Greers Ferry Lake and Lake Ouachita, Arkansas

US Army Corps of Engineers
Little Rock District

WATER SUPPLY STORAGE REALLOCATION REPORT

Reallocation of Storage at Greers Ferry Lake and Lake Ouachita, Arkansas for the Mid Arkansas Water Alliance

November 2008

Executive Summary

Reallocation of Storage at Greers Ferry Lake and Lake Ouachita, Arkansas for the Mid Arkansas Water Alliance

This report presents the results of a study to reallocate storage in Greers Ferry Lake and Lake Ouachita to the Mid Arkansas Water Alliance (MAWA) in Arkansas for municipal and industrial (M&I) water supply. This reallocation study comes at the request of the Mid Arkansas Water Alliance to purchase enough storage to yield 15 MGD in Greers Ferry Lake and 20 MGD in Lake Ouachita. The requests are mutually exclusive. The report results are for a 18,729.705 acre-feet flood control storage reallocation from Greers Ferry Lake to MAWA to meet the present and future needs of central Arkansas through the year 2025.

Of the 18,729.705 acre-feet available to MAWA; 18,556.050 would provide an expected yield of 15 MGD. The remaining 173.655 acre-feet (yield, 0.14 MGD) would be provided to existing users as dependable yield mitigation storage (DYMS) to maintain their current expected yields. The 18,729.705 acre-feet of storage represents 2.036 percent of the current 920,075.949 acre-feet of flood storage in the lake or 1.135 percent of the current 1,650,500 acre-feet of useable storage in Greers Ferry Lake. The top of the conservation pool would be increased by 0.6 feet. This reallocation will leave 14,547.583 acre-feet of the Chief of Engineers' Discretionary Storage remaining in Greers Ferry Lake.

An environmental assessment as directed by the National Environmental Policy Act is included as Appendix E. The total size of Greers Ferry Lake will not change, but the volumes between the conservation and flood pools would be slightly redistributed without a severe effect on other authorized purposes and without major structural or operational changes. A Finding of No Significant Impact was signed on 26 June 2007.

Although the report results indicate a conclusion for Lake Ouachita for a 33,303 acre-feet flood control storage reallocation that would increase the top of the conservation pool by 0.82 feet, these results are provided for information only to maintain consistency with the Environmental Assessment. Action on the Lake Ouachita Section is not requested and it was not certified under Agency Technical Review. MAWA members have since changed their Lake Ouachita request to a conservation pool reallocation due to the dam safety considerations presented below. Because of the urgent need for water supply in central Arkansas, the information about Lake Ouachita remains, but only the Greers Ferry Lake storage reallocation is being requested with this report. Reallocations from the two lakes are independent actions with no environmental, economic, ecological, or hydraulic connections. MAWA requested both lakes' storage reallocations together because a November 2002 Planning Assistance to States (PAS) Study identified the best alternative for central Arkansas water supply as the purchase of discretionary storage in Greers Ferry Lake and Lake Ouachita.

In May 2006, a risk assessment screening was performed for Blakely Mountain Dam at Lake Ouachita. This screening determined the dam may be at risk for failure from seepage and piping due to construction methods and the apparent lack of an adequate seepage blanket. Blakely Dam

received a Dam Safety Action Classification II (DSAC II) as unsafe or potentially unsafe. Thus Blakely Dam requires interim risk reduction measures. A seepage monitoring system has been designed to evaluate any deterioration of the core material. It will be implemented around November 2008 - January 2009. Once constructed, additional time will be required for monitoring. It will take at least two years to determine the dam's condition and recommend risk reduction measures. Depending on that determination, it could be numerous additional years to reclassify the dam from DSAC II to III or IV. Draft Corps Dam Safety policies do not allow raising the flood pool at Blakely Mountain Dam with its DSAC II classification. These conditions make the reallocation report conclusion for a flood pool storage reallocation at Lake Ouachita no longer feasible.

Any additional requests for storage by the MAWA would require a new water supply storage agreement between the Mid Arkansas Water Alliance and the United States Government. An unexecuted copy of the agreement for the Greers Ferry Lake request is included as Appendix D to this report. This report and the agreement are being submitted to the US Army Corps of Engineers Headquarters in Washington D.C. for approval for the Greers Ferry Lake portion only. Upon approval, the agreement will be executed and the reallocation of storage will be made.

If an agreement between the Mid Arkansas Water Alliance and the United States Government was executed for this water supply storage reallocation, MAWA would be required to pay an annual cost of $227,407 for storage within Greers Ferry Lake. Joint-use O&M costs of $21,303 are included in the annual payments for Greers Ferry Lake.

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LIST OF TERMS, REFERENCES, AND ACRONYMS

AF or Acre-Foot - a unit for measuring the volume of water. It is equal to the quantity of water required to cover 1.0 acre to a depth of 1.0 foot and is equal to 43,560 cubic feet. It is used in measuring volumes of water used or stored.

Authorized Project - A project specifically authorized by Congress for construction, generally, through language in an authorization or appropriation act, or a project authorized pursuant to Section 201, of the 1965 Flood Control Act.

Central Arkansas Water – Public water utility formed from the Little Rock and North Little Rock water works

Construction Cost - The total expenditures to physically build the project including the cost of lands, relocations, engineering, design, administration, and supervision. This cost is sometimes referred to as the "first cost."

Cost Allocation - A systematic distribution of costs among the project purposes of a multipurpose project.

Cost Sharing - The division of cost among various entities which gain benefit including Federal, state, local, or private interests.

CWCCIS or Civil Works Construction Cost Index System - This refers to the cost index used to inflate construction costs to present day values.

DYMS or dependable yield mitigation storage or mitigation storage - is defined as the storage necessary to keep existing users whole to compensate for the reduction in the dependable yield which occurs when the conservation pool is expanded into the flood pool.

EA - Environmental Assessment

ENR - Engineering News Record is used to inflate construction costs to present day values.

ER 1105-2-100 - Policy and Planning Guidance For Conducting Civil Works Planning Studies, 22 April 2000

Financial Feasibility - Criterion of project acceptability, based upon the financial value of the returns to the sponsoring entity exceeding the financial value of the costs to the sponsoring entity.

Government fiscal year - October 1 to September 30

gpm – gallons per minute

HQUSACE or Headquarters United States Army Corps of Engineers.

Immediate need - is that storage that the local sponsor must begin payment on immediately upon final approval of the water supply agreement whether or not it is needed.

Investment or investment cost - The construction cost plus interest during construction. In water supply agreements, this is the construction cost allocated to that portion of the water supply storage space plus interest during construction for those projects paid out over time, but does not include (if there is any) interest on the unpaid balance.

Joint-use Costs - Total project costs less all specific costs.

MGD or million gallons per day - a unit for measuring the flow or discharge of a volume of water over a period of time.

M&I or municipal and industrial - while not defined in legislative history, the term has been defined by the Corps to mean supply for uses customarily found in the operation of municipal water systems and for uses in industrial processes. Industrial processes can include thermal power generation and mining operations.

NED or National Economic Development Plan - is defined as the plan with the greatest excess benefits over costs.

O&M - operation and maintenance.

Period of Analysis - The period determined by the estimated point in time at which the combined effect of physical depreciation, obsolescence, changing requirements for project services, and time and discount allowances will cause

the cost of continuing the project to exceed the benefits to be expected from continuation. It may be equal to or greater than the amortization period and may be equal to, but is generally less than, the physical life.

PMA's - Power Marketing Agencies

Public Law 85-500, Title III, Water Supply Act of 1958, as amended - 1958 River and Harbor Act, 3 July 1958. Title III of this act is entitled The Water Supply Act of 1958. Section 301 provided that storage may be included for present and future municipal or industrial water supply in Corps or Bureau of Reclamation projects, the costs plus interest to be repaid by non-Federal entities within the life of the project but not to exceed 50 years after first use for water supply. No more than 30 percent of total project costs may be allocated to future demands. An interest-free period, until supply is first used, but not to exceed ten years, was permitted (72 Stat. 319, 43, U.S.C. 390b). These provisions were modified by Section 10 of Public Law 87-88 and Section 932 of Public Law 99-662.

Safe, dependable or critical period yield - is defined as the maximum quantity of water reliably available throughout the most severe drought of record.

Storage - the volume in a reservoir project between two different elevations. The normal unit of storage space is acre-feet. There may or may not be any water available within this space.

SUPER Model – Model used to simulate the hydrology and hydraulics of the White River.

SWPA - Southwestern Power Administration

Water Supply Handbook - IWR Report 96-PS-4 (Revised)

WRDA or Water Resource Development Act - is an annual Act to provide for the conservation and development of water and related resources.

Yield - The quantity of water which can be taken, continuously, for any particular economic use. For municipal and industrial water supply purposes, this is normally taken as the flow which can be guaranteed during the 50-year drought on a 98% dependability.

SECTION A

GREERS FERRY LAKE ANALYSIS

WATER SUPPLY STORAGE REALLOCATION REPORT AT GREERS FERRY LAKE FOR THE MID ARKANSAS WATER ALLIANCE

1. PURPOSE OF REPORT

A. Reallocation Request

A U.S. Army Corps of Engineers study, "The Mid Arkansas Water Resource Study", was completed in November 2002 for the Mid Arkansas Water Discussion Group to evaluate future water needs of central Arkansas and identify sources to meet those needs through the year 2050. Based upon the results of this study, the group decided that the best alternative for obtaining water for the central Arkansas area would be to purchase the remaining Corps of Engineers discretionary storage in Greers Ferry Lake and Lake Ouachita. On April 4, 2003 the Mid Arkansas Water Discussion Group evolved into the Mid Arkansas Water Alliance (MAWA) and was incorporated.

Another U.S. Army Corps of Engineers Study, "Mid-Arkansas Water Resource Study Update", was completed in December 2004 to update the needs of the eight counties in central Arkansas that comprise MAWA because the member utilities doubled since the initial report was completed. The purpose of this study was primarily to consider the population and demand based on the new members. Furthermore, this study took into consideration the existing raw water sources that were available to Central Arkansas Water, which were not considered in the initial study. Based on these findings and after meetings with the Little Rock District, MAWA decided their goals could be met through the year 2025 by reducing their initial request. A letter requesting the purchase of storage to provide 15 MGD from Greers Ferry Lake and 20 MGD from Lake Ouachita was submitted to the Little Rock District on 9 May 2005 by MAWA.

This study was conducted by the Little Rock District with input and assistance from the Vicksburg District for the analysis of Lake Ouachita. Section A of this report will focus on the reallocation at Greers Ferry Lake and Section B will focus on the reallocation at Lake Ouachita.

B. Reallocation Authority

Authority for the Corps to reallocate existing storage space to M&I water supply is contained in Public Law 85-500, Title III, Water Supply Act of 1958, as amended. The Secretary of the Army is authorized to cooperate with local interests in providing storage space for M&I water supply in U.S. Army Corps of Engineers projects as long as the local interests agree to pay the costs associated with the storage space. The Corps has the discretionary authority to reallocate the lesser of 15% or 50,000 acre feet of the total storage capacity in Greers Ferry Lake provided the reallocation has no severe effect on other authorized purposes and will not involve major structural or operational changes.

2. PROJECT BACKGROUND

A. Project History and Purposes

The Greers Ferry Reservoir project was authorized for flood control and other purposes by the Flood Control Act approved 28 June 1938. The Flood Control Act of 1954 modified the above-stated authorization of the Greers Ferry project to include the generation of hydroelectric power in conjunction with flood control, as recommended by the Chief of Engineers in House Document No. 499, 83rd Congress, 2nd session.

Construction for the Greers Ferry project was initiated on 7 June 1957 when construction of the office and service facilities was begun. These facilities were completed on 30 January 1958. Construction of the dam started 24 February 1959 and was completed sufficiently to start reservoir filling on 3 January 1962. Construction of the power plant started with contract for turbines on 19 January 1959 and was completed sufficiently to place the last unit on line on 6 May 1964. Flood control and power generation in-service dates are 1 February 1962, 1 April 1964 (Power Unit 1), and 1 June 1964 (Power Unit 2), respectively. Current project physical features are shown in Table 1.

TABLE 1
GREERS FERRY PROJECT PHYSICAL FEATURES

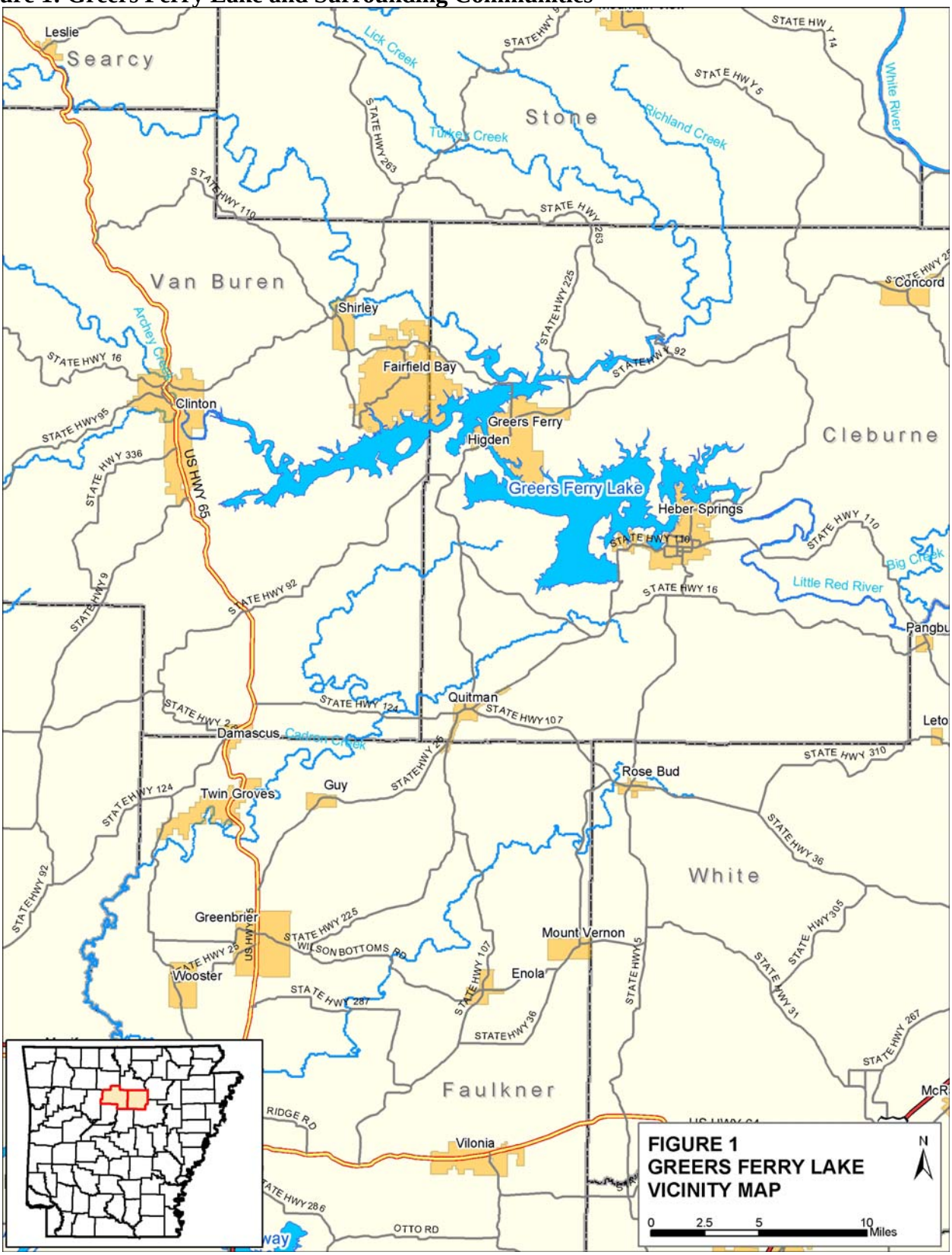
Feature	Elevation[1]	Area (acres)	Storage Volume (AF)	Equiv. Runoff[2] (inches)
Top of dam	498.00	----	----	
Top of flood control pool	487.00	40,000	2,844,500	46.5
Top of conservation pool [4]	461.44	31,000	1,924,424.051	31.3
Top of inactive pool	435.00	24,000	1,194,000	19.5
Usable Storage	487.00 - 435.00		1,650,500	
Flood control storage	461.44 - 487.00	----	920,075.949	
Conservation Storage	435.00 - 461.44	----	730,424.051	
Inactive storage[3]	Below elev. 435.00	----	1,194,000	

[1] Above the National Geodetic Vertical Datum (NGVD29).
[2] From 1,146 square miles of drainage area upstream from dam.
[3] 2008 Sediment surveys indicate no problem with sediment in Greers Ferry Lake.
[4] From SUPER Model

B. Project Location

The Greers Ferry Dam is located on the Little Red River in Cleburne County, Arkansas, approximately 79 miles upstream from its confluence with the White River. From the dam, the reservoir extends westward into Van Buren County, Arkansas. The reservoir collects drainage from 1,146 square miles of area upstream of the dam. A map of the area is shown in Figure 1.

Figure 1: Greers Ferry Lake and Surrounding Communities



C. Water Reallocations

There have been numerous M&I water supply reallocations from Greers Ferry Lake since the project's inception. The Corps has reallocated 16,722.712 (5,041.06 pending) acre-feet within its authority and 4,587.055 acre-feet by direction of Congress for M&I water supply storage at Greers Ferry Lake for the city of Heber Springs, which is exhibited in Appendix A of this report. Since the congressional reallocations do not count against the Corps of Engineers Discretionary Authority which is the least of 15% or 50,000 acre-feet of the total storage, 18,729.705 acre-feet would be available to MAWA to help meet the needs of central Arkansas through the year 2025.

This reallocation requested by the Mid Arkansas Water Alliance for 18,729.705 acre-feet would leave 14,547.583 acre-feet of discretionary storage in Greers Ferry Lake. While the Corps reallocation authority is for storage and not dependable yield, the intent and actual calculations are based on using the dependable yield requested by the customer to determine the amount of storage that will provide that yield. As stated in the Water Supply Handbook, IWR Report 96-PS-4 (Revised), page 2-3, "*Repayment agreements for storage space will base the amount of storage to be provided on the yield required by the non-Federal sponsor.*"

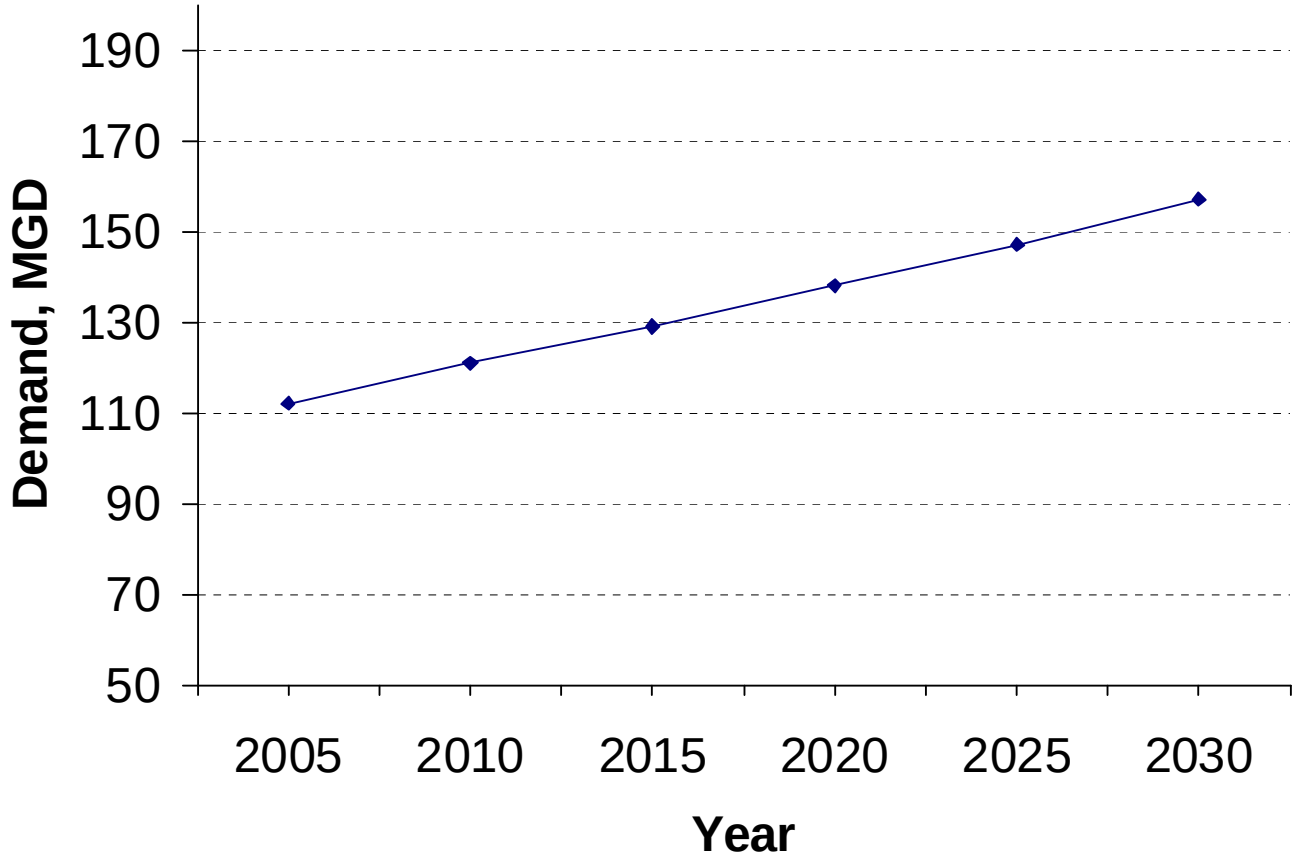
At the writing of this report, there are three reports pending approval or being prepared for reallocation from storage in Greers Ferry Lake: (1) the City of Heber Springs (Congressional Reallocation, 3,554.102 AF), (2) Searcy County Regional Water District (Discretionary Storage 5,041.060, AF) (3) The City of Clinton (Discretionary Storage, 2.5 MGD, acre-feet to be determined).

3. ECONOMIC ANALYSIS

A. Water Demand Analysis

The Mid Arkansas Water Resource Study Update, December 2004, presented data that showed the population of participating entities would be 748,380 in the year 2005 and is projected to be about 1,000,000 in the year 2025. Water usage within central Arkansas averaged 112 MGD in 2005, with a peak usage of 204 MGD in the summer months. The current dependable yield for water supply available in central Arkansas is 174.73 MGD which may not currently meet peak usage during a drought. Central Arkansas has experienced rapid growth and development. As population in the area continues to increase, manufacturing and service industries will most surely follow. Figure 2 displays a graph of central Arkansas' historical and projected water demand.

Figure 2
Central Arkansas Historical and Projected Average Water Demand



B. Analysis of Water Supply Alternatives

1) Groundwater

Groundwater in central Arkansas is drawn from two aquifer systems: the alluvial aquifer system and the Mississippi Embayment aquifer system. The alluvial system consists of the Arkansas River aquifer and the more extensive Mississippi River Valley aquifer.

The Mississippi Embayment aquifer underlies the alluvial aquifers although these aquifers are connected to each other throughout eastern Arkansas. The alluvial aquifers can yield large quantities of water; properly constructed wells can yield 500 gpm

almost anywhere in the system. Wells in the Mississippi River Valley system have been reported to yield as much as 5,000 gpm.

The Mississippi Embayment aquifer system is comprised of several aquifers: the Nacatoch, the Wilcox, the Sparta, and the Cockfield. The Sparta, the most productive aquifer, is capable of producing yields in excess of 1,000 gpm.

As a result of large scale groundwater withdrawals primarily for rice farming, groundwater levels in the state are declining. Declining aquifer water levels create a multitude of problems. Because of the excessive withdrawals of groundwater, the dependable yield has been approached or exceeded in the alluvial and Sparta aquifers. The Arkansas Natural Resources Commission has declared these aquifers at "critical groundwater levels" due to the dependable yield concerns relating to poor water quality and to saline intrusions consistent with declining groundwater levels. Therefore, alternatives utilizing groundwater sources will not be considered. Several of the existing entities currently use groundwater and are already experiencing difficulty in obtaining adequate water from their sources

2) Existing Surface Water Supplies

Several entities currently use surface water as their supply for drinking water and have joined the Mid Arkansas Water Alliance because their current supplies may not meet their demand through 2050. These include: Central Arkansas Water (Lakes Winona and Maumelle), City of Conway and Conway County (Lake James H. Brewer), City of Perryville (Cedar Lake), Benton (North Fork of the Saline River and Lake Norrell), City of Hot Springs (Lake Hamilton), and Hot Springs Village (Middle Fork of Saline River and Lake Lago). All other water supply for entities in MAWA comes from groundwater. Based upon the November 2002 Mid Arkansas Water Resource Study, the most economical option would be to reallocate storage in Greers Ferry Lake and Lake Ouachita.

3) Stream Withdrawal

There are no streams within the study area capable of providing enough dependable yield for this purpose. The Arkansas River as an alternative was eliminated because the Arkansas Department of Environmental Quality has listed it as having zero safe yield (and there is no suitable location for an impoundment).

4) New Lake and Pipeline

The water supply needs, for about a twenty-five year period, could be met by constructing a new reservoir on Bull Creek. This project would consist of constructing a 1,000 foot long by 93 feet high by 572 foot wide earthen dam containing 370,000 cubic yards of fill material. This project would have inundated 19 miles of Bull Creek to form a 3,575 acre lake. This reservoir would have been recharged by a 50 square mile drainage area and would have had an approximate yield of 34 MGD

This project was proposed in the early 1980's to supply water in the north central region of this study area. It was also restudied in 2002 for the Mid Arkansas Regional Water

Discussion Group. The results of both studies found that this alternative was not justifiable. The costs for constructing this reservoir are presented in Table 2.

The financial feasibility of constructing this reservoir will be revisited in this report.

TABLE 2
NEW LAKE AND PIPELINE ALTERNATIVE

	2002 Report	Updated Cost
Interest Rate	0.07375	0.04875
Period of Analysis (years)	30	30
Project First Costs:		
New Dam and Lake[1]	$19,000,000	$27,634,000
Treatment plant, pipeline and storage tank[1]	$35,600,000	$51,770,000
Total	$54,600,000	$79,404,000
Annual Cost:		
Interest & Amortization[2]	$5,469,000	$5,739,093
Operation & Maintenance[3]	$771,000	$1,120,000
Total	$6,240,000	$6,859,093

[1] Updated with the CWCCIS composite index from FY95 and FY07.
[2] Includes $10,068,000 of interest during construction from a 5-yr construction period.
[3] Updated O&M is based on the ratio of O&M to Total project costs of 1995 Estimate, 1.41%.

4. DERIVATION OF USER COST

A. YIELD/STORAGE ANALYSIS

1) General

Two options will be evaluated for reallocation of storage in Greers Ferry Lake. The effects of reallocating storage from current flood control storage or conservation (hydropower) storage will be considered. These are the only usable storage spaces in Greers Ferry Lake. Appendix F contains the an in-depth hydropower analysis. Current storage and associated expected yields are based on a conservation pool located between elevations 435 and 461.44 which contains 730,424.051 acre-feet of storage. The dependable yield of this storage during the drought of record was determined to be 595.299 MGD.

2) Conservation Pool

When storage is reallocated from the conservation pool there is no change in the yield/ storage ratio of the pool. The reallocation is made directly from hydropower storage causing both a reduction in their existing storage and a reduction in their yield.

A reallocation from the existing conservation pool for MAWA of 18,405 acre-feet of hydropower storage to M&I water supply purposes is estimated to provide a dependable yield of 15.0 MGD. The reallocation will reduce hydropower yield by 15.0 MGD and their storage by 18,405 acre-feet as 1,227 acre-feet yields 1 MGD.

3) Flood Pool

As the storage in the conservation pool is increased by reallocation from the flood pool, the yield/storage relationship changes. To determine the yield as the storage is increased it is necessary to reference the yield/storage curve for Greers Ferry Lake. The new dependable yield was determined by using the SUPER model. This method determined the 18,729.705 acre-feet of storage to provide a yield of 15.14 MGD would raise the top of the conservation pool by 0.6 feet (7.2 inches), from 461.44 to 462.04. Although 50,000 acre-feet is the upper limit of the Corps of Engineers' authority there have been reallocations made at Corps projects based on congressional legislation in the past. These congressional reallocations are not counted against the 50,000 acre-feet Corps authority. When storage is taken from the flood pool by raising the top of conservation pool the yield/storage ratio typically decreases and the amount of storage allocated to each existing water supply user must be increased to maintain their expected yield. This additional storage is called "dependable yield mitigation storage" or DYMS. As stated in EC 1105-2-100, Reallocation of Flood Control Storage to Municipal and Industrial Water Supply – Compensation Considerations, "*It is Corps policy not to provide DYMS for hydropower as is done for existing water supply users.*" Therefore, no DYMS is added to hydropower which results in their storage remaining constant and their yield decreasing. Each time additional storage is requested for reallocation from the flood pool a calculation is made estimating the requested dependable yield, and the DYMS for existing users. The cost of the DYMS is the responsibility of the water supply requestor, as stated in EC 1105-2-100, "*All costs associated with DYMS will be paid for by the new user of the new water supply storage space (i.e., the water supply requestor).*"

B. Hydropower Benefits Foregone

Hydropower benefits are based on the cost of the most likely alternative source of power. When storage is reallocated for water supply and an impact occurs to hydropower, the power benefits foregone are equivalent to the cost of replacing the lost power with the most likely alternative source of power.

The power benefits foregone can be divided into two components: The lost energy benefits and lost capacity benefits. In the case of water supply withdrawals, there is usually a loss of energy benefits, and lost energy benefits are based on the loss in generation (both at-site and downstream) as a result of water being diverted from the reservoir for water supply rather than passing through the hydro plant.

In addition, there could be a loss of capacity benefits as a result of a loss in dependable capacity at the project. Dependable capacity could be lost as a result of:

a) a loss in head due to lower post-withdrawal reservoir elevations.

b) a reduction in the usability of the capacity due to inadequate energy to support the full capacity during low-flow periods.

The hydropower benefits foregone due to the two possible reallocations are listed in Table 3.

TABLE 3
HYDROPOWER BENEFIT LOSSES DUE TO WATER WITHDRAWALS

	Benefits Foregone	
	Flood Pool	Conservation Pool
Reduction in streamflow (mgd)	15.00	15.00
Annual energy losses (MWh)[1]	2,822	3,267
Energy value (mills/kwh)[2]	44.53	44.53
Annual energy benefits foregone	$125,664	$145,480
Capacity losses (kilowatts)[1]	4.00	35.00
Capacity value ($/kw-yr)[2]	$106.20	$106.20
Annual capacity benefits foregone	$425	$3,717
Annual benefits foregone	$126,088	$149,197

[1] Provided by Hydropower Analysis Center, Power Branch, Water Management Division, Northwestern Division, Corps of Engineers, Portland Oregon, September 2005.

[2] Provided by Hydropower Analysis Center, Power Branch, Water Management Division, Northwestern Division, Corps of Engineers, Portland Oregon, February 2007.

C. Hydropower Revenues Forgone

Hydropower revenues foregone are based on the value of the lost power based on the power marketing agency's rates. Southwestern Power Administration rates as of October 2006 are:

Energy charge: 14.90 mills/kWh
Capacity charge: $42.34/kW-year

The energy charge is applied to the average annual energy losses and the capacity charge is applied to the loss in marketable capacity. The hydropower revenues foregone due to the two possible reallocations are listed in Table 4.

TABLE 4
HYDROPOWER REVENUE LOSSES DUE TO WATER WITHDRAWALS

	Revenues Foregone	
	Flood Pool	Conservation Pool
Reduction in streamflow (mgd)	15.00	15.00
Annual energy losses (MWh)[1]	2,822	3,267
Energy value (mills/kwh)[2]	14.90	14.90
Annual energy revenues foregone	$42,048	$48,678
Capacity losses (kilowatts)[1]	(64.00)	134.00
Capacity value ($/kw-yr)[2]	$42.34	$42.34
Annual capacity revenues foregone	($2,710)	$5,674
Annual revenues foregone	$39,338	$54,352

[1] Provided by Hydropower Analysis Center, Power Branch, Water Management Division, Northwestern Division, Corps of Engineers, Portland Oregon, September 2005.

[2] Provided by SWPA via review comments, October 2006.

D. Hydropower Replacement Cost

In the case of hydropower, the power benefits foregone are, by definition, identical to the NED cost of replacement power, based on the cost of the most likely alternative source of replacement power. Therefore, the replacement cost of power is the value of the power benefits foregone as shown in Table 3.

E. Flood Control Benefits Foregone

1) Dependable Yield Mitigation Storage

The purpose of providing dependable yield mitigation storage is to maintain the current yield of existing water supply users. When storage is reallocated from flood storage, the yield/storage ratio typically decreases. This means that the acre-feet of storage the

existing water supply user is contracted for will provide less yield (MGD). Typically, when DYMS is provided to existing water supply users the requesting entity would be required to purchase additional storage to keep the existing users whole, i.e. maintain the yield of existing users. If this reallocation were made from the flood pool, DYMS would be provided from MAWA's requested storage. The amount of storage available for use by MAWA would be 18,556.05 acre-feet and 173.655 acre-feet of storage would be provided to the existing water supply users in the form of DYMS.

2) Lost Flood Control Benefits

If storage is reallocated from the flood control pool for water supply there will be flood control benefits foregone. A reallocation of 18,729.705 acre-feet would cause an incremental average annual reduction of approximately $20,013 in flood control benefits. Total reallocations of 29,269.541 acre-feet of flood pool storage cause a cumulative average annual reduction of $31,275 (See Appendix B).

3) Lost Hydropower Benefits

A flood pool reallocation will have an effect on hydropower benefits. Although no water is being reallocated from the conservation pool, a change in the volume of the conservation pool, caused by raising the conservation pool to reallocate water from the flood pool, will cause capacity losses. These losses, although less severe than if water was reallocated from the conservation pool, need to be considered. The lost annual hydropower benefits from a flood pool reallocation, $126,088, are listed in Table 3.

4) Other Costs

No associated costs are anticipated with a flood pool reallocation.

5) Total Costs

The total cost associated with a flood pool reallocation is summarized in Table 5.

TABLE 5

TOTAL COST WITH REALLOCATION FROM FLOOD CONTROL STORAGE

ITEM	COST
Lost Flood Control Benefits	$ 20,013
Lost Hydropower Benefits	$ 126,088
Other Costs	-
TOTAL	$ 146,101

F. Updated Cost of Storage

The Greers Ferry Lake project came online for flood control and power in 1962 and 1964, respectively, and deliberate impoundment of the reservoir was initiated in January 1962 All recorded costs, however, were based on actual project costs through 1965. Total and joint updated project costs are $416,730,000 and $296,974,000, respectively. The updated costs were based on the costs of the project as presented in the final cost allocation report. The costs were then inflated to present day price levels by use of the Engineering News Record (ENR) Construction Cost Index and the Corps of Engineers Civil Works Construction Cost Index System (CWCCIS). Table 6 details the updated cost of the project.

TABLE 6

GREERS FERRY LAKE, ARKANSAS

UPDATED PROJECT COST ESTIMATE

Categories	Initial Project Cost 1964 Prices	Midpoint of Constr.	Index at Time of Const.	Jul 67 ENR Index	Jul 67 CWCCIS Index	FY 07 CWCCIS Index [1]	Project Cost at FY 07 Price Level	
Land and Damages								
Recreation	79,500						709,000	R
Other	3,857,400						34,422,000	J
Relocation								
Replacement-in-kind	0	1959	797	1,078	100	676.51	0	F
Other	6,470,400	1959	797	1,078	100	676.51	59,206,000	J
Reservoir								
Recreation	732,000	1959	797	1,078	100	709.45	7,024,000	R
Water Supply	0	1959	797	1,078	100	709.45	0	W
Other	540,800	1959	797	1,078	100	709.45	5,189,000	J
Dam and Spillway								
Main Dam	19,691,000	1959	797	1,078	100	667.25	177,712,000	J
Power Intake Works	1,043,500	1959	797	1,078	100	667.25	9,418,000	P
Auxiliary Dams	2,029,700	1959	797	1,078	100	667.25	18,318,000	J
Fish and Wildlife	18,900	1959	797	1,078	100	665.87	170,000	F
Powerplant	10,079,500	1959	797	1,078	100	621.06	84,671,000	P
Roads	60,600	1959	797	1,078	100	676.51	555,000	J
Recreational Facilities	1,590,000	1959	797	1,078	100	681.88	14,664,000	R
Buildings						681.88		
Recreation	249,200	1959	797	1,078	100	681.88	2,298,000	R
Other	82,300	1959	797	1,078	100	681.88	759,000	J
Equipment								
Recreation	87,000	1959	797	1,078	100	681.88	802,000	R
Other	88,200	1959	797	1,078	100	681.88	813,000	J
TOTAL	46,700,000						416,730,000	

TABLE 6, continued

SUMMARY			
Specific Costs			
Flood Control	0		0
Water Supply	0		0
Power	11,123,000		94,089,000
Recreation	2,737,700		25,497,000
Fish and Wildlife	18,900		170,000
Road Betterments	0		0
SUBTOTAL	13,879,600		119,756,000
Joint-Use Cost	32,820,400		296,974,000
TOTAL PROJECT COST	46,700,000		416,730,000

[1] CWCCIS factors are taken from EM1110-2-1304, dated 31 March 2000, revised 31March 08.

G. National Economic Development Plan

National Economic Development Plan methodology is used to determine from which pool the reallocation will be made. The new dam construction alternative will be evaluated against the best reallocation plan. The plans that considered using groundwater and stream withdrawal have been eliminated because they are unable to provide the required dependable yield. Table 7 presents the project benefits that are impacted with a reallocation in Greers Ferry Lake. By comparison, a flood pool reallocation would be the NED Plan because it would have the least benefits foregone.

Table 7
National Economic Development Plan

Benefits Foregone		
Conservation Pool		
-Hydropower	$	149,197
Total Conservation Pool	$	149,197
Flood Pool		
-Flood	$	20,013
-Hydropower	$	126,088
Total Flood Pool	$	146,101

H. User's Costs

The user's cost is based on the higher of the preceding calculations; lost hydropower benefits, lost hydropower revenues, replacement cost of hydropower, lost flood control benefits, and updated cost of storage. Table 8 lists these costs.

TABLE 8

COMPARISON OF ALTERNATIVES TO OBTAIN
USER COST FROM A FLOOD POOL REALLOCATION

ITEM	Capital Cost (Annual $'s)	O&M Cost (Annual $'s)	User Cost (Annual $'s)
Lost Hydropower Benefits	$ 126,088	$21,303	$ 147,391
Lost Hydropower Revenues	39,338	21,303	60,641
Replacement Cost of Hydropower	126,088	21,303	147,391
Maximum Costs Associated with Lost Flood Control	146,101	21,303	167,404
Updated Cost of Storage	206,104	21,303	227,407

The user's cost will be based on the updated cost of storage which was determined to be the highest. MAWA will have the option of making one lump sum payment of $3,370,655 or paying for the storage annually for a maximum of 30 years. The user will be required to pay joint-use O&M costs for the life of the project. These costs are the user's share of annual costs required to operate and maintain the project. Table 9 displays the user's total annual payment.

TABLE 9
ANNUAL REPAYMENT COST FOR REALLOCATED STORAGE

ITEM	Amount
Storage Required, (AF)	18,729.7
Water Supply Yield, (mgd)	15.000
Interest Rate, (percent)	4.875%
Repayment Period, (years)	30
Usable Project Storage	
Flood Control (AF)	920,075.949
Power Drawdown and Water Supply, (AF)	730,424.051
TOTAL	1,650,500.000
Joint-Use Project Cost	
Initial Construction (FY07 Prices)	$296,974,000
O&M (FY07)	$1,876,901
Allocated Water Supply	
Storage Cost	$3,370,655
Annual Cost of Storage	
Investment [1]	$206,104
O&M [2]	$21,303
TOTAL	$227,407

[1] Based on 4.875% interest rate and 30-year repayment period
[2] Based on 1.135% of the actual FY07 joint-use O&M cost.

5. TEST OF FINANCIAL FEASIBILITY

As a test of financial feasibility, the annual cost of the reallocated storage, (determined in paragraph 4H), is compared to the annual cost of the most likely, least costly, alternative that would provide an equivalent quality and quantity of water which the local interests would undertake in absence of utilizing the Federal project. Table 10 presents the cost of water supply storage space from Greers Ferry Lake expressed as an annual charge and is the flood damage reduction benefits foregone. The table also presents the estimated annual cost for the most likely non-Federal alternative; a new water supply lake. The cost is expressed as an estimated annual charge using a 4.875 percent interest rate and a 30-year period of analysis.

As depicted in Table 10, reallocation from Greers Ferry Lake is financially feasible compared with the most likely non-Federal alternative.

TABLE 10
TEST OF FINANCIAL FEASIBILITY

Alternative	Capital Cost	Annual Capital Cost	Annual O&M Cost	Total Annual Cost
Greers Ferry Lake, Flood Pool	$ 3,370,655	$ 206,104	$ 21,303	$ 227,407
New Lake & Pipeline	$ 79,404,000	$ 5,739,093	$ 1,120,000	$ 6,859,093

6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY

A water supply reallocation from Greers Ferry Lake will have an adverse affect on Southwestern Power Administration. Therefore, a credit to the accounting records could be made based on the estimated loss of power outputs and the current rates charged by Southwestern Power Administration. The period of analysis for the Greers Ferry Lake project will end in the year 2062. At the writing of this report there were 56 years remaining in this period. The estimated annual credit to the accounting records is $86,917. This credit is based on capacity credits and energy credits. The capacity credits are based on capacity benefits through 2021, $425, and capacity revenues, ($2,710), from 2022 to 2062. The energy credits are based on energy benefits through 2021, $125,664, and energy revenues, $42,048, from 2016 to 2062. All figures were brought to a present value using a 4.875-percent interest rate and a 56-year time horizon.

7. OTHER CONSIDERATIONS

A. NEPA DOCUMENTATION

The proposed storage reallocation would increase the top of the conservation pool at the Greers Ferry Lake project. Storage currently allocated to the flood pool will be reallocated to municipal and industrial water supply; therefore, the total size of the conservation pool and flood pool will not change, but the volumes between the two would be slightly redistributed. This is considered to have no impact on the natural or cultural resources listed as being present. A determination of "no significant impacts" is made and a finding to that effect was prepared as part of the National Environmental Policy Act documentation. The completed Environmental Assessment (EA) is included in Appendix E.

B. PUBLIC COMMENT

Public law and engineering regulations require a 30-day public comment period for this reallocation of storage. The 30-day comment period was held beginning 24 August 2006 and extended to 25 October 2006. The public review and comment is a requirement by the National Environmental Policy Act and Section 5 of Public Law 100-676. The public review was accomplished by running a news release in local newspapers, providing inspection copies of the draft reallocation report and draft EA at the project office, and sending a copy of the environmental assessment to interested state and Federal agencies and interested parties that requested a copy of the draft documents.

C. VIEWS OF FEDERAL, STATE AND LOCAL INTERESTS

See comments in Appendix C of this report and Appendix A of the accompanying Environmental Assessment.

D. RISK AND UNCERTAINTY

The analysis for this reallocation has risk and uncertainty. The selection of the pool with the least benefits foregone could reverse if prices received by farmers would increase relative to power costs especially as the dollar difference in losses is small. Also, water demand could be different than forecast based on population growth versus water conservation measures and changes in economic development.

8. CONCLUSIONS

The Mid Arkansas Water Alliance's request for municipal and industrial water supply storage from the flood pool in Greers Ferry Lake would be available to meet the future water supply needs of central Arkansas north of the Arkansas River. Of the 18,729.705 acre-feet required, 18,556.05 acre-feet would be available to MAWA and would provide an expected yield of 15.0 MGD. The remaining 173.655 acre-feet would provide an expected yield of 0.14 MGD, and be provided to the existing water supply users as DYMS to keep their existing contracts whole.

Impacts to hydropower and flood control were analyzed to determine which purpose would be impacted the least. Lost benefits for a flood pool reallocation were determined to be $146,101 annually and lost benefits for a conservation pool reallocation were determined to be $149,197 annually. According to National Economic Development Plan Analysis, the most economical reallocation alternative would be to reallocate from flood control storage in Greers Ferry Lake to meet the requests of MAWA.

MAWA would have the option of paying for the storage in one lump sum at a cost of $3,370,655 or $227,407 in annual payments for 30 years. The share of joint-use O&M costs for MAWA in FY 2007 were determined to be $21,303 and are included in the annual payment.

9. RECOMMENDATION

Based on the findings in this study and the Environmental Assessment, I recommend that 18,729.705 acre feet of storage in the Greers Ferry Lake project, between the elevations of 461.44 and 462.04 MSL, be made available for reallocation from the flood control pool to the

conservation pool. This would satisfy the needs of the Mid Arkansas Water Alliance in Arkansas for municipal and industrial water supply and maintain the current yield of the other water supply users.

Date_____ _____

DONALD E. JACKSON, Jr.
Colonel, US Army
District Engineer

SECTION B

LAKE OUACHITA ANALYSIS

Disclaimer -This Section is not under consideration with this action. Provided for information only to maintain consistency with the Environmental Assessment.

Disclaimer - Provided for information only to maintain consistency with the Environmental Assessment.

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WATER SUPPLY STORAGE REALLOCATION REPORT AT LAKE OUACHITA FOR THE MID ARKANSAS WATER ALLIANCE

1. PURPOSE

A. Reallocation Request

A U.S. Army Corps of Engineers study, The Mid Arkansas Water Resource Study, was completed in November 2002 for the Mid Arkansas Water Discussion Group to evaluate future water needs of central Arkansas and identify sources to meet those needs through the year 2050. Based upon the results of this study, the group decided that the best alternative for obtaining water for the central Arkansas area would be to purchase the remaining Corps of Engineers discretionary storage in Greers Ferry Lake and Lake Ouachita. On April 4, 2003 the Mid Arkansas Water Discussion Group evolved into the Mid Arkansas Water Alliance (MAWA) and was incorporated.

Another U.S. Army Corps of Engineers Study, Mid-Arkansas Water Resource Study Update, was completed in December 2004 to update the needs of the eight counties in central Arkansas that comprise MAWA because the member utilities doubled since the initial report was completed. The purpose of this study was primarily to consider the population and demand based on the new members. Furthermore, this study took into consideration the existing raw water sources that were available to Central Arkansas Water, which were not considered in the initial study. Based on these findings and after meetings with the Little Rock District, MAWA decided their goals could be met through the year 2025 by reducing their initial request. A letter requesting the purchase of storage to provide 15 MGD from Greers Ferry Lake and 20 MGD from Lake Ouachita was submitted to the Little Rock District on 9 May 2005 by MAWA.

This study was conducted by the Little Rock District with input and assistance from the Vicksburg District for the analysis of Lake Ouachita. Section A of this report will focus on the reallocation at Greers Ferry Lake and Section B will focus on the reallocation at Lake Ouachita.

B. Reallocation Authority

Authority for the Corps to reallocate existing storage space to M&I water supply is contained in Public Law 85-500, Title III, Water Supply Act of 1958, as amended. The Secretary of the Army is authorized to cooperate with local interests in providing storage space for M&I water supply in U.S. Army Corps of Engineers projects as long as the local interests agree to pay the costs associated with the storage space. The Corps has the discretionary authority to reallocate the lesser of 15% or 50,000 acre feet of the total storage capacity in Lake Ouachita provided the reallocation has no severe effect on other authorized purposes and will not involve major structural or operational changes.

2. PROJECT BACKGROUND

A. Project History

House Document No. 647, 78th Congress, 2d Session, recommended the construction of Blakely Mountain Dam – Lake Ouachita Project, Arkansas for flood control, hydroelectric power, and other purposes. The Flood Control Act of 1944 (Public Law 534, 78th Congress, 2d Session) Authorized the construction, operation and maintenance of this project.

Current project physical features are shown in Table 11.

TABLE 11
CURRENT PROJECT PHYSICAL FEATURES

Feature	Elevation[1]	Area (acres)	Storage Volume (acre-feet)	Equiv. Runoff[2] (inches)
Top of dam	616.00	----	----	
Top of flood control pool	592.00	48,300	2,768,000	47.0
Top of conservation pool	578.16[3]	40,100	2,151,000	36.5
Top of inactive pool	535.00	20,900	865,000	14.7
Flood control storage	578.16 - 592.00	----	617,000	
Conservation Storage	535.00 - 578.16	----	1,286,000	
Inactive storage	Below elev. 535.00	----	865,000	

[1] Above the National Geodetic Vertical Datum (NGVD29).
[2] From 1,105 square miles of drainage area upstream from dam.
[3] Current top of conservation pool is 578.04 due to a previously approved reallocation

B. Project Purposes and Location

Specifically authorized project purposes are flood control and hydroelectric power. Other functions benefiting from the project include recreation, fish and wildlife, and navigation. The project has been available for control of floods since February 1953 and in operation for the generation of power since 1 October 1955. Power is marketed by the Southwestern Power Administration (SWPA).

The Blakely Mountain Project consists of an earth-fill dam, a saddle spillway, flood control and power intake structure, flood control conduit and stilling basin, power conduit, surge tank, penstocks, powerhouse, switchyard and appurtenant structures. The dam is 1,100 feet long and has an average height of 205 feet above the streambed. The reservoir has a total storage capacity of 2,768,000 acre-feet at the top of the flood control pool with 617,000 acre-feet of that available for flood control storage. The conservation

pool has a total capacity of 1,286,000 acre-feet of storage and covers 40,100 acres at the top. The basin captures runoff from 1,105 square miles of drainage area above the dam.

Blakely Mountain Dam is located on the Ouachita River approximately 13 miles northwest of Hot Springs, Garland County, Arkansas. A Vicinity Map of Lake Ouachita is included as Figure 1-1.

C. Water Reallocations

Storage for water supply has been reallocated once since the construction of Blakely Mountain Dam – Lake Ouachita. This water supply agreement was executed on February 14, 1996 between the North Garland County Regional Water District (NGCRWD) and the United States Government. The agreement was for 1,575 acre-feet (current yield analysis data requires 1,629 acre-feet to provide 1 MGD) of storage to provide a yield of 1 million gallons per day (MGD). Currently, a second request by the NGCRWD for 3 MGD is being processed by the Vicksburg District. This will require the reallocation of about 4,886 acre-feet of storage. Based on the past reallocation, it is assumed that the second reallocation request would be made from the flood control pool, and after dependable yield mitigation storage is accounted for, 33,303 acre-feet would be available for MAWA. A reallocation of flood control storage to the conservation pool would allow MAWA to purchase 33,303 acre-feet of storage in Lake Ouachita.

This reallocation requested by the Mid Arkansas Water Alliance for 33,303 acre-feet would leave 10,182 acre-feet of discretionary storage remaining. While the Corps reallocation authority is for storage and not dependable yield the intent and actual calculations are based on using the dependable yield requested by the customer to determine the amount of storage that will provide that yield. As stated in the Water Supply Handbook, IWR Report 96-PS-4 (Revised), page 2-3, "*Repayment agreements for storage space will base the amount of storage to be provided on the yield required by the non-Federal sponsor*."

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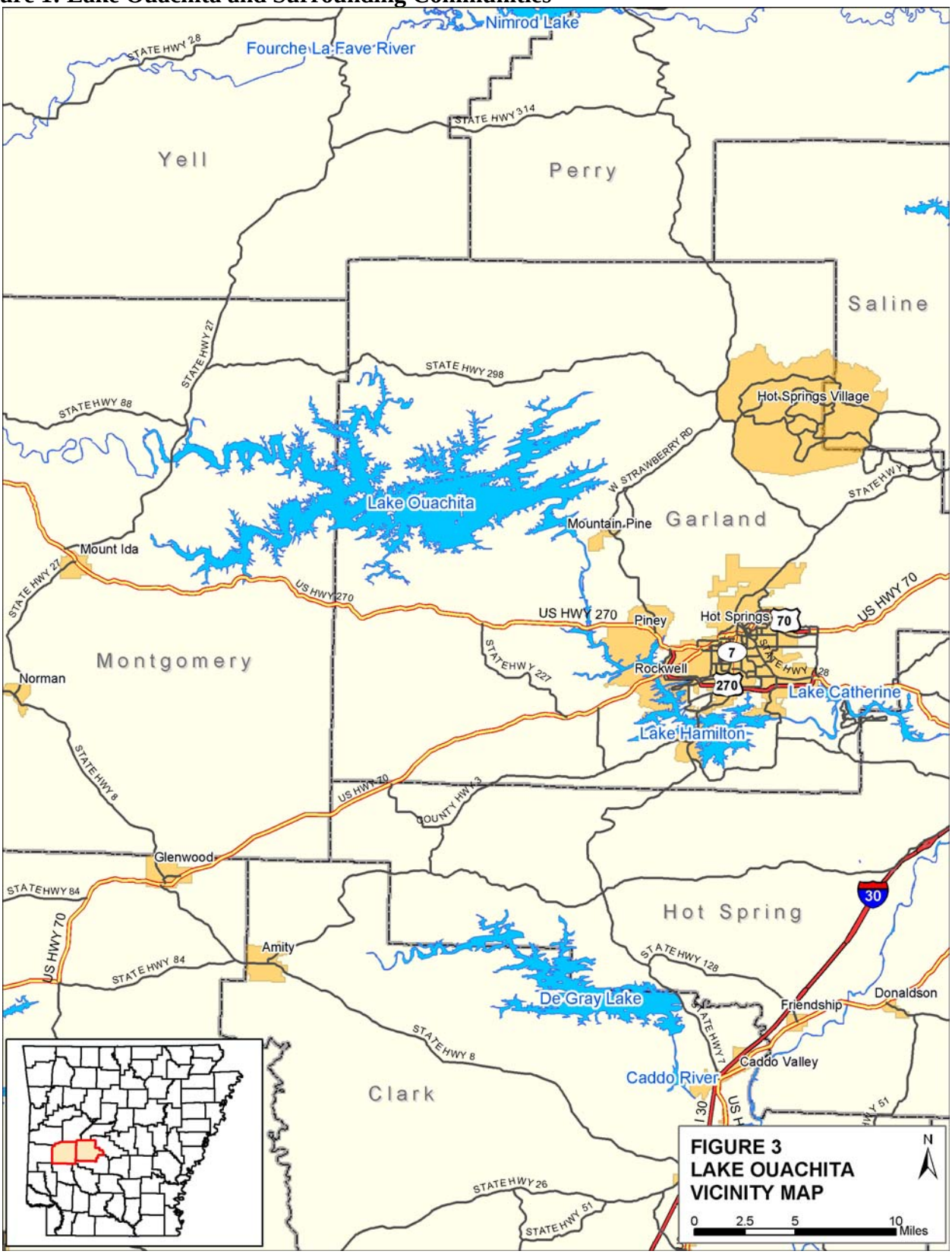
Figure 1: Lake Ouachita and Surrounding Communities

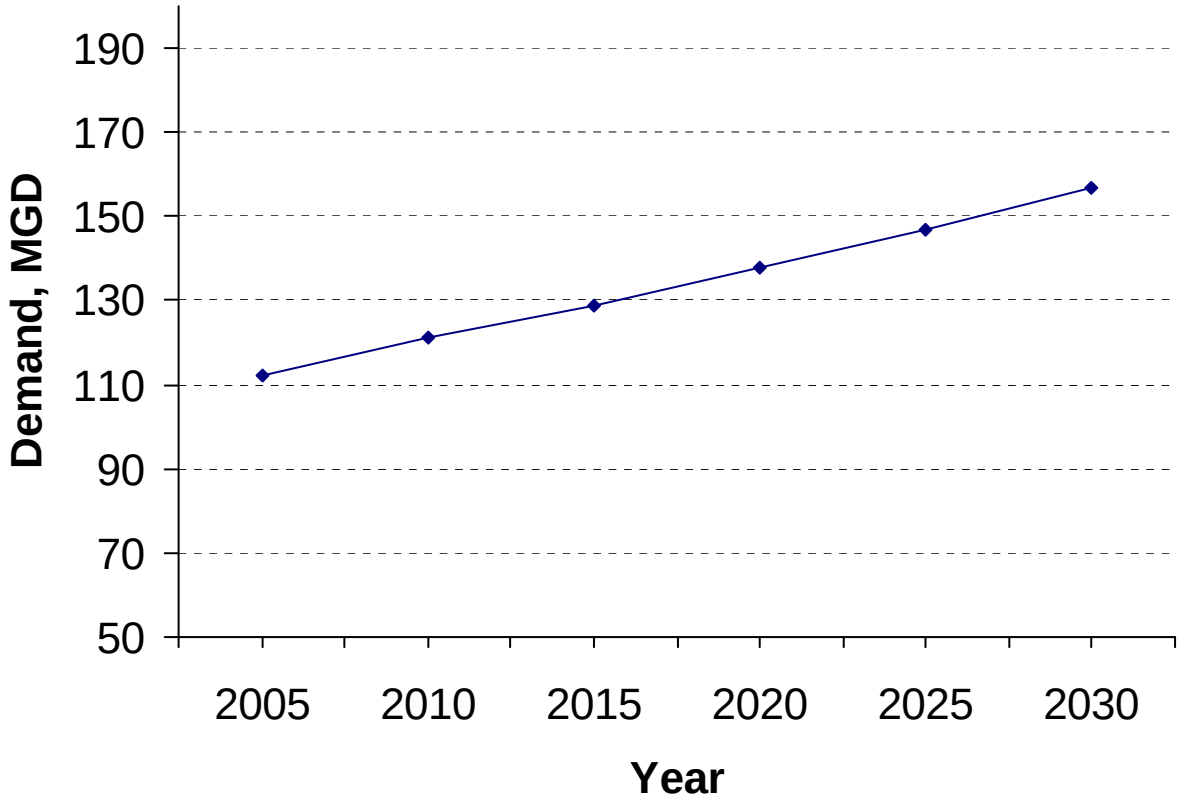


3. Economic Analysis

A. Water Demand Analysis

The Mid Arkansas Water Resource Study Update, December 2004, presented data that showed the population of participating entities would be 748,380 in the year 2005 and is projected to be about 1,000,000 in the year 2025. Water usage within central Arkansas averaged 112 MGD in 2005, with a peak usage of 204 MGD in the summer months. The current dependable yield for water supply available in central Arkansas is 174.73 MGD which may not currently meet peak usage during a drought. Central Arkansas has experienced rapid growth and development. As population in the area continues to increase, manufacturing and service industries will most surely follow. Figure 2 of Section B displays a graph of Central Arkansas' historical and projected water demand.

Figure 2
Central Arkansas Historical and Projected Water Demand



B. Analysis of Water Supply Alternatives

1) Groundwater

Groundwater in central Arkansas is drawn from two aquifer systems: the alluvial aquifer system and the Mississippi Embayment aquifer system. The alluvial system consists of the Arkansas River aquifer and the more extensive Mississippi River Valley aquifer.

The Mississippi Embayment aquifer underlies the alluvial aquifers although these aquifers are connected to each other throughout eastern Arkansas. The alluvial aquifers can yield large quantities of water; properly constructed wells can yield 500 gallons per minute (gpm) almost anywhere in the system. Wells in the Mississippi River Valley system have been reported to yield as much as 5,000 gpm.

The Mississippi Embayment aquifer system is comprised of several aquifers: the Nacatoch, the Wilcox, the Sparta, and the Cockfield. The Sparta, the most productive aquifer, is capable of producing yields in excess of 1,000 gpm.

As a result of large scale groundwater withdrawals primarily for rice farming, groundwater levels in the state are declining. Declining aquifer water levels create a multitude of problems. Because of the excessive withdrawals of groundwater, the dependable yield has been approached or exceeded in the alluvial and Sparta aquifers. The Natural Resources Commission has declared these aquifers at “critical groundwater levels” due to the dependable yield concerns relating to poor water quality and to saline intrusions consistent with declining groundwater levels. Therefore, alternatives utilizing groundwater sources will not be considered. Several of the existing entities currently use groundwater and are already experiencing difficulty in obtaining adequate water from their sources.

2) Existing Surface Water Supplies

Several entities currently use surface water as their supply for drinking water and have joined the Mid Arkansas Water Alliance because their current supplies may not meet their demand through 2050. These include Central Arkansas Water (Lakes Winona and Maumelle), City of Conway and Conway County (Lake James H. Brewer), City of Perryville (Cedar Lake), Benton (North Fork of the Saline River and Lake Norrell), City of Hot Springs (Lake Hamilton), and Hot Springs Village (Middle Fork of Saline River and Lake Lago). All other water supply for entities in MAWA comes from groundwater. Based upon the November 2002 Mid Arkansas Water Resource Study, the most economical option would be to reallocate storage in Greers Ferry Lake and Lake Ouachita.

3) Stream Withdrawal

There are no streams within the study area capable of providing enough dependable yield for this purpose. The Arkansas River was briefly considered because it would be capable of serving the needs to the north and south. This alternative was eliminated because the

Arkansas Department of Environmental Quality has listed it as not having enough dependable yield that would be available as a water supply.

4) New Lake and Pipeline

The water supply needs, for a about a twenty-five year period, could be met by constructing a new reservoir on Bull Creek. This project would have consisted of constructing a 1,000 foot long by 93 feet high by 572 foot wide earthen dam containing 370,000 cubic yards of fill material. This project would have inundated 19 miles of Bull Creek to form a 3,575 acre lake. This reservoir would have been recharged by a 50 square mile drainage area and would have had an approximate yield of 34 MGD

This project was proposed in the early 1980's to supply water in the north central region of this study area. It was also restudied in 2002 for the Mid Arkansas Regional Water Discussion Group. The results of both studies found that this alternative was not justifiable. The financial feasibility of constructing this reservoir will be revisited in this report. The costs for constructing this reservoir are presented in Table 12.

TABLE 12
NEW LAKE AND PIPELINE ALTERNATIVE

	2002 Report	Updated Cost
Interest Rate	0.07375	0.04875
Period of Analysis (years)	30	30
Project First Costs:		
New Dam and Lake[1]	$19,000,000	$27,634,000
Treatment plant, pipeline and storage tank[1]	$35,600,000	$51,777,000
Total	$54,600,000	$79,411,000
Annual Cost:		
Interest & Amortization[2]	$5,469,000	$5,739,093
Operation & Maintenance[3]	$771,000	$1,120,000
Total	$6,240,000	$6,859,093

[1] Updated with the CWCCIS composite index from FY95 and FY07.

[2] Includes $10,068,000 of interest during construction from a 5-yr construction period.

[3] Updated O&M is based on the ratio of O&M to Total project costs of 1995 Estimate, 1.41%.

4. DERIVATION OF USER COST

A. YIELD/STORAGE ANALYSIS

1) General

Two options will be evaluated for reallocation of storage in Lake Ouachita. The effects of reallocating storage from current flood control or hydropower storage will be considered. These are the only usable storage spaces in Lake Ouachita. Appendix F contains the an in-depth hydropower analysis
Current storage and yields are based on a conservation pool located between elevations 535.00 and 578.00 which contains 1,286,000 acre-feet of storage. The dependable yield of this storage during the drought of record is 793 MGD.

2) Conservation Pool

When storage is reallocated from the conservation pool there is no change in the yield of the pool. The reallocation is made directly from hydropower storage causing both a reduction in their existing storage and a reduction in their yield.
A reallocation from the existing conservation pool for MAWA of 32,573 acre-feet of hydropower storage to M&I water supply purposes is estimated to provide a dependable yield of 20.0 MGD. The reallocation will reduce hydropower yield by 20.0 MGD and their storage by 32,573 acre-feet.

3) Flood Pool

As the storage in the conservation pool is increased by reallocation from the flood pool, the yield/storage relationship typically decreases. To determine the change in the yield / storage ratio as the top of conservation pool is raised it is necessary to reference the yield/storage curve for Lake Ouachita. This method determined 33,303 acre-feet of storage is required to provide MAWA an expected yield of 20.0 MGD while maintaining the expected yield of the existing water supply users. Providing this storage from flood pool would raise the top of the conservation pool by 0.82 feet (9.8 inches), from 578.16 to 578.98.

When storage is taken from the flood pool, the amount of storage allocated to each existing water supply user must be increased to maintain their expected yield. This additional storage is called “dependable yield mitigation storage” or DYMS. As stated in EC 1105-2-100, Reallocation of Flood Control Storage to Municipal and Industrial Water Supply – Compensation Considerations, "*It is Corps policy not to provide DYMS for hydropower as is done for existing water supply users.*" Therefore, no DYMS is added to hydropower which results in their storage remaining constant and their yield decreasing. Each time additional storage is requested for reallocation from the flood pool a calculation is made estimating the requested dependable yield, and the DYMS for existing users. The cost of the DYMS is the responsibility of the water supply requestor, as stated in EC 1105-2-100, "*All costs associated with DYMS will be paid for by the new user of the new water supply storage space (i.e., the water supply requestor).*"

B. Hydropower Benefits Foregone

Hydropower benefits are based on the cost of the most likely alternative source of power. When storage is reallocated for water supply and an impact occurs to hydropower, the power benefits foregone are equivalent to the cost of replacing the lost power with the most likely alternative source of power. The power benefits foregone can be divided into two components: The lost energy benefits and lost capacity benefits. In the case of water

supply withdrawals, there is usually a loss of energy benefits, and lost energy benefits are based on the loss in generation as a result of water being diverted from the reservoir for water supply rather than passing through the hydro plant. In addition, there could be a loss of capacity benefits as a result of a loss in dependable capacity at the project. Dependable capacity could be lost as a result of:

a) a loss in head due to lower post-withdrawal reservoir elevations.

b) a reduction in the usability of the capacity due to inadequate energy to support the full capacity during low-flow periods.

The hydropower benefits foregone due to the two possible reallocations are listed in Table 13.

TABLE 13
HYDROPOWER BENEFIT LOSSES DUE TO WATER WITHDRAWALS

	Benefits Foregone	
	Flood Pool	Conservation Pool
Reduction in streamflow (mgd)	20.00	20.00
Annual energy losses (MWh)[1]	3,248.80	4,115.64
Energy value (mills/kwh)[2]	44.53	44.53
Annual energy benefits foregone	$144,669	$183,269
Capacity losses (kilowatts)[1]	944.00	1,351.00
Capacity value ($/kw-yr)[2]	$106.20	$106.20
Annual capacity benefits foregone	$100,253	$143,476
Annual benefits foregone	$244,922	$326,746

[1] Provided by Hydropower Analysis Center, Power Branch, Water Management Division,
Water Management Division, Northwestern Division, Corps

[2] Values obtained from the HAC for Greers Ferry, February 2007, were used at the Districts discretion to maintain consistency with the original reallocation analysis.

C. Hydropower Revenues Forgone

Hydropower revenues foregone are based on the value of the lost power based on the power marketing agency's rates. Southwestern Power Administration rates as of 13 July 2004 are:

Energy charge: 14.90 mills/kWh
Capacity charge: $42.34 /kW-year

The energy charge is applied to the average annual energy losses and the capacity charge is applied to the loss in marketable capacity. The hydropower revenues foregone due to the two possible reallocations are listed in Table 14.

TABLE 14
HYDROPOWER REVENUE LOSSES DUE TO WATER WITHDRAWALS

	Revenues Foregone	
	Flood Pool	Conservation Pool
Reduction in streamflow (mgd)	20.00	20.00
Annual energy losses (MWh)[1]	3,248.80	4,115.64
Energy value (mills/kwh)[2]	14.90	14.90
Annual energy revenues foregone	$48,407	$61,323
Capacity losses (kilowatts)[1]	1,682.00	1,812.00
Capacity value ($/kw-yr)[2]	$42.34	$42.34
Annual capacity revenues foregone	$71,216	$76,720
Annual revenues foregone	$119,623	$138,043

[1] Provided by Hydropower Analysis Center, Power Branch, Water Management Division, Northwestern Division, Corps of Engineers, Portland Oregon, September 2005.

[2] Provided by SWPA via review comments, October 2006.

D. Hydropower Replacement Cost

In the case of hydropower, the power benefits foregone are, by definition, identical to the NED cost of replacement power, based on the cost of the most likely alternative source of replacement power. Therefore, the replacement cost of power is the value of the power benefits foregone as shown in Table 3.

E. Flood Control Benefits Foregone

1) Dependable Yield Mitigation Storage

The purpose of providing dependable yield mitigation storage is to maintain the current yield of existing water supply users. When storage is reallocated from flood storage, the yield/storage ratio decreases. This means that the acre-feet of storage the existing water supply user is contracted for will provide less yield (MGD). Typically, when DYMS is provided to existing water supply users the requesting entity would be required to purchase additional storage to keep the existing users whole, i.e. maintain the yield of

existing users. Since the storage for this reallocation would be reallocated from flood storage, DYMS would be provided from MAWA's requested storage. The amount of storage available for use by MAWA would be 33,181 acre-feet and 122 acre-feet of storage would be provided to the existing water supply users in the form of DYMS.

2) Lost Flood Control Benefits

If storage is reallocated from the flood control pool for water supply there will be flood control benefits foregone. An estimate of the flood control benefits foregone is made using historical data and the annual flood losses prevented. These values are factored to current price levels and averaged over the period of collected data. A reallocation of 33,303 acre-feet would cause an incremental reduction of approximately $51,820 in flood control benefits. Calculations of lost flood control benefits are included in Appendix B.

3) Lost Hydropower Benefits

A flood pool reallocation will have an effect on hydropower benefits. Although no water is being reallocated from the conservation pool, a change in the volume of the conservation pool, caused by raising the conservation pool to reallocate water from the flood pool, will cause capacity losses. These losses, although less severe than if water was reallocated from the conservation pool, need to be considered. The lost hydropower benefits from a flood pool reallocation, $244,922, are listed in Table 13.

4) Other Costs

No associated costs are anticipated with a flood pool reallocation.

5) Total Costs

See Table 15 for the total benefits foregone associated with a flood pool reallocation.

TABLE 15

TOTAL COST WITH REALLOCATION FROM FLOOD CONTROL STORAGE

ITEM	COST
Lost Flood Control Benefits	$ 51,820
Lost Hydropower Benefits	$ 244,922
Other Costs	-
TOTAL	$ 296,742

F. Updated Cost of Storage

The Lake Ouachita project came online for flood control and hydropower in 1953 and 1955, respectively, and deliberate impoundment of the reservoir was initiated in 1952. All recorded costs, however, were based on actual project costs through 1957. Total and joint updated project costs are $296,157,0000 and $121,051,000, respectively. The updated costs were based on the costs of the project as presented in the final cost allocation report. The costs were then inflated to present day price levels by use of the Engineering News Record (ENR) Construction Cost Index and the Corps of Engineers

Civil Works Construction Cost Index System (CWCCIS). Table 16 on the next page details the updated costs of the project.

G. National Economc Development Plan

National Economic Development Plan methodology is used to determine which pool the reallocation will be made. The new dam construction alternative will be evaluated against the best reallocation plan. The plans that considered using groundwater and stream withdrawal have been eliminated because they are unable to provide the required dependable yield. Table 17 presents the project benefits that are impacted with a reallocation in Lake Ouachita. By comparison, a flood pool reallocation would be the NED Plan because it would have the least benefits foregone.

Table 17
National Economic Development Plan

Lost Benefits		
Conservation Pool		
-Hydropower		326,746
Total Conservation Pool	$	326,746
Flood Pool		
-Flood Damages		51,820
-Hydropower		244,922
Total Flood Pool	$	296,742

Disclaimer - Provided for information only to maintain consistency with the Environmental Assessment.

TABLE 16
OUACHITA LAKE, ARKANSAS
UPDATED PROJECT COST ESTIMATE

Categories	Initial Project Cost 1957 Prices	1957 ENR Index[2]	Jul 67 ENR Index	Jul 67 CWCCIS Index	FY 07 CWCCIS Index [1]	FY 07 Project Cost	
Land and Damages	2,361,600	724	1,074	100	657.84	23,046,000	J
Relocation	1,083,700	724	1,074	1,074	7,751.00	11,602,000	J
Reservoir	2,009,900	724	1,074	100	682.47	20,348,000	J
Dam and Spillway							
Main Dam	6,306,500	724	1,074	100	650.36	60,843,000	J
Power Intake Works	6,724,900	724	1,074	100	650.36	64,879,000	P
Flood Control Outlet Works	3,275,300	724	1,074	100	650.36	31,599,000	F
Powerplant	7,479,800	724	1,074	100	603.28	66,938,000	P
Roads	347,200	724	1,074	100	660.34	3,401,000	J
Buildings	169,200	724	1,074	1,074	7,751.00	1,811,000	J
Equipment	1,091,900	724	1,074	1,074	7,751.00	11,690,000	P
TOTAL	30,850,000					296,157,000	
SUMMARY							
Specific Costs							
Flood Control	3,275,300					31,599,000	FC
Power	15,296,600					143,507,000	P
SUBTOTAL	18,571,900					175,106,000	
Joint-Use Cost	12,278,100					121,051,000	
TOTAL PROJECT COST	30,850,000					296,157,000	

[1] CWCCIS factors are taken from EM1110-2-1304, dated 30 September 2006.
[2] ENR factors are taken from Engineering News Record, http://enr.construction.com/, February 2007.

H. Users Costs

The users cost is based on the higher of the preceding calculations; lost hydropower benefits, lost hydropower revenues, replacement cost of hydropower, lost flood control benefits, and updated cost of storage. Table 18 lists these costs.

TABLE 18
COMPARISON OF ALTERNATIVES TO OBTAIN
USER COST FROM A FLOOD POOL REALLOCATION

ITEM	Capital Cost (Annual $'s)	O&M Cost (Annual $'s)	User Cost (Annual $'s)
Lost Hydropower Benefits	$244,922	$11,385	$256,307
Lost Hydropower Revenues	119,623	11,385	131,008
Replacement Cost of Hydropower	244,922	11,385	256,307
Maximum Costs Associated with Lost Flood Control	296,742	11,385	308,127
Updated Cost of Storage	129,533	11,385	140,918

The users cost will be based on the lost flood control benefits which was determined to be the highest. MAWA will have the option of making one lump sum payment of $4,852,963 or paying for the storage annually for a maximum of 30 years. The user will be required to pay joint-use O&M costs for the life of the project. These costs are the users share of annual costs required to operate and maintain the project. Table 19 displays the users total annual payment.

TABLE 19
ANNUAL REPAYMENT COST
FOR REALLOCATION STORAGE

ITEM	Amount
Storage Required, (AF)	33,302.69
Water Supply Yield, (mgd)	20.000
Interest Rate, (percent)	4.875%
Repayment Period, (years)	30
Usable Project Storage	
Flood Control (AF)	617,000
Power Drawdown and Water Supply, (AF)	1,286,000
TOTAL	1,903,000
Joint-Use Project Cost	
O&M (FY06)	$650,550
Flood Control Benefits Foregone	$ 4,852,963
Annual Cost of Storage	
Investment [1]	$296,742
O&M [2]	$11,385
TOTAL	$308,127

[1] Based on 4.875% interest rate and 30-year repayment period

[2] Based on 1.75% of the actual FY06 joint-use O&M cost.

5. TEST OF FINANCIAL FEASIBILITY

As a test of financial feasibility, the users cost of the reallocated storage, (determined in paragraph 4H, is compared to the annual cost of the most likely, least costly, alternative that would provide an equivalent quality and quantity of water which the local interests would undertake in absence of utilizing the Federal project. Table 20 presents the cost of water supply storage space from Lake Ouachita expressed as an annual charge and is sum of the lost flood control benefits and OMRR&R. The table also presents the estimated annual cost the most likely non-Federal alternative; a new water supply lake. The cost is expressed as an estimated annual charge using a 4.875 percent interest rate and a 50-year period of analysis.

As depicted in Table 20, reallocation from Lake Ouachita is financially feasible compared with the most likely non-Federal alternative.

TABLE 20
TEST OF FINANCIAL FEASIBILITY

Alternative	Capital Cost	Annual Capacity Benefits Foregone	Annual OMRR&R Cost	Total Annual Cost
Ouachita Lake, Flood Pool	$ 4,853,000	$ 296,700	$ 11,400	$ 308,100
New Lake & Pipeline	$ 79,411,000	$ 5,739,093	$ 1,120,000	$ 6,859,093

6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY

A water supply reallocation from Lake Ouachita will have an adverse effect on Southwestern Power Administration. Therefore, a credit to the accounting records could be made based on the estimated loss of power outputs and the current rates charged by Southwestern Power Administration. The period of analysis for the Lake Ouachita project will end in the 2054. At the writing of this report there were 48 years remaining in this period. The estimated annual credit to the accounting records is $190,811 This credit is based on capacity credits and energy credits. The capacity credits are based on capacity benefits through 2021, $100,253, and capacity revenues, $71,216, from 2022 to 2054. The energy credits are 2022 to 2054. All figures were brought to a present value using a 4.875-percent interest rate and a 48-year time horizon.

7. OTHER CONSIDERATIONS

A. NEPA DOCUMENTATION

The proposed storage reallocation would increase the top of the conservation pool at the Lake Ouachita project. Storage currently allocated to the flood pool will be reallocated to municipal and industrial water supply; therefore, the total size of the conservation pool and flood pool will not change, but the volumes between the two would be slightly redistributed This is considered to have no impact on the natural or cultural resources listed as being present. A determination of "no significant impacts" is made and a finding to that effect was prepared as part of the National Environmental Policy Act documentation. The completed Environmental Assessment (EA) is attached.

B. Public Comment

Public law and engineering regulations require a 30-day public comment period for this reallocation of storage. The 30-day comment period was held beginning 24 August 2006 and ending 25 September 2006. The public review and comment is a requirement by the National Environmental Policy Act and Section 5 of Public Law 100-676. The public review was accomplished by running a news release in local newspapers, providing inspection copies of the draft reallocation report and draft EA at the project office, and

sending a copy of the environmental assessment to interested state and Federal agencies and interested parties that requested a copy of the draft documents.

C. Risk and Uncertainty

D. Views of Federal, State and Local Interests

See comments in Appendix C of this report and Appendix A of the accompanying Environmental Assessment.

8. CONCLUSIONS

The Mid Arkansas Water Alliance's request for the municipal and industrial water supply storage from the flood pool in Lake Ouachita would be available to meet the future water supply needs of central Arkansas south of the Arkansas River. Of the 33,303 acre-feet, 33,181 acre-feet would be available to MAWA and would provide a yield of 20.0 MGD. The remaining 122 acre-feet would yield 0.07 MGD, and be provided to the North Garland County Regional Water District as DYMS to keep their existing contract and current request whole.

Impacts to hydropower and flood control were analyzed to determine which purpose would be impacted the least. Lost flood control benefits were determined to be $296,742 annually and lost hydropower benefits were determined to be $326,746 annually. According to National Economic Development Plan Analysis, the most economical reallocation alternative would be to reallocate from flood control storage in Lake Ouachita to meet the requests of MAWA. MAWA would have the option of paying for the storage in one lump sum at a cost of $4,852,963 or $308,127 in annual payments for 30 years. The share of joint-use O&M costs for MAWA in FY 2007 were determined to be $11,385 and are included in the annual payment.

Due to DSAC II rating and corresponding analysis and potential remediation, MAWA is no longer pursuing the 33,181 acre-feet flood pool reallocation at Lake Ouachita. In March 2008, MAWA officially requested a reallocation study for M&I water supply from the Lake Ouachita conservation pool.

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APPENDIX A

CURRENT USERS AND DEPENDABLE YIELD MITIGATION STORAGE DETERMINATION

DEPENDABLE YIELD MITIGATION STORAGE DETERMINATIONS AT GREERS FERRY LAKE			
Water Supply User/pool	**Proposed Conservation Pool Top EL 462.04 FT**		
	Proposed Yield MGD	Proposed Storage AF	**DYMS AF**
MAWA/f	***15.000***	***18556.050***	
Searcy County (pending)/f	4.075	5,041.060	41.060
Clinton /f	1.762	2,179.717	17.765
Tannenbaum/f	0.073	90.306	0.736
City of Heber Springs (pending)/f	2.873	3,554.102	28.967
Thunderbird/f	0.045	55.668	0.454
CWS3/f	3.500	4,329.745	35.289
Red Apple Inn/f	0.053	65.565	0.534
CWS2/f	3.087	3,818.835	31.125
CWS1/c	0.185	228.858	1.865
Clinton/c	0.738	912.958	7.441
City of Heber Springs/c	0.835	1,032.953	8.419
Hydropower	573.569	709,545.575	-
Total Yield (as per SUPER data)	605.795		***173.655***
Total Storage (as per SUPER data)		749411.392	
Yield/Storage Ratio	0.0008083617		

c-conservation pool
f-flood pool

DEPENDABLE YIELD MITIGATION STORAGE DETERMINATIONS AT LAKE OUACHITA			
Water Supply User	**Proposed Conservation Pool Top EL 578.98 FT**		
	Proposed Yield MGD	Proposed Storage AF	**DYMS AF**
MAWA	20.000	33,181.000	-
North Garland County 2 (requested)	3.000	4,977.261	91.266
North Garland County 1	1.000	1,659.087	30.422
Hydropower	775.230	1,286,173.552	-
Total Yield (as per MVK data)	799.229		**121.688**
Total Cons. Storage (as per MVK data)		1325990.900	
Yield/Storage Ratio	0.0006027411		

APPENDIX B

FLOOD DAMAGE CALCULATIONS

GREERS FERRY LAKE

AVERAGE ANNUAL FLOOD DAMAGES PREVENTED AT CURRENT PRICE LEVELS

	Year	Flood Damages Prevented	Prices Recv'd by Farmers [1]	Factor of Increase	FDP at Current Prices
1	1962	$16,000	243	3.160	$50,568
2	1963	0	243	3.160	0
3	1964	49,000	237	3.241	158,785
4	1965	7,000	245	3.135	21,943
5	1966	264,000	264	2.909	768,000
6	1967	24,000	250	3.072	73,728
7	1968	118,000	255	3.012	355,388
8	1969	62,000	268	2.866	177,672
9	1970	138,000	274	2.803	386,803
10	1971	127,000	281	2.733	347,103
11	1972	246,000	313	2.454	603,604
12	1973	499,000	447	1.718	857,342
13	1974	845,000	481	1.597	1,349,189
14	1975	317,000	466	1.648	522,438
15	1976	358,000	475	1.617	578,829
16	1977	289,000	462	1.662	480,416
17	1978	262,000	529	1.452	380,371
18	1979	437,000	600	1.280	559,360
19	1980	596,000	624	1.231	733,538
20	1981	29,000	634	1.211	35,129
21	1982	1,276,000	598	1.284	1,638,742
22	1983	7,941,000	625	1.229	9,757,901
23	1984	795,000	641	1.198	952,512
24	1985	1,677,000	579	1.326	2,224,415
25	1986	404,000	554	1.386	560,058
26	1987	256,000	563	1.364	349,215
27	1988	774,000	627	1.225	948,057
28	1989	1,588,000	659	1.165	1,850,659
29	1990	2,542,500	660	1.164	2,958,545
30	1991	1,856,200	632	1.215	2,255,635
31	1992	889,860	626	1.227	1,091,713
32	1993	537,220	643	1.194	641,656
33	1994	635,850	634	1.211	770,241
34	1995	914,200	646	1.189	1,086,851
35	1996	865,940	712	1.079	934,048
36	1997	308,500	678	1.133	349,451
37	1998	334,400	644	1.193	398,788
38	1999	324,900	607	1.265	411,076
39	2000	1,010,300	611	1.257	1,269,902
40	2001	505,700	649	1.183	598,425
41	2002	974,500	621	1.237	1,205,179
42	2003	544,100	677	1.134	617,236
43	2004	1,985,900	758	1.013	2,012,099
44	2005	694,800	736	1.043	725,009
45	2006	856,300	768	1.000	856,300
Total		$35,175,170			$44,904,000
Avg. Annual		$782,000			$998,000

(1) The Index of Prices Received by Farmers was used because the flood damages prevented were largely agricultural. The index is for All U.S. Farm Products and was obtained from the National Agricultural Statistic Service.

Note: The flood damages prevented were calculated for every year and published by the district for that year.

GREERS FERRY LAKE
FLOOD DAMAGE BENEFIT REDUCTION DUE TO
REALLOCATION FROM FLOOD CONTROL STORAGE

$\frac{\text{Cumulative Damages Prevented}}{\text{Years in Operation}}$	=	Avg Annual Damage Prevented			
$\frac{\$44,904,000}{45}$	= Yrs	$998,000			
Incremental Annual Benefit Reduction	=	$998,000	x	$\frac{\text{Reallocated Storage}}{\text{Flood Control Storage}}$	
Incremental Annual Benefit Reduction	=	$998,000	x	$\frac{18,729.705}{934,000}$	AF AF
Incremental Annual Benefit Reduction	=	$20,013			
Cumulative Annual Benefit Reduction	=	$998,000	x	$\frac{\text{Cum. Reallocated Storage}}{\text{Flood Control Storage}}$	
Cumulative Annual Benefit Redu34ction	=	$998,000	x	$\frac{29,269.541}{934,000}$	AF AF
Cumulative Annual Benefit Reduction	=	$31,275			

LAKE OUACHITA
AVERAGE ANNUAL FLOOD DAMAGES PREVENTED CURRENT PRICE LEVELS

	Year	Flood Damages Prevented	Prices Recv'd by Farmers [1]	Factor of Increase	FDP at Current Prices
1	1955	0	243	3.160	0
2	1956	944,000	243	3.160	2,983,506
3	1957	747,000	243	3.160	2,360,889
4	1958	515,000	243	3.160	1,627,654
5	1959	824,000	243	3.160	2,604,247
6	1960	871,000	243	3.160	2,752,790
7	1961	747,000	243	3.160	2,360,889
8	1962	850,000	243	3.160	2,686,420
9	1963	953,000	243	3.160	3,011,951
10	1964	685,000	237	3.241	2,219,747
11	1965	902,000	245	3.135	2,827,494
12	1966	696,000	264	2.909	2,024,727
13	1967	618,000	250	3.072	1,898,496
14	1968	515,000	255	3.012	1,551,059
15	1969	515,000	268	2.866	1,475,821
16	1970	927,000	274	2.803	2,598,307
17	1971	0	281	2.733	0
18	1972	0	313	2.454	0
19	1973	592,000	447	1.718	1,017,128
20	1974	592,000	481	1.597	945,231
21	1975	902,000	466	1.648	1,486,558
22	1976	927,000	475	1.617	1,498,813
23	1977	953,000	462	1.662	1,584,208
24	1978	953,000	529	1.452	1,383,561
25	1979	0	600	1.280	0
26	1980	0	624	1.231	0
27	1981	464,000	634	1.211	562,069
28	1982	0	598	1.284	0
29	1983	362,000	625	1.229	444,826
30	1984	860,000	641	1.198	1,030,390
31	1985	0	579	1.326	0
32	1986	0	554	1.386	0
33	1987	0	563	1.364	0
34	1988	234,000	627	1.225	286,622
35	1989	119,000	659	1.165	138,683
36	1990	19,000	660	1.164	22,109
37	1991	2,323,000	632	1.215	2,822,886
38	1992	124,000	626	1.227	152,128
39	1993	0	643	1.194	0
40	1994	135,000	634	1.211	163,533
41	1995	61,000	646	1.189	72,520
42	1996	61,000	712	1.079	65,798
43	1997	99,000	678	1.133	112,142
44	1998	293,000	644	1.193	349,416
45	1999	25,000	607	1.265	31,631
46	2000	214,000	611	1.257	268,989
47	2001	86,000	649	1.183	101,769
48	2002	25,000	621	1.237	30,918
49	2003	217,000	677	1.134	246,168
50	2004	6,000	758	1.013	6,079
51	2005	60,000	736	1.043	62,609
52	2006	67,000	768	1.000	67,000
Total		$22,082,000			$49,938,000
Avg. Annual		$425,000			$960,000

(1)
The Index of Prices Received by Farmers was used because the flood damages prevented were largely agricultural. The index is for All

U.S. Farm Products and was obtained from the National Agricultural Statistic Service.

LAKE OUACHITA
FLOOD DAMAGE BENEFIT REDUCTION DUE TO
REALLOCATION FROM FLOOD CONTROL STORAGE

$\frac{\text{Cumulative Damages Prevented}}{\text{Years in Operation}}$	=	Avg Annual Damage Prevented			
$\frac{\$49,938,000}{52}$	=	$960,000			
	Yrs				
Incremental Annual Benefit Reduction	=	$960,000	x	$\frac{\text{Reallocated Storage}}{\text{Flood Control Storage}}$	
Incremental Annual Benefit Reduction	=	$960,000	x	$\frac{33,302.7}{617,000}$	AF / AF
Incremental Annual Benefit Reduction	=	$51,820			
Cumulative Annual Benefit Reduction	=	$960,000	x	$\frac{\text{Cum. Reallocated Storage}}{\text{Flood Control Storage}}$	
Cumulative Annual Benefit Reduction	=	$960,000	x	$\frac{39,817.3}{617,000}$	AF / AF
Cumulative Annual Benefit Reduction	=	$61,950			

APPENDIX C

See EA for

PERTINENT CORRESPONDENCE

Response to SWPA Comments follows

13 February 2007 (**REVISED 11 October 2007 per SWD Comments Dated 10 October 2007**) **Response to Southwestern Power Administration Comments on the Draft Water Supply Storage Reallocation Report – Reallocation of Storage at Greers Ferry Lake and Lake Ouachita, Arkansas for the Mid Arkansas Water Alliance (Draft Reallocation Report) dated August 2006** (Note: Paragraphs are numbered from the beginning of the referenced section or subsection)

1. Draft Reallocation Report, Executive Summary, Paragraph 2, Sentence 1. The sentence states that the proposed reallocation will meet the "present and future needs of central Arkansas through the year 2025." ER 1105-2-100 states on page E-216 that "All reallocations or additions of storage should be to serve immediate needs." In previous reports, the Corps has typically interpreted "immediate needs" to be those needs up to ten years in the future. The reallocation should be requested to meet the needs of MAWA through the year 2017 and no later than the year 2020.

MAWA is comprised of 27 member utilities. Due to the current drought situation, many utilities that are part of MAWA have discovered that their current water supply sources are not adequate to provide water to their users. These members are past due for new water supplies. Other members have water supply sources that have been estimated to be adequate for out to 50 years. MAWA is considered by the Corps to be a single entity which has demonstrated an immediate need for certain members to the point that it is nearly critical.

2. Draft Reallocation Report, Page iii, TABLE OF CONTENTS, LIST OF APPENDICES, APPENDIX E. "ENVORONMENTAL" should be "ENVIRONMENTAL". *Corrected Spelling*

3. Draft Reallocation Report, Page 1, 1. PURPOSE OF REPORT, A. Reallocation Request, Paragraphs 1 and 2. See Comment 1. The narrative describes how the current storage request will meet the needs of MAWA through the year 2025. ER 1105-2-100 states on page E-216 that "All reallocations or additions of storage should be to serve immediate needs." In previous reports, the Corps has typically interpreted "immediate needs" to be those needs up to ten years in the future. The reallocation should be requested to meet the needs of MAWA through the year 2017 and no later than the year 2020.

MAWA is comprised of 27 member utilities. Due to the current drought situation, many utilities that are part of MAWA have discovered that their current water supply sources are not adequate to provide water to their users. These members are past due for new water supplies. Other members have water supply sources that have been estimated to be adequate for out to 50 years. MAWA is considered by the Corps to be a single entity which has demonstrated an immediate need for certain members to the point that it is nearly critical.

4. Draft Reallocation Report, Page 2, 2. PROJECT BACKGROUND, A. Project History, Paragraph 2, Sentence 5. Our records show the in-service dates for the hydropower units to be March 1964 for Unit 1 and May 1964 for Unit 2. Please confirm the correct dates.

The report states that the last unit was placed on line on 6 May 1964.

5. Draft Reallocation Report, Page 4, 3. ECONOMIC ANALYSIS, A. Water Supply Demand Analysis, Paragraph 1. The paragraph states that the current dependable yield for water supply available in central Arkansas is 174.73 MGD. Figure 2 on Page 5 shows the projected average water demand to be about 130 MGD in the year 2015 and approximately 155 MGD in the year 2030. Southwestern would not oppose a demonstrated need for additional water supply, but we do not see an "immediate need" in the area for additional water supply based on the data.

MAWA is comprised of 27 member utilities. Due to the current drought situation, many utilities that are part of MAWA have discovered that their current water supply sources are not adequate to provide water to their users. These members are past due for new water supplies. Other members have water supply sources that have been estimated to be adequate for out to 50 years. MAWA is considered by the Corps to be a single entity which has demonstrated an immediate need for certain members to the point that it is nearly critical.

6. Draft Reallocation Report, Page 7, 4. DERIVATION OF USER COST, A. YIELD/STORAGE ANALYSIS, 1) General, Paragraph 2, Sentence 1. The sentence states that the conservation pool contains 716,500 acre-feet of storage between elevations 435 and 461. TABLE 1 on Page 2 shows the same amount of storage between elevations 435 and 461.44. Please correct.

Corrected Table and text

7. Draft Reallocation Report, Page 8, 4. DERIVATION OF USER COST, A. YIELD/STORAGE ANALYSIS, 3) Flood Pool, Paragraph 2, Sentences 3 and 6. The sentences cite EC 1105-2-216. Southwestern believes that EC has expired and was incorporated into ER 1105-2-100. Please verify and correct if necessary. *Corrected Reference*

8. Draft Reallocation Report, Page 8, 4. DERIVATION OF USER COST, A. YIELD/STORAGE ANALYSIS, 3) Flood Pool. ER 1105-2-100 states "Also to be considered, where appropriate, is the need to compensate hydropower users through operational changes." (Page E-219, e. Reallocation of Flood Control Storage, (1) Introduction, Paragraph 1, Sentence 2.) In 1998, a consensus operational change for Greers Ferry was developed between LRD and Southwestern. The agreed-upon plan included a seasonal pool rise to elevation

463.0 from April 1 through September 30 annually. Also, future water supply storage reallocations would be taken from flood storage, raising the levels of both the seasonal and non-seasonal pool. Southwestern agreed that the operational change would provide compensation to the Federal hydropower purpose for all future water supply storage reallocations from discretionary storage at Greers Ferry Lake. The plan was sent to Corps Headquarters for review and was returned with minor guidance for changes in December 1998. A draft Memorandum of Understanding between LRD and Southwestern was developed in early 1999. Southwestern requested that the operational change be implemented in a letter to LRD dated September 27, 2000. In a reply dated October 23, 2000, Colonel Holden, the LRD District Engineer at that time, proposed an interim operation with a seasonal pool at elevation 462.50 until the resolution of the White River Minimum Flow Study. The interim operation has been utilized since that time and was used in 2006. Since the Minimum Flow Study has been concluded and minimum flows have been deauthorized at Greers Ferry, we again request that LRD work with Southwestern to implement the operational change at Greers Ferry as quickly as possible. Since the permanent (non-seasonal) pool elevation has raised 0.18 feet since the consensus plan was developed, we believe the current seasonal pool level should be 463.18 and should be raised to 463.78 if the MAWA reallocation is approved.

There is current discussion between SWPA, SWL and SWD regarding this operational change.

9. Draft Reallocation Report, Page 9, 4. DERIVATION OF USER COST, B. Hydropower Benefits Foregone, TABLE 3. Based on Southwestern's preliminary analysis, TABLE 3 should be updated as shown below. The onpeak energy, off-peak energy, and capacity values are based on "THERMAL 3 PLANT POWER VALUES FOR THE SOUTHWEST REGION" computed by the Corps' Hydropower Analysis Center (HAC) for Southwestern dated January 2006. The on-peak energy value is based on a combustion turbine plant in Arkansas. The off-peak energy value is based on a coal-fired steam plant in Arkansas. The capacity value is based on a combustion turbine plant in Arkansas.

TABLE 3
HYDROPOWER BENEFIT LOSSES DUE TO WATER WITHDRAWALS

Benefits Foregone	Flood Pool	Conservation Pool
Reduction in streamflow (mgd)	15.00	15.00
Annual on-peak energy losses (MWh)	1,660	5,292
On-peak energy value (mills/kWh)	68.12	68.12
Annual on-peak energy benefits foregone	$113,079	$360,491
Annual off-peak energy losses (MWh)	3,179	0

Off-peak energy value (mills/kWh) 15.79 15.79
Annual off-peak energy benefits foregone $50,196 $0
Annual energy benefits foregone $163,276 $360,491
Capacity losses (kW) 669 2,197
Capacity value ($/kW-yr) $62.24 $62.24
Annual capacity benefits foregone $41,639 $136,741
Annual benefits foregone $204,914 $497,232

This section has been revised

10. Pages 9-10, 4. DERIVATION OF USER COST, C. Hydropower Revenues Forgone, Paragraph 1. The Southwestern Power Administration rates should be updated to the October 2006 values which are 14.9 mills/kWh for on-peak energy, 8.2 mills/kWh for off-peak energy, and $42.34/kW-year for capacity.

Concur

11. Page 10, 4. DERIVATION OF USER COST, C. Hydropower Revenues Forgone, TABLE 4. Based on Southwestern's preliminary analysis and current rates (see previous comment), TABLE 4 should be updated as shown below.

TABLE 4
HYDROPOWER REVENUE LOSSES DUE TO WATER WITHDRAWALS
Revenues Foregone
Flood Conservation
Pool Pool
Reduction in streamflow (mgd) 15.00 15.00
Annual on-peak energy losses (MWh) 1,660 5,292
On-peak energy value (mills/kWh) 14.90 14.90
Annual on-peak energy revenues foregone $24,734 $78,851
Annual off-peak energy losses (MWh) 3,179 0
Off-peak energy value (mills/kWh) 8.20 8.20
Annual off-peak energy revenues foregone $26,068 $0
Annual energy revenues foregone $50,802 $78,851
Capacity losses (kW) 669 2,197
Capacity value ($/kW-yr) $42.34 $42.34
Annual capacity revenues foregone $28,326 $93,023
Annual revenues foregone $79,128 $171,874

This section was revised based upon the capacity and energy charges provided.

12. Draft Reallocation Report, Page 11, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone. The section should be titled "Flood Control Reallocation Alternative Benefits Foregone." Please correct.

Do not concur. The existing title is appropriate.

13. Draft Reallocation Report, Page 11, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 1) Dependable Yield Mitigation Storage, Paragraph 1, Sentence 1. The sentence should state that the purpose of dependable yield mitigation storage is to maintain the current yield of existing ***water supply*** users. Please correct. *Added "water supply"*

14. Draft Reallocation Report, Page 11, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 1) Dependable Yield Mitigation Storage, Paragraph 1, Sentence 4. See previous comment. The phrase "existing water users" should be changed to "existing water supply users." Please correct.

Added "water supply"

15. Draft Reallocation Report, Page 11, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 2) Lost Flood Control Benefits. The Corps uses a simplistic, straight-line approach for computing lost flood control benefits while using a much more sophisticated approach for computing lost hydropower benefits. The hydropower losses would be much greater if the Corps used a technique similar to that used for lost flood benefits.

Do not concur. - SWL does not dispute that there are many other methods for computing flood control benefits foregone, and each of those methods will yield a slightly different answer. But, they will typically be on the same order of magnitude, and not change the conclusion of the study. Funding is not (and has never been) available to provide a more extensive analysis. Therefore we are required to utilize the tools available and rely on past precedent which has been successful in the past for providing storage to users.

16. Draft Reallocation Report, Page 11, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 3) Lost Hydropower Benefits. The HAC analysis should be included as an appendix to the report. It is difficult to properly evaluate the hydropower impact calculations without it. Please include the HAC analysis. *Data from HAC included*

17. Draft Reallocation Report, Page 11, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 3) Lost Hydropower Benefits, Paragraph 1, Sentence 2. The sentence incorrectly states that there will be a change in the volume of the power pool. The conservation pool volume will increase, but the power pool – the amount of storage available to hydropower – will not change. The power pool volume will stay the same, but the yield of that storage will be reduced. Please correct. *Corrected*

18. Draft Reallocation Report, Page 11, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 5) Total Costs, TABLE 5. Based on Southwestern's preliminary analysis, TABLE 5 should be updated as shown below.

TABLE 5
TOTAL COST WITH REALLOCATION
FROM FLOOD CONTROL STORAGE
ITEM COST
Lost Flood Control Benefits $18,610
Lost Hydropower Benefits $204,914
Other costs -
TOTAL $223,524

19. Draft Reallocation Report, Page 14, 4. DERIVATION OF USER COST, E. National Economic Development Plan. The section heading should be G. National Economic Development Plan. Please correct. *Corrected*

20. Draft Reallocation Report, Page 14, 4. DERIVATION OF USER COST, E. National Economic Development Plan, Table 7. Based on Southwestern's preliminary analysis, Table 7 should be updated as shown below.

Table 7
National Economic Development Plan
Lost Benefits
Conservation Pool
-Hydropower $497,232
Total Conservation Pool $497,232
Flood Pool
-Flood Damages $18,610
-Hydropower $204,914
Total Flood Pool $223,524

This table were updated.

21. Draft Reallocation Report, Page 14, 4. DERIVATION OF USER COST, F. Users Costs. The section heading should be H. Users Costs. Please correct.

Corrected

22. Draft Reallocation Report, Page 14, 4. DERIVATION OF USER COST, F. Users Costs, TABLE 8. The numbers in the table do not match the numbers in any of the previous tables. Where did they come from? Please explain.

These numbers match in the revised report. The rates were different because the water supply interest rate and the planning interest rate were different. A footnote should have been added to explain, but they were correct.

23. Draft Reallocation Report, Page 16, 5. TEST OF FINANCIAL FEASIBILITY, TABLE 10. Will an intake structure, pump station, or pipeline have to be built to accommodate the water supply withdrawals from Greers Ferry? If so, those costs should be included in the Greers Ferry Alternative.

No additional infrastructure will be required for this reallocation at Greers Ferry Lake.

24. Draft Reallocation Report, Page 16, 5. TEST OF FINANCIAL FEASIBILITY, TABLE 10. A new lake would be sized to meet the entire MAWA need. The costs of the new lake and pipeline should be compared with the costs of reallocation (and intake structures, pump stations, and pipelines, as necessary) at both Greers Ferry Lake and Lake Ouachita together and not separately. Please correct.

MAWA is comprised of two working groups – north and south of the Arkansas River. Constructing one reservoir would require crossing the Arkansas River and no central location is suitable for a large reservoir. Therefore, MAWA would have to construct two smaller reservoirs for each group.

25. Draft Reallocation Report, Page 16, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1, Sentence 1. The sentence should state that the reallocation "will have an adverse effect on the Federal hydropower purpose." Southwestern's customers will bear the adverse effects of the reallocation through both reduced power and energy available and higher rates for Federal hydropower. Please correct.

Do not concur. Credits will be provided to SWPA at the treasury.

26. Draft Reallocation Report, Page 16, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1, Sentence 3. The word "year" should be inserted between "the" and "2062". Please correct. *Corrected*

27. Draft Reallocation Report, Page 16, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1, Sentence 7. Why do capacity credits only go through the year 2015? Please explain. Note: If that year is based on Southwestern's latest contract expiration, please note that Southwestern's last current contract with customers taking energy from the project expires in 2021.

This section has been revised

28. Draft Reallocation Report, Page 16, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1, Sentence 9. The interest rate used was 5.125 percent. Other interest rates were used elsewhere in the report. Please explain.

This section has been revised

29. Page 16, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER

MARKETING AGENCY, Paragraph 1. The credit to the Federal Hydropower purpose should be recalculated based on Southwestern's preliminary analysis and updated tables. Please correct.

This section has been revised

30. Draft Reallocation Report, Page 16, 7. OTHER CONSIDERATIONS, A. NEPA DOCUMENTATION, Paragraph 1, Sentences 1-2. The sentences seem to have been written for a conservation storage reallocation. The combined amount of storage in the conservation and flood pools will not change, but the size of each pool will change as storage is reallocated from the flood pool to the conservation pool. Please correct. *Corrected*

31. Draft Reallocation Report, Page 20, 1. PURPOSE, A. Reallocation Request, Paragraphs 1 and 2. See Comments 1, 3, and 5. Storage should only be reallocated to meet the "immediate needs" of MAWA. Please correct.

MAWA is comprised of 27 member utilities. Due to the current drought situation, many utilities that are part of MAWA have discovered that their current water supply sources are not adequate to provide water to their users. These members are past due for new water supplies. Other members have water supply sources that have been estimated to be adequate for out to 50 years. MAWA is considered by the Corps to be a single entity which has demonstrated an immediate need for certain members to the point that it is nearly critical.

32. Draft Reallocation Report, Page 24, 2. PROJECT BACKGROUND, C. Water Reallocations, Paragraph 1, Sentence 2. The sentence should read "This water supply agreement was executed ***on*** February 14, 1996…" Please correct.

Corrected

33. Draft Reallocation Report, Page 24, 2. PROJECT BACKGROUND, C. Water Reallocations, Paragraph 2, Sentence 1. The three reallocations cited in Paragraph 1 (1,575 acre-feet, 5,004 acre-feet, and 33,303 acre-feet) add up to 39,882 acre-feet. That would leave 10,118 acre-feet of discretionary storage remaining and not 10,183 acre-feet. The Executive Summary states that 10,061 acre-feet of discretionary storage would remain after the reallocation, and the table in APPENDIX A seems to support that number. Please verify and correct.

Corrected

34. Draft Reallocation Report, Page 24, 3. ECONOMIC ANALYSIS, A. Water Supply Demand Analysis, Paragraph 1. The paragraph states that the current dependable yield for water supply available in central Arkansas is 174.73 MGD. Figure 2 on Page 25 shows the projected average water demand to be about 130 MGD in the year 2015 and approximately 155 MGD in the year 2030.

Southwestern would not oppose a demonstrated need for additional water supply, but we do not see an "immediate need" in the area for additional water supply based on the data.

MAWA is comprised of 27 member utilities. Due to the current drought situation, many utilities that are part of MAWA have discovered that their current water supply sources are not adequate to provide water to their users. These members are past due for new water supplies. Other members have water supply sources that have been estimated to be adequate for out to 50 years. MAWA is considered by the Corps to be a single entity which has demonstrated an immediate need for certain members to the point that it is nearly critical.

35. Draft Reallocation Report, Page 28, 4. DERIVATION OF USER COST, A. YIELD/STORAGE ANALYSIS, 3) Flood Pool, Paragraph 1, Sentence 3. The sentence should be corrected to state "…while maintaining the expected yield of the existing ***water supply*** user." *Corrected*

36. Draft Reallocation Report, Page 28, 4. DERIVATION OF USER COST, A. YIELD/STORAGE ANALYSIS, 3) Flood Pool, Paragraph 1, Sentence 4. The sentence states that the top of conservation pool will be raised from elevation 578.16. TABLE 11 on page 21 states that the current top of conservation pool is 578.04. Please clarify. *Corrected*

37. Draft Reallocation Report, Page 28, 4. DERIVATION OF USER COST, A. YIELD/STORAGE ANALYSIS, 3) Flood Pool, Paragraph 2, Sentences 3 and 6. The sentences cite EC 1105-2-216. Southwestern believes that EC has expired and was incorporated into ER 1105-2-100. Please verify and correct if necessary. *Corrected*

38. Draft Reallocation Report, Page 29, 4. DERIVATION OF USER COST, B. Hydropower Benefits Foregone, TABLE 13. Based on Southwestern's preliminary analysis, TABLE 33 should be updated as shown below. The onpeak energy, off-peak energy, and capacity values are based on "THERMAL PLANT POWER VALUES FOR THE SOUTHWEST REGION" computed by HAC for Southwestern dated January 2006. The on-peak energy value is based on a combustion turbine plant in Arkansas. The off-peak energy value is based on a coal-fired steam plant in Arkansas. The capacity value is based on a combustion turbine plant in Arkansas.

TABLE 13
HYDROPOWER BENEFIT LOSSES DUE TO WATER WITHDRAWALS
Benefits Foregone
Flood
Pool
Conservation
Pool

Reduction in streamflow (mgd) 20.00 20.00
Annual on-peak energy losses (MWh) 4,745 8,775
On-peak energy value (mills/kWh) 68.12 68.12
Annual on-peak energy benefits foregone $323,229 $597,753
Annual off-peak energy losses (MWh) 2,607 0
Off-peak energy value (mills/kWh) 15.79 15.79
Annual off-peak energy benefits foregone $41,165 $0
Annual energy benefits foregone $364,394 $597,753
Capacity losses (kW) 1,874 2,593
Capacity value ($/kW-yr) $62.24 $62.24
Annual capacity benefits foregone $116,638 $161,388
Annual benefits foregone $481,032 $759,141

This section has been revised

39. Draft Reallocation Report, Page 29, 4. DERIVATION OF USER COST, C. Hydropower Revenues Forgone, Paragraph 1. The Southwestern Power Administration rates should be updated to the October 2006 values which are 14.9 mills/kWh for on-peak energy, 8.2 mills/kWh for off-peak energy, and $42.34/kW-year for capacity. *Concur*

40. Draft Reallocation Report, Page 30, 4. DERIVATION OF USER COST, C. Hydropower Revenues Forgone, TABLE 14. Based on Southwestern's preliminary analysis and current rates (see previous comment), TABLE 14 should be updated as shown below.

TABLE 14
HYDROPOWER REVENUE LOSSES DUE TO WATER WITHDRAWALS
Revenues Foregone
Flood
Pool
Conservation
Pool
Reduction in streamflow (mgd) 20.00 20.00
Annual on-peak energy losses (MWh) 4,745 8,775
On-peak energy value (mills/kWh) 14.90 14.90
Annual on-peak energy revenues foregone $70,701 $130,748
Annual off-peak energy losses (MWh) 2,607 0
Off-peak energy value (mills/kWh) 8.20 8.20
Annual off-peak energy revenues foregone $21,377 $0
Annual energy revenues foregone $92,078 $130,748
Capacity losses (kW) 1,874 2,593
Capacity value ($/kW-yr) $42.34 $42.34
Annual capacity revenues foregone $79,347 $109,790
Annual revenues foregone $171,425 $240,537

This section has been revised based on the capacity and energy charges provided.

41. Draft Reallocation Report, Page 30, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone. The section should be titled "Flood Control Reallocation Alternative Benefits Foregone." Please correct.

Do not concur. The existing title is appropriate.

42. Draft Reallocation Report, Page 30, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 1) Dependable Yield Mitigation Storage, Paragraph 1, Sentence 1. The sentence should state that the purpose of dependable yield mitigation storage is to maintain the current yield of existing ***water supply*** users. Please correct. *Corrected*

43. Draft Reallocation Report, Page 30, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 1) Dependable Yield Mitigation Storage, Paragraph 1, Sentence 4. See previous comment. The phrase "existing water users" should be changed to "existing water supply users." Please correct.

Corrected

44. Draft Reallocation Report, Page 31, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 2) Lost Flood Control Benefits. The Corps uses a simplistic, straight-line approach for computing lost flood control benefits while using a much more sophisticated approach for computing lost hydropower benefits. The hydropower losses would be much greater if the Corps used a technique similar to that used for lost flood benefits.

Do not concur. - SWL does not dispute that there are many other methods for computing flood control benefits foregone, and each of those methods will yield a slightly different answer. But, they will typically be on the same order of magnitude, and not change the conclusion of the study. Funding is not (and has never been) available to provide a more extensive analysis. Therefore we are required to utilize the tools available and rely on past precedent which has been successful in the past for providing storage to users.

45. Draft Reallocation Report, Page 31, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 3) Lost Hydropower Benefits, Paragraph 1, Sentence 2. The sentence incorrectly states that there will be a change in the volume of the power pool. The conservation pool volume will increase, but the power pool – the amount of storage available to hydropower – will not change. The power pool volume will stay the same, but the yield of that storage will be reduced. Please correct. *Corrected*

46. Draft Reallocation Report, Page 31, 4. DERIVATION OF USER COST, E. Flood Control Benefits Foregone, 5) Total Costs, TABLE 15. Based on Southwestern's preliminary analysis, TABLE 15 should be updated as shown

below.

TABLE 15
TOTAL COST WITH REALLOCATION
FROM FLOOD CONTROL STORAGE
ITEM COST
Lost Flood Control Benefits $49,550
Lost Hydropower Benefits $481,032
Other costs -
TOTAL $530,582

This section has been revised.

47. Draft Reallocation Report, Page 34, 4. DERIVATION OF USER COST, G. National Economic Development Plan, Table 17. Based on Southwestern's preliminary analysis, Table 17 should be updated as shown below.
Table 17
National Economic Development Plan
Lost Benefits
Conservation Pool
-Hydropower $759,141
Total Conservation Pool $759,141
Flood Pool
-Flood Damages $49,550
-Hydropower $481,032
Total Flood Pool $530,582

This section has been revised

48. Draft Reallocation Report, Page 34, 4. DERIVATION OF USER COST, H. Users Costs, TABLE 18. The numbers in the table do not match the numbers in any of the previous tables. Where did they come from? Please explain.

These numbers match in the revised report. The rates were different because the water supply interest rate and the planning interest rate were different. A footnote should have been added to explain, but they were correct.

49. Draft Reallocation Report, Page 36, 5. TEST OF FINANCIAL FEASIBILITY, TABLE 20. The Draft Environmental Assessment (DEA) states that a water intake structure, pump station, and pipeline will have to be built to accommodate the water supply withdrawals from Lake Ouachita (DEA, Page 8, 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES, 2.2 LAKE OUACHITA, 2.2.1 Description of the Proposed Action, Paragraph 2). Those costs should be included in the Lake Ouachita Alternative. Please correct.

Do not concur. These costs would be paid by MAWA and not by the Federal Government. If it were the case that the cost of the required infrastructure were paid by the Federal Government, they would be included.

50. Draft Reallocation Report, Page 36, 5. TEST OF FINANCIAL FEASIBILITY, TABLE 20. A new lake would be sized to meet the entire MAWA need. The costs of the new lake and pipeline should be compared with the costs of reallocation (and intake structures, pump stations, and pipelines, as necessary) at both Lake Ouachita and Greers Ferry Lake together and not separately. Please correct.

MAWA is comprised of two working groups – north and south of the Arkansas River. Constructing one reservoir would require crossing the Arkansas River and no central location is suitable for a large reservoir. Therefore, MAWA would have to construct two smaller reservoirs for each group.

51. Draft Reallocation Report, Page 36, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1, Sentence 1. The sentence should state that the reallocation "will have an adverse effect on the Federal hydropower purpose." Southwestern's customers will bear the adverse effects of the reallocation through both reduced power and energy available and higher rates for Federal hydropower. Please correct.

Do not concur. Credits will be provided to SWPA at the treasury.

52. Draft Reallocation Report, Page 36, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1, Sentence 7. Why do capacity credits only go through the year 2015? Please explain. Note: If that year is based on Southwestern's latest contract expiration, please note that Southwestern's last current contract with customers taking energy from the project expires in 2021.

This section has been revised

53. Draft Reallocation Report, Page 36, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1, Sentence 9. The interest rate used was 5.125 percent. Other interest rates were used elsewhere in the report. Please explain.

This section has been revised

54. Page 36, 6. COST ACCOUNT ADJUSTMENTS/CREDITS TO POWER MARKETING AGENCY, Paragraph 1. The credit to the Federal Hydropower purpose should be recalculated based on Southwestern's preliminary analysis and updated tables. Please correct.

This section has been revised

55. Draft Reallocation Report, Page 36, 7. OTHER CONSIDERATIONS, A. NEPA DOCUMENTATION, Paragraph 1, Sentences 1-3. The combined amount of storage in the conservation and flood pools will not change, but the size of each pool will change as storage is reallocated from the flood pool to the conservation pool. Please correct. *Corrected*

56. Draft Reallocation Report, APPENDIX B, Fourth table "LAKE OUACHITA FLOOD DAMAGE BENEFIT REDUCTION DUE TO REALLOCATION FROM FLOOD CONTROL STORAGE." In the calculation of the Incremental Annual Benefit Reduction, 33,181 acre-feet is used instead of the 33,303 acrefeet which is being proposed for reallocation. Use of the correct number would give an answer of $49,550 which is the value in TABLE 15 on Page 31. Please correct.

This table has been revised and corrected.

APPENDIX D

WATER SUPPLY AGREEMENT
For Greers Ferry Lake

WATER STORAGE AGREEMENT
BETWEEN THE DEPARTMENT OF THE ARMY
AND
THE MID ARKANSAS WATER ALLIANCE
FOR
REALLOCATED WATER STORAGE SPACE IN GREERS FERRY LAKE, ARKANSAS

THIS AGREEMENT, entered into this ____ day of _____, 20___, by and between THE DEPARTMENT OF THE ARMY (hereinafter called the "Government") represented by the District Engineer executing this agreement, and _____ (hereinafter called the "User");

WITNESSETH THAT:

WHEREAS, the Flood Control Act of 1938 (Public Law 538, 78th Congress), authorized the construction, operation, and maintenance of the Greers Ferry Dam on the White River Waterway, Arkansas, (hereinafter called the "Project"); and

WHEREAS, the User desires to enter into an agreement with the Government for the use of storage for municipal and industrial water supply added to the Project by reallocation, and for payment of the cost thereof in accordance with the provisions of the Water Supply Act of 1958, as amended (43 U.S.C. 390b-f); and

WHEREAS, the User as shown in Exhibit “A”, attached to and made a part of this agreement, is empowered to enter into an agreement with the Government and is vested with all necessary powers of accomplishment of the purposes of this agreement including those required by Section 221 of the Flood Control Act of 1970 (42 U.S.C. 1962d-5d) (as amended).

NOW, THEREFORE, the Government and the User agree as follows:

ARTICLE 1 - Water Storage Space.

a. Project Modification. The Government, subject to the directions of Federal law and any limitations imposed thereby, shall modify the allocation of storage space in the Project so as to include therein space for the storage of water by the User.

b. Rights of User.

(l). The User shall have the right to utilize an undivided 2.426 percent estimated to contain 18,556.05 acre-feet (after adjustment for sediment deposits) of the usable conservation storage space in the Project (see column (5) of Exhibit B-1) between elevations 435.0 feet and 462.04 feet above National Geodetic Vertical Datum (NGVD), which is estimated to contain 749,411.392 acre-feet after adjustment for sediment deposits. The User’s storage space is to be used to impound water for present demand or need for municipal and industrial water supply.

(2). The User shall have the right to withdraw water from the lake, or to request releases to be made by the Government through the outlet works of the Project, subject to the provisions of Article lc and to the extent the aforesaid storage space will provide; and shall have the right to construct all such works, plants, pipelines, and appurtenances as may be necessary and

convenient for the purpose of diversion or withdrawals, subject to the approval of the District Engineer as to design and location. The grant of an easement for right-of-way, across, in and upon land of the Government at the Project shall be by a separate instrument in a form satisfactory to the Secretary of the Army, under the authority of and in accordance with the provisions of l0 U.S.C. 2668 and such other authorities as may be necessary. Subject to the conditions of such easement, the User shall have the right to use so much of the Project land as may reasonably be required in the exercise of the rights and privileges granted under this agreement.

c. Rights Reserved. The Government reserves the right to control and use all storage in the Project in accordance with authorized Project purposes. The Government further reserves the right to take such measures as may be necessary in the operation of the Project to preserve life and/or property, including the right not to make downstream releases during such periods of time as are deemed necessary, in its sole discretion, to inspect, maintain, or repair the Project.

d. Quality or Availability of Water. The User recognizes that this agreement provides storage space for raw water only. The Government makes no representations with respect to the quality or availability of water and assumes no responsibility therefor, or for the treatment of the water.

e. Sedimentation Surveys.

(1). Sedimentation surveys will be made by the District Engineer during the term of this agreement at intervals not to exceed fifteen (15) years unless the District Engineer determines that such surveys are unnecessary. When, in the opinion of the District Engineer, the findings of such survey indicate any Project purpose will be affected by unanticipated sedimentation distribution, there shall be an equitable redistribution of the sediment reserve storage space among the purposes served by the Project including municipal and industrial water supply. The total available remaining storage space in the Project will then be divided among the various Project features in the same ratio as was initially utilized. Adjusted pool elevations will be rounded to the nearest one-half foot. Such findings and the storage space allocated to municipal and industrial water supply shall be defined and described as an exhibit, which will be made a part of this agreement, and the water control manual will be modified accordingly.

(2). The Government assumes no responsibility for deviations from estimated rates of sedimentation, or the distribution thereof. Such deviations may cause unequal distribution of sediment reserve storage greater than estimated, and/or encroachment on the total storage at the Project.

f. Dependable Yield Mitigation Storage. In addition to the 18556.05 acre-feet of water supply storage space acquired by the User, the User will pay for an additional 173.655 acre-feet of dependable yield mitigation storage.

ARTICLE 2 - Regulation of and Right to Use of Water. The regulation of the use of water withdrawn or released from the aforesaid storage space shall be the sole responsibility of the User. The User has the full responsibility to acquire in accordance with State laws and regulations, and, if necessary, to establish or defend, any and all water rights needed for utilization of the storage provided under this agreement. The Government shall not be responsible for diversions by others, nor will it become a party to any controversies involving the use of the storage space by the User except as such controversies may affect the operations of the Project by the Government.

ARTICLE 3 - Operation and Maintenance. The Government shall operate and maintain the Project and the User shall pay to the Government a share of the costs of such operation and maintenance as provided in Article 5c. The User shall be responsible for operation and maintenance of all installations and facilities which it may construct for the diversion or withdrawal of water, and shall bear all costs of construction, operation and maintenance of such installations and facilities.

ARTICLE 4 - Measurement of Withdrawals and Releases. The User agrees to furnish and install, without cost to the Government, suitable meters or measuring devices satisfactory to the District Engineer for the measurement of water which is withdrawn from the Project by any means other than through the Project outlet works. The User shall furnish to the Government monthly statements of all such withdrawals. Prior to the construction of any facilities for withdrawal of water from the Project, the User will obtain the District Engineer's approval of the design, location and installation of the facilities including the meters or measuring devices. Such devices shall be available for inspection by Government representatives at all reasonable times. Releases from the water supply storage space through the Project outlet works shall be made in accordance with written schedules furnished by the User and approved by the District Engineer and shall be subject to Article lc. The measure of all such releases shall be by means of a rating curve of the outlet works, or by such other suitable means as may be agreed upon prior to use of the water supply storage space.

ARTICLE 5 - Payments. In consideration of the right to utilize the aforesaid storage space in the Project for municipal and industrial water supply purposes, the User shall pay the following sums to the Government:

a. First Cost of Storage.

(1). The User shall repay to the Government, at the times as hereinafter specified, the amounts stated below which, as shown in Exhibit B-II attached to and made a part of this agreement, constitute the entire actual amount of the first cost of storage allocated to the water storage right acquired by the User under this agreement. The amount of the cost is based on the updated cost of storage. The costs shown in Exhibit B are for (18,729.705) acre-feet of storage space. Of this space (18,556.05) acre-feet are for the User and (173.655) acre-feet are for dependable yield mitigation storage. The interest rate to be used for purposes of computing interest on the unpaid balance will be the yield rate adjusted at five-year intervals as determined by the Secretary of the Treasury on the basis set forth in Section 932 of the 1986 Water Resources Development Act. For this agreement, the starting interest rate shall be that rate in effect at the time the agreement is approved. For FY 2007, such rate is 4.875 percent. Should the agreement not be signed in FY 2007, the amounts due herein will be adjusted to reflect the application of the appropriate rate.

(2). The cost allocated to the storage space indicated in Article 1b(1) is currently estimated at

$3,370,655 on the basis of the costs presented in Exhibit B-II. These costs shall be repaid within the life of the Project in not to exceed 30 years from the date this agreement is executed by the Secretary of the Army or his duly authorized representative. The payments shall be in equal consecutive annual installments, adjusted at 5-year intervals as shown in Exhibit "C". The first payment shall be due and payable within 30 days after the User is notified by the District Engineer that this agreement is executed. Annual installments thereafter will be due and payable on the anniversary date of the date of notification. Except for the first payment, which will be

applied solely to the retirement of principal, all installments shall include accrued interest on the unpaid balance at the rate provided above. The last annual installment shall be adjusted upward or downward when due to assure repayment of all of the first cost of storage allocated to the storage within 30 years from the above date.

b. Repair, Rehabilitation, and Replacement (RR&R) Costs. The User will be required to pay 1.135 percent of the cost of joint-use RR&R of Project features. Payment of these costs shall be made either incrementally during construction or in lump sum (including interest during construction) upon completion of construction.

c. Annual Operation and Maintenance (O&M) Expense.

The User will be required to pay 1.135 percent of the annual experienced joint-use O&M expense of the Project.

Payments for O&M expense are due and payable in advance on the date for payment of the first cost of storage as set forth in Article 5a(2) and shall be based on O&M expense for the Project in the Government fiscal year most recently ended. The amount of each annual payment will be the actual experienced O&M expense allocated joint-use for the preceding fiscal year or an estimate thereof when actual expense information is not available.

d. Prepayment. The User shall have the right at any time to prepay the indebtedness under this Article in whole or in part, with accrued interest thereon to the date of such prepayment.

e. Delinquent Payments. If the User shall fail to make any of the aforesaid payments when due, then the overdue payments shall bear interest compounded annually until paid. The interest rate to be used for overdue payments due under the provisions of Articles 5a, 5b, 5c and 5d above shall be that determined by the Department of Treasury's Treasury Financial Manual (1 TFM 6-8000, "Cash Management"). The amount charged on payments overdue for a period of less than one year shall be figured on a monthly basis. A month's interest will be charged for any portion of each month that the payment is delinquent. This provision shall not be construed as giving the User a choice of either making payments when due or paying interest, nor shall it be construed as waiving any other rights of the Government, at law or in equity, which might result from any default by the User.

ARTICLE 6 - Duration of Agreement. This agreement shall become effective when signed by the Secretary of the Army or his duly authorized representative and shall continue in full force and effect for the life of the Project.

ARTICLE 7 - Permanent Rights to Storage. Upon completion of payments by the User, as provided in Article 5a herein, the User shall have a permanent right, under the provisions of the Act of 16 October 1963 (Public Law 88-140, 43 U.S.C. 390e), to the use of the water supply storage space in the Project as provided in Article 1, subject to the following:

a. The User shall continue payment of annual operation and maintenance costs allocated to water supply.

b. The User shall bear the costs allocated to water supply of any necessary reconstruction, rehabilitation, or replacement of Project features which may be required to continue satisfactory operation of the Project. The District Engineer will establish such costs and

repayment arrangements shall be in writing in accordance with the terms and conditions set forth in Article 5b for reconstruction, rehabilitation, and replacement costs, and be made a part of this agreement.

c. Upon completion of payments by the User as provided in Article 5a, the District Engineer shall re-determine the storage space for municipal and industrial water supply in accordance with the provisions of Article 1e. Such redetermination of reservoir storage capacity may be further adjusted from time to time as the result of sedimentation resurveys to reflect actual rates of sedimentation and the exhibit revised to show the revised storage space allocated to municipal and industrial water supply.

d. The permanent rights of the User under this agreement shall be continued so long as the Government continues to operate the Project. In the event the Government no longer operates the Project, such rights may be continued subject to the execution of a separate agreement or additional supplemental agreement providing for:

(1). Continued operation by the User of such part of the facility as is necessary for utilization of the water supply storage space allocated to it;

(2). Terms which will protect the public interest; and,

(3). Effective absolvement of the Government by the User from all liability in connection with such continued operation.

ARTICLE 8 - Release of Claims. The User shall hold and save the Government, including its officers, agents and employees harmless from liability of any nature or kind for or on account of any claim for damages which may be filed or asserted as a result of the storage in the Project, or withdrawal or release of water from the Project, made or ordered by the User or as a result of the construction, operation, or maintenance of the water supply facilities and appurtenances thereto owned and operated by the User except for damages due to the fault or negligence of the Government or its contractors.

ARTICLE 9 - Transfers and Assignments.

a. The User shall not transfer or assign this agreement nor any rights acquired thereunder, nor sub-allot said water supply storage space or any part thereof, nor grant any interest, privilege or license whatsoever in connection with this agreement, without the approval of the Secretary of the Army, or his duly authorized representative provided that, unless contrary to the public interest, this restriction shall not be construed to apply to any water that may be obtained from the water supply storage space by the User and furnished to any third party or parties, nor any method of allocation thereof.

b. Regarding approval of assignments, references to restriction of assignments shall not apply to any transfer or assignment to the United States Department of Agriculture, Rural Economic Community Development (RECD), formerly Farmers Home Administration, or its successor agency, or nominee, given in connection with the pledging of this water storage agreement as security for any loans or arising out of the foreclosure or liquidation of said loans. The User will notify the Corps in writing 15 days prior to applying for a RECD loan. A copy of the final loan instrument will be furnished to the Corps for their record.

ARTICLE 10 - Officials Not to Benefit. No member of or delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

ARTICLE 11 - Covenant Against Contingent Fees. The User warrants that no person or selling agency has been employed or retained to solicit or secure this agreement upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the User for the purpose of securing business. For breach or violation of this warranty the Government shall have the right to annul this agreement without liability or in its discretion to add to the price or consideration, or otherwise recover the full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE 12 – "Intentionally left blank."

ARTICLE 13 - Environmental Quality. During any construction, operation, and maintenance by User of any facilities, specific actions will be taken to control environmental pollution which could result from such activity and to comply with applicable Federal, State, and local laws and regulations concerning environmental pollution. Particular attention should be given to:

a. Reduction of air pollution by control of burning, minimization of dust, containment of chemical vapors, and control of engine exhaust gases, and of smoke from temporary heaters;

b. Reduction of water pollution by control of sanitary facilities, storage of fuels and other contaminants, and control of turbidity and siltation from erosion;

c. Minimization of noise levels;

d. On-site and off-site disposal of waste and spoil; and,

e. Prevention of landscape defacement and damage.

ARTICLE 14 - Federal and State Laws.

a. Compliance. In acting under its rights and obligations hereunder, the User agrees to comply with all applicable Federal and State laws and regulations, including but not limited to: 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.), the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)), and the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655).

b. Civil Rights Act. The User furnishes, as part of this agreement, an assurance (Exhibit D) that it will comply with Title VI of the Civil Rights Act of 1964 (78 Stat. 241, 42 U.S.C. 2000d, et seq.) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 195 of Title 32, Code of Federal Regulations.

c. Regulatory Program. Any discharges of water or pollutants into a navigable stream or tributary thereof resulting from the User's facilities and operations undertaken under this agreement shall be performed only in accordance with applicable Federal, State, and local laws and regulations.

d. Lobbying Activities. The User furnishes, as part of this agreement, a certification (Exhibit E and if applicable, Standard Form-LLL "Disclosure of Lobbying Activities") that it will comply with Title 31 U.S.C. Section 1352 of the limitation on use of appropriated funds to influence certain Federal contracting and financial transactions (Public Law 101-121, October 23, 1989) and Federal Acquisition Regulation 52.203-12 issued pursuant thereto.

ARTICLE 15 - Definitions.

a. First cost of storage. This is the cost assigned to the Users right to the storage space in the project. In this Agreement, the first cost of storage was developed by the updated cost of storage method and is summarized in Exhibit B-II.

b. Interest Payments.

(1). Interest on the unpaid balance. When the Project cost is amortized, this is the interest on the unpaid balance (see Exhibit C). When payments are made in "lump sum," there is no amortization schedule and therefore, no "interest on the unpaid balance."

c. Specific costs. The costs of Project features normally serving only one particular Project purpose.

d. Joint-use costs. The costs of features used for any two or more Project purposes.

e. Annual operation and maintenance (O&M) expense. Annual expenses funded under the O&M, General account. These expenses include the day-to-day costs to operate and maintain the Project as well as O&M costs which are not capitalized.

f. Repair, rehabilitation and replacement (RR&R) costs. Costs funded in part under the Operation and Maintenance, General, or Construction, General accounts but not associated with first cost of storage. Such expenditures are for costly, infrequent work and are intended to ensure continued satisfactory operation of the Project. For the purposes of this agreement the term "reconstruction" used in Article 8 "Permanent Rights to Storage" shall be included in this definition of repair, rehabilitation and replacement; repayment of those costs shall be the same as described in Article 5b.

g. Fiscal Year. Refers to the Government's fiscal year. This year begins on 1 October and ends on 30 September.

h. Life of the Project. This is the physical life of the Project.

i. District Engineer. Refers to the District Engineer of the Little Rock District of the United States Army Corps of Engineers, or his/her successor or designee.

j. Dependable Yield Mitigation Storage. The use of the reallocated space for water supply storage diminishes the dependable yield of water to prior water supply users. To compensate for that loss, additional conservation storage, above and beyond the storage required by the new user, is provided and made available to the prior users. The new user pays for this space. The reallocated storage mitigation space becomes part of the total storage space jointly shared by all the water supply users.

IN WITNESS WHEREOF, the parties have executed this agreement as of the day and year first above written.

THE DEPARTMENT OF THE ARMY	MID ARKANSAS WATER ALLIANCE
_____	_____
Donald E. Jackson. Jr. Colonel, U.S. Army District Commander	Steve Morgan President
DATE:_____	DATE:_____

EXHIBIT A: CERTIFICATION

I _____, Attorney for the _____, have reviewed the foregoing agreement executed by _____, and as principal legal officer of/for the _____ certify that [I have considered the legal effect of Section 221 of the 1970 Flood Control Act (Public Law 9l-6ll) and find that] _____ is legally and financially capable of entering into the contractual obligations contained in the foregoing agreement and that, upon acceptance by the Department of the Army, it will be legally enforceable.

Given under my hand, this _____ day of _____20____.

_____

Attorney for the _____

EXHIBIT B: COST COMPUTATIONS

I - LAKE STORAGE

MAWA

Feature	Elevation (feet, NGCD)		Usable Storage (acre-feet) 1/	Percent of	
				Usable Storage 2/	Conservation Storage 3/
(1)	(2)		(3)	(4)	(5)
Flood Control	462.04	487	901,088.608	54.595	
Conservation	435	462.04	749,411.392	45.405	100
Water Supply			40,039.472	2.426	5.343
MAWA			18,556.050	1.124	2.476
Searcy County, pending			5,041.060	0.305	0.673
Clinton			2,179.717	0.132	0.291
City of Heber Springs, pending			3,554.102	0.215	0.474
Thunderbird			55.668	0.003	0.007
CWS3			4,329.745	0.262	0.578
Red Apple Inn			65.565	0.004	0.009
CWS2			3,818.835	0.231	0.510
CWS1			228.858	0.014	0.031
Clinton			912.958	0.055	0.122
Tannenbaum			90.306	0.005	0.012
City of Heber Springs			1,032.953	0.063	0.138
DYMS to support MAWA			173.655	0.011	0.023
Hydropower			709,371.920	42.979	94.657
Total Usable Storage			1,650,500	100	

Notes:
1/ Storage remaining after 100 years of sedimentation from the date the project is operational and does not include dead storage and/or storage set aside for hydropower head.
2/ Used to compute the Users cost (see Exhibits B-II and B-III).
3/ This percent is used to compute the Users storage space (see Article 1b(1)).

EXHIBIT B: (Continued)

II - FIRST COST TO BE REPAID BY THE USER
FOR THE REALLOCATED STORAGE SPACE

TABLE 8

COMPARISON OF ALTERNATIVES TO OBTAIN
USER COST FROM A FLOOD POOL REALLOCATION

ITEM	Capital Cost (Annual $'s)	O&M Cost (Annual $'s)	User Cost (Annual $'s)
Lost Hydropower Benefits	$ 126,088	$21,303	$ 147,391
Lost Hydropower Revenues	39,338	21,303	60,641
Replacement Cost of Hydropower	126,088	21,303	147,391
Maximum Costs Associated with Lost Flood Control	146,401	21,303	167,704
Updated Cost of Storage	206,104	21,303	227,407

III - TOTAL ANNUAL COST TO USER
FOR THE REALLOCATED WATER SUPPLY STORAGE

Item	Type of Use	Computation	Cost
Interest and amortization	Total cost of storage space acquired by the User as determined in Exhibit B-II.	$ $3,370,655 x 0.061146575 factor; based on 30 payments, of which 29 payments are at interest rate of 4.875%.	$206,104
Operation and maintenance 1/	Joint-use actual for FY2007	1.135% 2/ x $ 1,876,900.97	$21,303
Repair, rehabilitation and replacement 3/	Joint –use actual for FY2007	1.135% 2/ x $0	$ 0

Notes:
1/ Payment due and payable on the date specified in Article 5(a)(2).

2/ Percent of Users share of the Usable storage space in the project (column (4) of exhibit B-I).

3/ Repair, rehabilitation and replacement costs are payable only when incurred as specified in Article 5(b).

EXHIBIT C: AMORTIZATION SCHEDULE PRESENT DEMAND

(Interest & Amortization Only, Variable O&M Not Included)

TOTAL COST (18,729.705 acre-feet)		$ 3,370,655
NUMBER OF PAYMENTS……		30
INTEREST RATE, PERCENTAGE (FY 2007 RATE 1/)		4.875

ANNUAL PAYMENT NUMBER	$ AMOUNT OF PAYMENT	$ INTEREST	$ ALLOC COST	$ BALANCE ALLOC COST
				3,370,655.00
1	206,104.00	0.00	206,104.00	3,164,551.00
2	206,104.00	154,271.86	51,832.14	3,112,718.86
3	206,104.00	151,745.04	54,358.96	3,058,359.90
4	206,104.00	149,095.05	57,008.95	3,001,350.95
5	206,104.00	146,315.86	59,788.14	2,941,562.81
6	206,104.00	143,401.19	62,702.81	2,878,860.00
7	206,104.00	140,344.43	65,759.57	2,813,100.43
8	206,104.00	137,138.65	68,965.35	2,744,135.08
9	206,104.00	133,776.59	72,327.41	2,671,807.67
10	206,104.00	130,250.62	75,853.38	2,595,954.29
11	206,104.00	126,552.77	79,551.23	2,516,403.06
12	206,104.00	122,674.65	83,429.35	2,432,973.71
13	206,104.00	118,607.47	87,496.53	2,345,477.18
14	206,104.00	114,342.01	91,761.99	2,253,715.19
15	206,104.00	109,868.62	96,235.38	2,157,479.81
16	206,104.00	105,177.14	100,926.86	2,056,552.95
17	206,104.00	100,256.96	105,847.04	1,950,705.91
18	206,104.00	95,096.91	111,007.09	1,839,698.82
19	206,104.00	89,685.32	116,418.68	1,723,280.14
20	206,104.00	84,009.91	122,094.09	1,601,186.05
21	206,104.00	78,057.82	128,046.18	1,473,139.87
22	206,104.00	71,815.57	134,288.43	1,338,851.44
23	206,104.00	65,269.01	140,834.99	1,198,016.45
24	206,104.00	58,403.30	147,700.70	1,050,315.75
25	206,104.00	51,202.89	154,901.11	895,414.64
26	206,104.00	43,651.46	162,452.54	732,962.10
27	206,104.00	35,731.90	170,372.10	562,590.00
28	206,104.00	27,426.26	178,677.74	383,912.26
29	206,104.00	18,715.72	187,388.28	196,523.98
30 2/	206,104.52	9,580.54	196,523.98	-

1/ In accordance with Section 932 of the Water Resources Development Act of 1986, this interest rate will be adjusted at 5-year intervals throughout the repayment period. The rate is the yield rate as determined by the Secretary of the Treasury * 1/8 %.

2/ The last (30th) payment will be adjusted upward or downward to assure that all costs are repaid within 30 years of approval of the agreement.

EXHIBIT D: ASSURANCE OF COMPLIANCE

ASSURANCE OF COMPLIANCE WITH THE DEPARTMENT OF DEFENSE DIRECTIVE UNDER TITLE VI OF THE CIVIL RIGHTS ACT OF 1964, AS AMENDED; THE AGE DISCRIMINATION ACT OF 1975; AND THE REHABILITATION ACT OF 1973, AS AMENDED

The party executing this assurance, being the applicant recipient of Federal financial assistance under the instrument to which this assurance is attached; HEREBY AGREES THAT, as a part of its obligations under the aforesaid instrument, it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), as amended (42 U.S.C. 2000d), and all requirements imposed by or pursuant to the Directive of the Department of Defense (32 CFR Part 195), issued as Department of Defense Directive 5500.11, pursuant to that title; The Age Discrimination Act of 1975 (42 U.S.C. 6102); the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), to the end that in accordance with the aforementioned Title, Directive and Acts, no person in the United States shall on the ground of race, color, age, sex, religion, handicap or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant-Recipient receives Federal financial assistance from the Department of the Army and HEREBY GIVES ASSURANCE THAT it will immediately take any measures necessary to effectuate this agreement.

If any personal property or real property, or interest therein, or structure thereon is provided or improved with the aid of Federal financial assistance extended to the applicant-recipient by the Department of the Army, or if such assistance is in the form of personal property or real property, or interest therein or structure thereon, then this assurance shall obligate the applicant-recipient or in the case of any transfer of such property, any transferee, for the period during which the property is used for a purpose for which the Federal financial assistance is extended or for another purpose involving the provision of similar services or benefits, or for the period during which it retains ownership or possession of the property whichever is longer. In all other cases, this assurance shall obligate the applicant-recipient for the period during which the Federal financial assistance is extended to it by the Department of the Army. The Department of the Army representatives will be allowed to visit the recipient's facilities. They will inspect the facilities to ensure that there are no barriers to impede the handicap's accessibility in either programs or activities.

THIS ASSURANCE is given in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property, discounts or other Federal financial assistance extended after the date hereof to the applicant-recipient by the Department of the Army, including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The applicant-recipient recognizes and agrees that such Federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the applicant-recipient, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign this assurance on behalf of the applicant.

Date _____

_____
(Applicant-Recipient)

By _____

Title _____

_____

_____
(Applicant-Recipient's Mailing Address)

EXHIBIT E: CERTIFICATION REGARDING LOBBYING

WATER SUPPLY STORAGE REALLOCATION AT GREES FERRY LAKE
MID ARKANSAS WATER ALLIANCE

1. The undersigned certifies, to the best of their knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress in connection with the water supply agreement for the MID ARKANSAS WATER ALLIANCE, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities", in accordance with its instructions. This form is available at http://contacts.gsa.gov/webforms.nsf.

c. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31 U.S.C. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

MID ARKANSAS WATER ALLIANCE

BY _____

DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB
0348-0046

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action:
☐ a. contract
b. grant
c. cooperative agreement
d. loan
e. loan guarantee
f. loan insurance

2. Status of Federal Action:
☐ a. bid/offer/application
b. initial award
c. post-award

3. Report Type:
☐ a. initial filing
b. material change
For Material Change Only:
year _____ quarter _____
date of last report _____

4. Name and Address of Reporting Entity:
☐ **Prime** ☐ **Subawardee**
Tier _____, *if known*:

Congressional District, *if known*:

5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime:

Congressional District, *if known*:

6. Federal Department/Agency:

7. Federal Program Name/Description:

CFDA Number, *if applicable*: _____

8. Federal Action Number, *if known*:

9. Award Amount, *if known*:
$

10. a. Name and Address of Lobbying Entity
(*if individual, last name, first name, MI*):

b. Individuals Performing Services (*including address if different from No. 10a*)
(*last name, first name, MI*):

(attach Continuation Sheet(s) SF-LLLA, if necessary)

11. Amount of Payment (*check all that apply*):
$ _____ ☐ **actual** ☐ **planned**

12. Form of Payment (*check all that apply*):
☐ **a. cash**
☐ **b. in-kind; specify:** nature _____
value _____

13. Type of Payment (*check all that apply*):
☐ **a. retainer**
☐ **b. one-time fee**
☐ **c. commission**
☐ **d. contingent fee**
☐ **e. deferred**
☐ **f. other; specify:** _____

14. Brief Description of Services Performed or to be Performed and Date(s) of Service, including officer(s), employee(s), or Member(s) contacted, for Payment Indicated in Item 11:

(attach Continuation Sheet(s) SF-LLLA, if necessary)

15. Continuation Sheet(s) SF-LLLA attached: ☐ **Yes** ☐ **No**

16. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less that $10,000 and not more than $100,000 for each such failure.

Signature: _____
Print Name: _____
Title: _____
Telephone No.: _____ Date: _____

Federal Use Only:

Authorized for Local Reproduction
Standard Form LLL (Rev. 7-97)

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employeeof a Member of Congress in connection with a covered Federal action. Use the SF-LLLA Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizationallevel below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, State and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).

11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.

12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.

13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.

14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.

15. Check whether or not a SF-LLLA Continuation Sheet(s) is attached.

16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Approved by OMB
0348-0046

DISCLOSURE OF LOBBYING ACTIVITIES

CONTINUATION SHEET

Reporting Entity: _____ Page _____ of _____

APPENDIX E

NEPA DOCUMENTATION
ENVIRONMENTAL ASSESSMENT

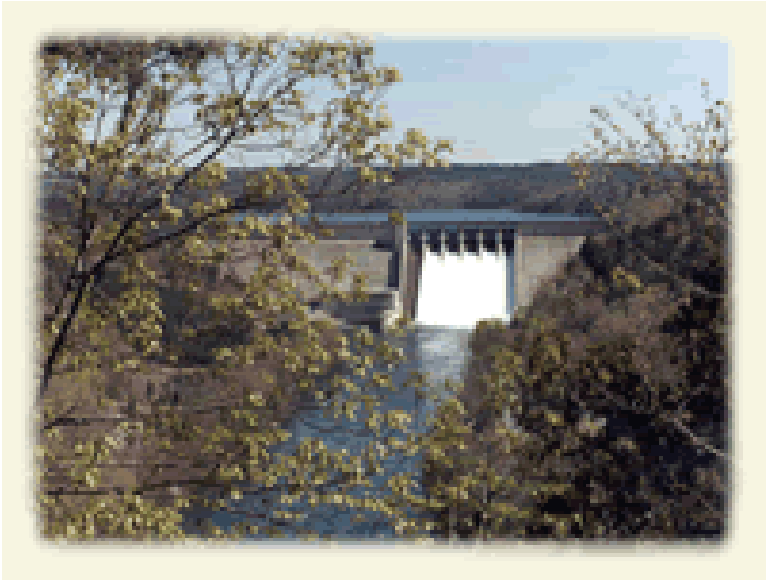
(SEE ACCOMPANYING DOCUMENT)

APPENDIX F

HYDROPOWER ANALYSIS CENTER REPORT

US Army Corps
of Engineers ®
Northwestern Division

Greers Ferry Powerhouse
Hydropower Value Update



February 2007

Prepared for

U.S. Army Corps of Engineers
Little Rock District
Little Rock, Arkansas

PREPARED BY
HYDROPOWER ANALYSIS CENTER

HYDROPOWER ANALYSIS CENTER
QUALITY CONTROL/QUALITY ASSURANCE CERTIFICATION

HYDROPOWER VALUE - UPDATE
Greers Ferry Lake

Location: Little Red River, Arkansas
District: Little Rock District
Division: Southwestern Division
Project Manager: Michael Collis

Hydropower Analysis Center - Product

Principal Project Study Manager: Russell Davidson, Civil Engineer, P. E.

Hydropower Analysis Center - Product Review

Product Review: Michael Egge, Electrical Engineer, P.E.

I hereby certify that the technical review process for the Greers Ferry Lake – Hydropower Value Update is complete and all technical issues are resolved. This document contains sound and acceptable technical practices of the disciplines involved.

Russell Davidson, P.E.
Principal Study Manager

16 Feb 07
Date

Michael J. Egge
HAC Acting Technical Manager

16 Feb 2007
Date

Greers Ferry Powerhouse
HYDROPOWER VALUES
February 2007

by
Hydropower Analysis Center
Portland, OR

related to:
WATER SUPPLY STORAGE REALLOCATION REPORT
Reallocation of Storage at Greers Ferry Lake and Lake Ouachita, Arkansas
for the Mid Arkansas Water Alliance

Draft dated August 2006
Little Rock District, Southwestern Division

Overview

A reallocation study is being undertaken by the Little Rock District at the request of the Mid Arkansas Water Alliance to purchase enough storage to yield 15 MGD in Greers Ferry Lake. Study has shown that 18,730 acre-feet of storage in the flood pool in Greers Ferry Lake is needed to be reallocated to the Mid Arkansas Water Alliance (MAWA) in Arkansas for municipal and industrial (M&I) water supply to meet the present and future needs of central Arkansas through the year 2025.

HAC has been tasked by Little Rock District to develop current hydropower values for the generation for energy and capacity at Greers Ferry Lake. These values will be used by the District to compute the hydropower losses associated with diverting 15 MGD from Greers Ferry Lake.

Greers Ferry Dam is located on the Little Red River at river mile 79.0, three miles northeast of Heber Springs, Arkansas. The reservoir has a maximum storage of 2,844,500 acre-feet and drains an area of 1,146 square miles above the dam. The lake is one of five multiple-purpose projects constructed in the White River Basin for the control of floods and generation of hydroelectric power. The project also offers excellent recreational opportunities. Construction of the dam began in March 1959 and was completed in July 1964 at a cost of $46 million. The dam structure is 140 feet high and 1,704 feet long. The project power plant has an installed capacity of 96 MW and generates an average of 189,000 MWh annually.

Following is a brief description of methods and assumptions that provide the basis for the 2006$ updated energy and capacity values at Greers Ferry Lake. The updated values for energy and capacity are;

Energy Value = $44.53/MWh
Capacity Value = $106.20/kW-yr

Capacity Value

The method to determine the hydropower replacement cost for electrical generation was initially developed by the Federal Energy Regulatory Commission (FERC). This analysis of the capacity value used the same method as described in more detail in the White River Minimum Flow Study dated August 2003.

Replacement cost for the following type of thermal electric generating plants was determined using the FERC method;

Coal-Fired Steam Electric Generating Plants	(CO)
Combined-Cycle Electric Generating Plants	(CC)
Combustion Turbine Electric Generating Plants	(CT)

The value of hydropower plant capacity is quantified by computing the cost of replacement generation using alternative thermal generation sources.

Hydropower plants have additional capabilities to support system reliability when compared to thermal generating plants. Power from thermal generating plants has a lesser reliability and flexibility than hydropower generating plants. Adjustment factors are applied to thermal generating plant type to make them equivalent to hydropower generating plants to yield a more accurate representation of their equivalency.

Application of these adjustments to the Capacity Value (CV) is described in Engineer Manual 1110-2-1701, dated 31 December 1985, Chapter 9 and Appendix O, Equation O-3. The adjusted FERC capacity value ($\mathbf{CV_{FREC}}$) incorporates the unadjusted capacity value (**CV**), the ratio of availability **(HMA/TMA)** and the flexibility adjustment **(1+F)**, as shown in the equation below. The ratio of availability accounts for the relative mechanical/electrical reliability of hydropower compared to the thermal alternative, while the flexibility adjustment accounts for the added operational flexibility of hydropower compared to the thermal alternative.

$$\mathbf{CV_{FERC} = CV * [\ HMA / TMA\ ] * (1 + F\ )}$$

Hydro-Mechanical Availability (HMA) is 100% minus the forced outage rate. The FERC Spreadsheet Model uses an estimated (typical/generic) HMA of 98% (or a forced outage rate of 2%).

Thermal-Mechanical Availability (TMA) of the alternative generating plant type. The FERC Spreadsheet model uses 90% for the combustion turbine and combined cycle plant types and 85% for the coal-fired steam plant types.

Flexibility (F) adjustment factor accounts for the added flexibility of hydropower units compared to thermal generation ((0.05 for coal-fired steam and 0.025 for gas-fired combined cycle plant and combustion turbines) alternatives.

Adjustment factors used in this analysis follow;

Plant Type	Adjustment Factor		
	HMA	TMA	F
Coal-fired Steam	0.98	0.85	0.05
Combined Cycle	0.98	0.90	0.025
Combustion Turbine	0.98	0.90	0.025

Other Indexes and factors used in the FERC Methodology are;

Handy-Whitman Construction Cost Index- used to update regional construction cost for various machinery installation and facilities associated with power generating plants, substations, and transmission systems.

ENR Skilled Labor Index- used to update the cost of power plant operation.

GDP Deflator-used to deduct inflation from the estimated costs for construction of power generating plants.

Fuel Prices - used to compute energy prices were only for developing the operating costs of the various plant types for use in the screening curve analysis. The 60-month average fuel price listed by the Energy Information Administration was used in computing the FERC energy prices and plant replacement costs. This 60-month average fuel price was used as the long-term estimate because of the volatility in the gas market in recent years.

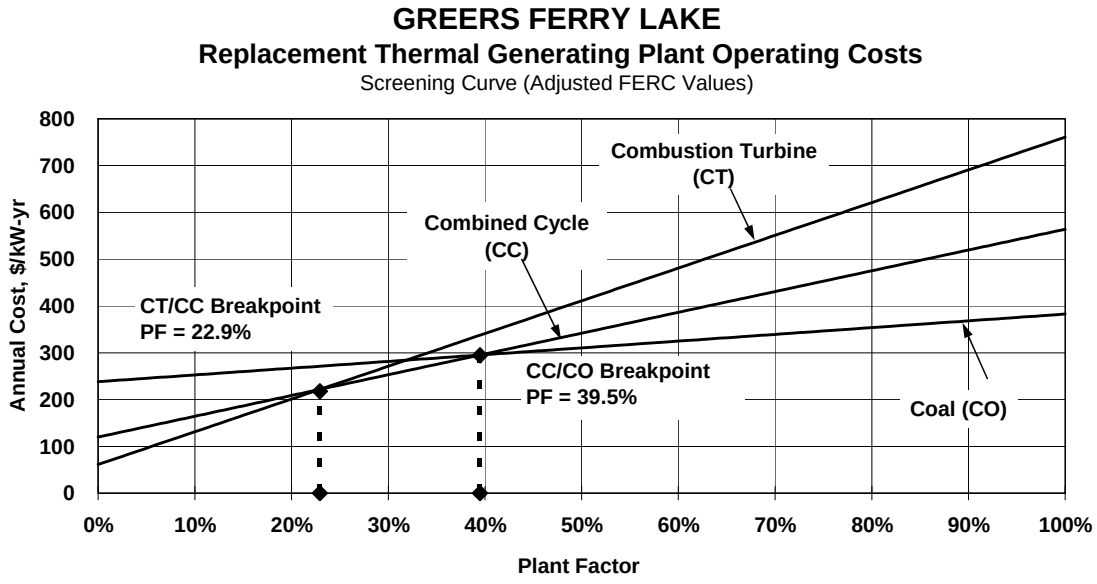
Water Resources Federal Interest Rate - FY 2007 of 4.875%- used to value the return on long-term federal investments when evaluating benefits for project alternatives when planning federal water resources projects.

Adjusted Capacity Values were computed in the FERC Spreadsheet Model using indices for Arkansas (see Attachment 1). The adjusted capacity and energy values are as follows;

ALTERNATIVE PLANT TYPE	FERC CAPACITY VALUE (C_V) ($/kW-YR)	FERC ENERGY VALUE (E_V) ($/MWh)
Coal-Steam Fired	238.15	16.50
Combined-Cycle	119.86	50.70
Combustion Turbine	61.30	79.85

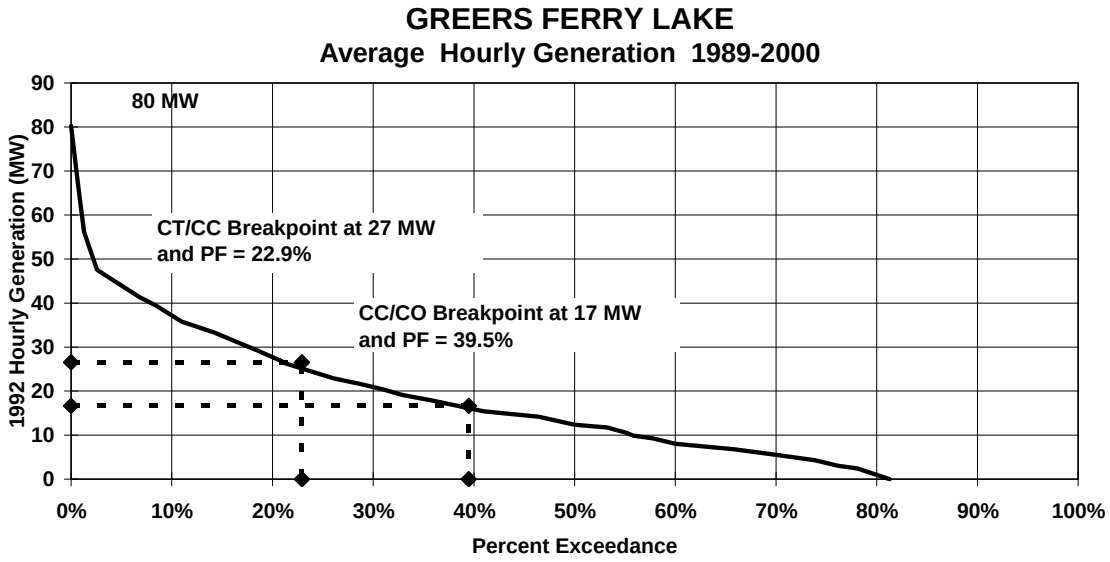
These FERC Energy Values were developed and are used for the only purpose of developing the thermal generating plant operating costs for Screening Curve below. Sensitivity analyses indicated that these fuel prices had only small influence over the ultimate composite capacity value resulting from the screening curve analyses. The y-axis intercept is the FERC Capacity Value and the cost of operation or slope of the curve is the FERC Energy Value.

Using the same FERC Methodology of determining the hydropower replacement cost, consistent with the White River Minimum Flow Study dated August 2003, resulted in the Screening Curve that follows;



This screening curve indicates the least cost replacement thermal power plant type for operation at plant factors less than 22.9% would be gas-fired combustion turbine (CT). For operations at plant factors greater than 39.5% coal-fired steam (CO) generating plant would be the least cost thermal plant type. The least cost thermal plant type operating between these two plant factors would be a gas-fired combined cycle (CC) generating plant.

Examination of the generation-duration curve indicates the portion of time, on an average annual basis, that the hydropower plant in this study is operated above given capacity. The plot of the generation-duration curve follows;



The breakpoint plant factors (22.9 and 39.5 percent) obtained from the screening curve were matched to the same percent exceedance on the generation-duration curves in order to determine the megawatts of generation for the three types of thermal plants which would be the replacement generation for Greers Ferry Lake. A generation value of 27 MW was obtained for the 22.9 percent breakpoint, while a generation value of 17 MW was obtained for the 39.5 percent breakpoint. These two values of generation were then used to divide the generation-duration curve into three components: a 53 MW (80 MW – 27 MW) combustion-turbine (upper) component, a 10 MW (27 MW – 17 MW) combined-cycle (middle) component, and a 17 MW (17 MW – 0 MW) coal-fired steam (lower) component. Thus, the most likely, least-cost thermal alternative to the Greers Ferry project's generation was found to be 53 MW of gas-fired combustion turbine, 10 MW of gas-fired combined cycle, and 17 MW of coal-fired steam.

The annual hydropower plant replacement cost is then the composite cost ($CV_{(composite)}$) of the mix of thermal generation plant types computed as follows;

$CV_{(composite)}$ = Wt. CO CV + Wt. CC CV + Wt. CT CV

Wt. CO CV = \$238.15/kW-yr * [17 MW / (53 MW + 10 MW + 17 MW)] = \$50.61/kW-yr
Wt. CC CV = \$119.86/kW-yr * [10 MW / (53 MW + 10 MW + 17 MW)] = \$14.98/kW-yr
Wt. CT CV = \$61.30/kW-yr * [53 MW / (53 MW + 10 MW + 17 MW)] = \$40.61/kW-yr
\$106.20/kW-yr

Annual Capacity Value for Greers Ferry Powerhouse = \$106.20/kW-yr

Energy Value

The updated energy value used to determine the value of energy impacts for Greers Ferry Powerhouse is based on information developed by Platts Power Outlook Research Service; a wholesale North American power market forecast service. Platts is a Division of the McGraw-Hill Companies, Inc. Platts data sets are proprietary and are used under subscription by the Corps of Engineers' Hydropower Analysis Center.

Platts uses AuroraXMP, an electric energy market model owned and licensed by EPIS, Incorporated to forecast market clearing prices for electric power. Platts estimates both On-Peak and Off-Peak energy values on a monthly basis for a 20 year forecast period from 2006 through 2025.

The hourly market-clearing price is based upon a fixed set of resources dispatched in least-cost order to meet demand while subject to emissions limits. The hourly price is set equal to the variable cost of the marginal resource needed to meet the last unit of demand. A long-term resource optimization feature within the AURORA model allows generating resources to be added or retired based on economic profitability. Market-clearing price and the resource portfolio are interdependent. Market-clearing price affects the revenues any particular resource can earn and consequently will affect which resources are added or retired. AURORA sets the market-clearing price using assumptions on demand levels (load) and supply costs. The demand forecast implicitly includes the effect of price elasticity over time. The supply side is defined by the cost and operating characteristics of individual electric generating plants, including resource capacity, heat rate, and fuel price. AURORA recognizes the effect that transmission capacity and prices have on the system's ability to move generation output between areas.

In providing input data to AURORA, Platts utilizes numerous other models and data sources including the following:

- Electricity Demand model
- Coal Market model
- Gas Market model
- NEWGen database of new generating capacity
- SO2 and NOx emissions allowance price forecasting model

Platts develops power price forecasts for all the North American Electric Reliability Council (NERC) regions. Discussions with Southwestern Power Pool (SPP) indicated that the power generated at Greers Ferry Powerhouse is marketed to Preference Customers located throughout the SPP region of Arkansas, Kansas, Louisiana, Oklahoma, most of Missouri, and portions of Mississippi, New Mexico, and Texas.

The power values used in this report are based on the Baseline Price Forecast in the November 2006 release by the Platts Power Outlook Research Service and represent conditions as of the end of third quarter of 2006 (this is the latest data currently

available). Third quarter is equivalent to Fiscal Year 2007. The Baseline forecast assumes average hydrologic conditions occur for each year of the simulation.

Platts provides a 20 year forecast of projected market energy values on both a monthly and annual basis for the period 2006 through 2025. These forecasted values are provided in both Nominal (inflation included) and Constant 2006 dollars for annual values, while monthly values are provided in Nominal Dollars only. To account for the monthly variation in generation that occurs at hydropower plants, it is desirable to use the monthly energy values to derive the annual, levelized value so that the levelized annual value reflects the monthly generation distribution. To utilize the monthly values, each of the monthly values was converted to Constant 2006 Dollars (inflation removed) based on the annual inflation rates used by Platts. In addition, Platts provides energy values for both "On-Peak" and "Off-Peak" periods. For SPP, the definition of On-Peak hours is 16 hours per day, 5 days per week (Monday through Friday) with remaining hours and some holidays considered Off-Peak. Greers Ferry is a storage project and is used for the daily shaping of power releases. The project has an annual plant factor of less than 20. The project is used primarily for peaking. The flow is shaped to permit operating at full capacity during the high demand hours and shutting the plant down during the remaining hours.

To estimate a single levelized energy value, SWD-SUPER run used to simulate the water supply diversion from Greers Ferry Lake was used to estimate both the distribution of On-Peak and Off-Peak energy for each month (Figure 1) as well as the monthly energy distribution for the entire year (Figure 3). The monthly Platts energy values were then used to develop the annual energy value.

Figure 1 - Monthly On and Off-Peak Energy Split

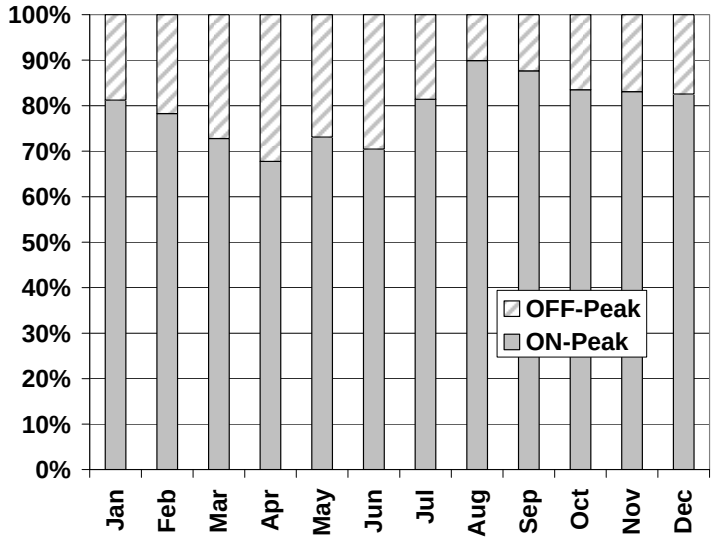
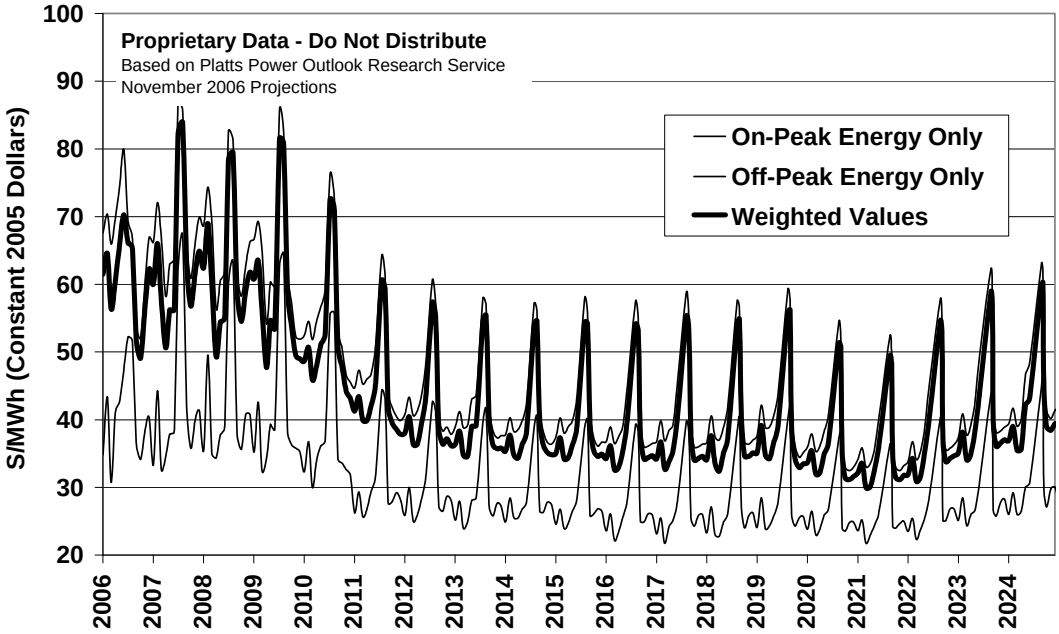


Figure 2 - Monthly Energy Values



To develop a levelized power value for the 50 year project period, after the weighted monthly energy values are determined for each month in the 20 year forecast period, these monthly figures are converted to annual values by multiplying each month by the percent of generation that occurs in that month and these products are summed to produce an annual value. The annual energy distribution used is shown in Figure 3 and the resulting annual values are shown in Figure 4. Annual values for the years after 2025 (last year of Platts forecast) are assumed equal to 2025 (constant after 2025).

Figure 3 - Annual Energy Distribution

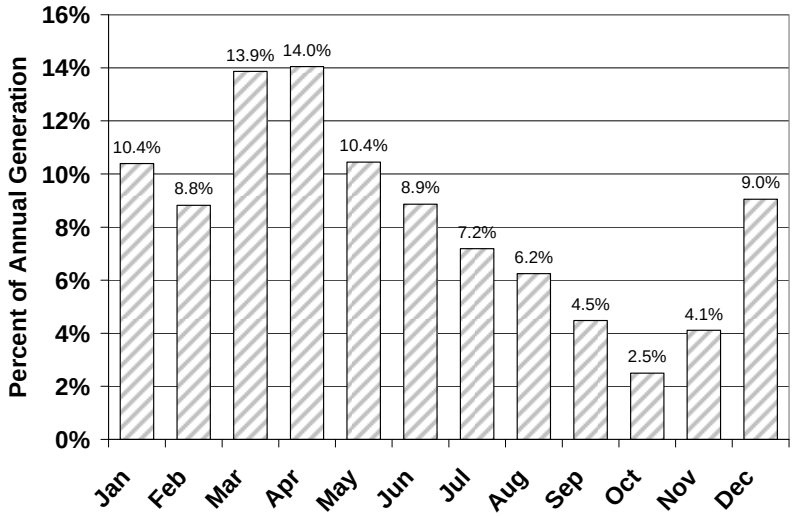
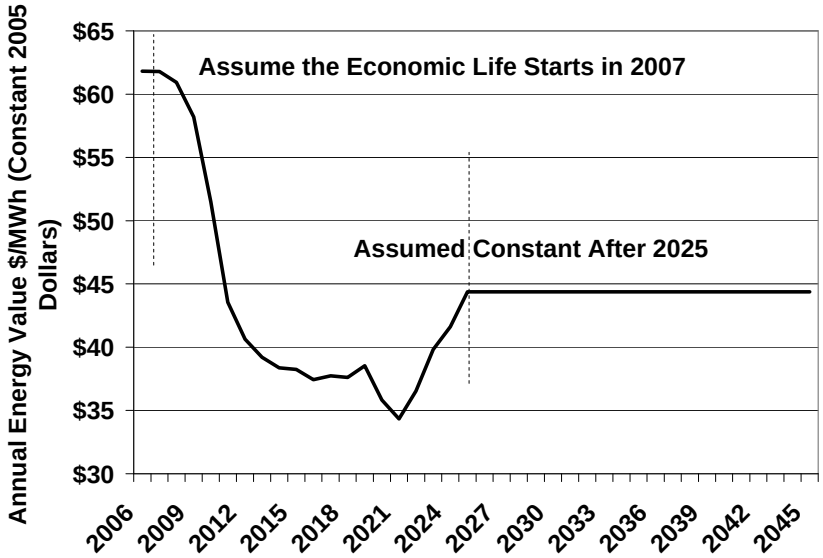


Figure 4 - Annual Energy Values



Each annual value is present-worthed to the 2007 level using the Federal interest rate of 4.875%. The present worth of each year through 2056 is totaled, and this total present worth is converted to an annual equivalent or "Levelized" value for an assumed project life of 50 years and the Federal interest rate. This is shown in Table 1. Please note in this table, the shaded values show the years assumed constant after the 20 year forecast period of energy values.

Annual Energy Value for Greers Ferry Powerhouse = $44.53/MWh

Table 1 - Levelized Energy Value at 4.875%

FY 2006 Interest Rate	**4.875%**
Start of Economic Life	**2007**
End of Economic Life	**2056**
Period of Analysis (Years)	**50**

Year Number	Calendar Year	Present Worth Factor	Annual Energy Value $/MWh	Present Worth Energy Value $/MWh
	2006	1.0000	61.82	---
1	2007	0.9535	61.80	58.93
2	2008	0.9092	60.94	55.41
3	2009	0.8669	58.20	50.46
4	2010	0.8266	51.48	42.55
5	2011	0.7882	43.55	34.33
6	2012	0.7516	40.64	30.54
7	2013	0.7166	39.19	28.09
8	2014	0.6833	38.37	26.22
9	2015	0.6516	38.25	24.92
10	2016	0.6213	37.43	23.25
11	2017	0.5924	37.74	22.36
12	2018	0.5649	37.61	21.25
13	2019	0.5386	38.53	20.75
14	2020	0.5136	35.83	18.40
15	2021	0.4897	34.33	16.81
16	2022	0.4669	36.54	17.06
17	2023	0.4452	39.82	17.73
18	2024	0.4245	41.63	17.67
19	2025	0.4048	44.38	17.97
20	2026	0.3860	44.38	17.13
21	2027	0.3680	44.38	16.33
22	2028	0.3509	44.38	15.58
23	2029	0.3346	44.38	14.85
24	2030	0.3191	44.38	14.16
25	2031	0.3042	44.38	13.50
26	2032	0.2901	44.38	12.87
27	2033	0.2766	44.38	12.28
28	2034	0.2637	44.38	11.71
29	2035	0.2515	44.38	11.16
30	2036	0.2398	44.38	10.64
31	2037	0.2286	44.38	10.15
32	2038	0.2180	44.38	9.68
33	2039	0.2079	44.38	9.23
34	2040	0.1982	44.38	8.80
35	2041	0.1890	44.38	8.39
36	2042	0.1802	44.38	8.00
37	2043	0.1718	44.38	7.63
38	2044	0.1639	44.38	7.27
39	2045	0.1562	44.38	6.93
40	2046	0.1490	44.38	6.61
41	2047	0.1421	44.38	6.30
42	2048	0.1354	44.38	6.01
43	2049	0.1292	44.38	5.73
44	2050	0.1231	44.38	5.47
45	2051	0.1174	44.38	5.21
46	2052	0.1120	44.38	4.97
47	2053	0.1068	44.38	4.74
48	2054	0.1018	44.38	4.52
49	2055	0.0971	44.38	4.31
50	2056	0.0926	44.38	4.11
Present Worth Energy Value Total				828.97
LEVELIZED ENERGY VALUE ($/MWh)				**44.53**

ATTACHMENT 1

Capacity Values Computation

				Date Run
COAL-FIRED STEAM POWER VALUE				02/15/07
	PROJECT NAME:	Greers Ferry WS Reallocation		
	LOCATION:	SOUTHWEST POWER POOL (SPP)		
	FINANCING:	FEDERAL @	4.875%	
Capacity Value		$238.15	per kW-yr	
Energy Value		$16.50	per MWh	
PROGRAM INPUT DATA			State Index Number	4
			State Location	AR
Cost Level Date	1/1/2007		H-W Index Reg No	4
Single unit capacity	600		ROW ($/acre)	2570
Capacity factor	0.65		Clearing % of ROW	0.60
Trans Voltage	345		Rec Sub Land Cost	24174
Transformer MVA	200		Plant Invest	1551
No of Trans	6		FC Mov-Ave Time Frame	60
No of Trans Pos	2		Fuel Cost	127.0
Single or Three Phase	1		Heat Rate	10730
Length Line 1	50		Variable O&M	2.87
Length Line 2	0		Fixed O&M	71.25
Line 1: Total Circuits	3		O&M update	3.07
No of Single Circ	1		Plant update	2.92
No of Double Circ	1		Transmission update	2.64
Line 2: Total Circuits	0		Depreciation Plant (%)	1.54
No of Single Circ	0		Deprec Sub (%)	1.54
No of Double Circ	0		Deprec Trans Tower (%)	0.50
			Deprec Trans Pole (%)	1.54
Cost of Money (%)	4.875			
Plant Life	30		Fed Inc Tax (%)	0.000
Substation Life	30		Fed Misc Tax (%)	0.000
Trans (towers) Life	50		State & Local Tax (%)	0.000
Trans (poles) life	30			
			Hydro Flex Adjust	0.050
Plant insurance (%)	0.25		Alt Mechanical Avail	0.850
Trans Insurance (%)	0.10		Hydro Mech Avail	0.980
Sub insurance (%)	0.25		Mech Avail Adjust	0.153

				Date Run
COMBINED CYCLE POWER VALUE				02/15/07
	PROJECT NAME:	Greers Ferry WS Reallocation		
	LOCATION:	SOUTHWEST POWER POOL (SPP)		
	FINANCING:	FEDERAL @	4.875%	
Capacity Value		$119.86	per kW-yr	
Energy Value		$50.70	per MWh	
PROGRAM INPUT DATA			State Index Number	4
			State Abbr. (exact)	AR
Cost Level Date	1/1/2007		H-W Index Reg No	4
Single unit capacity	150		ROW ($/acre)	2556
Capacity factor	0.20		Clearing % of ROW	0.60
Trans Voltage	230		Rec Sub Land Cost	24039
Transformer MVA	200		Plant Invest	780
No of Trans	1		FC Mov-Ave Time Frame	60
No of Trans Positions	1		Fuel Cost	618.4
Single or Three Phase	3		Heat Rate	8030
Length Line 1	0		Variable O&M	1.04
Length Line 2	0		Fixed O&M	49.57
Line 1: Total Circuits	2		O&M update	3.07
No of Single Circ	2		Plant update	2.92
No of Double Circ	0		Transmission update	2.64
Line 2: Total Circuits	0		Depreciation Plant (%)	1.54
No of Single Circ	0		Deprec Sub (%)	1.54
No of Double Circ	0		Deprec Trans Tower (%)	0.50
			Deprec Trans Pole (%)	1.54
Cost of Money (%)	4.875			
Plant Life	30		Fed Inc Tax (%)	0.000
Substation Life	30		Fed Misc Tax (%)	0.000
Trans (towers) Life	50		State & Local Tax (%)	0.000
Trans (poles) life	30			
			Hydro Flex Adjust	0.025
Plant insurance (%)	0.25		Alt Mechanical Avail	0.900
Trans Insurance (%)	0.10		Hydro Mech Avail	0.980
Sub insurance (%)	0.25		Mech Avail Adjust	0.089

				Date Run
COMBUSTION TURBINE POWER VALUE				02/15/07
	PROJECT NAME:	Greers Ferry WS Reallocation		
	LOCATION:	SOUTHWEST POWER POOL (SPP)		
	FINANCING:	FEDERAL @	4.875%	
Capacity Value		$61.30	per kW-yr	
Energy Value		$79.85	per MWh	
PROGRAM INPUT DATA			State Index Number	4
			State Location	AR
Cost Level Date	1/1/2007		H-W Index Reg No	4
Single unit capacity	100		ROW ($/acre)	2277
Capacity Factor	0.10		Clearing % of ROW	0.60
Transmission Voltage	230		Rec Sub Land Cost	21480
Transformer MVA	125		Plant Invest	463
No of Trans	2		FC Mov-Ave Time Frame	60
No of Trans Pos	2		Fuel Cost	618.4
Single or Three Phase	3		Heat Rate	12870
Length Line 1	0		Variable O&M	0.26
Length Line 2	0		Fixed O&M	16.26
Line 1: Total Circuits	2		O&M update	3.07
No of Single Circ	2		Plant update	2.92
No of Double Circ	0		Transmission update	2.64
Line 2: Total Circuits	0		Depreciation Plant (%)	1.54
No of Single Circ	0		Deprec Sub (%)	1.54
No of Double Circ	0		Deprec Trans Tower (%)	0.50
			Deprec Trans Pole (%)	1.54
Cost of Money (%)	4.875			
Plant Life	30		Fed Inc Tax (%)	0.000
Substation Life	30		Fed Misc Tax (%)	0.000
Trans (towers) Life	50		State & Local Tax (%)	0.000
Trans (poles) life	30			
			Hydro Flex Adjust	0.025
Plant insurance (%)	0.25		Alt Mechanical Avail	0.900
Trans Insurance (%)	0.10		Hydro Mechanical Avail	0.980
Sub insurance (%)	0.25		Mech Avail Adjust	0.089