



Nuclear Regulatory Commission
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Exhibit SNC 000047

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Rejected: Stricken:

U.S. Army Corps of Engineers Final Environmental Impact Statement for the Savannah River Navigation Maintenance (September 1976)

FINAL
ENVIRONMENTAL STATEMENT

OPERATION AND MAINTENANCE OF NAVIGATION PROJECT
SAVANNAH RIVER BELOW AUGUSTA
INCLUDING THE NEW SAVANNAH BLUFF LOCK AND DAM
GEORGIA AND SOUTH CAROLINA

U.S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA
SEPTEMBER 1976

STATEMENT OF FINDINGS

OPERATION AND MAINTENANCE OF NAVIGATION PROJECT SAVANNAH RIVER BELOW AUGUSTA INCLUDING THE NEW SAVANNAH BLUFF LOCK AND DAM GEORGIA AND SOUTH CAROLINA

1. I have reviewed and evaluated, in light of the overall public interest, the documents concerning the proposed action of continued operation and maintenance of the authorized navigation project for the Savannah River between Augusta and Savannah, which provides for a channel 9 feet deep and 90 feet wide. This channel extends from the upper end of Savannah Harbor to the end of navigation just below the 13th Street bridge in Augusta, a distance of about 180 miles. The project also includes a lock and dam at New Savannah Bluff, located approximately 20 miles below Augusta. The lock is 56 feet wide by 360 feet long with a maximum lift of 15 feet and was completed in 1937. I have also considered all comments received in the coordination of the Draft Environmental Statement relative to the project. Navigational interest on the Savannah River dates back to the River and Harbor Act of 19 September 1890, when Congress authorized a 5-foot channel to be maintained from Savannah to Augusta. Subsequent acts of Congress authorizing improvements to the river demonstrate the continued interest in navigation on the river. Senate Document 6, 81st Congress 1st Session, authorized open river regulation and provided for easing of bends in order to achieve a minimum radius of 600 feet.

2. The possible consequences of the proposed project and its alternatives have been studied for environmental, social well-being, and engineering effects, including regional and national economic development and engineering feasibility. Other factors bearing on my review include effects on archeological and historical sites, water quality, wildlife and aquatic resources, and rare or endangered species.

3. In evaluating whether or not the proposed project should be continued, the following points were considered pertinent:

a. Environmental considerations included the disruption of the aquatic communities through localized temporary increases in turbidity; destruction of benthic organisms; the loss of some fish habitat; and the destruction of some terrestrial habitat due to the construction of new cutoffs along the waterway.

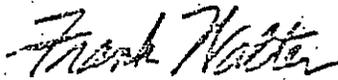
b. Social and economic considerations included the beneficial impact on the industries along the river by reducing the shipping costs and stimulating productivity and thereby increasing employment in the area. The potential for new industries locating in the area would be enhanced and the potential for improved waterborne transportation and new industry would also have additional incentives for locating in the area. This, in turn, would stimulate the economy of the area and result in higher employment levels and better living conditions.

c. Engineering considerations included continuation of the currently used snagging and dredging operations, with future maintenance, including additional pile dikes, revetments, river cutoffs and river widenings. The alternative considered included the foregoing of further operation and maintenance, which would allow deterioration of the lock dam, allow blockage of the channel by debris and shoaling, and eliminate commercial navigation as a factor in future economic expansion and social well-being of the region. Alternative disposal methods considered included diked disposal areas; however, this would result in the destruction of existing bottomland hardwoods and adjacent wetland areas.

4. I find that the continued operation and maintenance of the Savannah River below Augusta navigation project, including New Savannah Bluff Lock and Dam, is based on thorough analysis and evaluation of various practicable alternative courses of action. I also find that whenever adverse effects are found to be involved, they cannot be avoided by following reasonable alternative courses of action which would achieve the Congressionally specified purposes; that where the proposed action has an adverse effect, this effect is either ameliorated or substantially outweighed by other considerations of national policy; that the recommended action is consonant with national policy, statutes and administrative directives; and that, on balance, the total public interest should best be served by the continuation of the project as planned.

30 Sep 76

(Date)

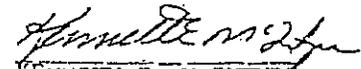


FRANK WALTER
Colonel, Corps of Engineers
District Engineer

I have reviewed the Statement of Findings and concur with the recommendations of the District Engineer.

27 Dec 76

(Date)

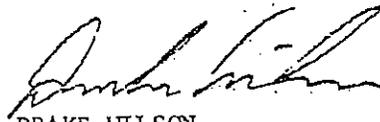


KENNETH E. McINTYRE
Brigadier General, USA
Division Engineer

I concur in the preceding Statement of Findings.

5 Feb 1977

(Date)



DRAKE WILSON
Brigadier General, USA
Deputy Director of Civil Works

SUMMARY

OPERATION AND MAINTENANCE OF NAVIGATION PROJECT
SAVANNAH RIVER BELOW AUGUSTA
INCLUDING THE NEW SAVANNAH BLUFF LOCK AND DAM
GEORGIA AND SOUTH CAROLINA

() DRAFT ENVIRONMENTAL STATEMENT (X) FINAL ENVIRONMENTAL STATEMENT

RESPONSIBLE OFFICE: District Engineer, U.S. Army Engineer District,
Savannah, P. O. Box 889, Savannah, Georgia 31402 Telephone (912)
233-8822

1. NAME OF ACTION: (X) ADMINISTRATIVE () LEGISLATIVE

2. DESCRIPTION OF ACTION: Continuing operation and maintenance of the authorized navigation channel 9 feet deep and 90 feet wide, extending from the upper end of Savannah Harbor to Augusta, Georgia. Maintenance consists of channel dredging accompanied by snagging, pile dikes, revetments and river cutoffs as required.

3. (A.) ENVIRONMENTAL IMPACTS: Continued safe use of channel for recreational and commercial purposes along the waterway. Disruption of the aquatic communities in the areas being maintained.

(B.) ADVERSE ENVIRONMENTAL EFFECTS: Localized temporary increases in turbidity, destruction of benthic organisms, the loss of some fish habitat and the destruction of some terrestrial habitat due to the construction of new cutoffs along the waterway.

4. ALTERNATIVES: Forego further operation and maintenance; allow deterioration of lock and dam; allow blockage of the channel by debris and shoaling; and eliminate commercial navigation as a factor in future economic expansion and social well being of the region.

5. COMMENTS RECEIVED:

Soil Conservation Service
U.S. Forest Service
Environmental Protection Agency
National Marine Fisheries Service, NOAA
U.S. Department of Commerce
U.S. Department of the Interior
U.S. Department of Housing and Urban Development
U.S. Department of Health, Education and Welfare
Federal Power Commission
Federal Energy Administration

Georgia Office of Planning and Budget
South Carolina State Clearinghouse, Office of the Governor
South Carolina Water Resources Commission
South Carolina Wildlife and Marine Resources Department
South Carolina Department of Archives and History
South Carolina Department of Health and Environmental Control
South Carolina State Commission of Forestry
South Carolina State Archeologist - Dr. Robert L. Stephenson
Mayor of Savannah, Georgia
Savannah Port Authority
Georgia Ports Authority
American Bureau of Shipping

6. Draft Statement filed with CEQ 28 June 1976.
Final Statement filed with CEQ

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1.00 Project Description.

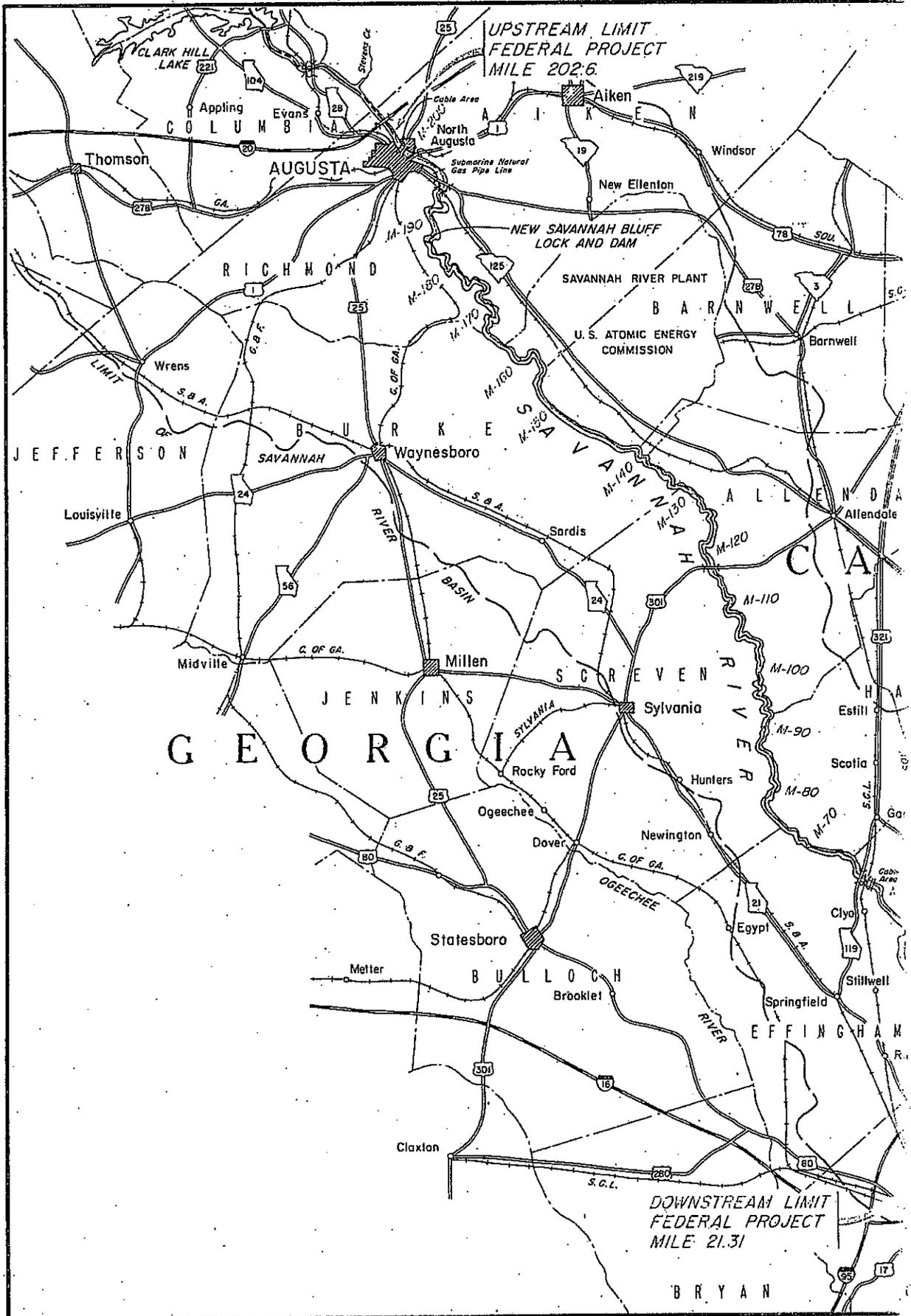
1.01 Project authorization and history. Interest in navigation on the Savannah River dates back to the River and Harbor Act of September 19, 1890, when Congress authorized a 5-foot channel to be maintained from Savannah to Augusta. Subsequent acts of Congress authorizing improvements to the river demonstrate the continued interest in navigation on the river. Local interests and industrial developers have also shown strong interest in navigation on the Savannah River as evidenced by their own studies and development.

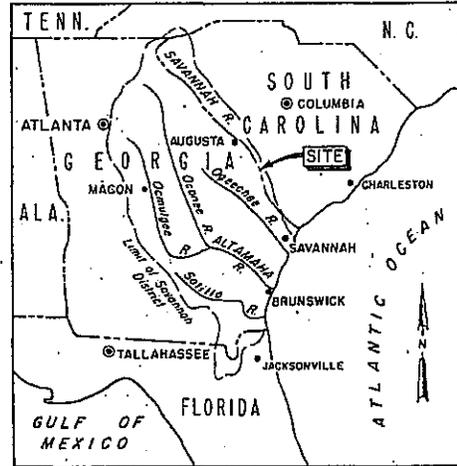
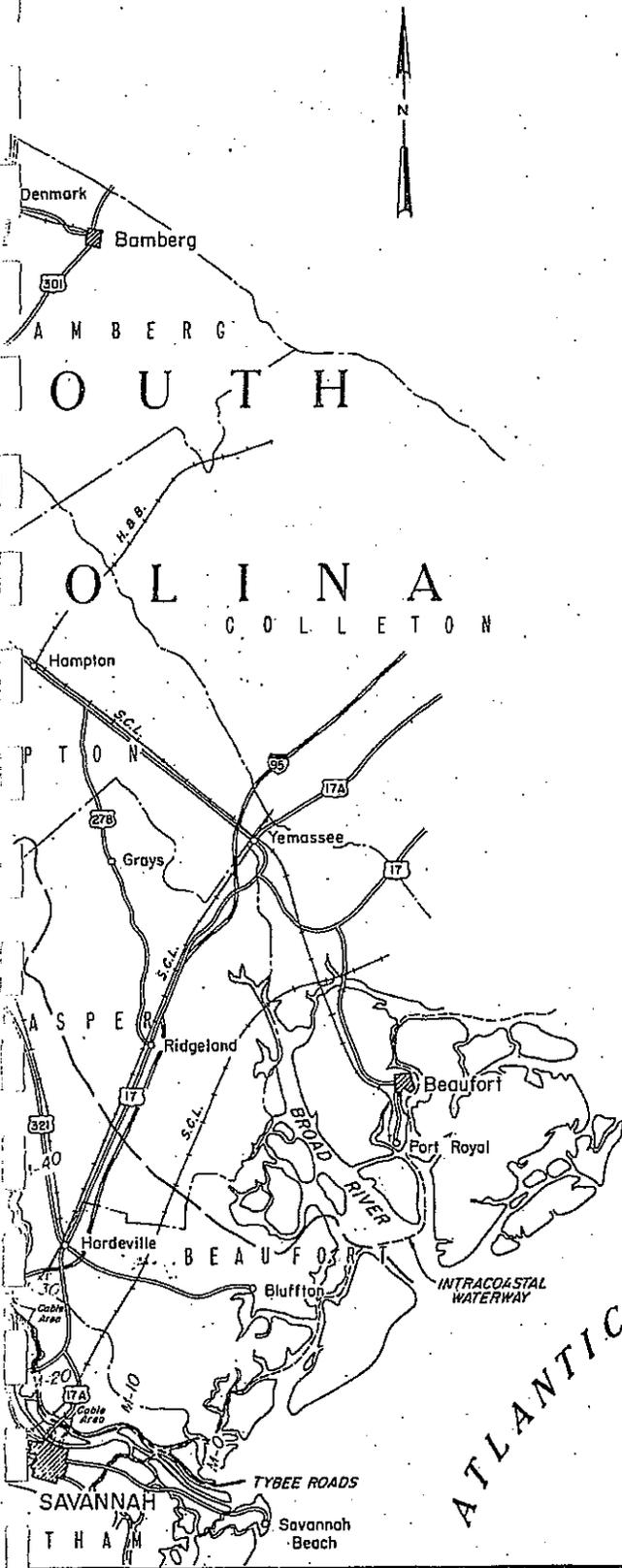
1.02 The authorized project for the Savannah River between Augusta and Savannah (see Plate 1) provides for a channel 9 feet deep and 90 feet wide. This channel extends from the upper end of Savannah Harbor to the end of navigation just below the 13th Street bridge in Augusta, a distance of about 180 miles. The project also includes a lock and dam at New Savannah Bluff, located approximately 20 miles below Augusta. The lock is 56 feet wide by 360 feet long with a maximum lift of 15 feet and was completed in 1937. Senate Document 6, 81st Congress 1st Session, authorized open river regulation and provided for easing of bends in order to achieve a minimum radius of 600 feet.

1.03 The 9-foot depth was originally planned to be obtained by utilizing a dependable release from Clark Hill Reservoir of 5,300 cfs to provide a depth of 7 feet combined with dredging and open-channel regulation to provide the 9-foot depth. Sharp river bends were to be either by-passed with cutoffs or widened.

1.04 In 1958, extensive dredging was performed on the river to obtain the 9-foot channel depth and reduce the sharp bends. In all, 24 cutoffs were initially made to improve channel alignment. Early experience with the open river channel indicated that numerous shoals developed in the channel during high water periods. Subsequently, 70 sets of pile dikes were constructed to stabilize the channel cross section and reduce the shoaling. Results of recent channel surveys and the records of maintenance dredging indicate that these pile dikes appear to be functioning as designed. They have stabilized the channel and reduced the shoaling in most of the areas in which they were constructed. However, there are several other areas where chronic shoaling occurs and impedes navigation. Based on surveys and current maintenance procedures, a 9-foot channel is available only during periods of high water (normally from November to April), with a 7 to 7.5-foot depth controlling navigation during the normal low-water periods (from May to November).

CORPS OF ENGINEERS





VICINITY MAP



BRIDGES				
MILE	NAME	TYPE	HORIZONTAL CLEARANCE (FT.)	VERTICAL CL. ABOVE M.L.W. (FT.)
21.6	U.S. Highway 17	Swing	90.0	15.0
27.4	S.C.L. Railroad	Bascule	90.0	15.5
27.7	U.S. Highway I-95	Fixed	150.0	61.0
60.9	S.C.L. Railroad	Swing	103.0	26.0
61.3	State Highway 119	Fixed	100.0	38.0
118.7	U.S. Highway 301	Swing	100.0	26.0
118.8	U.S. Highway 301	Fixed	120.0	40.0
195.4	S.C.L. Railroad	Bascule	100.0	27.0
195.7	State Highway 28	Fixed	169.0	62.0
195.8	State Highway 28	Fixed	165.0	47.6
199.5	U.S. Highway 1	Fixed	100.0	40.0
199.6	5th Street	Swing	75.0	39.0
199.7	Southern Railway	Bascule	82.0	26.0
200.6	13th Street	Fixed	120.0	40.0

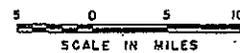
NOTES

Head of navigation is Mile 202.6.

Zero mile is Savannah Harbor Station Cr-000 (Vicinity Ft Pulaski) mouth of Savannah River

SAVANNAH RIVER BELOW AUGUSTA, GEORGIA

PREPARED SEPTEMBER 1978



U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

1.05 Maintenance in the past has consisted of channel dredging accompanied by the construction of cutoffs, revetments, snagging, and pile dikes.

1.06 Proposed action. It is proposed to continue operation and maintenance of the navigation channel between Savannah and Augusta, Georgia, including the New Savannah Bluff Lock and Dam. However, past levels of annual funding and associated levels of maintenance have failed to adequately maintain the authorized 9-foot channel. Consequently, the backlog of maintenance related work has accumulated and future maintenance will include additional pile dikes, revetments, river cutoffs and river widenings as well as continuation of the current snagging and dredging operations. A list of the areas which will require the most intensive maintenance is given in Table 1, and the exact locations of the four river cutoffs and the four river widenings are shown in Appendix C, Plates C-1 through C-8.

TABLE 1

MAINTENANCE AREAS
SAVANNAH RIVER BELOW AUGUSTA

LOCATION (RIVER MILE)			
From	To	From	To
27.3	28.1	90.0	90.2
37.8	38.0	97.6	99.0
39.0	39.2	100.6	100.8
42.9	43.0	101.7	102.2
44.7	44.9	109.2	109.5
52.7	52.9	110.4	110.5
54.3	55.4	128.2	128.4
58.9	59.4	133.3	133.9
60.5	61.1	136.2	136.3
64.6	64.9	137.8	138.2
68.6	68.8	138.9	139.3
82.5	82.9	148.3	149.6
84.4	84.7	151.0	151.3
86.5	86.8	174.4	174.6
87.4	87.6	183.1	183.5

1.07 Dredging operations will be accomplished through the use of a small pipeline dredge similar to those used in past dredging operations. Normal techniques would readily remove the sandy material and no difficulties in handling are expected. The dredged material would be placed around pile dikes where practical or on the shallow side of the river. Where material would be placed on the shallow side of the river, it should be out of the main channel and strong current. In no area should the material, once placed, exceed the low-water elevation. It should normally run from 1 to 2 feet below the low-water elevation. This is required to prevent interference with the natural drainage of the surrounding lowlands.

2.00 Environmental Setting Without the Project.

2.01 Geographical location of the project. The Savannah River begins near Hartwell, Georgia, at the junction of the Seneca and Tugaloo Rivers in the hilly Piedmont Province of Georgia and South Carolina. From this junction, the river flows southeasterly approximately 300 miles into the Atlantic Ocean near Savannah, Georgia.

2.02. The entire drainage basin of the Savannah River totals 10,577 square miles. Of this total, 175 square miles are in southwestern North Carolina, 4,581 square miles are in western South Carolina, and 5,821 square miles are in eastern Georgia.

2.03 Topography. The project area is divided into two major topographic sections: the Piedmont province and the Coastal Plains province. These provinces are separated by a narrow strip less than ten miles wide with irregular boundaries known as the Fall Line. The difference in the land structure can be visually noted from one section to another, but the change is subdued.

2.04 At Augusta, Georgia, the Savannah River meets the Fall Line along which the rocky terrain of the Piedmont foothills meets the sandy soil of the Coastal Plain area. The Upper Coastal Plain (about 2,495 square miles) from Augusta, Georgia, to the northern limit of Hampton County, South Carolina, is characterized by rolling terrain that averages 135 feet above sea level. Here the river is much less meandering than in the Lower Coastal Plain (about 1,082 square miles) which is flatter and is characteristically flooded along the river for longer periods. The river twists and winds, forming numerous oxbows along its course. Swamps and lakes are very common.

2.05 Columbia County, Georgia, is the only county in the impact zone above the Fall Line. It lies on the Washington Plateau, which is covered with much disintegrated rock waste and is closely cut by many small gullies and ravines. The two highest points, Burte and Dixon mountains, 540 feet and 460 feet respectively, are located in the eastern part of the county.

2.06 Below the Fall Line, much of Richmond, Burke and Screven Counties in Georgia, and Aiken, Barnwell and Allendale Counties in South Carolina lie on the Louisville Plateau, which is characterized by broad, flat areas which slope gently southward and touch the Savannah River. The land adjacent to the river is low and marshy in most places. The portions of Burke, Screven, Allendale and Barnwell Counties furthest from the river lie on the Tifton upland, which is characterized by gently rolling hills with broad, smooth summits. Steep precipitous slopes are restricted to the immediate vicinity of the larger rivers. Shallow sinkholes are found in the area of Burke County where near-surface limestone is deposited. Another topographical feature of the area is the occurrence of circular, elliptical, or elongated depressions that may reach several acres in size known as Carolina Bays. These depressions are sand-rimmed, poorly drained, and occupied by dense vegetation such as cypress, gum and grass. Carolina Bays are particularly prevalent in Screven County. The remainder of Screven, Chatham, and Effingham Counties in Georgia and Hampton and Jasper Counties in South Carolina lie on the Coastal Terrace, which is characterized by large, flat, sandy and sandy loam surfaces.

2.07 Geology and soils. Recession of the Atlantic Ocean during the Pleistocene period left the present Upper and Lower Coastal Plain with a sedimentary rock base. This base is composed of stratified silts, sands, limestones and clays which outcrop in wide bands parallel to the Fall Line which separates the Piedmont from the Coastal Plain. These strata dip and thicken as they near the ocean (6,000 feet thick at Savannah, Georgia).

2.08 The weathering of the bedrock formed various soil types. The Upper Coastal Plain soils developed in unconsolidated, stratified marine sediments. The uppermost reaches of the Coastal Plain sometimes have soils that developed from the weathering of underlying rock in the Piedmont Province. Those soils best suited for agriculture occur on ridge tops and slopes and are of the Norfolk, Tifton, Orangeburg, Faceville and Gilead series. These include loamy sand to sandy loam soils with sandy clay loam to sandy clay subsoils. Stream valleys contain alluvial materials that were derived from upland soils. The soil texture and drainage along streams can vary within short distances. The lowlands and flatwoods have poorly drained soils of the Lynchburg and Rains series. These grayish soils were formed from thin beds of sandy clay loam and sandy loams.

2.09 The Lower Coastal Plain is of more recent origin than the Upper Coastal Plain. The soils developed from unconsolidated sand and clay sediments are often wet, depending on topographic position and drainage. Large acreages of flatwoods can have slow surface runoff and poor internal drainage. The dominant soil series are Lakeland, Klej, Lynchburg, Bladen, and Plummer. Lakeland and Klej soils are common throughout the Lower Coastal Plain along ridgecrests and slopes. The poorly drained areas contain the Lynchburg, Bladen and Plummer soil types. Numerous swamps of varying sizes occur throughout this portion of the Savannah River basin. The soils specifically associated with the lands adjacent to the Savannah River in the region of interest are of two types: the Chewacla-Wehadkee-Alluvial Land and the Swamp-Alluvial Land from Augusta, Georgia, to the middle of Screven County, Georgia. This type occupies nearly level, moderately well drained to wet bottomlands along large streams and rivers flowing from the Piedmont area. The latter soil association continuing south along the river commonly occurs on nearly level, extremely wet bottomland and is subject to frequent overflow. These soils are mixed and are quite variable in texture.

2.10 Hydrology. The hydrology of the area involves consideration of the artesian aquifer, shallow aquifer, and surface waters. The principal or Coastal Plains aquifer originates over an extensive recharge area below the Fall Line. Much of Screven County, Georgia, lies within the zone where the recharge area crosses the Savannah River. The aquifer slopes gently toward the coast, where the water is eventually discharged. This is an artesian aquifer, which means that the water is under hydrostatic pressure and tends to rise to a height which may be above the land surface. The aquifer is particularly vulnerable to human disturbance in the recharge area and in the area where it approaches salt water. Construction projects, modification of the flow of surface waters into the aquifer, and pollution in the recharge area can affect the quality and quantity of the artesian water. A severe drawdown of the artesian water supply has occurred due to

excessive water use in the Savannah area. Artesian water that once flowed freely above sea level is now as much as 110 feet below sea level. Salt water has entered the aquifer at Port Royal Sound, South Carolina (McCullum and Counts, 1964). The aquifer is overlain by a 150-200 feet thick aquiclude, an impervious layer of clay and silts which prevents natural water flow in or out of the aquifer.

2.11 The recharge zones of the artesian aquifer and shallow groundwater aquifers are dependent on surface waters for resupply. Swamps are frequently recharge areas. It has been found that swamps are very efficient mineral filters. They are capable of performing tertiary treatment of bulk wastes and of removing toxic and even radioactive wastes from large quantities of water.

2.12 Water flow in the Savannah River is regulated by Clark Hill Dam and to a lesser extent by upstream dams at Lake Hartwell and private power developments. This flow is then reregulated at Stephens Creek Dam above Augusta, Georgia. The average yearly flow of water at Augusta is 10,230 cfs, but varies from a minimum of 5,800 cfs in November to a maximum of 15,200 cfs in May. Flow from Clark Hill Dam is designed for a minimum of 5,800 cfs at Augusta for navigation purposes. Flow data from Burtons Ferry Bridge, approximately 80 miles downstream from Augusta, indicate even more variability. In 1969, the maximum flow in May was 29,500 cfs, while in November, the maximum flow was 8,410 cfs. The mean flows for May and November, respectively, were 7,500 and 6,900 cfs. Near Clyo, Georgia, the flow rate increased. The yearly discharge in May, 1969, was a maximum of 37,500 cfs, with a mean of 22,560 cfs, while the November flow reached a maximum of 9,250 cfs with a mean of 8,175 cfs.

2.13 The water temperatures of the Savannah River are dependent upon flow rates, temperatures of runoff, degree of turbulence, shading quality of bank vegetation, ambient temperature and other factors. Therefore, water temperatures along the Savannah are continually variable. At Burtons Ferry Bridge in 1969-1970, the maximum temperatures at 3 feet below the surface reached 25°C in August. The minimum temperature was 6.5°C in December. Near Clyo, Georgia, at mile 65, the water temperature ranged from 8°C in February to 23°C in August.

2.14 Water quality. Several studies relating to the water quality of the Savannah River have been conducted in recent years. These studies show that two major waste discharge areas occur in the Savannah River--one is the Augusta area and the other is the Savannah area. In the Augusta area, numerous tributaries of the Savannah River are grossly polluted by wastewater discharges. The dilution of these wastewater discharges by the Savannah River helps to mitigate the effects of the discharge on the water quality of the river. However, effects due to pollution loading in the Augusta area are noticeable. High levels of fecal coliform bacteria are present downstream from Augusta; pathogenic Salmonella are also present. Significant levels of chromium and mercury are present downstream of Augusta. Until recently, the Savannah River was closed to fishing due to mercury pollution.

2.15 Although dissolved oxygen concentrations have not been measured below 5.0 mg/l, the trend over the years has been for a decrease in dissolved oxygen concentrations downstream of Augusta. Water quality data from two locations along the project stretch of the Savannah River have been extracted from the U.S. Geological Survey's Water Resources Data for Georgia Water Year 1975 and are included in Appendix H. Chemicals often associated with organic enrichment have shown an increase downstream of Augusta.

2.16 Downstream from Augusta, the water quality of the Savannah River tends to improve due to further dilution and the waste assimilative capacity of the river. Isolated points of pollution are found in the tributaries of the Savannah River, but the effects on the Savannah River are negligible. From U.S. Highway 301 to the U.S. Highway 17 bridge, the water quality of the Savannah River appears to be quite good.

TABLE 2

WATER QUALITY OF THE SAVANNAH RIVER BELOW AUGUSTA

STREAM	REACH	CLASSIFICATION*
Savannah River	Clark Hill Dam to Augusta, 13th Street Bridge	Drinking Water
Savannah River	Augusta, 13th Street Bridge to U.S. Highway 301 Bridge	Fishing
Savannah River	U.S. Highway 301 Bridge to U.S. Highway 17 Bridge	Drinking Water
Savannah River	U.S. Highway 17 Bridge to Field's Cut	Industrial Navigation
Savannah River	Field's Cut to Fort Pulaski	Fishing
Savannah River	Fort Pulaski to open sea and all littoral waters of Tybee Island	Recreation

*Criteria applicable to classifications may be found in the Rules of the Environmental Protection Division, Georgia Department of Natural Resources, Chapter 391-3-6.

SOURCE: Ga. Dept. of Natural Resources, Environmental Protection Division, Water Quality Investigation, Savannah River Basin in Georgia, Dec. 1974.

2.17 The Savannah Harbor area was grossly polluted several years ago; however, it is now in general compliance with established water quality standards and the great majority of the wastewater discharge in the area is receiving the legally required degree of treatment. The bulk of the present pollution load in the Savannah Harbor is due to the concentration of population and large-scale wastewater generating industries, whose discharges are substantial even though adequately treated by present standards. Dissolved oxygen concentrations are quite low and fecal coliform bacterial levels are often extremely high.

2.18 In summary, the Savannah River is a large river with a fairly large waste assimilative capacity. For most of the river between Augusta and Savannah, water quality is good. However, in the Augusta and Savannah areas, the pollution load on the river is significant. Details concerning waste sources and specific water parameters can be found in Georgia Department of Natural Resources, Environmental Protection Division, Water Quality Investigation, Savannah River Basin in Georgia, December 1974. The river classifications of the various stretches of the Savannah River below Augusta are presented in Table 2.

2.19 There are no documented major groundwater quality problems in the Savannah River Basin. Wastewater disposal by deep well injection, a potential source of groundwater contamination, is not permitted in the State. Saltwater intrusion, often a problem in coastal areas, is not significant in the lower Savannah Basin because of the artesian nature of the aquifer in the Savannah coastal area. Groundwater in the basin ranges from soft to hard.

2.20 Biology. Flora and fauna of the Savannah River are quite diverse and extensive. The most comprehensive study of the Savannah River biota was conducted by Patrick, et. al., c. 1966, between river miles 123 and 162. Over 400 species of algae were identified. Low levels of plankton (up to 3,000 organisms/liter) were reported. Most of the organisms consisted primarily of scuffed-up bottom forms and some forms that were discharged from the reservoir behind Clark Hill Dam. The most common plankton organisms were two diatoms, Melosira and Asterionella, and three rotifers, Keratella, Polyarthra and Trictocerca.

2.21 Flora. The flora associated with the Savannah River are essentially those to be found in alluvial swamps and wetland forests. Aquatic vascular plants are fairly common along the river, but their distribution is spotty (Georgia Power Company, 1972). Areas of low current, i.e., in oxbows, behind sand bars, around spur dikes, support the largest concentrations of aquatic plants. The more common aquatic plants include Myriophyllum (water milfoil), Ceratophyllum (hornwort), Alternanthera (alligatorweed), and Lemna (duckweed).

2.22 The primary vegetation type in the Upper Coastal Plain is loblolly-shortleaf pine, which merges into longleaf-slash pine as it nears the Lower Coastal Plain. The Lower Coastal Plain is almost entirely longleaf-slash pine except for some loblolly-slash pine along the coast and the marsh areas of the coastal islands. Swamp and bottomland hardwood vegetation is found along the Savannah River and other major rivers and tributaries within the Upper and Lower Coastal Plain. The bottomland vegetation includes black and tupelo gum, cypress, ash, maple and bottomland oaks. Another vegetation type of interest in the Upper Coastal Plain occurs in the Fall Line-Sandhills region. The Sandhills are typified by three species of scrub oak, longleaf pine, and unusual herbs and shrubs, many of which are found only in the Sandhills.

2.23 Hardwood-pine stands are scattered throughout the Savannah River Basin and include the species normally found in the pine and upland hardwood types. The trees commonly found along the Savannah River are listed in Table 1 of Appendix B.

2.24 Invertebrates. Over 360 species of aquatic invertebrates have been identified in the Savannah River (Patrick, et. al., c. 1966). Bottom fauna concentrations are scattered and rather sparse; this is primarily due to the shifting sand bottom and the lack of shallow water areas which normally support the largest number of bottom-dwelling invertebrates. The invertebrates which inhabit the Savannah River are shown in Table 1 of Appendix F.

2.25 Fish. Fish species which migrate from the ocean to breed in the Savannah River (anadromous species) include the Blueback herring, Hogchoker, Hickory shad, American shad, Needlefish and Striped bass. White mullet also migrate upstream from the ocean, but do not breed in the Savannah River. Species which migrate from the Savannah River to breed in the ocean include only the American eel. The types of fish which are commonly found in the Savannah River are shown in Table 1 of Appendix D.

2.26 Wildlife. Many kinds of wildlife are abundant along the Savannah River. Fur-bearers like otters, mink, muskrat and beaver reside in and along the river and its tributaries. Waterfowl, especially the woodduck, find very favorable conditions for nesting, resting and feeding. Herons build rookeries among the flooded timber. The oak trees that grow on higher elevations provide mast for raccoons, gray squirrels, deer and turkeys. In short, the river, swamps and adjacent upland forests provide abundant habitat for many species of wildlife. The species of birds, mammals, reptiles and amphibians whose range could include this portion of the Savannah River are shown in Tables 2, 3, and 4 of Appendix B.

2.27 Endangered species. Rare and unusual plants of the Savannah River below Augusta are shown in Table 3. The fish, reptiles and amphibians, birds and mammals inhabiting the Savannah River Basin, which appear in the United States List of Endangered Fauna for 1974, published by the U.S. Department of Interior, Fish and Wildlife Service, are listed in Table 4.

2.28 Climatology. The climate of the Coastal Plain Province of Georgia and South Carolina is best described as subtropical, with warm summers and mild winters. This is due to the latitude and the warming effect of the Gulf Stream.

2.29 Temperature. Summer temperatures average between 80° and 82°F, with coastal temperatures reaching 90°F or more 50 days per year. Most years have some days reaching as high as 100°F. Winter temperatures are more variable, but average 56° on the lower east coast, with only ten days of freezing temperature per year. Cold snaps occur regularly from mid-November to mid-March, but alternate with longer periods of mild weather. Snowfall is insignificant in the entire Coastal Plain Province. Relative humidity is moderately high. Readings average 85 percent or more at 7:00 a.m. and drop to 55 percent by 1:00 p.m. Monthly averages are higher in the summer than in the other seasons.

2.30 Rainfall. Rainfall increases from the Fall Line to the coast. Near Augusta, Georgia, as little as 40 inches of rain per year is measured, while the coast averages approximately 53 inches per year. However, rainfall varies greatly from year to year in the same region. The wettest periods

TABLE 3

RARE, ENDANGERED AND UNUSUAL PLANTS OF THE
SAVANNAH RIVER BELOW AUGUSTA
(COOLEY, 1974)

SCIENTIFIC NAME	COMMON NAME	LOCATION	STATUS
ARALIACEAE			
<u>Aralia nudicaulis</u>	Wild Sarsaparilla	Bluffs of Savannah River, Screven and Effingham Cos., Ga.	R in SRB
BRASSICACEAE			
<u>Nasturtium officinale</u>	Watercress	Allendale Co., S.C.	R in SRB
ERICACEAE			
<u>Vaccinium crassifolium</u>	Creeping Blueberry	S of Rincon, Effingham, Co., Ga.	R in SRB
LILIACEAE			
<u>I. discolor</u>	Clawed Trillium	Savannah River valley contains 99% of known locations	VR
MAGNOLIACEAE			
<u>Magnolia tripetala</u>	Umbrella Tree	Bluffs of Savannah River, 40 miles N of Savannah	R this far South
MENISPERMACEAE			
<u>Menispermum canadense</u>	Moonseed	Screven Co., Ga.	R in SRB
OLEACEAE			
<u>Forestiera segregata</u> (<u>F. porulosa</u>)	Florida Privet	Coastal Islands, Chatham Co., Ga.	R this far North
ONAGRACEAE			
<u>Ludwigia spathulata</u>		Echols Mill Granitic Out- crop, Oglethorpe Co., Ga., Aiken Co., S.C.	VR
OPHIOGLOSSACEAE			
<u>Botrychium lunarioides</u>	Winter Grapefern	Aiken Co., S.C.	VR
RHAMNACEAE			
<u>Sageretia minutiflora</u>		Coastal Islands, Chatham Co., Ga., and Beaufort, Co., S.C.	northern- most records

Symbols used to indicate status are: R--Rare; VR--Very Rare; E--Endangered.

TABLE 4

ENDANGERED SPECIES OF THE SAVANNAH RIVER BASIN

SCIENTIFIC NAME	COMMON NAME
FISH:	
<u>Acipenser brevirostrum</u>	Shortnose Sturgeon
MAMMALS:	
<u>Felis concolor coryi</u>	Florida Panther
REPTILES & AMPHIBIANS:	
<u>Alligator mississippiensis</u>	American Alligator
* <u>Chelonia mydas</u>	Green Turtle
* <u>Hyla andersoni</u>	Pine Barren Tree Frog (Anderson's Tree Frog)
BIRDS:	
<u>Haliaeetus leucocephalus leucocephalus</u>	Southern Bald Eagle
<u>Pelecanus occidentalis carolinensis</u>	Eastern Brown Pelican
<u>Falco peregrinus anatum</u>	American Peregrine Falcon
<u>Dendrocopos borealis</u>	Red-cockaded Woodpecker
<u>Vermivora bachmanii</u>	Bachman's Warbler
<u>Dendroica kirtlandii</u>	Kirtland's Warbler

*Threatened

are generally in the winter and midsummer, with a dry period in autumn. Afternoon thundershowers occur frequently during the summer wet season.

2.31 Recreation. Access to the river by boat is limited with only seven ramps for boat launching in South Carolina and eight in Georgia for the Augusta-Port Wentworth part of the river. Some of these ramps are not accessible during heavy rains when roads to them become impassable. These ramps are generally unattended and so data concerning their use are either unavailable or unreliable. Those ramps close to Augusta (especially the one at the New Savannah Dam & Lock) and close to the Savannah Metropolitan Area are used far more than others.

2.32 Other than those parts of the river near Augusta and Savannah, most of the recreational use of the river is largely limited to fishing or hunting. The availability of ramps is not well advertised and, with few exceptions, no parks or picnic facilities are available.

2.33 Few of the access points are near major highways and many do not have a paved road leading to them. Highway maps show only one U.S. Route (U.S. 301) and only two paved state highways (Ga. 80 and Ga. 119) crossing the Savannah between Augusta and Port Wentworth. A map shows only one additional paved road leading to the river from either side and shows no

indication of any tourist attractions (parks or camping areas) along this entire stretch of the river.

2.34 Recreation attendance at the New Savannah Bluff Lock and Dam in 1974 totalled 246,500. It is calculated that about one-third of those visiting were fishermen with others attracted by picnicking and sightseeing.

2.35 Archeology and history. Communications with the Georgia Historical Society and Georgia Historical Commission indicate that no designated historical sites are located within the project area.

2.36 Archeological sites, however, are abundant along the Savannah River. Table 5 lists the sites by county and state, with a general site description and location. Much of the data were obtained from Dr. Joseph Caldwell, University of Georgia, and Dr. Robert Stephenson, University of South Carolina. It is their professional opinion that detailed site locations should not be given in order to protect the sites from well-meaning, but uninformed, relic seekers. In addition, both men agree that the present list represents less than 10 percent of the actual number of archeological areas and that more detailed searches are necessary to identify, excavate, and analyze all sites. (Wood, et. al., 1973)

2.37 Economics. Those counties bordering on the Savannah River are primarily rural, non-industrialized, with the exception of the large urban areas of Augusta and Savannah.

2.38 Major industries in Augusta and Savannah. Manufacturing in the impact zone tends to be concentrated in the vicinity of Augusta and Savannah. There are currently more than 300 manufacturing plants in the Savannah, Georgia area, and over 150 plants in the Augusta, Georgia area. Olin Mathieson Company completed construction of a plant in 1965, at an estimated cost of \$20,000,000 and Columbia Nitrogen Company completed a \$40,000,000 plant in 1963. Recent developments include Georgia Ports Authority's construction of container cargo handling facilities and LASH facilities in Savannah Harbor.

2.39 Metropolitan Augusta is the largest industrial center in the impact zone, with total manufacturing employment of 29,100 in 1970. Cotton textiles is the major industry, employing almost one-half of the total industrial employment (8,460) and the manufacturing of atomic materials is second (5,100). (See Table 6.) Pulp and paper products, one of the major industries in the impact zone, employed 1,382 workers. Other important industries offering employment in metropolitan Augusta are fiberglass, clay refractories and bakery products.

2.40 Pulp, paper and paper products lead all other industries in employment in metropolitan Savannah, accounting for about one-third of this area's total industrial employment (Table 7). Chemical and chemical process industries, which include pulp, paper and paper products, and fertilizers, account for almost 50 percent of Savannah's manufacturing employment. Transportation equipment manufacturing industries, such as truck trailers, shipbuilding and

TABLE 5

ARCHEOLOGICAL SITES WITHIN APPROXIMATELY ONE MILE OF
THE SAVANNAH RIVER, AUGUSTA TO SAVANNAH
(WOOD, ET. AL., 1973)

Georgia

Richmond County

1. Hollywood Site--5 miles above Silver Bluff and 10 miles below Augusta, 2 mounds: pyramidal and conical
2. White's Mound--Augusta quadrangle

Burke County

3. Mound and remains--600 acres on Savannah River
4. On bluff just north of Shell Bluff--village site with much pottery
5. Stony Bluff Landing--implements of a great aboriginal workshop
6. Near Shell Bluff--1/2 mile west of River, several modern burials with coffin-nails, etc.

Screven County

7. Near Hudson's Ferry--pointed tools, 3 fossil shark's teeth showing use in handles as pointed tools
8. Hudson's Ferry--steamboat landing, 2 vessels of earthenware containing cremated bones
9. Mill's Landing--mound with circular base

South Carolina

Aiken County

1. Fort Moore--18th century, trading post of major importance
2. Fort Moore--(Edward's), trading post of major importance, pretty much destroyed
3. Silver Bluff--mounds and village site at one time, now partially washed away
4. Mell's Cache--point cache
5. Sheila's Site--Caldwell site, a prehistoric village
6. Two mounds--Charleston Museum, appears to be a site of major importance
7. Historic house site
8. Eagle Point--prehistoric camp or village
9. W. Breedlove and J. McGregor site, survey
10. W. Breedlove and J. McGregor site, survey
11. W. Breedlove and J. McGregor site, survey
12. Deptford site--heavy occupational debris, some later material

TABLE 5 (Cont'd)

South Carolina (Cont'd)

Allendale County

13. Little Hell Landing--village site
14. Cox Site (Fennel Hill)--Savannah River Site, good deal of material
15. Village with burial ground and shell midden, mound destroyed, good site
16. King Creek--Savannah River site, chert artifacts
17. Camp or village site, prehistoric
18. Lawton Mounds--village and mounds, included on the National Register of Historic Places
19. Horseshoe Lake--woodland village, sherds and chert, investigated by E. Thomas Hemmings
20. Red Bluff Landing--Archaic and Woodland flint quarry, included in the National Register of Historic Places
21. Rabbit Mound--archaic shell midden, investigated by Stoltman and Peterson, artifact at Peabody Museum
22. Clear Mount--Stallings Island and Deptford site (same as 38AL15)
23. Best Corner--archaic--late ceramic, investigated by S. Lee
24. Leland Ferguson Sites, survey sites
25. Stone tools, fiber tempered sherd, L. Ferguson site
26. W. Breedlove and L. Ferguson, J. McGregor sites
27. Multi-component site, historic and prehistoric material
28. W. Breedlove and L. Ferguson survey site
29. W. Breedlove and L. Ferguson survey site

Barnwell County

30. L. Ferguson survey site
31. L. Ferguson survey site
32. L. Ferguson survey site

Hampton County

33. Stokes Bluff--Woodland Mississippian village, bones, flakes, sherds, T. M. Ryan site
 34. Bluff Lake--Deptford material, L. Ferguson site
-

TABLE 6
 MAJOR MANUFACTURING IN THE AUGUSTA SMSA
 1975-1976

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF EMPLOYEES
Textiles	21	9467
Chemicals & Allied Products	21	6499
Stone, Clay, Glass & Concrete	20	3616
Products:		
Food & Kindred Products	34	2522
Paper & Allied Products	10	2398
Apparel	16	1935
Non-Electrical Machinery	17	1846
Printing & Publishing	13	692
Instruments	2	640
Fabricated Metals	20	537
Transportation Equipment	<u>2</u>	<u>486</u>
TOTAL	176	30,638
Total number of manufacturers:	204	
Total manufacturing employment:	31,681	
Metropolitan Area population (1974):	273,800	

SOURCE: 1976 Georgia Manufacturing Directory and 1975 South Carolina Industrial Directory.

TABLE 7

MAJOR MANUFACTURING IN THE SAVANNAH SMSA
1976

TYPE OF INDUSTRY	NUMBER OF PLANTS	NUMBER OF EMPLOYEES
Paper & Allied Products	6	3710
Chemicals & Allied Products	22	2346
Transportation Equipment	9	2150
Food & Kindred Products	34	2058
Apparel	18	1030
Lumber & Wood Products	28	859
Fabricated Metals	26	657
Petroleum Refining	12	637
Stone, Clay, Glass & Concrete	16	627
Printing & Publishing	<u>18</u>	<u>436</u>
TOTAL	189	14,510
Total number of manufacturers: 198		
Total manufacturing employment: 15,254		
Metropolitan Area population (1974): 199,200		

SOURCE: 1976 Georgia Manufacturing Directory.

repairs, and aircraft manufacture, employ 2,381 workers. Food and kindred products employ more than 2,000 people. The other industries employing a substantial number of workers are woodworks and building materials.

2.41 Motor and railroad service. The river basin is bounded by four Interstate routes. I-20 passes through the Augusta area to the north and I-95 passes immediately north and west of Savannah. Some 60 miles to the northeast, I-26 parallels the river and I-16 lies to the south, although it veers to the west to reach Macon. U.S. 301 extends north-south almost midway between Savannah and Augusta.

2.42 Several state routes (Ga. 24, 21, S.C. 125) and minor U.S. routes (601, 178) penetrate the basin or pass near its borders, but the basin is not intensively served by highway routes parallel to the river.

2.43 The Interstate routes, especially I-20 and I-95, are designed to carry the heavy flow of the north-south traffic from the Northeast U.S. into and out of the South and Southeast. They tap the opposite ends of the basin and are a major transport asset.

2.44 For the most part, rail traffic, like the highway traffic, flows through the region in a north-south direction. The main lines of the Seaboard Coast Line Railway (SCL) pass through Savannah. The SCL lines from Spartanburg to Savannah pass through Augusta and, for a distance, parallel the Savannah River but veer northward to join the main line north of Savannah, Georgia. The SCL also approaches Augusta from Sumter through the center of South Carolina. Between Savannah and Augusta, the Savannah & Atlanta and the Central of Georgia Railroads in Georgia and the Southern Railway in South Carolina approximately parallel the Savannah River.

2.45 Water transport. The Savannah River below Augusta was improved to achieve a channel depth of nine feet on the improved waterway in 1958. Table 8 shows the commodities shipped on the Savannah River below Augusta, 1958-1975. Over this historical period, the largest tonnages were shipped in 1970 (a grand total of 135,574 short tons). In 1971, however, there was a substantial drop in tonnage to 66,446 short tons. There were large tonnage declines registered in the categories of logs, fertilizers, and structural clay products. This decline continued through 1973, with a low of 13,275 tons. Traffic increased to 47,566 tons in 1974 and increased sharply in 1975, when 71,070 tons moved up the Savannah River.

2.46 Population. Population density within the basin is considered less than that of the States of Georgia and South Carolina as a whole. With the exception of the industrialized areas of Augusta and Savannah, Georgia, and Aiken, South Carolina, which experienced population gains in the period 1959-1970, all counties in Georgia and South Carolina below Augusta and adjacent to the Savannah River suffered population losses for the same period. (U.S. Department of Commerce, Bureau of Economic Analysis - Savannah River Economic Base Study Area, January 1975.) Population migration, except for retirement, is considered to reflect employment opportunity.

TABLE 8

TOTAL SAVANNAH RIVER TONNAGE, 1958-1975

Year	Tonnages
1958	68,906
1959	71,068
1960	63,073
1961	54,002
1962	99,840
1963	81,290
1964	46,260
1965	59,983
1966	57,351
1967	95,956
1968	88,951
1969	109,423
1970	135,574
1971	66,446
1972	51,936
1973	13,275
1974	47,566
1975 (estimate)	71,070

SOURCE: Waterborne Commerce of the United States, U.S. Army Corps of Engineers

2.47 Aesthetics. The continually changing channel of the Savannah River across its flood plain has built a diverse landscape of bluffs, levees, swamps, lakes and creeks. Equally diverse is the array of plants and animals living in the habitats created by the river. The Georgia Scenic Rivers Report (Georgia Natural Areas Council, 1973) rated 53 rivers and creeks in Georgia; with the Savannah River below Augusta rated as the second most scenic. Near-virgin cypress swamps border Ebenezer Creek, a tributary of the Savannah River in Effingham County, Georgia. Bear Island in Effingham County, Georgia, has a 500-acre hardwood forest that is near-virgin. Most of the sweetgum trees average 3-1/2 feet in diameter. Griffin's Landing in Burke County, Georgia, has been registered with the Georgia Natural Areas Council. It possesses unique sediments of fossilized oyster beds and was once an old steamboat landing. Shell Bluff in Burke County, Georgia, consists of a rich hardwood forest and bluff.

2.48 The natural beauty of the Lower Savannah River has been preserved by a number of interacting factors. Among these are: (1) the floodplain forests have not been exploited extensively for timber since the removal of the economically valuable cypress; (2) the pattern of large land-holdings extensively used for forestry and recreation has maintained a low population level over wide areas and has prevented intensive development; and (3) the major uses of the area--hunting, fishing, and boating--have little permanent effect on the natural environment.

3.00 Relationship of the Proposed Action to Land Use Plans. The operation and maintenance of the Savannah River below Augusta does not conflict with any local, Federal or State land use plans or policies, as given in the Georgia State Comprehensive Outdoor Recreation Plan, 1972.

4.00 Environmental Impact of the Proposed Action.

4.01 Topography. The proposed action of removing obstructions from the navigable channel of the Savannah River will have no effect on the overall topography of the Savannah River Basin.

4.02 Geology and soils. The removal of obstructions from the navigable channel of the Savannah River will have no significant effect upon the geology and soils of the Savannah River Basin area. Obviously, some localized changes of sand bar formations or some variations in the cutting and deposition patterns within the river will result from the dredging and obstruction removal operation. However, in geological time, this impact will be imperceptible.

4.03 Hydrology. Except for localized changes in stream flow, this project will have no impact on the overall hydrology of the Savannah River.

4.04 Water quality. There will be localized increases of bottom or bank disturbance at the time of the construction, dredging and removal of obstructions, which will result in a temporary increase in turbidity. However, the continued operation and maintenance will not adversely affect the designated classifications of the Savannah River as referenced in Table 2.

4.05 Biological impact. The environmental effects resulting from this project are associated with the maintenance activities and the depositing

of the removed material in a new location. Since these activities are restricted mainly to the river, the aquatic ecosystem has the greatest impact. Even though fish and aquatic invertebrate habitats are destroyed in these areas, this disruption is only temporary and the species formerly present soon reestablish themselves. This disruption results in no significant impact to the overall aquatic resources of the basin or to the anadromous fish species using the river.

4.06 The only maintenance activity which will directly affect the land species of animals and plants is the construction of new cutoffs. This activity would destroy the habitat in the area cut for the new channel but would cause only a minor impact on the overall population of plants and animals in the area. Due to the small acreage involved in the individual cutoffs, the surrounding area should have no trouble handling the displaced animals. The other maintenance activities have only a minimal impact on land species.

4.07 Air and noise quality. Localized degradation of air and noise quality as a result of the operation of the engines associated with dredging equipment will occur, but this degradation will be transitory. Additional degradation may occur because of increased barge and boat traffic on the river. The effects on air and noise quality will not be drastically increased by continuation of this project.

4.08 Climatology. The proposed project should have no effects on climate, temperature or precipitation.

4.09 Recreation. This dredging and clearing project will continue to permit the recreational and commercial use of the Savannah River Basin, insure the safety of the navigational channels and protect pleasure boaters using the stream. However, the permanent actions of diking, widening and constructing river cutoffs will have an adverse effect on existing and future recreational use of the river.

4.10 Archeological and historical. No archeological or historical sites should be affected by the dredging and obstruction removal operation. As already noted, these operations occur only within the stream bank areas where there are no known archeological or historical sites. If any maintenance involves bank disturbance, an archeological survey will be conducted on those areas affected prior to construction. If such sites are located, proper steps will be taken to mitigate any adverse effects.

4.11 Economic aspects. The two major urban centers of Augusta and Savannah represent focal points for manufacture and shipment of goods. Augusta has excellent power supply, mineral resources, and water resources to support industrial operations. In Augusta, the Georgia Ports Authority has constructed a State Port for handling cargo. Several private companies also have terminals at Augusta for shipment of commodities on the Savannah River. Savannah, with its deepwater harbor, offers excellent waterborne transportation facilities for shipment of goods. Analysis of potential commodity movements revealed a potential 2.6 million tons of commodities which could move on the river if the channel were maintained in an economically navigable condition. This maintenance could result in a beneficial impact

on the industries by reducing the shipping costs and stimulating productivity and thereby increasing employment in the area. Also, with the potential for waterborne transportation, new industry would have additional incentives for locating in the area. This, in turn, would stimulate the economy of the area and result in higher employment levels and better living conditions.

4.12 Aesthetics. The normal operation and maintenance do not have any long-term adverse visual or aesthetic impacts. During the time maintenance dredging is conducted, some visual and aesthetic impacts will occur due to the presence of the dredge and pipelines. However, these impacts are short-term, lasting only as long as the dredge and equipment are working in the area. After the use of these sites is completed, the visual and aesthetic qualities of the areas are the same as they were prior to maintenance dredging. However, in the areas of the proposed new construction, especially in the cutoff areas, the aesthetic quality of the Savannah River will be lowered. Also, the increased use of the improved channel by barge and boat traffic will distract from the scenic value of the river.

4.13 Traffic on the project portion of the waterway would suffer some inconvenience in the vicinity of dredging operations, but removal of the shoals would provide a safer trafficway for recreational and commercial craft. During actual dredging in narrow portions of the Savannah River below Augusta, the floating pipeline from the dredge to the disposal area would cause an inconvenience to boaters. In some instances, it may be necessary for boaters to wait until the pipeline is disconnected to allow passage. However, such inconvenience would be short-term in any given area.

4.14 Impacts due to dredging. Shoal removal by hydraulic dredge will cause an increase in suspended solids and turbidity in the working area and will result in a temporary lowering of water quality in the immediate vicinity of the work. The accompanying turbidity would probably cause fish and other free-moving aquatic life to avoid the area temporarily. In most cases, increased turbidity due to dredging is a transient condition. When dredging ceases in an area, turbidity diminishes to background levels within a few hours (Biggs, R. B., 1967).

4.15 Dredge material disposal is accomplished by placing the material elsewhere in the river out of the main channel. Also, where possible, the material will be placed within the pile dike systems to increase their efficiency. Careful planning is required to insure that the material is placed to prevent it from being washed into the channel downstream. Also, nowhere does the disposed material exceed the normal low water plane. This prevents the disruption of the natural drainage from surrounding areas.

4.16 Even by taking all available precautions, dredging and dredge disposal disrupt some of the existing aquatic communities. Therefore, aquatic habitat is destroyed by the removal of the material and by the depositing of the material in a new location. The overall aquatic community is not lost and in a few months, will have reestablished in the disturbed areas. There will not be any adverse impacts on the fish spawning because dredging is normally performed during the summer low water periods. Dredging is

not necessary in late winter or spring spawning periods due to the high water; and it is the high water which reduces the controlling depth when normal flow is established, thus making dredging necessary.

4.17 The main adverse impact is that associated with water quality and increased turbidity. This impact is primarily temporary and can be minimized through the use of silt screens where practicable and necessary. However, background turbidity in the Savannah River is generally high.

4.18 Impacts due to the construction of pile dikes and revetments. Construction of pile dikes causes a localized change in flow patterns of the river. This results in the destruction of some invertebrates. Some species of fish life in the river are attracted to the dikes, and these areas will serve as spawning grounds and nursery areas for the fish and aquatic invertebrates.

4.19 Construction of revetments destroys the invertebrates in localized areas and prevents the growth of plant life. However, the revetments decrease the amount of streambank erosion and thereby reduce siltation and turbidity.

4.20 Impacts due to construction of cutoffs. The main impact due to the construction of cutoffs is the destruction of vegetation within the construction right-of-way. The clearing required eliminates streamside habitat for small game, waterfowl and fur-bearing mammals. The plant life that normally grows back usually consists of tangled briars and honeysuckle. However, cutoffs will not result in any direct impact to any of the swamps or wetlands along the Savannah River.

4.21 The material removed from cutoffs is either placed in the oxbow part of the river or on high ground adjacent to the cutoff. This results in increased turbidity and siltation in the water which would possibly cause fish and other free-moving aquatic life to avoid the area. Localized invertebrate habitats are also destroyed. Some aquatic habitat is destroyed while some is created. Fish habitat may be created in the cutoffs if disposal does not fill them in and if a sufficient flow is allowed to circulate to keep the cutoffs from becoming stagnant.

4.22 Freshly cut excavations are subject to severe erosion when exposed to river currents. This erosion generates silt and sediment that adversely affect downstream water quality. Measures that could be taken to minimize these adverse impacts include the possible use of silt screens where large quantities of dredging are required. This confines the adverse effects on water quality to a local area. To reduce the bank erosion of freshly cut areas, the slopes are either grassed or protected by stone revetment.

4.23 Snagging. The authorized channel is maintained by a snagging vessel, which removes obstructions such as fallen trees, logs and stumps. Only those obstructions that are clearly within the channel are removed. Trees partially in the water and partially on the bank are not removed. The removed obstructions are placed along the banks or near sand bars out of the channel as deterrents to erosion and as potential fish habitats. Maintenance snagging of the project area is performed about once a year. The time of the year for this maintenance depends on the water level in the

river. There will be localized increases in turbidity at the time of snagging or the removal of obstructions. Some fish habitats will be removed and others will be developed by using the snags to block the upstream side of oxbows where cut-offs have been constructed. The removal of the snags and replacement of them in other areas may disrupt some invertebrate habitats in the work sites for a short period of time.

5.00 Any Adverse Environmental Effects Which Cannot Be Avoided Should the Proposal be Implemented.

5.01 Water quality. Some degradation in water quality occurs in the immediate vicinity of maintenance activities. Increases in suspended solids and turbidity are temporary and disappear shortly after termination of maintenance activities.

5.02 Benthos. Maintenance activities temporarily reduce the benthic populations in the immediate vicinity; however, this reduction does not have a significant impact upon the higher organisms of the waterway. Investigations indicate that benthic dwelling organisms usually repopulate dredged areas within a month or two after dredging.

5.03 Other biological resources. Displacement of animal and bird species utilizing selected cutoff areas for habitat cannot be avoided. Also, some disruption and displacement of aquatic life in the waterway also occurs. These effects are temporary and no permanent adverse impact would be likely to occur.

5.04 Some adverse effects would occur during maintenance in terms of localized degradation of air quality due to the exhaust from dredging equipment. There would also be some temporary adverse impact in terms of noise generation from the maintenance effort.

5.05 Other indirect adverse impacts could affect water quality and the scenic aspects of the Savannah River due to the increase of barge and boat traffic using the maintenance channel.

6.00 Alternatives to the Proposed Action. The purpose of this project has been described as the maintenance of a 9-foot deep and 90-foot wide channel in the Savannah River in order to provide adequate opportunity for safe and economical navigation for barges and pleasure craft. As stated in Section 1.00, alternatives to this proposed action are discontinuation of the maintenance of this project and operation of the lock and dam, and continued maintenance of the channel for safe and economic navigation.

6.01 The discontinuation of the maintenance of the channel of the Savannah River is an obvious alternative to the proposed action. However, failure to perform the proposed work would result in continued shoaling which would be hazardous to safe navigation, curtailing the use of the waterway for recreational and commercial purposes and reducing the related economic and social benefits associated therewith. Use of the present waterway would be restricted to shallower draft boats and passage at high water. Shoaling would return the channel to approximately the original depths and the benthic organisms would be reestablished as they are following dredging activities. Also,

some of the adverse environmental effects expected from the maintenance operation would be realized by this alternative. Since obstructions in the river are not necessarily permanent but are often times moved by flood waters, fish habitats will be destroyed periodically, even if snagging and dredging do not occur. Erosion will occur as the river finds its own channel, increasing turbidity and displacing various habitats.

6.02 An alternative to the proposed method of disposal as discussed in Section 1.00 is the use of diked disposal areas. This method prevents the spreading of dredged material and reduction in turbidity. However, this method has several undesirable impacts. One undesirable impact of this alternative is that the area along this part of the Savannah River has only limited development and construction of dikes would destroy existing bottom-land hardwoods and adjacent wetland areas. In addition, the cost of dike construction would greatly increase the cost of the maintenance of the Savannah River.

7.00 Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity. There is no life limit to this project. As long as the maintenance is carried out, the river may be utilized by small boat traffic and barges. It has already been noted that the long-term productivity of this river will not be affected as a result of this project. There will be some changes in locations of fish habitats. However, new fish habitats will be established. This project does not involve any utilization of the natural environment that will prevent its use or its change of use for long-term productivity in the future.

8.00 Any Irreversible or Irrecoverable Commitment of Resources Which Would Be Involved in the Proposed Action Should It Be Implemented. There is no irreversible or irretrievable commitment of natural resources or environment associated with this project other than the use of fuel oil in operating the dredging vessel and other natural resources associated with this equipment. The river system can be returned to its non-maintained status at any time. This river system would then be navigable, subject to the permutation of factors and forces related to the movement of shoals and obstructions within the river channel.

9.00 Coordination and Comment and Response.

9.01 On 22 July 1974, the Department of the Army, acting through the Chief of Engineers, published final regulations (33 C.F.R. 209) which prescribed the policies, practices and procedures to be followed by all Corps of Engineers installations in connection with their review of Federal projects performed by the Corps of Engineers which involve the disposal of dredged material in navigable waters. These regulations were developed pursuant to Sections 313 and 404 of the Federal Water Pollution Control Act (FWPCA) (33 U.S.C. 1323 & 1344) and Section 103(e) of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA) (33 U.S.C. 1413(e)). These regulations require that the Corps of Engineers issue a public notice prior to undertaking a Federal project involving the disposal of dredged material in navigable waters. The public notice for the proposed action is attached as Appendix G. The public notice was mailed on 30 April 1975, to about 476 Federal, State and local governments and business, organizational and private addressees.

9.02 Pursuant to provisions of the National Environmental Policy Act of 1969 (Public Law 91-190), coordination has been effected with agencies which are authorized to develop and/or enforce environmental standards to obtain a current assessment of the environmental impact of the proposed plan. Interested citizen groups were also invited to comment on the environmental impacts involved in implementing the project.

9.03 The Draft Environmental Statement was sent to the following Governmental agencies and citizen organizations requesting their views and comments. The comments which were received are included in this section with responses to those comments. Those who did not respond in the 45 day waiting period were assumed to have no comments on the project.

Advisory Council on Historic Preservation
Soil Conservation Service
U.S. Forest Service
U.S. Geological Survey
Environmental Protection Agency
Federal Highway Administration
National Marine Fisheries Service, NOAA
U.S. Department of Commerce
U.S. Department of the Interior
U.S. Department of Housing and Urban Development
U.S. Department of Health, Education and Welfare
Federal Power Commission
Federal Energy Administration
Georgia Office of Planning and Budget
South Carolina State Clearinghouse, Office of the Governor
Lower Savannah Regional Planning & Development Commission
Upper Savannah Development Commission
Lowcountry Regional Planning Commission
Central Savannah River Area Planning & Development Commission
Mayor of Savannah, Georgia
Mayor of Augusta, Georgia
Mayor of North Augusta, Georgia
Savannah Port Authority
Georgia Ports Authority
Georgia Conservancy, Inc.
National Audubon Society
Ogeechee Audubon Society
S.C. Water Resources Commission
S.C. Wildlife Federation
Georgia Wildlife Federation
Georgia Sierra Club
Natural Preservation Areas Council
Transportation Institute
American Bureau of Shipping
American Institute of Merchant Shipping
American Waterways Operators
American Petroleum Institute (API)
American Pilots Association
American Association of Port Authorities

9.04 U.S. Department of Agriculture, Soil Conservation Service. In a letter dated 16 July 1976, the Soil Conservation Service furnished the following comment on the Draft Environmental Statement.

9.05 Comment: We appreciate the opportunity to review the well-prepared Draft Environmental Statement for Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, Including the Savannah Bluff Lock and Dam, Georgia and South Carolina. We do not have any comments or suggestions on this draft statement.

9.06 Response: No response required.

9.07 U.S. Department of Agriculture, Forest Service. In a letter dated 9 July 1976, the Forest Service furnished the following comment on the Draft Environmental Statement.

9.08 Comment: Since this is a maintenance project involving little or no new lands and the dredged material will be deposited below the normal low water plane of the river, significant project impact on forest lands and resources is not anticipated.

9.09 Response: Concur.

9.10 U.S. Environmental Protection Agency. In a letter dated 23 August 1976, the Environmental Protection Agency furnished the following comments on the Draft Environmental Statement.

9.11 Comment: In general, we do not object to the method of spoil disposal behind pile dikes or on the river bank if the spoil is unpolluted. However, polluted spoil should be deposited in a diked area above the flood plain. The Statement gives no information on the location of approved spoil sites. These should be shown on a map, along with an indication of the type of spoil sites involved: (a) pile dike; (b) river bank; and (c) diked upland site, etc. Spoil sites at new cutoffs should be coordinated with the conservation agencies. Generally better water quality can be attained by leaving the cutoff open.

9.12 Response: The areas requiring the most intensive maintenance are presented in Table 1 and their locations are shown on the plates of Appendix C of the Final Statement. The disposal areas will be in the same general locations. Initially, under the increased maintenance, the project would require 264,069 cubic yards of material to be dredged from the river channel and 624,000 cubic yards from river cutoffs. This material would be placed along the shallow side of the river or along pile dikes for the river dredging operations and in the oxbows developed by the cutoffs for the cutoff dredging. Subsequent dredging requirements are estimated at 50,000 cubic yards per year from the river channel. This material would be placed along the shallow side of the river or in pile dike areas. None of the oxbows will be completely closed off.

9.13 Comment: In addition, although it is indicated that water quality data have been taken in the Savannah River, the exact location of the samples and the various parameters taken are not shown. This data should

be included in the final statement together with any sediment sampling data that may be applicable.

9.14 Response: Water quality data were extracted from the U.S. Geological Survey's Water Resources Data for Georgia Water Year 1975 and are included in Appendix H of the Final Environmental Statement.

9.15 Comment: Page 5, paragraph 2.10 brings up the question of whether or not dredging operations will break through the aquiclude and permit the inflow of salt water into the aquifer. This question should be answered prior to dredging operations.

9.16 Response: This sentence has been deleted from the Final Statement because it was inaccurate. The aquiclude is composed of an impermeable bed of silts and clays and is 150-200 feet thick. Therefore, the project will have no effect on the aquiclude.

9.17 Comment: Page 8, paragraphs 2.24 and 2.25 do not adequately assess the invertebrate or fish population. Qualitative tables are presented in the EIS; however, these tables do not supply adequate information for assessment of the Savannah River resources. There is no possible method of determining the effect a project will have on a particular environment without having good quantitative data.

9.18 Response: Concur; however, this information is not currently available for inclusion in the Final Environmental Statement.

9.19 Comment: Throughout the Statement there are implications that dredging and deposition only have a short-term effect on the aquatic ecosystem. If there are any validating reports for these statements, they should be cited.

9.20 Response: Wood, et. al., 1973, in a report on Economic Benefits and Environmental Issues Related to Channel Improvements on the Savannah River, states that "Serious, temporary changes in the biological aspects of the Savannah River were reported after the dredging in 1956-1960." During this time there was extensive maintenance dredging conducted, including several cutoffs.

9.21 Comment: Page 21, paragraph 4.21, states that the material removed from the cutoffs will be placed in the oxbows of the river or barged to suitable disposal sites. Oxbows contain the prime habitat for most aquatic organisms within the river system. If the oxbows are used for deposition sites, this will destroy the most productive river habitat available. Other possible deposition sites exist, but there is no information as to location of these sites or the amount of material to be deposited.

9.22 Response: The oxbows referred to are the ones created by the channel cutoffs and not the currently existing oxbows along the river. Oxbows are traps for sediment when the river is in flood stage and deposition of dredged material in these oxbows only speeds up these natural processes. Initially, under the increased maintenance, the project would require 264,069 cubic yards of material to be dredged from the river channel and 624,000 cubic yards from river cutoffs. This material would be placed along the shallow

side of the river or along pile dikes for the river dredging operations and in the oxbows developed by the cutoffs for the cutoff dredging. Subsequent dredging requirements are estimated at 50,000 cubic yards per year from the river channel. This material would be placed along the shallow side of the river or in pile dike areas.

9.23 Comment: Finally, we recommend following any applicable State of Georgia and State of South Carolina Air Pollution Control Rules and Regulations.

9.24 Response: These rules and regulations will be followed.

9.25 U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. In a letter dated 23 July 1976, the National Marine Fisheries Service furnished the following comments on the Draft Environmental Statement.

9.26 Comment: The DEIS lacks sufficient environmental information and project details upon which an accurate evaluation of the potential impacts of the proposed project on anadromous fishery resources of the Savannah River can be made. Furthermore, alternative methods for project maintenance should be fully discussed. We recommend the statement be redrafted and recirculated for review and comments.

9.27 Response: Due to high water during the spawning season, dredging is not normally required. Most of the dredging will be conducted in the low water summer months. Additional discussion has been included in the Alternative section of the Final Environmental Statement. It is not felt that a complete redrafting and recirculation is warranted for this project.

9.28 Comment: 1.00 Project Description, Page 3, paragraph 1.06, Proposed Action. This section should be expanded to include a detailed discussion of dredging methods, time of dredging, location of spoil disposal areas, construction details for additional pile dikes and revetments, and areas proposed for widening and river cutoffs. Additional figures illustrating the above features would facilitate review.

9.29 Response: The dredging methods to be used in areas requiring the most intensive maintenance or construction have been added to Section 1.00 and the locations are shown on the plates of Appendix C of the Final Statement. The dredging will normally occur during the summer months due to the low water generally occurring during this time. Figure examples of typical pile dikes, river cutoffs, revetments, and general riverbend improvement have also been added in Appendix F of the Final Environmental Statement.

9.30 Comment: 4.00 Environmental Impact of the Proposed Action, Page 18, paragraph 4.05, Biological Impact. This section should be expanded to address specific areas designated for dredging, spoil disposal, construction of pile dikes and revetments, and areas proposed for widening and river cutoffs. The potential biological impacts will undoubtedly vary from site to site, depending on activities proposed and biological communities present.

9.31 Response: Table 1 and the plates in Appendix C have been included in the Final Statement to give the locations of areas requiring the most intensive maintenance work. The potential biological impacts will vary from site to site; however, the general impacts will be about the same for all areas.

9.32 Comment: 6.00 Alternatives to the Proposed Action, Page 22, paragraphs 6.00 and 6.01. This section should be expanded to include a discussion of alternate methods of construction and relocation of spoil disposal areas. Specifically, the alternative of widening as opposed to channel cutoffs and utilization of spoil disposal areas outside the river should be discussed.

9.33 Response: Additional discussion has been added to Section 6.00.

9.34 U.S. Department of the Interior. In an undated letter received on 6 August 1976, the Department of the Interior furnished the following comments on the Draft Environmental Statement.

9.35 Comment: The statement does not adequately describe location or extent of proposed river cutoffs, river widening, and the impact of the proposed construction on the associated wetland areas along the river.

9.36 Response: The areas requiring the most intensive maintenance are presented in Table 1 and their locations are shown on the plates of Appendix C of the Final Environmental Statement. These modifications will not directly affect any of the wetlands along the Savannah River.

9.37 Comment: Significant natural areas border the Savannah River. They are:

Ebenezer Creek Swamp, Effingham County, Georgia, listed in the National Registry of Natural Landmarks.

Shell Bluff, Burke County, Georgia and Bear Island Wildlife Management Area, Effingham County, Georgia, both potentially eligible for inclusion in the National Registry.

Griffins Landing, Burke County, Georgia, a fossil area which may be significant. In the process of evaluation for potential eligibility.

The location of these sites in relation to proposed Corps activities should be adequately discussed.

9.38 Response: There will not be any modifications in the stretches of river in which these natural areas are located.

9.39 Comment: Section 2.04 states that swamps and lakes are very common. Section 2.09 states that numerous swamps of varying sizes occur throughout the Lower Coastal Plain area of the river. In Section 2.26 swamps are specifically mentioned as providing abundant habitat for many species. However, in Section 4.20 the discussion makes no mention of how cutoff construction will impact the water regimen of the swamps and wetlands occurring in cutoff

areas. We believe this should be discussed in Section 4.20 as well as Sections 5.03 and 8.00. The discussion should also demonstrate how environmental concerns will be received from various agencies and individuals prior to cutoff construction.

9.40 Response: None of the modifications from the existing operation and maintenance activities will directly affect any of the swamps, wetlands or Nationally significant natural areas found along the Savannah River. Appendix C of the Final Statement shows the locations of the areas needing the most intensive maintenance. Comments on these construction areas must be made during the Final Statement review.

9.41 Comment: Page 11, 2.35 Archeology and History. The final statement should evidence consultation with the State Historic Preservation Officer of both Georgia and South Carolina.

9.42 Response: The Draft Environmental Statement was coordinated with both State Historic Preservation Officers. The reply from South Carolina is included in Appendix E. We did not receive comments from the Georgia State Historic Preservation Officer on this project.

9.43 Comment: Page 11, 2.36. The potential for presently unrecorded archaeological sites in the area of the proposed project's potential environmental impact has been noted. The final statement should include an adequate discussion on the presence or absence of archeological resources found as a result of onsite surveys and the evaluation of any sites found for significance and eligibility for inclusion in the National Register of Historic Places.

9.44 Page 19, 4.10 Archeological and Historical. The final statement should discuss impacts on cultural resources found during onsite surveys. Measures required to mitigate for potential impacts should also be presented.

9.45 Page 21, 4.20 Impacts due to construction of cutoffs. The destruction of subsurface archeological resources should be included in this section. Cultural resources are important non-renewable aspects of the human environment and should be considered as valuable resources requiring special consideration during the planning stage.

9.46 Response: Any additional pile dike, revetment, river cutoff or widening will be investigated by an archeologist prior to any construction work. The snagging and maintenance dredging in the existing channel should not have any significant impacts on the underwater archeology that has not been previously disturbed. If a shipwreck is uncovered during dredging, the dredging operation would cease in that area of the river until the wreck is identified as to historical value and a decision is made as to the proper handling of the wreck. Archeological materials, both historic and prehistoric, which may have fallen into the river channel from their original context, and which may require maintenance dredging would be relocated on the river banks.

9.47 Proper archeological investigation of the entire stretch of the river would involve an extensive survey and reconnaissance program. The Corps of Engineers is only authorized to fund archeological surveys in areas that may

be impacted by their construction activities. However, in those areas which have been identified and which require mitigation measures, the Corps would take the necessary measures to protect and preserve the cultural resources.

9.48 Department of Housing and Urban Development. In a letter dated 5 August 1976, the Department of Housing and Urban Development furnished the following comment on the Draft Environmental Statement.

9.49 Comment: We have reviewed the Draft Environmental Impact Statement (EIS) and have no comments to offer, as we feel all concerns within our expertise are adequately addressed.

9.50 Response: Noted.

9.51 Department of Health, Education and Welfare. In a letter dated 29 July 1976, the Department of Health, Education and Welfare furnished the following comment on the Draft Environmental Statement.

9.52 Comment: We have reviewed the subject draft Environmental Impact Statement. Based upon the data contained in the draft, it is our opinion that the proposed action will have only a minor impact upon the human environment within the scope of this Department's review. The impact statement has been adequately addressed for our comments, except for vector-control.

The final Environmental statement should address the potential impact upon insect disease vectors and upon the risks of vector-borne diseases.

9.53 Response: This maintenance project involves little new lands and the dredged material will be deposited below the normal low water plane of the river. Therefore, it is not anticipated that this project will cause any additional vector-borne diseases in the project area.

9.54 Federal Power Commission. In a letter dated 25 August 1976, the Federal Power Commission furnished the following comment on the Draft Environmental Statement.

9.55 Comment: These comments of the Federal Power Commission's Bureau of Power are made in accordance with the National Environmental Policy Act of 1969 and the August 1, 1973, Guidelines of the Council on Environmental Quality. Our principal concern with projects affecting land and water resources is the possible effect of such projects on bulk electric power facilities, including potential hydroelectric developments, and on natural gas pipeline facilities.

9.56 Review by the Commission staff indicates that there are several steam-electric power plants along this reach of the Savannah River. The cooling water facilities of these plants utilize the Savannah River as the source of cooling water supply. Also, several electric power transmission lines and natural gas pipelines cross this reach of the Savannah River. Presumably there would be no conflict in the operation and maintenance of these electric power and natural gas facilities with the continuing operation and maintenance of the navigation project.

9.57 Response: Concur. There will be no adverse effects on the operation and maintenance of these electric power and natural gas facilities.

9.58 Federal Energy Administration. In a letter dated 27 July 1976, the Federal Energy Administration furnished the following comment on the Draft Environmental Statement.

9.59 Comment: In reviewing the Statement, no conflicts with FEA mission responsibilities were found. If the Savannah River is used to transport any of the atomic materials manufactured in the Augusta area, then improvement of the navigation channel could be right in line with FEA's objective of bringing about the distribution of energy to all parts of the United States in sufficient quantities to meet demand.

9.60 Response: Noted.

9.61 Georgia State Clearinghouse, Office of Planning and Budget. In a letter dated 4 August 1976, the Office of Planning and Budget furnished the following comments on the Draft Environmental Statement.

9.62 Comment: The document submitted by the Corps of Engineers implies that the dredging of 181 miles of river and spoiling in adjacent wet areas will have only temporary impact and there will be no substantial impact to any part of the river system. It is our opinion that the document's content does not support this conclusion. In fact, we find it difficult to adequately assess the project's merits or liabilities because of the limited data provided.

9.63 Response: The Final Statement includes more detail and discussion. Although there are adverse impacts at the time of construction and dredging and for a period of time thereafter, these impacts do not usually last for a long period of time.

9.64 Comment: Although organisms native to the Savannah River have evolved under conditions of high silt transport and can be expected to withstand or recolonize after periods of reasonably high siltation, they have proven to be responsive to "normal" maintenance dredging operations in the river. Using current maintenance dredging techniques the less mobile organisms are lost in the immediate area of dredging and for some distance downstream, due in part to excessive siltation. Although recolonization of these areas eventually occurs, it is impeded by a less than optimum substrate, in which organisms might find attachment. The dredging operation, while removing large particulate matter from the bottom, resuspends fine particles to settle downstream. The "fines" impede the respiration of the various riverine organisms, as well as create substrate, which is unsuitable for attachment for many benthic species. We believe that disposal of spoil within the river channel can only intensify these conditions. The construction of semi-permanent diked disposal areas outside the 20-year floodplain would help eliminate the need for spoil to be placed within the flood channel of the river and would be stabilized against erosion during normal high-water periods. With this plan, there would be a necessity to remove

some wetland vegetation for barge access; however, the amount might not be equal the amount to be lost with the proposed plan. We are uncertain as to the overall merits of spoiling outside the 20-year floodplain, but we feel the Corps should at least address it as an alternative.

9.65 Response: Diked disposal areas have been discussed in paragraph 6.02 of the Final Environmental Statement.

9.66 Comment: Due to problems associated with current methods of project maintenance, we believe the final statement should include a discussion of the possibility of manipulating impoundments on the Savannah River in order to maintain year-round operable depths with a minimum of maintenance dredging. We would be interested to know whether it would be feasible in the cost analysis to partially or completely maintain the Savannah River as a navigable body by careful regulation and release of upstream impounded water and to know the relation to hydroelectric generation.

9.67 Response: Current releases from the existing impoundments on the Savannah River are determined by the storage that was allocated to particular uses when the projects were authorized. Each impoundment has certain amounts of its storage set aside for different purposes, such as flood control, power generation and navigation. This storage allocation was specified in the authorization of the project by Congress. To change this allocation of water storage would require Congressional action; first to authorize a reanalysis of the water allocation and then to make the recommended modifications, if any.

9.68 Comment: It is our understanding that the Corps of Engineers is implying that public recreation will be benefitted as a result of the project. We feel that the document has not adequately expressed that there might be conflicts between public recreation and commercial navigation. We feel that the Corps should address this factor and initiate a cost analysis of the issue. It appears to us to be an incongruity when the Corps assumes substantial monetary benefits on projects where there may be liabilities. The proposed action lies between two metropolitan areas, both growing in terms of recreational needs. This factor should be considered in the preparation of the final document.

9.69 Response: The recreation potential was not analyzed for this statement. However, the recreation potential is currently being studied under the Savannah River Basin Study which is a separate study. Additional information has been added to the recreational impact section of the Final Statement.

9.70 Comment: In conclusion, we feel that the Corps has not properly quantified and addressed impacts or alternatives. The above-mentioned issues should be discussed in subsequent documents. Issues involving water quality should be coordinated with the Environmental Protection Division, and those involving fish and wildlife coordinated with the Game and Fish Division.

9.71 Response: Noted. The Final Environmental Statement better addresses the impacts and adverse effects. The State Clearinghouse, as the designated A-95 agency for coordination, has been the primary coordination point with State agencies.

9.72 Technical Comments with Originating Division of the Department of Natural Resources, Office of Planning and Research (OPR).

9.73 Comment: Page 1, p. 1.04. We doubt that the general public is aware of what constitutes a pile dike. A detailed description, as well as a schematic diagram, should be provided in the final document.

9.74 Page 2, p. 1.06. The same applies for revetments and proposed spoiling in river cutoffs. Narrative descriptions and diagrams should be included in subsequent documents for the purpose of informing that sector of the public which is not fully cognizant of these actions.

9.75 Response: Typical illustrations of a pile dike, channel cutoff, revetment and riverbend improvement have been added as Appendix C of the Final Statement.

9.76 Comment: Page 2, p. 2.06. The Corps should delineate the acreage of marsh to be affected by the project (if any).

9.77 Response: There will be no direct effects on the marshes along the Savannah River as a result of this project.

9.78 Comment: Page 5, p. 2.11, sentences 1 and 2. This paragraph states that swamps are frequently recharge areas. Does this imply that portions of the swamps to be adversely affected (p. 4.20) are potential aquifer recharge zone? This issue should be addressed in more detail, with the acreages to be affected quantified.

9.79 Response: There will not be any direct effects on the swamps along the Savannah River. The disposal material will be placed so that the surrounding low lands can naturally drain.

9.80 Comment: Page 5, p. 2.11, sentences 3 and 4. We are cognizant that swamps are beneficial in terms of filtering runoff from upland areas. Does the Corps have specific documentation quantifying the above-cited statement? If so, the bibliography should include these citations.

9.81 Response: This information, as well as much of the other information used in Section 2.00 of the Statement, was taken from Wood, et. al., 1973. This is the last entry of Appendix A. In addition, many other documents and references confirm this statement.

9.82 Comment: Page 6, p. 2.15; Page 7, p. 2.21. We note that both of these statements seem to imply a tendency of the Savannah River below Augusta to have eutrophication and dissolved oxygen problems. (Often these are associated). Will action on the cutoffs and spoiling on swamps in general increase the potential for water quality degradation, in light of p. 2.11 stating the value of river swamps with regard to tertiary treatment?

9.83 Response: There will be no dredged material disposal on the river swamps and the disposal in the river cutoffs should not permanently affect the dissolved oxygen content of the river.

9.84 Comment: We are concerned about the aesthetic effects on Ebineezer and Brian Creeks, which are potential National Natural Landmarks because of their scenic qualities. Will the Corps' spoiling have any impact on these creeks in terms of aesthetic or other factors?

9.85 Response: The project will have no effect on these creeks or on any National Natural Landmarks.

9.86 Comment: Page 18, p. 4.03. The Corps has not previously addressed any "localized changes in stream flow" resulting from the project. This should be described in more detail. The Department of Natural Resources Geologic and Water Resources Division should be coordinated with closely as a result of changes in channel morphology. (Contact Bill Clark 656-3214).

9.87 Response: Any time there is a snag pulled or moved, a pile dike or revetment constructed, or any dredging done, there will be some localized change in the stream flow. Coordination is conducted where needed with State and Federal agencies.

9.88 Comment: Page 19, p. 4.06. What is involved in the construction of new cutoffs in terms of cubic yards of dredge or fill?

9.89 Response: 624,069 cubic yards of material will be involved in the construction of new cutoffs.

9.90 Comment: Page 19, p. 4.09. The assessment of impacts on recreation are incomplete. The permanent actions of diking, widening, constructing river cutoffs and snagging all have major impacts on existing and future recreational use of the river.

9.91 Response: This information has been added to the Final Environmental Statement.

9.92 Comment: Page 20, p. 4.12. The assessment of impacts on aesthetics are unrealistic. The study has concluded that no long term adverse visual impacts will be caused by the proposed actions. Pile dikes, dredge material, results of snagging and river cutoffs are not aesthetically pleasing.

9.93 Response: This information has been included in the Final Statement. However, snagging very often improves as well as changes fish habitat.

9.94 Comment: The Corps states that "in most cases increased turbidity due to dredging is a transient condition," implying that in some cases it is not. The Corps should address this issue, further quantifying available data.

9.95 Response: The above quote was taken out of context. If the reviewer had read the next sentence he could have noted that in most cases, when dredging ceases in an area, turbidity diminishes to background levels within a few hours. However, in some cases, it may take longer.

9.96 Comment: Page 20, p. 4.15. The Corps states that "where possible, the material will be placed within the pile dike systems to increase their

efficiency." This implies that, in some cases, the material will not be placed within the pile dike systems. In general, we would appreciate the Corps' quantifying approximately what volume in cubic yards will be placed on wetlands or shallow flats.

9.97 Response: It is true that all the dredged material will not be required for the pile dike systems. Initially, under the increased maintenance, the project would require 264,069 cubic yards of material to be dredged from the river channel and 624,000 cubic yards from the river cutoffs. This would be placed along the shallow side of the river or along pile dikes for the river dredging operations and in the oxbows developed by the cutoffs for the cutoff dredging. Subsequent dredging requirements are estimated at 50,000 cubic yards per year from the river channel. This material will be placed along the shallow side of the river or in the pile dike areas.

9.98 Comment: Page 21, p. 4.19. Are revetments not subject to erosion?

9.99 Response: Revetments are constructed in such a way as to resist normal stream erosion. In fact, the purpose of a revetment is to protect the bank on which it is constructed.

9.100 Comment: Page 21, p. 4.20. Again, the construction of cutoffs is of extreme concern to us. The Corps should address and quantify impacts further.

9.101 Response: Additional impacts as a result of cutoff construction have been included in the Final Statement.

9.102 Comment: Page 22, p. 8.00. This statement implies that all impacts from this project are temporary. We feel that spoil deposition does not have temporary impacts, that its damage in certain instances is permanent.

9.103 Response: Although there are adverse impacts at the time of construction and/or dredging and for a period of time thereafter, these impacts are not permanent. The stream channel is constantly changing with or without man's interference; and, although the flora and fauna are destroyed, they are able to reinvade the areas of disturbance.

9.104 Technical Comments With Originating Division of the Department of Natural Resources, Game and Fish Division (G&F).

9.105 Comment: Page 19, p. 4.09. It is very doubtful that maintenance dredging, snagging, and construction of cut-offs will enhance the existing stream fishery.

9.106 Response: This has been corrected in the Final Statement.

9.107 Comment: Page 20, p. 4.12. In discussing aesthetics, the impact of constructing new cutoffs is not considered. We feel the construction of cutoffs will degrade the aesthetic value of the existing stream environment.

9.108 Response: This has been added to the Final Statement.

9.109 Comment: Page 20, p. 4.15. We believe the disposal of dredged spoil in the river will be detrimental to fisheries and benthic communities. Also, it is probable that this material will be deposited in other downstream areas during subsequent periods of high water. Therefore, we recommend that all dredged spoil be placed in selected diked, upland disposal sites of low wildlife value.

9.110 Response: We concur that dredged material disposal in the river will be detrimental to fisheries and benthic communities. Also, some of the disposal material will be redeposited downstream; however, this should be outside of the channel on the slack water side. Diked areas were considered for disposal; however, since most of the area along this stretch of the Savannah River has only limited development and numerous swamp and marsh areas, it would be both economically and environmentally unjustifiable to dispose outside the river channel.

9.111 Comment: Construction of cut-offs will result in loss of stream fish habitat by converting existing stream meanders to oxbow or pond type habitats. Blocking stream flows as planned through these newly created oxbows will encourage aquatic plant infestations and may create oxygen depletion problems during the summer months. Existing wildlife habitat within the new channel corridor will also be permanently lost. The new cut-offs will increase stream velocity resulting in increased scouring action and sedimentation downstream. In view of these concerns, we request consideration be given to deleting the construction of additional cut-offs.

9.112 Response: The purpose of the construction of cutoffs is to increase stream scouring in a problem area of the channel so that dredging will not be required to maintain the channel. None of the cutoffs will be completely closed off.

9.113 Comment: We are glad the Corps of Engineers recognizes that snagging will destroy fish and invertebrate habitat. Therefore, we recommend that snagging be confined to mid-channel removal of only hazardous to navigation.

9.114 Response: The navigation channel is the only place snagging is required and it is the only place where snagging will be performed.

9.115 Environmental Protection Division, Department of Natural Resources.

9.116 Comment: This office offers no objections to this project if it is carried out in such a manner so as not to violate applicable Water Quality Standards, if the activities do not interfere with other legitimate water uses and if the dredging and spoil disposal is performed in accordance with Water Quality Considerations for Court and Dredging Operations, revised April 1971, EPA, Region 4, Water Quality Office, Federal Facilities Branch.

9.117 Response: Noted.

9.118 Environmental Protection Division. In a separate letter dated 5 August 1976, the Environmental Protection Division of the Georgia Department of Natural Resources furnished the following comments on the Draft Environmental Statement.

9.119 Comment: As the EIS notes, various anadromous fish species utilize the affected portion of the Savannah River for breeding. Dredging in the lower portion of the river from March 16 through May 31 would be particularly objectionable due to the effect on the breeding grounds of the striped bass.

9.120 Response: Because of the high water levels normally occurring during the spring months, most dredging is done during the low water summer months. This should result in no adverse effects on the spring spawning.

9.121 Comment: The EIS indicates that material dredged from the main channel is deposited elsewhere in the river. The disadvantage of this disposal method, with the resulting double disruption of the river aquatic community and adverse effect on water quality at the dredging and disposal sites, is obvious. Also the probability seems high that a significant portion of the material removed from the channel will be washed back into the channel downstream and be redredged repeatedly as it moves toward the ocean. Alternate disposal methods should be continually evaluated and utilized whenever possible.

9.122 Response: Disposal of the dredged material into the river will be detrimental to the existing benthic communities and some of the material will be redeposited downstream; however, this material should be washed away from the channel into the slack water side of the river where shoaling will not affect navigation. Diked areas were considered for disposal; however, since most of the area along the Savannah River has only limited development and numerous swamp and low marsh areas, it would be more environmentally damaging to have disposal on these low areas than in the river slack water areas.

9.123 Comment: Although sites are not specifically identified, the EIS indicates that construction of new cutoffs of river loops is anticipated. It further indicates that material removed from the cutoffs may be deposited in the oxbow portions of the river aggravating natural siltation which construction of the cutoffs would cause in these areas.

9.124 Response: Locations of areas which will need intensive maintenance or construction are given in Table 1 and in the plates of Appendix C of the Final Environmental Statement. Although there will be disposal of the material dredged from the river cutoffs into the old channel to help divert the river through the new channel, this should not aggravate the natural siltation.

9.125 Comment: In the EIS, the proposed activities are represented as being required for maintenance of the existing navigation channel. Since the existing channel has been utilized for many years, the construction of new cutoffs is not required for successful navigation. Construction of new cutoffs would be an effort by the Corps of Engineers to improve the navigation channel. In connection with proposed revetments and pile dikes, construction of new cutoffs would amount to additional channelization of portions of the Savannah River. To comply with provisions of NEPA, a separate EIS should be prepared for any major proposed navigation channel improvements.

9.126 Response: Since the provision for minimum radius bends was included in the authorization of the present project, the bend easings and cutoffs discussed in the statement are necessary to maintain the channel minimum bend radius as authorized. Therefore, the bend easings and cutoffs are considered to be within the present authorization and do not require a separate Environmental Statement.

9.127 Comment: Section 2.17, p.7, states: "The Lower Savannah River, near Savannah, Georgia, is polluted by untreated or inadequately treated domestic and industrial wastes." For the record, the Savannah Harbor area, which was grossly polluted several years ago, is now in general compliance with established water quality standards, and the great majority of wastewater discharge in the area is receiving the legally required degree of treatment. The bulk of the present pollution load in Savannah Harbor is due to the concentration of population and large scale wastewater generating industries, whose discharges are substantial even though adequately treated by present standards.

9.128 Response: This information has been included in the Final Statement.

9.129 State of South Carolina, Water Resources Commission. In a letter dated 4 August 1976, the Water Resources Commission furnished the following comments on the Draft Environmental Statement.

9.130 Comment: The EIS stresses the natural beauty, undeveloped character, excellent fishing and hunting, etc., on this stretch of the river. Simultaneously, the lack of all-weather access points and recreational facilities and parks is emphasized. To achieve the full benefits of this project to recreational usage, the Corps should consider improvements in these areas in both states. Paved access roads, parking areas and ramps are a critical need as are developed camping areas and parks.

9.131 Response: The recreation potential was not analyzed for this study because it is a commercial navigation study. However, the recreation potential is currently being studied under the Savannah River Basin Study.

9.132 Comment: In section 2.45, the water transport figures in Table 7 should read Shipment in Tons rather than Tonnage in Thousands of Tons since yearly totals are in tons.

9.133 Response: This table has been corrected in the Final Environmental Statement.

9.134 Comment: In section 2.46, Population, Aiken County from period 1959-1970 showed an increase of population of approximately 11,355 persons. (U.S. Army Corps of Engineers, South Atlantic Division, Intragovernmental Order Number SADPD-75-1 Bureau of Economic Analysis, U.S. Dept. of Commerce, Washington, D.C., December '75, p. 28).

9.135 Response: This correction has been made in the Final Statement.

9.136 Comment: In section 4.11, Economic Aspects, Analysis of potential commodity movements along project revealed 2.6 million tons could be moved. Using figures, for tonnage from Table 7, p.17) tonnage transported was substantially less. For the period 1966-1975, the average yearly tonnage was 76,142 tons which was approximately three (3) percent of the potential. An estimate that is 34 times greater than this average use is misleading. This would involve tremendous expansion of demand and supply to warrant such estimates. This would involve construction of additional production and dockage facilities and the consideration of existing rail and highway systems already located within the Augusta area.

9.137 Response: The 2.6 million tons of commodities cited in the EIS' economic analysis represents the known tonnage that could utilize the river if it were made economically feasible. This tonnage was determined through surveys of industries located in the Savannah-Augusta area. Future industrial development, except for that well along in the planning or construction stage, was not considered. There is no attempt to say that this much commerce would move on the river if it were maintained at the authorized channel depth. Rather, there is a potential for this much tonnage in the event the channel becomes economically feasible. The actual use of the river would depend on the navigation conditions of the river and the transportation costs and desires of private industry.

9.138 Comment: In section 6.01, Alternatives to the Proposed Action, navigation by pleasure craft is extremely limited due to limited access of public to the river. Alternatives to maintenance operations would include adequate transportation alternatives (i.e. rail and highway modes) and these may be sufficient for present and future needs of Augusta industrial area.

9.139 Response: While present use of the river by pleasure craft is limited, this use is expected to grow with future development of public access areas to the river. Alternatives for the Savannah River navigation project consist primarily of whether or not to maintain the navigation project on the river. The need for the navigation project is based on the desires and interests of the area industry and local and state agencies. While it is true that adequate alternative modes of transportation exist, the need for the navigation project is dependent upon the need for waterborne transportation. This need is predicated on the economics of the various modes of shipment. Rail and highway often provide economical means for shipment of goods. However, waterborne transportation can also provide economical means for shipment, especially for heavy bulk items. Therefore, the analysis of whether or not to maintain the navigation project assumes that discontinuation of the project would result in the use of alternative modes of transportation.

9.140 Comment: We have the following questions on dredging and disposal of spoil material:

In section 1.04: Where are the "chronic Shoaling" areas?
How often will dredging be necessary?
How much dredging is the project projecting
and where (specifically) is the dredging
material to be disposed of?

9.141 Response: The areas requiring the most intensive maintenance are presented in Table 1 and in the plates of Appendix C of the Final Statement. Dredging will be necessary on an annual basis, once or twice a year. Initially, under the increased maintenance, the project would require 246,069 cubic yards of material to be dredged from the river channel and 624,000 cubic yards from river cutoffs. This material would be placed along the shallow side of the river or along pile dikes for the river dredging operations and in the oxbows developed by the cutoffs for the cutoff dredging. Subsequent dredging requirements are estimated at 50,000 cubic yards per year from the river channel. This material would be placed along the shallow side of the river or in pile dike areas.

9.142 Comment: We would also desire information pertaining to the quantity of spoil disposal sites in South Carolina and how many, or what percentage, are below mean high water elevation or below ordinary highwater elevation?

9.143 Response: Dredged material disposal sites would be in the river along the shallow side or in pile dike areas. The number of sites will depend on the dredging requirements and exact locations at the time of dredging. The material in all cases would be placed so that it would be below the normal low water plane. This would be done to prevent possible interference with natural drainage.

9.144 South Carolina Wildlife and Marine Resources Department. In a letter dated 22 July 1976, the South Carolina Wildlife and Marine Resources Department furnished the following comment on the Draft Environmental Statement.

9.145 Comment: We do not object to this project; however, we do recommend scheduling the construction work whereby the increased turbidity will not have any detrimental effects on either indigenous or anadromous species.

9.146 Response: Noted. Due to high water during the spawning season, dredging is not normally required. Most of the dredging will be conducted in the low water summer months.

9.147 South Carolina Department of Archives and History. In a letter dated 21 July 1976, the Department of Archives and History furnished the following comment on the Draft Environmental Statement.

9.148 Comment: We concur with Dr. Stephenson's observations about the likelihood and known existence of archeological sites in or near the project area.

9.149 Response: No response required.

9.150 South Carolina Department of Health and Environmental Control. In a letter dated 13 July 1976, the Department of Health and Environmental Control furnished the following comments on the Draft Environmental Statement.

9.151 Comment: River cutoffs should be excavated prior to their connection to the waterway, thereby reducing the impact(s) of construction activities (i.e. increased turbidities, flotsam) upon contiguous State waters.

9.152 Response: Since the normal procedure is to start dredging from one end and dredge to the other side, the increase in turbidity, etc., will be localized until the cutoff is connected to the other side to allow the current to flow through. When this current flows through the new cut, it will probably temporarily increase the turbidity downstream. However, in dredging with the method suggested by your comment, there would still be a temporary increase in turbidity at the time the connections are dredged.

9.153 Comment: The locations of all proposed channel modifications (i.e. river widenings, pile dikes, revetments, and river cutoffs) should be depicted within the final EIS.

9.154 Response: The areas requiring the most intensive maintenance are presented in Table 1 and their locations are shown on the plates of Appendix C.

9.155 South Carolina State Commission of Forestry. In a letter dated 28 June 1976, the State Commission of Forestry furnished the following comment on the Draft Environmental Statement.

9.156 Comment: Your request for comments on the adequacy of the Impact Statement for the Savannah River Navigation Project has been received.

9.157 It appears that most of the work will not affect woodland areas any more than the normal flooding and changes in the river course than it does now.

9.158 We find this statement adequate for our purposes as is written.

9.159 Response: No response required.

9.160 Dr. Robert L. Stephenson, South Carolina State Archeologist. In a letter dated 1 July 1976, Dr. Stephenson furnished the following comments on the Draft Environmental Statement.

9.161 Comment: I have reviewed the Draft Environmental Statement for Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, Including the Savannah Bluff Lock and Dam, South Carolina. I was pleased to see, on page 11, the brief but significant archeological statement. I would like to comment on the Draft Environmental Statement by way of reiterating and emphasizing that brief statement.

9.162 This area of the Savannah River has been a major artery for cultural development for well over 12,000 years. There is no single mile of that entire stream channel or of any of its cut-offs, oxbows, or any of its shore line that doesn't potentially have an archeological site on it. The list of sites mentioned in Table 4 reflect only the very limited archeological reconnaissance of the area that has been done in the past. As your statement says, this probably reflects no more than 10% of the sites in the area.

9.163 Response: No response required.

9.164 Comment: As this dredging project proceeds, every additional pile dike, every revetment, every river cut-off and widening, has a potential of destroying an archeological site and would need to be investigated by an archeologist before it can be cleared for archeological impact. The snagging and dredging operations in the river itself have considerable potential for underwater archeology that may pertain to isolated shipwrecks and/or accumulations of archeological materials, both historic and prehistoric, that may have fallen into the river from the bluffs on either side of the channel.

9.165 Response: Any additional pile dike, revetment, river cutoff or widening will be investigated by an archeologist prior to any construction work. The snagging and maintenance dredging in the existing channel should not have any significant impacts on the underwater archeology that has not been previously disturbed. If a shipwreck is uncovered during dredging, the dredging operation would cease in that area of the river until the wreck is identified as to historical value and a decision is made as to the proper handling of the wreck. Snagging operations should not significantly impact underwater archeology because snags such as trees that occasionally fall into the river are rooted in the banks. Their removal involves lifting them out of the water and relocating them on the banks of the river. Archeological materials, both historic and prehistoric, which may have fallen into the river channel from their original context and which may require maintenance dredging, would be relocated on the river banks.

9.166 Comment: Proper archeological investigation of this entire stretch of river poses a very large project in just the survey and reconnaissance alone. The potential for mitigation of adverse effects on archeological sites, once found, is likewise a very large project. I hope these things can be accomplished before the project is undertaken so that, in the fine tradition of Corps of Engineers work, the cultural resources in a large area will be preserved.

9.167 Response: Proper archeological investigation of the entire stretch of the river would involve an extensive survey and reconnaissance program. The Corps of Engineers is only authorized to fund archeological surveys in areas that may be impacted by its construction activities. However, in those areas which have been identified and which require mitigation measures, the Corps would take the necessary measures to protect and preserve the cultural resources.

9.168 Office of the Mayor, City of Savannah. In a letter dated 22 July 1976, Mayor John P. Rousakis furnished the following comment on the Draft Environmental Statement.

9.169 Comment: We have reviewed the environmental statement and we believe that it accurately assesses the impact of the proposed project.

9.170 We find this project to be consistent with the development goals for the Savannah area. Failure to implement the project would not be in the

best interest of the economic development of Savannah. We urge you to proceed swiftly with the completion of this project.

9.171 Response: No response required.

9.172 Savannah Port Authority - Port and Industrial Development. In a letter dated 23 June 1976, the Savannah Port Authority furnished the following comment on the Draft Environmental Statement.

9.173 Comment: Thanks for the opportunity to comment on the impact statement relating to the operation and maintenance of the navigation project between Savannah and Augusta. It appears to be a very thorough study. We consider it completely adequate. We feel that the Savannah River navigation project is a vital element in the area economy.

9.174 Response: No response required.

9.175 Georgia Ports Authority. In a letter dated 2 August 1976, the Georgia Ports Authority furnished the following comment on the Draft Environmental Statement.

9.176 Comment: In response to your letter dated June 21, 1976 to Mr. J. D. Holt referencing your Draft Environmental Statement for Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, Including the Savannah Bluff Lock and Dam, Georgia and South Carolina, this is to advise that the Georgia Ports Authority has no comments.

9.177 Response: No response required.

9.178 American Bureau of Shipping. In a letter dated 2 July 1976, the American Bureau of Shipping furnished the following comment on the Draft Environmental Statement.

9.179 Comment: We have reviewed the Draft Environmental Impact Statement for the subject project enclosed with your letter of 21 June 1976, and have to advise that this Bureau has no comments to offer.

9.180 Response: No response required.

APPENDIX A
BIBLIOGRAPHY

APPENDIX A

BIBLIOGRAPHY

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APPENDIX B
BIOLOGICAL INVENTORIES

TABLE 1

TREES

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Sweetgum <u>Liquidambar sty- raciflua</u>	Resident	Regional Bottom- lands	Common	South to Southeast U.S.	None
Red Maple <u>Acer rubrum</u>	Resident	Regional Swampy Sites and Uplands	Abundant	Mid to Eastern U.S.	Insignificant
Black Willow <u>Salix nigra</u>	Resident	Regional Moist Areas	Common	Eastern U.S.	Insignificant
Eastern White Pine (Northern White Pine) <u>Pinus strobus</u>	Resident	Regional High- lands	Uncommon	Eastern U.S.	None
Loblolly Pine <u>Pinus taeda</u>	Resident	Regional Except Higher Mts.	Abundant	South- east U.S.	None
Pitch Pine <u>Pinus rigida</u>	Resident	Regional High- lands	Common	Eastern U.S.	None
Red Cedar <u>Juniperus vir- giniana</u>	Resident	Ridges in Regional Areas	Common	Eastern U.S.	None
Black Walnut <u>Juglans nigra</u>	Resident	Regionally Scat- tered	Common	Eastern U.S.	None
Shagbark Hickory <u>Carya ovata</u>	Resident	Low Hills, Streams and Swamps	Common	Eastern U.S.	Insignificant
Shellbark Hickory <u>Carya laciniosa</u>	Resident	Rich Bottomlands	Common	Eastern U.S.	Insignificant

TABLE 1 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Carolina Hickory <u>Carya caroliniae- septentrionalis</u>	Resident	Low Woods and River Bottoms	Common	Eastern U.S.	Insignificant
Mockernut Hickory <u>Carya tomentosa</u>	Resident	Well-drained Soils	Uncommon	Eastern U.S.	Insignificant
Pignut Hickory <u>Carya glabra</u>	Resident	Regional Uplands	Uncommon	Eastern U.S.	Insignificant
Sand Hickory <u>Carya pallida</u>	Resident	Regional Sandy Soils	Common	Eastern U.S.	None
Bitternut Hickory <u>Carya cordiformis</u>	Resident	Regional Streams and Swamps	Common	Eastern U.S.	Insignificant
Eastern Cottonwood <u>Populus deltoides</u>	Resident	Along Streams	Uncommon	Eastern U.S.	Insignificant
River Birch <u>Betula nigra</u>	Resident	Stream Banks	Common	Eastern U.S.	Insignificant
Sweet Birch <u>Betula lenta</u>	Resident	Cool, Rich Soils	Uncommon	Eastern U.S.	Insignificant
American Hornbeam (Blue Beech) <u>Carpinus carolini- ana</u>	Resident	Streams and Low- lands	Common	Eastern U.S.	Insignificant
Eastern Hophornbeam (Hop Hornbeam) <u>Ostrya virginiana</u>	Resident	Low Stream Banks	Common	Eastern U.S.	Insignificant
American Beech <u>Fagus grandifolia</u>	Resident	Moist Soils	Common	Eastern U.S.	Insignificant

TABLE 1 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Allegheny Chinkapin <u>Castanea pumilia</u>	Resident	Upland Woods, Swamp Borders	Uncommon	Eastern U.S.	Insignificant
White Oak <u>Quercus alba</u>	Resident	Rich Uplands, Moist Bottoms	Abundant	Eastern U.S.	Insignificant
Post Oak <u>Quercus stellata</u>	Resident	Sandy Uplands	Common	Eastern U.S.	Insignificant
Overcup Oak <u>Quercus lyrata</u>	Resident	Rich, Low Grounds	Common	Eastern and Southern U.S.	Insignificant
Chesnut Oak <u>Quercus prinus</u>	Resident	Upland Soils	Common	Eastern U.S.	Insignificant
Northern Red Oak <u>Quercus rubra</u>	Resident	Low Ground Edges and Along Small Streams	Common	Eastern U.S.	Insignificant
Southern Red Oak <u>Quercus falcata</u>	Resident	Uplands	Common	South Eastern U.S.	Insignificant
Shumard Oak <u>Quercus shumardii</u>	Resident	Fertile Soils Near Streams	Uncommon	South Eastern U.S.	Insignificant
Black Oak <u>Quercus velutina</u>	Resident	Uplands	Common	Eastern U.S.	Insignificant
Willow Oak <u>Quercus phellos</u>	Resident	Flats and Low Grounds	Uncommon	South Eastern U.S.	Insignificant

TABLE 1 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Water Oak <u>Quercus nigra</u>	Resident	Stream Banks and Low Grounds	Common	Eastern U.S.	Insignificant
Blackjack Oak <u>Quercus mari- landia</u>	Resident	Poor or Dry Soils	Abundant	Eastern U.S.	Insignificant
American Elm <u>Ulmus americana</u>	Resident	Rich Soils Along Stream Banks and Low, Rocky Hill- sides	Common	Eastern U.S.	Insignificant
Slippery Elm <u>Ulmus rubra</u>	Resident	Stream Banks	Common	Eastern U.S.	Insignificant
Winged Elm <u>Ulmus alata</u>	Resident	Dry, Gravelly Uplands	Common	Eastern U.S.	None
Sugarberry <u>Celtis laevigata</u>	Resident	Wet, Swampy Places	Uncommon	Eastern U.S.	Insignificant
Georgia Hackberry <u>Celtis tenuifolia</u>	Resident	Hillsides	Common	South Eastern U.S.	Insignificant
Red Mulberry <u>Morus rubra</u>	Resident	Fertile Valleys and Hillsides	Uncommon	Eastern U.S.	Insignificant
Cucumber Tree <u>Magnolia acuminata</u>	Resident	Caves and Lower Slopes	Common	South Eastern U.S.	Insignificant
Umbrella Magnolia <u>Magnolia tripetala</u>	Resident	Near Streams and in Damp Soils	Common	South Eastern U.S.	Insignificant

TABLE 1 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Fraser Magnolia <u>Magnolia fraseri</u>	Resident	Moist Soils Near Streams	Uncommon	South Eastern U.S.	Insignificant
Yellow Poplar <u>Liriodendron tulipifera</u>	Resident	Deep, Rich, Rather Moist Soils	Common	Eastern U.S.	Insignificant
Sassafras <u>Sassafras albidum</u>	Resident	Dry Soils, Abandoned Fields	Common	Eastern U.S.	None
Sweetgum (Red Gum) <u>Liquidambar styra- ciflua</u>	Resident	Bottomlands	Common	Eastern U.S.	Insignificant
American Sycamore <u>Platanus occi- dentalis</u>	Resident	Stream Banks	Common	Eastern U.S.	Insignificant
Downy Serviceberry <u>Amelanchier arbor- ea</u>	Resident	Near Streams	Common	Eastern U.S.	Insignificant
Black Cherry <u>Prunus serotina</u>	Resident	Deep, Rich Soils Caves	Common	Eastern U.S.	Insignificant
Hawthorne <u>Crataegus sp.</u>	Resident	Regional Soils	Common	Eastern U.S.	None
Honey Locust <u>Gleditsia tria- canthos</u>	Resident	Old Fields, Ditch Banks, Stream Borders	Common	Eastern U.S.	Insignificant
Black Locust <u>Robinia pseudoa- cacia</u>	Resident	Slopes	Common	Eastern U.S.	None

TABLE 1 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Eastern Redbud <u>Cercis canadensis</u>	Resident	Fertile Hill- sides	Common	Eastern U.S.	None
American Holly <u>Ilex opaca</u>	Resident	Rich, Moist Soils	Common	Eastern U.S.	None
Chalk Maple <u>Acer leucoderme</u>	Resident	Regional Hill- sides	Common	South Eastern U.S.	None
Florida Maple (Southern Sugar Maple) <u>Acer barbatum</u>	Resident	Regional Low, Wet Woods	Common	South Eastern U.S.	Insignificant
Boxelder <u>Acer negundo</u>	Resident	Moist, Deep Soils Near Streams	Common	South Eastern U.S.	Insignificant
Painted Buckeye (Georgia Buckeye) <u>Aesculus sylvatica</u>	Resident	Fertile Hill- sides	Common	South Eastern U.S.	None
White Basswood <u>Tilia heterophylla</u>	Resident	Regional Deep Moist Soils	Common	South Eastern U.S.	None
Black Tupelo <u>Nyssa sylvatica</u>	Resident	Swamps and Hill- sides	Common	South Eastern U.S.	Insignificant
Flowering Dogwood <u>Cornus florida</u>	Resident	Regional Fertile Well Drained Soils	Common	South Eastern U.S.	None

TABLE 1 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Sourwood <u>Oxydendrum arbor- eum</u>	Resident	Fertile, Well Drained Soils	Common	Eastern U.S.	None
Persimmon <u>Diospyros virgini- ana</u>	Resident	Light, Well Drained Soils	Common	South Eastern U.S.	None
Carolina Silverbell <u>Halesia carolina</u>	Resident	Wooded Slopes, Stream Banks	Common	South Eastern U.S.	Insignificant
White Ash <u>Fraxinus americana</u>	Resident	Moist, Fertile Soils	Abundant	Eastern U.S.	Insignificant
Green Ash <u>Fraxinus pennsylv- vanica</u>	Resident	Low, Rich Soils Near Streams	Common	Eastern U.S.	Insignificant
Southern Catalpa <u>Catalpa bignoni- oides</u>	Resident	Along Streams and Gullies	Common	Eastern U.S.	Insignificant

TABLE 2

BIRDS

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Mallard Duck <u>Anas platyrhyn-</u> <u>chos</u>	Migrant	Waterways and Marsh Area Regionwide	Common	U.S.	Negligible
Ring-necked Duck <u>Aythya collaris</u>	Migrant	Regionwide Wooded Lakes Waterways	Common	U.S.	Negligible
Green-winged Teal <u>Anas carolinensis</u>	Migrant	Regionwide Marsh Areas	Common	U.S.	Negligible
Blue-winged Teal <u>Anas discors</u>	Migrant	Regional Marsh Areas	Uncommon	U.S.	Negligible
Widgeon <u>Mareca americana</u>	Migrant	Regional Ponds and Bays	Uncommon	U.S.	Negligible
Shoveler <u>Spatula clypeata</u>	Migrant	Regional Ponds and Marshes	Uncommon	U.S.	Negligible
Gadwall <u>Anas strepera</u>	Migrant	Regional Water- ways	Occasional	U.S.	Negligible
Pintail <u>Anas acuta</u>	Migrant	Regional Ponds and Marshes	Common	U.S.	Negligible
Coot <u>Fulica americana</u>	Resident	Regional Water- ways	Common	U.S.	Negligible
Gallinules <u>Porphyryula mar-</u> <u>tinica</u>	Resident	Regional Low- lands, Swamp Waterways	Common	Southeast Occasion- ally North	Negligible
Canada Goose <u>Branta canadensis</u>	Migrant	Regional Water- ways	Occasional	North America	None

TABLE 2 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Snow Goose <u>Chen hyperborea</u>	Migrant	Regional Coastal Waterways	Occasional	Mid to East- ern North America	None
Woodcock <u>Philohela minor</u>	Migrant	Woodland Swamps, Thickets	Common	Eastern North America	Negligible
Wood Duck <u>Aix sponsa</u>	Resident	Wooded Swamps, Ponds, Streams	Common	Eastern North America	Negligible
Blue Goose <u>Chen caerules- cens</u>	Migrant	Regional Coastal Waterways	Rare	Mid to East- ern North America	None
Piedbilled Grebe <u>Podilymbus podi- ceps</u>	Migrant	Regional Marshes Waterways	Common	Eastern North America	Negligible
Great Blue Heron <u>Ardea herodias</u>	Resident	Regional Water- ways	Common	Eastern North America	Negligible
Little Blue Heron <u>Florida caerulea</u>	Resident	Regional Water- ways	Common	South and Eastern U.S.	Negligible
Snowy Egret <u>Leucophoyx thula</u>	Resident	Regional Water- ways	Common	Eastern U.S.	Negligible
Common Egret <u>Casmerodius albus</u>	Resident	Regional Swamps and Waterways	Common	Eastern U.S.	Negligible
Green Heron <u>Butorides vires- cens</u>	Resident	Regional Water- ways	Common	Eastern U.S.	Negligible

TABLE 2 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Black-Crowned Heron <u>Nycticorax nycti- corax</u>	Resident	Waterways	Common	Eastern U.S.	Negligible
Yellow-Crowned Heron <u>Nyctanassa viola- cea</u>	Resident	Swamps, Water- ways	Common	Eastern U.S.	Negligible
Least Bittern <u>Ixobrychus exilis</u>	Resident	Marsh and Water- ways Regionally	Occasional	Mid to Eastern U.S.	Negligible
King Rail <u>Rallus elegans</u>	Resident	Fresh Water Marsh Area and Waterways	Uncommon	Mid to Eastern U.S.	Negligible
Louisiana Heron <u>Hydranassa tri- color</u>	Resident	Swamp, Marshes and Other Water- ways	Occasional	Eastern Seaboard and Southern U.S.	Negligible
Cattle Egret <u>Bubulcus ibis</u>	Resident	Waterways, Swamps and Marshes	Common	Southern U.S.	Negligible
White Ibis <u>Guara alba</u>	Resident	Marsh and Water- ways	Abundant	Deep South	Negligible
Wood Ibis <u>Mycteria ameri- cana</u>	Resident	Coastal Areas	Common	Southern U.S.	Negligible
Glossy Ibis <u>Plegadis fal- cinellus</u>	Migrant	Regional Marsh- land Areas	Rare	Southern U.S., Rarely North	None
Yellow-legs <u>Totanus sp.</u>	Migrant	Regional Mud- flats and Margins	Uncommon	U.S.	Negligible
Spotted Sandpiper <u>Actitis macularia</u>	Migrant	Waterways (Most- ly Lakes and Streams) Region- ally	Uncommon	U.S.	Negligible

TABLE 2 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Solitary Sandpiper <u>Tringa solitaria</u>	Migrant	Marsh Wilderness Regionally	Occasional	Eastern U.S.	Negligible
Common Snipe <u>Capella gallinago</u>	Migrant	Marsh and Stream Areas Regionally	Common	Midwestern and Eastern U.S.	Negligible
Ring-Billed Gull <u>Larus delawarensis</u>	Migrant	Regional Coast Waterways	Common	U.S.	None
Virginia Rail <u>Rallus limicola</u>	Migrant	Regional Marsh- lands	Rare	Midwestern and Eastern U.S.	None
American Bittern <u>Botaurus lentiginosus</u>	Migrant	Regional Marshes	Uncommon	U.S.	None
Bob-White <u>Colinus virginianus</u>	Resident	Brush and Crop- lands	Common	Midwestern and Eastern U.S.	None
Mourning Dove <u>Zenaidura macroura</u>	Migrant	Brush and Crop-	Common	Eastern U.S.	None
Southern Bald Eagle <u>Haliaeetus leucocephalus leucocephalus</u>	Migrant	Regional Rivers and Lakes	Endangered	U.S.	Negligible
American Peregrine Falcon <u>Falco peregrinus anatum</u>	Migrant	Regional	Rare	U.S.	None
Red-Cockaded Wood- pecker <u>Dendrocopus borealis</u>	Resident	Regional Pine Woodlands	Uncommon	Southern States	None

TABLE 2 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Wild Turkey <u>Meleagris gallopavo</u>	Resident	Regional Dense Hardwood Wood- lands	Uncommon	U.S.	Negligible
Pileated Woodpecker <u>Hylatomos pileatus</u>	Resident	Bottomland Hardwoods	Common	Eastern U.S.	Negligible
Red-Wing Blackbird <u>Agelaius phoeniceus</u>	Migrant	Bottomland Marsh, Swamps	Common	Eastern U.S.	Negligible
Wood Warblers <u>Parulidae</u>	Migrant	Hardwood Forests	Common	Eastern U.S.	Negligible
Thrushes <u>Turdidae</u>	Migrant	Hardwood Forests	Common	Eastern U.S.	Negligible
Vireos <u>Vireonidae</u>	Migrant	Hardwood Forests	Common	Eastern U.S.	Negligible
Titmice <u>Paridae</u>	Resident	Hardwood Forests	Common	Eastern U.S.	Negligible
Nuthatches <u>Sittidae</u>	Resident	Woodlands	Common	Eastern U.S.	Negligible
Brown Creeper <u>Certhia familiaris</u>	Migrant	Woodlands	Common	Eastern U.S.	Negligible
Wrens <u>Troglodytidae</u>	Migrant	Woodlands	Common	Eastern U.S.	Negligible
Towhee <u>Pipilo erythrophthalmus</u>	Migrant	Open Brushy	Common	Eastern U.S.	Negligible

TABLE 2 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Blue Jay <u>Cyanocitta cris- tata</u>	Resident	Woodlands, Brushy Areas	Common	Eastern U.S.	None
Crow <u>Corvus brachy- rhynchos</u>	Migrant	Fields, Woodlands	Common	U.S.	None
Red-Shouldered Hawk <u>Buteo lineatus</u>	Migrant	Moist Woodlands	Common	Eastern and Central U.S.	Negligible
Broad-Winged Hawk <u>Buteo platyp- terus</u>	Migrant	Dry Forests and Wooded Highlands	Common	Eastern U.S.	None
Sharp-Shinned Hawk <u>Accipiter striatus velox</u>	Migrant	Woodlands	Common	Eastern U.S.	None
Cooper's Hawk <u>Accipiter cooperii</u>	Migrant	Woodlands	Common	Most of U.S.	None
Red-Tailed Hawk <u>Buteo jamaicensis</u>	Migrant	Dry Woodlands	Common	Eastern North America	None
Sparrow Hawk (Kestrel) <u>Falco sparverius</u>	Migrant	Woodlands	Common	Eastern North America	None
Marsh Hawk (Harrier) <u>Circus cyaneus hudsonius</u>	Migrant	Meadows, Bushy Marshes	Common	Eastern U.S.	Negligible
Turkey Vulture <u>Cathartes aura</u>	Migrant	Woodlands	Common	Eastern U.S.	None
Black Vulture <u>Coragyps atratus</u>	Migrant	Woodlands	Common	Eastern U.S.	None
Screech Owl <u>Otus asio</u>	Resident	Woodlands	Common	Eastern U.S.	None

TABLE 2 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Barred Owl <u>Strix varia</u>	Resident	Swampy Woodlands	Common	Eastern U.S.	None
Pine Woods Sparrow <u>Aimophila aesti- valis</u>	Migrant	Open Pine Country	Common	Eastern U.S.	None
Eastern Tree Sparrow <u>Spizella arborea</u>	Migrant	Edges Brushy Marshes	Common	Eastern U.S.	None
Rusty Blackbird <u>Euphagus carolinus</u>	Migrant	Swampy Woodlands	Common	Eastern U.S.	Negligible
Purple Grackle <u>Quiscalus quiscula</u>	Migrant	Croplands	Common	Eastern U.S.	Negligible
Prothonotary Warbler <u>Protonotaria cit- rea</u>	Migrant	River Swamps	Common	Eastern U.S.	Negligible
Swainsons Warbler <u>Limnothlypis swain- sonii</u>	Migrant	River Swamps	Common	Eastern U.S.	Negligible
Parula Warbler <u>Parula americana</u>	Migrant	Humid Woodlands	Common	Eastern U.S.	Negligible
Bachmans Warbler <u>Vermivora bach- mani</u>	Migrant	Wooded River Swamps	Rare	South Eastern U.S.	Negligible
Ivory-Billed Woodpecker <u>Campephilus prin- cipalis</u>	Resident	River Bottom Forests	Very Rare Endangered	South Eastern U.S.	Negligible

TABLE 3

MAMMALS

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
White-tailed Deer <u>Odocoileus vir- ginianus</u>	Resident	Statewide Woody Areas	Common	Eastern U.S.	None
Raccoon <u>Procyon lotor</u>	Resident	Statewide Vari- ous Habitats	Common	U.S.	None
Opossum <u>Didelphis mar- supialis</u>	Resident	Statewide Vari-	Common	U.S.	None
River Otter <u>Lutra canadensis</u>	Resident	Streams and Marshes	Uncommon	U.S.	Insignificant
Gray Fox <u>Urocyon cinereo- argenteus</u>	Resident	Statewide	Common	U.S.	None
Bobcat <u>Lynx rufus</u>	Resident	Statewide Woody Areas	Occasional	Southern U.S.	None
Mink <u>Mustela vison</u>	Resident	Statewide Streams and Marshes	Common	U.S.	Insignificant
Smoky Shrew <u>Sorex fumeus</u>	Resident	Cool, Rich Deciduous Forests	Uncommon	Eastern U.S.	None
Short Tailed Shrew <u>Blarina brevicauda</u>	Resident	Statewide, Cool Moist Habitats	Common	Eastern U.S.	None
Least Shrew <u>Cryptotis parva</u>	Resident	Statewide, Old Field Succes- sions	Uncommon	Eastern U.S.	None

TABLE 3 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Eastern Mole <u>Scalopus aquaticus</u>	Resident	Statewide	Common	Eastern U.S.	None
Little Brown Bat <u>Myotis lucifugus</u>	Resident	Statewide Caves, Buildings, Hollow Trees	Common	Eastern U.S.	None
Silver Haired Bat <u>Lasionycteris noctivagans</u>	Migrant	Piedmont-Fall Line, Trees Along Water Courses	Uncommon	Eastern U.S.	None
Eastern Pipistrelle <u>Pipistrellus sub- flavus</u>	Resident	Statewide	Common	Eastern U.S.	None
Cottontail Rabbit <u>Sylvilagus flo- ridanus</u>	Resident	Statewide Upland Woods and Open Areas	Common	Eastern U.S.	None
Swamp Rabbit <u>Sylvilagus aquati- cus</u>	Resident	Piedmont and Upper Coastal Plain Watery Habitats	Common	Eastern U.S.	Insignificant
Woodchuck <u>Marmota monax</u>	Resident	Mountainous Wooded and Semicultivated Regions	Uncommon	Eastern U.S.	None
Eastern Chipmunk <u>Tamias striatus</u>	Resident	Piedmont and Mountains, Open Woods	Common	Eastern U.S.	None
Gray Squirrel <u>Sciurus carolin- ensis</u>	Resident	Statewide Hard- wood Forests	Common	Eastern	None

TABLE 3 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Fox Squirrel <u>Sciurus niger</u>	Resident	Statewide Hard- wood Forests	Uncommon	Eastern U.S.	None
Southern Flying Squirrel <u>Glaucomys volans</u>	Resident	Statewide Forest Habitats	Common	Eastern U.S.	None
Beaver <u>Castor canadensis</u>	Resident	Statewide Lakes, Streams, Ponds	Common	Eastern U.S.	Insignificant
Rice Rat <u>Oryzomys palustris</u>	Resident	Statewide	Common	U.S.	Insignificant
Harvest Mouse <u>Reithrodontomys humulis</u>	Resident	Statewide	Common	Eastern U.S.	None
Golden Mouse <u>Peromyscus nut- talli</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant
Cotton Rat <u>Sitomodon hispidus</u>	Resident	Statewide Dense Grassy Habitats	Common	Eastern U.S.	Insignificant
Pine Mouse <u>Pitymys pinetorum</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant
Muskrat <u>Ondatra zibethicus</u>	Resident	Mountain and Piedmont, Aquatic Habitats	Common	Eastern U.S.	Insignificant
Norway Rat <u>Rattus norvegicus</u>	Resident	Statewide	Common	U.S.	None
House Mouse <u>Mus musculus</u>	Resident	Statewide	Common	U.S.	None

TABLE 3 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Black Bear <u>Ursus americanus</u>	Resident	Mountains, On the Ocmulgee River Drainage - Along the Fall Line and in the Okefenokee Swamp	Common	U.S.	Insignificant
Long Tailed Weasel <u>Mustela frenata</u>	Resident	Statewide Brushlands, Forests	Common	Eastern U.S.	Insignificant
Eastern Spotted Skunk <u>Spilogale pu- torius</u>	Resident	Statewide Except Coastal Plain	Common	Eastern U.S.	None
Striped Skunk <u>Mephitis mephitis</u>	Resident	Statewide, Agricultural or Wasteland	Common	Eastern U.S.	None

TABLE 4

AMPHIBIANS AND REPTILES

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Eastern Four-toed Salamander <u>Hemidactylum scutatum</u>	Resident	Eastern and Northeastern Parts	Common	Eastern U.S.	None
Carolina Purple Salamander <u>Gyrinophilus danieli dunnii</u>	Resident	North of Fall Line	Common	Eastern U.S.	None
Slender Glass Lizard <u>Ophiosaurus attenuatus longi- caudus</u>	Resident	Piedmont and Coastal Plain	Common	Central and South- eastern U.S.	Insignificant
Brown Skink <u>Lygosoma laterale</u>	Resident	Statewide	Common	Southern U.S.	Insignificant
Florida Five-lined Skink <u>Eumeces inexpectatus</u>	Resident	Statewide	Common	U.S.	Insignificant
Greater Five-lined Skink <u>Eumeces laticeps</u>	Resident	Statewide	Common	U.S.	Insignificant
Common Five-lined Skink <u>Eumeces fasciatus</u>	Resident	Statewide	Common	U.S.	Insignificant
Six-lined Racerunner <u>Cnemidophorus sex- lineatus</u>	Resident	Statewide Except Cumberland Plateau	Common	U.S.	Insignificant
Carolina Anole <u>Anole carolinensis carolinensis</u>	Resident	Statewide	Common	South- eastern U.S.	Insignificant

TABLE 4 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Carolina Pigmy Rattlesnake <u>Sistrurus milia- rus miliarus</u>	Resident	North of Middle Coastal Plain	Common	South- eastern U.S.	Insignificant
Eastern Tiger Salamander <u>Ambystoma ti- grinum tigrinum</u>	Resident	Piedmont and Coastal Plain	Common	Central and East- ern U.S.	Insignificant
Spotted Salamander <u>Ambystoma macu- latum</u>	Resident	North of Middle Coastal Plain	Common	Eastern U.S.	Insignificant
Fowlers Toad <u>Bufo woodhousei fowleri</u>	Resident	North of Lower Coastal Plain	Common	EsSEN- tially Throughout	Insignificant
Eastern Narrow Mouthed Toad <u>Microhyla caro- linensis caro- linensis</u>	Resident	Statewide	Common	Southern U.S.	Insignificant
Common Tree Frog <u>Hyla versicolor versicolor</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant
Southern Leopard Frog <u>Rana pipiens sphenoccephala</u>	Resident	Piedmont and Coastal Plain	Common	U.S.	Insignificant
Bull Frog <u>Rana grylio</u>	Resident	Statewide	Common	U.S.	Insignificant
Snapping Turtle <u>Chelydra serpen- tina serpentina</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant
Common Musk Turtle <u>Sternotherus odoratus</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant

TABLE 4 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Common Box Turtle <u>Terrapene carolina carolina</u>	Resident	Essentially Statewide	Common	Eastern U.S.	Insignificant
Yellow Bellied Turtle <u>Pseudemys scripta scripta</u>	Resident	Piedmont and Coastal Plain	Common	Eastern U.S.	Insignificant
Timber Rattlesnake <u>Crotalus horridus horridus</u>	Resident	Northernmost Counties	Common	Eastern and South- eastern U.S.	None
Northern Copperhead <u>Ancistrodon con- tortrix mokeson</u>	Resident	Northern Part of State	Common	Eastern and South- eastern U.S.	None
Southern Ground Snake <u>Haldea striatula</u>	Resident	Statewide	Common	Southern and South- western U.S.	None
Keeled Green Snake <u>Opheodrys aestivus</u>	Resident	Statewide	Common	Midwest to Eastern and Southern U.S.	None
Northern Banded Water Snake <u>Natrix sipedon pleuralis</u>	Resident	Extreme North- eastern Counties	Common	Eastern U.S.	Insignificant
Eastern Garter Snake <u>Thamnophis sirtalis sirtalis</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant
Scarlet Snake <u>Cemophora coc- cinea</u>	Resident	Statewide	Common	Southeast U.S.	Insignificant

TABLE 4 (Cont'd)

<u>Species</u>	<u>Habitat and/or Seasonal Status</u>	<u>Range In Region or State</u>	<u>Abundance In Region</u>	<u>Range In U.S.</u>	<u>Project Impact</u>
Eastern King Snake <u>Lampropeltis getu- lus getulus</u>	Resident	Statewide Except Northwestern Corner	Common	Eastern U.S.	Insignificant
Brown King Snake <u>Lampropeltis cal- ligaster rhombo- maculata</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant
Scarlet Milk Snake <u>Lampropeltis do- liata</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant
Eastern Coachwhip <u>Masticophis fla- gellum flagellum</u>	Resident	Statewide	Common	South- eastern U.S.	Insignificant
Black Racer <u>Coluber constrictor constrictor</u>	Resident	Statewide	Common	Eastern U.S.	Insignificant

APPENDIX C
TYPICAL ILLUSTRATIONS
OF RIVERBEND IMPROVEMENTS

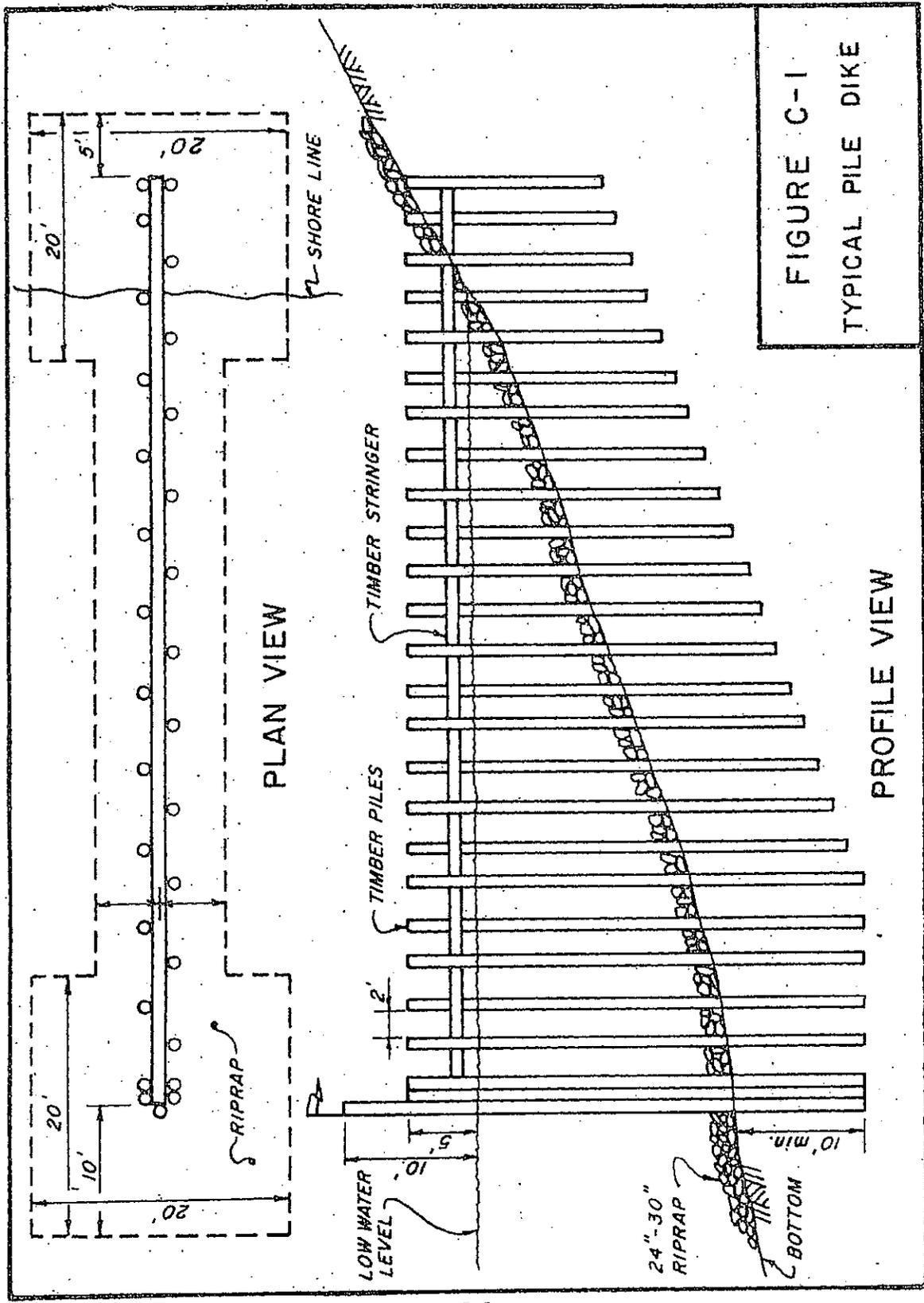


FIGURE C-1
TYPICAL PILE DIKE

PROFILE VIEW

PLAN VIEW

C-1

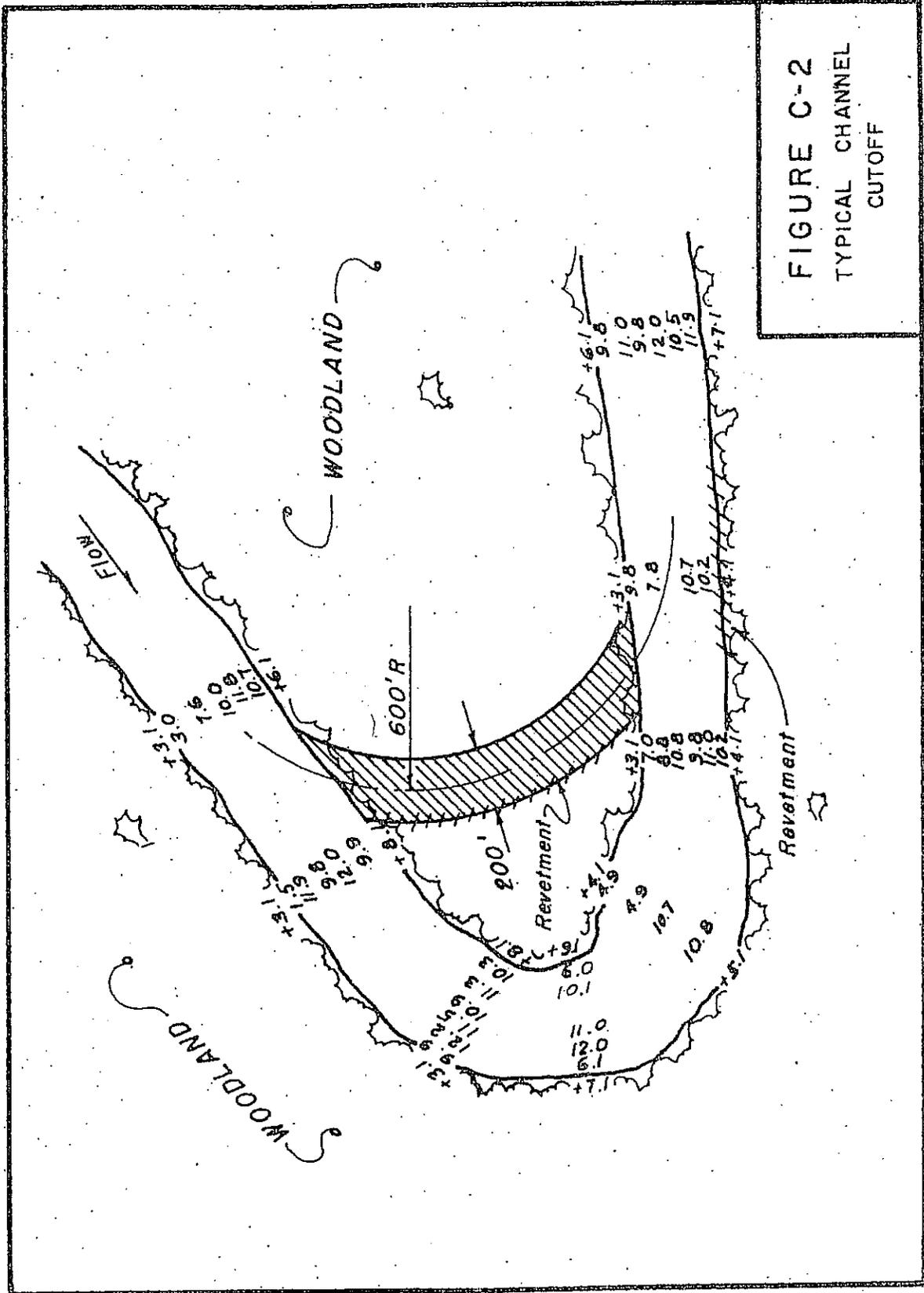
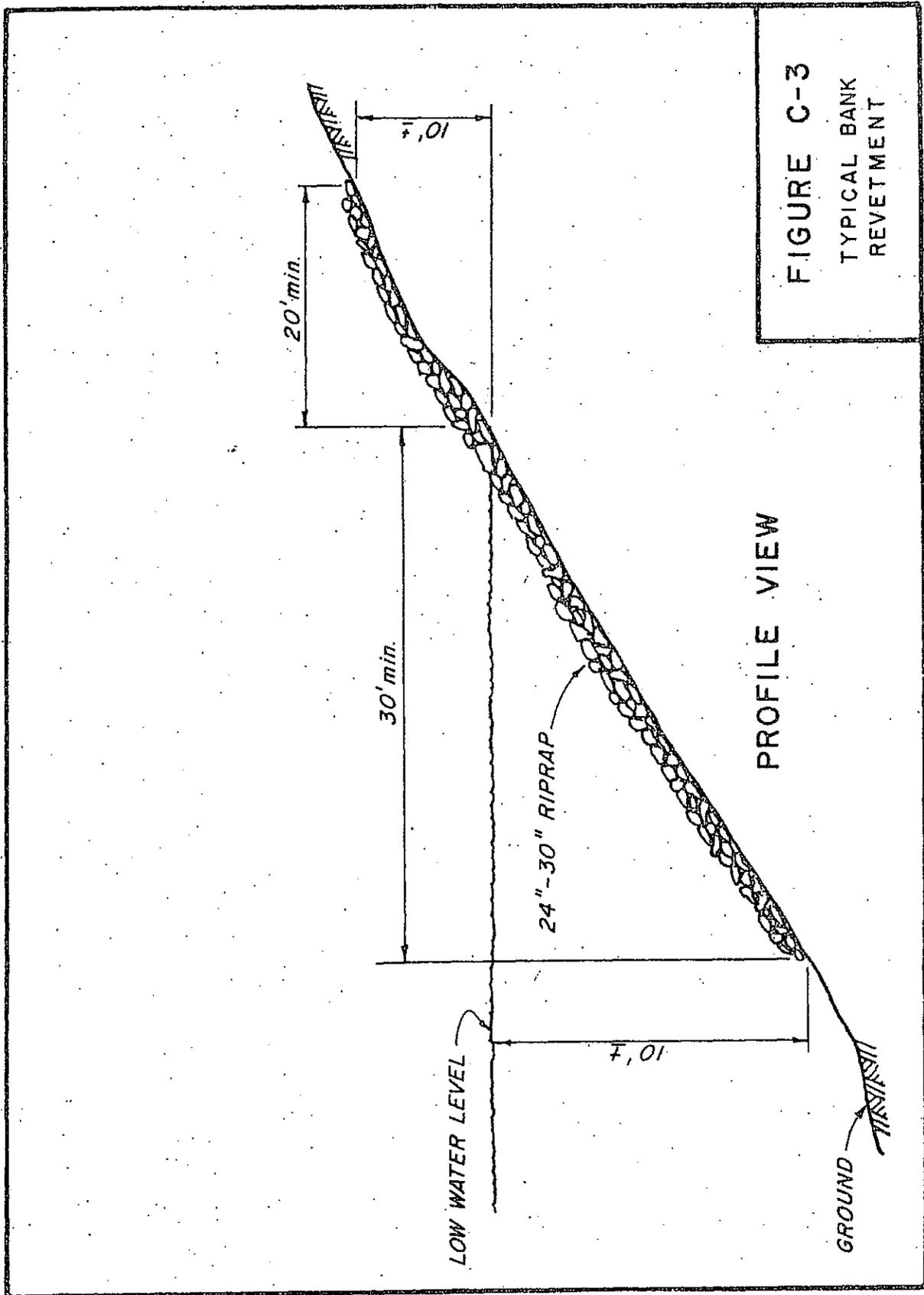


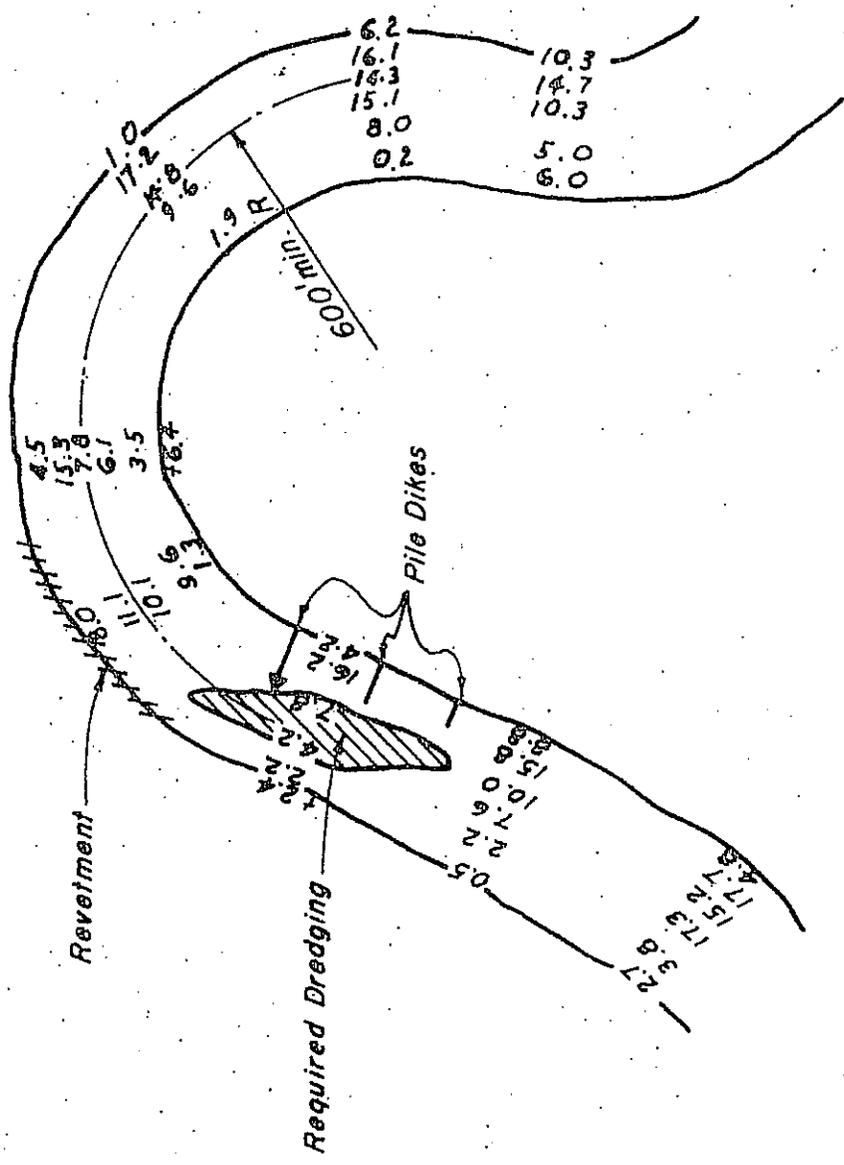
FIGURE C-2
TYPICAL CHANNEL
CUTOFF



PROFILE VIEW

FIGURE C-3
TYPICAL BANK
REVETMENT

FIGURE C-4
TYPICAL RIVERBEND
IMPROVEMENT



BEAUFORT-JASPER
WATER AUTHORITY
FRESH-WATER CANAL

Mayer's Lake

Revetment

200'

Pile dike

DIKE

Spoil to block old channel

Q of improved channel

Bridge Point



SCALE: 1" = 500' ±

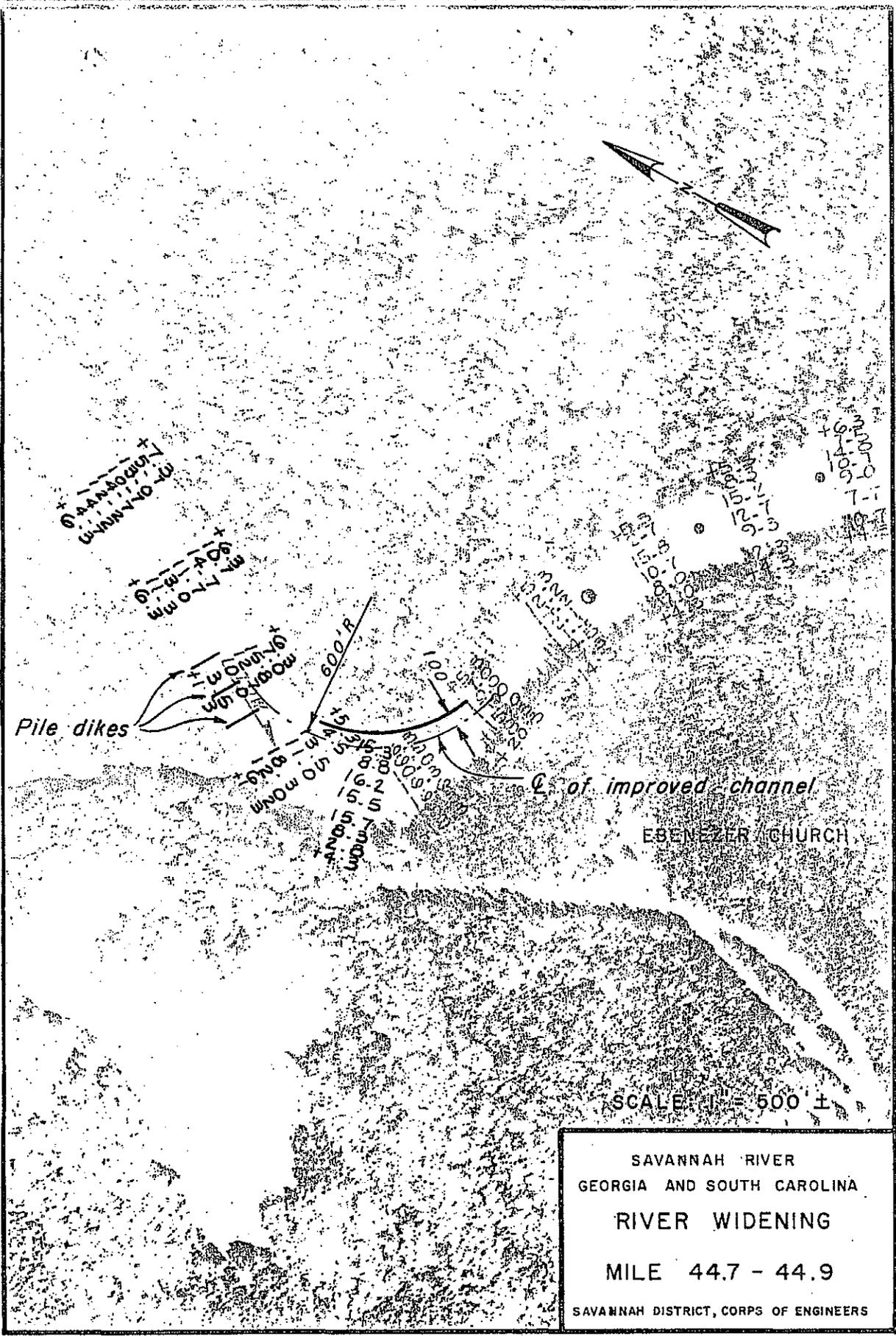
SAVANNAH RIVER
GEORGIA AND SOUTH CAROLINA

RIVER CUTOFF

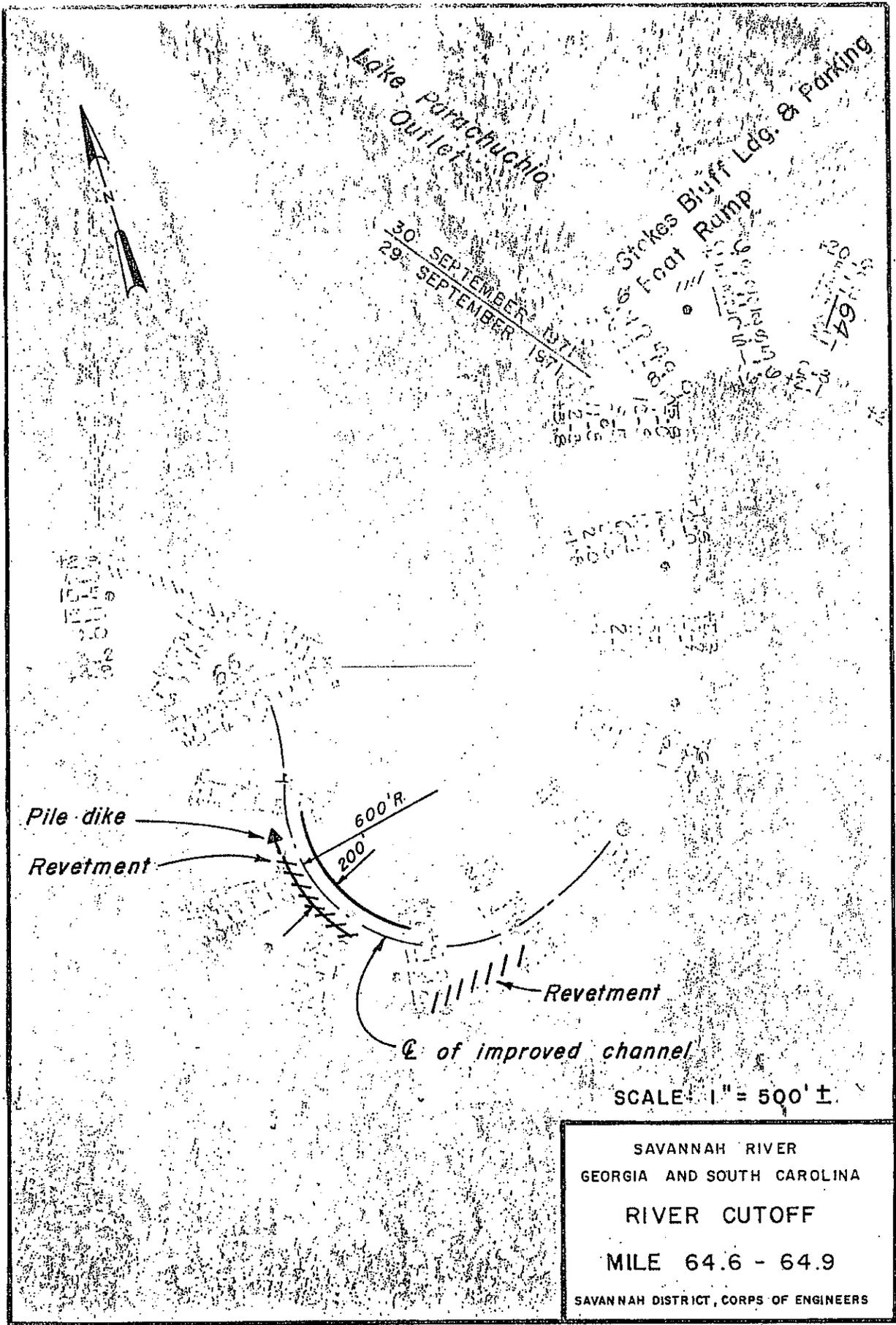
MILE 39.0 - 39.2

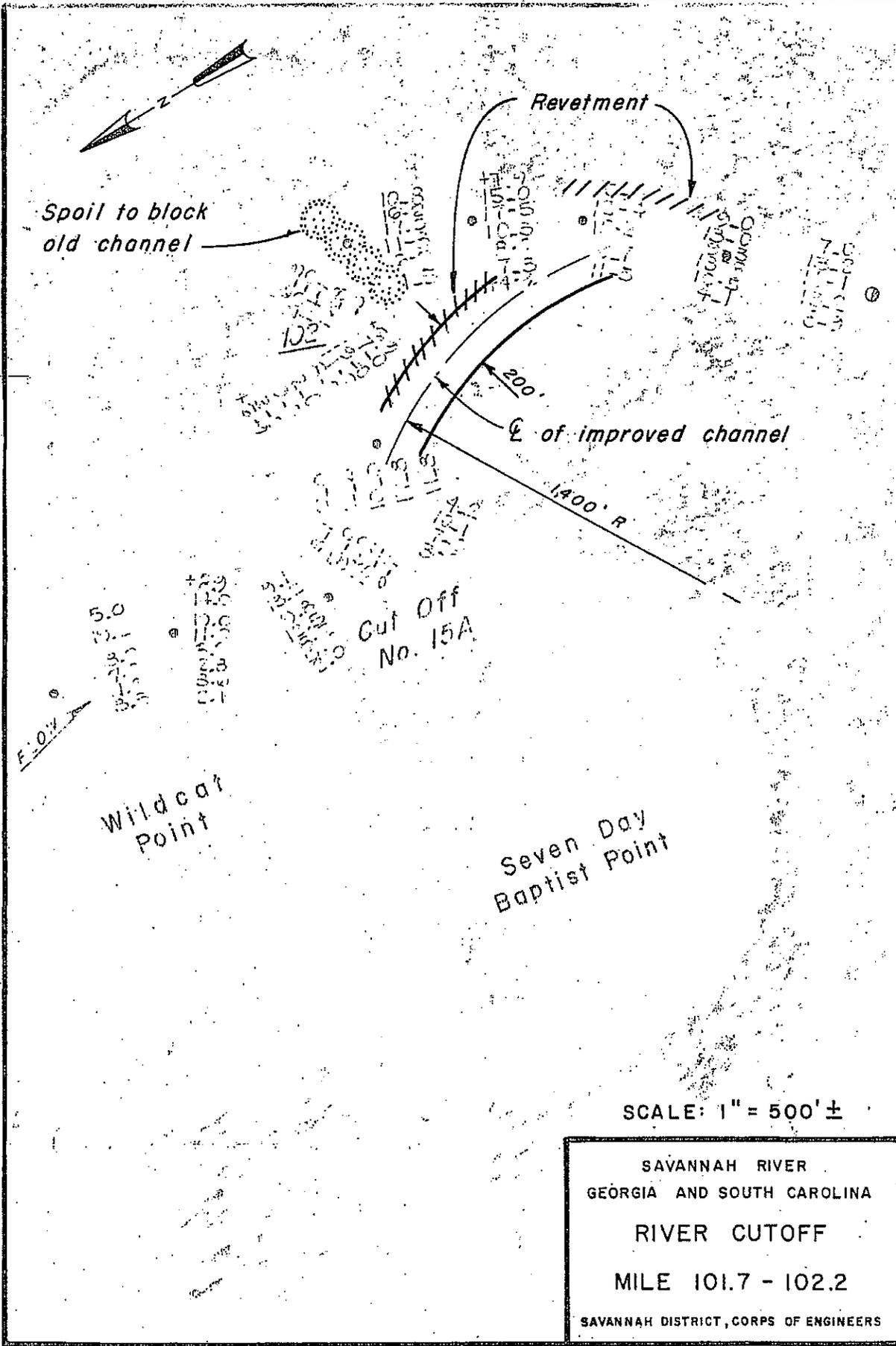
SAVANNAH DISTRICT, CORPS OF ENGINEERS

PLATE C-1



SAVANNAH RIVER
 GEORGIA AND SOUTH CAROLINA
 RIVER WIDENING
 MILE 44.7 - 44.9
 SAVANNAH DISTRICT, CORPS OF ENGINEERS

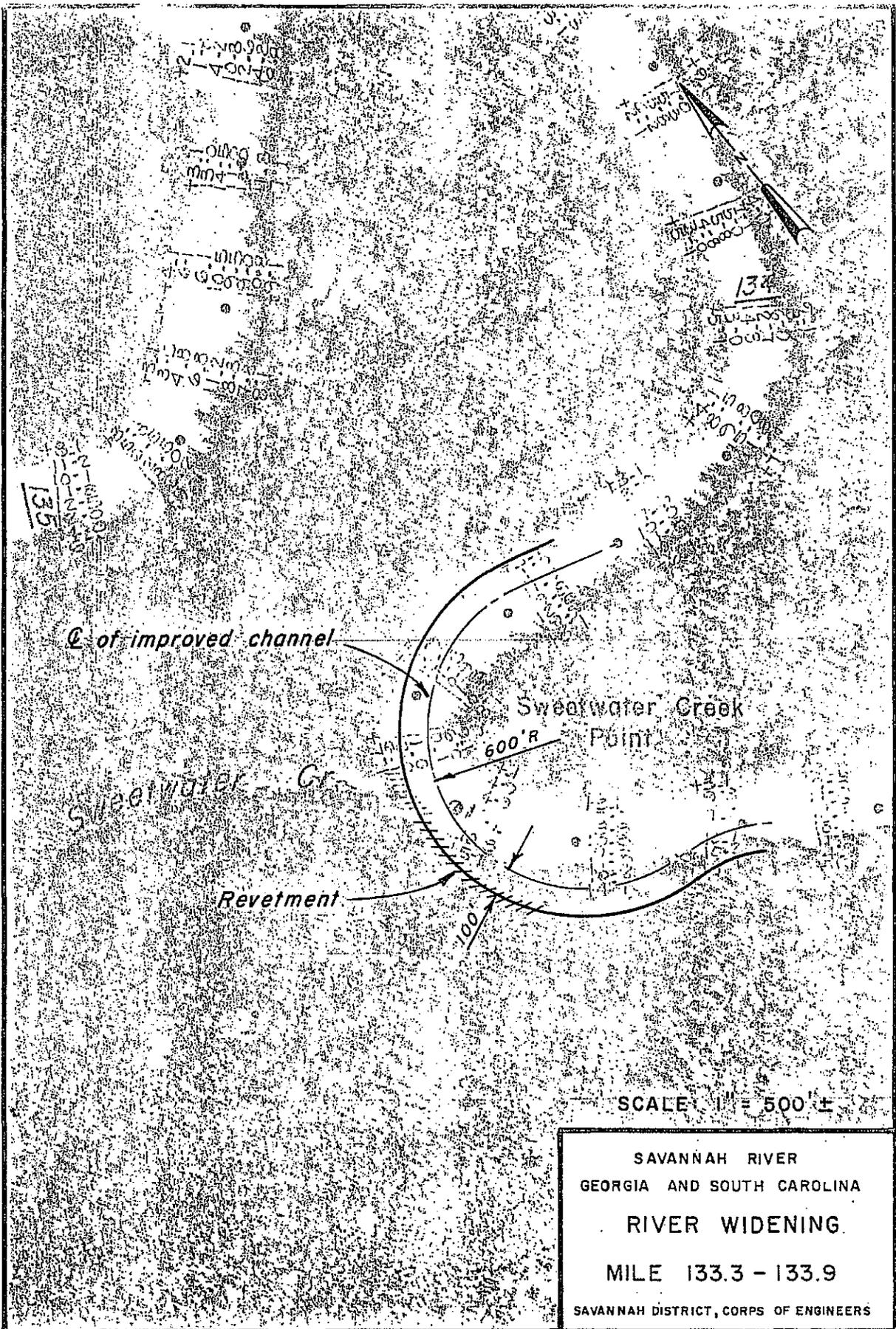




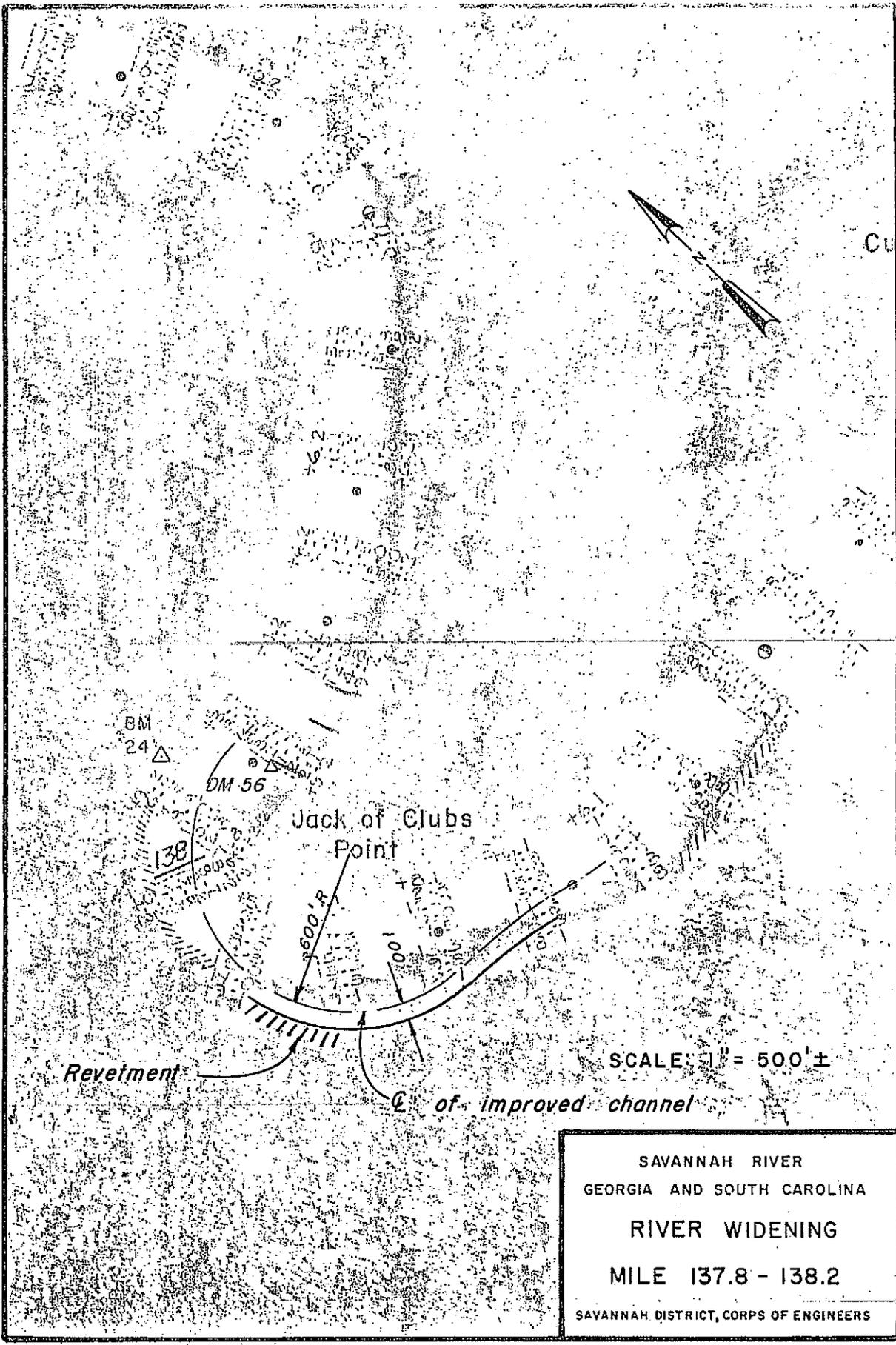
SCALE: 1" = 500' ±

SAVANNAH RIVER
 GEORGIA AND SOUTH CAROLINA
 RIVER CUTOFF
 MILE 101.7 - 102.2
 SAVANNAH DISTRICT, CORPS OF ENGINEERS

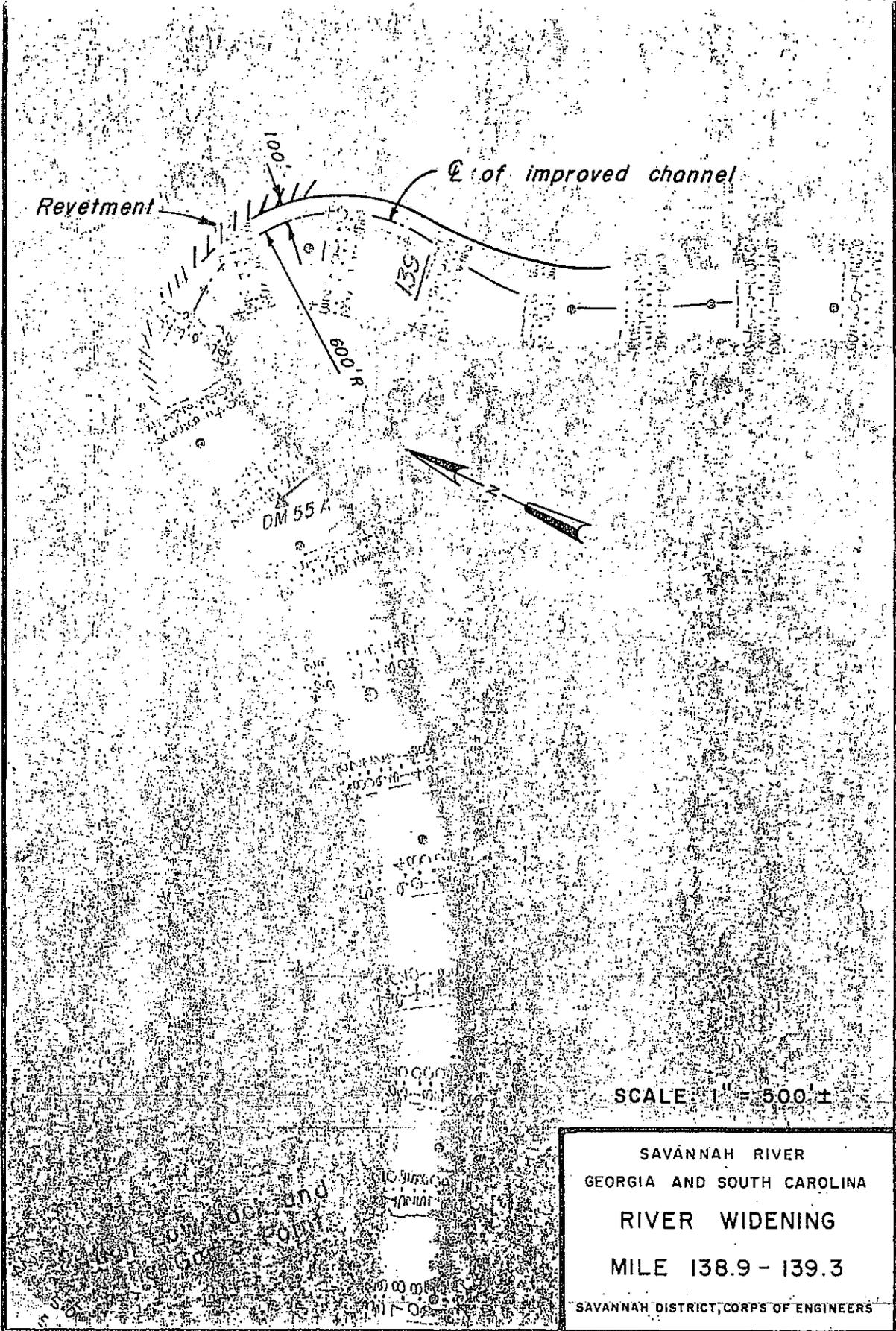
PLATE C-5



SAVANNAH RIVER
 GEORGIA AND SOUTH CAROLINA
 RIVER WIDENING
 MILE 133.3 - 133.9
 SAVANNAH DISTRICT, CORPS OF ENGINEERS



SAVANNAH RIVER
 GEORGIA AND SOUTH CAROLINA
 RIVER WIDENING
 MILE 137.8 - 138.2
 SAVANNAH DISTRICT, CORPS OF ENGINEERS



APPENDIX D
FISHES OF THE SAVANNAH RIVER

TABLE 1

FISHES OF THE SAVANNAH RIVER

Scientific Name	Common Name
<u>Amia calva</u>	Bowfin
<u>Lepisosteus osseus</u>	Longnose Gar
<u>Lepisosteus oculatus</u>	Spotted Gar
<u>Lepisosteus platyrhincus</u>	Florida Gar
<u>Alosa aestivalis</u>	Blueback Herring
<u>Alosa mediocris</u>	Hickory Shad
<u>Alosa sapidissima</u>	American Shad
<u>Dorosoma cepedianum</u>	Gizzard Shad
<u>Dorosoma petenense</u>	Threadfin Shad
<u>Esox americanus</u>	Redfin Pickerel
<u>Esox niger</u>	Chain Pickerel
<u>Umbra pygmaea</u>	Eastern Mudminnow
<u>Cyprinus carpio</u>	Carp
<u>Hybognathus nuchalis</u>	Silvery Minnow
<u>Hybopsis bellica</u>	Alabama Chub
<u>Hybopsis rubrifrons</u>	Rosyface Chub
<u>Notropis chalybaeus</u>	Ironcolor Shiner
<u>Notropis cummingsae</u>	Dusky Shiner
<u>Notropis hudsonius</u>	Spottail Shiner
<u>Notropis leddsi</u>	Leed's Shiner
<u>Notropis maculatus</u>	Taillight Shiner
<u>Notropis niveus</u>	Snowy Shiner
<u>Notropis petersoni</u>	Coastal Shiner
<u>Notemigonus crysoleucas</u>	Golden Shiner
<u>Carpiodes carpio</u>	River Carpsucker
<u>Carpiodes cyprinus</u>	Quillback
<u>Carpiodes velifer</u>	Highfin Carpsucker
<u>Erimyzon oblongus</u>	Creek Chubsucker
<u>Erimyzon sucetta</u>	Lake Chubsucker
<u>Noturus gyrinus</u>	Tadpole Madtom
<u>Noturus insignis</u>	Margined Madtom
<u>Noturus leptacanthus</u>	Speckled Madtom
<u>Ictalurus catus</u>	White Catfish
<u>Ictalurus punctatus</u>	Channel Catfish
<u>Ictalurus natalis</u>	Yellow Bullhead
<u>Ictalurus nebulosus</u>	Brown Bullhead
<u>Ictalurus platycephalus</u>	Flat Bullhead
<u>Aphredoderus sayanus</u>	Pirate Perch
<u>Gambusia affinis</u>	Mosquitofish
<u>Anguilla rostrata</u>	American Eel
<u>Morone saxatilis</u>	Striped Bass
<u>Elassoma zonatum</u>	Banded Pygmy Sunfish

TABLE 1 (Cont'd)

Scientific Name	Common Name
<u>Micropterus salmoides</u>	Largemouth Bass
<u>Enneacanthus gloriosus</u>	Bluespotted Sunfish
<u>Lepomis auritus</u>	Redbreast Sunfish
<u>Lepomis cyanellus</u>	Green Sunfish
<u>Lepomis macrochirus</u>	Bluegill
<u>Lepomis marginatus</u>	Dollar Sunfish
<u>Lepomis megalotis</u>	Longear Sunfish
<u>Lepomis microlophus</u>	Redear Sunfish
<u>Lepomis punctatus</u>	Spotted Sunfish
<u>Chaenobryttus gulosus</u>	Warmouth
<u>Pomoxis annularis</u>	White Crappie
<u>Pomoxis nigromaculatus</u>	Black Crappie
<u>Centrarchus macropterus</u>	Flier
<u>Perca flavescens</u>	Yellow Perch
<u>Etheostoma fusiforme</u>	Swamp Darter
<u>Etheostoma olmstedii</u>	Tessellated Darter
<u>Percina caprodes</u>	Logperch
<u>Percina nigrofasciata</u>	Blackbanded Darter
<u>Minytrema melanops</u>	Spotted Sucker
<u>Opsopoedus emiliae</u>	Pugnose Minnow
<u>Lapidesthes sicculus</u>	Brook Silverside
<u>Fundulus notti</u>	Starhead Minnow
<u>Trinectes maculatus</u>	Hogchoker
<u>Mugil nr. curema</u>	White Mullet

APPENDIX E

CORRESPONDENCE WITH OTHERS

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

P.O. Box 832, Athens, Georgia 30601

Telephone: FTS-289-2275

July 16, 1976

LTC Freeman G. Cross, Jr.
Deputy District Engineer
Corps of Engineers
P.O. Box 889
Savannah, Georgia 31402

Dear Col. Cross:

We appreciate the opportunity to review the well-prepared Draft Environmental Statement for Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, Including the Savannah Bluff Lock and Dam, Georgia and South Carolina. We do not have any comments or suggestions on this draft statement.

Sincerely,


Dwight M. Treadway
State Conservationist



UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

1720 Peachtree Road, N. W.
Atlanta, Georgia 30309

8400
July 9, 1976



LTC Freeman G. Cross
Savannah District
Corps of Engineers
P.O. Box 889
Savannah, GA 31402

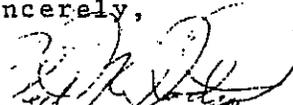
Dear LTC Cross:

The United States Forest Service, State and Private Forestry has reviewed the draft environmental statement entitled, "Operation and Maintenance of Navigation Project, Savannah River Below Augusta Including the Savannah Bluff Lock and Dam, Georgia and South Carolina".

Since this is a maintenance project involving little or no new lands and the dredged material will be deposited below the normal low water plane of the river, significant project impact on forest lands and resources is not anticipated.

Thank you for the opportunity to review and comment on this draft EIS.

Sincerely,


ROBERT K. DODSON
Area Environmental Coordinator

Copy: State Forester
GA
SC



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

1421 PEACHTREE ST., N. E.
ATLANTA, GEORGIA 30309

AUG 23 1976

Lieutenant Colonel Freeman C. Cross, Jr., USA
Deputy District Engineer
Savannah District, Corps of Engineers
P. O. Box 889
Savannah, Georgia 31402

Dear Colonel Cross:

We have reviewed the Draft Environmental Impact Statement on Operation and Maintenance of the Navigation Project on the Savannah River below Augusta (including the Savannah Bluff Lock and Dam) in Georgia and South Carolina, and offer the following comments.

In general, we do not object to the method of spoil disposal behind pile dikes or on the river bank if the spoil is unpolluted. However, polluted spoil should be deposited in a diked area above the flood plain. The Statement gives no information on the location of approved spoil sites. These should be shown on a map, along with an indication of the type of spoil sites involved: (a) pile dike; (b) river bank, and (c) diked upland site, etc. Spoil sites at new cutoffs should be coordinated with the conservation agencies. Generally better water quality can be attained by leaving the cutoff open.

In addition, although it is indicated that water quality data have been taken in the Savannah River, the exact location of the samples and the various parameters taken are not shown. This data should be included in the final statement together with any sediment sampling data that may be applicable.

Also, we note the following:

(a) Page 5, paragraph 2.10 brings up the question of whether or not dredging operations will break through the aquiclude and permit the inflow of salt water into the aquifer. This question should be answered prior to dredging operations.

(b) Page 8, paragraphs 2.24 and 2.25 do not adequately assess the invertebrate or fish population. Qualitative tables are presented in the EIS; however, these tables do not supply adequate information for assessment of the Savannah River resources. There is no possible method of determining the effect a project will have on a particular environment without having good quantitative data.

(c) Throughout the Statement there are implications that dredging and deposition only have a short-term effect on the aquatic ecosystem. If there are any validating reports for these statements, they should be cited.

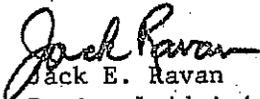
(d) Page 21, paragraph 4.21, states that the material removed from the cutoffs will be placed in the oxbows of the river or barged to suitable disposal sites. Oxbows contain the prime habitat for most aquatic organisms within the river system. If the oxbows are used for deposition sites, this will destroy the most productive river habitat available. Other possible deposition sites exist, but there is no information as to location of these sites or the amount of material to be deposited.

Finally, we recommend following any applicable State of Georgia and State of South Carolina Air Pollution Control Rules and Regulations.

In view of the foregoing, we have rated ER- (environmental reservations) concerning the environmental effects of certain aspects of the proposed action and 2 (insufficient information) to the Impact Statement:

Please send us 5 copies of the final statement when available, and if we can be of further assistance in any way, please let us know.

Sincerely yours,


Jack E. Ravan
Regional Administrator



UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

August 3, 1976

Lieutenant Colonel Freeman Cross
Savannah District, Corps of Engineers
Department of the Army
Post Office Box 889
Savannah, Georgia 31402

Dear Colonel Cross:

This is in reference to your draft environmental impact statement "Operation and Maintenance of Navigation Project, Savannah River Below Augusta, Including the Savannah Bluff Lock and Dam, Georgia and South Carolina." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure: Memo from Mr. William H. Stevenson
Regional Director
National Marine Fisheries Service





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Duval Building
9450 Gandy Boulevard
St. Petersburg, FL 33702

JUL 28 1976

July 23, 1976

FSE21/RPC

TO: Director,
Ofc of Ecology & Environmental Conservation, EE

THRU: *Wal. B. Evans*
Associate Director for
Resource Management, F3

FROM: *William H. Stevenson*
Regional Director

SUBJECT: Comments on Draft Environmental Impact Statement --
Operation and Maintenance of Navigation Project,
Savannah River Below Augusta, Including the Savannah
Bluff and Dam (COE) (DEIS #7606.29)

The draft environmental impact statement for Operation and Maintenance of Navigation Project, Savannah River below Augusta, Including the Savannah Bluff Lock and Dam that accompanied your memo of June 25, 1976, has been received by the National Marine Fisheries Service for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

GENERAL COMMENTS:

The DEIS lacks sufficient environmental information and project details upon which an accurate evaluation of the potential impacts of the proposed project on anadromous fishery resources of the Savannah River can be made. Furthermore, alternative methods for project maintenance should be fully discussed. We recommend the statement be redrafted and recirculated for review and comments.

SPECIFIC COMMENTS:

1.00 Project Description

Page 3, paragraph 1.06. Proposed Action

This section should be expanded to include a detailed discussion of dredging methods, time of dredging, location of spoil disposal areas, construction details for additional pile dikes and revetments,



and areas proposed for widening and river cutoffs. Additional figures illustrating the above features would facilitate review.

4.00 Environmental Impact of the Proposed Action.

Page 18, paragraph 4.05. Biological Impact.

This section should be expanded to address specific areas designated for dredging, spoil disposal, construction of pile dikes and revetments, and areas proposed for widening and river cutoffs. The potential biological impacts will undoubtedly vary from site to site, depending on activities proposed and biological communities present.

6.00 Alternatives to the Proposed Action.

Page 22, paragraphs 6.00 and 6.01.

This section should be expanded to include a discussion of alternate methods of construction and relocation of spoil disposal areas. Specifically, the alternative of widening as opposed to channel cutoffs and utilization of spoil disposal areas outside the river should be discussed.

It is requested that one copy of the Final EIS be sent our Area Supervisor, NMFS, Environmental Assessment Division, P.O. Box 570, Beaufort, North Carolina 23616.

CC:
F34(3)
FSE211



United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / 148 Cain St., N.E. / Atlanta, Ga. 30303

ER-76/607

District Engineer
U.S. Army Corps of Engineers
P. O. Box 889
Savannah, Georgia 31402

Dear Sir:

As requested in your June 21, 1976, letter to the Assistant Secretary Program Policy, we have reviewed the draft environmental impact statement for the proposed Operation and Maintenance for Savannah River below Augusta, Georgia and South Carolina project for its effects on outdoor recreation, geology, hydrology, fish and wildlife resources, and national parks, landmarks and historic areas.

We offer the following comments for your consideration:

General Comments

The statement does not adequately describe location or extent of proposed river cutoffs, river widening, and the impact of the proposed construction on the associated wetland areas along the river.

Significant natural areas border the Savannah River. They are:

Ebenzer Creek Swamp, Effingham County, Georgia, listed in the National Registry of Natural Landmarks.

Shell Bluff, Burke County, Georgia and Bear Island Wildlife Management Area, Effingham County, Georgia, both potentially eligible for inclusion in the National Registry.

Griffins Landing, Burke County, Georgia, a fossil area which may be significant. In the process of evaluation for potential eligibility.

The location of these sites in relation to proposed Corps activities should be adequately discussed.

Section 2.04 states that swamps and lakes are very common. Section 2.09 states that numerous swamps of varying sizes occur throughout the Lower Coastal Plain area of the river. In Section 2.26 swamps are specifically mentioned as providing abundant habitat for many species. However, in Section 4.20 the discussion makes no mention of how cutoff construction will impact the water regimen of the swamps and wetlands occurring in cutoff areas. We believe this should be discussed in Section 4.20 as well as Sections 5.03 and 8.00. The discussion should also demonstrate how environmental concerns will be received from various agencies and individuals prior to cutoff construction.

Specific Comment

Page 11, 2.35 Archeology and History

The final statement should evidence consultation with the State Historic Preservation Officer of both Georgia and South Carolina.

Page 11, 2.36

The potential for presently unrecorded archeological sites in the area of the proposed project's potential environmental impact has been noted. The final statement should include an adequate discussion on the presence or absence of archeological resources found as a result of onsite surveys and the evaluation of any sites found for significance and eligibility for inclusion in the National Register of Historic Places.

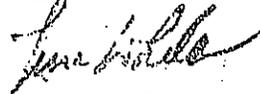
Page 19, 4.10 Archeological and Historical

The final statement should discuss impacts on cultural resources found during onsite surveys. Measures required to mitigate for potential impacts should also be presented.

Page 21, 4.20 Impacts due to construction of cutoffs

The destruction of subsurface archeological resources should be included in this section. Cultural resources are important non-renewable aspects of the human environment and should be considered as valuable resources requiring special consideration during the planning stage.

Sincerely yours,



(Miss) June Whelan
Special Assistant to the Secretary
Southeast Region



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGION IV

50 7TH STREET N.E.
ATLANTA, GEORGIA 30323

July 29, 1976

OFFICE OF THE
REGIONAL DIRECTOR

HEW-673-6-76

Freeman G. Cross, Jr.
LTC, Corps of Engineers
Deputy District Engineer
Department of the Army
Savannah District Corps of Engineers
P.O. Box 889
Savannah, Georgia 31402

Subject: Operation and Maintenance of Navigation Project
Savannah River Below Augusta Including the
Savannah Bluff Lock and Dam Georgia and South Carolina

Dear Mr. Cross:

We have reviewed the subject draft Environmental Impact Statement. Based upon the data contained in the draft, it is our opinion that the proposed action will have only a minor impact upon the human environment within the scope of this Department's review. The impact statement has been adequately addressed for our comments, except for vector-control.

The final Environmental statement should address the potential impact upon insect disease vectors and upon the risks of vector-borne diseases.

Sincerely yours,

Philip P. Sayre
Regional Environmental Officer
DHEW - Region IV



REGION IV
Pershing Point Plaza
1371 Peachtree Street, N.E.
Atlanta, Georgia 30309

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ATLANTA AREA OFFICE
PEACHTREE CENTER BUILDING 230 PEACHTREE STREET, N.W.
ATLANTA, GEORGIA 30361

August 5, 1976

IN REPLY REFER TO:
4.1CP

Colonel Freeman C. Cross, Jr.
Deputy District Engineer
Department of the Army
Savannah District, Corps of Engineers
Post Office Box 889
Savannah, Georgia 31402

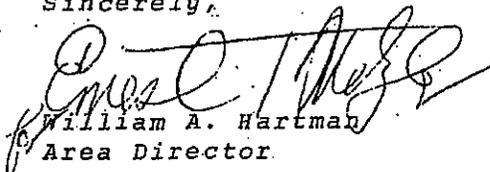
Dear Colonel Cross:

Subject: Draft Environmental Impact Statement
Operation and Maintenance of a Navigation Project
Savannah River below Augusta, Georgia
Georgia and South Carolina

We have reviewed the Draft Environmental Impact Statement (EIS) and have no comments to offer, as we feel all concerns within our expertise are adequately addressed.

We appreciate the opportunity to comment on the Draft EIS and request a copy of the Final EIS upon publication.

Sincerely,


William A. Hartman
Area Director

cc:
Mr. Timothy Atkeson
General Counsel
Council of Environmental Quality
722 Jackson Place, Northwest
Washington, D. C. 20006

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:

AUG 25 1976

Lieutenant Colonel Freeman G. Cross, Jr.
Deputy District Engineer, Corps of Engineers
Department of the Army
P.O. Box 889
Savannah, Georgia 31402

Reference: SASPD-E

Dear Colonel Cross:

This is in reply to your letter of June 21, 1976, addressed to the Commission's Acting Advisor on Environmental Quality, requesting comments of the Federal Power Commission on the draft environmental statement for the operation and maintenance of the navigation project, Savannah River below Augusta, including the Savannah Bluff Lock and Dam, Georgia and South Carolina.

The proposed action would involve the continued operation and maintenance of the authorized navigation channel, 9 feet deep and 90 feet wide, between Savannah and Augusta, Georgia, a distance of about 180 miles. Maintenance work would consist of channel dredging accompanied by the construction of cutoffs, revetments, pile dikes, and snagging.

These comments of the Federal Power Commission's Bureau of Power are made in accordance with the National Environmental Policy Act of 1969 and the August 1, 1973, Guidelines of the Council on Environmental Quality. Our principal concern with projects affecting land and water resources is the possible effect of such projects on bulk electric power facilities, including potential hydroelectric developments, and on natural gas pipeline facilities.

Review by the Commission staff indicates that there are several steam-electric power plants along this reach of the Savannah River. The cooling water facilities of these plants utilize the Savannah River as the source of cooling water supply. Also, several electric power transmission lines and natural gas pipelines cross this reach of the Savannah River. Presumably there would be no conflict in the operation and maintenance of these

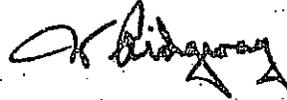


Lieutenant Colonel Freeman G. Cross, Jr. -2-

electric power and natural gas facilities with the continuing operation and maintenance of the navigation project.

The opportunity to review this draft environmental statement is appreciated.

Very truly yours,



W. Ridgway
Chief, Bureau of Power



FEDERAL ENERGY ADMINISTRATION

Region IV
1055 PEACHTREE STREET, N.E.
ATLANTA, GEORGIA 30309

July 27, 1976

LTC Freeman G. Cross, Jr.
Deputy District Engineer
Corps of Engineers, Savannah District
Department of the Army
P. O. Box 889
Savannah, Georgia 31402

Dear Colonel Cross:

RE: Navigation Project, Savannah River Below Augusta

Thank you for the opportunity to comment on the draft EIS covering the Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, including the Savannah Bluff Lock and Dam, Georgia and South Carolina.

In reviewing the Statement, no conflicts with FEA mission responsibilities were found. If the Savannah River is used to transport any of the atomic materials manufactured in the Augusta area, then improvement of the navigation channel could be right in line with FEA's objective of bringing about the distribution of energy to all parts of the United States in sufficient quantities to meet demand.

If we can be of further service to you, please contact Robert Biccum at (404) 526-5463.

Sincerely,

Roy F. Pettit
for
Roy F. Pettit
Deputy Regional Administrator

cc: Office of Environmental
Impact



Office of Planning and Budget
Executive Department

James T. McIntyre, Jr.
Director

C O R R E C T E D C O P Y
G E O R G I A S T A T E C L E A R I N G H O U S E M E M O R A N D U M

TO: Freeman G. Cross, Jr.
LTC, Corps of Engineers
Department of the Army
P.O. Box 889
Savannah, Georgia 31402

FROM: Charles H. Badger, Administrator *CHB*
Georgia State Clearinghouse
Office of Planning and Budget

DATE: August 17, 1976

SUBJECT: RESULTS OF STATE-LEVEL REVIEW

Applicant: Savannah Corps of Engineers

Project: Draft EIS Operation and Maintenance of Navigation Savannah
River below Augusta

State Clearinghouse Control Number: 76-06-23-03

The State-level review of the above-referenced document has been completed. As a result of the environmental review process, the activity this document was prepared for is recommended for further development with the following recommendations for strengthening the project:

Comments prepared by the Game & Fish Division, Department of Natural Resources, for Page 21, paragraph 4.20 and 4.21 of the EIS should be corrected to read as follows:

Construction of cut-offs will result in loss of stream fish habitat by converting existing stream meanders to oxbow or pond type habitats. Blocking stream flows as planned through these newly created oxbows will encourage aquatic plant infestations and may create oxygen depletion problems during the summer months. Existing wildlife habitat within the new channel corridor will also be permanently lost. The new cut-offs will increase stream velocity resulting in increased scouring action and sedimentation downstream. In view of these concerns, we request consideration be given to deleting the construction of additional cut-offs.



Office of Planning and Budget
Executive Department

James T. McIntyre, Jr.
Director

GEORGIA STATE CLEARINGHOUSE MEMORANDUM

TO: Freeman G. Cross, Jr.
LTC, Corps of Engineers
Department of the Army
Savannah District, Corps of Engineers
P.O. Box 889
Savannah, Georgia 31402

FROM: 
Charles H. Badger, Administrator
Georgia State Clearinghouse
Office of Planning and Budget

DATE: August 4, 1976

SUBJECT: RESULTS OF STATE-LEVEL REVIEW

Applicant: Savannah Corps of Engineers

Project: Draft EIS Operation and Maintenance of Navigation Savannah River
below Augusta

State Clearinghouse Control Number: 76-06-23-03

The State-level review of the above-referenced document has been completed. As a result of the environmental review process, the activity this document was prepared for is recommended for further development with the following recommendations for strengthening the project:

The document submitted by the Corps of Engineers implies that the dredging of 181 miles of river and spoiling in adjacent wet areas will have only temporary impact and there will be no substantial impact to any part of the river system. It is our opinion that the document's content does not support this conclusion. In fact, we find it difficult to adequately assess the project's merits or liabilities because of the limited data provided.

Although organisms native to the Savannah River have evolved under conditions of high silt transport and can be expected to withstand or recolonize after periods of reasonably high siltation, they have proven to be responsive to "normal" maintenance dredging operations in the river. Using current maintenance dredging techniques the less mobile organisms are lost

in the immediate area of dredging and for some distance downstream, due in part to excessive siltation. Although recolonization of these areas eventually occurs, it is impeded by a less than optimum substrate, in which organisms might find attachment. The dredging operation while removing large particulate matter from the bottom, resuspends fine particles to settle downstream. The "fines" impede the respiration of the various riverine organisms, as well as create substrate, which is unsuitable for attachment for many benthic species. We believe that disposal of spoil within the river channel can only intensify these conditions. The construction of semi-permanent diked disposal areas outside the 20-year floodplain would help eliminate the need for spoil to be placed within the food channel of the river and would be stabilized against erosion during normal high-water periods. With this plan, there would be a necessity to remove some wetland vegetation for barge access; however, the amount might not be equal the amount to be lost with the proposed plan. We are uncertain as to the overall merits of spoiling outside the 20-year floodplain, but we feel that the Corps should at least address it as an alternative.

Due to problems associated with current methods of project maintenance, we believe the final statement should include a discussion of the possibility of manipulating impoundments on the Savannah River in order to maintain year-round operable depths with a minimum of maintenance dredging. We would be interested to know whether it would be feasible in the cost analysis to partially or completely maintain the Savannah River as a navigable body by careful regulation and release of upstream impounded water and to know the relation to hydroelectric generation.

It is our understanding that the Corps of Engineers is implying that public recreation will be benefitted as a result of the project. We feel that the document has not adequately expressed that there might be conflicts between public recreation and commercial navigation. We feel that the Corps should address this factor and initiate a cost analysis of the issue. It appears to us to be an incongruity when the Corps assumes substantial monetary benefits on projects where there may be liabilities. The proposed action lies between two metropolitan areas, both growing in terms of recreational needs. This factor should be considered in the preparation of the final document.

In conclusion, we feel that the Corps has not properly quantified and addressed impacts or alternatives. The above-mentioned issues should be discussed in subsequent documents. Issues involving water quality should be coordinated with the Environmental Protection Division, and those involving fish and wildlife coordinated with the Game and Fish Division.

Technical Comments with Originating Division of the Department of Natural Resources, Office of Planning and Research (OPR)

Page 1, ¶ 1.04

--We doubt that the general public is aware of what constitutes a pile dike. A detailed description, as well as a schematic diagram, should be provided in the final document.

Page 2, ¶ 1.06

--The same applies for revetments and proposed spoiling in river cutoffs. Narrative descriptions and diagrams should be included in subsequent documents for the purpose of informing that sector of the public which is not fully cognizant of these actions.

Page 2, ¶ 2.06

The Corps should delineate the acreage of marsh to be affected by the project (if any).

Page 5, ¶ 2.11, sentences 1 and 2

This paragraph states that swamps are frequently recharge areas. Does this imply that portions of the swamps to be adversely affected (¶ 4.20) are potential aquifer recharge zone? This issue should be addressed in more detail, with the acreages to be affected quantified.

Page 5, ¶ 2.11, sentences 3 and 4

We are cognizant that swamps are beneficial in terms of filtering runoff from upland areas. Does the Corps have specific documentation quantifying the above-cited statement? If so, the bibliography should include these citations.

Page 6, ¶ 2.15; Page 7, ¶ 2.21

We note that both of these statements seem to imply a tendency of the Savannah River below Augusta to have eutrophication and dissolved oxygen problems. (Often these are associated). Will action on the cutoffs and spoiling on swamps in general increase the potential for water quality degradation, in light of ¶ 2.11 stating the value of river swamps with regard to tertiary treatment?

Pages 16 and 18, ¶ 2.47

We are concerned about the aesthetic effects on Ebenezer and Brian Creeks, which are potential National Natural Landmarks because of their scenic qualities. Will the Corps' spoiling have any impact on these creeks in terms of aesthetic or other factors?

Page 18, ¶ 4.03

The Corps has not previously addressed any "localized changes in stream flow" resulting from the project. This should be described in more detail. The Department of Natural Resources Geologic and Water Resources Division should be coordinated with closely as a result of changes in channel morphology. (Contact Bill Clark 656-3214).

Page 19, ¶ 4.06

What is involved in the construction of new cutoffs in terms of cubic yards of dredge or fill?

Page 19, ¶ 4.09

The assessment of impacts on recreation are incomplete. The permanent actions of diking, widening, constructing river cutoffs and snagging all have major impacts on existing and future recreational use of the river.

Page 20, ¶ 4.12

The assessment of impacts on aesthetics are unrealistic. The study has concluded that no long term adverse visual impacts will be caused by the proposed actions. Pile dikes, dredge material, results of snagging and river cutoffs are not aesthetically pleasing.

The Corps states that "in most cases increased turbidity due to dredging is a transient condition," implying that in some cases it is not. The Corps should address this issue, further quantifying available data.

Page 20, ¶ 4.15

The Corps states that "where possible, the material will be placed within the pile dike systems to increase their efficiency." This implies that, in some cases, the material will not be placed within the pile dike systems. In general, we would appreciate the Corps' quantifying approximately what volume in cubic yards will be placed on wetlands or shallow flats.

Page 21, ¶ 4.19

Are revetments not subject to erosion?

Page 21, ¶ 4.20

Again, the construction of cutoffs is of extreme concern to us. The Corps should address and quantify impacts further.

Page 22, ¶ 8.00

This statement implies that all impacts from this project are temporary. We feel that spoil deposition does not have temporary impacts, that its damage in certain instances is permanent.

Technical Comments with Originating Division of the Department of Natural Resources, Game and Fish Division (G&F)

Page 19, ¶ 4.09

It is very doubtful that maintenance dredging, snagging, and construction of cut-offs will enhance the existing stream fishery.

Page 20, ¶ 4.12

In discussing aesthetics, the impact of constructing new cutoffs is not considered. We feel the construction of cutoffs will degrade the aesthetic value of the existing stream environment.

Page 20, ¶ 4.15

We believe the disposal of dredged spoil in the river will be detrimental to fisheries and benthic communities. Also, it is probable that this material will be deposited in other downstream areas during subsequent periods of high water. Therefore, we recommend that all dredged spoil be placed in selected diked, upland disposal sites of low wildlife value.

Page 21, ¶ 4.20 and 4.21

~~Construction of cutoffs will result in loss of stream fish habitat by converting existing stream meanders to oxbow or pond type habitats. Blocking stream flows as planned through these newly created oxbows will encourage aquatic plant infestations and may create oxygen depletion problems during the summer months. Existing wildlife habitat within the new channel~~

Freeman C. Cross, Jr.
76-06-23-03
Page Five

Page 21, P 4.23

We are glad the Corps of Engineers recognizes that snagging will destroy fish and invertebrate habitat. Therefore, we recommend that snagging be confined to mid-channel removal of only hazardous to navigation.

Environmental Protection Division, Department of Natural Resources

This office offers no objections to this project if it is carried out in such a manner so as not to violate applicable Water Quality Standards, if the activities do not interfere with other legitimate water uses and if the dredging and spoil disposal is performed in accordance with Water Quality Consideration for Court and Dredging Operations, revised April 1971, EPA, Region, 4, Water Quality Office, Federal Facilities Branch

The following State agencies have been offered the opportunity to review and comment on this project:

Department of Natural Resources
Department of Transportation
Office of Planning and Budget, Executive Department

The Corps of Engineers may expect comments for this project from the Central Savannah River APDC.

cc: ~~Bruce Osborn, OPB~~
Ray Siewert, DNR



JOE D. TANNER
Commissioner

J. LEONARD LEDBETTER
Division Director

Department of Natural Resources

ENVIRONMENTAL PROTECTION DIVISION
270 WASHINGTON STREET, S.W.
ATLANTA, GEORGIA 30334

August 5, 1976

Mr. Steven Osvald, Chief
Regulatory Functions Branch
Corps of Engineers
P. O. Box 889
Savannah, Georgia 31402

Re: Draft Environmental Statement
"Operation & Maintenance of
Navigation Project - Savannah
River below Augusta"
June, 1976

Dear Mr. Osvald:

After review of this EIS, we offer the following comments. Where appropriate, we have coordinated our comments with those of the Georgia Game and Fish Division, which has, in turn, had discussions with the U.S. Fish and Wildlife Service. Our views are generally consistent with the views of these other agencies.

1. As the EIS notes, various anadromous fish species utilize the affected portion of the Savannah River for breeding. Dredging in the lower portion of the river from March 16 through May 31 would be particularly objectionable due to the effect on the breeding grounds of the striped bass.
2. The EIS indicates that material dredged from the main channel is deposited elsewhere in the river. The disadvantage of this disposal method, with the resulting double disruption of the river aquatic community and adverse effect on water quality at the dredging and disposal sites, is obvious. Also the probability seems high that a significant portion of the material removed from the channel will be washed back into the channel downstream and be redredged repeatedly as it moves toward the ocean. Alternate disposal methods should be continually evaluated and utilized whenever possible.
3. Although sites are not specifically identified, the EIS indicates that construction of new cutoffs of river loops is anticipated. It further indicates that material removed from the cutoffs may be deposited in the oxbow portions of the river aggravating natural siltation which construction of the cutoffs would cause in these areas.

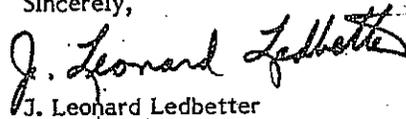


In the EIS, the proposed activities are represented as being required for maintenance of the existing navigation channel. Since the existing channel has been utilized for many years, the construction of new cutoffs is not required for successful navigation. Construction of new cutoffs would be an effort by the Corps of Engineers to improve the navigation channel. In connection with proposed revetments and pile dikes, construction of new cutoffs would amount to additional channelization of portions of the Savannah River. To comply with provisions of NEPA, a separate EIS should be prepared for any major proposed navigation channel improvements.

4. Section 2.17, p.7, states: "The Lower Savannah River, near Savannah, Georgia, is polluted by untreated or inadequately treated domestic and industrial wastes." For the record, the Savannah Harbor area, which was grossly polluted several years ago, is now in general compliance with established water quality standards, and the great majority of wastewater discharge in the area is receiving the legally required degree of treatment. The bulk of the present pollution load in Savannah Harbor is due to the concentration of population and large scale wastewater generating industries, whose discharges are substantial even though adequately treated by present standards.

If you have any questions, please contact this office.

Sincerely,



J. Leonard Ledbetter
Director

JLL:mg

cc: Mr. E. T. Heinen
Dr. Fred Marland
Mr. Carl Hall
Jim Setser



State of South Carolina

Office of the Governor

JAMES B. EDWARDS
GOVERNOR

DIVISION OF ADMINISTRATION
Edgar A. Brown Building
Columbia, South Carolina 29201

August 11, 1976

LTC Freeman G. Cross, Jr.
Deputy District Engineer
Savannah District, Corps of Engineers
Post Office Box 889
Savannah, Georgia 31402

Dear LTC Cross:

Ref: Draft Environmental Statement on the Operation and Maintenance
of Navigation Project, Savannah River Below Augusta, Including
~~the Savannah Bluff Lock and Dam, Georgia and South Carolina.~~

The State Clearinghouse has completed its review of the referenced draft environmental statement. Enclosed are the comments that I have received from the Water Resources Commission, the Department of Archives and History, the Wildlife and Marine Resources Department, and the Department of Health and Environmental Control. I hope that these comments will assist you in the preparation of the final statement.

Please note especially the comments from the Water Resources Commission and the Department of Health and Environmental Control concerning the dredging and disposal of spoil material and proposed channel modifications. This information is essential in order for us to determine the impact of the proposed action.

Thank you for the opportunity to comment on the draft statement, and I look forward to receiving the final statement.

Sincerely,

A handwritten signature in cursive script that reads "Elmer C. Whitten, Jr.".

Elmer C. Whitten, Jr.
State Clearinghouse

ECWjr:ece

Enclosures

State of South Carolina
Water Resources Commission



Clair P. Guess, Jr.
Executive Director

August 4, 1976

Mr. Elmer C. Whitten, Jr.
A-95 Coordinator
Division of Administration
1205 Pendleton Street
Columbia, S.C. 29201

DIVISION OF
ADMINISTRATION

Dear Elmer:

The staff of the South Carolina Water Resources Commission has received and reviewed the draft environmental statement for the Operation and Maintenance of the Navigation Project for the Savannah River below Augusta and has the following comments.

The EIS stresses the natural beauty, undeveloped character, excellent fishing and hunting, etc., on this stretch of the river. Simultaneously, the lack of all-weather access points and recreational facilities and parks is emphasized. To achieve the full benefits of this project to recreational usage, the Corps should consider improvements in these areas in both states. Paved access roads, parking areas and ramps are a critical need as are developed camping areas and parks.

In section 2.45, the water transport figures in Table 7 should read Shipments in Tons rather than Tonnage in Thousands of Tons since yearly totals are in tons.

In section 2.46, Population, Aiken County from period 1959-1970 showed an increase of population of approximately 11,355 persons. (U.S. Army Corps of Engineers, South Atlantic Division, Intragovernmental Order Number SADPD-75-1 Bureau of Economic Analysis, U.S. Dept. of Commerce, Washington, D.C., December '75, p.28).

In section 4.11, Economic Aspects, Analysis of potential commodity movements along project revealed 2.6 million tons could be moved. Using figures, for tonnage from Table 7, p.17) tonnage transported was substantially less. For the period 1966-1975, the average yearly tonnage was 76,142 tons which was approximately three (3) percent of the potential. An estimate that is 34 times greater than this average use is misleading. This would involve tremendous expansion of demand and supply to warrant such estimates. This would involve construction of additional production and dockage facilities and the consideration of existing rail and highway systems already located within the Augusta area.

Mr. Elmer C. Whitten, Jr.
August 4, 1976
Page # 2

In section 6.01, Alternatives to the Proposed Action, Navigation by pleasure craft is extremely limited due to limited access of public to the river. Alternatives to maintenance operation would include adequate transportation alternatives (i.e. rail and highway modes) and these may be sufficient for present and future needs of Augusta industrial area.

We have the following questions on dredging and disposal of spoil material:

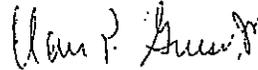
In section 1.04: Where are the "chronic Shoaling" areas?
How often will dredging be necessary?
How much dredging is the project projecting and where (specifically) is the dredging material to be disposed of?

We would also desire information pertaining to the quantity of spoil disposal sites in South Carolina and how many, or what percentage, are below mean high water elevation or below ordinary highwater elevation?

The staff at the Water Resources Commission appreciates the opportunity to comment on this important matter and reserves the right to comment on further developments.

I remain,

Sincerely yours,



Clair P. Guess, Jr.
Executive Director

CPGJr:rhy

sts/srp/wcm

cc: Dept. of Health & Environmental Control
Dept. of Wildlife & Marine Resources



**South Carolina
Project Notification & Review System**

PROJECT NOTIFICATION REFERRAL

TO: Dr. Charles Lee
Dept of Archives & History

RECEIVED

JUN 30 1976

S. C. DEPARTMENT OF
ARCHIVES & HISTORY

STATE APPLICATION
IDENTIFIER

Clearinghouse
Use Only
CONTROL NUMBER

DIST. NO. FY
11 2016 6

SUSPENSE DATE
7/23

The attached project notification is being referred to your agency in accordance with Office of Management and Budget Circular A-95. This System coordinates the review of proposed Federal or federally assisted development programs and projects. Please provide comments below, relating the proposed project to the plans, policies, and programs of your agency. All comments will be reviewed and compiled by the State Clearinghouse. Any questions may be directed to this office by phone at 758-2946. Please return this form prior to the above suspense date to:

State Clearinghouse
Division of Administration
1205 Pendleton Street
Columbia, South Carolina 29201

Signature Elmer C. Whitten, Jr.

Name Elmer C. Whitten, Jr.

RESULTS OF AGENCY REVIEW

- PROJECT CONSISTENT WITH AGENCY PLANS AND POLICIES
- AGENCY REQUESTS CONFERENCE TO DISCUSS COMMENTS
- AGENCY COMMENTS ON CONTEMPLATED APPLICATION AS FOLLOWS:

We concur with Dr. Stephenson's observations about the likelihood and known existence of archeological sites in or near the project area.

RECEIVED
JUL 26 1976
DIVISION OF
ADMINISTRATION

(Use separate continuation sheets if necessary)

FOR THE REVIEWING AGENCY:

SIGNATURE: Charles Z. Jaul

DATE: 7/21/76

TITLE: Assistant Director

PHONE: 758-5816



**South Carolina
Project Notification & Review System**

PROJECT NOTIFICATION REFERRAL

TO: S. C. Wildlife and Marine Res.

RECEIVED

JUN 29 1976

S. C. WILDLIFE & MARINE
RESOURCES DEPARTMENT

STATE APPLICATION IDENTIFIER		
Clearinghouse Use Only		
CONTROL NUMBER		
DIST.	NO.	FY
11	2016	6
SUSPENSE DATE		
7/23		

The attached project notification is being referred to your agency in accordance with Office of Management and Budget Circular A-95. This System coordinates the review of proposed Federal or federally assisted development programs and projects. Please provide comments below, relating the proposed project to the plans, policies, and programs of your agency. All comments will be reviewed and compiled by the State Clearinghouse. Any questions may be directed to this office by phone at 758-2946. Please return this form prior to the above suspense date to:

State Clearinghouse
Division of Administration
1205 Pendleton Street
Columbia, South Carolina 29201

Signature Elmer C. Whitten Jr.
Name Elmer C. Whitten, Jr.

RESULTS OF AGENCY REVIEW

- PROJECT CONSISTENT WITH AGENCY PLANS AND POLICIES
- AGENCY REQUESTS CONFERENCE TO DISCUSS COMMENTS
- AGENCY COMMENTS ON CONTEMPLATED APPLICATION AS FOLLOWS:

Personnel of the S. C. Wildlife and Marine Resources Department have reviewed the Draft Environmental Statement for the Savannah River and the Savannah Bluff Lock and Dam.

We do not object to this project; however, we do recommend scheduling the construction work whereby the increased turbidity will not have any detrimental effects on either indigenous or anadromous species.

RECEIVED
JUL 26 1976
DIVISION OF
ADMINISTRATION

(Use separate continuation sheets if necessary)

FOR THE REVIEWING AGENCY:
SIGNATURE: [Signature] DATE: July 22, 1976
TITLE: Executive Director PHONE: 758-6536



BOARD OF HEALTH

Lachlan L. Hyatt, Chairman
William M. Wilson, Vice-Chairman
I. DeQuincy Newman, Secretary
W. A. Bannette, Jr.
Leonard W. Douglas, M.D.
J. Lorr Mason, Jr., M.D.
William C. Moore, Jr., D.M.D.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

E. KENNETH AYCOCK, M.D., M.P.H., COMMISSIONER
J. MARION SIMS BUILDING — 2600 BULL STREET
COLUMBIA, SOUTH CAROLINA 29201

July 13, 1976

Colonel Frank Walter
District Engineer
U.S. Army Engineer District, Savannah
Corps of Engineers
P.O. Box 889
Savannah, Georgia 31402

Dear Colonel Walter:

This office has completed its review of the draft EIS regarding maintenance and operation of the Savannah River Navigation Project below Augusta (including the New Savannah Bluff Lock and Dam) and offers the following recommendations for your consideration:

(1) River cutoffs should be excavated prior to their connection to the waterway, thereby reducing the impact(s) of construction activities (i.e. increased turbidities, flotsam) upon contiguous State waters.

(2) The locations of all proposed channel modifications (i.e. river widenings, pile dikes, revetments, and river cutoffs) should be depicted within the final EIS.

We appreciate this opportunity to have commented on the subject matter. If we can be of any further assistance to you, please don't hesitate to contact us.

Very truly yours,

Barry Shedrow

C. Barry Shedrow
Environmental Analysis Section
Programs Development Division
Bureau of Wastewater and Stream
Quality Control

CBS/cbs

South Carolina State Commission of Forestry

JOHN R. TILLER STATE FORESTER

P. O. BOX 889 SAVANNAH GEORGIA 31402

June 28, 1976

Mr. Freeman G. Cross, Jr.
LTC, Corps of Engineers
Deputy District Engineer
Savannah Dist., Corps of Engineers
P. O. Box 889
Savannah, Georgia 31402

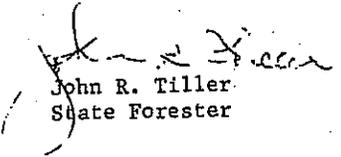
Dear Sir:

Your request for comments on the adequacy of the Impact Statement for the Savannah River Navigation Project has been received.

It appears that most of the work will not affect woodland areas any more than the normal flooding and changes in the river course than it does now.

We find this statement adequate for our purposes as is written.

Very truly yours,


John R. Tiller
State Forester

JRT:yr



BOARD MEMBERS

Lachlan L. Hyatt, Chairman
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William C. Moore, Jr., D.M.D.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

E. KENNETH AYCOCK, M.D., M.P.H., COMMISSIONER
J. MARION SIMS BUILDING — 2600 BULL STREET
COLUMBIA, SOUTH CAROLINA 29201

July 13, 1976

Colonel Frank Walter
District Engineer
U.S. Army Engineer District, Savannah
Corps of Engineers
P.O. Box 889
Savannah, Georgia 31402

Dear Colonel Walter:

This office has completed its review of the draft EIS regarding maintenance and operation of the Savannah River Navigation Project below Augusta (including the New Savannah Bluff Lock and Dam) and offers the following recommendations for your consideration:

(1) River cutoffs should be excavated prior to their connection to the waterway, thereby reducing the impact(s) of construction activities (i.e. increased turbidities, flotsam) upon contiguous State waters.

(2) The locations of all proposed channel modifications (i.e. river widenings, pile dikes, revetments, and river cutoffs) should be depicted within the final EIS.

We appreciate this opportunity to have commented on the subject matter. If we can be of any further assistance to you, please don't hesitate to contact us.

Very truly yours,

C. Barry Shedrow
Environmental Analysis Section
Programs Development Division
Bureau of Wastewater and Stream
Quality Control

CBS/cbs



UNIVERSITY OF SOUTH CAROLINA

COLUMBIA, S. C. 29208

INSTITUTE OF ARCHEOLOGY AND ANTHROPOLOGY

July 1, 1976.

Lt. Col. Freeman G. Cross, Jr.
Deputy District Engineer
Savannah District, Corps of Engineers
U.S. Department of the Army
P.O. Box 889
Savannah, Georgia 31402

Dear Lt. Col. Cross:

I have reviewed the Draft Environmental Statement for Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, Including the Savannah Bluff Lock and Dam, South Carolina. I was pleased to see, on page 11, the brief but significant archeological statement. I would like to comment on the Draft Environmental Statement by way of reiterating and emphasizing that brief statement.

This area of the Savannah River has been a major artery for cultural development for well over 12,000 years. There is no single mile of that entire stream channel or of any of its cut-offs, oxbows, or any of its shore line that doesn't potentially have an archeological site on it. The list of sites mentioned in Table 4 reflect only the very limited archeological reconnaissance of the area that has been done in the past. As your statement says, this probably reflects no more than 10% of the sites in the area.

As this dredging project proceeds, every additional pile dike, every revetment, every river cut-off and widening, has a potential of destroying an archeological site and would need to be investigated by an archeologist before it can be cleared for archeological impact. The snagging and dredging operations in the river itself have considerable potential for underwater archeology that may pertain to isolated shipwrecks and/or accumulations of archeological materials, both historic and prehistoric, that may have fallen into the river from the bluffs on either side of the channel.

Proper archeological investigation of this entire stretch of river poses a very large project in just the survey and reconnaissance alone. The potential for mitigation of adverse effects on archeological sites, once found, is likewise a very large project. I hope these things can be accomplished before the project is undertaken so that, in the fine tradition of Corps of Engineers work, the cultural resources in a large area will be preserved.

Sincerely yours,

Robert L. Stephenson
Director and State Archeologist

RLS:mls



OFFICE OF THE MAYOR - CITY OF SAVANNAH

JOHN P. ROUSAKIS, MAYOR

July 22, 1976

Freeman G. Cross, Jr.
LTC, Corps of Engineers
Deputy District Engineer
P.O. Box 889
Savannah, Georgia 31402

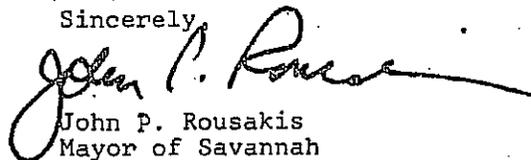
Dear Colonel Cross:

Thank you for your letter of June 21, 1976 regarding the environmental statement for Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, Including the Savannah Bluff Lock and Dam, Georgia and South Carolina. We have reviewed the environmental statement and we believe that it accurately assesses the impact of the proposed project.

We find this project to be consistent with the development goals for the Savannah area. Failure to implement the project would not be in the best interest of the economic development of Savannah. We urge you to proceed swiftly with the completion of this project.

Thank you for your continuing good work in the Savannah area.

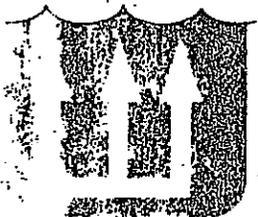
Sincerely,



John P. Rousakis
Mayor of Savannah

JR/pr

cc: A. A. Mendonsa



Port Industrial Development

East P. Street • P.O. Box 100 • Savannah, Georgia
Telephone (912) 233-9611 • Cable SAVV 1000

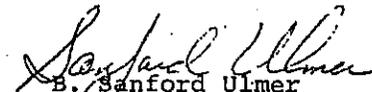
June 23, 1976

Colonel Freeman G. Cross, Jr.
Deputy District Engineer
U. S. Corps of Engineers
P. O. Box 889
Savannah, Ga. 31402

Dear Col. Cross:

Thanks for the opportunity to comment on the impact statement relating to the operation and maintenance of the navigation project between Savannah and Augusta. It appears to be a very thorough study. We consider it completely adequate. We feel that the Savannah River navigation project is a vital element in the area economy.

Sincerely,


B. Sanford Ulmer
Executive Director

BSU:hcs



WESLEY ALLEN, JR.
Director of Engineering,
Planning & Maintenance

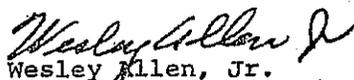
August 2, 1976

LTC Freeman G. Cross, Jr.
Deputy District Engineer
Savannah District, Corps of Engineers
P. O. Box 889
Savannah, Georgia 31402

Dear LTC Cross:

In response to your letter dated June 21, 1976 to Mr. J. D. Holt referencing your Draft Environmental Statement for Operation and Maintenance of a Navigation Project, Savannah River Below Augusta, including the Savannah Bluff Lock and Dam, Georgia and South Carolina, this is to advise that the Georgia Ports Authority has no comments.

Sincerely,


Wesley Allen, Jr.
Director of Engineering,
Planning & Maintenance

WAjr/as

APPENDIX F
SUMMARY OF AQUATIC INVERTEBRATES
OF THE SAVANNAH RIVER
(AFTER WOOD)

TABLE 1

AQUATIC INVERTEBRATES

Group	Number of Species	More Common Representative(s)
Sponges	3	<u>Spongilla fragilis</u>
Flatworms	1	<u>Dugesia tigrina</u>
Nemertean Worms	1	<u>Prostoma rubrum</u>
Rotifers	48	<u>Bdeloid rotifers</u>
Bryozoans	4	<u>Plumatella repens</u> <u>Fredericella sultana</u>
Segmented Worms	16	<u>Limnodrilus hoffmeisterii</u>
Clams	11	<u>Eliptio hopetonensis</u> <u>Lampsilis dolabraeformis</u>
Snails	5	<u>Physa heterostropha</u> <u>Physa columnella</u>
Water Fleas	2	
Aquatic Sow Bugs	1	<u>Ascellus communis</u>
Scuds	3	<u>Hyaella azteca</u>
Fresh Water Shrimps	3	<u>Palaemonetes paludosus</u>
Crayfishes	1	<u>Procambarus pubescens</u>
Stoneflies	13	<u>Perlesta placida</u> <u>Taeniopterix nivalis</u>
Mayflies	33	<u>Heptagenia</u> <u>Isoychia</u> <u>Stenonema</u>
Dragonflies, Damselflies	27	<u>Ischnura</u>
True Bugs	21	
Dobson Flies	1	<u>Corydalus cornutus</u>
Caddisflies	18	<u>Chimarra</u> <u>Cheumatopsyche</u> <u>Hydropsyche</u>
Aquatic Beetles	88	<u>Elmidae</u>
Two-winged Flies	59	<u>Chironomidae</u>

APPENDIX G

PUBLIC NOTICE



DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 889
SAVANNAH, GEORGIA 31402

SASKS

30 April 1975

PUBLIC NOTICE

(Maintenance Dredging - Savannah River Below
Augusta, Savannah District, Georgia - South Carolina)

TO WHOM IT MAY CONCERN:

The Savannah District Corps of Engineers, Savannah, Georgia, proposes to perform maintenance dredging in several shoal areas of the Savannah River below Augusta, Georgia. The periodic maintenance dredging of the Savannah River below Augusta is authorized under Senate Document 6, 81st Congress, River and Harbor Act of May 17, 1950, which provides for a channel nine (9) feet deep and ninety (90) feet wide from the upstream limit of the Federal project or mile 202.6 in the vicinity of Augusta, Georgia, to the downstream limit or mile 21.31 at the upper end of Savannah Harbor.

Project Description: The work involves the removal by hydraulic dredge of all material lying above the plane of ten (10) feet below the low water plane at approximately eighteen sites between river mile 180.0 and 27.1 as shown on the attached map (inclosure 1). The locations (river mile) of the eighteen sites are given in the attached list (inclosure 2). A total of about 200,000 cubic yards of dredged material (all eighteen sites combined) will be removed from the channel. The dredged material (composition-sand) will be deposited along the bank in shallow water to maintain the general cross-section of the river. When possible, material will be placed within pile dike systems to increase the efficiency of these structures. This method of disposal is typical of past dredging disposal techniques.

Maintenance of the Savannah River navigation channel is normally required following an extended period of high discharge which is about once each year. The proposed work is tentatively scheduled to commence in June 1975 and will be completed in approximately six (6) months. There is no known significant amount of private dredging in the subject area.

Previous maintenance dredging has been coordinated with U.S. Department of the Interior, the States of Georgia and South Carolina and other interested parties. A draft Environmental Impact Statement (EIS) is being prepared on the maintenance dredging of the Savannah River below Augusta by the Savannah District Office. The EIS will be distributed to all interested parties and ~~coordinated with appropriate federal, state, and local agencies and conservation groups, including those interested parties listed on the attached list of this notice.~~



SASKS

Maintenance Dredging - Savannah River
Below Augusta, Savannah District, Ga - S.C.

The EIS will be reviewed under the following laws:

- a. Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500).
- b. Sections 307(c)(1) and (2) of the Coastal Zone Management Act of 1972 (16 U.S.C. 1456(c)(1) and (2) 86 Stat. 1280).
- c. The National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347).
- d. The Fish and Wildlife Act of 1956 (16 U.S.C. 472a et seq.), the Migratory Marine Game-Fish Act (16 U.S.C. 760c-760g), and the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c).
- e. The Endangered Species Act of 1973 (16 U.S.C. 668aa-668cc-6, P.L. 93-205).
- f. The National Historic Preservation Act of 1966 (16 U.S.C. 470).

Designation of the proposed disposal site for dredged material associated with this Federal project shall be made through the application of guidelines promulgated by the Administrator, EPA, in conjunction with the Secretary of the Army. If these guidelines alone prohibit the designation of this proposed disposal site, any potential impairment to the maintenance of navigation, including any economic impact on navigation and anchorage which would result from the failure to use this disposal site, will also be considered.

This public notice is being distributed to all known interested persons in order to assist in developing facts on which a decision by the Corps of Engineers can be based. For accuracy and completeness of record, all data in support of or in opposition to the proposed work should be submitted in writing setting forth sufficient detail to support convictions. Any person who has an interest which may be affected by the disposal of this dredged material may request a public hearing. The request must be submitted in writing to the District Engineer within thirty (30) days of the date of this notice and must clearly set forth the interest which may be affected and the manner in which the interest may be affected by this activity to U.S. Army Engineer District, Savannah, P.O. Box 889, Savannah, Georgia 31402, in time to be received on or before 30 May 1975.

2 Incl

1. Map
2. List of Dredging Sites
and Interested Parties

for

Edwin C. Keiser
EDWIN C. KEISER

Colonel, Corps of Engineers
District Engineer

2

MAINTENANCE DREDGING - SAVANNAH RIVER BELOW AUGUSTALOCATION (RIVER MILE)

27.1 - 27.6	77.3 - 77.5
39.1 - 39.3	128.2 - 128.4
43.0 - 43.3	136.1 - 136.4
54.0 - 54.1	144.0 - 144.3
54.6 - 54.7	146.5 - 146.8
54.9 - 55.1	148.2 - 148.5
59.4 - 59.5	149.4 - 149.6
67.4 - 67.7	151.1 - 151.3
69.2 - 69.5	179.7 - 180.0

LIST OF INTERESTED PARTIES

Environmental Protection Agency
 Federal Highway Administration, USDI
 National Marine Fisheries Service, Washington, D.C. (NOAA)
 U.S. Department of Commerce, Washington, D.C.
 U.S. Department of the Interior, Washington, D.C.
 Georgia Conservancy
 Ogeechee Audubon Society
 National Audubon Society
 U.S. Department of Health, Education and Welfare
 U.S. Department of Housing and Urban Development
 Georgia State Clearinghouse (OP&B)
 South Carolina State Clearinghouse (Office of the Governor)
 Mayor of Savannah, Georgia
 Mayor of Augusta, Georgia
 Mayor of North Augusta, South Carolina
 Savannah Ports Authority
 Georgia Ports Authority



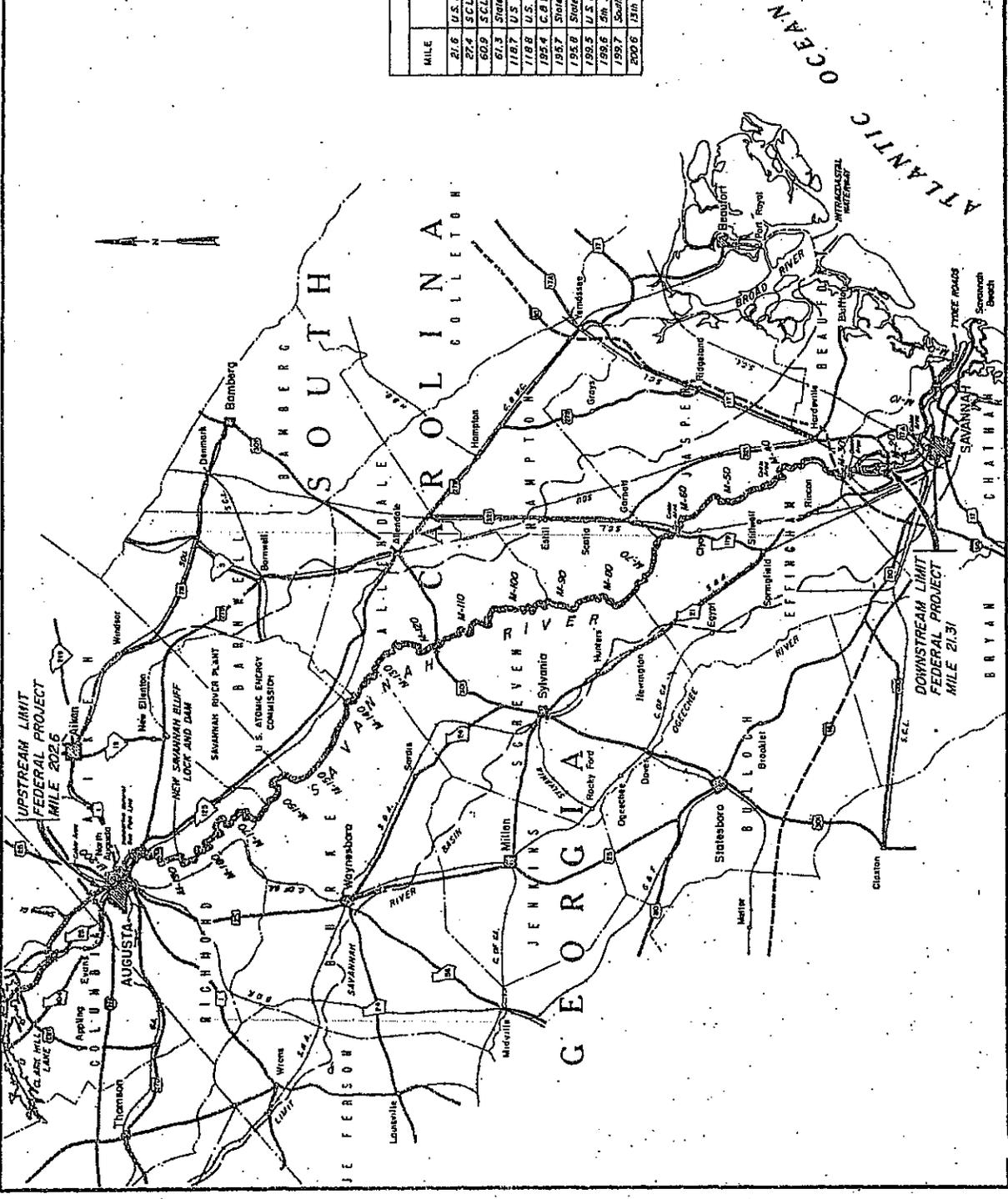
VICINITY MAP
SCALE IN MILES

MILE	NAME	TYPE	HORIZONTAL CLEARANCE (FT)	VERTICAL CLEARANCE (MLW) (FT)
21.6	U.S. Highway 7	Swamp	900	750
22.4	S.C.L. Railroad	Bascule	900	755
60.9	S.C.L. Railroad	Swamp	1030	760
61.3	State Highway 19	Fixed	1000	380
118.7	U.S. Highway 301	Swamp	1000	260
118.8	U.S. Highway 301	Fixed	1200	400
195.4	C.B.W.C. Railroad	Bascule	1000	270
195.7	State Highway 28	Fixed	1690	620
195.8	State Highway 28	Fixed	1650	476
199.5	U.S. Highway 1	Fixed	1000	400
199.7	5th Street	Swamp	750	390
199.7	Southern Railway	Bascule	820	260
200.6	13th Street	Fixed	1200	400

NOTES.

Head of navigation is Mile 202.6
Zero mile is Savannah Harbor Station D-1000
(Vicinity Ft. Pulaski mouth of Savannah River)

**SAVANNAH RIVER BELOW
AUGUSTA, GEORGIA**
PREPARED JUNE 1973
SCALE IN MILES
U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA



APPENDIX H

WATER QUALITY DATA*

*Extracted from U.S. Geological Survey's Water Resources Data for Georgia Water Year 1975.

SAVANNAH RIVER BASIN

U2197500 Savannah River at Burton Ferry Bridge, near Hillhaven, Ga.

LOCATION.--Lat 32°56'20", long 81°30'10", Screven County, at bridge on U.S. Highway 301, 2 mi (3.2 km) downstream from Rocky Creek, 9 mi (14.5 km) east of Hillhaven, and at mile 118.7 (191.0 km), revised.

DRAINAGE AREA.--8,650 mi² (22,400 km²), approximately.

PERIOD OF RECORD.--Discharge: October 1, 1939 to September 30, 1970.
 Chemical analyses: February 1968 to May 1972, August 1974 to current year.
 Water temperature: January 1956 to September 1970.

AVERAGE DISCHARGE.--31 years (1939-70), 10,520 ft³/s (298 m³/s), 16.52 in./yr (419.6 mm/yr).

EXTREMES.--Period of record: Maximum discharge, 141,000 ft³/s (3,990 m³/s) Aug. 18, 1940, gage height, 27.0 ft (8.23 m); minimum daily, 2,120 ft³/s (60.0 m³/s) Sept. 9, 1951. Maximum water temperature, 30.0°C Aug. 25, 1959; minimum, 4.0°C Feb. 19, 20, 1958. Flood in October 1929 reached a stage of 30.8 ft (9.39 m), from information by Corps of Engineers, discharge, 220,000 ft³/s (6,230 m³/s), from rating curve extended above 141,000 ft³/s (3,990 m³/s).

REMARKS.--Laboratory chemical analyses by the Laboratory Services Section, Environmental Protection Division, Georgia Department of Natural Resources. Field determination of Discharge, Water Temperature, pH, and Dissolved Oxygen by U.S. Geological Survey.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	DIS-CHARGE (CFS)	pH (UNITS)	TEMPERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)
AUG. 14...	1145	9670	7.0	25.0	8.2
SEP. 18...	0715	7860	7.0	24.0	8.2

DATE	ALKALINITY AS CaCO ₃ (MG/L)	DIS-SOLVED NITRATE PLUS NITRATE (NI) (MG/L)	DIS-SOLVED AMMONIA NITROGEN (NI) (MG/L)	DIS-SOLVED AMMONIA (NH ₄) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	HARDNESS (CA+MG) (MG/L)
AUG. 14...	18	.26	<.02	--	.10	14
SEP. 18...	19	.23	.05	.06	.07	15

DATE	SPECIFIC CONDUCTANCE (MICRO-MHOS)	COLOR (PLATINUM-COHALT) (UNITS)	TURBIDITY (JTU)	BIO-CHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	FECAL COLIFORM (EC BROTH) (MPN)	TOTAL ORGANIC CARBON (C) (MG/L)
AUG. 14...	68	--	--	--	--	4.0
SEP. 18...	67	20	9	.7	930	3.0

SAVANNAH RIVER BASIN

02197500 Savannah River at Burton Ferry Bridge, near Hillhaven, Ga.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	TIME	DIS-CHARGE (CFS)	PH (UNITS)	TEMPERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)
OCT. 30...	1500	6760	7.2	17.5	7.1
DEC. 04...	0900	7510	7.0	9.0	10.0
JAN. 13...	1620	10400	7.3	11.0	8.8
FEB. 25...	1500	26100	6.7	14.0	5.6
APR. 07...	1500	39900	6.6	15.5	7.1
MAY 12...	1530	15400	6.6	13.5	5.9
JULY 14...	1705	0540	6.7	21.5	5.8
AUG. 19...	0615	910	6.8	25.0	5.8

DATE	ALUMINUM AS GAC03 (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (M) (MG/L)	DIS-SOLVED AMMONIA NITROGEN (M) (MG/L)	DIS-SOLVED AMMONIA (M) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	HAZARDOUSNESS (CA, MG)
OCT. 30...	22	.17	.05	.06	.09	17
DEC. 04...	21	.20	.09	.12	.07	14
JAN. 13...	17	.19	.11	.14	.07	16
FEB. 25...	12	.12	<.02	--	.06	16
APR. 07...	11	.07	.02	.03	.03	14
MAY 12...	11	.21	.11	.17	.07	13
JULY 14...	15	.31	.07	.09	.11	13
AUG. 19...	18	.30	.08	.10	.07	14

DATE	SOLUBLE CHLORIDE (M) (MG/L)	COLOR (PLATINUM) (UNITS)	TURBIDITY (ITU)	HEAVY METAL (M) (MG/L)	FECAL COLIFORMS (MPN)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT. 30...	73	10	5	.8	410	3.0
DEC. 04...	69	24	8	.5	400	3.0
JAN. 13...	55	60	18	1.1	2100	4.0
FEB. 25...	53	60	20	1.1	210	10
APR. 07...	43	90	19	.9	11	7.0
MAY 12...	52	70	20	.8	410	5.0
JULY 14...	54	30	15	--	--	3.0
AUG. 19...	66	10	4	.6	2300	3.0

SAVANNAH RIVER BASIN

02198500 Savannah River near Clio, Ga.
(International hydrological grade station)

LOCATION.--Lat 32°31'30", long 81°15'45", Effingham County, on downstream side of center pier of drawspan of bridge on Seaboard Coast Line Railroad, 3.0 mi (4.8 km) north of Clio, and at mile 60.9 (98.0 km), revised.

DRAINAGE AREA.--9,850 mi² (25,500 km²), approximately.

PERIOD OF RECORD.--Discharge: October 1929 to September 1933, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1303. Gage-height records collected at same site 1921-43, by National Weather Service (unpublished prior to 1933).

Chemical analyses: May 1938 to April 1939, October 1964 to current year.

Water temperature: May 1938 to April 1939.

GAGE.--Water-stage recorder. Datum of gage is 13.41 ft (4.09 m) above mean sea level. Prior to Jan. 31, 1933, nonrecording gage at same site and at datum 4.00 ft (1.22 m) higher. Jan. 31, 1933 to June 12, 1945, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--42 years, 12,010 ft³/s (340 m³/s), 16.56 in/yr (420.6 mm/yr).

EXTREMES.--Current year: Maximum discharge, 50,600 ft³/s (1,430 m³/s) Mar. 24, 25, 30, gage height, 17.83 ft (5.435 m); minimum daily, 7,260 ft³/s (206 m³/s) Oct. 10.

Period of record: Maximum discharge, 270,000 ft³/s (7,650 m³/s) Oct. 6, 1929, gage height, 29.7 ft (9.05 m), present datum (from information by Corps of Engineers), from rating curve extended above 120,000 ft³/s (3,400 m³/s); minimum daily, 1,950 ft³/s (55.2 m³/s) Sept. 27, 1931.

REMARKS.--Records good except those for period of no gage-height record, which are fair. Flow regulated by Lake Burton, Mchis Reservoir, Hartwell and Clark Hill Lakes (see stations 02178500, 02179500, 02187250, and 02194500). Laboratory chemical analyses by the Laboratory Services Section, Environmental Protection Division, Georgia Department of Natural Resources. Field determination of Discharge, Water Temperature, pH, and Dissolved Oxygen by U.S. Geological Survey.

REVISIONS (WATER YEARS).--WSP 1112: 1940.

SAVANNAH RIVER BASIN

02198500 Savannah River near Clio, Ga.--Continued
(International hydrological decade station)

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	TIME	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHDS)	PH	DIS- SOLVED OXYGEN (MG/L)
OCT.					
23...	0845	7500	70	7.0	--
NOV.					
22...	0940	8300	71	7.0	4.0
DEC.					
04...	1045	7940	71	7.4	10.1
18...	0915	8720	65	7.5	10.6
JAN.					
17...	0955	14400	55	7.0	10.0
FEB.					
21...	0945	23800	56	6.7	8.4
25...	1630	25200	54	6.9	6.0
MAR.					
13...	0800	23800	58	6.9	9.0
APR.					
17...	0815	39200	52	7.0	8.8
MAY					
08...	0930	14400	62	7.0	7.8
13...	0700	16800	54	7.0	6.8
JUNE					
19...	0830	11700	64	7.0	7.4
JULY					
17...	0800	12700	60	6.7	7.4
AUG.					
13...	1330	10100	67	--	6.7
19...	0945	9320	70	7.0	6.9
SEP.					
11...	1330	9200	65	7.1	6.9

DATE	DIS- SOLVED SILICA (SiO2) (MG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL MANG- NESE (MNI) (UG/L)	DIS- SOLVED MANG- NESE (MNI) (UG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NESIUM (MG) (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	BICAR- BONATE (HCO3) (MG/L)
OCT.										
23...	--	--	--	--	--	--	--	--	--	--
NOV.										
22...	--	--	--	--	--	--	--	--	--	--
DEC.										
04...	--	--	--	--	--	--	--	--	--	--
18...	10	450	110	70	30	6.1	1.4	6.0	1.4	24
JAN.										
17...	--	--	--	--	--	--	--	--	--	--
FEB.										
21...	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--
MAR.										
13...	6.2	700	190	40	20	4.0	1.3	4.5	1.3	22
APR.										
17...	--	--	--	--	--	--	--	--	--	--
MAY										
08...	--	--	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--	--
JUNE										
19...	9.7	2000	400	100	30	4.9	1.2	6.2	1.3	10
JULY										
17...	--	--	--	--	--	--	--	--	--	--
AUG.										
13...	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--
SEP.										
11...	9.6	950	200	70	20	4.6	1.1	6.6	1.5	24

SAVANNAH RIVER BASIN

02198500 Savannah River near Clyn, Ga.--Continued
(International hydrological decade station)

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 to SEPTEMBER 1975

DATE	TOTAL			TOTAL			TOTAL		
	CHLOROPHYLL A	CHLOROPHYLL B	CHLOROPHYLL C	CHLOROPHYLL A	CHLOROPHYLL B	CHLOROPHYLL C	CHLOROPHYLL A	CHLOROPHYLL B	CHLOROPHYLL C
001									
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									

DATE	TOTAL		TOTAL		TOTAL		TOTAL	
	CHLOROPHYLL A	CHLOROPHYLL B						
001								
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
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25								
26								
27								
28								
29								
30								
31								

SAVANNAH RIVER BASIN

02198500 Savannah River near Flye, Ga.--Continued
(International hydrological decade station)

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	DIS-SOLVED CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)	DIS-SOLVED CHROMIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)
NOV. 27...	--	--	--	--	--	--	--	--	--	--
NOV. 22...	--	--	--	--	--	--	--	--	--	--
DEC. 19...	1	1	0	0	5	5	0	0	4	4
JAN. 17...	--	--	--	--	--	--	--	--	--	--
FEB. 21...	--	--	--	--	--	--	--	--	--	--
MAR. 13...	1	0	0	0	<10	0	1	1	5	4
APR. 17...	--	--	--	--	--	--	--	--	--	--
MAY 04...	--	--	--	--	--	--	--	--	--	--
JUN. 14...	0	0	1	0	<10	2	0	0	2	2
JUL. 17...	--	--	--	--	--	--	--	--	--	--
AUG. 13...	--	--	--	--	--	--	--	--	--	--
SEP. 11...	0	0	0	0	<10	0	1	0	0	0

DATE	TOTAL LEAD (Pb) (UG/L)	DIS-SOLVED LEAD (Pb) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	DIS-SOLVED SELENIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	SUS-PENDED SEDIMENT CHARGE (T/DAY)
NOV. 27...	--	--	--	--	--	--	--	--	42 850
NOV. 22...	--	--	--	--	--	--	--	--	28 627
DEC. 19...	11	4	--	0	0	0	20	10	15 353
JAN. 17...	--	--	--	--	--	--	--	--	81 3150
FEB. 21...	--	--	--	--	--	--	--	--	12 771
MAR. 13...	0	0	2	0	0	0	0	0	10 643
APR. 17...	--	--	--	--	--	--	--	--	8 847
MAY 04...	--	--	--	--	--	--	--	--	30 1170
JUN. 14...	20	12	1	1	0	0	10	0	30 948
JUL. 17...	--	--	--	--	--	--	--	--	34 1170
AUG. 13...	--	--	--	--	--	--	--	--	23 627
SEP. 11...	15	12	1	0	0	0	30	5	20 497

DATE	TOTAL THALLIUM (Tl) (UG/L)	TOTAL URANIUM (U) (UG/L)	DIS-SOLVED URANIUM (U) (UG/L)	SUS-PENDED URANIUM (U) (UG/L)	DIS-SOLVED RADIUM (Ra) (PC/L)	SUS-PENDED RADIUM (Ra) (PC/L)	DIS-SOLVED RADIUM (Ra) (PC/L)	SUS-PENDED RADIUM (Ra) (PC/L)	DIS-SOLVED RADIUM (Ra) (PC/L)	SUS-PENDED RADIUM (Ra) (PC/L)	DIS-SOLVED RADIUM (Ra) (PC/L)	SUS-PENDED RADIUM (Ra) (PC/L)	TRITIUM IN WATER MOLES (COUNT)	TRITIUM IN WATER MOLES (COUNT)
NOV. 27...	--	--	--	--	--	--	--	--	--	--	--	--	2360	50.0
NOV. 22...	--	--	--	--	--	--	--	--	--	--	--	--	1090	30.0
DEC. 19...	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JAN. 17...	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB. 21...	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MAR. 13...	62	15	<.0	1.2	1.4	1.2	2.7	1.0	.02	.04	--	--	--	--

