Alabama Power

600 North 18th Street
Hydro Services 16N-8180
Birmingham, AL 35203
205 257 2251 tel
arsegars@southernco.com

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VIA ELECTRONIC FILING

Project No. 2628-066
R.L. Harris Hydroelectric Project
Response to August 29, 2022 Harris Project License Application Additional Information Request - Schedule A

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street N.
Washington, DC 20426

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-066). Alabama Power filed the Final License Application (FLA) for the Harris Project on November 23, 2021[1]. On December 23, 2021[2], FERC issued a License Application Deficiencies and Additional Information Request (AIR #1) letter to Alabama Power. FERC issued a second AIR (AIR #2) on February 15, 2022[3]. On March 1, 2022, Alabama Power requested an extension of time to June 15, 2022 to respond to both AIR #1 and AIR #2[4] concurrently. On March 3, 2022, FERC granted Alabama Power's request for an extension of time to respond to AIR #1 and AIR #2[5]. Alabama Power filed a response to the deficiencies noted in AIR#1 on March 23, 2022[6]. Alabama Power filed a response to AIR #1 and AIR #2 on June 15, 2022[7].

On August 29, 2022[8], FERC issued a third AIR (AIR #3), which outlines specific requests in Schedule A, including engineering and design studies for structural modifications for a theoretical "high level" intake and analyses for seven additional operating scenarios for such intake. Responses to Schedule A are in Attachment 1. However, these questions request an evaluation of alternative solutions to address an

[1] Accession #s 20211123-5074,-5075,-5076,-5077, -5078, -5079

[2] Accession # 20211223-3032

[3] Accession #20220215-3039

[4] Accession # 20220301-5206

[5] Accession # 20220303-3044

[6] Accession #20220323-5045

[7] Accession #s 20220615-5192, -5193

[8] Accession #20220829-3050

adverse impact that has not been established to exist at Harris Dam. Questions 1-3 contain incorrect statements, assumptions and, seemingly, conclusions about water quality and water temperature that are not supported by the record in this proceeding, and therefore the premise of the requested information is flawed.

The information requested in Questions 1-3 assumes adverse impacts without the benefit of FERC's environmental analysis that is typically presented in a Draft Environmental Assessment (EA) or Draft Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). Rather, Questions 1-3 incorrectly assert effects that have not to date been analyzed by FERC and pre-determines that the effects/impacts are adverse. These premature conclusions do not correlate with the substantial data that is already in the Harris relicensing record.

In AIR #3, Schedule A, first paragraph, FERC states:

> "the low-level intake is located below the thermocline and therefore is not expected to improve the water quality in downstream releases from the project because it would withdraw colder, less oxygenated water from the hypolimnion when Harris Lake is stratified."

This statement is factually incorrect. Alabama Power's proposed continuous minimum flow unit would include aeration in its design, as described in the FLA and joint AIR #1 and AIR #2 response, to ensure compliance with state water quality standards in the Harris Project tailrace. Also, Alabama Power's proposed continuous minimum flow release of approximately 300 cubic feet per second (cfs) would reduce average and maximum daily and hourly temperature fluctuations downstream of Harris Dam, as described in the Exhibit E of the FLA. Accordingly, information/data available to FERC as part of the FLA and previous AIR responses does not support FERC's statement that Alabama Power's proposal "is not expected to improve the water quality in downstream releases." Alabama Power has serious concerns about the impact of FERC's apparent pre-judgment of an important relicensing issue before it completes a thorough and adequate review of the substantial data submitted by Alabama Power in support of its licensing proposal and alternatives. This approach by FERC can lead stakeholders to believe there is an adverse effect, when in fact, an adverse effect has not been clearly established and is merely speculative at this point.

It appears through Questions 1-3 that FERC is requesting Alabama Power to provide a "solution" for this undefined and unsubstantiated adverse effect. Resource agencies and other stakeholders in the Harris Project relicensing process have stated on the record that there is a "temperature issue." As a result of this being identified early in the relicensing process by stakeholders, Alabama Power completed multiple studies to respond to questions about temperature below Harris Dam. Alabama Power worked with agencies and stakeholders to develop study plans and conduct studies that would provide information to describe, quantify, and examine the extent of the perceived temperature issue. At the request of the Alabama Department of Conservation and Natural Resources (ADCNR), Alabama Power contracted with Auburn University to perform an extensive sampling effort in the Tallapoosa River downstream of Harris Dam to Horseshoe Bend and perform bioenergetics modeling to determine how temperature may affect the growth of target fish species in the study area below Harris Dam. Study results have been distributed to stakeholders and filed with FERC. A review of the long-term record of water temperatures below Harris, comparisons with recent water temperature records from unregulated sites upstream of Harris, and the results of Auburn's review of fish temperature requirements contained in the *Aquatic Resources Study Report* are the basis for Alabama Power's conclusion that the temperature regime of the Tallapoosa River below Harris Dam is supportive of a warm-water fishery and there is no justification for making a structural modification to address an undefined tailrace temperature issue at Harris. The FERC-approved relicensing studies, along with the extensive additional modeling conducted for the response to AIR #1 and #2, provide information that indicates temperature and DO are not having significant impacts on aquatic resources below Harris Dam under baseline conditions.

Furthermore, stakeholders have stated that water temperature fluctuations can have adverse effects on some fish species. FERC states in Question #2 that "…a minimum flow release mechanism using a high-level intake would withdraw warmer, more oxygenated water from the epilimnion from April 1 through October 30, and potentially improve dissolved oxygen levels and warmer temperatures in the Tallapoosa River downstream from Harris Dam". This statement is misleading. Though warmer water from the epilimnion may raise the average water temperature in the tailrace below Harris Dam, as data in the attached response to Question #2 establishes, the average and maximum daily and hourly temperature deltas would increase. In contrast, Alabama Power's proposed continuous minimum flow release of approximately 300 cfs would reduce average and maximum daily and hourly temperature fluctuations downstream of Harris Dam.

In Questions 1-3, FERC is requesting information that requires a lengthy, complex, and expensive additional study. In order to develop "concept plans" for structural mechanisms that provide a "higher level intake of water," Alabama Power would need to contract an engineering design firm to develop 30 percent designs, the level of effort needed to provide the information requested (location, description, composition, dimensions, configuration, estimated installed costs, itemized costs, operation and maintenance costs). This request is not supported by existing information on the record and providing a full response would unnecessarily and substantially further delay the relicensing process.

As previously stated, temperature was raised early in the process as an issue for which more information was needed. Temperature data were collected, modeled, and provided to all stakeholders. The need for the specific information requested in AIR #3 could have been discussed and put forth as a study request much earlier in the ILP pre-filing process. In fact, FERC is deviating from the intent and procedures of the ILP to request Alabama Power to, post-filing, resolve an issue that FERC has yet to analyze in the NEPA process. Without completing its independent review of data and analysis pursuant to the NEPA, FERC is prematurely requesting that a licensee invest in the design of structural modifications that are not reasonable and would provide an undefined benefit to the aquatic resources below Harris Dam, as discussed in response to Questions 1-3.

At this point in the relicensing process, FERC should thoroughly review all the existing information, which includes dissolved oxygen and temperature data and modeling, an analysis of temperature effects on aquatic organisms below Harris Dam, and the results of Auburn University's bioenergetics modeling. Following that review, FERC should present its independent analysis of effects in a draft NEPA document. If FERC determines that Alabama Power's proposal to provide an approximate 300 cfs continuous minimum flow below Harris Dam would adversely affect temperature and dissolved oxygen in the Harris tailrace, then at that time additional protection, mitigation, or enhancement measures would be developed and analyzed.

While we profoundly disagree with FERC's premature conclusions and factually incorrect statements used to justify the need for the requested additional information in this AIR, Alabama Power has timely developed information to assist FERC in the continued processing of this application. This information is included in Attachment 1, and associated edits are included in revised Exhibits A, B, E, and H. Attachment 2 provides a list of the contents of the Response to August 29, 2022 Harris Project License Application Additional Information Request. The revised Exhibits are available on the Harris Relicensing website at www.harrisrelicensing.com.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angela Anderegg

Angie Anderegg
Harris Relicensing Project Manager

cc: Harris Action Team Stakeholder List

Attachment 1 – Response to August 29, 2022 Harris Project License Application Additional Information Request - Schedule A

Attachment 2 – Contents of Response to August 29, 2022 Harris Project License Application Additional Information Request

Attachment 1

Response to Harris Project License Application Additional Information Request – Schedule A

08-29-2022 FERC ADDITIONAL INFORMATION REQUEST

Developmental Resources

1. *In its June 15, 2022 response to Commission staff's February 15, 2022, AIR Item #2, Alabama Power provided a mostly qualitative evaluation of four potential mechanisms to release minimum flows greater than 300 cubic feet per second (cfs) (i.e., 350, 400, and 450 cfs) to the Tallapoosa River downstream of Harris Dam. Alabama Power's proposal to release a continuous 300-cfs minimum flow below the dam assumes that all inflow to the project would be used for generation and that the existing low-level intake would be used to provide flows to the proposed Francis-type minimum flow turbine. The low-level intake is located below the thermocline and therefore is not expected to improve the water quality in downstream releases from the project because it would withdraw colder, less oxygenated water from the hypolimnion when Harris Lake is stratified.*

   In comparison, a minimum flow release mechanism using a high-level intake would withdraw warmer, more oxygenated water from the epilimnion from April 1 through October 30, and potentially improve dissolved oxygen (DO) levels and water temperatures in the Tallapoosa River downstream from Harris Dam. A high-level intake could be implemented through a variety of release mechanisms including a siphon-system, pump-system, modified gate release, modifications to the proposed minimum flow turbine-unit, or some combination of the above. In order for staff to fully evaluate the feasibility of different minimum flow release mechanisms, including a high-level intake system, and the effects on aquatic resources downstream, please provide the following:

   a) *for each mechanism (i.e., a modified minimum flow turbine-unit, siphon-system, pump-system, and modified-gate release), a description of structural modifications to the dam or other project facilities to accommodate a high-level intake, the feasibility (time, cost, effectiveness, etc.,) of the modifications, and any specific safety concerns associated with such modifications;*

   b) *a conceptual plan for a minimum flow turbine system utilizing a high-level intake to pass up to 300 cfs, including: (1) the location, number, size, and type of turbine(s) that would be used; (2) an estimate of the annual generation (in kilowatt-hours) and the hydraulic capacity of each turbine unit (in cfs), if different from the license application proposal (300 cfs); (3) the location and description (composition, dimensions, configuration, etc.,) of the intake and discharge conveyance structures; (4) the elevation necessary for an intake structure to operate during winter pool surface water elevation of Harris Lake; (5) a description of the estimated installation costs, with itemized costs for the flow release mechanism and associated project modifications; and (6) an estimate of operation and maintenance (O&M) costs, including energy gains/losses (due to differences in head);*

   c) *a conceptual plan for a siphon-system utilizing a high-level intake that could pass up to 300 cfs. In Alabama Power's response to staff's February 15, 2022 AIR Item #2, use of a siphon was the only mechanism evaluated for providing minimum flows that would draw from the epilimnion. Alabama Power states that this strategy was determined to be physically feasible on the east side of the dam in 2003, but required an estimated cost of $10,000,000 for installation and $75,000 for annual O&M. Alabama Power provided few details on the potential design for a siphon system, and has not evaluated the feasibility and cost if a siphon system was deployed to provide minimum flows only during the summer months when Harris Lake is at full pool elevation. The plan should include: (1) a detailed description of the syphon system including the size, depth, and location of the intake and piping; (2) an itemized list of estimated costs for installation of the mechanism and any modifications to existing project features; and (3) estimated O&M costs, including energy loss from the minimum flow release, between continuous operation of the system versus operation solely when Harris Lake is at full pool;*

d) *a conceptual plan for a pump-system utilizing a high-level intake to pass 150 cfs and 300 cfs. The plan should include: (1) a detailed description of the pump-system including the size, depth, and location of the intake and piping; (2) an itemized list of estimated costs for installation of the mechanism and any modifications to existing project features; and (3) estimated O&M costs, including energy losses to operate the pumps, energy losses to pass the minimum flow, and any cost savings from operating the pumps only at full pool versus one that would be operated continuously; and*

e) *a conceptual plan for modifying an existing gate in the dam to accommodate a high-level release of 150 cfs to 300 cfs. The plan should include: (1) a detailed description of the gate including the size, depth, and location; (2) the estimated cost for modifying the gate, with itemized costs for the changes to the gate and for modifying Harris Dam; and (3) estimated O&M costs, including energy losses to pass the minimum flow.*

Alabama Power Response:

As explained in the cover letter to this response, the assumption that "the low-level intake is located below the thermocline and therefore is not expected to improve the water quality in downstream releases from the project…" is factually incorrect. Alabama Power's proposed continuous minimum flow unit would include aeration in its design, as described in the Final License Application (FLA) and joint response to AIR #1 and AIR #2, to ensure compliance with state water quality standards in the Harris Project tailrace. Also, Alabama Power's proposed continuous minimum flow release of approximately 300 cubic feet per second (cfs) would reduce the average and maximum daily and hourly water temperature fluctuations downstream of Harris Dam. Despite this incorrect assumption, Alabama Power provides the following information on the feasibility of providing a continuous minimum flow using a "high-level intake" to assist FERC in the continued processing of the Harris Project FLA.

Minimum Flow System Utilizing a High-Level Intake

An evaluation of installing a high-level, dedicated intake from the forebay to the proposed minimum flow system was conducted using existing information and drawings from Harris Dam. Existing Units 1 and 2 are supplied with water from a round penstock. At the headworks, the round penstock is trifurcated into three large rectangular openings relatively close to the reservoir surface. The total opening for each unit at the intake level is approximately 2500 square feet. The large openings are required because of low hydrostatic pressure near the surface and the need to supply each unit with flows necessary for all operations. In order to supply the minimum flow unit with a water flow of approximately 300 cfs, an opening of approximately 120 square feet (or, if round, a pipe diameter of approximately 12 feet) would be required at the intake level. This is a very conservative estimate considering the invert of the minimum flow intake would be higher than the invert for the existing units. The easternmost trifurcation intake channel for Unit 1 is located directly above the non-overflow section where the minimum flow unit would be located. A large opening (i.e., 120 square feet or, if round, approximately 12 feet in diameter) cored into a 51-degree slope approximately 60 feet above the powerhouse is a major concern in terms of structural integrity and safety, not to mention the difficulty to core on this slope at a high distance above level grade. In fact, the steep concrete slope of the dam may require that access and coring be performed from the intake side of the penstock. In either case, additional concrete work would need to be performed on the reservoir side of the intake, requiring the stop logs to be removed for access. For this work to occur, the reservoir would need to be held at an elevation below 746.0 feet mean sea level (ft msl; the bottom of the unit intake), which is 39 feet below winter pool, for an extended period during construction. Holding the elevation at 746.0 ft msl or below would create a risky scenario during even a normal rainfall event because both units and the spillway would be unavailable to pass water. The unavailability stems from the fact that the spillway crest is at elevation 753.0 ft msl, or seven feet above bottom of the unit intake, and the mechanical operating limit of Unit 2 is elevation 768.0 ft msl. With no way to evacuate water, construction equipment and the stage of construction could prevent insertion of headgates or stoplogs to block rising water in Unit 1. This could be very serious if the bore or cut to the back slope of the dam for the new minimum flow penstock was open. Further, Alabama Power has a responsibility under the U.S. Army Corps of Engineers (USACE) and FERC regulations to operate the Harris project for flood control consistent with the rules and regulations prescribed by the USACE. Without the ability to operate the Harris project consistent with procedures established in those rules and regulations, Alabama Power would be violating its responsibilities and needlessly risking danger from flood damage to life, health and property, both upstream and downstream of Harris dam. As such, Alabama Power would not operate Harris in this manner, and would not approach the USACE asking for permission to do so.

Additionally, the minimum flow unit design, as proposed, receives water through the Unit 1 penstock that is parallel to the axis of the dam. The approximate footprint of the proposed minimum flow unit with connection to the scroll case is shown as a faded yellow rectangle on Figure 1. As depicted in Figure 1, to create a separate intake for the minimum flow unit, the penstock (shown in red on Figure 1) would have to be routed perpendicular to the axis of the dam. Therefore, the entire generator and turbine layout for the minimum flow unit would have to be rotated 90 degrees, shown in Figure 1 as a bold yellow rectangle. A 300 cfs unit requires no less than 40 feet of width; however, the proposed powerhouse extension for the minimum flow unit is limited to approximately 25 feet wide wall to wall on the inside. The change in orientation required to construct a separate intake for the minimum flow unit would result in a significantly smaller minimum flow unit and therefore, a significantly smaller continuous minimum flow release[1].

Because of serious structural integrity and safety concerns with coring through the dam, extreme impacts to lake levels and flood control procedures during construction, significant reduction in the amount of flow the unit would be able to release, and importantly, passing water from a higher intake elevation would result in an increase in the average and maximum daily and hourly temperature deltas downstream of Harris dam (see response to Question 2), creating a separate minimum flow unit intake is neither feasible nor reasonable, and therefore an option that Alabama Power will not pursue.

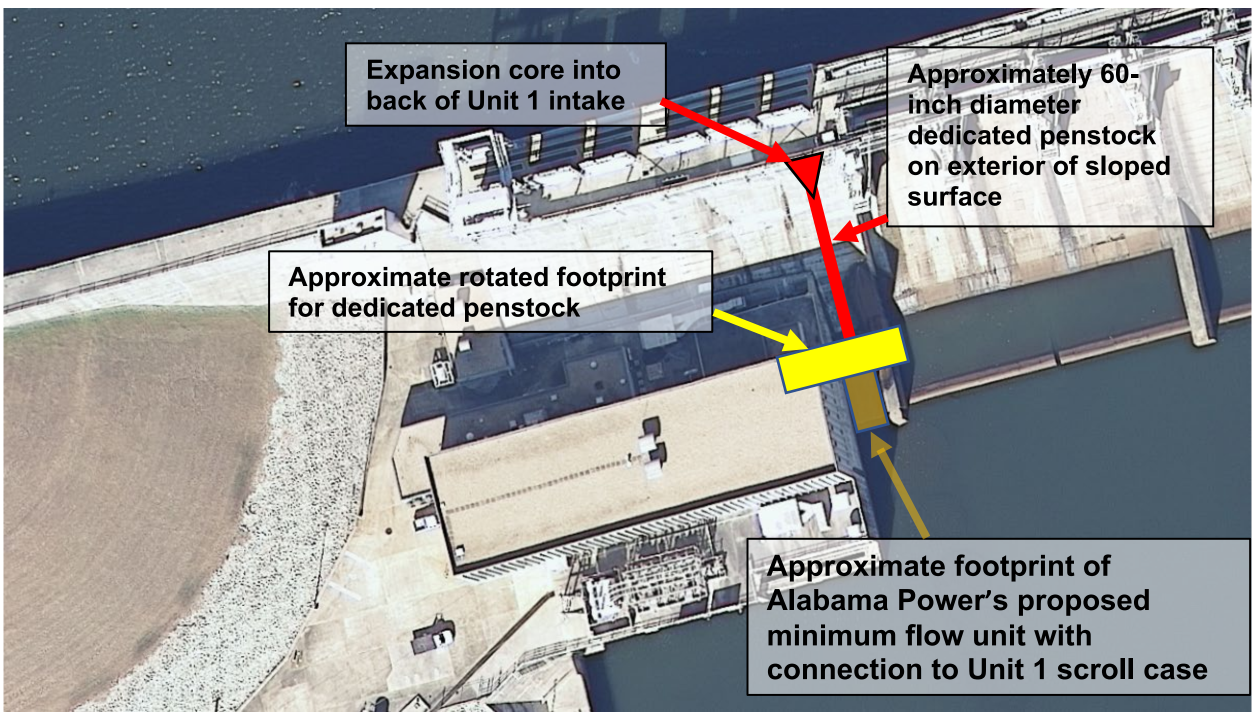

Figure 1 **Conceptual Design of Proposed Minimum Flow Unit with High Level Intake**

[1] Note that the HydroBudget model assumes that the proposed minimum flow unit will produce 2.65 MW at 300 cfs. Because the capacity of a unit with a dedicated "higher level" intake is unknown due to the change in configuration, an estimate of the annual generation is not being included in this response. Furthermore, Alabama Power is not providing an estimate of the capital or O&M costs due to the number of unknowns.

Siphon-system Utilizing a High-Level Intake

If a siphon were to be installed at Harris Dam, it would necessarily be located on the east side of the spillway, as depicted in Figure 2 below. To ensure the road across Harris Dam continues to be usable, a notch would have to be cut into the east embankment or east non-overflow section of the dam. Capital costs for installation are estimated to be $10M for one 150 cfs siphon and $20M for two 150 cfs siphons (to provide 300 cfs) and would be the same whether the system operated year-round or only at full pool.

A review of available information shows that widespread use of siphons as a reliable, permanent, continuous flow device is almost non-existent at hydropower projects for even small flows. Poor reliability is most likely the main reason because of the many factors that can cause the siphon to cease operation, which in turn creates a new set of challenges for O&M and maintaining continuous flow. These challenges were described in detail in Alabama Power's response to the February 15, 2022 AIR.

To determine the energy gains and losses for passing 300 cfs through a siphon-system, Alabama Power utilized the same HydroBudget model developed for the downstream release alternatives presented in the Downstream Release Alternatives Phase 2 Report (Alabama Power and Kleinschmidt 2022). The HydroBudget model indicates that releasing 300 cfs through a siphon-system continuously (i.e., year round) would result in an annual energy loss of 24,826 megawatt hours (MWHrs) and an annual revenue loss of $704,168 at Harris Dam compared to the Green Plan (baseline). The HydroBudget model indicates that releasing 300 cfs through a siphon-system only when Lake Harris is at full pool (May 1 through September 30) would result in an annual energy loss of 10,717 MWHrs and an annual revenue loss of $289,893 at Harris Dam compared to the Green Plan (baseline).

The use of a siphon system at Harris Dam is not a reasonable alternative due to high capital costs, potential dam safety concerns[2], maintenance and reliability issues that would result in interrupted minimum flow, and significant impacts to generation and revenue from flow being passed by a non-generation mechanism. Also, passing water from a higher intake elevation would result in an increase in the average and maximum daily and hourly temperature deltas (see response to Question 2).

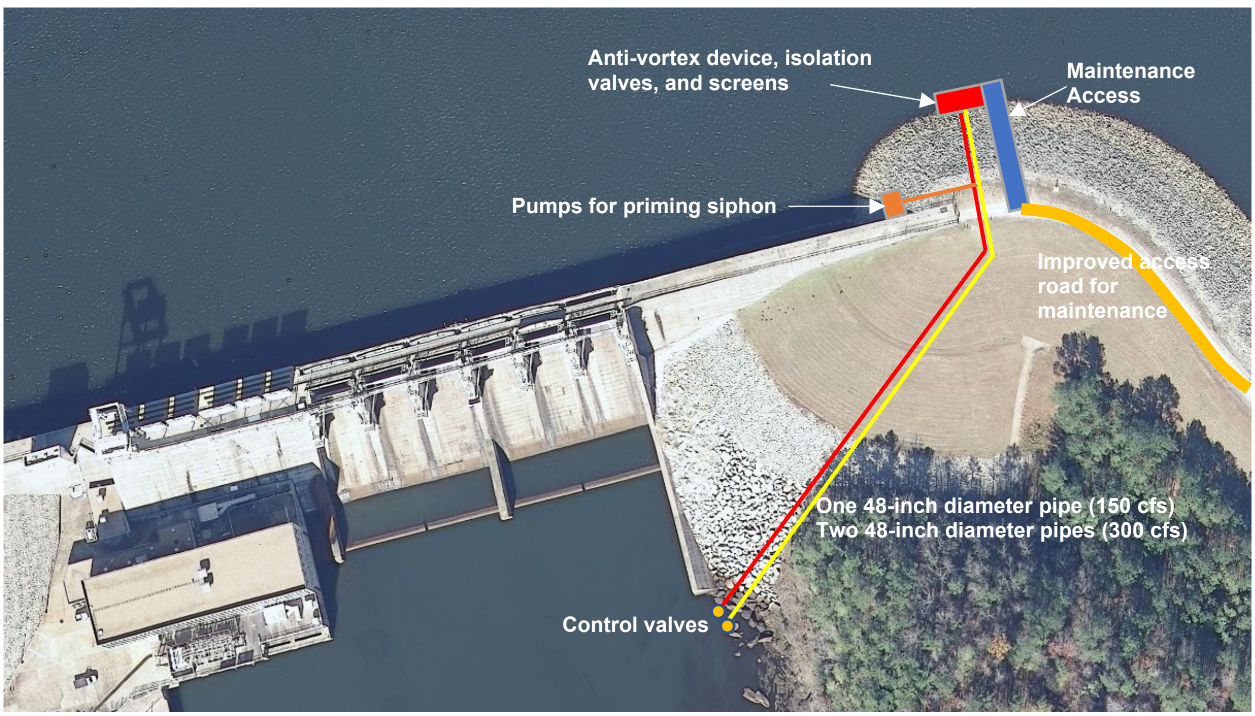

Figure 2 Conceptual Design of Siphon System

[2] As stated in response to FERC's February 15, 2022 AIR, a robust structural analysis and design for siphon installation would be required to ensure all dam safety concerns were considered and fully evaluated.

Pump-System Utilizing a High-Level Intake

In order to use a pump-system to provide a continuous minimum flow downstream of Harris Dam, a large concrete pump station would need to be constructed at the edge of the reservoir on the east embankment. Two things would need to be considered in designing the pump(s) in order to avoid cavitation in the system and therefore avoid damage to the pump and to the piping system downstream of the pump location. The first consideration is the discharge head of the pump. Using data from MWI Pumps, Inc., the pump type required for this use is a mixed-flow design.[3] A 48-inch pump is the minimum size that will deliver a 150 cfs (67,300 GPM) flow required at a total dynamic head (TDH) of between 40 and 45 feet. This TDH is required to prevent cavitation in the piping downstream of the pump. If cavitation were to occur in the piping system downstream of the pump, vapor would rise to the high point of pipe system and form a bubble that would effectively reduce the pipe diameter, causing excessive back pressure on the pump. This would lead to premature failure of the pump motor. The second consideration is the position of the pump centerline relative to the reservoir elevation. The pump would need to be positioned low enough so that the net positive suction head available is greater than the net positive suction head required by this specific manufacturer's pump. If this requirement is not met, cavitation will occur inside the pump and the pump will prematurely fail.

The intake diameter of a 48-inch mixed-flow pump is 64 inches with an impeller diameter of 42.3 inches and a discharge diameter of 48 inches. A 48-inch diameter discharge pipe would be required in order for the velocity to be below 12 feet per second, which is common engineering design practice. Using the manufacturer's data, the motor size required would be approximately 1000 horsepower. For a continuous 150 cfs pumping scenario, the annual parasitic energy requirement would be approximately 6,600 MWHr.

The pump station would require three-phase power be routed from the main powerhouse switching yard to the new pumps on the east embankment. Monitoring and control wiring must be installed from the powerhouse control room to the pump building. Site access for construction vehicles and maintenance trucks carrying the pumps and/or motors would not be available on the existing road from across the dam. The approximate one-mile road on top of the east embankment would need to be improved to the east to the paved county road. The pump building would house pumps, a crane system for maintenance, motor starters, breakers, and other ancillary equipment. The external piping system would require a motorized isolation valve, anti-vortex device, and screens on the intake side. The discharge end at the tailrace would require a motorized control valve.

Redundancy and configuration must also be considered since repairs to pumps and motors usually have a long lead time. A redundant system for the 150 CFS flow would require an additional pump of the same type/size in a parallel setup with isolation valves connected to the common intake and discharge pipe. A 300 cfs system with no redundancy would require two pumps and two pipelines (and would have an annual parasitic energy requirement of approximately 13,200 MWHr). A fully redundant 300 cfs system would require four pumps, two pumps in parallel on each of the two piping systems.

To determine the energy gains and losses for passing 150 cfs through a pump-system, Alabama Power utilized the same HydroBudget model developed for the downstream release alternatives presented in the Downstream Release Alternatives Phase 2 Report (Alabama Power and Kleinschmidt 2022). The HydroBudget model indicates that releasing 150 cfs through a pump-system continuously (i.e., year round) would result in an annual energy loss of 12,603 megawatt hours (MWHr) and an annual revenue loss of $306,241 at Harris Dam compared to the Green Plan (baseline). The HydroBudget model indicates that releasing 150 cfs through a pump-system when Lake Harris is at full pool (May 1 through September 30) would result in an annual energy loss of 5,524 MWHr and an annual revenue loss of $99,068 at Harris Dam compared to the Green Plan (baseline). Releasing 300 cfs through a pump-system continuously (i.e., year round) or when Lake Harris is at full pool has the same energy losses as described above for the siphon-system. Note that these energy losses do not include the substantial parasitic energy requirements for the pumps as noted above.

[3] See https://mwipumps.com/wp-content/uploads/Mixed-Flow-Curve-48-MWI-11-19-2019.pdf.

Because the use of pumps for a minimum flow would require a major infrastructure addition, Alabama Power anticipates the cost would be on par with the installation of the proposed minimum flow turbine (i.e., tens of millions of dollars). However, in addition to the significant impact to generation and revenue from water being passed by a non-generation mechanism, the pumps would require an extreme amount of energy to operate. For these reasons, and because passing water from a higher intake elevation would also result in an increase in the average and maximum daily and hourly temperature deltas (see response to Question 2), the use of pumps to provide a continuous minimum flow is not a reasonable alternative.

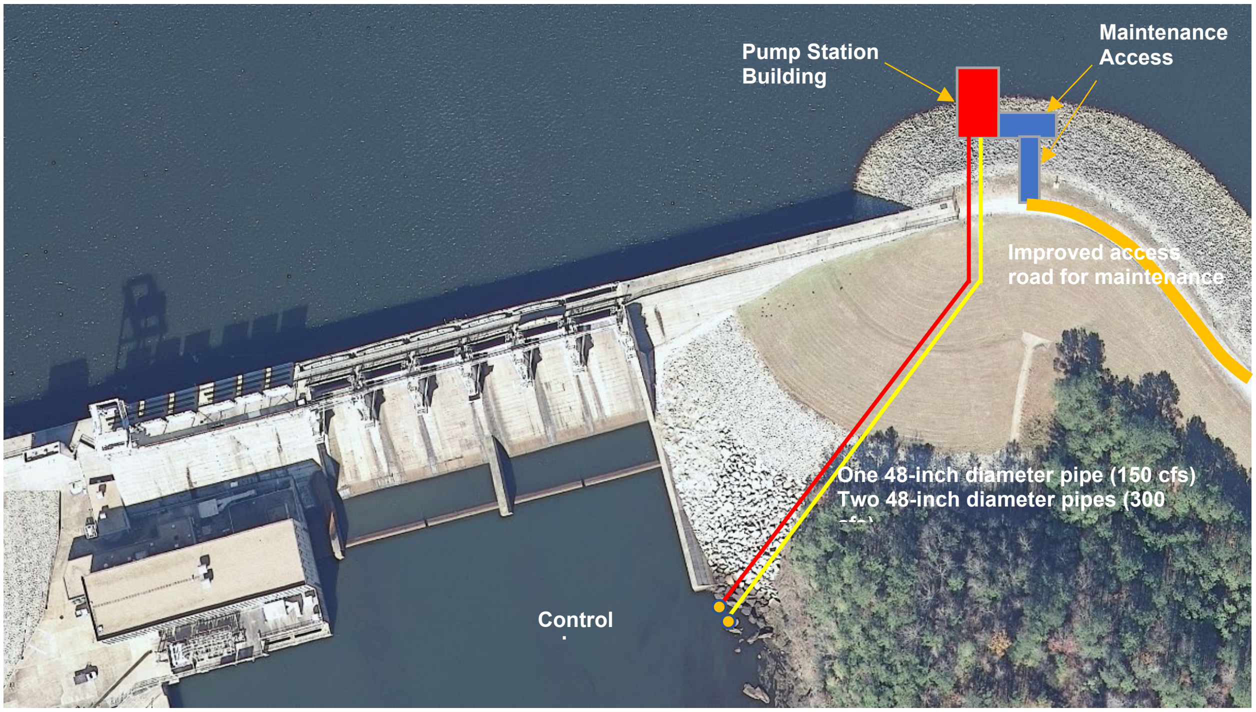

Figure 3 Conceptual Design of Pump System

<u>Spillway Gate Modification to Accommodate a High-Level Release</u>

As described in Alabama Power's response to AIR #2, the spillway gates at Harris were designed to pass flow during flood conditions, not continuously. When a spillway gate is raised, the water passed originates from approximately 753 feet mean sea level (msl) in Harris reservoir, which is lower than the intake elevation of Units 1 and 2 with the skimmer weir in the raised position. In order to release water from higher in the reservoir through the spillway, one of the existing spillway gates would have to be totally replaced and redesigned to release from the top of the gate. Based on recent experience with replacing a large radial Tainter gate like those at Harris, the estimated capital cost to replace a Harris spillway gate is approximately $6 million. This cost includes engineering design, fabrication, and installation of the new gate. Annual operation and maintenance costs for the gate are estimated to be approximately $100K due to the frequent maintenance that would be needed from continuously passing a flow through the gate. Annual energy losses from releasing 150 cfs or 300 cfs from a modified gate is the same as described above for the pump-system (150 cfs) or the siphon-system (300 cfs).

The use of a spillway gate to provide a continuous minimum flow may be possible, but Alabama Power does not consider this option reasonable due to the unknown impacts to the stability of the dam and gate itself, as well as significant impacts to generation and revenue from the minimum flow being passed by a non-generation mechanism. Furthermore, passing water from a higher intake elevation would result in an increase in the average and maximum daily and hourly temperature deltas (see response to Question 2).

2. *Alabama Power developed Environmental Fluid Dynamics Code (EFDC) and Hydrologic Engineering Center's River Analysis System (HEC-RAS) models during the prefiling phase of the relicensing process to provide quantitative estimates of the potential environmental benefits from the proposed downstream release alternative (i.e., the proposed minimum flow turbine-unit with a low-level intake) to water temperatures and DO concentrations in the Tallapoosa River downstream from Harris Dam. In order to help us understand the potential environmental benefits of using a high-level intake to improve water quality downstream from Harris Dam, please use the EFDC and HEC-RAS models to evaluate the effects of each of the scenarios in Table 1 below. Please include the effects on water temperature and DO at points in the immediate tailrace area, and 7 miles downstream from the project. In addition, please update exhibits throughout the license application to reflect these scenarios.*

Table 1 R.L. Harris AIR Model Runs – Minimum Flow (cfs) Scenarios

Table 1. R.L. Harris AIR Model Runs – Minimum Flow (cfs) Scenarios								
Scenario	***Low Level Minimum Flow Turbine (as proposed)***		***High Level Minimum Flow Turbine Intake***		***High Level Non-Generation Source (Siphon/Pump/Gate Mod.)***		***Total Volume***	
	May 1 - Oct 31	***Nov 1 - Apr 30***	***May 1 - Oct 31***	***Nov 1 - Apr 30***	***May 1 - Oct 31***	***Nov 1 - Apr 30***	***May 1 - Oct 31***	***Nov 1 - Apr 30***
1	*0*	*0*	*300*	*300*	*0*	*0*	*300*	*300*
2	*0*	*0*	*0*	*0*	*300*	*0*	*300*	*0*
3	*300*	*300*	*0*	*0*	*150*	*0*	*450*	*300*
4	*300*	*300*	*0*	*0*	*150*	*150*	*450*	*450*
5	*0*	*0*	*0*	*0*	*300*	*300*	*300*	*300*
6	*0*	*0*	*150*	*300*	*150*	*0*	*300*	*300*
7	*0*	*0*	*300*	*300*	*150*	*0*	*450*	*300*

<u>Alabama Power Response:</u>

During the prefiling phase of relicensing, the EFDC model was developed and used to evaluate the effects of different reservoir operating curves on water quality in the forebay only, NOT downstream of Harris Dam. The HEC-RAS model was used to evaluate the effects of flow scenarios on downstream aquatic habitat and water temperature. Neither the EFDC nor HEC-RAS model was used to evaluate the effects of flow scenarios on downstream dissolved oxygen levels[4]. Rather, effects to dissolved oxygen were evaluated qualitatively based on the predicted ability of the proposed minimum flow unit to aerate the proposed 300 cfs continuous release as needed to ensure compliance with applicable water quality standards and conditions of the 401 Water Quality Certification to be issued by the Alabama Department of Environmental Management (ADEM) for the Harris Project.

FERC's seven minimum flow scenarios (as outlined in Table 1 above) are significantly more complex to model than the alternatives evaluated during the Downstream Release Alternatives Study. In order to evaluate these seven new scenarios, many assumptions would have to be made. For example, the location of the high-level intake would be dependent on which mechanism is being considered and, as described in response to Question 1 above, that location cannot be known without a full engineering design study. In addition, modeling and analyzing these new scenarios would be inconsistent with the evaluation of the effects of downstream release alternatives on water temperature conducted during

[4] A summary of the hydrologic models can be found in the Operating Curve Change Feasibility Analysis Phase 2 Report and Downstream Release Alternatives Phase 2 Report (Revised June 2022 under Accession No. 20220615-5192). Section 3.5 of the Downstream Release Alternatives Phase 2 Report provides additional details of how temperature was assessed using the models.

relicensing and subsequent AIRs; thus, eliminating the ability to conduct a comparative analysis between those alternatives and these seven new scenarios.

As described in the Final Downstream Release Alternatives Phase 2 report, the effects of downstream release alternatives on water temperature in the tailrace, one mile, and seven miles downstream of Harris Dam were simulated using the water quality module of the HEC-RAS model. Simulations were run for each downstream release alternative for a duration of two weeks during a spring period (April), summer period (July), and fall period (September). The two-week periods were selected based on the availability of contiguous in-situ data from all three locations for the simulation window. The HEC-RAS model generated an hourly time-series of water temperature for each downstream release alternative. A winter period was not simulated since the reservoir is not thermally stratified during that time and water temperatures are typically uniform throughout the water column.

In order to provide the information necessary for FERC to evaluate the effects of passing water from higher levels than the existing intake, Alabama Power performed an analysis, consistent with the methods used during relicensing and previous AIRs, for the following three scenarios:

1. **450SURF**: A year-round, continuous release of 450 cfs from the surface of Lake Harris. This simulates a release of the warmest, most oxygenated water possible.
2. **450_778**: A year-round, continuous release of 450 cfs from a theoretical high-level intake located at 778 ft msl (see Figure 4).
3. **300_778**: A year-round, continuous release of 300 cfs from a theoretical high-level intake located at 778 ft msl.

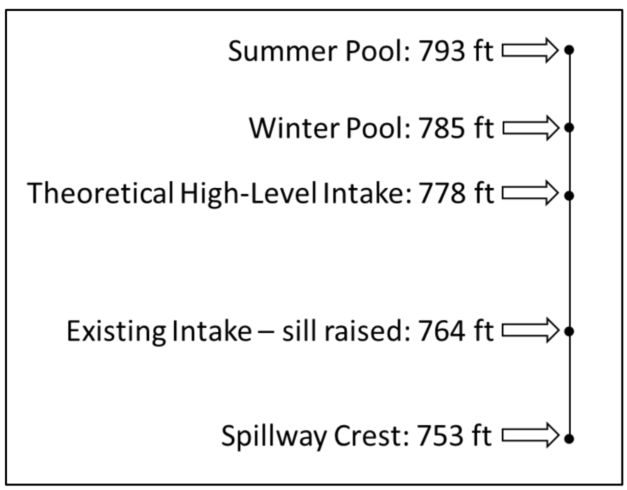

Figure 4 Schematic of Theoretical High-Level Intake Location

The 450SURF scenario was chosen based on the assumption that FERC is exploring ways to increase downstream water temperatures. A surface minimum flow release represents the greatest potential for increasing downstream water temperatures; i.e., what the downstream temperature could be if the entire release could be as warm as what was recorded at the surface for each season. For the 450_778 and 300_778 scenarios, a theoretical high-level release elevation of 778 ft was chosen because (1) it is high enough that it could be utilized at both summer and winter pool levels, and (2) below this level, water in the forebay typically has lower water temperatures.

These three scenarios were simulated using the existing HEC-RAS model and the same methods previously employed to assess the effects of the minimum flow scenarios on downstream water temperatures during two-week periods in Spring, Summer, and Fall. Results of those simulations are summarized below. Water temperatures for the surface and high-level minimum flow releases were based on vertical profile data collected by Alabama Power in the Harris Dam forebay in 2019 and 2020 as follows:

- 450 cfs surface release (450SURF)
    - Spring: 18.8 °C
    - Summer: 30.5 °C
    - Fall: 29.1 °C
- 450 and 300 cfs high-level intake release (450_778 & 300_778)
    - Spring: 18.5 °C
    - Summer: 26.3 °C
    - Fall: 28.6 °C

Spring

Immediate Tailrace Area (0.2 miles downstream of Harris Dam)

Compared to the 300 cfs scenario proposed by Alabama Power from the existing intake, a surface release of 450 cfs resulted in an average water temperature increase of 0.5 °C (Table 2). The 450 cfs, high-level intake scenario resulted in an average water temperature increase of 0.38 °C. The 300 cfs, high-level intake scenario resulted in an average water temperature increase of 0.28 °C. Each of these scenarios resulted in higher average and maximum daily and hourly temperature deltas in the tailrace when compared to the proposed 300 cfs scenario.

7 miles downstream of Harris Dam

Compared to the 300 cfs scenario proposed by Alabama Power from the existing intake, a surface release of 450 cfs resulted in an average water temperature increase of 0.11 °C. The 450 cfs, high-level intake scenario resulted in an average water temperature increase of 0.09 °C. The 300 cfs, high-level intake scenario resulted in an average water temperature increase of 0.05 °C. Each of these scenarios resulted in average and maximum daily and hourly temperature deltas that were similar to the proposed 300 cfs scenario.

Table 2 Results of Spring HEC-RAS Water Temperature Simulations of New Scenarios

	Spring				
Alternative	**Period Avg (°C)**	**Avg Daily Δ (°C)**	**Max Daily Δ (°C)**	**Avg Hourly Δ (°C)**	**Max Hourly Δ (°C)**
0.2 Miles Downstream of Harris Dam					
GP	16.95	3.88	6.79	0.35	5.90
300CMF	17.06	2.36	3.71	0.23	2.85
450CMF	17.09	2.11	3.15	0.21	2.47
450SURF	**17.56**	**2.73**	**4.49**	**0.30**	**3.57**
450_778	**17.44**	**2.56**	**4.26**	**0.28**	**3.36**
300_778	**17.34**	**2.83**	**5.01**	**0.30**	**4.07**
7 Miles Downstream of Harris Dam					
GP	16.78	3.67	5.31	0.29	2.65
300CMF	16.79	3.57	5.15	0.28	2.29
450CMF	16.81	3.46	4.92	0.27	2.12
450SURF	**16.90**	**3.36**	**5.39**	**0.28**	**2.20**
450_778	**16.88**	**3.34**	**5.26**	**0.27**	**2.14**
300_778	**16.84**	**3.43**	**5.37**	**0.28**	**2.34**

Summer

Immediate Tailrace Area (0.2 miles downstream of Harris Dam)

Compared to the 300 cfs scenario proposed by Alabama Power from the existing intake, a surface release of 450 cfs resulted in an average water temperature increase of 4.66 °C (Table 3). The 450 cfs and 300 cfs, high-level intake scenarios resulted in an average water temperature increase of 2.11 °C. Each of these scenarios resulted in drastically higher average and maximum daily and hourly temperature deltas in the tailrace when compared to the proposed 300 cfs scenario.

7 miles downstream of Harris Dam

Compared to the 300 cfs scenario proposed by Alabama Power from the existing intake, a surface release of 450 cfs resulted in an average water temperature increase of 1.54 °C. The 450 cfs, high-level intake scenario resulted in an average water temperature increase of 0.72 °C. The 300 cfs, high-level intake scenario resulted in an average water temperature increase of 0.79 °C. Each of these scenarios resulted in higher average and maximum daily temperature deltas and similar average and maximum hourly temperature deltas when compared to the proposed 300 cfs scenario.

Table 3 Results of Summer HEC-RAS Water Temperature Simulations of New Scenarios

Alternative	Summer				
	Period Avg (°C)	**Avg Daily Δ (°C)**	**Max Daily Δ (°C)**	**Avg Hourly Δ (°C)**	**Max Hourly Δ (°C)**
0.2 Miles Downstream of Harris Dam					
GP	23.94	4.32	5.23	0.54	3.90
300CMF	23.65	2.54	3.24	0.31	2.04
450CMF	23.58	2.17	2.78	0.26	1.64
450SURF	**28.31**	**6.68**	**8.77**	**0.66**	**7.57**
450_778	**25.76**	**4.12**	**5.54**	**0.40**	**4.67**
300_778	**25.76**	**4.67**	**6.42**	**0.45**	**5.38**
7 Miles Downstream of Harris Dam					
GP	25.80	4.19	5.31	0.33	1.89
300CMF	25.37	3.90	5.10	0.31	1.63
450CMF	25.18	3.81	5.10	0.30	1.49
450SURF	**26.91**	**5.66**	**7.50**	**0.46**	**3.05**
450_778	**26.09**	**4.87**	**6.39**	**0.39**	**2.58**
300_778	**26.16**	**4.89**	**6.55**	**0.39**	**2.48**

Fall

Immediate Tailrace Area (0.2 miles downstream of Harris Dam)

Compared to the 300 cfs scenario proposed by Alabama Power from the existing intake, a surface release of 450 cfs resulted in an average water temperature increase of 2.19 °C (Table 4). The 450 cfs and 300 cfs, high-level intake scenarios resulted in an average water temperature increase of 1.87 °C. Each of these scenarios resulted in drastically higher average and maximum daily and hourly temperature deltas in the tailrace when compared to the proposed 300 cfs scenario.

7 miles downstream of Harris Dam

Compared to the 300 cfs scenario proposed by Alabama Power from the existing intake, a surface release of 450 cfs resulted in an average water temperature increase of 0.73 °C. The 450 cfs and 300 cfs, high-level intake scenarios resulted in an average water temperature increase of 0.62 °C. Each of these scenarios resulted in average and maximum daily and hourly temperature deltas that were similar to the proposed 300 cfs scenario.

Table 4 Results of Fall HEC-RAS Water Temperature Simulations of New Scenarios

	Fall				
Alternative	**Period Avg (°C)**	**Avg Daily Δ (°C)**	**Max Daily Δ (°C)**	**Avg Hourly Δ (°C)**	**Max Hourly Δ (°C)**
0.2 Miles Downstream of Harris Dam					
GP	25.39	3.61	4.40	0.39	2.99
300CMF	25.56	2.20	2.89	0.23	1.61
450CMF	25.52	1.81	2.03	0.22	1.57
450SURF	**27.75**	**4.72**	**6.63**	**0.42**	**4.26**
450_778	**27.43**	**4.40**	**6.25**	**0.39**	**3.92**
300_778	**27.43**	**4.40**	**6.25**	**0.39**	**3.92**
7 Miles Downstream of Harris Dam					
GP	26.66	2.84	3.64	0.24	0.78
300CMF	26.18	2.97	4.14	0.25	0.71
450CMF	26.06	3.03	4.14	0.26	0.69
450SURF	**26.91**	**3.26**	**4.81**	**0.27**	**0.75**
450_778	**26.80**	**3.20**	**4.72**	**0.27**	**0.75**
300_778	**26.80**	**3.20**	**4.72**	**0.27**	**0.75**

As stated above, during the pre-filing phase of relicensing, effects to dissolved oxygen were evaluated qualitatively based on the predicted ability of the proposed minimum flow unit to aerate the proposed 300 cfs continuous release as needed to ensure compliance with applicable water quality standards and conditions of the 401 Water Quality Certification to be issued by the ADEM for the Harris Project. Any additional discharge, regardless of where it originates, would have to meet state water quality standards.

3. *Please provide an assessment of the environmental effects to downstream aquatic resources (i.e., fish, macro-invertebrates, mussels) of using a high-level intake to pass warmer, more oxygenated water from the epilimnion that could increase average DO and water temperature in the Tallapoosa River. Please use the results of the analysis of releasing water from above the thermocline, including the model runs, in AIR No. 2 above to provide an assessment for each scenario.*

   Alabama Power Response:

   As described above, passing a minimum flow from a higher intake elevation would result in an increase in the average and maximum daily and hourly temperature deltas in the tailrace. It would also result in slightly higher increases in average water temperature in the tailrace (0.28 – 2.11 °C) and almost negligible increases in water temperature seven miles downstream (0.05 – 0.79°C) when compared to Alabama Power's proposal.

   Slight increases in average water temperature could result in increased growth rates for some fish species. However, stakeholders have stated that water temperature fluctuations can have negative effects on some fish species. As indicated in our response to Question 2, passing a minimum flow from a higher intake elevation would result in an increase in the average and maximum daily and hourly temperature deltas compared to baseline (Green Plan) operation, while Alabama Power's proposal would reduce the average and maximum daily and maximum hourly temperature deltas downstream of Harris Dam.

   Regarding dissolved oxygen, any discharge, regardless of where it originates, would meet state water quality standards, which the Alabama Department of Environmental Management (ADEM) deems protective of aquatic life.

4. *In response to Commission staff's February 15, 2022, AIR Item #11, Alabama Power states that the net head for the proposed minimum flow turbine-unit would be 115 feet. Please revise Figure 5-2 of Exhibit E in the license application to include the elevation of the centerline of the minimum flow unit runner.*

   Alabama Power Response:

   Figure 5-2 has been revised in Exhibit E to include the center-line elevation of the minimum flow unit runner.

5. *The project was originally licensed to operate in peaking mode without the Green Plan pulses. Over the course of the license term, Alabama Power modified project operation in accordance with the Green Plan. The proposed operations include provisions to: (a) release a continuous, minimum flow of 300 cfs through a new, minimum flow turbine-unit at Harris Dam; (b) discontinue implementation of Green Plan pulses, except when the minimum flow turbine-unit is out of service; (c) generate power in a peaking mode of operation; and (d) maintain the existing rule curve of Harris Lake during a new license term. While the license application includes a copy of the existing Green Plan schedule and protocols, it does not include the same information for the proposed peaking mode of operation. In order for staff to fully understand and analyze the operational changes proposed, please provide a detailed explanation of the proposed peaking operation, including use of the minimum flow turbine-unit, in terms of peaking cycles (magnitude of discharge, timing and frequency of peaking cycles, duration of peaking events, etc.).*

Alabama Power Response:

Under existing operations, as described in the Green Plan, releases (i.e., generation) are based on the previous day's flow at the Heflin gauge, with the number and duration of the releases varying according to the previous day's flow at the Heflin gauge and when the peak load occurs throughout the day. In Alabama Power's service territory, there is typically one peak in the summer months (late afternoon) and two peaks in the winter months (morning and evening).

In Alabama Power's proposed operations, under normal conditions, Alabama Power will continue to operate the Harris Project during daily peak-load periods to maintain reservoir levels according to the operating curve. Releases for flood control operations and system reliability issues (e.g., transmission support) will also continue to occur as needed.

Under normal conditions, the Project will typically generate power 1 to 6 hours per day. During the summer months, generation will typically be scheduled in the afternoon and, during the winter months, generation will typically be scheduled in the morning and evening. The magnitude of discharge will depend on system needs but will either be one unit (approximately 6,500 cfs) or two units (approximately 13,000 cfs). The minimum flow unit (approximately 300 cfs) will continue to operate during peaking cycles. Therefore, the total magnitude of discharge is expected to vary between approximately 6,800 cfs when one unit is operating and 13,300 cfs when two units are operating at their efficient gate settings.

It should be noted that the small increase in discharge due to the continuous minimum flow release during normal operations results in the same daily volume of water being released as compared to Green Plan (baseline) operations; some of the water that would have otherwise been passed through the existing turbines during peak generation or during Green Plan (baseline) pulses would now be passed through the minimum flow turbine.

Alabama Power is filing a revised Exhibit B with this AIR response that includes the requested operational information.

6. *In the R. L. Harris Water Control Manual (Appendix I of the Alabama-Coosa-Tallapoosa Water Control Manual, EXHIBIT C MEMORANDUM OF UNDERSTANDING BETWEEN CORPS OF ENGINEERS AND ALABAMA POWER COMPANY), there is a highlighted note: "INSERT SIGNED COPIES: MOU DATED 27 SEP 1972; REVISION TO MOU DATED 11 OCT 1990; AND 2011 "ATTACHMENT." Please provide copies of these documents in order for staff to fully understand project operation(s) within the greater Alabama-Coosa-Tallapoosa Basin.*

Alabama Power Response:

The R. L. Harris Water Control Manual (Appendix I of the Alabama-Coosa-Tallapoosa Water Control Manual) referenced in Question #6 is the R. L. Harris Water Control Manual dated May 2015. That version and the associated memoranda of understanding listed in Question #6 have been replaced and are no longer in effect. The U.S. Army Corps of Engineers (USACE) released a new R. L. Harris Water Control Manual as Appendix I to the Alabama-Coosa-Tallapoosa River Basin Water Control Manual dated April 2022. This April 2022 Harris Water Control Manual is the current version that describes project operations for the Harris Project. It contains no changes in project operations from the 2015 version but it is simply an administrative update to the 2015 version that the USACE issued for inclusion in its new ACT Master Manual. A copy of the April 2022 R. L. Harris Water Control Manual, including the November 2022 memorandum of understanding, is included in the Revised Exhibit B that is being submitted as part of Alabama Power's response to this AIR.

7. *On November 22, 2021, Alabama Power provided a geographic information system (GIS) shapefile labeled Harris_Baseline_Project_Boundary (2021 baseline project boundary) as part of its license application. The project boundary depicted in the 2021 baseline project boundary shapefile differs from the shapefile filed with the approved Exhibit G drawings for the project on March 17, 2017. Based on our review, it appears that the 2021 shapefile uses a different elevation, or different elevation model, to define the project boundary around Harris Lake, decreasing the total area within the 2021 baseline project boundary by approximately 5,440 acres. In addition, there appear to be areas where the project boundary diverges from elevation contours, and the 2021 shapefile does not align with the 2017 shapefile (e.g., shape and/or angle of the polygon is different, and there are new cutouts for what appear to be roads or right-of-way corridors). To facilitate our analysis of the proposed changes to the project boundary included in the license application, please explain the reason(s) for the differences between the 2021 baseline project boundary and the 2017 project boundary shapefiles. If the 2017 project boundary shapefile is still correct, please revise and refile: (1) the Proposed_Changes_June2022 shapefile to accurately depict the proposed changes (i.e., additions and removals of land and/or water acreage) to the project boundary in relation to the 2017 project boundary shapefile; and (2) any other GIS data filed with the license application that would need to be updated based on the use of the 2017 project boundary shapefile, such that all GIS data uses uniform coordinate systems, projections, and datums across all shapefiles.*

Alabama Power Response:

As discussed with HAT4 throughout the Project Lands Evaluation study and as noted by Alabama Power in its Project Lands Phase 2 progress update[5], "the Project Lands shapefiles were created with aerial photography and LiDAR information in order to provide a more accurate depiction of the project boundary. As such, the baseline shapefile is not the same as the FERC-approved boundary but is intended to depict the same information in a more accurate manner."

18 CFR § 4.41 requires data to be "positionally accurate to ±40 feet, in order to comply with the National Map Accuracy Standards for maps at a 1:24,000 scale (the scale of USGS quadrangle maps)," which is the accuracy at which the FERC-approved 2017 project boundary shapefile was created. This degree of accuracy is not, however, such that would have been adequate for relicensing studies. Other relicensing datasets (i.e., T&E, Erosion & Sedimentation, Recreation, etc.) were created at an accuracy level that exceeded that required by 18 CFR § 4.41 (i.e., other datasets were more accurate than quad-based project boundary data). In order to properly overlay the data for analysis and conduct spatial analyses during relicensing, it was necessary to create a more accurate (i.e., LiDAR-based) baseline project boundary. Further, it is Alabama Power's intention that the project boundary to be approved under the new license order incorporates the most accurate information available. This includes incorporating LiDAR information, survey information regarding property lines/corners, and utilizing aerial imagery to verify property boundaries. In order to compare the higher accuracy proposed project boundary to the quad-accuracy baseline, a new shapefile was created. For example, Alabama Power used survey and GPS information to depict project boundary corners located off of a contour. Therefore, the shape/angle of a polygon may differ from the 2017 data. Note, however, that both versions are intended to depict the same information. In other words, the 2022 LiDAR-based relicensing project boundary is not intended to have any property removed from it that has not been previously approved by FERC. Further, although the datasets may appear to have differing projections or to have been created using different digital elevation models, the difference in accuracy is what causes this appearance.

Regarding the removal of roads/corridors within the LiDAR-based baseline project boundary, this was done in error. The removal of these corridors was intended to be part of the proposed boundary and should not have been reflected in the baseline. Because the previously filed baseline data illustrated the roads removed in error, Alabama Power is including within this filing a corrected baseline project boundary shapefile named *Harris_Baseline_Project_Boundary_Dec2022.shp*. Additionally, a revised shapefile named *Proposed_Changes_Dec2022.shp* is also included within this filing to reflect the road corridors proposed for removal. Please note that the road corridors were already depicted as removed in

[5] 06-29-2021 Project Lands Phase 2 Progress (Accession No. 20210629-5089)

the *Harris_Proposed_Project_Boundary_June2022.shp* that was filed on June 15, 2022, and, therefore, there is no need to revise this file.

Additionally, when evaluating these shapefiles in order to answer this AIR, Alabama Power discovered errors in the 2017 FERC-approved data that account for the acreage difference noted by FERC ("decreasing the total area within the 2021 baseline project boundary by approximately 5,440 acres"). Alabama Power discovered that, within the 2017 FERC-approved data, the center of any area that is completely surrounded by project lands (i.e., a "donut hole") was filled in error. Therefore, the 2017 data depicts areas as projects lands that are not in fact included in the project. The FERC-approved Exhibit G drawings, however, do not illustrate this error due to the symbology used and, therefore, provide an accurate depiction (at a 1:24,000 scale) of the project boundary.

Lastly, Alabama Power is including within this filing a revised Exhibit A, Exhibit E, and Exhibit H for the purposes of updating the previously provided baseline acreage totals, as well as to include the removal of various road corridors as part of the license proposal.

Aquatic Resources

8. *Attachment 2 of Alabama Power's response to Commission staff's December 23, 2021 AIR Item #9 included an email from Dennis Devries of Auburn University to Jason Moak of Kleinschmidt with an attachment titled "Auburn Univ report to Alabama Power-Harris bioenergetics revised 10-19-21-CLEAN.pdf," dated October 20, 2021. This correspondence suggests that the most recent Bioenergetics report should be dated no earlier than October 19, 2021 if it was revised by Auburn University with corrected water quality data and filed as part of the November 2021 Aquatic Resources Report. However, the most recent version of the Bioenergetics report is dated January 2021. Therefore, please clarify whether the most recent version of the Bioenergetics report used the corrected water quality data, as stated in your response to AIR #9, "to describe the magnitude and duration of water temperature fluctuations and to determine if there were any differences in these fluctuations as a result of Green Plan implementation." If the most recent version of the Bioenergetics report was in fact filed to the record, please clearly identify and explain any discrepancies in the report, including an explanation for conflicting dates, as appropriate. If the most recent version of the Bioenergetics report was not provided previously, please file it to the record, along with: (1) a red-line version of the most recent report, including changes made since the January 2021 filing; or (2) a detailed list of all changes made by Auburn University and Alabama Power since the January 2021 report.*

Alabama Power Response:

Alabama Power provided the most recent version of Auburn University's Using Bioenergetics to Address the Effects of Temperature and Flow on Fishes in the Harris Dam Tailrace (Bioenergetics Report) (revised October 19, 2021) as Appendix D of the Aquatic Resources Study Report (Revised November 2021)[6]. Auburn University did not update the date on the title page of the report from January 2021; however, the report was revised by Auburn University on October 19, 2021 based on the revised temperature dataset. In Attachment B of its June 15, 2022 response to AIRs, Alabama Power included correspondence with Auburn University regarding the revised temperature data and impacts to the Bioenergetics Report. As noted in the correspondence, the following items were modified due to the revised temperature dataset:

- Pages 13 and 14 text regarding temperature deltas (both pages changed due to word changes on page 13 that spilled over as format changes on page 14)
- Table 2.1
- Figure 2.1
- Figures 2.2A, 2.2B, 2.2C, 2.2D
- Figure 2.3
- Figure 2.4
- Figure 2.5
- Figures 2.7A, 2.7B, 2.7C

[6] Concurrent with the Final License Application filed on November 23, 2021, Alabama Power filed all of its final or revised study reports.

9. *In response to Item #5 of staff's February 15, 2022 AIR, Alabama Power states that Discrete Bubble Modeling (DBM) was conducted and provides a brief discussion of the model results. However, the response does not include a detailed summary of the specific assumptions or rationale used to determine various inputs and parameters used in the model. The validity of model output is highly dependent on the assumptions incorporated into the model and input values. In order for staff to fully understand the results of the DBM exercise, please provide a detailed explanation of all assumptions, equations, or other information used to inform model inputs, including the boundary conditions, with rationale for the values used, and the results for each scenario modeled. In addition, please include any technical reports or memoranda associated with this modeling.*

Alabama Power Response:

The information requested can be found in an Assessment of a Minimum Flow Aerating Turbine at the R.L. Harris Hydroelectric Project with a Discrete Bubble Model, included with this AIR response (filed as CEII).

10. *Alabama Power's response to Commission staff's February 15, 2022 AIR Item #6 does not state whether the proposed minimum flow would maintain surface water elevations below the dam that are conducive to operation of the water quality monitoring equipment. Therefore, please clarify whether the proposed minimum flow would be sufficient to keep the proposed water quality monitoring equipment in the water so that it would monitor and report DO and temperature data reliably.*

Alabama Power Response:

As described in the various study plans and final license application, the DO and temperature monitoring site approximately 800 feet downstream of Harris Dam was chosen in consultation with ADEM. The site was selected for a few reasons, including being the only area in the vicinity with bank access that also had adequate depth to keep the monitoring probe submerged during current operations. By adding an additional approximately 300 cfs continuous minimum flow to the tailrace, the depth at the site will slightly increase over current baseline. Therefore, since the monitor is already submerged it will remain that way under the proposed minimum flow as well as any drought operation cutbacks that would be developed as outlined in the final license application.

Cultural Resources

11. *In Alabama Power's June 15, 2022 response to Commission staff's February 15, 2022 AIR Item #19, the updated site table indicates that there are 345 archaeological sites within the Area of Potential Effects (APE) at Harris Lake, 148 sites at Skyline, and 19 sites located downstream of Harris Dam. At Harris Lake, the table indicates that the State Historic Preservation Officer (SHPO) concurs with Alabama Power's National Register of Historic Places (National Register) evaluations of 55 sites (24 sites were recommended to be eligible, 31 sites were recommended to be ineligible). In addition, the updated site table indicates that 122 sites within the project APE have been recommended to be ineligible for listing, but concurrence from the Alabama SHPO has not been received. These sites are noted with a "No" or "No?" in the National Register eligibility column, and with an "N/A" in the SHPO determination column. The National Register eligibility of an additional 168 sites remains undetermined. The updated site table indicates that 11 of these 168 sites will be further assessed, 132 sites are currently inundated, and 25 sites have been "removed from consideration" through "appropriate consultation."*

    In addition, Item #19b of staff's AIR, requested documentation of written concurrence from the SHPO for each National Register recommendation provided with the license application. Alabama Power's AIR response included a copy of a letter dated April 27, 2022, from the Alabama SHPO, concurring with the eligibility recommendations for 9 sites that were addressed in a report titled A Cultural Resources Assessment and Testing Tracts to be Removed from the Harris Project Boundary in Randolph County, Alabama (Stager and Watkins, 2021). With respect to the other determinations of eligibility, the AIR response states that the Alabama SHPO "provided concurrence with the archaeological site information" in a letter dated June 8, 2022. However, a copy of this letter filed with the AIR response states only that "the site information provided matches our previous consultation records." A formal letter from Alabama Power to the SHPO requesting specific concurrence with the eligibility recommendations for each site was not provided with the AIR response, and the SHPO's letter does not provide specific concurrence with each site recommendation as required by section 106 of the National Historic Preservation Act, and its implementing regulations found at 36 CFR 8004(c)(2).

    All sites that have not been formally evaluated for listing on the National Register remain potentially eligible until such time that formal evaluations have taken place and specific Alabama SHPO concurrence with eligibility recommendations for each individual site has been received. Therefore, please file documentation of SHPO concurrence with Alabama Power's National Register recommendations for each site that has been recommended to be eligible, ineligible, or otherwise removed from consideration within the project APE at Harris Lake, Skyline, and along the Tallapoosa River downstream from Harris Dam. We suggest submitting the updated site tables for each area to the SHPO and requesting formal concurrence with each National Register recommendation and each recommendation for site treatment.

Alabama Power Response:

Alabama Power is including an updated site table for the Harris Project, with SHPO's October 28, 2022 concurrence, as a separate attachment to this AIR Response (filed as Privileged). For reference, a summary of the number and National Register eligibility of sites in the updated site table and Alabama Power's Revised Exhibit E is provided in Table 5 below. Exhibit E was revised to reflect these changes, where applicable. In addition, FERC noted it did not receive Alabama Power's letter to SHPO requesting concurrence with the eligibility recommendations. Alabama Power is including the communications with the SHPO from both FERC's February 2022 AIR and the August 2022 AIR with this filing (filed as Privileged).

Finally, Alabama Power plans to include a table of the 47 sites that are recommended eligible in the APE in the next version of the HPMP.

Table 5 Harris Project Cultural Resources Sites National Register of Historic Places Eligibility

	NRHP Eligibility					
	No?	**No**	**Undetermined**	**Ineligible**	**Eligible**	**Total**
Lake Harris	**117**	**6**	**165**	**28**	**22**	**338**
Skyline	**None**	**None**	**111**	**18**	**19**	**148**
Downstream	**None**	**None**	**9**	**4**	**6**	**19**

Attachment 2

Contents of Response to August 29, 2022 Harris Project License Application Additional Information Request

CONTENTS OF FILING

R.L. Harris Hydroelectric Project (P-2628)

DESCRIPTION	SECURITY	FILE NAME
Cover Letter, AIR #3 Response Document	Public	2022-12-27 Cover Letter for AIRs.pdf
Exhibit A	Public	Exhibit_A_December2022.pdf
Exhibit B	Public	Exhibit_B_December2022.pdf
Exhibit B – Appendix F	Privileged	Exhibit_B_AppF.pdf
Exhibit E	Public	Exhibit_E_December2022.pdf
Appendices A through H	Public	Exhibit_E_Appendices_December2022.pdf
Exhibit H	Public	Exhibit_H_December2022.pdf
AIR#3, QUESTION ??		
Assessment of a Minimum Flow Aerating Turbine at the R.L. Harris Hydroelectric Project with a Discrete Bubble Model	CEII	Discrete_Bubble_Model_Report.pdf
AIR#3, QUESTION 11		
Updated Site Table	Privileged	AIR3Q11_Site_Info_Table.pdf
SHPO Concurrence/Consultation	Privileged	AIR3Q11_SHPO_Consult.pdf
SHAPEFILES		
AIR #3, Question 7 - Corrected Baseline Project Boundary	Public	Harris_Baseline_Project_Boundary_December2022.zip
AIR #3, Question 7 - Revised Proposed Changes to Project Boundary	Public	Proposed_Changes_December2022.zip