1 PURPOSE AND NEED FOR ACTION.

The proposed chloride control project is a Federal endeavor to reduce the natural occurring levels of chlorides in the Wichita River in Texas. Natural mineral concentrations from the upper reaches of the Wichita River Basin render downstream waters unusable for most beneficial purposes. The primary constituents are chlorides and sulfates. The goal of the project is to improve the quality of the water resources to the extent that they would be more readily usable for municipal, industrial, and agricultural purposes.

Surface and groundwater resources to meet current and future economic growth within the Wichita River Basin are reaching their maximum dependable limits (RRA, 2001). Controlling chlorides presents a practical means to achieve an economically feasible source of water for municipal, industrial, and agricultural purposes and support the water needs of the region (Figure 1-1). Chloride control presents a cost effective and technically feasible means of reclaiming an existing water source to supplement present surface and groundwater supplies. One purpose of chloride control is to prepare for and sustain economic growth and to meet the water resource needs of the demand centers as economically as possible.

The City of Wichita Falls is a major water consumer and a major water supplier within the region. Wichita Falls provides water to several surrounding cities, water districts, industry, and agriculture. Some communities have an immediate need for a supplemental source supply to accommodate present water supply shortages. Because of extended drought conditions experienced in the region, water from Lake Kemp is currently intended for supplemental use along with Arrowhead and Kickapoo reservoirs within the next 3 years. Utilization of Lake Kemp, as modeled in this study, could add up to 61,222 acre-feet of water per year to the present municipal, industrial and agriculture water supplies within the region. Recent studies conducted pursuant to updating the Texas Water Plan have indicated a present and future need for the use of Lakes Kemp and Diversion to supplement existing water supply sources.

Other entities not supplied directly from the Wichita Falls system are considering the use of Lake Kemp with advanced treatment techniques to supplement their existing water supplies until such time as the water quality is sufficiently improved through chloride control. These entities include the cities of Seymour, Vernon, Electra, Harrold, Oklaunion, and several water supply districts.

In summary, the Wichita River system is ideally located to provide supplemental water supply to a multi-county region of North Texas that is expected to collectively require an additional source supply by 2015.

a. History and Authorization of the Chloride Control Projects. The U.S. Public Health Service initiated a study in 1957 to locate natural brine source areas and determine the contribution of brine sources to the Wichita River and Red River. The USACE entered the study in 1959 and recommended measures to control the natural chloride sources. A timeline for the project can be constructed as follows:

- 1957: U.S. Public Health Service directed to locate major sources of natural chloride discharges.
- 1959: Congress directs the USACE to determine if the chloride sources could be controlled and, if so, to determine the costs and benefits of alternative control plans.
- 1962: Experimental work at Estelline Springs (Area V in the upper Red River Basin) authorized.
- 1964: An effective control plan at Area V implemented. Area V used as an indicator of the potential for chloride control in remaining portions of the basin.
- 1966: The USACE reported on chloride control plans for chloride sources in the Wichita River (Areas VII, VIII, and X). These plans were known as Part I and were authorized by Congress the same year.
- 1968: Pre-construction planning started for Phase I.

- 1970: Construction at other areas in the Red River Basin (Part II) authorized, though, to date, construction on these areas has not been initiated.
- 1972: Detailed studies for Phase I completed.
- 1974: Funds allotted by the Water Resources Development Act (Public Law 93-251) for construction at Area VIII and Truscott Brine Disposal Reservoir. (Truscott Brine Disposal Reservoir is a storage reservoir for collected brine.)
- 1976: In accordance with NEPA, a FES for the overall RRCCP completed.
- 1977: FES for Phase I filed with the Environmental Protection Agency (EPA) in May 1977. Construction on Area VIII begins.
- 1978: The USACE requested an economic reanalysis of the entire RRCCP.
- 1986: Congress authorized further construction on the Red River.
- 1987: Area VIII became operational. (Area VIII is currently seen as an indicator of the effectiveness that can be realized with inflatable dam retention and pump-out collection techniques.)
- 1991: A second economic reanalysis requested by the Office of the Assistant Secretary of the Army prior to construction of any other areas outside Area X.
- 1993: Economic reevaluation completed in June confirming economic benefits.
- 1997: Delay ordered in construction of chloride control project for economic reevaluation of Wichita River Basin. This informal economic reevaluation was completed in October 1997 and indicated that a thorough reevaluation of the Wichita River Basin features was warranted based upon the project's economic effectiveness.

The USACE was subsequently approved to undertake a proposed reevaluation of the Wichita River Basin features of the WRCCP to be titled "Wichita River Basin Project Reevaluation" (Reevaluation). Due to changes in the proposed project following the FES filing for the RRCCP, a supplement to the FES was required to comply with the intent of the National Environmental Policy Act (NEPA) as defined in paragraph 1502.9, 40 Code of Federal Regulations (CFR). In 1998, the NEPA scoping process began for the Reevaluation.

The authority to construct this project is contained in the following:

- Section 203, Flood Control Act of 1966, Public Law 89-789, Arkansas-Red River Basins, Texas, Oklahoma and Kansas, Part 1, November 7, 1966.
- Section 201, Flood Control Act of 1970, Public Law 91-611, Arkansas-Red River Basins Water Quality Control Study, Texas, Oklahoma and Kansas, Part II, November 31, 1970.
- Section 74, Water Resources Development Act of 1974, Public Law 93-251, March 7, 1974.
- Section 153, Water Resources Development Act of 1976, Public Law 94-587, October 22, 1976.
- Section 1107, Water Resources Development Act of 1986, Public Law 99-662, November 17, 1986, General Design Phase I Plan Formulation, Volumes I and II (DM 25), November 1980.

b. National Environmental Policy Act Documentation. A FES for the project, dated July 1976, was prepared, distributed for agency and public review, and filed with the Environmental Protection Agency (EPA) on May 18, 1977. The environmental impacts of the RRCCP addressed in the FES were based on environmental studies performed by the University of Oklahoma (1975) and West Texas State University (1972, 1973) under contract to the USACE. The proposed project area is shown on Figure 1-1.

In 1994, due to the length of time between filing the 1976 FES for the RRCCP, initiation of construction of the project, and changes in the study area conditions, as well as in the project design; a supplement to the 1976 FES was required to comply with the intent of the NEPA as defined in paragraph 1502.9, 40

CFR. Paragraph 1502.9 of 40 CFR provides the basis for Federal agencies to determine if a particular action will require a supplement to an existing environmental impact statement by stating,

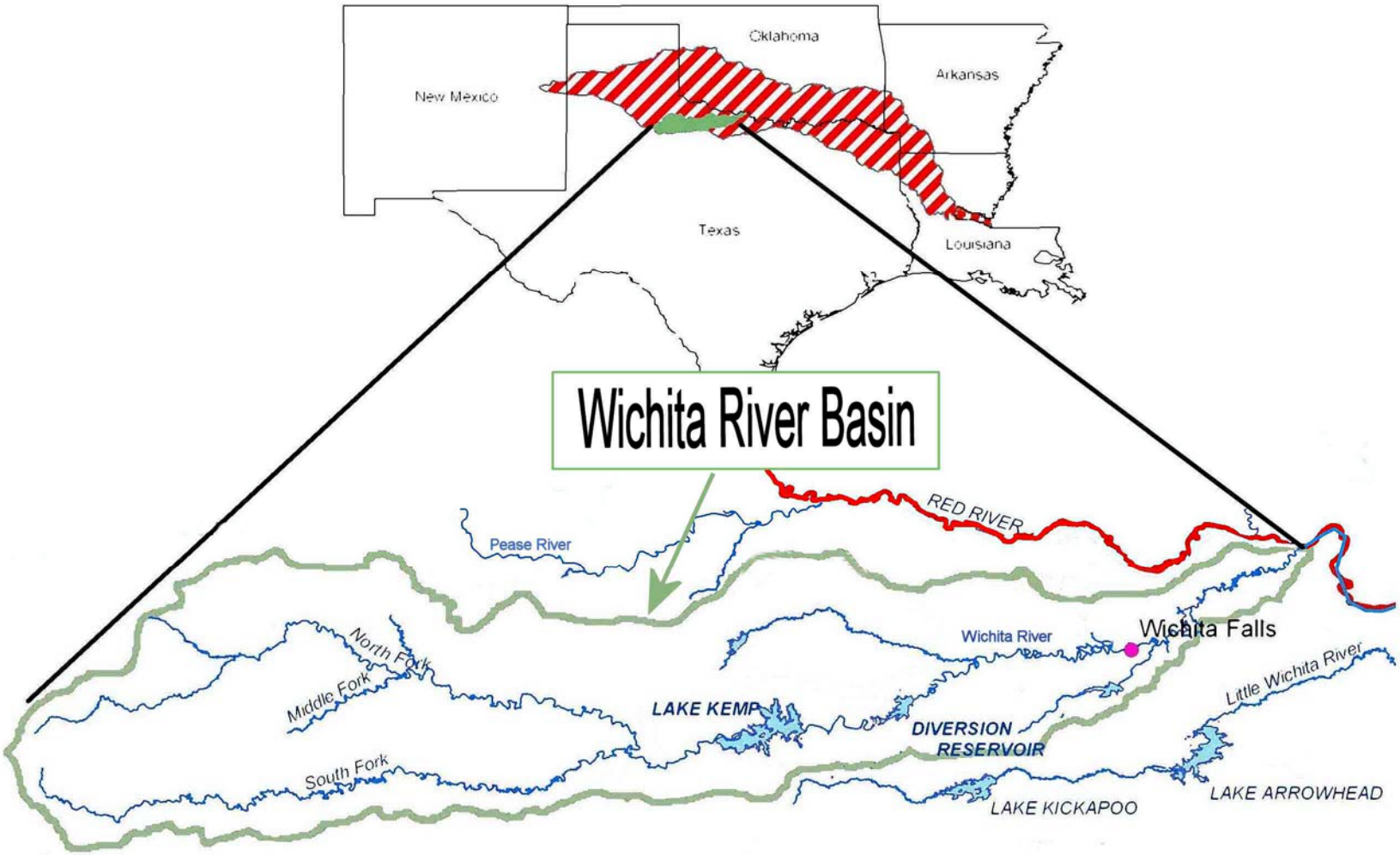
> *"Agencies: (1) Shall prepare supplements to either draft or final environmental impact statements if: (i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts."*

Subsequently, a Notice of Intent to prepare a supplement to the FES was published in the Federal Register on April 12, 1994. A Draft SFES (DSFES) was prepared and released for public review on April 27, 1995. However, due to geographic shifts in water demand projections, potential impacts upon environmentally sensitive areas along the Red and Pease Rivers, and potential impacts to fish and wildlife species habitat, the final SFES was never coordinated or filed with the EPA. The environmental impacts of the RRCCP addressed in the 1995 DSFES were based on the previous environmental studies as well as those performed by the USACE Environmental Laboratory in Vicksburg, Mississippi (Schroeder and Toro, 1996), the USACE (1993a), and others under contract to the USACE and can be found at http://www.swt.usace.army.mil/LIBRARY/Library.CFM.

In accordance with paragraph 1502.20 of 40 CFR, Ch. V (7-1-91 edition), the District has elected to tie this supplement to the 1976 FES. Subsequently, to avoid repetitive discussions of issues addressed in the 1976 FES and 1995 DSFES, this supplement will only reference issues addressed in the FES, DSFES, and contracted environmental studies and will concentrate primarily on issues specific to subsequent actions. Copies of supporting environmental studies are on file in the Environmental Analysis and Support Branch of the Tulsa District Planning, Environmental, and Regulatory Division. Copies of the 1976 FES and 1995 DSFES are provided at http://www.swt.usace.army.mil/LIBRARY/Library.CFM.

A Notice of Intent to prepare the Wichita River supplement to the FES was published in the Federal Register on July 22, 1998.

FIGURE 1-1.
CHLORIDE CONTROL, WICHITA RIVER BASIN REEVALUATION, TEXAS & OKLAHOMA.



c. Description of Proposed Project. Originally, the authorized RRCCP would have controlled 8 of 10 major natural chloride emission areas to improve water quality for municipal, industrial, and agricultural use. However, the Reevaluation is focused upon the 3 natural chloride emission areas within the Wichita River Basin: Areas VII, VIII, and X (Figure 1-1).

As previously described, Areas VII, VIII and X are on upstream forks of the Wichita River and are the subject of this document. The proposed project facilities consist of 3 low flow dams for collection of brine, 5 spray fields for brine volume reduction, one brine disposal reservoir for holding concentrated brine solutions, and necessary pumps and pipelines to transport brine solutions from the low flow dams to the brine disposal reservoir.

The remaining 5 control areas from the original authorized project, Areas V, VI IX, XIII, and XIV, are either in the floodplain of the Red River or on tributaries of the Red River. Of these, only Area V is addressed in detail in this document because it has already been constructed and remains part of the base condition for the proposed project.

1. Area V. Area V is a large spring in the floodplain of the Prairie Dog Town Fork of the Red River in Hall County, about 0.5 mile east of Estelline, Texas. Chloride control features at this site were implemented in 1964 and are still in operation. Because the facilities have been implemented, are still in operation, and are part of the authorized project, Area V is considered an existing condition and is expected to remain and be functional in the future. Control at this area consists of a ring dike approximately 9 feet high and 340 feet in diameter extending to bedrock around the spring. The dike allows the head to be increased on the spring (approximately 7 feet) so the natural flow is suppressed. Area V produced 300 tons per day of salt. Of these, 240 tons/day are being controlled. A total of 98 acres of land has been acquired for operation of this area.

2. Area VII (Y-Ranch Pump Station). This area would be located at river mile 209.6 on the North Fork of the Wichita River and would have a drainage area of about 492 square miles (Figure 1-1). The brine would be collected through the use of a low flow dam with a 5-foot-high inflatable weir. All low flows would be transported through an intake to a wet well beneath a pump station where they would be pumped through a pipeline to Truscott Brine Disposal Reservoir for evaporation and permanent storage. When stream flows overtop the inflatable dam by 6 inches or more, the weir would automatically deflate and allow the floodwaters to pass downstream. One spray field would be constructed for flow reduction at the pump station intake. The spray field would encompass 24 acres. A second spray field would be constructed at the pipeline outfall. This second spray field would occupy 28 acres. Out of the total of 244 tons/day of salt produced at Area VII, 195 tons/day would be controlled. No facilities at Area VII have been constructed.

3. Area VIII. This site is located on the South Fork of the Wichita River (Figure 1-1). The primary collection area (Bateman Pump Station) is located at river mile 74.9 and has a drainage area of approximately 221 square miles. The brine is collected through the use of a low flow dam with a 5-foot-high inflatable weir which is operated identically to the one described for Area VII. The collected brine is pumped through a pipeline to Truscott Brine Disposal Reservoir for evaporation and permanent storage. A spray field for brine volume reduction currently operates at the pipeline discharge at Truscott Brine Disposal Reservoir. A second spray field would be constructed at the Area VIII pump station intake and would occupy 37 acres. Out of the total of 189 tons/day of salt produced at Area VIII, 165 tons/day are controlled. This portion of the authorized project has been constructed and is currently in operation.

A secondary collection area (Ross Pump Station) at Area VIII has been authorized if needed, and would be located at river mile 61.5, with approximately 396 miles of drainage area. The physical features of the Ross Pump Station would be the same as that described for the Bateman Pump Station, including the brine disposal reservoir (Truscott). However, construction of the secondary collection facility (Ross Pump Station) has been deferred indefinitely.

4. Area X (Lowrance Pump Station). This area is located at river mile 20.5 on the Middle Fork of the Wichita River and includes a drainage area of approximately 60 square miles (Figure 1-1). The brine would be collected through the use of a low flow dam with a 5-foot-high inflatable weir which would also operate identically to the one described for Area VII. The collected brine would be pumped through a pipeline to Truscott Brine Disposal Reservoir for evaporation and permanent storage. A second spray field would be constructed at the pipeline intake and would occupy 32 acres. A spray field at the pipeline outlet would occupy 28 acres of land. Out of the total of 58 tons/day of salt produced at Area X, 49 tons/day would be controlled. The Area X (Lowrance) low-flow collection dam and pump station have been completed, but construction has not begun on the pipeline, pumps, or controls to transfer the brine solutions from Area X to Truscott Brine Disposal Reservoir.

5. Truscott Brine Disposal Reservoir. The reservoir is located at river mile 3.6 on Bluff Creek, a south bank tributary of the North Fork of the Wichita River, and has a drainage area of approximately 26 square miles (Figure 1-1). Truscott Brine Disposal Reservoir was originally designed as a total retention impoundment for the permanent storage of brine from Areas VIII and X. The dam is an earth-filled embankment approximately 15,500 feet long with a maximum height above the streambed of 107 feet. The spillway is of an excavated, uncontrolled, saddle type. It is 1,000 feet long with the crest established at the top of the flood control pool for the 100-year event. Although the reservoir is not designed to release brine, the spillway is included as a safety feature to ensure that the embankment will not fail in the event of an exceptionally large rainfall event. The brine pool could ultimately cover 3,700 acres at elevation 1510.4 feet NGVD. A total of 3,932 acres of land has been acquired for operation of this brine storage reservoir.

d. Description of Design Changes Since Authorization. Funds have been appropriated to complete design and begin construction of the remaining authorized facilities at Areas VII and X. Since filing the FES, several changes have occurred within the project area and in the project design. Detailed descriptions of these changes by area are as follows:

No changes to Area V or Area VIII and its conveyance structures would occur, as these are already in operation. A spray field of 37 acres would be added at Area VIII.

Area VII brine collections would be pumped directly to the Truscott Brine Disposal Reservoir for permanent storage instead of being pumped to Crowell Brine Reservoir. Crowell Brine Reservoir would be eliminated as a storage reservoir, since under the proposed plan none of the other areas previously proposed to discharge to Crowell Brine Reservoir would be constructed. This would result in installing a pipeline in a new location from Area VII to the Truscott Brine Disposal Reservoir, a distance of approximately 15 miles. Twenty acres of land would be required for construction and operation of these facilities at Area VII while 24 acres would be needed for spray field construction at the pipeline intake. An additional 181 acres would be required for pipeline installation and 28 acres for spray field operation at the pipeline discharge. The area formerly identified and purchased for construction of Crowell Brine Reservoir would all be utilized for mitigation of wildlife resources.

Area X brine collections would be pumped **directly** to the Truscott Brine Disposal Reservoir for permanent storage instead of being pumped to Truscott via an intersection with the existing Area VIII

pipeline. This would result in the installation of a new 10.4-mile pipeline. Spray fields would be constructed at the pipeline inlet and outlet. A total of 178 acres of land would be required for construction and operation of these facilities for Area X.

A tabular summary of currently proposed project features and design changes related to the proposed project is shown in Table 1-1. The component locations are described in Table 1-2. The authorized project with these design changes is the proposed chloride control project.

e. Economic Basis for Authorized Project. To evaluate the effectiveness of the proposed project in improving the quality of water for beneficial purposes, an economic evaluation was performed in accordance with Section 103 of the Water Resources Planning Act, as amended (42 U.S.C. 1962a-2), "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies". This evaluation is contained in "Supplemental Data to Arkansas-Red River Basin Chloride Control, Red River Basin, Design Memorandum No. 25, General Design, Phase I - Plan Formulation", Volumes I and II, Department of the Army, Tulsa District, Corps of Engineers, Oklahoma, dated November 1980. The 1980 evaluation was updated and is contained in the Limited Reevaluation Report (LRR) dated June 1993. In 2001 the evaluation was updated again to address only the Wichita River and is included by reference at http://www.swt.usace.army.mil/LIBRARY/Library.CFM.

The Federal objective is to contribute to National Economic Development (NED) while protecting the Nation's environment pursuant to Federal Statutes, executive orders, and planning requirements. The general management standard of the value of goods and services is defined as the willingness of users to pay for each increment of output from a plan. The optimum NED plan identifies beneficial and adverse effects on the economy and reasonably maximizes net NED benefits. This is the proposed plan presented in Section 2.

Regional Economic Development (RED) impacts that register positive and negative changes in distribution of regional economic activity, such as expenditure impacts on regional income and regional employment, are discussed in Section 4.0 of this document. The benefit-to-cost ratio (BCR) is based on NED effects on the national economy. The most recent cost-benefit analysis for the proposed plan shows the project to be economically justified and is included in the Reevaluation Report for the project.

1. Beneficial Effects. The beneficial effects of the NED plan are increases in the economic value of the national output of goods and services from the plan; the value of output resulting from external economies caused by a plan; and the value associated with the use of otherwise unemployed or underemployed labor resources. National economic development benefits for chloride control include water quality improvement for municipal and industrial water supply and agricultural irrigation. Recreation and commercial or sport fisheries may also experience beneficial impacts.

Measurement of NED benefits occurs in those counties that may be economically affected by the proposed project (Figure 1-1). The counties in the study area are either existing or potential users of Wichita/Red River water for one or more of the following reasons:

- The projected demand for water in some counties exceeds the existing source capabilities; therefore, alternatives must be considered;
- Proximity to the Wichita/Red River or a major tributary makes water conveyance costs low such that use of the river is economically feasible compared to alternative sources;
- Current and past activities document that the Wichita/Red River is a viable alternative water source for the Dallas-Fort Worth metropolitan area; and

- There is a lack of readily available viable alternatives to the Wichita/Red River as a water source for some counties.

Municipal and industrial NED benefits are measured as water quality improvement benefits and water supply benefits. Water quality benefits are derived when Wichita/Red River water is used. The benefit is a measure of the quality cost of water (either the cost of treatment to an acceptable standard or the damage cost as a result of no treatment) without the project as compared to cost of water with the project. A water supply benefit results if Wichita/Red River water were to be used only with project implementation. The resulting benefit is equal to the cost of Wichita/Red River water minus the next least costly alternative for water supply with the project.

Agricultural irrigation benefits equal the difference in net crop returns with the proposed project minus the net crop returns without the proposed project. As such, it is necessary to project the type and amount of crops expected to be grown over the project life with and without the proposed project. The basic assumption behind the forecast of cropping patterns for both with and without the proposed project is that they would be based on providing the maximum possible net revenue to the farmer. The combination of crops that would provide the maximum possible net revenue is the optimal crop mix. An optimal crop mix is estimated for each reach, with irrigable land (acreage of each soil type) and irrigation water as resource constraints. Differences in net revenues occur primarily from higher yields resulting from increased irrigation with water of improved quality.

2. Adverse Effects. The adverse effects of the proposed plan with respect to NED are the resources used in implementing the plan, such as implementation outlays, associated costs, and other direct costs. One adverse effect would be land use changes from spray field construction and operation.

3. Speculative Effects. Potential NED economic impacts on public recreation, such as Lake Kemp recreation and on other stream and lake uses as a result of water quality changes depend on documentation of baseline and future conditions as outlined in the EOP. At the present time, many of these changes are speculative or unquantifiable. However, efforts have been made to develop an accurate analysis of the relationship between water quality and recreation economics as detailed in Section 4 of this document.

f. Issues Addressed. Major issues addressed in this document were categorized into the following components and include: (1) hydrological, biological, and water quality issues concerning fish, aquatic invertebrates, aquatic macrophytes, and the wetland/riparian ecosystems of the Wichita River and Red River above Lake Texoma to the confluence of the Wichita River; (2) the Lake Kemp, Lake Diversion, and Lake Texoma components, including chloride/turbidity relationships, chloride/fish reproduction issues, chloride/plankton community issues, chloride/nutrient dynamics issues, and impacts on recreational values; (3) a Se component addressing concentrations and impacts on biota; (4) man-made brines and associated reduction; (5) Section 401 water quality issues; (6) mitigation as it relates indirectly to habitat losses resulting from irrigated cropland and direct impacts resulting from construction of project components; (7) Federally-listed threatened and endangered species; (8) unquantifiable/undefined impacts, and (9) water quality and quantity impacts to Dundee State Fish Hatchery.

TABLE 1-1

SUMMARY OF PROPOSED FEATURES FOR THE WICHITA RIVER ONLY PORTION OF THE AUTHORIZED RRCCP

Area	Authorized Plan	Proposed Plan
AREA V (Estelline Springs)		
Collection	Ring Dike, 9 feet high and 340 feet diameter. Natural flow suppression.	No change
Real Estate	98 acres	No change
AREA VII (Y-Ranch Pump Station)		
Collection	Low-flow collection dam. Deflatable, fabric-type weir.	No change.
Pump Station	Two electric motors with vertical multi-stage turbines and discharge capacities of 9,000 and 3,800 gal/min.	Three vertical turbine pumps providing a maximum flow rate of 9,200 gal/min.
Pipeline	One 33-inch-diameter pipeline, approximately 12 miles long.	One 20- to 24-inch-diameter steel pipeline, approximately 15 miles long.
Disposal	Crowell Brine Reservoir - 100-year storage pool at elevation 1494.0 NGVD (see Area IX)	Truscott Brine Disposal Reservoir 100-year pool at elevation 1505.0 NGVD.
Real Estate	Approximately 230 acres	307 total acres, not including disposal required.
Intake and Discharge Spray Fields	Not Included	Overhead discharge nozzles for 25% volume reduction

TABLE 1-1 (Continued)

Area	Authorized Plan	Proposed Plan
AREA VIII (Bateman Pump Station)		
Collection	Low-flow collection dam. Deflatable, fabric-type weir.	No change (constructed).
Pump Station	Three vertical turbine pumps with discharge capacities of 2,244 gal/min.	No change (constructed).
Pipeline	One 30-inch-diameter pipeline 21.9 miles long.	No change (constructed).
Disposal	Truscott Brine Disposal Reservoir	Truscott Brine Disposal Reservoir as constructed plus 2 spray fields (collection and discharge points).
Real Estate	4,430 total acres required (192 pump station, 306 pipeline, 3,932 disposal)	As constructed plus 74 acres for spray field construction and overspray
Intake Spray Field	Not Included	Overhead discharge nozzles for 25% volume reduction
AREA X (Lowrance Pump Station)		
Collection	Low-flow collection dam. Deflatable, fabric-type weir.	No change (constructed).
Pump Station	Two pumps, with discharge capacities of 4,500 gal/ min. and 1,800 gal/min.	Three vertical turbine pumps from 150 to 200 horsepower providing a total pump station flow of 1,800 to 4,500 gal/min.
Pipeline	One 30-inch-diameter pipeline, approximately 8 miles long.	One 18-inch-diameter steel/PVC pipeline, approximately 10.4 miles long.
Disposal	Truscott Brine Disposal Reservoir	No change (constructed).
Real Estate	280 total acres required.	210 total acres required
Intake and Outfall Spray Fields	Not Included	Overhead nozzles for 25% volume reduction

TABLE 1-2

WICHITA RIVER ONLY PORTION OF THE RRCCP COMPONENT LOCATIONS

Description of Collection/Disposal Areas	River Mile	Latitude/ Longitude	Collection Facility Location
AREA V			
Collection Area	1074.5	34° 33’ 50” 100° 25’ 22”	Located 3/4-mile east of Estelline, Texas, and 1 mile south of the Prairie Dog Town Fork of the Red River.
AREA VII (Y-Ranch Pump Station)			
Collection Area	209.6	33° 56’ 21” 100° 03’ 17”	Located on the North Fork of the Wichita River near Crowell, Texas, in Cottle County.
AREA VIII (Bateman Pump Station)			
Collection Area	74.9	33° 32’ 00” 100° 15’ 00”	Located on the South Fork of the Wichita River.
AREA X (Lowrance Pump Station)			
Collection Area	19.7	33° 45’ 00” 100° 10’ 00”	Located on the Middle Fork of the Wichita River.
TRUSCOTT BRINE RESERVOIR			
Truscott Brine Dam	3.6	33° 47’ 52" 99° 50’ 11"	Bluff Creek, Knox County, Texas