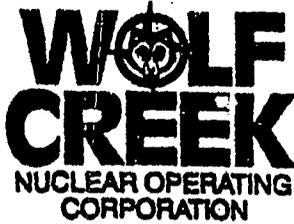


**A39**



A 39

## INTEROFFICE CORRESPONDENCE

**TO:** J. D. Weeks (WC-OP)  
**FROM:** E. K. Brown (WC-SYS)  
**DATE:** March 4, 1993  
**SUBJECT:** Circulating Water Pump and Traveling Water Screen Operational Flexibility



**Purpose:**

The function of this letter is to transmit information that can be used to provide more flexibility in Circulating Water Pump (CWP) and Traveling Water Screen (TWS) operations.

**Summary:**

A CWP can be operated with only one TWS in operation (other TWS in bay blocked for maintenance) provided the requirements stated in this letter have been met.

**Requirements:**

- 1) TWS is in best possible condition with normal PMs recently accomplished.
- 2) Normal lake water level, 1987' or greater.
- 3) No other operating pumps in bay prior to starting CWP.
- 4) Only one service water pump (full or low flow) may be operated in the bay with one operating TWS and only after CWP is in operation.
- 5) TWS ... slow speed (at minimum) prior to starting CWP.
- 6) Operations personnel shall investigate lake conditions and monitor the equipment during startup.
- 7) TWS design dP of 5 feet of water shall not be exceeded.
- 8) No restrictions or requirements are being placed on the Fire Pumps.

**Discussion:**

An investigation was conducted to determine if systems operations (Circ Water, Service Water, Fire Protection) could be performed with only one TWS in operation. It was concluded that design documentation neither specified nor contained information to support operation of all pumps in a bay with flow passing through only one TWS.

**"SAFETY! BE WISE, DON'T COMPROMISE"**

March 4, 1993

The problem was presented to the manufacturer, Envirex Inc. After review of design and operation information the manufacturer believes the necessary flow can be passed through one TWS. The considerations taken into account are expected flow rate at low lake level; the limiting condition for the TWS and the operating pumps. Based on this information the requirements and recommendations of this letter were developed.

**Risks and Benefits:**

There are certain risks that occur during the performance of this evolution. These risks and consequences are those normally associated with the TWSs and the CWP. Increased probability of equipment damage is the risk of not following the requirements and recommendations as explained. A power reduction or plant trip could be the consequence.

The benefit of operating the TWSs and CWPs in the manner discussed is improved flexibility. Maintenance could be performed any time of the year without affecting power production because of reduced CW system flow rate. Equipment and system reliability is therefore enhanced.

**Recommendations:**

- 1) Only operate in this manner when absolutely necessary due to equipment failures or maintenance.
- 2) Strictly adhere to the requirements set forth in the summary section.
- 3) Change the applicable equipment and system operating procedures to provide the requirements and guidance as indicated in this letter.

*Edwin K. Brown*

Edwin K. Brown  
Systems Engineer

- cc: O. L. Maynard WC-AD  
D. L. Fehr WC-TR  
C. W. Fowler WC-MD  
C. M. Sprout WC-SYS  
J. D. Stamm WC-PDE  
L. W. Holloway WC-SYS *dwk*  
D. Jacobs WC-MA

*Reviews (WLD)*

70017940434

**A40**

10/01/96



# RECORD SUPPLEMENTAL/CORRECTION SHEET

1. AFFECTED RECORD

*CD 9.8.96*

File No.: ~~K01-1917~~ K01-033

Record Title/Record PIR 96-1917  
Number: \_\_\_\_\_

2. DESCRIPTION OF DATA BEING CHANGED, AMENDED, ETC.

Add an independent review of PIR by a person who has received root cause training.

*GAM'Ullman* *9/26/96*

3. REASON FOR SUPPLEMENT OR CORRECTION

The person who perform the independent review of this PIR was not trained in root cause analysis. This was identified during Audit K469.

4. APPROVAL SIGNATURES. THESE CHANGES HAVE RECEIVED THE APPROPRIATE REVIEW AND APPROVALS BY THE ORIGINATING ORGANIZATION.

*Kathryn S. Kline*  
Originator

*9/26/96*  
Date

*Kevin Dwin*  
Approval Signature

*9-26-96*  
Date

\_\_\_\_\_  
Additional Signature(s) (if required)

\_\_\_\_\_  
Date

Does this Supplemental/Correction Sheet affect the Code QA Program? No  Yes   
(If yes, complete the following with the appropriate signatures.)

\_\_\_\_\_  
Manager Maintenance

\_\_\_\_\_  
Date

\_\_\_\_\_  
Supervisor Quality Control (QC Inspections) or  
Supervisor Quality Evaluations (Surveillances)

\_\_\_\_\_  
Date

\_\_\_\_\_  
ANII/ANI/AI

\_\_\_\_\_  
Date

IMAGED 10/01/96



PERFORMANCE IMPROVEMENT REQUEST

PIR 96-1917

PAGE 1 of 10

INITIATION

A. Describe the Problem, Concern, Condition, or Recommendation

- Consider:
- 1) consequences or potential consequences
  - 2) generic implications
  - 3) reference documents
  - 4) operability/reportability

ORIGINAL

This PIR is being initiated to re-open the issue addressed by PIR 96-0313.

PIR 96-0313 indicated:

"This PIR is being written because while working on B Traveling screen with a Local Control it was discovered that the screen could run with the handswitch in the off position. This [putting the handswitch in the off position as opposed to having the supply breaker opened] has been a standard practice for mech. maintenance for the life of the plant and could have caused great damage to the screen and to the personal [sic] that were working on the screen if it started while work was being done on the screen."

PIR 96-0313 was not classified as significant (that error is the subject of PIR 96-1688) and therefore did not receive the level of attention that it should have. Although not specifically stated in PIR 96-0313, it is now known that the traveling screen did start during the maintenance work. Because of the significance of this (involvement of personnel injury and clearance order not providing the intended safety function), a formal Root Cause Analysis is required.

Rather than re-open PIR 96-0313, this new PIR has been initiated to determine why the possibility of the screens starting was not recognized during the processing of Clearance Order/Local Controls. At this time, it is not clear if this was due to inadequate information on drawings reviewed by Clearance Order personnel or by an error in reading appropriate drawings.

In any event, this PIR should be classified as significant and a formal root cause analysis performed to determine the scope, cause and appropriate preventative action.

B. Describe Any Immediate Actions Taken (if applicable)

SIGNIFICANT

C. Initiator/Mail Stop: D. Peavler (CC-PIA) Date: 7/30/96 Phone: 4420

IMAGED 10/01/96



# PERFORMANCE IMPROVEMENT REQUEST

PIR 96-1917

PAGE 2 of 10

## REVIEW

### SCREENING REVIEW

- A. Operability Potentially Affected?
  - Yes - Shift Supervisor contacted: \_\_\_\_\_ Date/Time \_\_\_\_\_
  - No
- B. Potentially Reportable ?
  - Yes - RER #: \_\_\_\_\_
  - No
- C. Significant?
  - Yes - Category: \_\_\_\_\_
  - No
- D. Priority: 3.7
- E. Problem?
  - Yes
  - No
- F. Reactivity Control Problem?
  - Yes
  - No
- G. Radiological Occurrence?
  - Yes
  - No
- H. Generic Implications?
  - Yes, See Comments
  - No
- I. Additional Action Recommended?
  - Yes
  - No - PIR Closed\*\*

Comments:

J. Recommended Responsible Manager: Chris Younis

K. Screening Review Performed by: D. Peavler Date: 7/31/96 Phone: 4420

### RESPONSIBLE MANAGER REVIEW

- A. Additional Action?
  - Yes
  - No - PIR Closed \*\*

Comments:

B. Assigned to: Hargis

C. Responsible Manager: Kenneth Date: 7/24/96 Phone: 4430

D. Due Date\*: 7/30/96

\*Due date is for RCA/CA Plan if PIR is significant and for scheduled closure if non-significant.

Distribution: Originator: \_\_\_\_\_; Quality Evaluations (SE-QE), Training (TR-TR) - Significant PIRs Only,

\*\* Nuclear Safety Engineering (SE-NSE), Plant Trending & Evaluation (SE-PTE) - Closed PIRs Only

Others: \_\_\_\_\_



## PERFORMANCE IMPROVEMENT REQUEST

### Root Cause Analysis & Corrective Action Plan (for Significant PIRs)

PIR 96-1917PAGE 3 of 10

#### A. ROOT CAUSE ANALYSIS [Investigation Results, Root Cause(s), and Contributing Factors]

PIR 96-1917 was written to address the safety concerns surrounding the operation of the "B" Circulating Water Traveling Screen during a maintenance evolution. The PIR states that "it is now known that the traveling screen did start during the maintenance work". The PIR goes on to state that this was a "near miss - personnel injury and clearance order [did]not provide the intended safety function".

Discussion with the Maintenance mechanic who was at the worksite reveals this is not entirely accurate. (See attached e-mail from R. Dorpinghaus dated 8/29/96 for a complete description of events.) The screen was started using the Local Control after completion of the screen overhaul work. The screen would not stop once it was started.

Review of the Screen Wash System Function Description, FD-SW-01-WC Rev. 5, and the applicable electrical prints E-1005-SW01 and E-1005-SW09 (print review was performed with the assistance of an electrician and I&C technician) reveal the screen will not automatically start when the local handswitch (1HSSW0033) is in the OFF position. Once placed in a running mode (e.g.: slow or fast), the screen will not stop if the screen receives an automatic actuation. It is entirely possible that the screen received an automatic actuation during the work since this was during the icing event and a differential bay level could have existed that caused an automatic actuation. Automatic actuations can also occur due to a timing mechanism in the circuit.

The root cause is therefore determined to be that all involved work parties (Maintenance and Operations) were unaware that once a screen is started, it may not stop if the screen receives an automatic actuation.

#### B. CORRECTIVE ACTION PLAN TO PREVENT RECURRENCE (Include planned completion dates)

Once the Operations Clearance Order Group became aware of this occurrence, it was decided all future Clearance Orders for traveling screens would have the feeder breaker opened to ensure undesired screen operation would not occur. To verify this, an existing Clearance Order on the traveling screens was reviewed (96-1250-SW). This Clearance Order was found to have both the local handswitch and feeder breaker tagged in the OFF position. To reinforce this good safety practice, this PIR is placed in Operations required reading (OP 960000071).

This PIR is forwarded to Mechanical Maintenance and IPS Tiger Team with the recommendation to include this PIR in their required reading to help ensure all appropriate personnel understand traveling screen operation.

The following is noted:

- Root cause investigation for this PIR was extremely difficult since the originating PIR 96-0313 and its evaluation / closure, contained no references to the work packages, clearance order or drawings which were performed or evaluated. PIR 96-1917 initiation also did not provide any definitive documentation of the maintenance work which was performed. A PIR will be issued by 9/6/96 to address the need for thorough documentation and recommend changes to the PIR form to ensure all references are documented.
- Operations was not included in the investigation of PIRs 96-0313 (written on 2/5/96 to originally document the problem and closed on 6/12/96). The PIR does not mention any discussion with Operations personnel, nor is Operations or Maintenance placed on distribution. PT&E review of PIR 96-0313 resulted in their issuing PIR 96-1681. Again, no mention of any discussions with Operations personnel is given. Through this documentation review, it is only evident that Operations became aware of this issue on 7/30/96 when PT&E issued PIR 96-1917. A PIR will be issued by 9/6/96 to document this and develop a recommendation to enhance the PIR form to record those groups contacted. This will help ensure needed interdepartmental communication takes place.

Distribution: Originator: D. Peavler (CC-PIA)

Others: PT&E (SE-PA), T. Hood (CC-DES), P. Martin (OB-IPS), R. Miller (WC-MA), K. Hargis (OB-OP)

RECEIVED 10/01/96

IMAGED 10/01/96

	<p><b>PERFORMANCE IMPROVEMENT REQUEST</b></p> <p><b>Root Cause Analysis &amp; Corrective Action Plan</b> <b>(for Significant PIRs)</b></p>	<p>PIR <u>96-1917</u></p> <p>PAGE <u>4</u> of <u>10</u></p>
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- PIR 96-1681 was initiated on 6/27/96 and recognized the need to "have the issue screened as significant, and insure a formal Root Cause Analysis is performed." PIR 96-1681 was screened as non-significant. It wasn't until 7/30/96 that Significant PIR 96-1917 was issued; thereby ensuring a formal root cause analysis would be performed on this apparent safety issue. A PIR will be issued by 9/6/96 to address this delay in evaluating a safety issue.

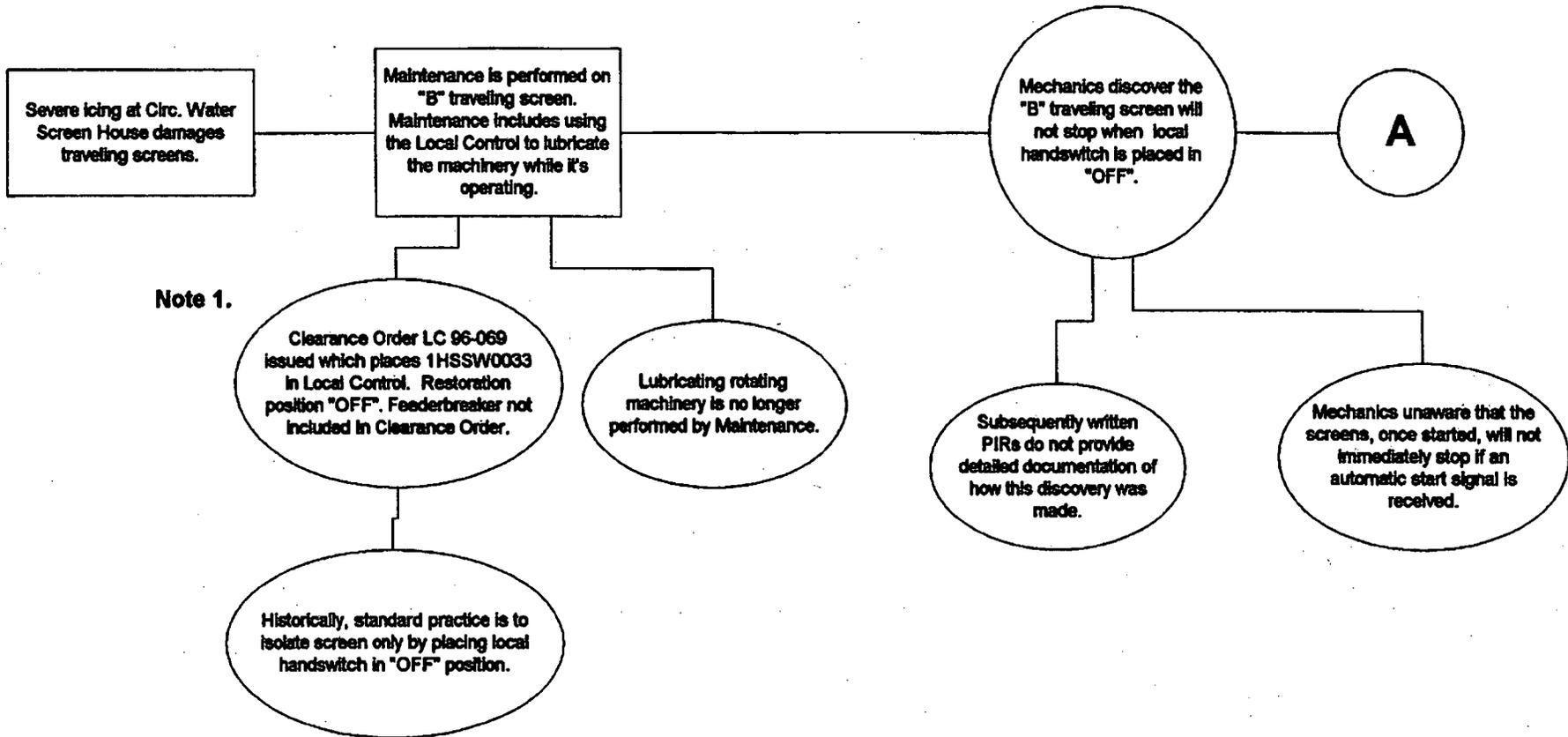
Planned Completion Date: 9-27-96

Investigated by: Ken Hall *Ken W Hall* Date: 8/30/96 Phone: 8709

Independent Reviewer: *K E Hargis* Date: *8/30/96* Phone: *4722*

Responsible Manager Approval: *[Signature]* Date: *8-30-96*

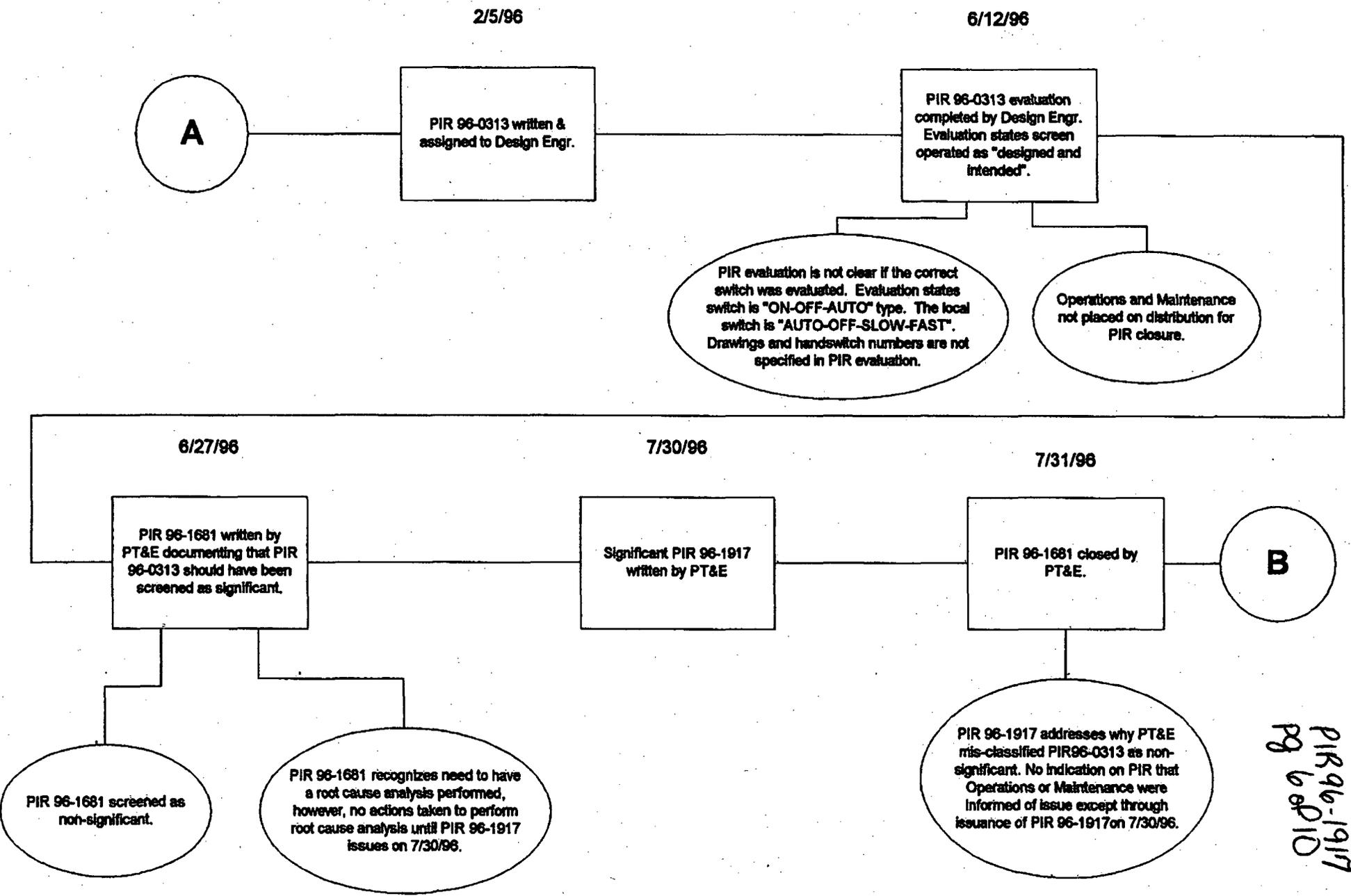
Distribution: Originator: D. Peavler (CC-PIA)  
 Others: PT&E (SE-PA), T. Hood (CC-DES), P. Martin (OB-IPS), R. Miller (WC-MA), K. Hargis (OB-OP)



Notes:

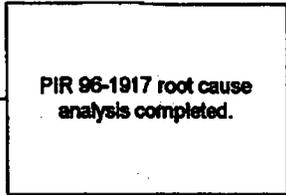
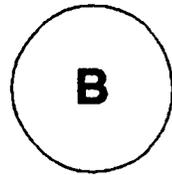
1. It is assumed that this is the applicable Local Control. Investigation is unable to determine exactly what Work Package Task was performed, and what LC 96-069 was used for (Reason block on Clearance form was not completed.)

PIR 96-1917  
Pg 5 of 10



PIR 96-1917  
pg 6 of 10

8/30/96



PIR 96-1917  
pg 7 of 10

IMAGED 10/01/96

PER 96-1917  
pg 8 of 10

**Hall Kenneth W**

---

**From:** Hargis Kenneth E  
**To:** Hall Kenneth W  
**Subject:** FW: CIRC. WATER SCREEN  
**Date:** Thursday, August 29, 1996 2:50PM

fyi

-----  
**From:** Dorpinghaus Ron H  
**To:** Hargis Kenneth E  
**Cc:** Nelson Kevin E  
**Subject:** CIRC. WATER SCREEN  
**Date:** Thursday, August 29, 1996 2:10PM

After the completion of overhaul work on "B" screen, and prior to turning it back to OP'S, we were starting to perform the required 2hr. run as stated in the tech. manual. After completion of hanging a local control, which is how we had until this time done business, we proceeded to run the screen in the slow speed. After several revolutions we tried to change to fast speed, however the speed would not change. We tried to change speed numerous times with no success, we then tried to stop the screen and once again we did not have any success in controlling the screen. The site watch was then asked for assistance, whose efforts were also in vain. The site watch was then requested to pull the breaker at the panel, this was the only way to stop the screen. At this time we called a stop to all work activities involving this screen, reported the problems to the Control Room. The SS called out the Electricians who started troubleshooting activities. The exact results of this Troubleshooting can best be answered by the Electricians. I hope this satisfies your questions, if not please let me know.

IMAGED 10/01/96

	<b>PERFORMANCE IMPROVEMENT REQUEST</b>	<b>PIR 96-1917</b>
<b>Corrective Actions Taken (for Significant PIRs)</b>		<b>PAGE 9 of 10</b>

**A. CORRECTIVE ACTION TAKEN [Identify all documents created or revised]**

PIR 96-1917 was written to address the safety concerns surrounding the operation of the "B" Circulating Water Traveling Screen during a maintenance evolution. The PIR stated that "it is now known that the traveling screen did start during the maintenance work". The PIR went on to state that this was a "near miss - personnel injury and clearance order [did]not provide the intended safety function".

Investigation revealed the screen was started using the Local Control after completion of the screen overhaul work. The screen would not stop once it was started. The root cause of the problem was determined to be that all involved work parties (Maintenance and Operations) were unaware that once a screen is started, it may not stop if the screen receives an automatic actuation.

Corrective actions taken include the following:

- Once the Operations Clearance Order Group became aware of this occurrence, it was decided all future Clearance Orders for traveling screens would have the feeder breaker opened to ensure undesired screen operation would not occur. To verify this decision is implemented, an existing Clearance Order on the traveling screens was reviewed (96-1250-SW). This Clearance Order was found to have both the local handswitch and feeder breaker tagged in the OFF position.
- PIR 96-1917 was placed in Operations required reading (OP 96000071). This was done to reinforce the practice of opening the screen feeder breaker when performing screen maintenance, and to inform personnel about screen operation. This PIR was forwarded to Mechanical Maintenance and IPS for suggested inclusion in their required reading.
- PIR 96-2164 was written documenting that a 4 week delay occurred between the time a personnel safety issue was recognized and documented on PIR 96-1681, and by the time a significant PIR (96-1917) was written to initiate root cause analysis.

PIR 96-1681 was written by PT&E on 6/27/96 after their review of closed PIR 96-0313 revealed PIR 96-0313 was incorrectly screened. PIR 96-0313 was screened as non-significant and should have been significant due to a potential personnel safety near miss and a potentially inadequate clearance order. Immediate actions taken by PT&E on PIR 96-1681 recognize the need to "have the issue screened as significant, and insure a formal root cause analysis is performed." Although PIR 96-1681 was originated by PT&E with the above stated on the PIR, PT&E did not classify PIR 96-1681 as significant. PIR 96-1681 was assigned to PT&E for evaluation. The evaluation of PIR 96-1681 (written 7/30/96) deals entirely with why PT&E originally misclassified PIR 96-0313. No evaluation is performed of the original personal safety concern or of the clearance order concern. To address the clearance order concern, PT&E issued significant PIR 96-1917 on 7/30/96 (4 weeks after PIR 96-1681 was written).

- PIR 96-2165 was written recommending changes to PIR forms to help ensure
  - \* all references applicable to the identified problem and resolution are recorded, and
  - \* primary personnel contacted during problem identification and resolution are recorded on the PIR form.
 Lack of supporting documentation greatly hampered root cause analysis and diminishes the ability of PIRs to act as useable historical documents. Listing personnel contacts will help reconstruct events during root cause analysis.

Distribution: Originator: D. Peavler (CC-PIA); Quality Evaluations (SE-QE), Training (TR-TR)  
 Nuclear Safety Engineering (SE-NSE), Plant Trending & Evaluation.(SE-PTE)  
 Others: K. Hargis (OB-OP)



## PERFORMANCE IMPROVEMENT REQUEST

PIR 96-1917PAGE 10 of 10

### Corrective Actions Taken (for Significant PIRs)

Corrective Action Properly Referenced in Procedures      Initials: KWH      Date: 9/5/96  
 Corrective Action Completed By: K. W. Hall ~~Kenneth Hall~~      Date: 9/5/96      Phone: 8709  
 Responsible Manager Approval: K. Davis      Date: 9-5-96  
 Scheduled Effectiveness Follow-up Date: 11/5/96

Distribution: Originator: D. Peavler (CC-PIA); Quality Evaluations (SE-QE), Training (TR-TR)  
    Nuclear Safety Engineering (SE-NSE), Plant Trending & Evaluation (SE-PTE)  
 Others: K. Hargis (OB-OP)

96-10-01-1917  
 10/01/96  
 10/01/96



PERFORMANCE IMPROVEMENT REQUEST

Effectiveness Follow-up  
(for Significant PIRs)

PIR 96-1917

PAGE 1 of 1

A. EFFECTIVENESS FOLLOW-UP PROCESS AND RESULTS

PIR 96-1917 was reviewed for effectiveness of corrective actions at preventing similar problems.

The corrective actions have been implemented as follows:

A review of the clearance orders on the traveling screens from 8/30/96 through 11/21/96 revealed four clearance orders: 96-1376SW, 96-1377SW for 10/3/96 - 10/4/96, and 96-1463SW, and 96-1464SW for 10/31/96 - 11/1/96. All included the necessary three local hand switches and three breakers tagged off.

PIR 96-1917 has been included in Operations required reading and is documented under RR# OP 960000071.

PIR 96-2164 was written and assigned to Plant Trending and Evaluation. It was closed 10/24/96.

PIR 96-2165 was written and assigned to Plant Trending and Evaluation. It was closed 10/10/96.

A review of the PIR trend database using key words (for all groups) "traveling screen", "travel", "screen" could find no similar events have occurred from 8/30/96 until 11/22/96.

Interviewed the Supervisor of the Clearance Order Group and he knows of no similar repeat occurrences with the traveling screens.

B. Based on the Results of the Effectiveness Follow-Up, Corrective Action to Prevent Recurrence has been:

Effective

Not Effective - New PIR # \_\_\_\_\_

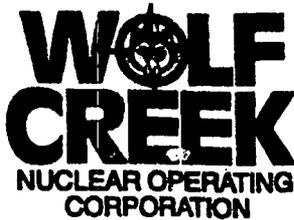
Review Performed by: Kathryn Kline *KSKline* Date: 11/22/96 Phone: 4403

Responsible Manager Approval: *K. Peavler* Date: 11-26-96

Distribution: Originator: Dave Peavler CC-PTE, Plant Trending & Evaluation (CC-PTE)  
Others: \_\_\_\_\_

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**A41**



A41

## INTEROFFICE CORRESPONDENCE

TO: P. M. Martin (WC-OP) EN 93-0214  
FROM: E. K. Brown (WC-SYS)  
DATE: June 22, 1993  
SUBJECT: Circulating Water System Operations

Source Reference: OP 93-0242; Request for recommendations on operation of the Circulating Water System.

Specific items:

- 1) One pump operation and valve lineup.

For one pump operation use two of the six flow paths through the condenser. The two paths chosen should be the upper most paths, i.e. the two upper water boxes or one upper and an intermediate water box if the one upper box is tagged out for maintenance. The other water box isolation valves shall be closed. The attached plot is from Calc. No. CW-M-005 and is recommended for incorporation into the appropriate procedures. The pump discharge valve shall then be positioned to establish pump discharge pressure within the confines indicated on the plot.

- 2) Two pump operation and valve lineup.

For two pump operations use all available flow paths and throttle the pump discharge valves as necessary to achieve a discharge pressure within the confines of the attached plot.

- 3) Sequencing of steps from one pump operation and two pump operation.

When starting two pump operation from a completely secured system 1) establish all available flow paths, 2) start both pumps and 3) throttle the discharge valves as necessary for a discharge pressure within the plot confines.

When starting the second pump after extended operation with one pump running 1) establish all available flow paths, 2) start the second pump and 3) throttle the discharge valves as necessary for a discharge pressure within the plot confines.

- 4) Three pump operation and valve lineup.

Use all available flow paths. All valves are to be in their full open position. The original design pump discharge pressure should be within the confines of the plot. If pump discharge pressure is not within the plot confines an investigation into a possible pump and/or motor problem should be initiated.

- 5) Rated ampere capacity of a Circulating Water Pump Motor.

The motor has design ratings of 4000 horsepower with 135 amps at 13200 volts supply voltage. The normal supply voltage is higher so the resulting motor amps drawn will be lower for any required power level.

"SAFETY! BE WISE, DON'T COMPROMISE"

700134U1

At the design voltage level of 13200 volts and normal hydraulic requirements the motor will draw from 98 to 125 amps. The normal hydraulic power requirements at the normal supply voltage level of 14100 volts will result in amps drawn from approximately 92 to 117 amps. The 85% limitation you mentioned in a recent conversation is from design hydraulic and electrical conditions and results in 115 amps. This value is still a good limit for normal supply voltage levels (>14000 volts) since all but the extreme upper end (low flow portion) of the pump curve are within this value. The pump normally will run closer to the runout end of the curve so this should not be a concern.

Additional Information:

Mike Watson, large motor System Engineer and Charley Minor, Electrical Maintenance, are working on a PIR as a result of the motor bearing problem from last outage. Other problems became apparent, such as the lack of alarms for the motor bearing and stator thermocouples during Modes 3 through 6; the computer had these as inactive alarms during these modes. These computer points, as well as others (since it may be a generic problem) are being investigated. I do recommend monitoring the motor's computer points for a few hours to watch for a possible problem after starting.

Action Item:

Please investigate and initiate the appropriate corrective actions for the red banding on the CWP motor amp meters in the Control Room. I noticed the red bands are not consistent for the three meters; two start at 135 and one starts at 140. I recommend 125 amps as the start of the danger region. Only under unusual pump and supply voltage conditions will this amount of current be drawn.

Response References:

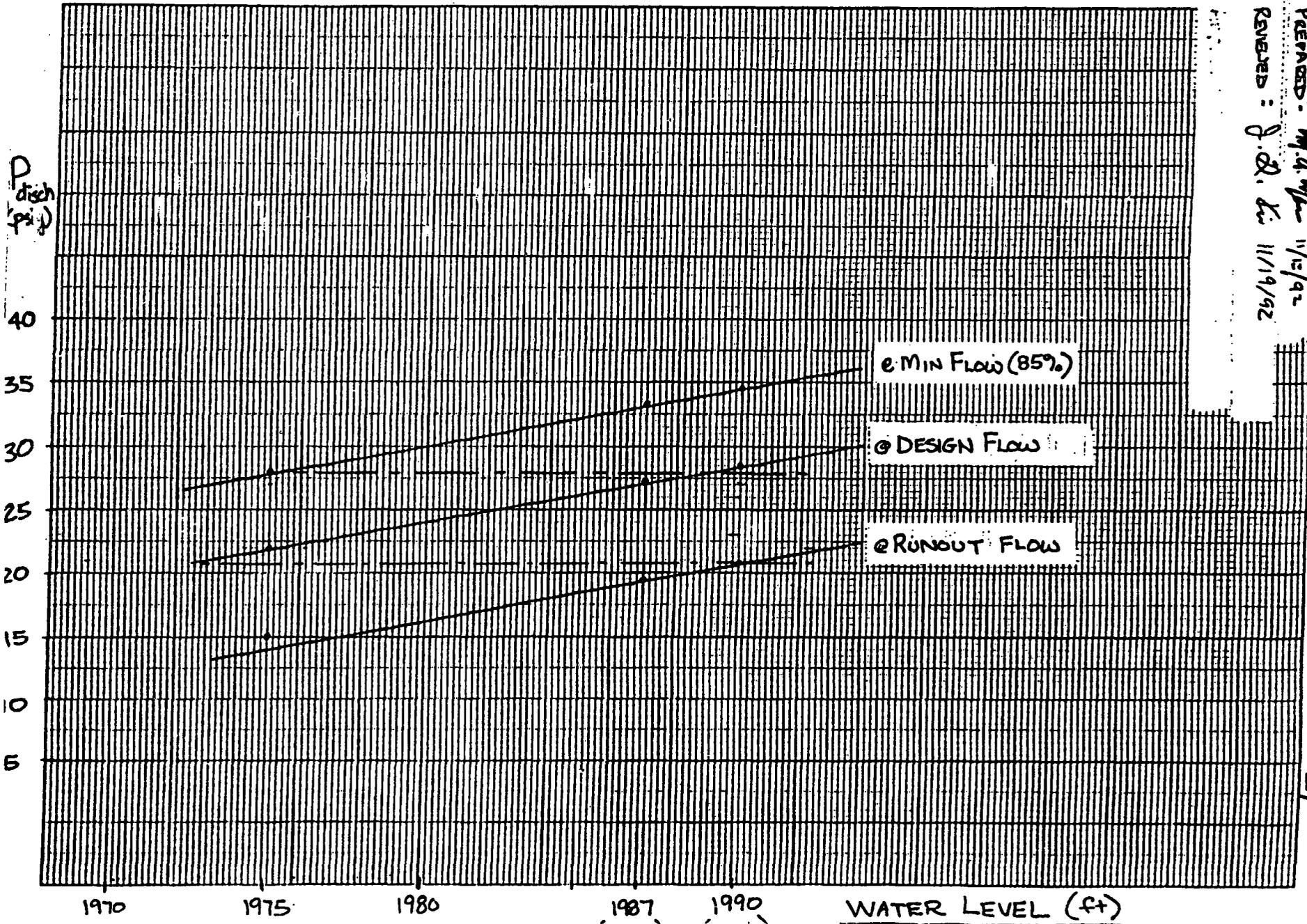
Calc. No. CW-M-005, Calculations for PMR 1464  
10466-M-10DA System Description, Circulating Water System  
FD-CW-01-WC Functional Description, Circulating Water Description  
A-3812-40944 Ingersoll-Rand Pump Curve, Circulating Water Pump  
A-3812-114D231M, Synchronous Motor Outline

*Edwin Brown*  
Edwin Brown  
System Engineer

cc: C. G. Minor (WC-ME)  
C. M. Sprout (WC-SYS)  
M. D. Watson (WC-SYS)  
J. D. Weeks (WC-OP)  
Records Management (WC-DS)

70013401977

7 0 0 1 5 4 0 1 9 1 -



NON-SAFETY

PMR DATA

CALC NO: CW-M-005 REV. 02

PAGE 11 OF 29

PREPARED: W/A W/A 11/13/92  
REVIEWED: J.R. L. 11/19/92

**A42**

A42

APPENDIX B

TO FACILITY OPERATING LICENSE NO. NPF-42

KANSAS GAS AND ELECTRIC COMPANY

KANSAS CITY POWER & LIGHT COMPANY

KANSAS ELECTRIC POWER COOPERATIVE, INC.

WOLF CREEK GENERATING STATION UNIT 1

DOCKET NO. 50-482

ENVIRONMENTAL PROTECTION PLAN

(NONRADIOLOGICAL)

WOLF CREEK GENERATING STATION

UNIT NO. 1

ENVIRONMENTAL PROTECTION PLAN

(NON-RADIOLOGICAL)

July, 1984

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1.0	Objectives of the Environmental Protection Plan .....	1-1
2.0	Environmental Protection Issues .....	2-1
2.1	Aquatic Issues .....	2-1
2.2	Terrestrial Issues .....	2-2
3.0	Consistency Requirements .....	3-1
3.1	Plant Design and Operation .....	3-2
3.2	Reporting Related to the NPDES Permit and State Certification .....	3-3
3.3	Changes Required for Compliance with Other Environmental Regulations .....	3-3
4.0	Environmental Conditions .....	4-1
4.1	Unusual or Important Environmental Events .....	4-1
4.2	Environmental Monitoring and Management .....	4-1
4.2.1	Fog Monitoring .....	4-1
4.2.2	Waterfowl Impaction .....	4-1
4.2.3	Land Management .....	4-1
5.0	Administrative Procedures .....	5-1
5.1	Review and Audit .....	5-1
5.2	Retention of Program Documentation .....	5-1
5.3	Changes in Environmental Protection Plan .....	5-1
5.4	Plan Reporting Requirements .....	5-1
5.4.1	Routine Reports .....	5-1
5.4.2	Nonroutine Reports .....	5-2

## 1.0 Objectives of the Environmental Protection Plan

The Environmental Protection Plan (EPP) is to provide for protection of nonradiological values during operation of Wolf Creek Generating Station. The principal objectives of the EPP are as follows:

- (a) Verify that the facility is operated in an environmentally acceptable manner, as established by the Final Environmental Statement Operating License Stage NUREG-0878 (FES-OLS), and other NRC environmental impact assessments.
- (b) Coordinate NRC requirements, assure they are suitably fulfilled and maintain consistency with other Federal, State and local requirements for environmental protection.
- (c) Keep NRC informed of the environmental effects of facility operation and of actions taken to control those effects.

Environmental concerns identified in the FES-OLS which relate to water quality matters are regulated by the NPDES permit issued by the State of Kansas.

## 2.0 Environmental Protection Issues

In the FES-OL dated January, 1982, the staff considered the environmental impacts associated with the operation of Wolf Creek Generating Station (WCGS). Certain environmental issues were identified which required monitoring, study or license conditions to resolve environmental concerns and to assure adequate protection of the environment.

### 2.1 Aquatic Issues

- (a) The impacts of Wolf Creek Generating Station operation on the aquatic environment of the John Redmont Reservoir – Neosho River system will be negligible during periods of normal and above-normal hydrologic conditions in the upstream watershed. However, should a severe and prolonged drought occur, the withdrawal of cooling-lake makeup water from the Redmont Dam tailwaters area would contribute to a marked draw-down of water in the reservoir and to reduced streamflow in the river, thus severely depleting available aquatic habitat and adversely affecting resident biota. (FES Section 5.5.2.1)
- (b) Some of the operational effects on aquatic organisms in the cooling lake will be locally severe. For example, periodically high concentrations of total residual chlorine in the vicinity of the cooling water discharge outlet is expected to cause appreciable mortality among aquatic organisms, especially during periods when temperatures in the area are insufficient to cause fish and other motile species to avoid the area. (FES Section 5.5.2.2)
- (c) Cold shock effects on fish due to reactor shutdowns could cause significant mortality to aquatic species in the cooling lake. (FES Section 5.5.2.2)
- (d) Impingement and/or entainment impacts on aquatic biota are expected to be significant since the approach velocity of water flow to the facility are relatively high. (FES Section 5.5.2.2)
- (e) Discharge from the cooling lake to Wolf Creek is expected to influence the composition of aquatic communities immediately downstream from the discharge outlet, but aquatic biota of the Wolf Creek- Neosho River confluence will not be adversely affected by the discharge. (FES Section 5.5.2.3)

The NRC will rely on the State of Kansas for determination of the need for monitoring or permit limitations related to these and other aquatic issues.

## 2.2 Terrestrial Issues

- (a) That the composition and structure of vegetation in the 453 ha (1120 acre) exclusion zone will be selectively controlled to be compatible with the function and security of station facilities. (FES-OLS: Section 5.5.1.1; Station Site)
- (b) That the vegetation within a buffer zone surrounding the cooling lake will be retained in or allowed to develop toward a natural state, i.e. naturally occurring biotic communities. (FES-OLS: Section 5.5.1.1; Station Site)
- (c) That herbicides used for the maintenance of transmission line corridors will be limited to herbicides approved by the U. S. EPA and the State of Kansas at the times of such use. (FES-OLS: Section 5.5.1.2; Energy-Transmission System)
- (d) That in the event of a serious disease problem involving waterfowl attributable to station operation occurs, the actions specified in the reference will be initiated following technical evaluation if deemed necessary. (FES-OLS: Section 5.5.1.1; Station Site)
- (e) The need for a wildlife monitoring program which includes a general survey program for waterfowl collision events be accomplished. (FES-OLS: Section 5.5.1.2; Energy-Transmission System)
- (f) The need for a fog monitoring program to document any potential increase in fogging due to the operation of the cooling lake heat dissipation system. (FES-OLS: Section 5.4.1; Fog and Ice)

### 3.0 Consistency Requirements

#### 3.1 Plant Design and Operation

The licensee may make changes in station design or operation or perform tests or experiments affecting the environment provided such activities do not involve an unreviewed environmental question and do not involve a change in the EPP\*. Changes in station design, operation, performance of tests or experiments which do not affect the environment are not subject to the requirements of this EPP. Activities governed by Section 3.3 are not subject to the requirements of this Section.

Before engaging in additional construction or operational activities which may significantly affect the environment, the licensee shall prepare and record an environmental evaluation of such activity. Activities are excluded from this requirement if all measurable nonradiological environmental effects are confined to the on-site areas previously disturbed during site preparation and plant construction. When the evaluation indicates that such activity involves an unreviewed environmental question, the licensee shall provide a written evaluation of such activity and obtain prior NRC approval. When such activity involves a change in the EPP, such activity and change to the EPP may be implemented only in accordance with an appropriate license amendment as set forth in Section 5.3 of this EPP.

A proposed change, test or experiment shall be deemed to involve an unreviewed environmental question if it concerns: (1) a matter which may result in a significant increase in any adverse environmental impact previously evaluated in the FES-OL, environmental impact appraisals, or in any decisions of the Atomic Safety and Licensing Board; or (2) a significant change in effluents or power level (3) a matter not previously reviewed and evaluated in the documents specified in (1) of this Subsection, which may have a significant adverse environmental impact.

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\* This provision does not relieve the licensee of the requirements of 10 CFR 50.59.

The licensee shall maintain records of changes in facility design or operation and of tests and experiments carried out pursuant to this Subsection. These records shall include written evaluations which provide bases for the determination that the change, test, or experiment does not involve an unreviewed environmental question or constitute a decrease in the effectiveness of this EPP to meet the objectives specified in Section 1.0. The licensee shall include as part of the Annual Environmental Operating Report (per Subsection 5.4.1) brief descriptions, analyses, interpretations, and evaluations of such changes, tests and experiments.

### 3.2 Reporting Related to the NPDES Permit and State Certification

Changes to, or renewals of, the NPDES Permit or the State certification shall be reported to the NRC within 30 days following the date the change or renewal is approved. If a permit or certification, in part or in its entirety, is appealed and stayed, the NRC shall be notified within 30 days following the date the stay is granted.

The licensee shall notify the NRC of changes to the effective NPDES Permit proposed by the licensee by providing the NRC with a copy of the proposed change at the same time it is submitted to the permitting agency. The licensee shall provide the NRC a copy of the application for renewal of the NPDES Permit at the same time the application is submitted to the permitting agency.

### 3.3 Changes Required for Compliance with Other Environmental Regulations

Changes in plant design or operation and performance of tests or experiments which are required to achieve compliance with other Federal, State, and local environmental regulations are not subject to the requirements of Section 3.1.

#### 4.0 Environmental Conditions

##### 4.1 Unusual or Important Environmental Events

Any occurrence of an unusual or important event that indicates or could result in significant environmental impact casually related to plant operation shall be recorded and promptly reported to the NRC within 24 hours followed by a written report per Subsection 5.4.2. The following are examples: excessive bird impaction events, onsite plant or animal disease outbreaks, mortality or unusual occurrence of any species protected by the Endangered Species Act of 1973, fish kills, increase in nuisance organisms or conditions, and unanticipated or emergency discharge of waste water or chemical substances.

No routine monitoring programs are required to implement this condition.

##### 4.2 Environmental Monitoring and Management

Environmental monitoring and management activities shall be undertaken as outlined in Section 2 and as described in the following.

###### 4.2.1 Fog Monitoring

A fog monitoring program shall be accomplished to document the frequency of occurrence of natural fog and future cooling lake operation induced fog through the first year of commercial operation of WCGS. A visimeter and continuous recorder shall be utilized in a conservative location throughout the program.

###### 4.2.2 Waterfowl Impaction

A general survey program shall be accomplished to document significant waterfowl collision events and determine if mitigation is warranted.

###### 4.2.3 Land Management

There shall be a land management program instituted at WCGS to provide for revegetation, maintenance, and restoration of the WCGS site. This program shall attempt to achieve a balance between production and conservation values on site property through the implementation of conservation and wildlife management techniques. There shall be no reporting requirements associated with this condition.

## 5.0 Administrative Procedures

### 5.1 Review and Audit

The licensee shall provide for review and audit of compliance with the EPP. The audits shall be conducted independently of the individual or groups responsible for performing the specific activity. A description of the organization structure utilized to achieve the independent review and audit function and results of the audit activities shall be maintained and made available for inspection.

### 5.2 Retention of Program Documentation

Program documentation relative to the environmental aspects of plant operation shall be made and retained in a manner convenient for review and inspection. Program documentation shall be made available to NRC on request.

Documentation of modifications to plant structures, systems, and components determined to potentially affect the continued protection of the environment shall be retained for the life of the plant. All other information, data, and finalized reports relating to this EPP shall be retained for five years or, where applicable, in accordance with the requirements of other agencies.

### 5.3 Changes in Environmental Protection Plan

Requests for changes in the EPP shall include an assessment of the environmental impact of the proposed change and a supporting justification. Implementation of such changes in the EPP shall not commence prior to NRC approval of the proposed changes in the form of a license amendment incorporating the appropriate revision to the EPP.

### 5.4 Plan Reporting Requirements

#### 5.4.1 Routine Reports

An Annual Environmental Operating Report describing implementation of this EPP for the previous calendar year shall be submitted to the NRC prior to May 1 of each year. The initial report shall be submitted prior to May 1 of the year following issuance of the operating license. The period of the first report shall begin with the date of issuance of the operating license.

The report shall include summaries and analyses of the results of the environmental protection activities required by Subsection 4.2 of this EPP for the report period, including a comparison with related preoperational studies, operational controls (as appropriate), and previous non-radiological environmental monitoring reports, and an assessment of the observed impacts of the plant operation on the environment. If harmful effects or evidence of trends toward irreversible damage to the environment are observed, the licensee shall provide a detailed analysis of the data and a proposed course of action to alleviate the problem.

The Annual Environmental Operating Report shall also include:

- (a) A list of EPP noncompliances and the corrective actions taken to remedy them.
- (b) A list of all changes in station design or operation, tests, and experiments made in accordance with Subsection 3.1 which involved a potentially significant unreviewed environmental issue.
- (c) A list of nonroutine reports submitted in accordance with Subsection 5.4.2.

In the event that some results are not available by the report due date, the report shall be submitted noting and explaining the missing results. The missing results shall be submitted as soon as possible in a supplementary report.

#### 5.4.2 Nonroutine Reports

A written report shall be submitted to the NRC within 30 days of occurrence of an unusual or important environmental event (see Section 4.1). The report shall (a) describe, analyze, and evaluate the event, including extent and magnitude of the impact, and plant operating conditions, (b) describe the probable cause of the event, (c) indicate the action taken to correct the reported event, (d) indicate the corrective action taken to preclude repetition of the event and to prevent the similar occurrences involving similar components or systems, and (e) indicate the agencies notified and their preliminary responses.

Events, reportable under this subsection which also require reports to other Federal, State or local agencies shall be reported in accordance with those reporting requirements in lieu of the requirements of this Subsection. The NRC shall be provided a copy of such report at the time it is submitted to the other agency.



AP 07-002

## ENVIRONMENTAL PROTECTION PROGRAM

Responsible Manager

Manager Regulatory Affairs

Revision Number	2
Use Category	Reference
Administrative Controls Procedure	Yes
Management Oversight Evolution	No
Program Number	07

DC38 8/4/2006

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1.0	PURPOSE	2
2.0	SCOPE	2
3.0	REFERENCES AND COMMITMENTS	2
4.0	DEFINITIONS	3
5.0	RESPONSIBILITIES	3
6.0	PROCEDURE	5
7.0	RECORDS	8
8.0	FORMS	8

Revision: 2	ENVIRONMENTAL PROTECTION PROGRAM	AP 07-002
Reference Use		Page 2 of 8

**1.0 PURPOSE**

1.1 This procedure establishes the administrative controls required to support the management commitment to operate the Wolf Creek Generating Station (WCGS) with minimal environmental impact.

**2.0 SCOPE**

2.1 The WCGS Environmental Protection Program includes meeting the requirements of the Environmental Protection Plan, Environmental Permits and Corporate Policy 5 Environmental Stewardship.

2.2 This procedure requires that changes in station design, operation, or performance of tests or experiments be controlled in accordance with the Environmental Protection Plan.

2.3 The procedure also requires that events and noncompliances be controlled in a manner protective of environmental quality at WCGS in accordance with the Environmental Protection Plan.

**3.0 REFERENCES AND COMMITMENTS**

**3.1 References**

- 3.1.1 Environmental Protection Plan (EPP), Appendix B to Facility Operating License NPF-42
- 3.1.2 NUREG-0878, Final Environmental Statement Related to the Operation of Wolf Creek Generating Station, Unit No. 1
- 3.1.3 Kansas Air Emission Source Class II Operating Permit 0310021
- 3.1.4 Kansas Water Pollution Control Permit and Authorization to Discharge Under the National Pollutant Discharge Elimination System (NPDES) Permit I-NE07-P002
- 3.1.5 Corporate Policy 3, Quality
- 3.1.6 Corporate Policy 5, Environmental Stewardship
- 3.1.7 AP 05-005, DESIGN, IMPLEMENTATION AND CONFIGURATION CONTROL OF MODIFICATIONS
- 3.1.8 AP 07-004, COMMUNICATIONS WITH ENVIRONMENTAL REGULATORY AUTHORITIES
- 3.1.9 AP 26A-003, 10 CFR 50.59 REVIEWS
- 3.1.10 AP 28A-001, PERFORMANCE IMPROVEMENT REQUEST

Revision: 2	ENVIRONMENTAL PROTECTION PROGRAM	AP 07-002
Reference Use		Page 3 of 8

3.1.11 AI 07-002, EPP PLANT DESIGN OR OPERATIONAL CHANGE EVALUATION

3.1.12 AI 07-003, SITE SURVEILLANCE

3.1.13 AI 26A-003, REGULATORY EVALUATIONS (OTHER THAN 10 CFR 50.59)

3.2 Commitments

3.2.1 None

4.0 **DEFINITIONS**

4.1 Cultural Resources

4.1.1 Means areas, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering and culture.

5.0 **RESPONSIBILITIES**

5.1 Environmental Management

5.1.1 Develops and implements procedures for performance of evaluations mandated by the EPP.

5.1.2 Evaluates unusual or important events, which may cause environmental impact as defined in the EPP.

5.1.3 Performs environmental monitoring, site surveillances and studies in accordance with approved procedures or plans.

5.1.4 Administers environmental permits necessary for operation of WCGS.

5.1.5 Performs liaison role with the Kansas Department of Health and Environment (KDHE).

5.1.6 Maintains the Land Management Program in accordance with section 4.2.3 of the EPP.

5.1.7 Generates the Annual Environmental Operating Report in accordance with section 5.4.1 of the EPP.

5.1.8 Generates written reports that are submitted to the NRC within 30 days of occurrence of an unusual or important environmental event in accordance with section 5.4.2 of the EPP.

Revision: 2	ENVIRONMENTAL PROTECTION PROGRAM	AP 07-002
Reference Use		Page 4 of 8

5.1.9 Provides applications for change and applications for renewal of the NPDES Permit to the NRC in accordance with section 3.2 of the EPP.

5.2 Operations

5.2.1 Operates WCGS in compliance with environmental permits to minimize environmental impacts.

5.2.2 Ensures that changes in station design, operation or performance of tests or experiments affecting the environment receive evaluation by Environmental Management.

5.3 Chemistry

5.3.1 Performs outfall sampling in accordance with the NPDES permit and submits the NPDES data to Environmental Management.

5.3.2 Develops and implements procedures to regulate nonradiological plant effluents within permit limitations.

5.4 Engineering

5.4.1 Ensures that plant modifications are designed to minimize environmental impact.

5.4.2 Ensures that changes in station design, operation or performance of tests or experiments affecting the environment receive evaluation by Environmental Management.

5.5 Quality Oversight

5.5.1 Performs independent quality evaluations.

Revision: 2	ENVIRONMENTAL PROTECTION PROGRAM	AP 07-002
Reference Use		Page 5 of 8

## 6.0 PROCEDURE

### 6.1 Environmental Protection Plan (EPP)

6.1.1 The purpose of the Environmental Protection Plan (EPP) is to provide for protection of nonradiological aspects of the environment during operation of WCGS.

6.1.2 The principal objectives of the EPP are as follows (reference section 1.0 of EPP):

1. Verify that WCGS is operated in an environmentally acceptable manner, as established by the Final Environmental Statement Operating License Stage NUREG-0878 (FES-OLS) and other NRC environmental impact assessments.
2. Coordinate NRC requirements, assure they are suitably fulfilled and maintain consistency with other Federal, State and local requirements for environmental protection.
3. Keep NRC informed of the environmental effects of facility operation and of actions taken to control those effects.

### 6.1.3 Plant Design and Operational Changes

1. In accordance with the EPP, WCGS may make changes in station design or operation or perform tests or experiments affecting the environment provided such activities do not involve an unreviewed environmental question and do not involve a change in the EPP (reference section 3.1 of EPP).
2. Changes in station design, operation, performance of tests or experiments, which do not affect the environment, are not subject to the EPP requirements (reference step 3.1 of EPP).
3. Changes in plant design or operation and performance of tests or experiments which are required to achieve compliance with other Federal, State, and local environmental regulations, are not subject to the EPP requirements (reference step 3.3 of EPP).
4. Environmental Management shall evaluate plant modifications and operational changes potentially involving environmental impact prior to implementation of the change.

Revision: 2	ENVIRONMENTAL PROTECTION PROGRAM	AP 07-002
Reference Use		Page 6 of 8

5. Changes for which an unreviewed environmental question is identified shall have a written evaluation and NRC approval prior to implementation.

6.1.4 Changes to the Environmental Protection Plan

1. Requests for changes to the EPP shall include an assessment of the environmental impact of the proposed change and a supporting justification (reference section 5.3 of EPP).
2. Implementation of such changes to the EPP shall not commence prior to NRC approval of the proposed changes in the form of a license amendment incorporating the appropriate revision to the EPP (reference section 5.3 of EPP).

6.1.5 Unusual/Important Environmental Events

1. Any occurrence of an unusual or important event that indicates or could result in significant environmental impact causally related to plant operation shall be reported immediately to Environmental Management (reference section 4.1 of EPP). Examples include:
  - a. Excessive bird impaction events
  - b. Onsite plant or animal disease outbreaks
  - c. Mortality or unusual occurrence of any species protected by the Endangered Species Act of 1973
  - d. Fish kills
  - e. Increase in nuisance organisms or conditions
  - f. Unanticipated or emergency discharge of wastewater or chemical substances
  - g. discovery of previously unknown cultural resources
2. Environmental Management will promptly perform an evaluation to determine if significant environmental impact has or could result.

Revision: 2	ENVIRONMENTAL PROTECTION PROGRAM	AP 07-002
Reference Use		Page 7 of 8

3. Events that indicate or could result in significant environmental impact shall be reported to the NRC within 24 hours followed by a written report per section 5.4.2 of the EPP.

NOTE

Fish kill events due to cold-shock confined to the lake are not considered reportable to the Kansas Department of Wildlife and Parks or the Kansas Department of Health and Environment. However, a courtesy call should be considered to keep these agencies informed.

4. The following guidance should be considered when determining whether or not an event is significant and thus reportable per the EPP:
  - a. Any environmental event that has a reasonable probability of receiving the attention of the news media.
  - b. Any environmental event that has, or has the potential to, cause adverse impacts offsite.
  - c. Events on site that have or will cause environmental impacts greater than that documented in the FES-OLS.

6.2 Environmental Permits

- 6.2.1 The EPP requires that WCGS be operated in compliance with environmental permits.
- 6.2.2 Procedures shall be developed that regulate plant effluents, i.e., air, wastewater, etc., within permit limitations.
- 6.2.3 Noncompliance with station environmental permits shall be identified to Environmental Management.
  1. Notifications to the Kansas Department of Health and Environment (KDHE) shall be accomplished in accordance with AP 07-004.
- 6.2.4 Plant effluent or wastewater monitoring shall be performed as required by the Air Operating Permit and the NPDES Permit.

Revision: 2	ENVIRONMENTAL PROTECTION PROGRAM	AP 07-002
Reference Use		Page 8 of 8

6.2.5 Site surveillances performed in accordance with AI 07-003 will be used to ensure compliance with applicable requirements of this section.

6.3 Corporate Policy 5 Environmental Stewardship

6.3.1 WCGS is to be operated in a safe and environmentally sensitive manner.

6.3.2 The Company is dedicated to protecting environmental quality in areas surrounding WCGS.

6.3.3 Adherence to this procedure ensures that operational and support activities minimize and measure the environmental effect of operations at WCGS.

6.3.4 Site surveillances performed in accordance with AI 07-003 will be used to ensure compliance with the requirements of this section.

6.4 Audit of the EPP

6.4.1 Audits shall be performed in accordance with section 5.1 of the Environmental Protection Plan.

6.5 Non-compliance and Corrective Action

6.5.1 Environmental Protection Plan, Environmental Permits and Corporate Policy 5 Environmental Stewardship non-compliance and corrective action shall be documented in accordance with AP 28A-001, PERFORMANCE IMPROVEMENT REQUEST.

7.0 RECORDS

7.1 None

8.0 FORMS

8.1 None

- END -

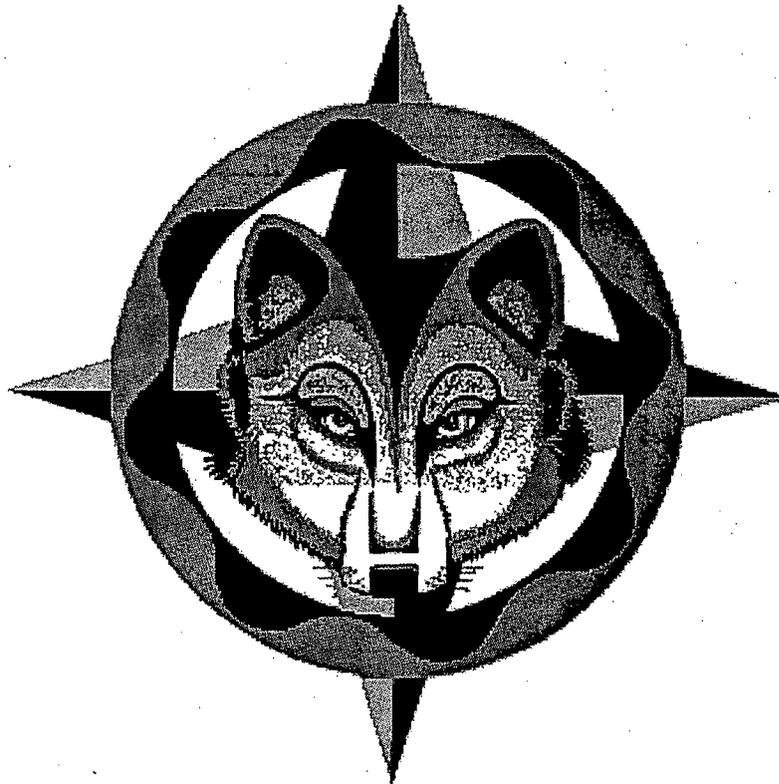
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**A43**

# WOLF CREEK UPDATED SAFETY ANALYSIS REPORT (USAR)



Revision - 18

Release Date - DC30 03/11/2005

## WOLF CREEK

on the Pennsylvanian strata. Quaternary alluvium reaches a thickness of approximately 25 feet in the Wolf Creek valley. Scattered Tertiary age deposits of clayey gravel cap some of the higher hills in the site area. Glacial deposits are not present at the site. The alternating Pennsylvanian strata forming the bedrock surface consist of competent rock units with a low amount of structural discontinuities in the rock mass. No major geologic features have been identified which could adversely affect the stability of subsurface materials at seismic Category I facilities. Minor geologic features, such as jointing, the zones of penecontemporaneous deformation, and the weathering profile in the rock, were considered during design and construction of facilities. Comprehensive geotechnical investigations of the site have determined the subsurface conditions in adequate detail to provide design criteria for foundation support of safety-related facilities. Major seismic Category I structures are supported on competent rock. Only minor, localized modifications to foundation materials were required in design and construction to provide uniform support of safety-related facilities.

#### 1.2.1.6 Seismology

The plant site is located in a relatively seismic stable region of the central United States. No earthquake epicenter has been reported closer than 40 miles to the site, and the nearest shocks have had epicentral intensities no greater than Intensity III. At distances of 85 and 105 miles from the site, earthquakes of Intensity VII to VII-VIII have been recorded. Since 1800, only seven earthquakes of Intensity V or greater have occurred within 100 miles of the site, and 16 events of Intensity VI or greater have been recorded within 200 miles. Previously recorded earthquakes probably have not generated intensities greater than VI at the site, and none of the buildings in the vicinity of the site have sustained any known structural damage due to earthquakes.

An Operating Basis Earthquake corresponding to a horizontal acceleration of six percent of gravity and a Safe Shutdown Earthquake corresponding to a horizontal acceleration of 12 percent of gravity was selected for the site. However, a seismic evaluation of these structures, systems, and components using the Lawrence Livermore Laboratories spectrum anchored at 0.15g for structures supported on bedrock is contained in Appendix 3C.

#### 1.2.1.7 Hydrology

##### 1.2.1.7.1 Surface Water Hydrology

The plant site is located within the Wolf Creek watershed northeast of Burlington, Kansas. The topography within the watershed varies from

## WOLF CREEK

undulating hills upstream of the plant site to a floodplain area shared with the Neosho River with a drainage area within Kansas of 6,300 sq. miles near the mouth of Wolf Creek with a drainage area of 35 sq. miles. The cooling lake alters the draining pattern of the watershed, but safety-related facilities are protected from severe hydrological events.

The cooling lake is designed to supply adequate cooling water to the plant during a one in fifty year drought. Makeup water is supplied to the cooling lake from the Wolf Creek watershed runoff and from makeup water pumped from John Redmond Reservoir. The region surrounding the site is not characterized by events such as tsunamis, surge activity, or severe ice flooding. Major dam failures on the Neosho River above Wolf Creek watershed will not affect safety-related facilities.

The flow of the Neosho River is controlled by three reservoirs above the site. The Maximum flood design elevation of 1097.5 ft. msl., resulting from the probable maximum flood routed through the cooling lake with coincident wave activity, is below the plant site grade of 1099.5 ft. msl.

### 1.2:1.7.2 Groundwater Hydrology

Only small quantities of groundwater are available within a 50-mile radius of the plant site. The groundwater is produced from three types of aquifers: the alluvial deposits in the river valleys, the weathered bedrock including the shallow soil, and the unweathered bedrock.

The alluvial aquifers are composed of silts, sands, and gravel. Yields from wells in the alluvial aquifers are up to 100 gallons per minute. Recharge to such aquifers occurs from precipitation and from rivers during periods of high flow. Regionally, discharge from the alluvial aquifers normally flows into the rivers.

The weathered bedrock aquifer consists of weathered shales, siltstones, sandstones, and limestones. Pressure tests indicate that this aquifer is sufficiently permeable to yield up to 10 gallons per minute for livestock and domestic wells. Recharge occurs from precipitation and locally from downward percolation through the overlying alluvium. Discharge occurs into both alluvium and streams.

The consolidated bedrock aquifers are composed of sandstones and limestones which are limited to yields ranging from about 1 to 10 gallons per minute. Recharge to such aquifers occurs by precipitation and infiltration of

## WOLF CREEK

surface water at the outcrops. Where overlain by shales and siltstones, which act as aquitards and aquicludes, vertical recharge to the limestones and sandstones is minimal.

There is no anticipated use of groundwater at the plant site. The operation of the plant will not have any detrimental effect on the groundwater environment, nor will local groundwater use affect the operation of the plant.

### 1.2.1.8 Meteorology

The continental location of the site ensures a wide seasonal range of temperature and frequent day to day temperature changes due to frequent passage of cyclonic systems through the vicinity. The maximum temperature was 117 degrees Fahrenheit recorded at Burlington, Kansas. The lowest extreme temperature was -26 degrees Fahrenheit. The prevailing winds are from the south to southeast except during the winter when north to northwest winds prevail. There are no meteorologically significant terrain features or bodies of water within 50 miles of the site.

The site vicinity is subject to occasional severe thunderstorms and the possibility of a tornado from early spring until autumn. The world record 42 minute rainfall of 12 inches occurred at Holt, Missouri, approximately 120 miles from the Wolf Creek Site. However, precipitation is generally moderate throughout the year and snowfall ranges from very little during some winters to substantial during others.

The fastest wind, excluding tornadoes was 86 mph.

The diffusion climatology is generally favorable due to the frequent passage of cyclonic storm systems. The poorest diffusion conditions occur during (1) nighttime inversions which become most developed during winters and (2) dominance of the site area by stagnant anticyclonic systems which may persist for several consecutive days, especially during late summer and autumn.

### 1.2.2 GENERAL ARRANGEMENT OF STRUCTURES

The principal structures located on the Wolf Creek Generating Station site are listed below.

- a. Reactor building - houses the reactor, reactor coolant piping, steam generators, pressurizer, reactor coolant pumps, accumulators, and the containment air coolers;

## WOLF CREEK

plant grade elevation of 1,099.5 feet. Its thickness at the site ranges from 40 to 117 feet, and it yields up to 0.5 gallons per minute to wells;

- d. The Tonganoxie Sandstone Member of the Stranger Formation is a fine-grained, slightly calcareous, micaceous sandstone. Interbedded with shale and siltstone, it has some vertical fractures. At the plant site, the top of the Tonganoxie Sandstone is about 290 feet below the plant grade elevation of 1,099.5 feet. Its thickness in this area ranges from 42 to 142 feet, and it rarely yields over 3 gallons per minute to wells.

During the boring and aquifer testing program (described in Section 2.5.4), none of the deep bedrock formations yielded more than 2 gallons per minute in a 3-inch test hole; only slightly higher yields could be expected with larger diameter wells. The flow rate was measured by air lifting the water out of the hole. The rate of water-level recovery was timed and measured to determine the permeability. Water-level readings in the piezometers show that leakyartesian conditions exist in the deeper bedrock strata below the weathered bedrock. The Toronto Limestone Member and younger strata are recharged principally by local precipitation. Much of the precipitation first recharges the overlying weathered bedrock aquifers which in turn provides some leakage to the deeper units including the Toronto Limestone Member. Pressure tests indicate that the permeability of the deeper bedrock shale units below the Toronto Limestone Member ranges from  $10^{-7}$  to  $10^{-8}$  centimeters per second (Section 2.5.4).

Ground-water and rock samples from the weathered Jackson Park Shale and Heumader Shale members, and ground water from the Plattsmouth Limestone Member in the Category I area were tested for water-soluble sulfate. It was determined that sulfate concentrations exhibit considerable horizontal and vertical variation within the vicinity of the plant site. The sulfate concentrations in soil and rock samples ranged from 3.1 to 535.0 milligrams per kilogram. Ground-water samples contained sulfate concentrations which ranged from 78.5 to 346.0 milligrams per liter (mg/l). At Well D-26, which was monitored by a water-level recorder during 1973 and 1974 and is located less than one mile northeast from the center of the plant site, sulfate concentrations range from 66 to 71 mg/l. At Well C-2, located approximately 1.75 miles northwest of the plant site, sulfate concentrations have varied between 764 and 1,050 mg/l. For well location and inventory data refer to Figure 2.4-52 and Table 2.4-29.

## WOLF CREEK

The criterion used for well sealing was in accordance with Sargent & Lundy's Specifications A-3854, (Section 304.1). This specification is reproduced as Table 2.4-29a.

The status of well sealing is presented in Tables 2.4-29b and 2.4-29c.

### 2.4.13.1.2 Onsite Use

There is no anticipated use of ground water at or near the site during plant operation.

### 2.4.13.2 Sources

Although most of the public water supplies in the vicinity of the site are derived from surface-water sources, ground water accounts for a small amount of both municipal and private water needs. Information was obtained from public agency contact and a local water well inventory. A discussion of regional and local ground-water flow regimes is also included in this section.

#### 2.4.13.2.1 Regional Public Ground-Water Use

This discussion of regional public ground-water use applies to a 20-mile radius of the site (Figure 2.4-53). Table 2.4-30 summarizes the information available regarding the municipal supplies in this region.

##### 2.4.13.2.1.1 Present Use

The amount of ground water used for public supplies within a 20-mile radius of the plant site is small. The city of Waverly, Kansas, about 10 miles north-northeast of the site, has five wells (228 to 300 feet deep) (References 19 and 15) which obtain water from the Tonganoxie Sandstone (Figure 2.4-53). An average of 39,000 gallons per day (about 5 gallons per minute per well) is pumped from this system (Reference 15). Bailer tests performed by the driller produced 10-25 gallons per minute, but a sustained yield of 5 gallons per minute is typical. A sanitary seal is installed in each well to prevent pollution from the surface from entering the well through the weathered rock zone.

The municipalities of Williamsburg, 20 miles northeast, and Melvern, 18 miles north of the site, also obtain water supplies from deep wells in the Tonganoxie Sandstone Member (Table 2.4-30). Borehole tests in the Tonganoxie Sandstone near the site produced yields of less than 3 gallons per minute (Section 2.4.13.1.1.2).

## WOLF CREEK

The municipalities of New Strawn, located 3 miles west of the site, and Hartford in Lyons County, located 15 miles west-northwest of the site, obtain ground water from wells less than 40 feet deep in the Neosho River alluvium (Reference 21). At Hartford, the static water level is about 32 feet below ground surface; it is about 12 feet below ground surface in the New Strawn well (Reference 20).

The only known ground-water supply being used for industrial purposes within a 20-mile radius of the site is from one well owned by the Atchison Topeka and Santa Fe Railway located about 15 miles northwest of the site (Well No. 39, Table 2.4-4 and Figure 2.4-8). The user has a water right for 10 gallons per minute.

### 2.4.13.2.1.2 Future Use

The use of ground water for public supplies in Coffey County is not expected to increase significantly as a result of population changes (Section 2.1.3). Total projected use (as estimated in 1979) is presented in Table 2.4-31 and shows a decrease in ground-water pumpage between 1965 and 1980 followed by an increase to slightly above 1965 levels in 2020 (Reference 22). The current (February, 1984) projected use of water in Coffey County is shown in Table 2.4-31a. The total use of water for domestic and manufacturing purposes increased by 159 acre-feet between 1965 and 1980, largely due to the increased domestic use of water by both the City of New Strawn, which obtains ground water from the alluvium along the Neosho River and the City of Burlington and the water districts around the site which used treated surface water, during the short term growth between 1970 and 1980. Although the projections shown in Table 2.4-31a for the year 2000 and after are preliminary and are subject to change, the 1984 projections of Table 2.4-31a for the year 2000 are consistent with the 1979 projections of Table 2.4-31, and show a gradual increase in the use of water for domestic and manufacturing purposes through the year 2035.

### 2.4.13.2.2 Local Ground-Water Use

A well inventory was made of 198 wells within 5 miles of the plant site. A summary of the well inventory is listed in Table 2.4-29.

#### 2.4.13.2.2.1 Present Use

The local wells are used for domestic and livestock purposes. The 198 wells are reported to produce a total of about 73,400 gallons per day or an average of 382 gallons per day per well. Table 2.4-29 lists the pertinent data collected on each well, and Figure 2.4-52 shows the locations of the property owners of the wells.

## WOLF CREEK

The wells supply small quantities of water (1/2 to 10 gallons per minute) from the weathered bedrock and larger quantities from the alluvium. The shallow dug wells have diameters of 3 to 6 feet; the drilled wells have diameters of 6 to 8 inches. Most wells in the area intercept ground water in the weathered bedrock zone where the permeability has been increased by weathering.

There are three water districts within a 5-mile radius of the site. The City of New Strawn is the smallest district and serves the residents of the New Strawn area. This district obtains ground water from the alluvium along the Neosho River below the John Redmond Reservoir near New Strawn. Rural Water Districts No. 2 and 3 serve numerous residents around the site, encompass a larger geographical area than the City of New Strawn, and both obtain treated surface water from the City of Burlington.

### 2.4.13.2.2.2 Future Use

Information obtained during the well inventory indicates a trend away from domestic ground-water usage and towards the use of treated surface water. Continued local use of ground water for domestic and livestock use is anticipated as shown in the long-term projections (1979 projections) of Table 2.4-31 (References 29 and 11).

District No. 2 plans a gradual increase in participants as the general trend from ground water to treated surface water continues.

### 2.4.13.2.3 Ground-Water Flow Regimes

This section describes the regional and local potentiometric surfaces and ground-water gradients. Regional conditions within 20 miles of the site are based on a literature search, and a site investigation, detailed in Section 2.5.4, was performed to describe local conditions. The weighted average permeability is given for each water-bearing soil and bedrock unit, and ground-water recharge is discussed. The effects of local pumping on ground-water levels at the plant site are also discussed.

#### 2.4.13.2.3.1 Regional Conditions

Within 20 miles of the site, the shallow ground-water table basically conforms to the topography of the region which has a gradient to the east and south in eastern Kansas. About 15 miles north of the site, shallow ground water in the weathered bedrock zone drains into the Marais des Cygnes River which flows eastward through Osage and Franklin counties, and into Miami County where the river assumes a southeastward course into Missouri (Figure 2.4-53).

## WOLF CREEK

To the west and south of the site, the shallow ground water drains into the Neosho River which flows southeastward at a gradient of about 4 feet per mile through Morris, Lyon, Coffey, Woodson, and Allen counties, where it continues southward into Oklahoma (Figure 2.4-53).

### 2.4.13.2.3.2 Local Conditions

Surface drainage of the site area is generally to the south by way of Wolf and Long creeks. The gradient of Wolf Creek is about 10 feet per mile, and the gradient of Long Creek is about 7 feet per mile.

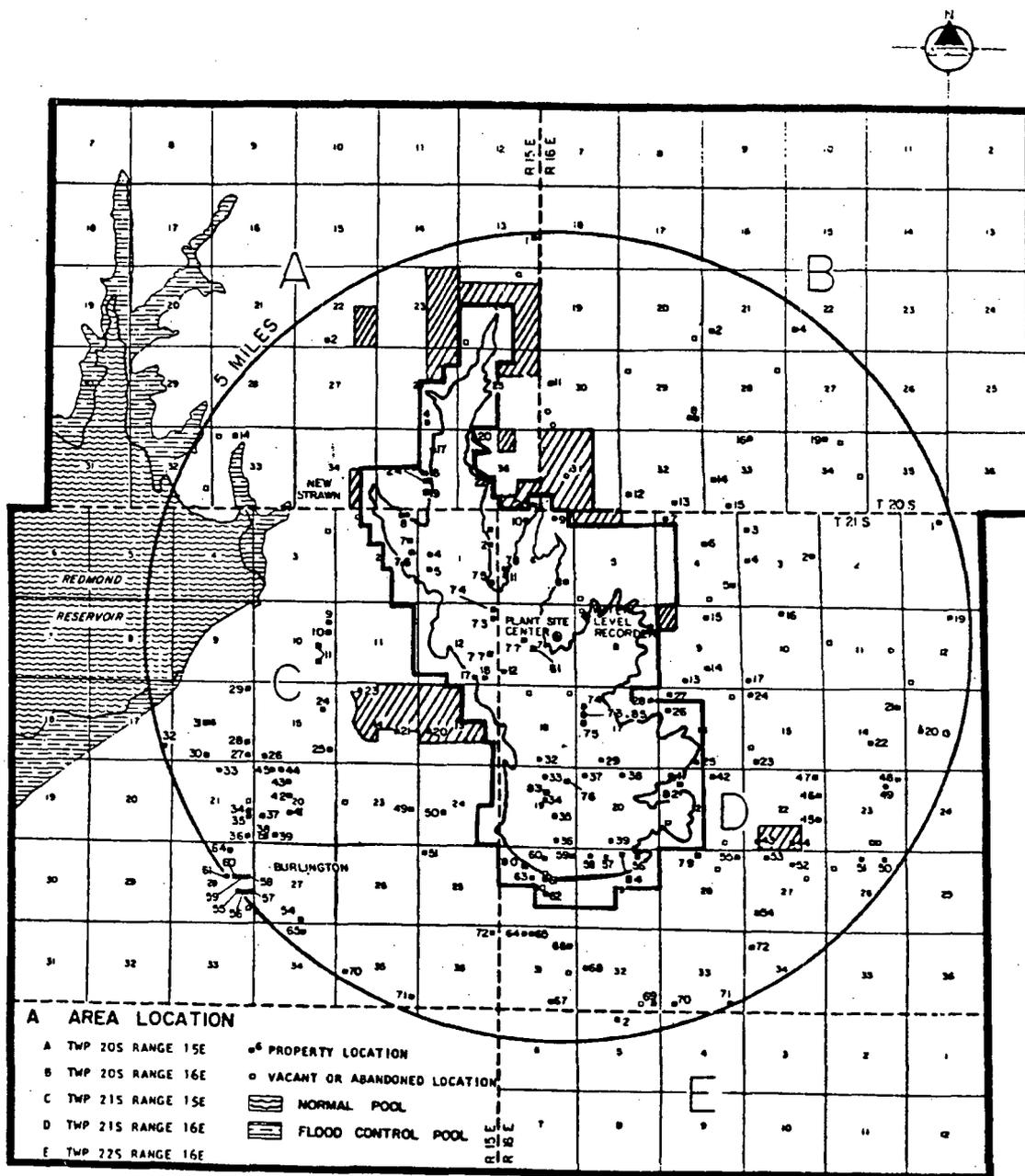
#### 2.4.13.2.3.2.1 Potentiometric Surfaces

The locations of the B-boring piezometers are shown on Figure 2.4-54. The P-, HS-, and ESW-series piezometers are shown on Figure 2.4-55. Graphs of water-level variations in the piezometers for the various rock units are shown on Figure 2.4-56. The piezometer water-level graphs generally show little change of water levels after the effects of drilling and permeability testing have dissipated, and it may be concluded that the ground-water level in the bedrock units is relatively stable.

Water levels in the inventoried wells (Table 2.4-29) show that the shallow ground-water table closely parallels the topography within at least a 5-mile radius of the plant site. The gradient of the water table, as determined from the water-table contour map, Figure 2.4-50, ranges from 20 to 160 feet per mile, depending on the topography. Direction of ground-water flow is perpendicular to the ground-water elevation contour lines (Figure 2.4-50).

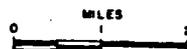
The potentiometric surface maps for the Plattsmouth Limestone, the Toronto Limestone, and the Ireland Sandstone members (Figures 2.4-57, 2.4-58, and 2.4-59, respectively) are based on piezometer readings for the individual rock units (Tables 2.4-32 and 2.4-33). The gradient of each of the potentiometric surfaces measured from these figures generally dip west and south away from the plant site at approximately 20 feet per mile. The average potentiometric surface gradient of these three units is about one half the average gradient of the ground-water table as measured in the weathered Jackson Park Shale and Heumader Shale members.

The ground-water gradient in the shallow, unweathered bedrock generally reflects surface topography more than regional structural trends. Figure 2.4-57 illustrates the potentiometric surface of ground water in the Plattsmouth Limestone Member. This surface is related to the local topography which indicates that there is some hydraulic connection between the Plattsmouth



**LEGEND:**

- SITE BOUNDARY
- COOLING LAKE AT NORMAL OPERATING LEVEL (1087 FEET)
- AREA OUTSIDE SITE BOUNDARY OWNED BY APPLICANTS



Rev. 0

**WOLF CREEK  
UPDATED SAFETY ANALYSIS REPORT**

Figure 2.4-52

Well Inventory within 5 Miles  
Relative to Cooling Lake and  
Property Boundary

**REFERENCE:**

GENERAL HIGHWAY MAP OF COFFEY COUNTY,  
KANSAS; PREPARED BY THE KANSAS STATE  
HIGHWAY DEPARTMENT.  
FIGURES 2.1-3, 2.4-52, 2.5-2 (FSAR).

**A44**

# PETITION TO LIST

## Neosho mucket (*Lampsilis rafinesqueana*)

### AS A FEDERALLY ENDANGERED SPECIES

#### CANDIDATE HISTORY

CNOR 5/22/84:

CNOR 1/6/89:

CNOR 11/21/91:

CNOR 11/15/94:

CNOR 10/30/01: C

CNOR 6/13/02: C

#### TAXONOMY

The taxonomic status of the Neosho mucket, *Lampsilis rafinesqueana* (Unionidae), as a valid species is uncontroversial (e.g., Williams et al. 1993; Obermeyer et al. 1997; Turgeon et al. 1998).

#### NATURAL HISTORY

Most unionid mussels are obligate parasites on fishes as larvae (glochidia). Neosho mucket glochidia have been successfully transformed onto smallmouth and largemouth bass, implicating these species as possible glochidia hosts (Barnhart and Roberts 1997). Gravid female Neosho muckets have been collected in June, July, and August, and females displaying mantle lures have been observed in July, August, and September. Mantle lures mimic small fish (Obermeyer 1999). The Neosho mucket is associated with stable runs, shoals, and riffles with gravely bottoms and moderate currents (Oesch 1984, Obermeyer 1999). Beyond this limited information, the habitat requirements and ecology of the species are poorly known.

The Neosho mucket is known only from the Illinois, Neosho, and Verdigris River basins in Arkansas, Kansas, Missouri, and Oklahoma. These basins flow into the Arkansas River in Northeastern Oklahoma. The Neosho mucket has been historically reported from the Illinois River in Oklahoma and Arkansas; the Neosho River in Oklahoma and Kansas; Neosho River tributaries, including the Elk River in Missouri, Cottonwood River in Kansas, and the Spring River in Oklahoma, Kansas, and Missouri, and Spring River tributaries, North Fork Spring River

and Indian Creek in Missouri, and Shoal and Center Creeks in Kansas and Missouri; the Verdigris River in Oklahoma and Kansas, and its tributaries, Caney River in Oklahoma and Kansas, and Fall River in Kansas (Harris and Gordon 1988, Obermeyer et al. 1997a, Mather 1990, Vaughn 1996).

A number of surveys have recently been conducted to determine the current range and status of the Neosho mucket. In Arkansas, the Neosho mucket was found at 19 of 22 survey sites in the Illinois River, Washington/Benton Counties. Although the Neosho mucket was the third most abundant species collected from the approximately 50-kilometer (km)(30-miles (mi)) surveyed reach of river, there was little evidence of recent recruitment (i.e., small, young mussels were seldom collected) (Harris 1998). The species has not been found in surveys of other tributaries of the Arkansas River in Arkansas (Harris and Gordon 1988).

In Oklahoma, living Neosho muckets were found to be locally common in about 92 km (55 mi) of the Illinois River from the Oklahoma/Arkansas State line, downstream to the headwaters of Tenkiller Lake, Cherokee County, Oklahoma (Mather 1990). The population within the survey reach was estimated at more than 1200 individuals. Population demographics were skewed toward older aged cohorts, and only 3 animals were encountered during the survey that could be considered juveniles (i.e., evidence of recent recruitment). Neosho muckets were not found within, or below Tenkiller Lake.

More recent surveys in northeastern Oklahoma (Vaughn 1995, 1996, 1997) found Neosho muckets locally common at 9 of 42 sites on the Illinois River. Vaughn (1997) estimated the population within the Oklahoma portion of the Illinois River (the same reach surveyed by Mather in 1990) at between 500 and 1,000 Neosho muckets. Although some evidence of reproduction was observed (i.e., gravid females displaying mantle lures), there was little evidence of recruitment into the population (i.e., very few small, young Neosho muckets were collected). Searches in other historically occupied drainages in Oklahoma found no live Neosho muckets at 10 sites on the Spring River, 17 sites on the Neosho River, 32 sites on the Verdigris River, and 29 sites on the Caney River, however, relic Neosho mucket shells confirmed the historic presence of the species at many of these sites, and fresh dead Neosho mucket shells were found at two sites on the Spring River. The results of these recent surveys suggest the Neosho mucket has been extirpated from the Caney, Verdigris, Neosho, and Spring Rivers in Oklahoma (Mather 1990; Vaughn 1995, 1996, 1997).

During recent mussel surveys of historically occupied streams in Kansas and Missouri, living Neosho muckets or fresh dead shells were found in the lower Fall River, Greenwood and Wilson Counties, Kansas; the Verdigris River between the Toronto Lake Dam and the confluence of the Elk River, Wilson and Montgomery Counties, Kansas; the Neosho River between the John Redmond Reservoir Dam and the Parsons City Dam in Coffey, Allen, and Neosho Counties, Kansas; and the Spring and North Fork Spring Rivers, and Center and Shoal Creeks in Cherokee County, Kansas, and Jasper County, Missouri (Obermeyer et al. 1997a, Obermeyer 1999).

Neosho muckets were relatively rare in the Fall, Verdigris, Neosho, and North Fork Spring Rivers, and Shoal Creek, representing from 0.2-1.7 percent of all live mussels collected, and

were not found at all stations surveyed. Neosho muckets were most abundant in a short reach (~10 km (6 mi)) of the Spring River, between the Missouri/Kansas State Line and the confluence of Center Creek, where it was the most abundant species found at 11 collection sites. In Center Creek, Jasper County, Missouri, only a single fresh dead shell was found. At all sites where living Neosho muckets were found, there was little evidence of recruitment. Based upon Obermeyer et al. (1997a) and others (Cope 1979, Cope and Distler 1985, Metcalf 1980), the Neosho mucket has been extirpated from the Elk, Caney, Cottonwood, and South Fork of the Cottonwood Rivers, the Neosho River above John Redmond Reservoir, the Verdigris River above Toronto Lake, the Fall River above Fall River Lake, and the lower reaches of the Spring River, Shoal and Center Creeks in Kansas, and Indian Creek in Missouri.

## POPULATION STATUS

3,000 - 10,000 individuals exist on 10,000 - 50,000 acres. The estimated 250 stream miles of occupied habitat mostly support small populations. Historically, one of the most common mussels in parts of its range, it is now rare and shows no signs of recruitment, and faces major threats (Busby and Vaughn in NatureServe Explorer 2002).

The Neosho mucket is protected under Kansas and Oklahoma State laws as an endangered species. The Illinois River in Oklahoma is a State-designated mussel sanctuary, and no mussel harvest is allowed. The species is not protected in Arkansas and Missouri, beyond general mussel harvest laws. The International Union for the Conservation of Nature (IUCN) classifies the species as endangered.

The Natural Heritage Programs of Arkansas, Kansas, and Oklahoma rank the Neosho mucket as Critically Imperiled.

The Missouri Natural Heritage Program ranks the Neosho mucket as Imperiled.

The U.S. Fish and Wildlife Service classifies the Neosho mucket as a candidate for Endangered Species Act protection with a listing priority number of 5.

## LISTING CRITERIA

### *A. The present or threatened destruction, modification, or curtailment of its habitat or range.*

Historical range: Arkansas, Kansas, Oklahoma, Missouri. The Neosho mucket has been historically reported from the Illinois River in Oklahoma and Arkansas; the Neosho River in Oklahoma and Kansas; Neosho River tributaries, including the Elk River in Missouri, Cottonwood River in Kansas, and the Spring River in Oklahoma, Kansas, and Missouri, and Spring River tributaries, North Fork Spring River and Indian Creek in Missouri, and

Shoal and Center Creeks in Kansas and Missouri; the Verdigris River in Oklahoma and Kansas, and its tributaries, Caney River in Oklahoma and Kansas, and Fall River in Kansas (Harris and Gordon 1988, Obermeyer et al. 1997a, Mather 1990, Vaughn 1996).

**Current range:** Arkansas, Kansas, Oklahoma, Missouri. In summary, the Neosho mucket has been extirpated from approximately 70 percent of its historic range. Most of this extirpation has occurred within the Oklahoma and Kansas portions of its range. Causes of the disappearance of the species from many areas have been attributed to impoundment, mining, and pollution (Mather 1990, Obermeyer et al. 1997b). The Neosho mucket survives in four river drainages, however, only two of these, the Spring and Illinois Rivers, currently support potentially viable populations of the species due to the presence of a relatively large number of individuals. However, recruitment is either very low or not occurring in all of the extant populations.

**Land ownership:** Over 90% of the lands draining the watersheds populated by Neosho muckets are privately owned. An extensive reach of the Illinois River in Arkansas flows through Ozark National Forest. With the exception of the Spring River, all river reaches currently supporting Neosho muckets in Kansas and Oklahoma are controlled or affected by U.S. Army Corps of Engineers Reservoirs. The Oklahoma Department of Wildlife Conservation manages a 565-acre primitive area on the Illinois River. The Nature Conservancy is acquiring 15,000 acres on the Illinois River. In addition, the Kansas Department of Wildlife and Parks owns a small parcel of land (representing less than one river mile of streambank) along the Spring River in Cherokee County, which includes a portion of the large remnant population of Neosho Muckets in this stretch of river.

The reduction of habitat and range of the Neosho mucket has been attributed to impoundment, sedimentation, agricultural pollutants (Mather 1990, Obermeyer et al. (1997b), and mining (Obermeyer et al. 1997b). At least 11 major dams have been constructed that have impounded significant portions of the historic range of the Neosho mucket, effectively resulting in fragmented Neosho mucket populations and habitats. The species does not tolerate lentic conditions and has not been collected from those portions of its historic habitat that have been impounded. In addition, it is believed that the operation of these dams will continue to negatively affect the Neosho mucket. For instance, Obermeyer et al. (1997b) noted extensive bank scouring in the Neosho River below John Redmond Dam and made observations that suggest channel instability as a primary factor in mussel distribution below this dam.

Several types of pollution are also thought to affect Neosho mucket populations. Sediment is probably the most abundant pollutant currently affecting the Neosho mucket (Obermeyer 1999). Excessive sedimentation is known to cause direct mortality of freshwater mussels by deposition and suffocation (Ellis 1936) and can eliminate or reduce the recruitment of juvenile mussels.

(Negus 1966, Box and Mossa 1999). High suspended sediment levels can also interfere with feeding activity (Dennis 1984). Sediment sources within the current range of the Neosho mucket include cultivated fields, cattle grazing, and urban, suburban, and rural construction activities. Sediment levels within the range of the Neosho mucket are higher than historic levels and are likely to increase. For example, the Illinois River in Arkansas drains portions of the two fastest growing counties in Arkansas. Continued development and growth within this basin will likely result in increased sediment and nutrient impacts to this river and to the Neosho mucket population found there (personal communication cited in U.S. Fish and Wildlife Service candidate assessment form).

Eutrophication, caused by the introduction of excess nutrients to a water body, has been shown to result in periodic low dissolved oxygen levels that are detrimental to mussels (Sparks and Strayer 1998). Excess nutrients also promote heavy growth of blue-green and other algae that can eliminate habitat for juvenile mussels. Nutrients, usually phosphorus and nitrogen, can emanate from agricultural, urban, and suburban runoff, including cultivated fields and pastures, livestock feedlots, leaking septic tanks, residential lawns, etc., in levels that result in eutrophication and reduced oxygen levels. At least one example of this has been documented within the range of the Neosho mucket where extirpation of mussel species from the Cottonwood River during the 1960s was attributed to feedlot runoff (Obermeyer et al. 1997b).

Pesticide residues from agricultural, residential, or silvicultural activities may also impact Neosho mucket populations, however, there is currently no available information on the sensitivity of this species to common pesticides. Nonetheless, chemical run-off or spills have resulted in mussel mortalities in various regions of the country, and there is no reason to believe that the Neosho mucket would be any less susceptible to pesticide residues than other mussel species. In fact, toxic contamination, including oil and saltwater spills, and heavy metals from mine tailings, have resulted in mussel mortality in the Cottonwood and Spring Rivers in the past (see Obermeyer 1999), but it is not known whether or not any of these mortalities were Neosho muckets. Also, pesticides and high fecal coliform counts have been reported for the Verdigris River downstream of Independence, Kansas, (Kansas Department of Health and Environment 1994) which are likely to affect the quality of Neosho mucket habitat.

In-stream and floodplain sand and gravel mining has been shown to cause channel degradation and is associated with mussel declines and extirpations in a number of river basins (Box and Mossa 1999, Hartfield 1993, Kanehl and Lyons 1992). An unknown number of mining operations are known to exist within the historic range of the species, and it is likely that other operations will be initiated in the future as the demand for gravel for roads and construction-related activities increases. Since Neosho muckets inhabit gravel/sand stream beds that are vulnerable to mining activities, it is expected that this particular threat to Neosho mucket habitat will increase. Pollution from mineral mining has already been implicated in the extirpation of all mussel species, including the Neosho mucket, from the lower Spring River in Kansas (*in litt.* 2000 cited in U.S. Fish and Wildlife Service candidate assessment form).

**B. Overutilization for commercial, recreational, scientific, or educational purposes.**

The Neosho mucket was once valuable in the pearl button industry, and historic episodes of over-harvest in the Neosho River may have contributed to its decline (Obermeyer et al. 1997b). Commercial harvest of the species is now prohibited in Kansas and Oklahoma. Arkansas currently permits commercial harvest of Neosho muckets at sizes of four inches or greater in length, and Missouri prohibits commercial mussel harvest but allows up to five Neosho muckets per person per day to be collected for private purposes (e.g., bait, shell collection, etc.). It is not known what effect the legal harvest of Neosho muckets is having on the populations of the species in these two states, but harvest for the cultured pearl nuclei trade is either prohibited or restricted to some degree in those states. Overall, the Neosho mucket's limited distribution and small population sizes makes it vulnerable to illegal commercial harvest.

### *C. Disease or predation.*

Diseases of freshwater mussels are poorly known, and are unknown as a factor in the decline of the Neosho mucket. Juvenile and adult mussels are prey items for some invertebrate predators and parasites (e.g., flatworms, trematodes, mites, etc.), and provide prey for a few vertebrate species (e.g., racoons, muskrats, minks, freshwater drum, etc.). Predation by naturally occurring predators is a normal aspect of the population dynamics of a healthy mussel population. However, predation may contribute to the further decline of localized mussel populations with low numbers of individuals and limited recruitment.

Escape of the non-native black carp, a molluscivore currently grown and used for mollusk control in fish farm operations, could present a threat of increased predation to native mollusks, including the Neosho mucket, but it is not known whether or not this species is being utilized by fish farmers within the range of the Neosho mucket. There is one record of an accidental release of black carp in Missouri (personal communication cited in U.S. Fish and Wildlife Service candidate assessment form). In April 1994, 30 or more black carp were released from an aquaculture facility near Lake of the Ozarks/Bagnell Dam when the fish were washed into the Osage River during a flood event. To date, none of these fish have been recaptured. The fish were reported to be triploid (non-reproductive). The Missouri Department of Conservation also recently made a decision to propagate certified triploid black carp for use in aquaculture facilities to control the yellow grub, a pest of aquaculture facilities throughout the Midwest and Gulf Coast states. Even if these fish are non-reproductive, accidental releases into streams could still impact native mussels, including Neosho mucket, as a result of increased predation.

### *D. The inadequacy of existing regulatory mechanisms.*

Although the negative effects of point source discharges on aquatic communities within the range of the Neosho mucket have been reduced over time by compliance with State and Federal regulations pertaining to water quality, there has been less success in dealing with non-point source pollution. Such impacts result from individual private landowner activities (e.g., construction, grazing, agriculture, silviculture, etc.), and public construction works (e.g., bridge and highway construction and maintenance, etc.).

Each state within the range of the Neosho mucket has a variety of laws and guidelines (e.g.,

forestry best management practices) which are intended to minimize non-point sources, however, the efficiency at which these regulations work can vary depending on the strength of the regulation, enforcement capabilities, and other factors. Often the inadequacy of these regulations or their enforcement can lead to stream impacts which may affect the Neosho mucket. The Neosho mucket is protected under Kansas and Oklahoma State laws as an endangered species. The Illinois River in Oklahoma is a State-designated mussel sanctuary, and no mussel harvest is allowed. The species is not protected in Arkansas and Missouri, beyond general mussel harvest laws. There is currently no requirement within the scope of Federal environmental laws to specifically consider the Neosho mucket during Federal activities, or to ensure that Federal projects will not jeopardize its continued existence.

**Current Conservation Efforts:** The Missouri Department of Conservation is working to artificially propagate Neosho muckets for population augmentation and reintroduction. The Kansas Department of Wildlife and Parks has developed a State recovery plan for the Neosho mucket and three other rare mussel species.

***E. Other natural or manmade factors affecting its continued existence.***

The Neosho mucket is now limited to four drainage populations: the Neosho, Verdigris, Illinois, and Spring River drainages. Each is isolated from the others by one or more major impoundments and by extended reaches of degraded river habitat. Isolation renders the four extant drainage populations vulnerable to random catastrophic events (e.g., flood scour, drought, toxic spills, etc.). During the 2000 drought, the Fall River population of Neosho mucket was severely stressed and threatened by low flow conditions and low dissolved oxygen concentrations (*in litt.* 2000 cited in U.S. Fish and Wildlife Service candidate assessment form). Limited range also makes these isolated populations vulnerable to land use changes that would result in increases in non-point source pollution impacts within occupied watersheds. Isolation also prevents emigration or immigration between populations in response to adverse or positive environmental changes, and increases the deleterious effects of inbreeding.

Recent collections indicate that Neosho mucket recruitment is limited (Mather 1990, Harris 1998, Obermeyer et al. 1997a; Vaughn 1995, 1996, 1997). All extant populations of the Neosho mucket are currently dominated by older aged cohorts, and juvenile muckets are rare. It is currently unknown if recruitment rates offset mortality rates in any population.

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**A45**

# KANSAS

## County Listing of T&E and SINC

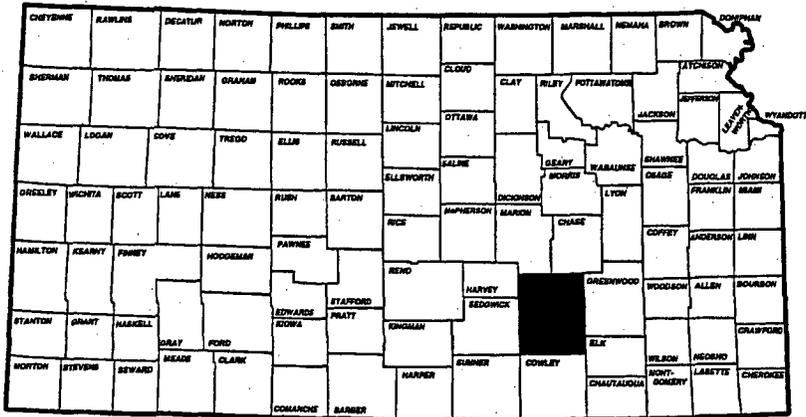
A COUNTY BY COUNTY GUIDE TO SPECIES  
LISTED AS THREATENED & ENDANGERED AND  
SPECIES IN NEED OF CONSERVATION IN KANSAS  
BY THE STATE AND FEDERAL GOVERNMENTS.

INCLUDES COUNTY LOCATION, SPECIES COMMON AND TAXONOMIC NAME,  
AND STATUS OF SPECIES UNDER STATE AND FEDERAL GUIDELINES .

Edited and published by the Kansas Department of Wildlife & Parks, Environmental Section.

# BUTLER COUNTY

## COUNTY LOCATOR MAP



## STATUS KEY

- THR = Threatened
- END = Endangered
- SNC = Species In Need of Conservation
- CAN = Candidate Listing
- NA = Not Applicable

## THREATENED & ENDANGERED (T&E) SPECIES

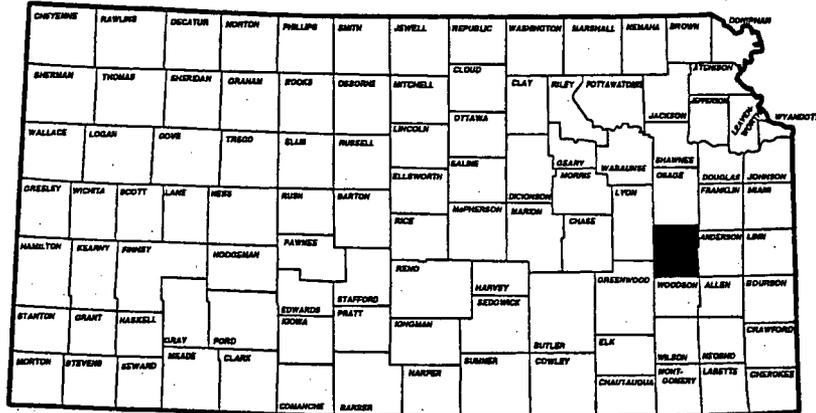
- |  |   |
|--|---|
| <b>American Burying Beetle</b> <i>Nicrophorus americanus</i><br>State: END Federal: END Critical Habitat: NO | <b>Snowy Plover</b> <i>Charadrius alexandrinus</i><br>State: THR Federal: NA Critical Habitat: NO |
| <b>Bald Eagle</b> <i>Haliaeetus leucocephalus</i><br>State: THR Federal: THR Critical Habitat: YES           | <b>Topeka Shiner</b> <i>Notropis topeka</i><br>State: THR Federal: END Critical Habitat: YES      |
| <b>Eastern Spotted Skunk</b> <i>Spilogale putorius</i><br>State: THR Federal: NA Critical Habitat: NO        | <b>Whooping Crane</b> <i>Grus americana</i><br>State: END Federal: END Critical Habitat: NO       |
| <b>Eskimo Curlew</b> <i>Numenius borealis</i><br>State: END Federal: END Critical Habitat: NO                |   |
| <b>Least Tern</b> <i>Sterna antillarum</i><br>State: END Federal: END Critical Habitat: NO                   |   |
| <b>Peregrine Falcon</b> <i>Falco peregrinus</i><br>State: END Federal: NA Critical Habitat: NO               |   |
| <b>Piping Plover</b> <i>Charadrius melodus</i><br>State: THR Federal: THR Critical Habitat: NO               |   |
| <b>Sharp Hornsnail</b> <i>Pleurocera acuta</i><br>State: THR Federal: NA Critical Habitat: NO                |   |

## SPECIES IN NEED OF CONSERVATION (SINC)

- |   |   |
|---|---|
| <b>Black Tern</b> <i>Chlidonias niger</i><br>State: SNC Federal: NA Critical Habitat: NA            | <b>Yellow-throated Warbler</b> <i>Dendroica dominica</i><br>State: SNC Federal: NA Critical Habitat: NA |
| <b>Creeping Mussel</b> <i>Strophitus undulatus</i><br>State: SNC Federal: NA Critical Habitat: NA   |   |
| <b>Ferruginous Hawk</b> <i>Buteo regalis</i><br>State: SNC Federal: NA Critical Habitat: NA         |   |
| <b>Golden Eagle</b> <i>Aquila chrysaetos</i><br>State: SNC Federal: NA Critical Habitat: NA         |   |
| <b>Henslow's Sparrow</b> <i>Ammodramus henslowii</i><br>State: SNC Federal: NA Critical Habitat: NA |   |
| <b>Short-eared Owl</b> <i>Asio flammeus</i><br>State: SNC Federal: NA Critical Habitat: NA          |   |
| <b>Spotted Sucker</b> <i>Minytrema melanops</i><br>State: SNC Federal: NA Critical Habitat: NA      |   |
| <b>Whip-poor-will</b> <i>Caprimulgus vociferus</i><br>State: SNC Federal: NA Critical Habitat: NA   |   |

# COFFEY COUNTY

## COUNTY LOCATOR MAP



## STATUS KEY

- THR = Threatened
- END = Endangered
- SNC = Species In Need of Conservation
- CAN = Candidate Listing
- NA = Not Applicable

## THREATENED & ENDANGERED (T&E) SPECIES

- |  |  |  |
|--|--|--|
| <b>American Burying Beetle</b> <i>Nicrophorus americanus</i><br>State: END Federal: END Critical Habitat: NO | <b>Least Tern</b> <i>Sterna antillarum</i><br>State: END Federal: END Critical Habitat: NO                           | <b>Snowy Plover</b> <i>Charadrius alexandrinus</i><br>State: THR Federal: NA Critical Habitat: NO      |
| <b>Bald Eagle</b> <i>Haliaeetus leucocephalus</i><br>State: THR Federal: THR Critical Habitat: YES           | <b>Neosho Madtom</b> <i>Noturus placidus</i><br>State: THR Federal: THR Critical Habitat: YES                        | <b>Western Fanshell Mussel</b> <i>Cyprogenia aberti</i><br>State: END Federal: NA Critical Habitat: NO |
| <b>Butterfly Mussel</b> <i>Ellipsaria lineolata</i><br>State: THR Federal: NA Critical Habitat: NO           | <b>Neosho Mucket Mussel</b> <i>Lampsilis rafinesqueana</i><br>State: END Federal: NA Critical Habitat: YES           | <b>Whooping Crane</b> <i>Grus americana</i><br>State: END Federal: END Critical Habitat: NO            |
| <b>Common Map Turtle</b> <i>Graptemys geographica</i><br>State: THR Federal: NA Critical Habitat: NO         | <b>Ouachita Kidneyshell Mussel</b> <i>Pychobranchus occidentalis</i><br>State: THR Federal: NA Critical Habitat: YES |  |
| <b>Eastern Spotted Skunk</b> <i>Spilogale putorius</i><br>State: THR Federal: NA Critical Habitat: NO        | <b>Peregrine Falcon</b> <i>Falco peregrinus</i><br>State: END Federal: NA Critical Habitat: NO                       |  |
| <b>Eskimo Curlew</b> <i>Numenius borealis</i><br>State: END Federal: END Critical Habitat: NO                | <b>Piping Plover</b> <i>Charadrius melodus</i><br>State: THR Federal: THR Critical Habitat: NO                       |  |
| <b>Flat Floater Mussel</b> <i>Anodonta suborbiculata</i><br>State: END Federal: NA Critical Habitat: NO      | <b>Rabbitsfoot Mussel</b> <i>Quadrula cylindrica</i><br>State: END Federal: NA Critical Habitat: YES                 |  |
| <b>Flutedshell Mussel</b> <i>Lasmigona costata</i><br>State: THR Federal: NA Critical Habitat: YES           | <b>Redspot Chub</b> <i>Nocomis asper</i><br>State: THR Federal: NA Critical Habitat: NO                              |  |

## SPECIES IN NEED OF CONSERVATION (SINC)

- |  |  |
|--|--|
| <b>Black Tern</b> <i>Chlidonias niger</i><br>State: SNC Federal: NA Critical Habitat: NA             | <b>Short-eared Owl</b> <i>Asio flammeus</i><br>State: SNC Federal: NA Critical Habitat: NA         |
| <b>Blue Sucker</b> <i>Cypleptus elongatus</i><br>State: SNC Federal: NA Critical Habitat: NA         | <b>Spike Mussel</b> <i>Elliptio dilatata</i><br>State: SNC Federal: NA Critical Habitat: NA        |
| <b>Bobolink</b> <i>Dolichonyx oryzivorus</i><br>State: SNC Federal: NA Critical Habitat: NA          | <b>Wabash Pigtoe Mussel</b> <i>Fusconaia flava</i><br>State: SNC Federal: NA Critical Habitat: NA  |
| <b>Cerulean Warbler</b> <i>Dendroica cerulea</i><br>State: SNC Federal: NA Critical Habitat: NA      | <b>Wartyback Mussel</b> <i>Quadrula nodulata</i><br>State: SNC Federal: NA Critical Habitat: NA    |
| <b>Fawnsfoot Mussel</b> <i>Truncilla donaciformis</i><br>State: SNC Federal: NA Critical Habitat: NA | <b>Washboard Mussel</b> <i>Megalaniais nervosa</i><br>State: SNC Federal: NA Critical Habitat: NA  |
| <b>Golden Eagle</b> <i>Aquila chrysaetos</i><br>State: SNC Federal: NA Critical Habitat: NA          | <b>Whip-poor-will</b> <i>Camprimulgus vociferus</i><br>State: SNC Federal: NA Critical Habitat: NA |
| <b>Gravel Chub</b> <i>Erimystax x-punctatus</i><br>State: SNC Federal: NA Critical Habitat: NA       |  |
| <b>Prairie Mole Cricket</b> <i>Gryllotalpa major</i><br>State: SNC Federal: NA Critical Habitat: NA  |  |



 [Email Page](#)

## LEAST TERN (*Sterna antillarum*)

KANSAS: Endangered  
FEDERAL: Endangered

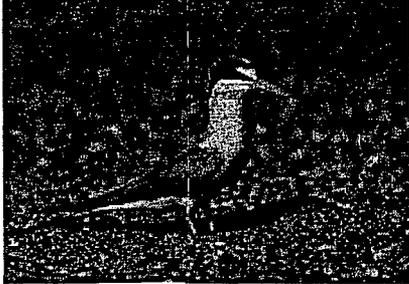
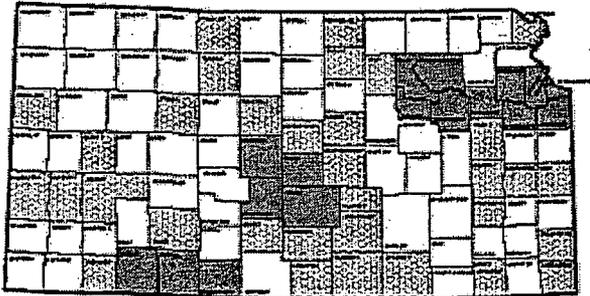


Photo by Bob Gress

### SPECIES DESCRIPTION

This smallest of the North American terns is 8-10 inches long with a wingspread of about 20 inches. The adult is white below and grayish above with a black cap and white forehead. The leading edge of the wing primaries is also black. Least Terns are summer residents in Kansas. Nesting birds have been recorded in six central and western Kansas counties, Jeffery Energy Center and along the Kansas River. Terns require barren areas near water such as saline flats in salt marshes, sand bars in river beds, and shores of large impoundments. A dependable food supply of small fish and aquatic crustaceans must be nearby. Least Terns may occur accidentally or occasionally as transients anywhere in the state. The marked counties are the only ones for which reliable records are known.

### SPECIES PROTECTION AND CRITICAL HABITATS



**Least Tern** 49.58 kB

#### Map Key

Least Terns are protected by the Kansas Nongame and Endangered Species Conservation Act, the Federal Endangered Species Act, and state and federal regulations applicable to those acts. Any time a project is proposed that will likely impact the critical habitats designated below, the project sponsor must contact the Environmental Services Section, Kansas Department of Wildlife & Parks, 512 SE 25th Ave., Pratt, Kansas 67124-8174. Department personnel can then advise the project sponsor on permit requirements under Kansas statutes. Sponsors of project impacting Least Tern habitats must also contact the Endangered Species Specialist, U.S. Fish and Wildlife Service, 315 Houston Street, Suite E, Manhattan, Kansas 66502.

#### DESIGNATED CRITICAL HABITATS

As defined by Kansas Administrative Regulations, critical habitats include those areas documented as currently supporting self-sustaining population(s) of any threatened or endangered species of wildlife as well as those areas determined by the Kansas Department of Wildlife and Parks to be essential for the conservation of any threatened or endangered species of wildlife.

Currently, the following areas are designated critical for Least Terns:

(1) All lands and waters within the current active main stem channel of those reaches of the Cimarron River located in Clark, Comanche, and Meade counties.

(2) All lands and waters within the boundaries of Cheyenne Bottoms Wildlife Area in Barton County.

(3) All lands and waters within Quivira National Wildlife Refuge in Stafford, Reno, and Rice counties.

(4) In Pottawatomie County, all lands and water within 5 miles of the Jeffrey Energy Center, Secs. 6 & 7, T9S, R12E) and (Secs. 1, 12, T9S, R11E).

(5) All the waters within a corridor along the main stem of the Kansas River from the confluence of the Smoky Hill River and Republican River on Fort Riley in Geary County to the confluence of the Missouri River in Kansas City, Wyandotte County. The U.S. Fish and Wildlife Service has authority to designate areas of critical habitat for federally listed endangered species, but has not done so for Least Terns in Kansas.

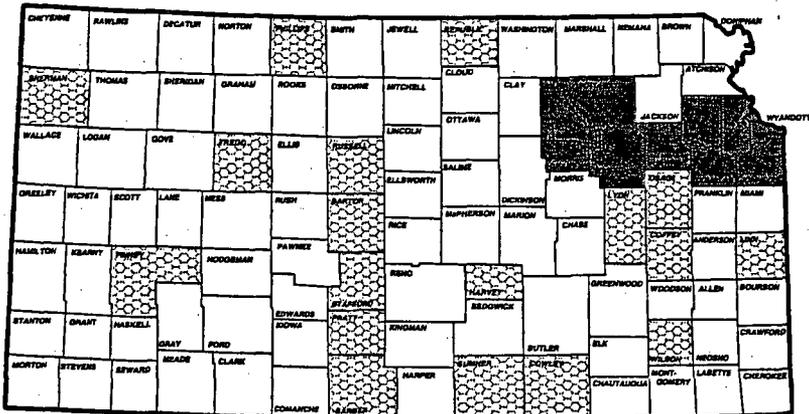
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# PIPING PLOVER

*Charadrius melodus*

## RANGE MAP



## STATUS

**KANSAS:** Threatened

**FEDERAL:** Threatened

## MAP KEY



Probable Historic Range



Known Historic Range



Designated Critical Habitat

## SPECIES DESCRIPTION

The Piping Plover is a small (6-7 inches long) whitish plover the color of dry sand. It has a narrow black band above the forehead which reaches from eye to eye, a complete or incomplete dark ring around the neck, and yellow legs. In summer, the bill is yellow with a dark tip. In winter bill and legs are dark.

Piping Plovers are rare migrants through Kansas. They require sparsely vegetated shallow wetlands and open beaches and sandbars adjacent to or within streams and impoundments. Nesting has been recorded on sand bars along the Kansas River.

Piping Plovers may occur occasionally anywhere in the state where suitable habitat is found. The marked counties are the only ones for which observation records are known.

## SPECIES PROTECTION AND CRITICAL HABITATS

Piping Plovers are protected by the Kansas Nongame and Endangered Species Conservation Act, the Federal Endangered Species Act, and state and federal regulations applicable to those acts. Any time an eligible project is proposed that will impact the species' preferred habitats within its probable range, the project sponsor must contact the Environmental Services Section, Kansas Department of Wildlife and Parks, 512 SE 25th Ave., Pratt, Kansas 67124-8174. Department personnel can then advise the project sponsor on permit requirements under Kansas' statutes. Sponsors of projects impacting Piping Plover habitats must also contact the Endangered Species Specialist, U.S. Fish and Wildlife Service, 315 Houston Street, Suite E, Manhattan, Kansas 66502.

## DESIGNATED CRITICAL HABITATS

As defined by Kansas Administrative Regulations, critical habitats include those areas documented as currently supporting self-sustaining population(s) of any threatened or endangered species of wildlife as well as those areas determined by the Kansas Department of Wildlife and Parks to be essential for the conservation of any threatened or endangered species of wildlife. Currently, the following areas are designated critical for Piping Plovers:

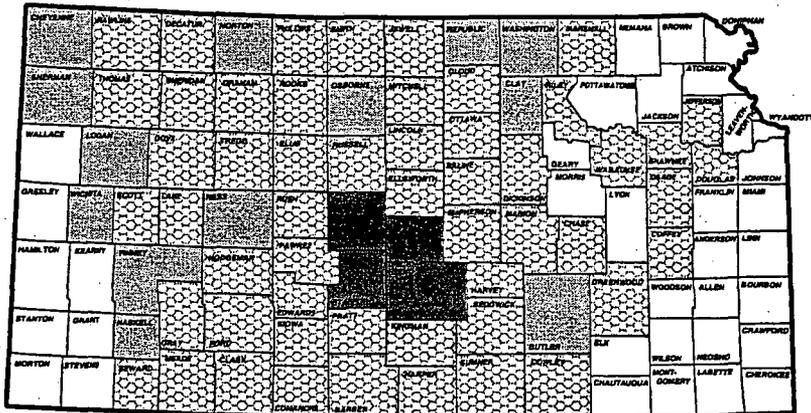
All the waters within a corridor along the main stem of the Kansas River from the confluence of the Smoky Hill River and Republican River on Fort Riley in Geary County to the confluence of the Missouri River in Kansas City, Wyandotte County.

The U.S. Fish and Wildlife Service has authority to designate areas of critical habitat for federally listed threatened species, but has not done so for Piping Plovers in Kansas.

# WHOOPING CRANE

*Grus americana*

## RANGE MAP



## STATUS

**KANSAS:** Endangered

**FEDERAL:** Endangered

## MAP KEY



Probable Historic Range



Known Historic Range



Designated Critical Habitat

## SPECIES DESCRIPTION

The Whooping Crane is the tallest (5 ft.) North American bird and has a 7-8 foot wing spread. Adults are white with black wing tips and a red face. Young may be whitish gray with rusty wash color on their head and neck and scattered reddish brown feathers over their back and sides.

Whooping Cranes are regular spring and fall transients through Kansas, generally passing through the marked corridor in March-April and October-November. Occurrences outside the marked corridor have been infrequent but as crane populations increase, such sightings may become more frequent.

Preferred resting areas are wetlands in level to moderately rolling terrain away from human activity where low, sparse vegetation permits ease of movement and an open view. During migration, cranes feed on grain, frogs, crayfish, grasshoppers, fish, crickets, spiders, and aquatic plants.

## SPECIES PROTECTION AND CRITICAL HABITATS

Whooping Cranes are protected by the Kansas Nongame and Endangered Species Conservation Act, the Federal Endangered Species Act, and state and federal regulations applicable to those acts. Any time an eligible project is proposed that will impact the species' preferred habitats within its probable range, the project sponsor must contact the Environmental Services Section, Kansas Department of Wildlife and Parks, 512 SE 25th Ave., Pratt, Kansas 67124-8174. Department personnel can then advise the project sponsor on permit requirements under Kansas' statutes. Sponsors of projects impacting critical Whooping Crane habitats must also contact the Endangered Species Office, U.S. Fish and Wildlife Service, 15 Houston Street, Suite E, Manhattan, Kansas 66502.

## DESIGNATED CRITICAL HABITATS

As defined by Kansas Administrative Regulations, critical habitats include those areas documented as currently supporting self-sustaining population(s) of any threatened or endangered species of wildlife as well as those areas determined by the Kansas Department of Wildlife and Parks to be essential for the conservation of any threatened or endangered species of wildlife. Currently, the following areas are designated critical for Whooping Cranes:

- (1) All lands and waters within Cheyenne Bottoms Wildlife Area located east of U.S. Highway 281 and north of U.S. Highway 56 in Barton County.
- (2) All lands and waters within Quivira National Wildlife Refuge in Stafford, Reno, and Rice counties.

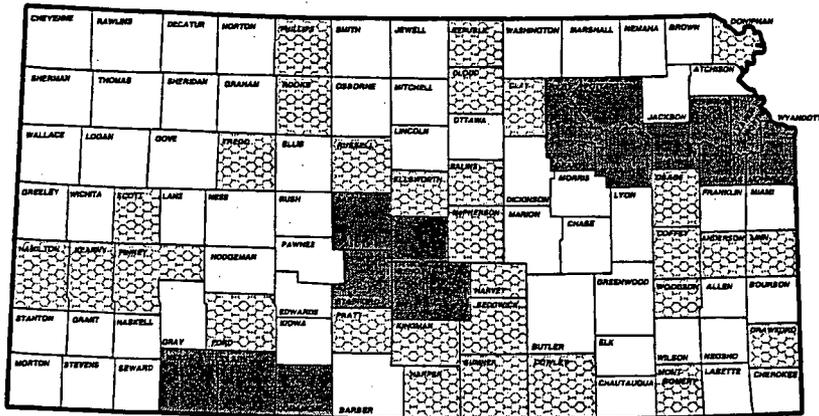
The U.S. Fish and Wildlife Service has authority to designate areas of critical habitat for federally listed endangered species and has designated the following in Kansas:

Areas of land, water, and airspace with the following components: (1) Quivira National Wildlife Refuge in Stafford, Reno, and Rice counties; (2) Cheyenne Bottoms State Waterfowl Management Area in Barton County. (50CFR17.95)

# LEAST TERN

*Sterna antillarum*

## RANGE MAP



## STATUS

KANSAS: Endangered

FEDERAL: Endangered

## MAP KEY

-  Probable Historic Range
-  Known Historic Range
-  Designated Critical Habitat

## SPECIES DESCRIPTION

This smallest of the North American terns is 8-10 inches long with a wingspread of about 20 inches. The adult is white below and grayish above with a black cap and white forehead. The leading edge of the wing primaries is also black.

Least Terns are summer residents in Kansas. Nesting birds have been recorded in six central and western Kansas counties, Jeffery Energy Center and along the Kansas River. Terns require barren areas near water such as saline flats in salt marshes, sand bars in river beds, and shores of large impoundments. A dependable food supply of small fish and aquatic crustaceans must be nearby.

Least Terns may occur accidentally or occasionally as transients anywhere in the state. The marked counties are the only ones for which reliable records are known.

## SPECIES PROTECTION AND CRITICAL HABITATS

Least Terns are protected by the Kansas Nongame and Endangered Species Conservation Act, the Federal Endangered Species Act, and state and federal regulations applicable to those acts. Any time a project is proposed that will likely impact the critical habitats designated below, the project sponsor must contact the Environmental Services Section, Kansas Department of Wildlife & Parks, 512 SE 25th Ave., Pratt, Kansas 67124-8174. Department personnel can then advise the project sponsor on permit requirements under Kansas statutes. Sponsors of project impacting Least Tern habitats must also contact the Endangered Species Specialist, U.S. Fish and Wildlife Service, 315 Houston Street, Suite E, Manhattan, Kansas 66502.

## DESIGNATED CRITICAL HABITATS

As defined by Kansas Administrative Regulations, critical habitats include those areas documented as currently supporting self-sustaining population(s) of any threatened or endangered species of wildlife as well as those areas determined by the Kansas Department of Wildlife and Parks to be essential for the conservation of any threatened or endangered species of wildlife. Currently, the following areas are designated critical for Least Terns:

- (1) All lands and waters within the current active main stem channel of those reaches of the Cimarron River located in Clark, Comanche, and Meade counties.
- (2) All lands and waters within the boundaries of Cheyenne Bottoms Wildlife Area in Barton County.
- (3) All lands and waters within Quivira National Wildlife Refuge in Stafford, Reno, and Rice counties.
- (4) In Pottawatomie County, all lands and water within 5 miles of the Jeffery Energy Center. (Secs. 6 & 7, T9S, R12E) and (Secs. 1, 12, T9S, R11E).
- (5) All the waters within a corridor along the main stem of the Kansas River from the confluence of the Smoky Hill River and Republican River on Fort Riley in Geary County to the confluence of the Missouri River in Kansas City, Wyandotte County.

The U.S. Fish and Wildlife Service has authority to designate areas of critical habitat for federally listed endangered species, but has not done so for Least Terns in Kansas.

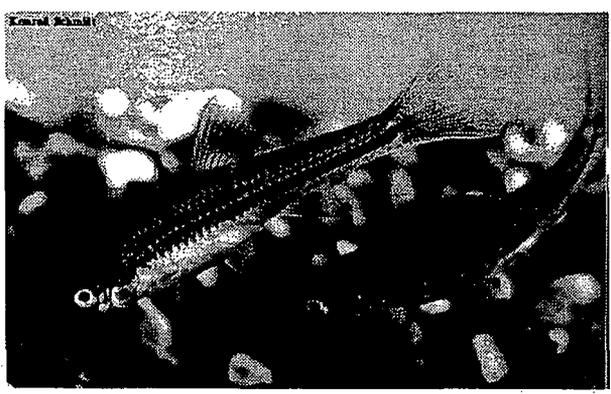
**A48**

USFWS 2005c  
Section 2.5



WUOC-131

## Questions and Answers about the Topeka Shiner



### 1) What is a Topeka shiner?

The Topeka shiner is a small minnow, normally less than 3 inches long. It is silvery-green with a distinct dark stripe preceding the dorsal fin and a dusky stripe along the entire length of the fish. The scales above this line are outlined with dark pigment, appearing cross-hatched, while the scales below this line have no pigment, appearing silvery-white in color.

### 2) What is the range of the Topeka shiner?

The Topeka shiner's historic range included parts of Iowa, Kansas, Minnesota, Missouri, Nebraska, and South Dakota. It is still present in these states, but exists only in small, isolated populations in a significant portion of its current range.

### 3) Where do Topeka shiners live?

Topeka shiners live in small to mid-size prairie streams in the central United States where they are usually found in pool and run areas. Suitable streams tend to have good water quality and cool to moderate temperatures. Many of these streams have year-round flow, although some may become dry during summer or periods of prolonged drought. Occasionally, Topeka shiners are found in larger streams that are downstream of large populations. In Iowa, Minnesota, and portions of South Dakota, Topeka shiners also live in oxbows and off-channel pools.

### 4) Why is the Topeka shiner declining?

The Topeka shiner was once a common fish throughout its range but its presence has declined by about 70 percent at known collection sites during the last 40 to 50 years. Habitat destruction, sedimentation, and changes in water quality are thought to have caused the population decline. Also, the creation of impoundments on small prairie streams that were stocked with predaceous fish like the largemouth reduced Topeka shiner numbers.

**5) What activities harm Topeka shiner habitat?**

- development and degradation of streams
- in-stream gravel mining
- changes in the stream hydrology
- stream channelization projects
- dam construction and development
- destruction of off-channel habitats, such as oxbows

**6) What is being done to protect the Topeka shiner?**

Measures to protect the Topeka shiner include:

**Listing:** The Topeka shiner is listed as an endangered species throughout its range (parts of Kansas, Iowa, Minnesota, Missouri, Nebraska, and South Dakota).

**Recovery Plans:** The Service is developing a recovery plan that describes and prioritizes actions necessary to conserve the Topeka shiner.

**Research:** Several university and private researchers and Federal and State biologists are researching the needs of the Topeka shiner. The results of their studies will help us manage the species and its habitat.

**Management and Habitat Protection:** State and private organizations are working to create protection and management plans to ensure the recovery of the fish. The state of Missouri has developed a comprehensive management plan, which focuses efforts on conserving Topeka shiners in the state. In Minnesota, the Department of Natural Resources and the Service have cooperated to develop a list of Best Management Practices for projects that take place in and along streams occupied by Topeka shiners. South Dakota has completed a Topeka shiner State Management Plan. In Kansas, the Topeka shiner is State-listed as a threatened species and the State has designated its own critical habitat for the species.

**7) What protection does the Topeka shiner currently receive as a listed species?**

The ESA prohibits the import, export, or interstate or foreign sale of protected animals and plants without a special permit. Under the ESA, take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

The ESA requires Federal agencies to consult with the Service to conserve listed species and ensure that any activity they fund, authorize, or carry out will not jeopardize the continued survival and recovery of a listed species or destroy or adversely modify its critical habitat. The ESA also directs all Federal agencies to use their existing authorities to develop and carry out programs to conserve endangered and threatened species.

The Service may issue permits for activities that are otherwise prohibited under the ESA, if these activities are for scientific purposes or to enhance the propagation or survival of the affected species, or for take that is incidental to otherwise lawful activities.

### **8) What can I do to conserve Topeka shiners?**

There are a number of things that landowners and others can do to conserve Topeka shiners, including:

- restoring stream habitats
- placing vegetated buffers along streams (e.g., by managing livestock access to streambanks)
- revegetating exposed, eroding banks
- conserving soil throughout watersheds
- avoiding or reducing direct impacts to streams and oxbows

The U.S. Department of Agriculture, Soil and Water Conservation Districts, U.S. Fish and Wildlife Service, and State conservation agencies can assist landowners with the funding and implementation of projects to conserve Topeka shiners and their stream habitats.

### **9) Where can I get more information on the Topeka Shiner and critical habitat?**

For general information on Topeka shiners and the designation of critical habitat contact Vernon Tabor at the Kansas Ecological Services Field Office, at the above address; telephone 785/539-3474; facsimile 785/539-8567.

For local information on Topeka shiners in your state, contact one of the Service field offices below:

Columbia, Missouri Ecological Services Field Office  
101 Park Deville Dr., Suite A  
Columbia, MO 65203  
tel: 573/234-2132

Rock Island, Illinois Ecological Services Field Office (for Iowa information)  
4469 48<sup>th</sup> Avenue Court  
Rock Island, IL 61201  
tel: 309/793-5800

Phil Delphey  
Twin Cities, Minnesota Ecological Services Field Office  
4101 East 80<sup>th</sup> Street  
Bloomington, MN 55425  
tel: 612/725-3548 ext. 206

**A49**

# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Robert C. Hagan  
Vice President Nuclear Assurance

December 22, 1992

NA 92-0137

United States Fish and Wildlife Service  
Post Office Box 25486  
Denver Federal Center  
Denver, Colorado 8025

Attention: Mr. Max Schroeder

Subject: 1992 Activities and Renewal Request of Threatened  
Neosho Madtom Subpermit

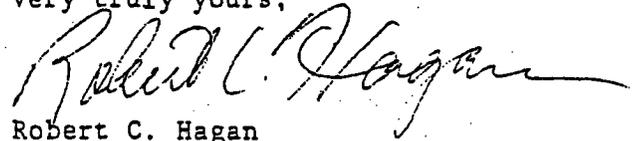
Dear Mr. Schroeder:

The purpose of this letter is to report 1992 activities and request renewal of Wolf Creek Nuclear Operating Corporation's threatened Neosho Madtom subpermit 91-27 under authority of PRT-704930. Due to flooding conditions in the Neosho River during November and December, we were unable to complete seining activities to the extent originally intended. We were only able to seine in one gravel riffle area on December 15, 1992 at the Burlington city dam in the SE 1/4 of 23-21-15 in Coffey County, Kansas. We did not capture any madtoms during three kick-seine hauls with a 6' x 15' straight seine with 1/4 inch mesh. ] \*

Renewal of this permit is requested for 1993. We intend to continue environmental monitoring of the Neosho River as in the past and expect to incidentally catch Neosho madtoms. There will be no changes to the schedule, methods, or justifications presented in our application for subpermit 91-27.

If you need more information or have questions, please feel free to contact Brad Loveless or Dan Haines at (316) 364-4168.

Very truly yours,



Robert C. Hagan  
Vice President Nuclear Assurance

RCH/tlr

cc: William H. Gill (State Supervisor, Fish and Wildlife Service)

**A50**

Rhodes 1992  
WCNOC 198



ENVIRONMENTAL MANAGEMENT ROUTING FORM  
OUTGOING CORRESPONDENCE

A. No. ET 92-0022 Date 1-30-92 Responsible Person Dan Haines

To: Bill Hlavachick From: Forrest T. Rhodes

B. Subject: 1991 Conditional Wildlife Permit Report and 1992

Renewal Application

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

C. Copy to Records Management (WC-DS): Yes  No

D. Personal Copies

Name  
R. C. Hagan (MS2-01), w/a  
D. E. Haines (WC-TR), w/a  
B. S. Loveless (WC-TR), w/a  
K. J. Moles (MS2-01), w/a

Name  
A. E. Wessel (WC-ETS), w/a  
\_\_\_\_\_  
\_\_\_\_\_

E. Put in TE File No. ~~42083~~ 42084

F. SEM 1252 1/22/92

WOLF CREEK GENERATING STATION  
 TRANSMITTAL  
 CONCURRENCE / SIGNOFF SHEET



1. Letter No. ET 92-0022 Date Response Due: 1-31-92  
 Required  Requested

2. Subject: 1991 Conditional Wildlife Permit Report and 1992 Renewal Application

3. Responsible Organization(s): Environmental Management

4. Responsible Regulatory Services Individual: Dan Haines ext: 5140

5. Commitments contained in letter:  YES  NO If YES, list below:

Transmit copy of renewed USFWS Threatened Species Permit to KDWP when received.

6. Remarks / comments:

7. Technical Review and Concurrence	Date Received	Signature	Date
Manager Regulatory Services *		<i>Brad Lovelace</i>	1/24/92

\* Comments generated during review of the attached documents have been resolved and the document is ready for transmittal to the NRC.

6. Executive Review and Concurrence	Date Received	Signature	Date
<input type="checkbox"/> V.P. - Operations			
<input type="checkbox"/> V.P. - Eng. & Tech. Services			
<input type="checkbox"/> Director Quality			
<input type="checkbox"/> _____			

# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Forrest T. Rhodes  
Vice President  
Engineering & Technical Services

January 30, 1992

ET 92-0022

Kansas Department of Wildlife and Parks  
Fisheries and Wildlife Division  
RR #2, Box 54A  
Pratt, KS 67124

Attention: Mr. Bill Hlavachick

Subject: 1991 Conditional Wildlife Permit Report and 1992  
Renewal Application

Dear Mr. Hlavachick:

The purpose of this letter is to report 1991 Conditional Wildlife Permit #SC-067-91 activities by Wolf Creek Nuclear Operating Corporation and to renew this permit for 1992. First, please find the report forms attached. Most fish used for radioisotopic monitoring were sent to a private laboratory for analysis. The remainder were given to the Kansas Department of Health and Environment under the Power Plant Monitoring Act.

Second, please find a renewal application and a check for \$5.50 for a 1992 permit. Subpermittees are listed on the application and will carry a copy of the permit when conducting permitted activities.

The renewal application requests that activities as they relate to the incidental capture of the threatened Neosho madtom be permitted. As you are aware these activities during 1991 were completed as allowed by the U.S. Fish and Wildlife Service permit PRT-704930, subpermit 91-27. We have requested renewal of this federal permit for similar work in 1992 and this renewal request is attached for your benefit. A copy of the renewed federal permit will be sent to you for your files when received.

If there are any questions, please contact Brad Loveless or Dan Haines at (316) 364-4168.

Very truly yours,



Forrest T. Rhodes  
Vice President  
Engineering & Technical Services

FTR/tlr

Attachments (2)

APPLICATION FOR SCIENTIFIC, EDUCATION, OR EXHIBITION PERMIT  
(Collecting and Salvage)

Kansas Department of Wildlife and Parks  
Fisheries and Wildlife Division  
RR #2 Box 54A  
Pratt KS 67124

FEE: \$5.50

( ) NEW  
(X) RENEWAL

PLEASE COMPLETE FULLY AND IN DETAIL.

Name of Applicant Brad S. Loveless for Wolf Creek Nuclear Operating Corporation

Address P.O. Box 411, Burlington, KS 66839

Date 1-6-92 Phone Number (316) 364-4168

Species to be collected, etc. (common names) See Attachment

Number of specimens involved See Attachment

Major area of activity See Attachment

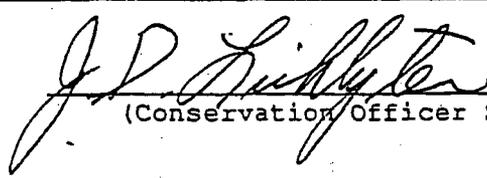
Anticipated dates of activity See Attachment

Date specific purpose of activity See Attachment

Methods of collecting See Attachment

Place where specimens are to be housed See Attachment

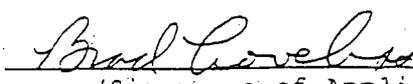
Federal Permit No. PRT-715225 - Salvage,  
PRT-704930, subpermit 91-27  
Threatened Species

  
(Conservation Officer Signature)

This permit, which expires December 31, must be in possession while conducting the above activity. A \$5.00 fee plus a \$.50 service charge (\$5.50 total) must be submitted with this permit application. Any applicant desiring to conduct the above activities on any Department of Wildlife and Parks lands must first obtain written permission from the Department in addition to the special permit prior to the initiation of any activities.

FAILURE TO COMPLY WITH THE CONDITIONS SET FORTH IN THE PERMIT WILL RESULT IN THE IMMEDIATE REVOCATION OF THE PERMIT. Subpermittees:

- |                  |                |                  |
|------------------|----------------|------------------|
| Don Eccles       | Dan Haines     | Ken Thrall       |
| Juice Reischmann | Mark Schreiber | Brian Winzenried |
| Dece Hobby       | Dan Williamson | Jeff Walton      |

  
(Signature of Applicant)

Species to be Collected, etc.

It is expected that all fish common to Wolf Creek Cooling Lake (WCCL) and the Neosho River drainage may be sampled. Only those species of commercial or recreational value will be kept for radiological analyses. These include but are not limited to such fish as largemouth bass, white crappie, white bass, channel catfish, buffalo, and carp.

Game bird and game mammal samples for radiological isotope analyses will be taken from readily obtainable species common to the Coffey County area. These include eastern cottontail, fox squirrel, white-tailed deer, greater prairie chicken, and northern bobwhite quail.

Salvage specimens will include wounded or dead nonendangered migratory birds which consist of, but are not limited to, various waterfowl, raptors, and other waterbirds subject to the conditions and requirements of WCNOC's Federal Fish and Wildlife Permit #PRT-715225.

Number of Specimens Involved

Only enough will be collected to complete biological and radiological environmental monitoring programs and facilitate the management of the WCCL fishery. The quantity of specimens to be handled is as follows:

**Fisheries study:**

Because of the quantitative nature of the gear types to be employed, the number of specimens involved will depend upon the concentration and species composition of fish present at the time of sampling. An adequate number of specimens will be sampled to accurately assess the fish populations in WCCL and if necessary, in the Neosho River in the vicinity of Wolf Creek Generating Station.

**Radiological/Environmental:**

Enough fish will be kept to satisfy Nuclear Regulatory Commission (NRC) radiological/environmental monitoring requirements. Each sample will consist of the minimum number of individual fish needed to yield 500-1000 grams of boneless flesh. The number and kind of samples needed will not exceed one sample of all commercially or recreationally important species monthly. These will be collected from WCCL and the Neosho River.

Game bird and game mammal samples will be collected annually. Each sample will consist of the minimum number of specimens needed to yield 500-1000 grams of boneless flesh. If available, road-killed birds and mammals will be used. Deer will not be collected unless a road kill is available from the appropriate areas or arrangements can be made with local legal hunters.

#### Major Area of Activities

Most of the sampling will occur in central Coffey County in the vicinity of WCCL and along the Neosho River. Major collecting locations on the Neosho River are immediately upstream (NW 1/4 of 12-22-15) and downstream (SE 1/4 of 12-22-15) of the Wolf Creek confluence. Work will also be completed at the Burlington City Dam (SW 1/4 of 23-21-15) and in the tailwater area of John Redmond Reservoir (W 1/2 of 9-21-15, and E 1/2 of 10-21-15). Monitoring will also be done on the Neosho River in southeastern Lyon County (S 1/2 10-20-13 and NE 1/4 15-20-13) near Hartford.

Game bird and mammal samples will be collected immediately north of the power plant in 6-21-16 and southeast in 16-21-16 and 17-21-16. Control samples will be collected in the vicinity of Hartford in east-central Lyon or west-central Coffey Counties on legal public hunting lands or on private property with consent from the landowner.

#### Purpose of Activity

The purpose of monitoring the cooling lake fishery is to provide data for making management decisions to reduce gizzard shad impingement problems and enhance station operability as a result. The WCCL monitoring programs will also provide adequate baseline data with which operational events can be compared in order to assess impacts. These involve both terrestrial and aquatic populations in the vicinity of WCCL.

A major purpose of the monitoring program on the Neosho River will be to determine the distribution and population density of the Asiatic clam (Corbicula fluminea). Because habitats are similar and collection gears will not discriminate, it is expected that various fishes including the Neosho madtom may be captured. Although this species will no longer be targeted, incidental catches will be recorded to document continued presence or absence above and below the Wolf Creek confluence. All will be immediately released alive to the river. All activities with regard to the threatened Neosho madtom will be performed in accordance with Federal Threatened Species Permit PRT-704930, subpermit 91-27 and subsequent renewals.



Methods of Collection

The following equipment will be used to collect samples:

Wolf Creek Cooling Lake:

6 x 50 foot bag seine with 1/4 inch mesh  
6 x 15 foot straight seine with 1/8 inch mesh  
8 x 100 foot monofilament gill nets w/1.0 inch mesh  
8 x 100 foot monofilament gill nets w/1.5 inch mesh  
8 x 100 foot monofilament gill nets w/2.5 inch mesh  
8 x 100 foot monofilament gill nets w/4.0 inch mesh  
Large frame modified fyke nets  
Variable voltage AC/DC boat mounted shocker  
Otter trawl

Neosho River:

6 x 50 foot bag seine with 1/4 inch mesh  
6 x 15-20 foot straight seine with 1/8 inch mesh  
Variable voltage AC/DC boat mounted shocker

Required game birds and game mammals will be collected using shotguns or .22 caliber rifles in the most efficient manner feasible for taking the sample.

Place Where Specimens are to be Housed

Fish collected during monitoring will be weighed and measured and returned to the water or disposed of properly. Voucher specimens may be preserved and stored in the Environmental Management laboratory in the Dwight D. Eisenhower Nuclear Training Center at Wolf Creek Generating Station. No Neosho madtoms will be kept. All radiological/environmental samples will be kept in the same lab before being shipped to contracted analytical laboratories.

SCIENTIFIC, EDUCATION, OR EXHIBITION PERMIT REPORT FORM  
(Collecting and Salvage)

SC-067-91  
Permit Number

WCNOC  
Permit Holder Name

Date of Each Collection Month/Day	Number & Species Handled		Give each collection location including legal description (Quarter, section, township, and range numbers, and County)	Disposition of Specimens (Include Museum Voucher Numbers, if applicable)
	No.	Species (Common Name)		
1991	2362	Gizzard shad	Wolf Creek Cooling Lake (WCCL)	All specimens returned to WCCL unless noted otherwise
"	61	Common carp	"	3 used for radioisotopic analyses
"	11	Golden shiner	"	
"	503	Red shiner	"	
"	20	Ghost shiner	"	
"	50	Bullhead minnow	"	
"	3	Fathead minnow	"	
"	50	Smallmouth buffalo	"	2 used for radioisotopic analyses
"	41	Bigmouth buffalo	"	
"	6	Yellow bullhead	"	
"	124	Channel catfish	"	5 used for radioisotopic analyses
"	4	Blue catfish	"	
"	32	Flathead catfish	"	
"	6	Blackstripe topminnow	"	
"	9	Mosquito fish	"	
"	394	Brook silversides	"	
"	551	White bass	"	12 used for radioisotopic analyses

Attachment to ET 92-0022

SCIENTIFIC, EDUCATION, OR EXHIBITION PERMIT REPORT FORM  
(Collecting and Salvage)

SC-067-91  
Permit Number

WCNOC  
Permit Holder Name

Date of Each Collection Month/Day	Number & Species Handled		Give each collection location including legal description (Quarter, section, township, and range numbers, and County)	Disposition of Specimens (Include Museum Voucher Numbers, if applicable)
	No.	Species (Common Name)		
1991	4	Striped bass	Wolf Creek-Cooling Lake (WCCL)	All specimens returned to WCCL unless noted otherwise
"	195	Wiper hybrid	"	
"	41	Green sunfish	"	
"	5	Orangespotted sunfish	"	
"	563	Bluegill	"	
"	4	Longear sunfish	"	
"	3	Hybrid sunfish	"	
"	334	Smallmouth bass	"	
"	242	Largemouth bass	"	
"	164	White crappie	"	
"	220	Black crappie	"	
"	9	Logperch	"	
"	221	Walleye	"	
"	68	Freshwater drum	"	



SCIENTIFIC, EDUCATION, OR EXHIBITION PERMIT REPORT FORM  
(Collecting and Salvage)

SC-067-91  
Permit Number

WCNOC  
Permit Holder Name

Date of Each Collection Month/Day	Number & Species Handled		Give each collection location including legal description (Quarter, section, township, and range numbers, and County)	Disposition of Specimens (Include Museum Voucher Numbers, if applicable)
	No.	Species (Common Name)		
			The migratory birds among the list below were	
			handled under U.S. Fish and Wildlife Service	
			Special Wildlife Permit Number PRT-715225	
1-2-91	1	American goldeneye	NE 1/4 7-21-16, Coffey County	Buried Probable powerline collision
1-4-91	1	Mallard	NE 1/4 7-21-16, Coffey County	Buried
1-17-91	7	Northern bobwhite	NE 1/4 6-21-16, Coffey County	Used for radioisotopic analyses
1-17-91	2	Eastern cottontail	NE 1/4 6-21-16, Coffey County	Used for radioisotopic analyses
1-17-91	7	Northern bobwhite	NW 1/4 16-21-16, Coffey County	Used for radioisotopic analyses
1-17-91	2	Eastern cottontail	NW 1/4 16-21-16, Coffey County	Used for radioisotopic analyses
3-5-91	1	Snowy owl	SE 1/4, 7-21-16, Coffey County	Unknown cause of death Partially scavenged
3-7-91	1	American coot	NE 1/4 7-21-16, Coffey County	Powerline collision, buried
3-14-91	1	American coot	NE 1/4 7-21-16, Coffey County	Powerline collision, buried
5-15-91	1	Double-crested cormorant	NE 1/4 7-21-16, Coffey County	Powerline collision, buried
7-23-91	1	Upland sandpiper	NE 1/4 7-21-16, Coffey County	Powerline collision, buried
9-27-91	32	Brown-headed cowbird	NE 1/4 7-21-16, Coffey County	Unknown cause of death Buried
10-3-91	1	Green-winged teal	NE 1/4 7-21-16, Coffey County	Powerline collision, buried



# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Forrest T. Rhodes  
Vice President  
Engineering & Technical Services

January 10, 1992

ET 92-0004

U.S. Fish and Wildlife Service  
P.O. Box 25486  
Denver Federal Center  
Denver, CO 80225

Attention: Mr. Max Schroeder

Reference: Letter ET 91-0174, dated October 7, 1991, from  
Forrest T. Rhodes (WCNOC) to Dan Mulhern (USFWS)  
Subject: Report of Activities and 1992 Renewal Request for  
Endangered/Threatened Species Permit PRT-704930,  
Subpermit 91-27

Dear Mr. Schroeder:

~~The purpose of this letter is to complete activity reporting requirements~~  
and request renewal of Wolf Creek Nuclear Operating Corporation's subpermit  
91-27 under PRT-704930 for the incidental capture of the threatened Neosho  
madtom. The following specimens were captured from and released alive to  
the Neosho River during ecological monitoring performed as stated in our  
application (see Reference).

<u>Date</u>	<u>Number</u>	<u>Number of Hauls</u>	<u>Habitat</u>	<u>Location</u>
11-20-91	18	4	Sand/Gravel Riffle	SE 1/4 12-22-15, Coffey County, KS
11-20-91	13	4	Rock/Gravel Riffle	NW 1/4 12-22-15, Coffey County, KS
11-21-91	0	4	Gravel/Cobble Riffle Flat Rocks/Gravel Riffle	S 1/2 10-20-13, Lyon County, KS

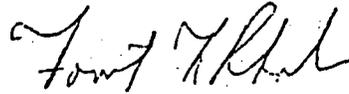
Each haul consisted of kick-seining along approximately six linear meters of riffle habitat with a 6' x 15' straight seine with 1/4 inch mesh. No Neosho madtoms were killed or injured during our river monitoring activities.

The second purpose of this letter is to request renewal of this threatened species permit to allow similar ongoing monitoring to be completed during 1992. The monitoring activities presented in the reference will be identical as they relate to the Neosho madtom.

Page 2  
ET 92-0004

We hope that the data presented above will be of use in your Neosho madtom recovery efforts. If any questions arise, please contact Brad Loveless or Dan Haines at 316 364-4168.

Very truly yours,



Forrest T. Rhodes  
Vice President  
Engineering & Technical Services

FTR/tlr

cc: Mr. Dan Mulhern (USFWS)

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