RED RIVER
CHLORIDE CONTROL PROJECT

August 8, 1988

Secretary of the Army
ATTN: Assistant for Civil Works
The Pentagon (Room 2E570)
Washington, D.C. 20310

Committee on Environment and
Public Works of the Senate
SD458 Dirksen--Senate Office Building
Washington, D.C. 20510

Committee on Public Works
and Transportation of the
House of Representatives
2165 Rayburn--House Office Building
Washington, D.C. 20515

Gentlemen:

We are pleased to submit the attached report of the Red River Chloride Control Project Evaluation Panel's findings in compliance with Section 1107 of P.L. 99-662. The report details the evaluation of the operational effectiveness of Area VIII of the Red River Chloride Control Project. The Project's objective is to improve the quality of water in the river by removal of salt pollutants. We found the operation of the completed works in Area VIII to be consistent with the Project benefits projected by the economic reanalysis in the U.S. Army Corps of Engineer Memorandum No. 25 of 1980. On the basis of these findings the Panel feels that proceeding with construction of the remaining elements of the Project is justified in accordance with the intent of Section 1107 of P.L. 99-662.

The report provides related background information for the Red River Chloride Control Project with particular emphasis on our analysis of the operational performance of the installed portions of the Project in Area VIII. (Almost 50 percent of the natural chlorides polluting Lake Kemp come from the saline springs and seeps of Area VIII.) The Panel visited the site to see the constructed facilities and met several times to review and provide guidance for the data collection and analysis process. Pertinent information on the history of the Panel's activities and excerpts from the minutes of the various meetings are included in the report.

The Panel decided that the analysis based on daily data collected during the first full year (May 1, 1987 through April 30, 1988) of operation of the Bateman Pump Station (which is where the saline water is removed from the river system) was sufficient to adequately assess the effectiveness of the installed facilities. The data studied quantifies the reduction of chlorides at gaging stations operated by the U.S. Geological Survey in cooperation with the Corps at both Bateman and approximately 50 river miles downstream at Benjamin. Flows were exceptionally high during May, June, and July 1987 and relatively low during the remainder of the test period. This was a fortunate event in that it provided both high- and low-flow conditions for evaluating the project's performance at Benjamin.

In addition to the 1987-88 data, sufficient chloride and flow data had been collected during water years 1971 through 1976 for utilizing in a simulation model to predict operational results. Simulation runs were made assuming the Bateman Pumping Station was operated in a similar manner during 1971-76 as it was during the evaluation period. This simulation resulted in an even greater reduction of the chloride load than occurred during the one-year evaluation period.

The principal findings of importance to the purpose of the Panel's task are:

* The physical facilities necessary for collecting brine at Bateman and pumping it to Truscott Brine Lake are in place and functioning adequately. The operation of the pumping plant and pipeline has proven successful with very little down time.

* The control system at the Bateman Pumping Station is operating slightly better and more effectively than was predicted in Memorandum No. 25. Chloride removal during the test period actually exceeded projections.

* There appeared to be significant flushing of chloride from the alluvium in the intervening reach between Bateman and Benjamin during the high-flow period between May and June 1987 which resulted in high chloride loads passing Benjamin. After this initial flushout,

chloride loads at Benjamin during the low-flow period from September through April 1988 were less than the long-term average anticipated with the Bateman Pumping Plant in operation. As suggested in the design documents, high chloride loads can be expected during high flows in the early years of operation. But an analysis of the data suggests that the long-term average should approximate the anticipated load after the system approaches equilibrium with the Area VIII facilities in operation.

We believe our task has been completed and recommend that authorization be given to continue with the construction of the Red River Chloride Control Project. The Panel greatly appreciates the cooperation and assistance it has received from the Tulsa District, U.S. Army Corps of Engineers, Tulsa, Oklahoma, and the Texas District Office, U.S. Geological Survey. We feel that a note of thanks is in order for both of these units.

Sincerely,

Jack Keller

Dr. Jack Keller, Chairman

REPORT

on the

Evaluation of the effectiveness of operation of Area VIII of the Red River Chloride Control Project

Required by
PL 99-662

August 1988

PANEL

Position	Member	Representing
Chairman	Dr. Jack Keller	National Academy of Science
Vice Chairman	Mr. Jack Rawson	U. S. Geological Survey
Member	Dr. Herbert Grubb	State of Texas
Member	Mr. Jackson Kramer	Texas Water Commission
Member	Mr. Glenn Sullivan	State of Oklahoma

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DEFINITION OF SELECTED TERMS

Discharge (or Flow) is the volume of water that passes a given point within a given period of time.

Mean discharge is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Day-second/feet (DSF) is the volume of water passed in one day at a flow of one CFS.

Cubic foot per second (cfs) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to 7.48 gallons per second, 448.8 gallons per minute, or 0.02832 cubic meters per second.

Discharge weighted average concentration approximates the composition of water, or the concentration of a constituent, that would be found in a reservoir containing all the water passing a given location in a given time after mixing in the reservoir. It is computed by multiplying the discharge for a sampling period by the concentration of individual ions constituents for the corresponding period and dividing the sum of the products by the sum of the discharges.

Tons/day is the quantity of a substance (tons) in solution or suspension that passes a stream section during a 24-hour period. It is calculated by multiplying the product of the daily mean discharge (cfs) and daily mean concentration (Mg/L) by 0.0027.

Dissolved refers to that material in a representative water sample which passes through a 0.45 micrometer membrane filter. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Milligrams per liter (Mg/L) is a unit for expressing the concentration of chemical constituents in solution and represents the mass of solute (milligrams) per unit volume (liter) of water.

Specific conductance is a measure of the ability of water to conduct an electrical current and is expressed in microsiemens per centimeter at 25°C. Specific conductance is related to the type and concentrations of ions in solution and can be used for approximating the concentrations of dissolved solids and major ions in the water. These relationships are not constant from stream to stream and even may vary for the same source with changes in the composition of the water.

Water Year Begins on October 1 of the preceding year and ends September 30 of the year of record, i.e. water year 1988 begin in October 1, 1987.