
# ALABAMA POWER COMPANY

*BIRMINGHAM, ALABAMA*

## MARTIN HYDROELECTRIC PROJECT

*FERC NO. 349*

## WATER QUANTITY, WATER USE AND WATER WITHDRAWALS

*JULY 2010*

*Prepared by:*

ALABAMA POWER
A SOUTHERN COMPANY

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

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# WATER QUANTITY, WATER USE AND WATER WITHDRAWALS

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# WATER QUANTITY, WATER USE AND WATER WITHDRAWALS

## *1.0 EXECUTIVE SUMMARY*

Alabama Power Company (Alabama Power) is relicensing the Martin Hydroelectric Project (Lake Martin or Martin) on the Tallapoosa River. The Federal Energy Regulatory Commission's (FERC) Integrated Licensing Process (ILP) that Alabama Power is using to relicense the project includes a multi-year cooperative effort with interested stakeholders to address operational, recreational and ecological concerns associated with hydroelectric project operations. Alabama Power has consulted a wide variety of stakeholders, including state and federal resource agencies, non-governmental organizations, and interested citizens to gather their input on important relicensing issues. In preliminary consultation with various agencies and stakeholders, the following issues were identified: the amount of water being withdrawn from Lake Martin and the correlation with population; limiting future water withdrawals, especially for municipalities; and accommodating/increasing permitted withdrawals for riparian use.

There is a plentiful supply of water available in the state, but there is a lack of storage to collect and hold the water for use during periods of low flow. Because of this lack of storage capacity, many entities often rely on Alabama Power's reservoirs to supply their water needs, and the Company has established a water withdrawal policy with respect to these non-project uses of its federally-licensed project lands and waters.

Apart from the impacts of water withdrawals on our reservoirs, Alabama Power cooperates with the U.S. Army Corp of Engineers (USACE) to support navigation downstream of our Tallapoosa projects and in the Alabama River. Alabama Power also cooperates with the state of Alabama's Office of Water Resources (OWR) to plan for and mitigate the effects of periods of droughts.

This paper will detail Alabama Power's water withdrawal policy, current known municipal, commercial, industrial, and agricultural water withdrawals from the Martin Project, ecological and navigational flow requirements in the Tallapoosa River basin that affect the Martin Project, and drought considerations at the Martin Project.

## *2.0 WATER WITHDRWALS*

### 2.1 History of Alabama Power's Water Withdrawal Policy

Over the last three decades, there have been a growing number of new demands placed on the state's water resources. These additional demands have been for such uses as residential water supply due to growth, industrial growth, agriculture, recreational use and environmental stewardship. Since large storage reservoirs can provide a reliable water supply, many water withdrawers have sought approval from Alabama Power to use its hydropower reservoirs as a source of water. To address these growing demands, Alabama Power developed a water withdrawal policy and permitting process. Alabama Power's policy was developed in 1989 to manage water withdrawals and give consideration to the economic impacts that water withdrawals have on its reservoirs.

Consistent with FERC licensing authority, Alabama Power developed a water withdrawal policy that included payment of compensation designed to offset the costs to Alabama Power's ratepayers for the impacts associated with the withdrawals from its reservoirs.

## 2.2 Introduction to Alabama Power's Water Withdrawal Policy

Alabama Power's Martin Hydroelectric Project was designed primarily to produce affordable and efficient electricity, while regulating a river that was susceptible to flood and drought conditions. In addition to the construction, operation and maintenance responsibilities mandated in the project licenses, FERC has also charged Alabama Power with certain management responsibilities, including authority over water withdrawals from its project reservoirs. Project reservoirs have become an increasingly important water supply source for surrounding community needs, agriculture and commerce. Through the implementation of the water withdrawal policy, Alabama Power considers requests for water to be withdrawn from Company reservoirs.

## 2.3 Alabama Power Water Withdrawal Policy

Alabama Power's water withdrawal policy was developed to manage water withdrawals from its hydropower project reservoirs, including the Martin Project, as well as to encourage responsible management and resource planning by water withdrawers. Any party interested in withdrawing water from Alabama Power's Martin hydroelectric reservoir may do so only after applying for and receiving a water withdrawal permit. All water withdrawals from project reservoirs require Alabama Power approval. Under the Standard Land Use article in its FERC licenses, Alabama Power has the authority to permit water withdrawals up to 1 million gallons per day (mgd) without prior FERC authorization, but must obtain FERC's prior approval before authorizing withdrawals in excess of 1 mgd.

In 1993, the Alabama Legislature enacted the Alabama Water Resources Act, which created the OWR. The OWR's primary purpose was to create a system for tracking the various uses of Alabama's waters. This system was aimed at helping the state develop plans and strategies for the management of its waters. The Alabama Water Resources Act also required that a declaration of beneficial use be submitted to OWR by each public water system that regularly serves, individually or in combination with other such systems, more than 10,000 households and by each person who diverts, withdraws, or consumes more than 100,000 gallons of water a day from the waters of the state. Thus, this law requires that a prospective withdrawer of water from an Alabama Power reservoir must file a declaration with OWR.

In 2001, the OWR requested that Alabama Power implement measures to provide conservation of water resources. In response to this request, Alabama Power implemented a process requiring applicants to demonstrate that they have initiated consultation with the OWR prior to granting permission to withdraw from Alabama Power's reservoirs.

## 2.4 Alabama Power Permitting Process

The first formal step in obtaining a water withdrawal permit is for the interested party to submit a Standard Land Use (SLU) form to Alabama Power which is an "Application for Use of Land/Water within FERC Licensed Hydroelectric Project Boundaries" (Appendix A). Before this application is formally submitted to Alabama Power, the applicant typically schedules a meeting with an Alabama Power representative to discuss the specifics of the proposed water withdrawal, potential impacts to project resources resulting from the withdrawal, compensation for the water withdrawal impacts, and any other pertinent information that will need to be included in the permit application.

After a water withdrawal application has been formally submitted, Alabama Power staff reviews the information provided in the application, requests more information from the applicant if necessary, and determines whether or not the proposed water withdrawal is acceptable and if prior FERC approval is required. Water withdrawal permit decisions are made primarily on the basis of whether or not the proposed withdrawal is deemed to be in the public interest, such as a quantified need to serve a community.

Upon Alabama Power acceptance of the proposed water withdrawal application, the prospective withdrawer and Alabama Power enter into a Water Withdrawal Agreement. This agreement covers details specific to the water withdrawal, including terms and conditions for the withdrawal. A standard Water Withdrawal Agreement includes a number of clauses and statements which establish that the Agreement: is not a "water sales" agreement; does not convey any property rights (including riparian rights); is based on other joint use agreements approved by the FERC; may be tailored to address unique withdrawal issues and it will be included in any FERC approval application.

An important part of the permitting process includes requiring the prospective withdrawer to consult with various state and federal resource agencies (identified in the SLU Form in Appendix A). In some instances, the consultation phase may be done concurrently with Water Withdrawal Agreement negotiations.

In addition to the Water Withdrawal Agreement, the withdrawer must also obtain property rights from Alabama Power to use project lands that Alabama Power owns.

## 2.5 FERC Approval Process

Alabama Power must obtain prior FERC review and approval before permitting any proposed water withdrawal request exceeding 1 mgd. Using the information provided to Alabama Power by the applicant along with a properly executed Water Withdrawal Agreement, Alabama Power petitions FERC for approval of the proposed water withdrawal. Once Alabama Power submits a water withdrawal application, FERC evaluates the proposed plans, prepares an environmental report of the proposed water withdrawal, and reviews comments submitted by resource agencies and other stakeholders. Once FERC makes a final decision regarding the proposed water withdrawal and a formal FERC order is issued, Alabama Power either formally authorizes the withdrawer to begin construction and operation, or Alabama Power notifies the applicant that the proposed water withdrawal was not approved. Depending on various factors including staff resources, information requests, interventions, and contested issues, FERC approval can take anywhere from six months to several years.

## 2.6 Compensation for Water Withdrawals

In 1989, Alabama Power adopted a water withdrawal compensation policy for the purpose of ensuring that the withdrawer makes Alabama Power's electric customers whole for the impacts caused by the withdrawal of project waters. The current compensation methodology was developed using a pricing method similar to that employed by the USACE and has been accepted by FERC.

Under the current compensation policy, charges are based on the loss of storage reserved in the reservoir for the withdrawing entity, and the loss of energy that could have been generated from the withdrawn water. These charges are designed to accomplish three basic purposes. First, as discussed above, the charges provide fair compensation to Alabama Power and its electric customers for the impacts caused by the withdrawals. By having water withdrawers pay for the impacts of their withdrawals, Alabama Power avoids a situation where its electric customers are in effect subsidizing water suppliers and their customers. Second, the charge should have the effect of causing withdrawers to conserve water use. If a water user is required to pay compensation, that user will have an incentive to use less water. Third, the charges are intended to encourage others to develop additional storage capacity in this region of the country.

Alabama Power's water withdrawal compensation methodology is consistent with Alabama's Office of Water Resources long-term water withdrawal management goals and is based on a similar program administered by the USACE. This methodology is intended to balance environmental considerations, conservation issues, reservoir storage capacity, water supply, generation flexibility and project maintenance costs at project reservoirs.

The components of the charge are more fully described below.

There are three primary components to the compensation for water withdrawals from Project reservoirs: (1) Replacement Energy Charge (2) Storage Value Charge (3) Reservation Charge

2.6.1 Replacement Energy Charge

The removal of water from a point upstream of a hydroelectric project results in a direct loss of energy of all downstream dams because the water that has been removed will not pass through the turbines. Alabama Power uses an energy budget model to determine the amount of lost generation based on the magnitude of the withdrawal. The replacement energy cost is based on the highest cost resources operated each day to replace lost hydroelectric generation caused by water withdrawal.

Alabama Power encourages water uses to return as much water as possible to the reservoirs by offering a credit against energy charges for any identifiable and verifiable amounts of water returned to our reservoirs.

2.6.2 Storage Value Charge

The storage value of a reservoir is the capability to store an amount of water, making it available for use during periods of low flow in a river. A reservoir's storage capacity is critical to ensuring a reliable and dependable supply of water to meet the needs for which the reservoir was constructed. Without the reservoir, there is no storage value, and without the storage value in the reservoir, there can be no assurance that water will be available for use during low river flow conditions.

The storage value charge is based on the costs associated with impounding the required volume of water.

2.6.3 Reservation Charge

The reservation charge is 10% of the storage cost for water not withdrawn, but allotted for future withdrawal. The reservation charge is a means by which the withdrawer can plan for future growth and ensure that resources are reserved for that anticipated future demands. For example, if a water withdrawer has been approved for a 25 million gallons/day (MGD) withdrawal, but only expects to withdraw 10 MGD during a given year, the withdrawer will pay the storage value charge associated with the 10 MGD and 10% of the storage value charge for the remaining 15 MGD. For withdrawers who need a fixed withdrawal without any future growth, this reservation charge does not apply.

## 2.7 Current Water Withdrawals

Appendix B contains a listing of the currently known water withdrawals from the Martin Project. The list does not include single homeowner withdrawals, but rather those of a larger commercial or municipal nature that require a Certificate of Beneficial Use from the Alabama OWR.

## 2.8 Future Water Withdrawals

Demand for water in the Southeastern United States has significantly increased in the past three decades and should be expected to continue to do so in the decade to come. Several entities responsible for water management in Alabama are pursuing short and long-term solutions to growing water supply and demand concerns. In response to this growing water demand, there are several processes in place to resolve long-term water concerns The outcome of these efforts and negotiations are unknown, but are certain to impact water management not only in Alabama but, throughout the entire Southeastern United States.

With very little industrial and agricultural use in the Lake Martin area, most of the demand for water comes from municipal use. Data from the Alabama Office of Water Resources shows that population growth data for the three county area surrounding Lake Martin shows an approximate 37% growth rate over the expected term of a new license for the Martin project. Based on that projection, it would be likely that use from surface water sources would increase as well to keep up with that growth. There are currently two Municipal withdrawers on Lake Martin. Their currently permitted withdrawal amounts should address much of any need due to the growth projections. However, there is the possibility that an increase in withdrawal amounts could be requested to help meet any new demand. In that event, Alabama Power would implement its withdrawal policy as outlined in Section 2 of this paper.

This projection was developed from data provided by the Alabama Office of Water Resources under license by Woods and Poole Economics, Inc. Distribution of any data without permission is prohibited. Forecasts and projections are uncertain and future data may differ substantially from the forecasts and projections for Alabama. Neither the Alabama Office of Water Resources nor Woods & Poole Economics, Inc. makes any guarantee as to the accuracy of the data, analysis, forecasts, and projections in this profile. Any questions should be directed to the Alabama Office of Water Resources at (334) 242-5499 or water@adeca.alabama.gov<mailto:water@adeca.alabama.gov>.

The identification any future water withdrawers on Alabama Power reservoirs will be accomplished through the use of both primary and secondary data sources. The primary data source is the Alabama Power FERC permitting process including shoreline surveillance, while the secondary data source includes OWR records.

## *3.0 REQUIRED PROJECT RELEASES*

In addition to permitted water withdrawals and power production, the Martin Project provides navigational and ecological enhancements through controlled water releases.

### 3.1 Thurlow Dam Ecological Releases

Thurlow Dam is currently the only Alabama Power dam on the Tallapoosa River that has specific mandatory minimum flow license requirements for ecological use enhancement. Alabama Power has operated Thurlow Dam under minimum flow requirements since April 1991, which are targeted at providing improved water quality and aquatic habitat. Releases from the Martin Project support this Thurlow minimum flow requirement; in times of low flows, substantial support for the Thurlow minimum flow comes from Martin releases as intervening flows dwindle. The current release schedule for ecological flows is as follows:

> *Article 401 of the license for the Yates and Thurlow Project (FERC No. 2407) requires the licensee to release from the Thurlow development a minimum flow in accordance with Part I, Paragraphs 1,2,3,5,7 and 9 of the "Agreement for Continuous Minimum Releases from Thurlow Dam and Associated Environmental Studies" (Agreement). According to the Agreement, the target minimum flow is 1200 cubic feet per second (cfs), where the actual minimum flow is based on a number of calculations, as described in the Agreement. Once a week, the licensee is to determine whether there is sufficient run-off in the Tallapoosa Basin, that when combined with the normal filling and/or drawing of Harris and Martin reservoirs, will supply both power needs and the target minimum flow. If it is determined that run-off is insufficient to supply the minimum flow, a reduced target minimum flow would be computed in accordance with the Agreement. Article 401 allows the minimum flow to be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods upon agreement between the licensee and the Alabama Department of Conservation and Natural Resources. If the flow is so modified, the licensee is required to notify the Commission as soon as possible, but no later than 10 days after each such incident.*

The Agreement (Part I) is included in Appendix C.

### 3.2 Navigational Releases

Alabama Power has committed to provide the USACE with releases from its hydroelectric projects on the Coosa and Tallapoosa Rivers to support a minimum navigation channel on the Alabama River. The navigational releases for Martin and other Tallapoosa River Projects are shared with the Coosa River Projects since both systems provide flow to the Alabama River. The commitment states that a minimum of 32,480 cfs-days be released from the Coosa/Tallapoosa Projects every 7 days (equivalent to a

flow of 4,640 cfs). During any 3-day period, the releases will meet a minimum of 8,000 cfs/3-day. If the 7-day release exceeds 50,000 cfs, then it should not be reduced any faster than 1,700 cfs per day.

Releases from storage to meet this commitment are limited. The navigational release commitment was made in a 1972 letter from Alabama Power to the USACE. In that letter, Alabama Power committed to provide "4,640 cfs as a minimum weekly release, assuming of course that our upstream storage dams [on the Coosa and Tallapoosa] are above minimum rule curve elevations." Since 1972, there have been three occasions during droughts when the 4,640 cfs flow has been reduced: 1986, 1988 and 2007.

The FERC license for the Martin Project requires that reservoir discharges from storage can be controlled by reasonable rules and regulations of the Secretary of the Army in the interest of navigation. To date, the Secretary of the Army has not prescribed such reasonable rules and regulations for Martin Dam.

## *4.0 DROUGHT OPERATIONS*

### 4.1 Occurrence of Droughts

The National Weather Service defines a drought as "a period of abnormally dry weather which persists long enough to produce a serious hydrologic imbalance." Droughts vary in duration, degree of severity and geographical extent, and as a result, are difficult to predict and manage. Droughts of short duration may impact agriculture, but be of lesser significance to rivers and reservoirs. In Alabama, rainfall patterns differ regionally such that it is possible for one river basin to be near normal while elsewhere in the state, other river basins experience severe drought.

### 4.2 Impact of Drought on Hydro Projects

Alabama Power depends on increased rainfall during late winter and spring to fill its hydroelectric reservoirs to full summer pool. As rainfall deficits mount during prolonged drought conditions, reduced runoff and river inflows make it increasingly difficult to maintain reservoir levels. During extreme drought conditions, reservoir levels can also be negatively impacted by low inflows from depleted groundwater supplies and increased evaporation. During the worst droughts with unusually low humidity, evaporation can be over ¼ inch per day during summer months. Alabama Power, in cooperation with other responsible entities, closely monitors unusually dry conditions and makes every effort to fill the reservoir to full summer level, even by requesting temporary reductions in required releases from the federal and state resource agencies when hydrological and meteorological conditions warrant.

Droughts and their effects are difficult to manage and even more difficult to predict. As a result, significant impacts to hydroelectric projects may be felt despite Alabama Power's efforts to conserve water during periods of low rainfall. Effects of drought on hydroelectric operations can be classified into three broad categories: ecological impacts, reduced electric generating capacity, and reduced recreational opportunities.

In a hydroelectric project setting, the most significant ecological impact resulting from drought conditions is impaired water quality and reductions in required minimum flows. Within reservoirs, reduced flushing of nutrients associated with reduced flows may actually increase productivity, resulting in increased growth of some fish. However, increased productivity can also lead to increased biochemical oxygen demand (BOD) within the system, resulting in reduced dissolved oxygen and an increased potential for fish kills. As surface temperature rise within the reservoir due to low flows, species that prefer cooler water, such as striped bass, seek thermal refuge in deeper waters. In thermally stratified southeastern reservoirs, fish seeking thermal refuge in deeper waters may be exposed to low dissolved oxygen levels that are potentially lethal.

Ecological impacts associated with low instream flows include elevated water temperature, loss of riparian vegetation, lowered dissolved oxygen levels, and stranding of aquatic organisms. During drought conditions, limited releases of stored water from Alabama Power reservoirs will inevitably be required to ensure that minimum flow requirements below some of its projects and to the Alabama River are met. Minimum flow releases benefit instream water quality in reservoir tailwaters and help distribute the burden of reduced water availability between the reservoir and tailwater. Drought conditions can reduce water available for required minimum flows below certain hydroelectric projects with resulting impacts to endangered species and their habitats.

Water withdrawals, required releases, and water losses result in reservoir levels which are less desirable to people using the lakes for recreation. Alabama Power and FERC consider recreational use as an important project purpose, and for this reason, when the Martin reservoir is below the operating guide curve, other electric system resources are used in lieu of generation from Martin. Below the operating guide curve, releases from Martin are those necessitated by minimum flow requirements and other essential needs.

## 4.3 2007 Drought

During the summer of 2007, Alabama experienced the worst drought in its recorded history. During August 2007, nearly three-fourths of the state was classified as "exceptional," the highest drought level issued by the U.S. Drought Monitor. As a result of this record drought, Alabama Power reservoirs, including Martin, experienced record low inflows, which significantly curtailed hydroelectric generation at the Martin Project. During August of 2007, all Alabama Power storage projects, including Martin, reached winter pool elevations, something that had never occurred during the history of the projects. Alabama Power Company sought and gained some amount of relief from the FERC and the resource agencies on the minimum flow requirements from Thurlow. While this did not in itself solve the issue of declining reservoir storage in Martin, it did help to slow the decline and, importantly, provide a measure of security for continued support of a minimum flow from Thurlow.

The drought of 2007 taught us many things about the Coosa and Tallapoosa systems, as well as impacts to various stakeholders within these basins. Importantly, actions taken during 2007 laid the foundation for development of a drought plan for the Alabama portions of the ACT system.

## 4.4 Required Minimum Releases and Operating Guides

Alabama Power has established a drought contingency operating guideline for Martin Dam (Appendix D) and for other of its reservoirs. These curves were proposed by the State of Alabama with input from Alabama Power, and were a part of the ACT Compact process. Each drought contingency curve reached a high point on June 1st, coinciding with the highest water level reached during spring of the 1988 drought. The lower end of the curve is 2-3 feet below the normal winter level. The early thinking during development of these curves was that during severe drought conditions, reservoir elevations would be expected to drop to the drought contingency operating guideline, but not lower, to help support the 4,640 minimum flow releases described above. However, the drought of 2007 changed this thinking, and implementation of a drought plan such as that outlined below in Section 4.6 became necessary in part to negate these curves being used as an active trigger point for reducing navigation releases.

## 4.5 State Drought Plan

The State of Alabama Drought Management Plan (final draft) was completed in 2004 and includes measures for identifying and responding to drought impacts. The plan also includes a mechanism to protect reservoirs during severe droughts and identifies and defines the responsibilities of local, state, federal and private sector entities involved with drought management. Under this plan, Alabama Power is involved in data exchange and drought response with other organizations in the state. The State of Alabama's Drought Plan can be found at:
http://www.adeca.alabama.gov/Office%20of%20Water%20Resources/Document%20Lib

rary/20040422_ALDroughtPlan_DraftFinal.pdf. The plan has not been officially adopted by every governing agency as of February 2010.

## 4.6 Alabama Drought Response Operating Proposal

### 4.6.1 Overview

Alabama Power is in the process of developing a drought response plan currently identified as the Alabama Drought Response Operating Proposal (ADROP). ADROP is the basis of a plan to manage Alabama Power's water resources within the Alabama portion of the ACT during drought conditions. ADROP is still in the developmental stages, and there are issues still left to address. Alabama Power has worked with various state and federal resource agencies on ADROP, and the response from these resource agencies has been positive.

Rain and stream flow indicators are monitored in order to determine when the system is entering and exiting a drought period. When indicators reach specified levels, to be outlined in ADROP, drought triggers will be activated resulting in a reduction of flow into the Alabama River. Accordingly, the Coosa and Tallapoosa Rivers response to the reductions will be based on conditions within each river system. As the drought severity lessens or worsens, the intensity levels to be defined in ADROP call for a bracket (range) of operations. This will allow for flexibility and smoother transition when moving from one intensity level to another, without having absolute fixed points of operation.

### 4.6.2 Normal Conditions

During a normal water year, Alabama Power meets a minimum navigation target of 4,640 cfs in the Alabama River. This flow is met by releases from the two upstream converging rivers: Coosa and Tallapoosa. Out of Jordan Dam, on the Coosa River, a continuous minimum flow of 2,000 cfs is met during the months July through March. From April 1st through May 31st, Alabama Power releases a continuous base flow of 4,000 cfs for 18 hours per day and an 8,000 cfs pulse flow for the remainder of the day. During the month of June, the base and pulse flows are stepped down in daily increments back to the minimum continuous flow of 2,000 cfs. Recreation flows are made from Jordan April 1st to October 31st, in accordance with FERC license provisions. Out of Thurlow Dam, on the Tallapoosa River, a year-round minimum continuous flow of 1,200 cfs is released.

### 4.6.3 Drought Conditions, Indicators and Triggers

When drought conditions emerge in the basin which may potentially impact normal operating conditions, drought indicators will be used to describe the magnitude, duration, severity and extent of a drought. These indicators will be based on meteorological and hydrological variables. Because there is a well-established rain and stream gauging network in the Alabama portion of the ACT basin, precipitation was chosen as a meteorological indicator and stream flow as a hydrological indicator. Observations of precipitation and stream flow will be used to verify when the ACT is entering into or recovering from a drought. The precipitation indicator will be the average of normal monthly rainfall as measured at specific airport gages. The stream flow indicator will be based on percentiles taken from specific gages within the USGS's real-time gauging system. When the indicators meet specified criteria, Alabama Power and the appropriate state and federal agencies (Agencies) will begin to closely monitor the river system. As conditions continue to decline, Alabama Power and Agencies will begin weekly conference calls to discuss trends in data and determine when drought triggers need to be activated and the first level of drought response initiated.

There will be three levels of drought conditions identified in ADROP. Each level will be tied to a compounding trigger system. As more of the triggers are met, the system will intensify to a deeper drought response level. At each of the levels, if a trigger is met then a flow reduction will occur into the Alabama River leading to a corresponding reduction in releases from one or both of the upstream rivers, dependant upon severity of the drought in each river system. Throughout the duration of the drought, conditions will continue to be monitored for change. Changes in the drought intensity levels will be made when triggers are activated and there is consensus of such between Alabama Power and the Agencies. The determination that the system is coming out of a drought will take place when observed conditions within the ACT are out of the drought levels and the specified drought indicators are at or above their trigger levels. Finally, Alabama Power and Agencies will have to agree that the system is actually moving out of the drought before there will be a return to normal operations.

### 4.6.4 Coosa & Tallapoosa Responses

As stated above when drought levels are activated by triggers being met, a reduction in hydro project releases to the Alabama River will occur to allow a decrease in flow from either the Coosa or Tallapoosa River system, or both. Changes for each of the systems will be dependent on the conditions in each basin and also the season of the year. The Coosa portion could allow for a lower base minimum flow, as well as reduction of FERC license required spring attraction flows and recreation flows. The Tallapoosa portion of the plan will be some variation of the current FERC license minimum flow requirements and operations practices initiated in 2007.

#### 4.6.5 Conclusion

ADROP is still in the developmental stage and will evolve into a long term drought plan. Indicators and triggers will be primarily based on operating experience during the 2007 year, the drought of record for the basin. Moving forward, revisions made to ADROP will be based on a consensus between Alabama Power Company and the appropriate state and federal agencies. Any revisions that will affect the FERC license will subsequently be filed with FERC for approval prior to implementation of ADROP.
Implementation of ADROP will effectively eliminate the 1972 agreement discussed in Section 3.2 above.

## *5.0 REFERENCES*

Alabama Power Company (Alabama Power). 2003. Coosa/Warrior Relicensing Project: E4 – Water Quantity, Water Use and Water Withdrawals. Alabama Power Company, Birmingham, AL.

# APPENDIX A

# STANDARD LAND USE (SLU) FORM

## STANDARD LAND USE (SLU) FORM

## APPLICATION FOR USE OF LAND/WATER WITHIN FERC LICENSED HYDROELECTRIC PROJECT BOUNDARIES

As the owner and operator of a hydroelectric project licensed by the Federal Energy Regulatory Commission (FERC), Alabama Power Company (the Company) has certain interests in lands/waters in, on and adjacent to the Project reservoir.

Though the Company possesses these property rights, the Company is prohibited by its FERC license from allowing certain types of construction on or uses of the reservoir without obtaining approval of the FERC prior to the commencement of such activity. However, the Company may from time to time seek such FERC approval if, in the discretion of the Company, it decides such proposed use of project lands or waters will enhance the project's environmental, aesthetic or recreational values. The Company makes such determination on a case by case basis based in large part on the information submitted with this Application.

The information identified in this APPLICATION FOR USE OF LAND/WATER WITHIN FERC LICENSED HYDROELECTRIC PROJECT BOUNDARIES will assist the Company in determining whether it will seek FERC approval for the proposed use of Project lands/waters, however, Alabama Power Company may reject an application if the Company determines that the proposed use does not enhance the Project's environmental, recreational or aesthetic values. Moreover, even though an applicant submits to Alabama Power Company all of the information identified in this Application, the Company is under no obligation to seek FERC approval for such proposed use of the project lands or waters.

Alabama Power Company's review of the proposed land/water use is divided into two phases. In the first phase, the Company will review the information contained in Section I of this Application. If from this initial review the Company determines that the proposed land/water use is acceptable, the Applicant shall then submit to the Company the information identified in Section II. In the second phase, the Company will review all of the information submitted by the applicant to determine whether to seek approval from the FERC for the proposed land/water use. Should the Company decide to seek such approval, the Company will then petition the FERC to allow the proposed land/water use. Should the Company decide to seek FERC approval for the proposed use of Project lands/waters, no representation is made that such FERC approval will be given. All information and documents shall be sent to:

Alabama Power Company
600 North 18th Street
Post Office Box 2641
Birmingham, Alabama 35291
Attn: Manager - Alabama Power Hydro Licensing

## SECTION I

The applicant shall submit five copies of the following documents to Alabama Power Company for initial review. In the event the Company seeks FERC approval for the project, an additional 30 copies will need to be submitted by the applicant for filing of this Application.

### A. GENERAL INFORMATION

The applicant shall submit to Alabama Power Company a statement of general information including the applicant's name, address, telephone number and a general description of the proposed construction and land/water use.

### B. LAND SURVEY

A current survey performed by a registered land surveyor, with the proposed area of construction tied to a section corner, showing (1) the hydroelectric Project boundary, (2) the acreage involved in the proposed construction site (listing separately the acreage within Alabama Power Company fee lands, and acreage within Alabama Power Company flood easement lands), (3) the location of any borrow pits and/or spoil areas, and (4) the location of any wetland areas (as defined by current U.S. Department of the Army Corps of Engineers regulations).

### C. CONSTRUCTION PLANS WITHIN THE PROJECT BOUNDARY

Detailed construction drawings showing plan, elevation and typical cross sections of the construction, as well as a description of the facilities, features, method of construction, types of materials to be used and number of watercraft that can be accommodated at any one time.

### D. EXCAVATION INFORMATION

1) Quantity of material to be excavated, and/or filled and/or spoiled on Alabama Power Company fee lands.
2) Quantity of material to be excavated, and/or filled and/or spoiled on Alabama Power Company easement lands.

### E. PHOTOGRAPHS

Labeled, direction oriented photographs of the proposed construction area and adjacent areas.

### F. CONSTRUCTION DATES

Proposed start and projected completion date of work.

### G. CONSTRUCTION PLANS OUTSIDE THE PROJECT BOUNDARY

General arrangement construction drawings showing plan views of the facilities and including a description of the facilities.

## H. WASTE DISPOSAL STATEMENT

Written plans showing waste disposal method(s). Include detailed plan, elevation and section drawings of the proposed sewage system, as well as a detailed description of system operation.

## I. FUEL FACILITIES

Detailed plan, elevation and section drawings as well as a detailed system operation description for all fuel storage and fuel pumping facilities.

## J. MISCELLANEOUS PIPELINES AND OTHER UTILITIES

Tabulation showing description of line(s) involved to include type, size, capacity and length and also including the number and types of buildings or other facilities to be served.

## K. CROSS-SECTIONS OF RESERVOIR BOTTOM

Prepared by a registered land surveyor showing the existing reservoir bottom and the proposed modified reservoir bottom.

## L. WATER WITHDRAWAL SYSTEMS

Proposed withdrawal rate, system details and specifications, including flow rate at intake and screen design.

# SECTION II

If, after the initial review of the information and documents submitted above, Alabama Power Company determines that the applicant's proposal is acceptable, the applicant shall submit to the Company thirty-five copies of the following information:

## A. ADJACENT PROPERTY OWNER CONSULTATION

Copies of registered letters to, and responses from, all adjacent property owners and other property owners who may be directly impacted by the proposed construction, notifying them of the proposed work and requesting their comments.

## B. RESOURCE AGENCY CONSULTATION

Copies of registered letters to, and responses from, the below-listed resource agencies notifying them of the proposed work and requesting their comments.
Copies shall also be provided of any permits received from, and/or any agreements entered into with these agencies or copies of any related correspondence from same, indicating that permits are not required.

Resource agencies to be consulted include:

1. United States Department of the Interior Fish and Wildlife Service
2. Alabama Department of Conservation and Natural Resources
3. Alabama Department of Environmental Management
4. United States Department of the Army Corps of Engineers
5. U.S. Coast Guard
6. County Health Department
7. Environmental Protection Agency
8. Alabama Historical Commission
9. Alabama Department of Economic and Community Affairs – Office of Water Resources (for Water Withdrawal Requests Only)

## SECTION III

If, after reviewing all of the above-listed information, drawings, documentation and comments, the Company determines that the proposed land/water use would be in the best interests of the Project, the Company may then submit a filing to the FERC requesting the FERC's approval of the proposed land/water use. If the FERC approves the proposal, the Company will issue to the applicant a land/water use permit allowing the proposed construction activity and use of Project lands/waters. Should the FERC deny the proposal, the Company will notify the applicant that the proposed construction activity is disallowed.

# APPENDIX B

# WATER WITHDRAWALS FROM THE MARTIN PROJECT

**APPROVED WATER WITHDRAWALS FROM LAKE MARTIN, TALLAPOOSA RIVER**
**(Source: Alabama Power Company records; OWR records)**

| OWNER | FACILITY NAME | Alabama Power PERMIT LIMIT (MGD) | AVG. DAILY WITHDRAWAL (MGD) |
|---|---|---|---|
| Russell Lands, Inc. | Willow Point Golf & Country Club | ≤1 | 0.30 |
| City of Alexander City | Adams Water Treatment Plant | 24 | 7.3 |
| Central Elmore Water and Sewer Authority | CEW&SA Water Treatment Plant | 10 | 6.3 |
| StillWaters Resort | Beaver Lake Replenishment Pump Station | ≤1 | <0.1 |

APPENDIX C

AGREEMENT FOR CONTINUOUS MINIMUM RELEASES FROM THURLOW DAM
(PART I)

# AGREEMENT FOR CONTINUOUS MINIMUM RELEASES FROM THURLOW DAM AND ASSOCIATED ENVIRONMENTAL STUDIES

## *INTRODUCTION*

Alabama Power Company (APC) plans to relicense the Yates and Thurlow Projects (Federal Energy Regulatory Commission (FERC) Project Nos. 2407 and 2408, respectively). As part of the relicensing process, Alabama Power is required by the Federal Power Act, as amended, to consult with resource agencies. This Agreement is the result of two years of A PC consultation with the U.S. Fish and Wildlife Service (FWS), Environmental Protection Agency (EPA}, Alabama Department of Environmental Management (ADEM}, and Alabama Department of Conservation and Natural Resources (ADCNR) (hereinafter collectively referred to as "the agencies") regarding the agencies' concerns with the relicensing of the Yates and Thurlow Projects. This Agreement resolves all issues between the agencies (both collectively and individually} and A PC regarding the relicensing of the Thurlow and Yates projects. This Agreement is comprised of five parts: Part I - Thurlow Minimum Flow, Part 11- Proposed Fisheries Studies, Part III - Water Quality, Part IV -Habitat-Based Assessment of the Tallapoosa River Downstream of Thurlow Dam, and Part V -Reporting.

Alabama Power will include this Agreement in its license application to the FERC for the Yates and Thurlow Projects, and will request that the provisions of Part I and Part III of this Agreement be adopted in the new license issued for the Yates and Thurlow Projects. The results of the studies specified in Part II, Part III, and Part IV will be provided to the FERC for its consideration prior to issuance of the new license for the Yates and Thurlow Projects.

## *PART I – MINIMUM FLOW*

*ABBREVIATIONS:*

| | |
|---|---|
| **APC** | Alabama Power Company |
| **FWS** | United States Fish and Wildlife Service |
| **ADCNR** | Alabama Department of Conservation and Natural Resources |
| **FERC** | Federal Energy Regulatory Commission |
| **COE** | United States Army Corps of Engineers |
| **EPA** | Environmental Protection Agency |
| **ADEM** | Alabama Department of Environmental Management |

Beginning February 12, 1991, Alabama Power will operate the Thurlow Project so as to maintain a continuous release from the dam subject to the following terms, conditions and limitations:

1) **TARGET MINIMUM FLOW –** The target minimum flow to be released will be 1200 cfs. The minimum release will be made from a combination of releases from Unit 3 and from leakage. In the event Unit 3 is unavailable for operation, Alabama Power will meet the minimum flow requirement by a continuous release unless the minimum unit capacity is greater than the target minimum flow, in which case the unit will be pulsed.

2) **LOW FLOW ADJUSTMENT** – Every Tuesday, Alabama Power will make calculations to determine whether there is sufficient run-off in the Tallapoosa Basin that, when combined with the normal filling and/or drawing of Harris and Martin reservoirs, will supply both power needs and the target minimum flow. If such a calculation reveals that run-off is insufficient to supply the minimum flow at 1200 cfs, a reduced target minimum flow will be computed in accordance with Formula 1 contained herein.

3) **DAILY SETTING** – Each day, by 10:00 AM, Alabama Power will compute the actual minimum flow to be released from Thurlow and if necessary adjust the gate setting on Unit 3. The actual minimum release will be made from run-off into Yates and Thurlow Reservoirs, scheduled power releases from Martin Dam, and a volume of storage equivalent to 2400 cfs-days. The actual minimum flow will normally be computed by Formula 2, contained herein, but when the target minimum flow is reduced under Item 2, Formula 3, contained herein, will be used.

4) **VERIFICATION OF FLOWS** – By October 1, 1991, November 1, 1993, November 1 1995, November 1, 1997 and thereafter at five year intervals, A PC, in conjunction with the U. S. Geological Survey (USGS), will conduct flow measurements of Unit 3 and the total project leakage. The results of these measurements will be used to establish a table of gate settings vs. cfs for Unit 3 and the leakage combined. If Alabama Power uses this table to set the actual minimum flow, then no additional flow checks or verification will be required and the flows released are deemed to be proper. During this flow measurement, the minimum point at which Thurlow Unit 3 can be operated to generate electricity wi11 be determined .

   Initial implementation of this agreement will be based on USGS flow measurements made in 1990. On September 28, 1990, the USGS measured an 80 cfs leakage flow approximately 1.75 miles downstream of Thurlow Dam. On October 3, 1990, the USGS conducted flow measurements at the same location of the combined leakage flow and minimum flow at which Thurlow Unit 3 can be operated to generate electricity. This flow measurement indicated the combined leakage flow and minimum flow at which Thurlow Unit 3 can be operated to generate electricity was 430 cfs.

5) **LOW TURBINE FLOWS** – In the event the actual flow, as calculated herein, is less than the Unit 3 minimum plus leakage, the flow will be set to the Unit 3 minimum. Beginning by 10:00 AM, this Unit 3 minimum will flow through the unit until an amount of water equivalent to the actual flow determined for that day has been passed.

$$\text{Hours Operated} = \frac{(\text{actual minimum flow} - \text{leakage}) * 24 \text{ hours}}{\text{Unit 3 Minimum}}$$

6) **Power Operations** – Alabama Power agrees to make reasonable efforts to stagger the loading and unloading of the Thurlow Units so as to reduce water flow surges downstream. Such reasonable efforts shall include a one-hour delay between loading Unit 1 and Unit 2 at Thurlow. However no such staggering of the loading and

unloading of units shall be required if it conflicts with the energy needs of the Southern Electric System. Typically, this may be expected to occur ten percent of the time.

Whenever power operations will result in flows in excess of the minimum flow, Alabama Power has the right to operate the Thurlow units in any combination or sequence it so chooses, provided that such operation is otherwise consistent with this agreement.

7) **Reservoir Storage** – If the seasonal rule curves at either Martin or Harris reservoirs are revised by either the COE or the FERC, the storage table defined in Item 8 below will be revised accordingly. Before Alabama Power agrees to accept any revision of the seasonal rule curves, Alabama Power will analyze the effect of such a change on the minimum flow regime and the results of such an analysis will be transmitted to the FWS and the ADCNR.

8) **Reservoir Fluctuations** – Alabama Power will make an effort to maintain the surface elevation of the Yates and Thurlow reservoirs within the historical range of their fluctuation. Typical normal day to day operations would not be expected to result in reservoir fluctuations more than three to three and one half feet in Yates reservoir and one foot in Thurlow reservoir. These reservoir elevation fluctuations are measured from what is commonly referred to as elevation 344 at Yates Dam and elevation 287.7 at Thurlow Dam.

**9) FORMULAS**

*Definitions:*

**basin flow** The previous 30 day average flow in the Tallapoosa Basin in cfs/square mile as measured at Heflin, Newell and Hackneyville gages. Each gage will receive equal weight. If a gauging system is inoperative then the remaining gages will be weighted equally. The flows will be determined by stage measurements recorded on APC's automated gauging network, applied to the latest published USGS ratings and will not include shifts or other adjustments made after the fact in final published ratings.

**storage** The normal monthly volume of water stored (-) or released (+) in Harris and Martin Reservoirs expressed in cfs/square mile:

| | |
|---|---|
| January | 0.0000 |
| February | -0.3698 |
| March | -0.8854 |
| April | -0.8854 |
| May | 0.0000 |
| June | 0.1524 |
| July | 0.2396 |
| August | 0.2844 |
| September | 0.2867 |
| October | 0.2707 |
| November | 0.8852 |
| December | 0.0000 |

| | |
|---|---|
| **2 day forecast** | The average inflow into Yates & Thurlow for the next 2 days computed by the Alabama Power Streamflow Simulation Model, or estimated if unavailable. |
| **Unit 3 minimum** | The lowest flow that can be passed through the unit 3 turbine as measured in actual flow tests. |
| **2 day schedule** | The actual schedule for Martin Dam generation for the next 2 days in cfs-days |
| **storage account** | 2400 cfs-days allocated to minimum flow |
| **leakage** | Seepage through the dam, the spillway gates when closed and the turbines when off. Measured as 80 cfs in 1990, 38 cfs in 1997 and again as 38cfs in 2002. |

Do these checks and calculations each day.

**(Formula l)**
**IF** today is not Tuesday do not compute a new target minimum **OTHERWISE** when today is 1uesday check for low flow conditions.

**IF** the basin flow plus storage is less than

$$0.7273 = \frac{1200 \text{ cfs} \times 2}{3300 \text{ sq. mi}}$$

THEN

$$\textbf{reduced target minimum} = \frac{3300 \text{ Sq. mi.} \times (\text{basin flow} + \text{storage})}{2}$$

OTHERWISE

**target minimum** = 1200 cfs

IF the target minimum f1ow is not reduced be1ow 1200 cfs then use Formula 2, otherwise go to Formula 3.

**(Formula 2)**
The actual minimum flow is the lesser of these two values:
1) Target Minimum Flow
2) 2 day forecast + 2 day schedule + (storage account / 2)

When today is finished recompute the storage account

todays s.a. = previous day's s.a. – actual minimum flow + actual inflow + actual Martin discharge

**(Formula 3)**
Use only if the target minimum flow is reduced.

The actual minimum flow is the larger of (a) or (b)

(a) The smaller of these two values:
1) target minimum flow
2) 2 day forecast + 2 day schedule + (storage account / 2)

When today is finished recompute the storage account

todays s.a. = previous day's s.a. – actual minimum flow + actual inflow + actual Martin discharge

(b) The smaller of these three values:
1) $\frac{\text{2 day forecast + 2 day schedule + (storage account / 2)}}{2}$
2) 1200 cfs
3) 0 – when the previous day's s.a. is less than 2400 cfs.

When today is finished recompute the storage account

todays s.a.= previous day's s.a. – actual minimum flow + (actual inflow +actual Martin discharge)/2

**Final Check**

**IF** the actual minimum flow calculated in Formula (2) or Formula (3) is less than leakage + the Unit 3 minimum

THEN Actual minimum flow is the lesser of:
1) leakage + unit 3 minimum
2) 2 day forecast + 2 day schedule + storage account

AND
IF actual minimum flow is still less than the leakage + the unit 3 minimum

Unit 3 is run for less than 24 hour at unit 3 minimum

$$\text{Hours} = \frac{24 * (\text{actual minimum flow} - \text{leakage})}{\text{Unit 3 Minimum}}$$

END

# APPENDIX D

# DROUGHT CONTINGENCY GUIDE CURVE

## DROUGHT CONTINGENCY GUIDE CURVE