SULPHUR RIVER BASIN, TEXAS
RECONNAISSANCE PHASE

Section 905(b) Analysis

1. STUDY AUTHORITY

The authority for the study of Sulphur River is contained in a resolution by the Committee on Transportation and Infrastructure, United States House of Representatives, adopted March 11, 1998, as quoted below:

> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Cooper Lake and Channels, Texas, published as House Document 488, 83rd Congress, 2nd Session, and other pertinent reports, to determine whether modifications are warranted to address water and related resources problems in the Sulphur River basin, Texas. Special emphasis shall be given to the need for flood damage reduction, environmental restoration and protection, and related measures to remove and control log jams on the Sulphur River, Texas, below Cooper Lake."*

The analyses performed were conducted in accordance with the requirements of Section 905(b) of the Water Resource Development Act (WRDA) of 1986.

The initial appropriation was funded in fiscal year (FY) 1999. The following is a summary of the budget history under this study authority:

($'s in 000's)

Sub Class	FY99	FY00	FY01	FY02	FY03	FY04
Reconnaissance	$ 84	$ 5	($ 20)	$ 10	($5)	$33
Total	$ 84	$ 5	($ 20)	$ 10	($5)	$33

2. STUDY PURPOSE

The principal purpose of this reconnaissance-level analysis was to investigate the water resource problems, needs, and opportunities within the Sulphur River basin in Texas. Study efforts focused on determining if the problems warranted Federal participation in feasibility studies, defining the Federal interest based on a preliminary appraisal consistent with Army policies, costs, benefits, and environmental impacts of identified potential project alternatives, and assessing the level of interest and support from non-Federal entities in the identified potential solutions and cost-sharing of feasibility studies and construction.

3. LOCATION OF PROJECT / CONGRESSIONAL DISTRICT

The study area along the Sulphur River extends downstream from Lake Jim Chapman (formerly known as Cooper Lake) to Wright-Patman Lake, and also includes the North Sulphur River. The study area includes portions of Lamar, Delta, Hopkins, Franklin, Red River, Fannin, Hunt, Bowie, Cass, Morris and Titus County, and is within Texas Congressional District Number 1 (Honorable Max Sandlin). A project area map is provided at the end of this document.

4. DISCUSSION OF PRIOR STUDIES, REPORTS, AND EXISTING WATER PROJECTS

Numerous technical reports have been published that document investigations in the Sulphur River watershed, many of which pertain to projects that have been constructed and are currently operational, namely Cooper Lake and Wright Patman Lake. A partial listing of these reports is presented as follows: Corps of Engineers Reports, and Reports of Others.

CORPS OF ENGINEERS REPORTS

a. House Document No. 488, 83rd Congress, 2nd Session. This Congressional document contained the Chief of Engineers Report for the Cooper Lake and Channels project.

b. Cooper Lake and Channels, Final Environmental Impact Statement. This document, dated April 1977, was prepared to provide assurance that the goals and policies of the National Environmental Policy Act of 1969 (NEPA) were satisfied as part of this project.

c. Cooper Lake and Channels, Supplement to Final Environmental Impact Statement. This document, dated March 1981, was prepared in response to noted deficiencies in the Final EIS, as instructed in a Memorandum Opinion adjoining construction of the project, filed by the U.S. District Court for the Eastern District of Texas on December 8, 1978.

d. An Environmental Inventory and Survey of the Sulphur River Basin. This document, dated September 1971, was prepared by East Texas State University for the Corps of Engineers, New Orleans District, and consisted of an attitudinal survey of all community leaders in the Sulphur River Valley and residents of the impacted area of the Cooper Lake project.

e. Attitude of Community Residents Toward Cooper Reservoir and Sulphur River Channeling Program. This document, dated September 1972, was prepared by East Texas State University for the Corps of Engineers, New Orleans District, as a supplement to an earlier study, to include attitudes and aspirations of residents toward the Sulphur River Channeling project.

f. Cooper Lake and Channels, Sulphur River, Texas, Alternative Plan Studies. This document, dated March 1975, was prepared by URS/Forest and Cotton, Inc., for the Corps of Engineers, New Orleans District, to evaluate and confirm the project formulation for the Cooper Lake and Channels project, as authorized.

g. Cooper Lake and Channels, Sulphur River, Texas, Alternative Service Spillway Study, Cooper Dam and Reservoir. This document, dated April 1975, was prepared by URS/Forest and Cotton, Inc., for the Corps of Engineers, New Orleans District, to investigate alternative service spillways for the Cooper Lake project.

h. Cooper Lake and Channels, Texas, Project Disposition Report, City Lakes and Water Supply System, Municipality of Cooper, Texas, Delta County. This report, dated December 1976, was prepared by the Corps of Engineers, New Orleans District, and documented the needs, obligations, and alternative methods for the dislocation of the City Lakes water supply facility to ensure the integrity of the Cooper Lake project.

i. Cooper Lake and Channels, Report on Acquisition of Wildlife Mitigation Lands. This document, dated September 1981, recommended a plan to mitigate for wildlife habitat losses due to the construction of the Cooper Lake and Channels project.

j. Cooper Lake and Channels, Design Memoranda. These documents (No. 1 - 23) provided detailed designs for the various components of the project.

k. Wright Patman Lake, Final Environmental Impact Statement for Operation and Maintenance. This document, dated April 1984, was prepared by the Corps of Engineers, Fort Worth District, to provide assurance that the goals and policies of the National Environmental Policy Act of 1969 (NEPA) were satisfied as part of this project.

l. Wright Patman Lake, Sulphur River, Texas, Master Plan Design Memorandum No. 2. This document, dated January 1988, was prepared by the Corps of Engineers, Fort Worth District, to evaluate project resources that would develop policies to allow use, development, and management for their best use.

m. The Texas Statewide Inventory of Flood Protection Needs, May 1990. This study was developed to provide an up-to-date, community-specific inventory of flooding problems and solutions for 756 cities and towns in Texas that could be incorporated into the revised state water plan. This inventory contains data from Corps of Engineers planning studies and National Flood Insurance Program (NFIP).

n. Water Resources Development in Texas 1971, 1981, 1988, 1989, 1991, 1995. These reports, prepared by the Corps of Engineers, provide current information about water resource activities performed in Texas by the U.S. Army Corps. They illustrate the role of the Corps in navigation, planning, construction, and operation of projects for flood control, hurricane flood protection, municipal and industrial water supply, recreation, and other beneficial uses. The reports also describe projects that are complete, under construction, or in the planning stage, each of which has been initiated under specific authorization of Congress.

o. Texas Water Allocation Assessment – System Assessment of Jim Chapman and Wright Patman. This reconnaissance-level study is currently being conducted to determine if additional water supply yield may be possible through operation of these two reservoirs as a system.

REPORTS OF OTHERS

a. United States Study Commission – Texas. The United States Study Commission on the Neches, Trinity, Brazos, Colorado, Guadalupe, San Antonio, Nueces, and San Jacinto River Basins and intervening areas within the state of Texas was established by Congress in August 1958. The directive instructed the Commission to make an integrated and cooperative investigation, study, and survey in connection with and in promotion of the conservation, utilization, and development of the land and water resources of the area specified in order to formulate a comprehensive development plan for submission to and consideration by the President and the Congress.

b. The Report of the U.S. Study Commission - Texas, Part III - The Eight Basins. This report, dated March 1962, evaluated the water conservation requirements and means of satisfying needs to the year 2010.

c. The Texas Water Plan. This report, dated November 1968, prepared by the Texas Water Development Board outlines a flexible guide for the orderly development, conservation, and wise management of the State's water resources to meet the needs of the state to the year 2020. The plan includes the possibility of the importation of large quantities of surplus water from the lower reaches of the Mississippi River to areas of greatest need in Texas.

d. Water For Texas. The Texas Water Development Board, Austin, Texas, prepared this report, dated August 1997. This report updates and presents the 50-year plan for the state of Texas. The document presents current and prospective water uses, identifies water supplies, and matches supplies to water uses. The report also identifies water related management measures, facility needs and costs, addresses environmental concerns, and offers program and policy recommendations to better manage the State's water resources.

e. Waste Load Evaluation for Sulphur/South Sulphur, North Sulphur, and Upper South Sulphur Rivers in the Sulphur River Basin. This study, dated October 1990, was conducted by the Texas Water Commission.

EXISTING WATER PROJECTS

The Corps of Engineers operates two dams that affect water resources within the study area. Cooper Dam is located in Delta and Hopkins Counties, Texas, at river mile 23.2 on the South Sulphur River. Congressional authorization for construction of the Cooper Lake and Channels project is contained in an Act approved August 3, 1955 (Public Law 218, Chapter 501, 84th Congress, 1st Session). The authorized project included Cooper Lake (renamed as Jim Chapman Lake), and levees and channelization both upstream and downstream within the North and South Sulphur River basins. The authorized purposes included flood control, municipal and industrial water supply, and recreation. In addition, due to the inclusion of flood storage in Cooper Lake, the authorization also allowed for reallocation of 120,000 acre-feet of existing flood storage in Wright Patman Lake to conservation storage. Construction on the project was halted by a court injunction in 1971, pending completion of an Environmental Impact Statement (EIS). The initial EIS was filed with the Council on Environmental Quality (CEQ) in 1977, but was declared legally inadequate, in part due to the lack of an adequate fish and wildlife mitigation plan. A Supplemental EIS (SEIS) was filed with the Environmental Protection Agency in 1981, which recommended that an additional 25,500 acres of land of similar habitat type be acquired and developed in the White Oak Creek area 60 miles below Cooper Dam to mitigate for the loss of bottomland hardwoods and wildlife habitat due to the construction and impoundment of Cooper Lake. In 1984, the injunction was lifted and construction was completed. The Water Resources Development Act (WRDA) of 1986 (Public Law 99-662) authorized the acquisition and development of the recommended 25,500 acres in the White Oak Creek area. Deliberate impoundment of Cooper Lake began in 1989.

Wright Patman Dam, at Wright Patman Lake, is located nine miles southwest of Texarkana, Texas, and was designed for retention of floodwater of the Sulphur River. This project was authorized as Texarkana Dam and Reservoir by the Flood Control Act approved July 24, 1946 (Public Law No. 526, 79th Congress, 2nd Session). It was later known as Lake Texarkana and on December 15, 1973, the President signed H.R. 945, officially designating the project, "Wright Patman Dam and Lake," in honor of Congressman Patman of the First Congressional District of Texas.

5. PLAN FORMULATION

An assessment of water and related land resources problems, needs and opportunities is presented for the study area. General discussions are included on existing conditions assessments, expected future conditions, and statements of specific problems and opportunities with emphasis on problems warranting Federal participation in more detailed feasibility studies.

a. Identified Problems

(1) Existing Conditions

Flood Damages. The flood of record on the North Sulphur River occurred on October 19, 1971, with a peak flow of 90,600 cubic feet per second (cfs), approaching a SPF event. The flood of record along the South Sulphur River occurred on December 10, 1971, with a peak discharge of 42,500 cfs, which is slightly less than the 2 percent annual chance of exceedance (50-year frequency) flood event.

An extensive amount of channel realignment and straightening has occurred within the Sulphur River watershed study area. Prior to the authorization of a flood protection plan in the

Sulphur River Basin above Wright Patman Lake, channel improvements were undertaken by various local interests. Reaches of the North and South Sulphur Rivers were realigned in the 1920's, and the Corps of Engineers realigned reaches of the Sulphur River in the early 1950's. Once a meandering, relatively slow moving river, the straightening in the North Sulphur River resulted in an increase in stream flow velocities which, coupled with the highly erodible nature of the river bank, created an on-going problem of large quantities of sediment being transported and deposited downstream. Due to this erosive action, the width of the channel increased significantly, and the soil around bridge columns began to be eroded. As a result of the fast moving water along the North Sulphur River and the slower moving water in the South Sulphur River, an accumulation of sediment, with depths of up to 10 feet, began to form at the confluence of the two channels. The Cooper Lake and Channels project, authorized in 1955, was expected to improve this situation. Following authorization of the Cooper Lake and Channels project in 1955, work on the channels and levees was initiated. In May 1971, after passage of the National Environmental Policy Act in 1969, the U.S. District Court for the Eastern District of Texas, acting on a motion for preliminary injunction by the Texas Committee on Natural Resources, et al, halted further construction on the project until an environmental statement was filed with the Council on Environmental Quality (CEQ). At the time of the injunction, all levee and channel work upstream of the reservoir had been completed, and work downstream of the reservoir was approximately 50 percent complete. In June 1976, the draft environmental impact statement (EIS) was coordinated for review and on July 31, 1976, a public meeting was held to provide wider exposure and consideration of the statement. Based on the oral testimony given at the public meeting and the written statements of comment submitted during coordination, two distinct issues surfaced: 1) the need for an adequate supply of surface water and downstream flood control, as stressed by area residents and governing bodies, and 2) the opposition to a channel as a means of providing downstream flood control, as stressed by environmentally concerned agencies, groups, and individuals. Based on these observations, the decision was made to eliminate most of the uncompleted channel work. As such, when the injunction was lifted in 1984, following completion of a Supplemental Environmental Impact Statement (SEIS), channelization was terminated at its previously completed location just downstream of Highway 37, resulting in an abrupt transition back into the natural channel.

Erosion and subsequent bank failures, especially in the North Sulphur River, have continued unchecked since the channelization work was completed, and much of the riparian vegetation, including trees, has sloughed into the channel and been carried downstream. Furthermore, with the reduction in frequency and depth of flood inundation provided by the improved channel, large scale clearing of adjacent forested lands for agriculture production and grazing purposes occurred during the 1970's and 1980's. Much of the cleared material ended up in the river channel and has contributed to a significant accumulation of trees and other debris within the Sulphur River channel immediately downstream of Highway 37. This "logjam", as it is known locally, has filled the historical river channel, causing water to spread out and circumvent the "logjam" through a series of braided channels extending several miles downstream, where the multiple channels once again connect into a single river. The obstruction has subsequently caused a continuous back-up of water upstream of the "logjam", thereby increasing the depth, frequency and duration of flooding on the surrounding properties, and rendering a one-mile stretch of Highway 37 impassable during frequent flood events. The sediment being carried down the North Sulphur River continues to be deposited within the river channel and floodplain surrounding the "logjam", further exacerbating the problem.

The increased flows within the river also impact the integrity and performance of at least three Federal levees in the area, which were constructed in the 1950's in conjunction with the Cooper Lakes and Channel project. These levees are designated as Levee 1-R-N, Levee 4-R-SS and Levee 5-R-SS. Annual agricultural benefits derived from maintaining these levees were estimated at $653,700 at 1982 price levels ($1.1 million at September 2003 price levels). Due to the sedimentation that has occurred within the channel, however, much of the agricultural property behind the levees cannot drain to the river as originally designed, and

floodwaters must be pumped from behind the levees at a cost estimated by local interests of up to $50,000 annually. The increased frequency and duration of flood inundation has decreased crop production while increasing the production costs.

Levee 1-R-N, maintained by Lamar Levee Improvement District (LID) #1, is located in Lamar and Delta Counties along the North Sulphur and South Sulphur River channels. The levee extends approximately 9 miles upstream on the North Sulphur River from the confluence of the North Sulphur and South Sulphur River channels, and approximately 1.4 miles upstream on the South Sulphur River. In conjunction with the Cooper reservoir, the levee was designed to provide protection to approximately 5,100 acres from a 3.3 percent annual chance of exceedance (30-year frequency) flood event. The construction cost of the levee in 1962 was $259, 400 ($2.0 million at September 2003 price levels).

Emergency levee repairs were performed on this levee following flood events in 1971, 1981, and 1982. Costs to repair the levee in May 1972 were estimated at $220,000 ($846,000 at September 2003 prices). The damages caused by the 1981 storm were repaired by local interests at an estimated cost of $70,000 in October 1981 ($129,000 at September 2003 price levels). The storm of 1982 overtopped about 4,500 feet of the levee and breached over 700 feet. The cost to repair the levee was $550,000 ($936,000 at September 2003 price levels).

Levees 4-R-SS and 5-R-SS were originally constructed by local entities, but were strengthened and designed as part of the Cooper Lakes and Channel project to provide flood protection from a 3.3 percent annual chance of exceedance (30-year frequency) flood event for 2,500 and 13,379 acres of agricultural land, respectively. Levee 4-R-SS is located along the right descending bank of the South Sulphur River in Hopkins County LID #3. Levee 5-R-SS is located along the right descending bank of the South Sulphur River in Hopkins County LID #4 and in Delta County LID #1. The actual levee values were not available.

Emergency levee repairs were performed on these levees following flood events in 1971 and 1982. Costs to repair the levees in May 1972 were estimated at $426,000 ($1.6 million at September 2003 price levels). The storm of 1982 overtopped about 4,500 feet of Levee 4-R-SS and breached about 520 feet. The overtopped area of Levee 5-R-SS covered about 1,200 feet, with an additional 900 feet of breached area. The cost to repair both levees was $839,700 ($1.4 million at September 2003 price levels). The average repair costs for the 1971 and 1982 events were approximately $1.4 million.

While local interests have accomplished other minor levee repairs, construction of Cooper Lake, completed in 1989, was expected to eliminate frequent major repairs to the levees. Four months after completion of Cooper Dam, a storm event occurred which filled the reservoir to conservation capacity within four days. If the lake had been at the conservation pool elevation prior to the storm, the spillway would most likely have been overtopped. It is estimated that, because the "logjam" may increase the water surface profiles by two to six feet in such a storm, the levees would have been breached.

The storm of record for Cooper Lake, since its completion in 1989, occurred in December 2001. During this storm, overtopping of the spillway occurred from December 18 to December 21. Cooper Lake played a significant role in reducing overall flood flows downstream. Although flows from the reservoir were about 4,000 cubic feet per second (cfs) and total flow in the South Sulphur River was approximately 15,000 cfs during this event, the flows along the North Sulphur River exceeded 72,000 cfs. The maximum flow at Talco, downstream of Highway 37, was estimated at 73,300 cfs, and occurred at 3:00 am on December 18. According to local interests, the heavy rains forced the North Sulphur River to overtop the LID #1 levee, the South Sulphur River to overtop a Corps of Engineers levee that protects the Sulphur Bluff Bottoms, and the Sulphur River to overtop a Corps levee that protects the Brushy Creek Bottoms. Farmland was covered with up to 12 feet of water. State Highway 37 and U.S. Highway 271 were closed, forcing the Talco-Bogata school district to also close. In all,

approximately 18,000 acres of farmland were inundated. Due to the fact that siltation in the river channel had caused the riverbed to be at a higher elevation that the adjacent farmland, gravity flow to the river was not possible. One landowner, in an effort to remove the water prior to planting season, estimated his pumping costs at approximately $200,000.

Discussions with the Texas Department of Transportation (TxDOT) indicated that bridges along the North Sulphur were being eroded down to the drilled shafts, and that maintenance costs were approximately $4 to $5 million per year along the North Sulphur. In addition, TxDOT is currently considering the need to rebuild Highway 37 if the problems are not corrected.

Environmental Resources. Prior to European settlement, Texas had approximately 16 million acres of bottomland hardwood riparian habitat. Today, the state has less than 5.9 million acres (Texas Center for Policy Studies 1995). The most significant losses have occurred to the bottomland hardwood forests that existed as riparian stringers along the main stem river reaches and tributaries.

Bottomlands serve several important functions, such as contributing to the state's biodiversity. According to the Texas Environmental Almanac (1995), 189 species of trees and shrubs, 42 woody vines, 75 grasses, and 802 herbaceous plants occur in Texas' bottomlands. They are also known to support 116 species of fish, 31 species of amphibians, 54 species of reptiles, 273 bird species and 45 species of mammals. At least 74 species of threatened and endangered animals depend directly on bottomland hardwood systems and over 50 percent of neotropical songbirds not listed as endangered or threatened are associated with these systems. Besides providing critical wildlife and bird habitat, bottomland hardwood systems serve as catchment and water retention areas in times of flooding, help control erosion, contribute to the nutrient cycle, and play a vital role in maintaining water quality by serving as a depository for sediments, wastes and pollutants from runoff. Despite these important functions, bottomland hardwoods ecosystems are one of the most endangered ecosystems in the United States.

The sediment deposited with the Sulphur River floodplain covers existing bottomland hardwood areas, significantly degrading the value of the habitat for wildlife. The combination of flooding frequency, depth of inundation, and disturbance caused by continual sediment deposition have kept the bottomland vegetation in this area at a low successional level, dominated by willows and cottonwoods instead of the historical water oak-elm-hackberry forest association that would be native in the area.

Currently, the existing riparian hardwoods along the streams within the Sulphur River watershed would probably be characterized as moderate quality wildlife habitat, although U.S. Fish and Wildlife Service (USFWS) and U.S. Army Corps of Engineer (USACE) biologists did find pockets of relatively high quality hardwood habitat. However, when the system is analyzed as a whole, the extensive fragmentation of the bottomland hardwood ecosystem, especially along the North Sulphur River, and the degradation of the ecosystem in the area around the "logjam" have greatly diminished the overall habitat quality value of the Sulphur River watershed.

(2) Expected Future Conditions

Flood Damages. In the absence of a project, the accumulation of sediment and debris at the "logjam" will continue to increase and will ultimately overtop the Highway 37 bridge, requiring its replacement. Due to this expanding "logjam", it is estimated that the depth, frequency, and duration of flooding will continue to increase within the study area, partially negating the flood protection provided by the Cooper Lake project, and causing an escalation of losses to agricultural interests in terms of decreased crop production and increased production costs. Levees will likely be breached, and levee repairs will continue to increase in

both cost and frequency. The bridges upstream of Highway 37 will likely lose their structural integrity and have to be replaced due to the erosive action of the river.

Environmental Resources. The degradation of environmental resources within the Sulphur River watershed study area is expected to worsen, due to the continued widening of the North Sulphur River from erosive actions on the riverbanks, and the subsequent deposition of sediment within the floodplain surrounding the "logjam" downstream of Highway 37.

The riparian corridor along the North Sulphur River is expected to undergo continued degradation and decline as trees and vegetation on the riverbanks are undermined and ultimately swept into the river. Once transported downstream, this material is expected to cover an ever-expanding area of existing bottomland hardwoods, thereby limiting species diversity, promulgating the dominance of low quality species, and prohibiting the progression from low quality to high quality habitat.

(3) Planning Constraints and Planning Objectives

Planning Constraints

a. Alternative plans that resolve problems in one area should not create or increase problems in other areas.

Planning Objectives

a. Reduce flood hazards and associated flood damages within the Sulphur River study area for the period 2000-2050.

b. Restore and preserve high quality habitat within the Sulphur River watershed study area.

(4) Specific Problems and Opportunities

Utilizing existing data, the following problems and opportunities have been identified within the Sulphur River study area:

Problems

a. The combination of increased flow velocities due to previous straightening and channelizing efforts along the North Sulphur River, highly erodible riverbanks, and significant land clearing upstream of Highway 37 has created a massive accumulation ("logjam") of sediment and debris downstream of Highway 37.

b. The loss of a steady water supply for the original meanders and oxbows within the North Sulphur River system has caused degradation of aquatic and bottomland hardwood habitat values in these areas.

c. The erosive action caused by increased flow velocities in the river channel is likely to threaten the structural integrity of at least nine bridges spanning the North Sulphur River.

d. The ever-expanding "logjam" causes increased sediment deposition and flooding hazards in the surrounding area. A one-mile stretch of Highway 37 is impassable during frequent flood events; furthermore, continued sediment deposition will eventually overtop this bridge, necessitating its replacement at a higher elevation.

e. Periodic breaching and overtopping of levees occurs within the study area, necessitating costly repairs.

f. The duration of floodwater inundation on adjacent agricultural property, due to the inability of the lands to drain to the river because of river sedimentation, necessitates pumping of floodwaters from these lands. The latest flood necessitated pumping at a cost of up to $200,000. Consequently, crop production has decreased while production costs have increased.

g. Continual deposition of sediment has covered existing bottomland hardwood areas, significantly degrading the value of the habitat for wildlife. The combination of flooding frequency, inundation depths, and disturbance from continual sediment deposition has kept the bottomland vegetation in the area at a low successional level, dominated by willows and cottonwoods instead of the historically native water oak-elm-hackberry forest association. These factors have led to a significant loss and degradation of the bottomland hardwood ecosystem within the watershed.

Opportunities

a. Restoration of high quality aquatic resources along approximately 34 river miles of old North Sulphur River oxbows by facilitating water flow back into the system.

b. Reforestation of bottomland hardwoods and associated shrub species in selected areas between the old river channel and the constructed channel along the North Sulphur River.

c. Minimization, or elimination, of erosive action within the North Sulphur River system and subsequent sediment deposition at the "logjam" downstream of Highway 37.

d. Reduction of flood frequency, depth and duration of flood inundation, and flood damages on surrounding properties, including Highway 37, caused by the "logjam".

e. Application of habitat improvement and forest management techniques to protect the habitat values of the existing resources and to improve the quality to the highest extent practicable over the long-term.

f. Establishment of partnerships with other Federal, State and local agencies, such as the Natural Resource Conservation Service, the local Extension Service, and Texas Forest Service to educate and work with local land owners to improve land management and land-use practices that may have exacerbated the erosion, flooding, and water quality problems now being experienced in the Sulphur River watershed (e.g., clearcutting of timber, leaving timbering debris adjacent to streams and rivers which may enter the river system during flood events, poor maintenance of farm levees, property damage cause by feral hog populations, timbering or farming to the channel edge without leaving a vegetated buffer, etc.).

b. Alternative Plans

The following alternatives will likely be developed and evaluated for the purposes of flood damage reduction and ecosystem restoration in the feasibility phase:

1. No Action

2. Ecosystem Restoration. Restoration of flows through original North Sulphur River meanders and oxbows, reforestation, and forest management.

3. Diversion Channels. Diversion channels, of various bottom widths, around the "logjam".

4. Non-Structural Measures. Acquisition of floodplain property, thereby allowing flooding to inundate larger areas of land and creating opportunities for additional ecosystem restoration.

5. Channel Modifications. Channel modifications of various bottom widths, and/or removal of "logjam".

6. Levees. Levees of various heights to protect adjacent property.

7. Detention Reservoirs. Construction of upstream detention reservoirs.

8. Combinations of Measures. Combinations of the above measures.

c. Preliminary Evaluation Of Alternatives

The problems and needs identified within the study area yield opportunities for implementation of measures providing multi-objective ecosystem restoration and flood damage reduction benefits.

If no action is taken to solve the identified problems and needs within the study area, the trend of escalating flood damages and increased ecosystem degradation will continue, creating greater potential for loss of life, property, and habitat.

Preliminary analyses have been performed on an alternative to restore flow to the original meanders and oxbows within the North Sulphur River system by construction of a series of control structures, strategically located within the channelized areas and designed to slow the velocity of the water and force it back into approximately 34 miles of the old river channel. A series of ten such structures were analyzed. These weir structures would have an average height of 20 feet, a width of approximately 150 feet, and would include a 25-foot approach slab and a 75-foot long end sill. In addition, baffle blocks would be incorporated to serve as energy dissipaters, and rock riprap would be placed immediately downstream of the concrete end sill. The total cost of these ten structures was estimated at approximately $15.0 million. Annualized costs would be approximately $1.3 million.

An analysis of ecosystem restoration benefits that would be derived from this alternative indicates that significant gains in average annual habitat units (AAHU) would be possible. Restoration of flow through the old river channel would greatly improve the quality of aquatic habitat by providing refugia, spawning sites, and vegetated and shaded in-stream areas that are very limited for native aquatic species, especially in the North Sulphur River system. Furthermore, the decreased velocity of water in the channelized portion of the river would provide increased aquatic habitat values. Wildlife habitat within the North Sulphur River area could also be improved through reforestation of the riparian corridor along the meanders and oxbows, and reforestation of the areas between the old channel and the constructed channel. The total amount of ecosystem restoration benefits to be gained along the North Sulphur River was estimated at 1,009 AAHU.

In addition to ecosystem restoration benefits, however, the construction of the control structures as identified in this alternative could provide significant incidental benefits in terms of erosion control, which would directly impact bridges along the North Sulphur River, as well as the flooding problems downstream. It is estimated that the control structures would dramatically minimize, and virtually eliminate, the erosive actions that have dominated the river system since the straightening and channelizing efforts were completed. Left unchecked, it is believed that the erosive actions around the columns of at least nine bridges spanning the North Sulphur River would necessitate the replacement of these bridges in the future. A preliminary estimate for replacement of these nine bridges totaled approximately $8.0 million.

Minimizing the transport and deposition of sediment downstream near the "logjam" would prevent further worsening of the flood problems caused by the "logjam" within the study area. Because the erosion problems would not cease immediately, however, and because halting the erosion would not reverse or reduce the magnitude of the existing "logjam", alternatives were investigated to reduce the impacts of the current "logjam". Preliminary conclusions regarding channel modification alternatives that include removal of the "logjam" were that such efforts would be cost prohibitive; therefore, an analysis was performed on a diversion channel around the "logjam". The diversion channel investigated would modify and utilize an existing channel south of the river to circumvent the "logjam" and restore a more historical flow regime to the system. The diversion channel would begin approximately two miles upstream of the "logjam" and connect back into the river approximately 1.8 miles downstream. The proposed 3.8-mile channel would have a bottom width of 30 feet with side slopes of 3H:1V (horizontal:vertical). Due to the rural location of the potential project, no hazardous, toxic or radiological wastes (HTRW) are expected to be encountered. Preliminary costs for the diversion channel were estimated at approximately $3.7 million, with annualized costs of approximately $275,000.

The proposed diversion channel would significantly reduce the potential for continued accumulation of sediment within the study area, would decrease the depth, duration and frequency of flood flows, and would reduce the potential need for bridge, roadway and levee replacements. Specifically, the economic benefits derived from this diversion channel would include protection of the Highway 37 bridge and 3,000 feet of roadway from being overtopped by sediment and/or frequent flooding, and the protection of levees from further breaching and overtopping due to elevated water surface profiles caused by the "logjam". The agricultural benefits derived from the construction of the levees would also be fully restored. Costs for replacement of the Highway 37 bridge and roadway at a higher elevation were estimated at approximately $6.7 million, or $480,000 annually. Although difficult to determine at this level of study, the economic benefits derived from reducing the potential need for future periodic reconstruction of major portions of levees inundated by flooding caused by the "logjam" were estimated to be between $200,000 and $350,000 annually. In addition to levee reconstruction costs, if a levee failure were estimated to occur once every ten years due to the effect of the "logjam" on water surface elevations, the average annual agricultural benefits of constructing the diversion channel would be approximately $100,000. Therefore, total economic benefits of the diversion channel could conservatively be estimated at over $700,000 annually.

Implementation of the diversion channel alternative would also yield opportunities for ecosystem restoration within the area between the "logjam" and the diversion channel. With the diversion channel in place, it is estimated that reforestation and, in existing forested tracts, application of habitat improvement and forest management techniques could improve the quality of the existing habitat in the area around the "logjam" and provide a gain of 440 AAHU. In conjunction with the 1,009 AAHU gained with implementation of the control structures upstream, a total gain of 1,449 AAHU could be obtained for the study area.

Due to the interaction and effects of the erosive actions within the North Sulphur River and the subsequent deposition of sediment and flooding problems associated with the "logjam", it is felt that in order to best meet the needs of the area, actions to both halt the sediment deposition (accomplished through the ecosystem restoration alternatives investigated) and to relieve the flow

of water around the "logjam" are necessary. Providing ecosystem restoration benefits and minimizing erosion in the North Sulphur River would be an improvement, but would not solve the flooding problems cause by the current "logjam". Conversely, circumventing the "logjam" would provide temporary flood damage reduction benefits, but would not address the source of the "logjam", which would continue to grow and could eventually nullify the flood damage reduction benefits obtained by the diversion channel.

Non-structural measures, such as the acquisition of property within the Sulphur River floodplain, will be investigated during the feasibility phase. This alternative could provide increased opportunities for restoration of wildlife habitat throughout the study area.

An investigation of levee alternatives is proposed during the feasibility phase to determine the economic feasibility of increasing the protection to agricultural property adjacent to the river. The current Federal levees were designed in conjunction with the Cooper Reservoir (Jim Chapman Lake) to provide a 30-year level of flood protection. Increased protection could potentially yield significant agricultural benefits.

The construction of upstream detention reservoirs has the potential to reduce channel flow velocities, thereby reducing the erosive actions that exacerbate the identified problems within the river system. A study of the water supply needs of the area could also be conducted as part of the determination of multi-purpose benefits that could be derived with this alternative.

As the feasibility study progresses, combinations of the above measures would most likely emerge as the optimum solution for addressing the problems and needs of the study area.

6. FEDERAL INTEREST

The alternatives investigated in this analysis provide multi-purpose benefits of ecosystem restoration and flood damage reduction.

Ecosystem restoration is recognized as a viable Federal purpose. Natural resources -- croplands, forests, wetlands, rangelands and riparian areas – are the building blocks of most watersheds. The health of the nation's watersheds and the quality of the water are a direct reflection of how well these resources are maintained. The President's Clean Water Action Plan calls on all federal natural resource and conservation agencies to apply their collective expertise and resources to support and work with states, and others, to improve natural resources essential to clean water and encourages the use of new and innovative methods to provide incentives for all the partners, including private landowners, to become involved in, and work together toward, the long-term goal of improving water and related resources.

The analyses included herein indicate that a project consisting of the construction of 10 control structures along the North Sulphur River, designed to force water back into the old river channel, could provide significant ecosystem restoration benefits (1,009 AAHU), at an annual cost of approximately $1.3 million, or less than $1,300 per AAHU. These control structures could also prevent the possible need for reconstruction of nine bridges along the North Sulphur River, at a total cost of approximately $8.0 million, by reducing the erosive action around these bridges. The second part of the investigated project would include construction of a diversion channel around the current "logjam" downstream of Highway 37, at a total cost of $3.7 million, or $275,000 annually. Annual economic benefits derived from this channel could exceed $700,000, thereby providing positive net economic benefits. Ecosystem restoration opportunities afforded by construction of this channel could provide an additional gain of 440 AAHU for the study area.

The preliminary analyses conducted in this reconnaissance-level study indicate that positive ecosystem restoration benefits and positive net economic benefits can be obtained with the

identified alternatives, thereby establishing a Federal interest for further investigations of ecosystem restoration and flood damage reduction opportunities within the Sulphur River watershed.

In addition, the Sulphur Basin, since it is home to more than half of the unappropriated water in the State of Texas, has been the focus of numerous studies regarding the possibility of developing new water supply projects using the river's abundant supplies. The Corps of Engineers owns two major reservoirs in the basin. Lake Wright Patman is operated as a flood control lake, but is also a major water supply source for the City of Texarkana and the surrounding area. Jim Chapman Lake (formerly Cooper Lake) is a flood control lake in the upper portion of the basin that is also utilized as a water supply source for North Central Texas. Furthermore, due to the construction of the Cooper Lake and Channels project, there remains a Federal interest in the potential reallocation of 120,000 acre-feet of flood storage to conservation storage in Wright Patman Lake. This reallocation was allowed due to the inclusion of flood storage in Cooper Lake. Prior to implementation of this reallocation, however, a thorough assessment and documentation of its impacts must be conducted. Other water supply alternatives that have been proposed in the basin include various proposed sites for the George Parkhouse and Marvin Nichols Reservoirs.

Solutions are needed to address each of the three primary areas: flood damage reduction, ecosystem restoration, and water supply. However, the flood damage reduction and water supply alternatives will each have environmental impacts and will likely require significant habitat mitigation for implementation. The ecosystem restoration alternatives, likewise, will affect the viability of the flood damage reduction and water supply initiatives. Each of the identified alternatives must be reviewed in a holistic manner that optimizes basin wide solutions.

7. PRELIMINARY FINANCIAL ANALYSIS

A letter of intent from the Sulphur River Basin Authority (SRBA), dated 18 November 2003 (included herein), states the sponsor's understanding of the cost sharing responsibilities, and indicates their ability and willingness to participate in further cost-share feasibility studies.

8. SUMMARY OF FEASIBILITY STUDY ASSUMPTIONS

A summary of feasibility study assumptions is enclosed as Attachment I of this document.

9. FEASIBILITY PHASE MILESTONES

Feasibility phase milestones are enclosed as Attachment II of this document.

10. FEASIBILITY PHASE COST ESTIMATE

A feasibility phase cost estimate is enclosed as Attachment III of this document.

11. RECOMMENDATIONS

The results of this reconnaissance level study, as presented herein, outline existing problems, needs and opportunities within the Sulphur River watershed in regard to flood damage reduction, ecosystem restoration, and water supply.

The alternatives recommended for further investigation and possible implementation include a range of non-structural and structural flood damage reduction measures, and ecosystem restoration measures throughout the study area. These measures include the potential reallocation of flood storage in Wright Patman Lake to conservation storage, and development of a watershed management plan.

Feasibility level investigations, currently estimated at $4,060,000, would include a holistic watershed approach to the Sulphur River Basin in order to develop optimal solutions to the water resource-related problems, needs and opportunities within the area.

The SRBA, local sponsor for the study, is knowledgeable of the findings of this expedited reconnaissance level study, and have been cooperative during the study tenure. The sponsor is also aware that, under the requirements set forth in Public Law 99-662, dated November 17, 1986, further studies must be accomplished on a 50/50 cost sharing basis between the Federal Government and the non-Federal sponsor.

It is recommended that more detailed feasibility studies be approved for the Sulphur River watershed, for the purposes of flood damage reduction, ecosystem restoration, water supply and other associated purposes. This proposal is consistent with Army and budgetary policies and it is likely that a project meeting the criteria for Federal participation will proceed to implementation.

12. POTENTIAL ISSUES AFFECTING INITIATION OF FEASIBILITY PHASE

As it may relate to potential study sponsorship, the Texas Water Development Board completed the document "Water for Texas - 2002" in January 2002. This water plan recommended the development of a new reservoir, Marvin Nichols I, to meet the anticipated water supply needs of the Dallas/Fort Worth area and the Northeast Texas region. Marvin Nichols I would be constructed on the Sulphur River in Red River County, upstream of Wright Patman Lake. However, due to the controversial issues involved in the development and construction of a new reservoir, both the proponents and opponents of this new reservoir have indicated support for a basinwide study to investigate optimal use of water resources within the area.

13. VIEWS OF OTHER RESOURCES AGENCIES

Preliminary coordination with the U.S. Fish and Wildlife Service was undertaken during this reconnaissance-level investigation.

14. PROJECT AREA MAP

A project area map is enclosed at the end of this document.

John R. Minahan
Colonel, Corps of Engineers
District Engineer

Sulphur River Basin, Texas

Feasibility Study Assumptions

1. The feasibility study will address the problems, needs and opportunities of the Sulphur River Basin, including the North Sulphur River, within the limits as described herein. A final Feasibility Report will be produced following completion of the study.

2. The Sulphur River Basin Authority will act as the non-Federal sponsor for the feasibility study.

3. The schedule assumes that the sponsor will select a locally preferred plan in a timely fashion.

4. The schedule assumes the local sponsor is willing and able to sign the Feasibility Cost Sharing Agreement (FCSA) in September 2004, after finalizing the details of the Project Management Plan (PMP).

5. The feasibility study will be based on a package of engineering, economic, and environmental information developed through coordination with other project participants and resource agencies.

6. A detailed cost estimate will be prepared for the selected plan(s), providing an analysis suitable for a feasibility level study.

7. There will be only one review conference before the Alternative Formulation Briefing (AFB).

Attachment I

Sulphur River Basin, Texas

Feasibility Study Milestones

Major Milestones	Scheduled Completion
Execute FCSA	Sep 04
Initiate Feasibility Study	Oct 04
Feasibility Scoping Meeting	Nov 05
Alternative Formulation Briefing	Dec 06
Draft Report Submittal to HQUSACE / Public	May 07
Division Engineer Issues Notice	Oct 07
Final Feasibility Report Submittal to HQUSACE	Nov 07
Complete Washington Level Review	May 08

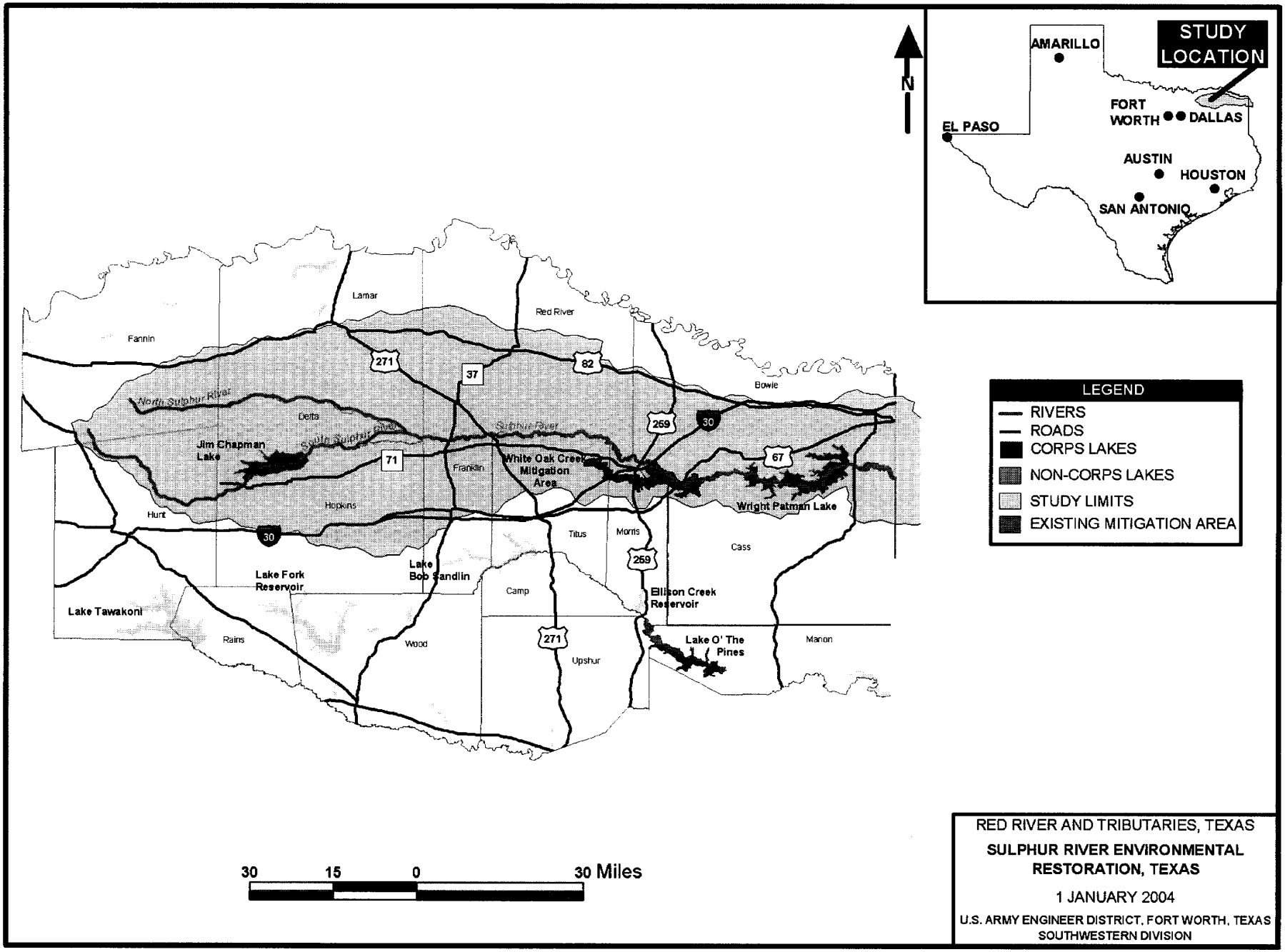
Attachment II

Sulphur River Basin, Texas

Feasibility Study Cost Estimate

Major Work Items	Study Cost
Public Involvement	$ 140,000
Economic Studies	$ 140,000
Recreation Studies	$ 84,000
Cultural Resource Studies	$ 112,000
Environmental Studies	$ 772,000
Fish and Wildlife Coordination	$ 210,000
HTRW Studies	$ 168,000
Engineering Studies	$ 810,000
Real Estate Studies	$ 168,000
Geographical Information Systems	$ 168,000
Cost Estimates	$ 210,000
Plan Formulation Studies	$ 98,000
Report Preparation	$ 56,000
Feasibility Management	$ 776,000
Programs and Project Management	$ 98,000
Review Contingency	$ 50,000
Total Study Cost	**$ 4,060,000**
Federal	$ 2,030,000
Non-Federal	$ 2,030,000
In-Kind	$ 1,015,000
Cash	$ 1,015,000

Attachment III



RED RIVER AND TRIBUTARIES, TEXAS

SULPHUR RIVER ENVIRONMENTAL RESTORATION, TEXAS

1 JANUARY 2004

U.S. ARMY ENGINEER DISTRICT, FORT WORTH, TEXAS
SOUTHWESTERN DIVISION

Sulphur River Basin Authority

November 18, 2003

Colonel John R. Minahan
District Engineer
U.S. Army Corps of Engineers, Fort Worth
P.O. Box 17300
Fort Worth, Texas 76102-0300

Dear Colonel Minahan:

This letter is to advise you that the Sulphur River Basin Authority (SRBA) is willing to enter into cost sharing negotiations for the feasibility phase of the Sulphur River basin study. The SRBA has reviewed the recently completed reconnaissance study (Section 905(b) Analysis), and agrees in principle with the scope, assumptions, and estimated costs for the proposed feasibility study.

The SRBA requests that we begin negotiations of the Feasibility Cost Sharing Agreement (FCSA) and Project Management Plan (PMP) for this study. Please accept this letter as the SRBA's intent to participate as the non-Federal study sponsor, conditioned on acceptable negotiation of an agreement and subsequent approval of that agreement by the Sulphur River Basin Authority's Board of Directors.

Sincerely,

Judy Lee
President, Board of Directors
Sulphur River Basin Authority

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