From NPDES Outfall 003(a) to Outfall 002

It became necessary to reroute excess Condensate Demineralizer Regenerative Wastes from the Secondary Liquid Wastes to the turbine sumps for waste discharge. These wastes were initially evaluated and permitted to be discharged through the Radwaste System Discharge into Circulating Water System Discharge (NPDES Outfall 003a). Due to the rerouting, these wastes were to be discharged through the Oil/Water Separator Discharge (NPDES Outfall 002). Methods of plant operation identified to the KDHE during the NPDES permitting process which subsequently change require a follow-up notification. The change described above required such a notification and an evaluation. Formal written approval from the KDHE for this change was received on 3/12/86. The discharge was not expected to constitute a significant increase of evaluated parameters, primarily sulfates and TDS, within the cooling lake. It was concluded that the modified flow path should not result in a significant increase in the evaluated level of environmental impact.

Evaluation 86-02 - Herbicide Use on WCGS Laydown Yard and Herbicide Brand Change on Protected Area Boundary

The usage of herbicides within the site exclusion zone was evaluated based on Section 2.2 of the EPP. The herbicides evaluated were currently EPA-approved. The evaluated application on the station lay-down yard and Protected Area Boundary were within the site exclusion zone and herbicide use was determined to be compatible with the function and security of station facilities as specified in Section 2.2(a) of the EPP.

Evaluation 86-03 - Increase in Emergency Siren Noise and Number

An environmental evalution was required because the placement of a new emergency siren would require work outside the site exclusion zone. In addition, the evaluation considered the increased noise level caused by the replacement of an existing siren and the placement of a new one. Installation of the new siren, consisting of a pole and guy wires, resulted in minimal disturbance and no environmental impacts were obvious. The expected noise level was considered to be similar to that of the existing alert system. Impacts from this system were evaluated to be infrequent and insignificant in Section 5.12 of the FES-OLS.

Evaluation 86-04 - Experimental Application of Aquatic Herbicide (Aquathol K) in WCCL

The effects of pondweed control in experimental plots with the aquatic herbicide Aquathol K was evaluated. Based on literature review, Aquathol K treatment has shown little effect on water quality. Secondary die-offs of fish from plant decomposition was not expected due to the small test area and relatively slow acting nature of Aquathol K. Acute effects were expected to be minimal because of the higher thresholds of aquatic organisms to the herbicide than that postulated to occur in the lake. Bioaccumulation and persistence in the environment were not characteristics of Aquathol K. Based on the evaluation, the proposed application in WCCL presented no significant danger to water quality or the organisms which were likely to encounter it.

Evaluation 86-05 - Herbicide Weed Control on Areas Within Site Exclusion Zone

The use of herbicides to control weeds on site facilities not previously evaluated were considered and conditionally approved. Conditions were that all herbicides be limited to those EPA approved, all label directions and precautions be followed, all wastes that were considered hazardous be handled through the site hazardous waste program, and all applicators be certified by the Kansas Department of Agriculture when required. Use was considered compatible with the function and security of station facilities as specified in Section 2.2(a) of the EPP and no adverse environmental effects were expected given compliance with the stated conditions.

Evaluation 86-06 - Construction of Permanent Guard House and Facilities

With the construction of a permanent guard house at the Exclusion Area entrance, disturbance was required outside the Exclusion Area. These areas were for a small parking lot and other associated road modifications. Because of the small size and

location of the work, no adverse environmental impacts were expected to be realized from the construction or operation of the guard house facility.

Evaluation 86-07 - Piping Installation to Vent Nitrogen

Piping to vent nitrogen gas to the outside atmosphere from area five of the Auxiliary Building was assessed. Since pure nitrogen gas was not considered to be a pollutant and thus not regulated by regulatory agencies, no adverse environmental impact was expected. The Plant Modification Request to do this was environmentally acceptable.

Evaluation 86-08 - WCGS Operational Environmental Monitoring Program Modifications

The intent of the evaluation was to define the operational environmental monitoring program at WCGS, compare it with the projections made in the ER(OLS) and FES(OLS), and evaluate its utility in detecting plant-caused impacts. Program reductions were made in areas where the data being collected were of little value in monitoring environmental impacts of plant construction or operation. Typical reasons for reductions included highly variable results, results with little or no variation, modification of one program area making the current sampling obsolete, or because a particular parameter or program area showed little promise of indicating plant impacts of the type and magnitude which were likely to occur. Areas where effort was increased or redistributed were changed to collect data which would either more accurately describe the chemical or biological conditions or would better detect plant-induced changes. With program changes taken into consideration, the operational monitoring effort fulfills the intent of early licensing commitments. It functions to monitor, identify and quantify any plant impacts on the WCGS environs.

Evalution 86-09 - Experimental Use of Nalco Super-Zinc 1360 Inhibitor and Sure-Cool 1370 Dispersent

To test chemical component corrosion control, Nalco 1360 and 1370 were to be added to a small volume of service water to mimic the effects on WCGS components in a temporary consultant trailer. The flow would then be routed back through and discharged to WCCL. For purposes of the experimentation planned, Nalco 1360 and 1370 were to be used at concentrations of 20 ppm and less than 1 ppm, respectively. As such, even if these were emptied directly into WCCL and allowed to accumulate for extended periods of time, resultant fish mortality would not be likely. In addition, because these small flows (<25 gpm) were to be diluted with 50,000

gpm of service water before passing through the plant, then by 480,000 gpm of circulating water before being discharged into WCCL, concentrations finally entering WCCL were minute. Thus, impacts to cooling lake biota would not be discernable.

3.2 Non-Routine Environmental Reports

3.2.1 Submitted Non-Routine Reports

No non-routine environmental reports involving significant impact were submitted to the NRC during 1986.

3.2.2 Unusual or Important Environmental Event Evaluations

No unusual or important environmental events reportable under specifications in the EPP were identified during 1986.

3.3 Environmental Noncompliances [EPP Subsection 5.4.1]

At WCGS in 1986, environmental noncompliances were recorded along with the events surrounding them. Noteworthy noncompliances included deviations from NPDES permit limitations, delayed completion of "Plant Design or Operating Change Evaluation" forms, a late weekly hazardous waste facility inspection, missed semi-monthly site surveillance, documentation of a temperature transient-caused fish kill, and late fog visiometer recorder calibration. These noncompliances were evaluated and determined not to be reportable pursuant to EPP Section 5.4.1.

ATTACHMENT 1

SUMMARY OF
ENVIRONMENTAL INVESTIGATIONS
AT WOLF CREEK GENERATING STATION, 1986

Wolf Creek Nuclear Operating Corporation

Environmental Management

Burlington, Kansas

1. 1986 LAND MANAGEMENT REPORT

In keeping with annual land management plan guidelines, an annual progress report was formulated. Land maintenance or improvement activities outside the exclusion zone included issuance of haying/grazing and cultivation leases, controlled burning, native grass seeding, waterway construction, terrace repair, and fence construction. Grazing, haying, and cultivation lease control were primary mechanisms used for managing company land resources for both agricultural benefits and enhancement of wildlife, soil, and native plant resources.

2. 1986 EA, ENGINEERING, SCIENCE, AND TECHNOLOGY ENVIRONMENTAL MONITORING REPORT

Environmental monitoring completed by EA, Engineering, Science, and Technology Inc., a consultant, included studies on the Neosho River, WCCL, and adjacent lands. Objectives accomplished by these studies were:

1. documentation of concentrations of general water quality parameters, aquatic nutrients, organically-derived materials and certain trace metals in the Neosho River and cooling lake

2. determination of general groundwater quality in the vicinity of the facility

3. characterization of the Neosho River and cooling lake benthic communities

4. determination of phytoplankton productivity of the Neosho River and cooling lake

5. determination of zooplankton biomass in the cooling lake

6. characterization of the Neosho River fishery

Water quality studies in the Neosho River near the WCCL have been conducted since 1973. Seasonal mean concentrations of water quality parameters during 1986 were within previously established ranges for the study area. Water quality among river locations were similar though slight natural differences between the John Redmond Reservoir tailwaters and the lower river were apparent. Seasonal differences observed during 1986 and previous years reflect changes in discharge rates from John Redmond Dam and runoff due to local precipitation and snowmelt events. Since filling of the WCCL began in 1981 flows from Wolf Creek into the Neosho River have been limited to seepage, releases for testing of blowdown procedures, and runoff events. There have been no apparent deleterious effects to water quality in the Neosho River due to operation of WCGS based on available water quality monitoring data.

Water quality studies of the WCCL began when the lake was initially filled during 1981. Water quality was greatly influenced by makeup water being pumped from the Neosho River during that year. Since 1982 makeup water has generally been added during routine use of the auxiliary raw water pumps and quarterly testing of the makeup water pumps. Therefore, the WCCL water quality has been generally independent from influence of the Neosho River. Concentrations of water quality parameters were very similar among locations in the cooling lake, with the shallow upstream site slightly different in water quality than near the main dam and the station intake. Concentrations of dissolved and suspended constituents continued to show declining trends since operation of the WCCL began, indicating an improvement in overall water quality. There appears to be no trend of increasing chemical parameter values that would indicate adverse impact from plant operations.

Groundwater data collected near WCGS since 1973 have shown that quality of well water varied widely among wells. Data collected during 1986 indicated water quality parameters from the monitoring wells were within concentration ranges observed in previous studies. Well water at the monitoring sites has typically been very hard with high levels of dissolved constituents. Water quality in the wells tend to reflect shallow perched water resulting from precipitation and runoff. These observations have not changed since dam closure or after WCGS began operation.

Macroinvertebrate studies of the Neosho River at the JRR tailwaters and upstream and downstream of the confluence with Wolf Creek have been conducted since 1973. Aquatic oligochaetes, mayflies, stoneflies, net-spinning caddisflies, and midge flies have been dominant organisms. No long-term patterns, empirical, or statistical differences have been found that suggested any alterations attributable to the construction and/or operation of the WCCL and WCGS. The data have been highly variable which has been attributed to fluctuating river flows that undoubtedly affect organism abundances but also greatly influences sampling efficiency.

The macroinvertebrate monitoring program on the Neosho River was reimplemented in 1985 to coincide with startup of WCGS after the program was discontinued in 1982. High, variable flows in 1985 resulted in low sample recovery and benthic densities that approached the lowest recorded since monitoring was initiated in 1973. Species richness and abundance improved substantially in 1986 as flows were comparatively stable and low. In 1986, the number of taxa encountered increased 43 percent (57 to 82 taxa), the number of organisms in qualitative samples increased nearly five-fold (381 to 1,741), and mean annual ponar densities increased nearly nine-fold (approximately 43 to 382/m^2). The potential for WCGS to impact the Neosho River macroinvertebrate community has been minimal based on low diversion rates from the JRR tailwaters and the lack of substantial discharge from the WCCL.

Benthic macroinvertebrates in WCCL have been sampled bimonthly since 1981 when the cooling lake was initially filled. The benthic fauna of WCCL is fairly typical of lakes in general and midwestern reservoirs in particular. Quantitative dissimilarities in the faunas from the three sampling sites

reflected differences in respective depths, substrate composition, and organic matter content. The data have exhibited high annual variation from 1981 through 1986 that likely reflects various ecological, climatic, and limnological factors. Operation of WCGS caused no apparent changes in the macroinvertebrate community during the initial two years of operation.

Although mean annual benthic macroinvertebrate densities in 1986 (195 organisms/m^2) were at low for the six-year study, densities declined annually through 1984 after peaking in 1982 (1,521/m^2). Mean annual densities recovered by 45 percent in 1985 (410/m^2), the first year of station operation. Downlake densities at the deepwater (17-22 m) location near the main dam were primarily responsible for the annual trend. At the organism level, primarily oligochaetes and chironomids influenced the trend as both groups declined annually after peaking in 1982. An exception was tubificids which recovered in 1985 before reaching a low in 1986. The 1985 recovery was due almost exclusively to mean annual tubificid densities at the deepwater location, which were the second highest recorded for the WCCL study. Apparent changes in WCCL benthos reflect normal responses of pioneer organisms to newly-filled reservoirs and could be expected independent of operation of WCGS.

Phytoplankton chlorophyll a concentrations and carbon fixation rates in the Neosho River from the tailwaters of John Redmond Dam to below the confluence with Wolf Creek have been monitored since 1973. Flow in the study area is controlled by releases from JRR. During periods of moderate to high flows, chlorophyll a concentrations and fixation rates immediately upstream and downstream of the confluence with the creek were very similar to those observed in the tailwaters. During low flow conditions, values for both parameters immediately upstream of Wolf Creek were often different (usually but not always higher) than those observed at the other locations. The 1986 average annual chlorophyll a concentration (47.80 mg/m^3) was the second highest of the 13-year study and carbon fixation rates (238.22 mg C/m^3/hr) averaged at least five times higher than previous annual maxima. Higher values in 1986 corresponded with lower river flow than in 1985 when values were below or near previous annual minima. There has been no indication that adverse effects on the phytoplankton of the Neosho River have occurred as a result of the construction and operation of WCGS.

Phytoplankton chlorophyll a concentrations and carbon fixation rates (surface samples) as well as zooplankton biomass (vertical tows) in the WCGS cooling lake have been monitored bimonthly since initial lake filling in 1981. Average annual chlorophyll a concentrations declined by approximately 30 percent from 1981 to 1982, remained fairly stable from 1982 through 1984, and returned to near 1981 levels in 1985 and 1986. Temporally, phytoplankton standing crop has been generally greatest in late summer or early autumn, and spatially, it has generally been least in the downlake deep water location near the dam. However, exceptions to these general patterns have been observed, and chlorophyll a concentrations were unusually high in October and December 1985 and April 1986. Carbon fixation rates have been strongly influenced by phytoplankton standing crop as well as natural variations in ambient conditions (e.g. temperature), and as a result

fixation rates have revealed few consistent spatial or temporal trends. Bimonthly and annual mean fixation rates in 1986 were the highest recorded during the six-year study, averaging 2.5 to 5.5 times higher than previous years. Bimonthly fixation rates were higher than previous values except during initial lake filling in 1981 when higher February-March values were recorded. Incubation temperatures during 1986 averaged nearly 2°C higher than in 1981-1985 because of warmer surface temperatures at the dam.

Average annual zooplankton biomass, both dry and ash-free dry weights, declined from 1981 through 1984, although dry weight biomass appeared to stabilize in 1983 and 1984. Ash-free dry weight has increased since 1984 (40 mg/m^3) to 67 in 1985 and 92 mg/m^3 in 1986. Dry weight surpassed (1985) or equaled (1986) the previous annual maximum observed during lake filling in 1981. Few consistent spatial and temporal trends have been observed for zooplankton biomass, but there has been a tendency for greater biomass in the up-lake shallower water and for greater biomass in late winter or early spring from 1981-1985 with spring and fall peaks in 1985 and 1986.

Annual trends in phytoplankton and zooplankton through 1984 were considered representative of a new lake that was initially filled with eutrophic water (from John Redmond Reservoir) and then gradually assumed its own character. Increases in plankton apparent in 1985 and 1986 were considered primarily a response to natural factors although operational effects of the thermal discharge and makeup water additions may have been contributing factors. Based on average annual chlorophyll a concentrations, the WCGS cooling lake remains in the mesotrophic classification.

The fish community in the Neosho River at the John Redmond Reservoir tailwaters, and above and below the confluence with Wolf Creek has been monitored since 1973. The study was curtailed in 1981 and discontinued from 1982-1984 before reinstatement in 1985 to coincide with startup of WCGS. Potential operational effects of WCGS on the fishery are limited to diversion of water from JRR tailwaters for raw water and/or makeup water for the WCCL and the effect discharges from the WCCL would have downstream of the confluence with Wolf Creek. Following initial lake filling in 1981 maximum diversion of river water occurred in 1986 when use of two auxiliary raw water pumps diverted 2 cfs which was equivalent to 3.0 percent of the mean daily discharge from JRR the last four days of June. Maximum diversion of river based on mean monthly flows occurred in February 1985 (0.3 percent) and June 1986 (0.4 percent).

A noteworthy fish kill occurred on the Neosho River during the first week of August 1986. Kansas Fish and Game Commission personnel estimated for six river miles that 11,900 fish were killed including 1600 blue suckers (Cycleptus elongatus), currently a threatened species in Kansas. Storm runoff carried into the river large quantities of leaves, field crops, and other organic material which had been stripped by a devastating hail storm, and the decay of this material caused a depletion of dissoved oxygen killing these fishes in parts of the Neosho River and some tributary creeks. The river locations studied during this monitoring were within the area affected. Subsequent fishery sampling during this monitoring revealed no detectable changes in the fish populations within the study area.

Electrofishing and seining data between locations upstream and downstream of the Wolf Creek confluence suggested no effects to the Neosho River fishery due to WCCL and operation of WCGS. Overall, few long-term trends were apparent and annual differences were related to natural variability, releases from JRR, and river flows which influenced gear efficiency.

3. FISHERY MONITORING ACTIVITIES

1985-1986

Fishery monitoring surveys were conducted on Wolf Creek Cooling Lake March 1985 through October 1986. These resulted in the collection of 6,851 fish representing 10 families and 31 species in 1985 and 4,500 fish from 11 families and 30 species in 1986. Data collected were used to describe the fishery which was subsequently evaluated based on the goal of increased plant reliability through reduced gizzard shad impingement. Plant operations beginning with initial criticality in May 1985, the start of commercial operations in September 1985 and continuing through 1986 have had no observed significant impacts on the cooling lake fishery. As of 1986, bluegills ranked first in percent abundance with 30.4% and gizzard shad were second at 20.4%. Largemouth bass were next highest at 10.5%. Percent biomass showed bluegills and shad to be 11th and 7th, respectively, indicating the majority of those captured to be small, young-of-the-year fishes. As expected, after dominating both abundance and biomass in 1984, black bullheads have declined to 12th on both lists in 1986. Largemouth bass rose to 18.8% in 1986 to top the percent biomass list, with carp rising from 4th in 1984 to 3rd in 1985 and 2nd in 1986. Wipers fell from the top species biomass in 1985 by 1/3 to 3rd place in 1986. This is not unexpected as the single, 1981 year class approaches the end of the wiper's expected life span of 4-7 years.

Growth and body condition data using Proportional and Relative Stock Density (PSD, RSD), relative weight (W_r), and condition factor (K_{TL}) show generally slowing growth with average condition for Wolf Creek's earliest predator age classes. Wiper growth has leveled off with body condition being moderate in 1986. Largemouth bass have body condition which is average for this region, consistent recruitment, and are on the average larger and more abundant than bass in most Kansas impoundments. Both black and white crappie populations are primarily composed of large, old individuals and little recruitment is evident. Walleye growth continues at a slow rate and condition remains 15-20% below the Kansas average. Beds of submersed aquatic macrophytes of the genus Potamogeton which first appeared in 1984 expanded greatly in 1985 but remained at similar levels in 1986. These areas of dense cover are credited with increases in largemouth bass recruitment and in the number of young-of-the-year bluegills surviving until fall when the plants die and break off, exposing the bluegills to predation. Except for a large drop in 1985, gizzard shad abundance and biomass have been very stable at low levels since lake fill, keeping impingement very low. Early year classes of predators have undergone slowing growth; sterile wipers will need restocking to

prevent their disappearance and crappie recruitment appears to be insufficient to maintain stocks at their current levels. Largemouth bass have shown good growth, reproduction, recruitment and promise to wax or wane appropriately as prey densities and predation pressure from other WCCL species vary.

4. FOG MONITORING ACTIVITIES

The purpose of the study is to assess the impact of waste heat dissipation from Wolf Creek Cooling Lake (WCCL) operations on the incidence of fogging along U.S. Route 75 in New Strawn, Kansas. Visibility was monitored continuously at New Strawn with an instrument that utilizes a light scattering measurement technique. In 1986, visibility was monitored for 3,300 hours during the months of January through May. Monitoring was not scheduled for the summer months of 1986 and was not conducted during the months of September through December due to a sensor malfunction. A total of 82 hours of fog were detected during the monitoring period, including 31 hours of dense fog. The greatest amount of fog was seen in February, when the frequency of fog occurrence was 9.8 percent. Fog frequency during each of the remaining four months was less than one percent. No fog episodes were identified during 1986 as having been initiated by WCCL operations. It was also considered unlikely that enhancement of existing natural fog had occurred for those fog episodes recorded at the monitoring site. Overall, 4,775 hours of visibility data were collected during the operational period. A total of 147 hours of fog were detected during this period, including 42 hours of dense fog. The frequency of fog occurrence was 3.1 percent during operations, compared to 4.0 percent during preoperations. Dense fog, which represents the greatest traffic hazard, was observed during 29 percent of all fog-hours. Northerly and northeasterly were observed to be the most commonly occurring wind directions associated with operational fog. This was considered a noteworthy change from preoperations, when easterly and southeasterly winds were most frequent. The reduced frequency of southeasterly winds resulted in a reduced potential for lake-induced or enhanced fog to be transported from the discharge cove of WCCL towards the monitoring site in New Strawn. Current plans are to extend visibility monitoring through early 1988. Changes are anticipated for future monitoring which will make it easier to evaluate the potential effect of enhancement of existing natural fog due to cooling lake operations.

5. WILDLIFE MONITORING ACTIVITIES

September 1985 through April 1986

Wildlife monitoring studies were conducted in the vicinity of WCGS from September 1985 through April 1986. Use of WCCL by waterfowl, waterbirds, and Bald Eagles was determined. Bird mortality due to collisions with transmission lines traversing WCCL was also assessed. With special attention to threatened and endangered species, records of all mammals, birds, and herptiles were maintained for comparisons to past construction and preoperational studies conducted since 1973.

A total of 133 avian species were observed during the 1985-1986 monitoring program. This number represents an eight percent decrease from similar 1984/1985 studies. Of these, 54 species of waterfowl and waterbirds were observed during 30 ground lake surveys. Species diversity ranged from 22 during January to 34 species during March 1986. Comprising 32 and 28 percent, respectively, American coot and mallard were the most abundant species observed.

Comparative use of the cooling lake and nearby JRR was determined. Duck usage of the two reservoirs was similar to the 1984/1985 season. Total number of ducks during the first year of station operation was not significantly different ($p=0.05$) from JRR counts. John Redmond Reservoir, as during preoperational studies, continued to maintain greater fall migrating duck usage than WCCL. Winter populations of ducks in the area appeared to switch to a higher degree of usage on WCCL than JRR during the first year of operation. Factors such as late harvest of crops in the area and presence of large wind-protected coves, seclusion, and hunter protection provided by WCCL may have contributed to this. The availability of large expanses of ice-free water caused from WCGS heated cooling water discharge was also a factor. These birds were apparently not, however, induced to remain in the area longer because of the heated effluent.

Comparative use between five cooling lake areas was determined. Greatest usage of WCCL were in areas that were adjacent to large cultivated fields, had large pondweed (Potamogeton) concentrations, and provided seclusion and wind protection. This was similar to preoperational seasons and operation's heated effluents did not appear to alter it. No disease outbreaks or appreciable crop depredation events were identified for any of the major waterfowl concentrations observed on WCCL.

Transmission line collision surveys revealed 60 mortalities near WCGS representing 14 species during the 1985/1986 monitoring. Survey efforts for two additional months were added to the preoperational programs to identify possible collision correlations with peak lake usage periods. No significant correlations were found. Twenty percent of the birds found were not water-related species. This was similar to preoperational studies. No selectivity in the type of birds susceptible to collisions between the areas surveyed was identified. Of the species found, none were listed as threatened or endangered species. It was concluded that no significant avian mortality due to transmission line impaction at WCGS was present.

Twenty-five mammal and 12 herptile species were observed in the vicinity of WCGS during the 1985/1986 monitoring. One mammal, the big brown bat, had not been previously documented near the site. No threatened or endangered mammal or herptile species were observed.

The Bald Eagle, prairie falcon, and interior least tern represented the threatened or endangered avian species observed in the vicinity of WCGS. Bald Eagles were common winter residents and fed on fish and weakened

waterfowl. Eagles in the vicinity of WCGS used the cooling lake solely as a feeding and loafing site, however not to the extent observed on JRR. No Bald Eagles were observed roosting on WCCL. The prairie falcon and interior least tern are two species which migrate through the area and are expected to be observed occasionally in the future. Station operation is not expected to adversely impact these species.

September through December 1986

This synopsis provides a summary of wildlife data collected from September through December 1986 as part of the 1986/1987 Operational Wildlife Monitoring Program. This data is not presented in the report summarized above. In keeping with the 1986/1987 Wildlife Study Plan, records of mammals, birds, and herptiles observed were maintained for comparisons to past construction and preoperational studies conducted since 1973. Special attention was given to both state and federally listed threatened and endangered wildlife species occurring in the vicinity of WCGS.

A total of 40 waterfowl and waterbird species were observed on ground counts during fall and early winter of 1986. As during the same period in 1985, the most abundant species were the American coot, mallard, and Franklin's gull. Apparent factors that have influenced usage of WCCL continue to include relatively clear water, secluded, wind protected coves, concentrations of aquatic weed growth, and availability of agricultural fields. Heated effluents during late December 1986 may have contributed, however because of the relatively mild weather and attractiveness of the conditions stated above, it was not felt that it played a major role in influencing local duck concentrations.

Transmission line collision surveys were completed during September through December 1986. Eleven mortalities representing six different species were found. No mortalities of threatened or endangered species were observed. All specimens found were water-related birds. None of the collision events observed during the fall and early winter of 1986 were considered significant.

Of the mammal and herptile species observed, all had previously been documented. No threatened or endangered mammal or herptile species were observed.

The Bald Eagle was the only threatened or endangered species observed. As during past studies, the eagles were common winter residents first appearing during late November. Eagles in the vicinity of WCGS used the cooling lake solely as a feeding and loafing site, however not to extent observed on JRR. No changes in Bald Eagle usage of WCCL due to station operation were identified.

WOLF CREEK
NUCLEAR OPERATING CORPORATION

April 29, 1987

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Letter: ET 87-0166
Re: Docket No. 50-482
Subj: Annual Environmental Operating Report

Gentlemen:

Enclosed is the Annual Environmental Operating Report which is being submitted pursuant to Wolf Creek Generating Station Facility Operating License NPF-42, Appendix B. This report covers the operation of Wolf Creek Generating Station for the period of January 1, 1986 to December 31, 1986.

Very truly yours,

John A Bailey

John A. Bailey
Vice-President Engineering
and Technical Services

JAB:jad

Enclosure

cc: PO'Connor (2)
RMartin
JCummins

IE25
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