

Chickamauga Lock Feasibility Report

Section I - The Study and Report

1. Scope of Study

Chickamauga Lock is a weakening link in this Nation's inland navigation system for two reasons. First are structural problems that result from an ongoing alkali aggregate reaction (AAR). AAR is a reaction between the alkali in the cement and the rock aggregate used to construct the project. The reaction causes a concrete structure to physically expand. This concrete expansion threatens the structural integrity of the lock. Chickamauga Lock is also too small and has no auxiliary chamber. Today's tows have to transit the lock one barge at a time resulting in much longer than normal processing times. This study evaluates the Tennessee River navigation system operating through Chickamauga Lock. This feasibility report will describe the problems associated with Chickamauga Lock and offer possible solutions.

2. Study Authority

This study was initiated under the U.S. Army Corps of Engineers Support for Others (SFO) authority. The Tennessee Valley Authority (TVA), as owner of the Chickamauga Project, requested and funded the U.S. Army Corps of Engineers Nashville District to conduct a Principle and Guidelines compatible feasibility study of navigation problems at Chickamauga Lock.

The Nashville District was to conduct an investigation of the feasibility of a new replacement lock at Chickamauga. The feasibility report for the TVA would be to the level of design detail to meet the requirements of ER 1110-2-1150, Engineering and Design of Civil Works Projects. The basis for the study was the "Final Environmental Impact Statement" (FEIS) prepared by the TVA

and the "Engineering Evaluation of Navigation Facility" report prepared by the TVA. The FEIS recommended the construction of a 110'x600' lock riverward of the existing lock and slightly downstream of the dam. The Corps was to supplement TVA's previous work to meet the requirements of The Principles and Guidelines.

Section 455 of the Water Resources Development Act of 2000, directs the Secretary of the Army to prepare a report of the Chief of Engineers for a replacement lock at Chickamauga Lock and Dam, Tennessee. It further directs the Secretary to utilize \$200,000 from funds transferred from the Tennessee Valley Authority for that purpose.

SEC. 455. CHICKAMAUGA LOCK AND DAM, TENNESSEE.

(a) *IN GENERAL.*—The Secretary shall use \$200,000, from funds transferred from the Tennessee Valley Authority, to prepare a report of the Chief of Engineers for a replacement lock at Chickamauga Lock and Dam, Tennessee.

(b) *FUNDING.*—As soon as practicable after the date of enactment of this Act, the Tennessee Valley Authority shall transfer to the Secretary the funds necessary to carry out subsection (a).

Section 2401 of the Supplemental Appropriations Act of 2001 makes available \$500,000 of Operations and Maintenance funds within the Corps for completion of this feasibility study.

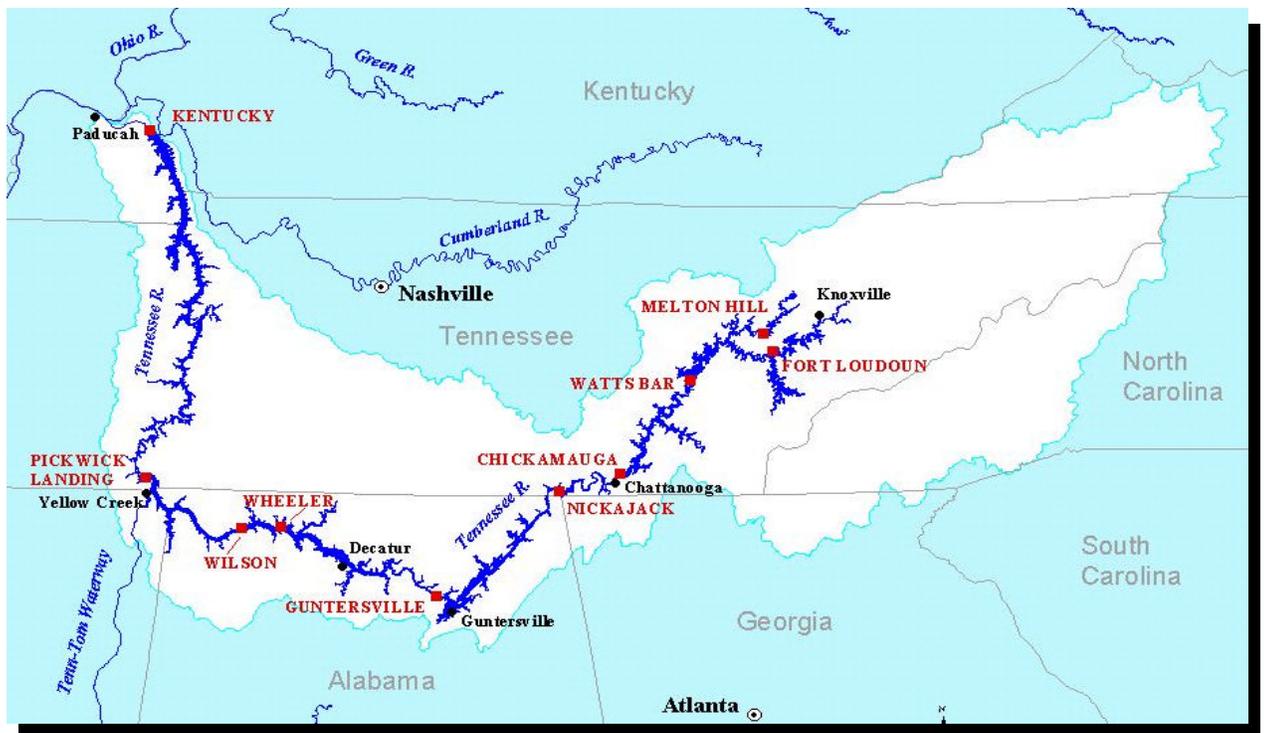
SEC. 2401. Of the amounts appropriated under the heading 'Operation and Maintenance, General' under title I of the Energy and Water Development Appropriations Act, 2001 (enacted by Public Law 106-377; 114 Stat. 1441 A-62), \$500,000 made available for the Chickamauga Lock, Tennessee, shall be available for completion of the feasibility study for Chickamauga Lock, Tennessee.

3. Description of the Study Area

Chickamauga Lock and Dam is located at mile 471.0 on the Tennessee River, about 13 miles upstream of the Port of Chattanooga, Tennessee. (See Figure I-1) The Tennessee River is formed at the junction of the Holston and French Broad Rivers near Knoxville in eastern Tennessee. From there, it flows 652 miles through Tennessee, northern

Alabama, northeastern corner of Mississippi, back into Tennessee and western Kentucky and enters the Ohio River at mile 935 near Paducah, Kentucky. The Tennessee River falls a total of 515 feet along its 652-mile length. The fall is gradual over most of the river's length except in the Muscle Shoals area of Alabama where a drop of 100 feet is found in a stretch of less than 20 miles. The river has a drainage area of 40,910 square miles. In addition to the Holston and French Broad Rivers, major tributaries of the upper Tennessee include the Hiwassee, Clinch, and Little Tennessee Rivers.

Figure 1 - Tennessee River Navigation System



Chickamauga Lock and Dam is one of 10 multipurpose lock-and-dam projects comprising the Tennessee River navigation system. Existing lock chambers on the mainstem system vary in size from the 110'x1,000' main chamber at the Pickwick Locks and Dam to the 60'x300' two-stage auxiliary lock chambers at the Wilson Locks and Dam. Only four of the Tennessee River projects – Pickwick, Wilson, Wheeler and Guntersville – have operating main and auxiliary locks. The Barkley Lock and Dam on the lower Cumberland River functions as an auxiliary lock for the

Kentucky Lock since the Barkley Lock is accessible to Tennessee River traffic through the Barkley Canal. Currently a new 110'X1,200' lock is under construction by the U.S. Army Corps of Engineers at the Kentucky Lock and Dam project. Main and auxiliary chamber sizes and construction dates are shown for the Tennessee River navigation projects in Table I-1.

Navigation pools on the Tennessee River range in length from 16 miles between Wilson and Wheeler dams to 184 miles between Kentucky and Pickwick dams. The mainstem pools provide a nine-foot navigation channel 300 feet wide along the entire 652 miles of length of the Tennessee River, except for a three-mile stretch at Knoxville. At this point, the channel width diminishes to 200 feet during winter periods when the lake level is drawn down for flood control purposes. In addition, the mainstem pools back water into tributary streams and embayments creating 140 additional miles of navigable tributaries.

Table I-1 - Tennessee River Lock and Dam Structures

Project	River Mile	Main Chamber Width/Length (Feet)	Aux. Chamber Width/Length (Feet)	Completion Date
Kentucky L/D	22.4	110 X 1,200 ¹	110 X 600	1942(Aux)
Pickwick L/D	206.7	110 X 1,000	110 X 600	1937(Aux)
Wilson L/D	259.4	110 X 600	60 X 300 ²	1927(Aux)
Wheeler L/D	274.9	110 X 600	60 X 400	1934(Aux)
Guntersville L/D	349.0	110 X 600	60 X 360	1937(Aux)
Nickajack L/D	424.7	None	110 X 600 ³	1967
Chickamauga L/D	471.0	60 X 360	None	1937
Watts Bar L/D	529.9	60 X 360	None	1941
Ft. Loudoun L/D	602.3	60 X 360	None	1943
Clinch River Melton Hill L/D	23.1	75 X 400	None	1963

¹A new lock is under construction by the U.S. Army Corps of Engineers. Currently the 110 X 800-foot lock at Barkley Lock and Dam provides an alternative route to Kentucky Lock and Dam.
²Double-lift lock
³The 110 X 800-foot main chamber has not been completed. Construction was halted in 1967.

The upper Tennessee River segment is considered to begin at the Chickamauga Lock and Dam and extend upstream to its terminus in Knoxville, a distance of 181 miles. Watts Bar and Ft. Loudoun Locks and Dams are located within

this segment. The Clinch (63 miles), Emory (12 miles), Hiwassee (19 miles), and Little Tennessee Rivers (19 miles) are the major navigable tributaries to the upper Tennessee segment. The Melton Hill Lock and Dam on the Clinch River provides navigation to the U. S. Department of Energy facilities in Oak Ridge, Tennessee. A limited navigation channel is also available on some other tributaries, including Soddy Creek, Piney River, King Creek, Little River, and French Broad River.

The economic impacts of the navigation problems and potential solutions encompass a wide geographical area. The Chickamauga Lock represents the gateway to the upper Tennessee River Valley. In addition, commodities traversing Chickamauga Lock have origins or destinations in 42 congressional districts in 17 states in the South, Midwest, and the Mid-Atlantic regions, traveling an average 1,400 miles. (See Figure I-2)

4. Contents of the Report

This main report is a nontechnical summary of the feasibility study investigating the need to replace the existing lock at Chickamauga. It presents a broad view of the overall study for both the general and technical reader. The following topics are presented in the report in the order they are listed: a description of the study area, including existing and future conditions; a definition of area problems and the need for measures to alleviate those problems; the formulation and evaluation of alternatives; the selection of a recommended plan; a summary of the selected plan's economics, including costs and benefits; and a description of how the plan could be implemented.

This report also includes Supplement 1 to the Final Supplemental Environmental Impact Statement (FSEIS). This FSEIS is only intended to address items not included in the 1996 FEIS that were either not required or not known at the time. Omissions that are the focus of this supplement are cumulative impacts, Fish and Wildlife Coordination, the Endangered Species Act Consultation, cultural and historic properties, and Section 404 of the Clean Water Act; Section 404 will be pursued under Section 404(r). The FEIS contains an evaluation of environmental and social impacts associated with the alternatives considered in the study

Figure I-2 Chickamauga Lock Traffic Origins and Destinations

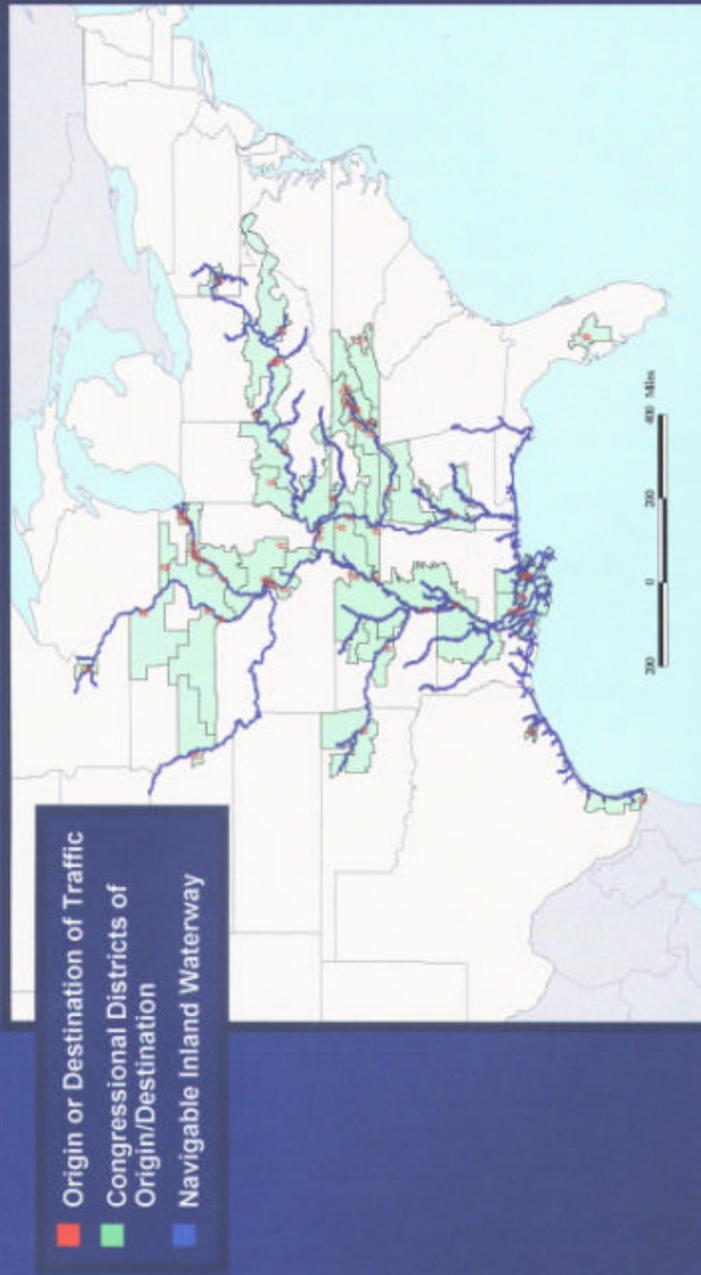


FIGURE I-2

with emphasis on the selected plan. These impacts were coordinated with the appropriate state and Federal environmental agencies. Their views are included and discussed in the FSEIS.

5. Participants in Study

Participants in the Chickamauga Lock Feasibility Study, in addition to the Nashville District Corps of Engineers (COE), include the Great Lakes and Ohio River Division Navigation Planning Center COE, the Louisville District COE, the Pittsburgh District COE, the U.S. Coast Guard, the Tennessee Valley Authority, the U.S. Fish and Wildlife Service (USFWS), and the Tennessee Wildlife Resources Agency. The LRD Navigation Planning Center estimated commodity movements, developed transportation rates and traffic demand forecasts, forecasted future waterway traffic, finalized fleet selection, computed the capacity of the Chickamauga Lock and alternatives, and computed system rate savings for the without-project condition and the final alternatives. The Louisville District conducted the lock structural reliability analysis with the help of the Pittsburgh District. The U.S. Coast Guard participated in all coordination meetings with the towing industry and in preparing TVA's Final Environmental Impact Statement (FEIS).

The Tennessee Valley Authority provided initial design and cost information for the various alternatives, conducted transportation rate studies, identified current and potential commodity movements, and prepared the 1996 Final Environmental Impact Statement. The U.S. Fish and Wildlife Service and the Tennessee Wildlife Resources Agency were participants in the development of the FEIS.

6. Coordination and Industry Involvement

TVA published a notice of intent to prepare an EIS for the Chickamauga Lock project on January 11, 1991 (56 FR 1216). Notice of availability of the draft EIS was published in the *Federal Register* on May 19, 1995 (60 FR 26882). Copies of the draft EIS were issued prior to publication of the Notice of Availability. TVA, in conjunction with the cooperating agencies, held a public meeting on May 18, 1995, at Chattanooga State Technical

Community College to receive comments on the draft EIS. About 60 people attended the meeting including representatives from industry, the public, state and local government, congressional staff, U.S. Department of Energy, U.S. Coast Guard, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers. In addition, TVA received written comments from Federal, state and local agencies, and industry. Written comments were also received from individuals and special interest groups. The majority of comments supported the replacement of the Chickamauga Lock. The main environmental concerns expressed were increased timber harvesting, water quality, and aquatic biology impacts and increased flooding. As appropriate, responses to comments were incorporated in the text of the FEIS.

A Notice of Intent to supplement TVA's FEIS was issued by the Corps of Engineers in the *Federal Register* during August 2001. The district received 11 letters in response to the notice. All responses were supportive of construction of a new lock at Chickamauga.

7. Earlier Studies and Reports

The Nashville District and TVA have prepared several reports concerning navigation concerns at Chickamauga Lock. The report Tennessee River and Tributaries, prepared by the Nashville District Corps of Engineers, was published in 1930. The report presented a plan for a 9-foot navigation channel from Paducah, Kentucky, to Knoxville, Tennessee. The report recommended the construction of 7 high dams to supplement the two existing dams on the Tennessee River. The report served as the basis for subsequent development of the river.

In addition, the Nashville District prepared the Upper Tennessee River Interim Navigation Study, Reconnaissance Report, dated March 1990 and revised February 1990. The study evaluated potential plans to improve navigation at Chickamauga, Watts Bar, and Fort Loudoun Locks and Dams on the Tennessee River between Chattanooga and Knoxville, Tennessee. The report concluded that the best plan to improve navigation on the Upper Tennessee River would be to add locks at Chickamauga and Watts Bar. The new locks would double system traffic by the year 2000. This two-lock plan would result in positive net benefits with a benefit-to-cost ratio of 1.5. The report recommended

further detailed engineering, economic, and environmental studies be undertaken to determine the best overall plan to improve navigation on the Upper Tennessee River.

The Tennessee Valley Authority has prepared several reports on possible replacement of the Chickamauga Lock. A report entitled Engineering Studies for Proposed Lock Addition - Chickamauga Project, was prepared by TVA, Division of Engineering Design, Hydro Design Projects and dated September 1983. The report describes preliminary engineering studies for an additional 110-foot X 600-foot lock at the Chickamauga project. Alternative locations for the new lock, the lock's foundation bearing material, and the lock's impact on spillway capacity are addressed in this study.

TVA has prepared a Final Environmental Impact Statement, Chickamauga Dam - Navigation Project, dated March 1996. The FEIS addressed the proposed construction of a new 110'X600' navigation lock at Chickamauga Dam. The FEIS addressed both the economic, social, and environmental impacts of various alternative plans as well as the proposed plan. The TVA Board signed a Record of Decision in March 1996.