

137 FERC ¶ 62,258
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Appalachian Power Company

Project No. 739-022

ORDER ISSUING NEW LICENSE

(December 27, 2011)

Article 404. Water Management. The Water Management Plan is approved and made part of the license and may not be amended without prior Commission approval. Upon license issuance, the licensee shall implement the Water Management Plan, filed June 29, 2009, consistent with the provisions contained within Part I, *Special Conditions*, sections D and E of the attached section 401 Virginia Water Protection Permit, issued February 14, 2011 (attached), and shall include the following modifications:

- (a) provisions for a minimum of two annual whitewater flow releases, in addition to the May squirt boat competition, to be scheduled during each annual review; and
- (b) provisions for providing, via a publically-accessible website: the dates and timing of planned whitewater flow releases; a clear description of the project's flow regime, as required by this license and the Virginia Department of Environmental Quality's section 401 Water Quality Certification; and tools to assist the public in predicting flow travel time from Claytor dam to reaches between the project and Glen Lyn.

Article 405. Reservoir Drawdown. At least 3 months prior to implementing a non-emergency reservoir drawdown, the licensee shall file with the Commission, for approval, a reservoir drawdown plan. The purpose of the drawdown plan is to minimize the impact of any project maintenance activity requiring a reservoir drawdown on aquatic resources in the project reservoir and downstream of the project and to allow shoreline property owners sufficient time to plan shoreline maintenance activities.

The licensee shall prepare the plan after consulting with the U.S. Fish and Wildlife Service, Virginia Department of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, Virginia Department of Environmental Quality, Pulaski County, New River Valley Planning District Committee, and the Friends of Claytor Lake.

The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and

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provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons based on project-specific information.

The licensee shall notify the public of the reservoir drawdown and shall notify property owners along the shoreline by mail of the drawdown 45 days prior to implementing the drawdown to allow property owners sufficient time to plan shoreline maintenance activities. The notification shall include rate (feet per day), limit in feet, and term of the drawdown.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

**Claytor Project No. 739
Appalachian Power Company
Water Management Plan**

Final - June 2009

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Claytor Project Water Management Plan:

1. Description of Current Project Operations:

The Claytor Project is a conventional hydroelectric facility on the New River in Pulaski, Virginia. There are four generating units with a total installed capacity of 75 MW and a total hydraulic capacity of 10,000 cfs. The reservoir backs water a distance of 21.67 miles. The surface area of the lake is 4,360 acres at full pond and has approximately 100 miles of shoreline.

The Project boundary at Claytor is generally the 1850 foot National Geodetic Vertical Datum (NGVD) contour. The normal full pond elevation at Claytor (as measured at the dam) is 1846.0 feet NGVD. During periods of high inflow, water elevations may increase above 1847.0 feet NGVD.

Under the current requirements of its 401 Certification, Appalachian is required to release an average daily flow of 750 cfs (7Q10) below the dam or inflow, whichever is less. (Note: While the 401 requirement is for an average daily flow, Appalachian has generally operated the plant to provide an average hourly flow of 750 cfs.)

During April 15th to October 15th, Appalachian voluntarily operates the project to maintain more constant downstream flows. While there is no license-required operation range during this period, the Project is generally operated to maintain reservoir elevations between 1845.0 feet NGVD and 1846.0 feet NGVD. If inflow is less than one unit flow, a unit is run in autocycle. This means that the unit will operate for a portion of the hour to provide flow. For example, to release an average hourly flow of approximately 750 cfs, the unit will operate for 23 minutes every hour.

Under a cooperative agreement with Virginia Department of Game and Inland Fisheries (VDGIF), Appalachian operates the Project to maintain stable reservoir elevations at or above 1,844 feet NGVD between April 15th through June 15th to protect spawning habitat for shallow water spawning fish.

From October 16th to April 14th, Appalachian operates the Claytor Project as a peaking facility. Typically the Project is operated so that the impoundment is full on Monday morning and is drawn down approximately 1-2 feet over the course of the week (between 1846 feet and 1844 feet), and then refilled over the weekend during the lower demand period. Peaking involves discharging flows during a morning peaking period and evening peaking period. During the hours outside of the peaking periods, an average hourly minimum flow requirement of 750 cfs is met. The amount and duration of the peaking depends on the amount of water available.

Appalachian has been providing for an annual drawdown of the reservoir in order to enable lake residents to clean up debris around their shoreline and to make repairs to their docks and shoreline stabilization. The drawdown is typically in the November /December timeframe and lasts two weeks. During the drawdown, the lake is lowered five feet to 1841 feet NGVD. The rate for lowering the reservoir is one foot

per day. On occasion there has been an eight-foot drawdown in the past to allow for the observation of changes in sedimentation deposits within the lake.

There have been occasions where Appalachian has provided special releases for downstream recreation events.

2. Proposed Operation Under the Term of the Next FERC License

As part of Appalachian's relicensing efforts, two studies were completed to provide information to help formulate how the project should be operated over the term of the next license in order to meet the various demands on the available water source. These studies include the Instream Flow Needs and Reservoir Elevation Study and the Flows and Recreation on the New River, Virginia Study.

The Instream Flow Needs Study utilized PHABSIM (physical habitat simulation) to determine the relationship between streamflow and habitat suitability criteria for selected aquatic species, life-stages or community guilds. PHABSIM relies on hydraulic field data for calibration of computer simulation models, plus suitability criteria for the major mesohabitat variables of water velocity, depth, and substrate /cover.

The Flows and Recreation on the New River, Virginia Study 1) identified flow-sensitive recreation opportunities; 2) described flow-quality relationships and flow ranges for recreation; 3) identified acceptable limits of fluctuations for recreation; and 4) and identified potential ways to improve recreation.

For the purpose of this section, the following modes of operation are defined as follows:

Peaking Operations – Releasing water during the peak demand periods, typically a several hour period in the morning and a several hour period during the evenings, and allowing the reservoir to refill during low demand periods, typically evenings and weekends. The duration of the peaking period depends on the amount of water available. Operations to meet 10-minute emergency response and blackstart are also included under this category. Individual units will be brought on-line in 15 minute intervals and off-line in 30 minute intervals. If operating the plant to meet blackstart or 10-minute response, there is no delay in bringing individual units on-line. With the loss of any generating capacity or outage of a key transmission facility on Appalachian Power Company's system, the Claytor Project can be brought from minimum or no load to full load within 10 minutes, thereby, contributing to the maintenance of system integrity. In addition, in the unlikely event that a blackout should occur on Appalachian Power Company's system, the Claytor Project could serve as a primary resource for restoration of the system.

Levelized Flow Operations – Releasing equal amounts of water over the course of a 24 hour period so that the outflow of the project approximately equals the inflow into the project and so that water levels on the reservoir are maintained within a one foot

band. Recreational releases may be provided under this mode of operation within the one foot band of reservoir fluctuation. The following section describes how the project will be operated under the new license:

A. Downstream Minimum Flow Requirements

Appalachian is proposing to provide a minimum average hourly flow downstream of the Claytor Dam as described in Table 1. Minimum flow will be released through the units by autocycle operation or through a spillway gate if no units are available.

a. Autocycle Operation:

During periods when the required discharge is less than one unit's discharge, a unit at Claytor will be operated on an hourly autocycle basis to provide the required flow. For example, one unit would be operated for 23 minutes each hour for an average hourly discharge of 750 cfs. (One unit averages a discharge of 2000 cfs.)

b. Providing Flow during Plant Outages:

There are seldom times when all four units at Claytor are out of service at the same time. However, if all units are scheduled out of service, plant personnel will open a spillway gate to establish required flows prior to taking the units out of service. If there is an event where all units are forced out of service, Roanoke Operations Center staff will immediately notify plant personnel to open a spillway gate in order to reestablish minimum flows as required. The flow will generally be restored within one hour. The response time during adverse conditions may be slightly longer.

B. Plant Operations and Reservoir Level Fluctuations

Appalachian proposes to operate in Levelized Flow mode from April 1st to November 30th and in Peaking mode from December 1st to March 31th. Table 1 provides a summary of reservoir levels and plant operations by month.

The following reservoir elevations will be observed during normal operating conditions:

From April 1st to November 30th, the project will be operated in Levelized Flow mode and the reservoir elevations will be maintained between 1845.0 feet NGVD and 1846.0 feet NGVD under normal operating conditions. Recreation releases will be provided as outlined in Section 2.C.

From December 1st to March 31th, the project will be operated in Peaking mode and the reservoir elevations will be maintained between 1844.0 feet NGVD and 1846.0 feet NGVD under normal operating conditions.

During periods of abnormal operating conditions of high inflow (inflow greater than plant capacity), reservoir elevations may rise up to and occasionally above 1847.0 foot elevation as measured at the dam. In anticipation of high inflow events, Appalachian may reduce the reservoir elevation to 1841.0 feet to provide additional inflow storage capacity. The intent of this drawdown is to lessen the impact on downstream. Prior to lowering the reservoir to 1841.0 feet, Appalachian will notify Claytor Lake State Park, Pulaski County, Virginia Department of Game and Inland Fisheries, marinas on the lake, and Friends of Claytor Lake. Flood operations are discussed below in Section 3.

Table 1: Minimum Flows, Mode of Operation and Reservoir Elevation Summary

Month	Minimum Average Hourly Flow Released from Claytor	Mode of Operation	Reservoir Levels*	Special Conditions
January	1000 cfs or inflow, whichever is less	Peaking	1844' – 1846'	
February	1200 cfs or inflow, whichever is less	Peaking	1844' – 1846'	
March	1200 cfs or inflow, whichever is less	Peaking	1844' – 1846'	
April	750 cfs or inflow, whichever is less	Levelized Flow	1845'-1846'	Spawning on the Reservoir
May	750 cfs or inflow, whichever is less	Levelized Flow	1845'-1846'	Spawning on the Reservoir
June	750 cfs or inflow, whichever is less	Levelized Flow	1845'-1846'	Spawning on the Reservoir
July	750 cfs or inflow, whichever is less	Levelized Flow	1845'-1846'	
August	750 cfs or inflow, whichever is less	Levelized Flow	1845'-1846'	
September	750 cfs or inflow, whichever is less	Levelized Flow	1845'-1846'	
October	750 cfs or inflow, whichever is less	Levelized Flow	1845' – 1846'	
November	750 cfs or inflow, whichever is less	Levelized Flow	1845' – 1846'	
December	1000 cfs or inflow, whichever is less	Peaking	1844'- 1846'	

***During normal operations. Levels during flood operations are provided in Section 3. of this plan.**

C. Provisions for Downstream Recreation Flows

The following recreation flows will be provided as described below when water is available (i.e. the reservoir limits in Section 2.A above can be maintained.)

Table 2: Recreation Flows

Month, Day of the Week or Date of Event	Flows to be Provided	Comments
Squirt Boat Competition - May	This competition encompasses several events that require the Radford Gage to be between 2.7' and 3.2' during one Thursday through Sunday period in May.	Flows can be accommodated if inflow is sufficient during this period. Reservoir elevations to be maintained between 1845' and 1846'
August, September, and October: when inflow is between 800 cfs and 1000 cfs	Recreation releases of 1000 cfs to provide flows at McCoy Falls between 8 am and 8 pm on Saturday and Sundays. When not releasing recreation flows, discharges will be 750 cfs.	Reservoir elevations to be maintained between 1845' and 1846'

Other special recreation releases may be considered following a review by the Technical Review Committee as described in Section 5.

In order to provide better flow information to the New River recreational users, information related to releases from the dam will be provided to the public via AEP's website, AEP.com.

D. Emergency Drawdown

Emergency drawdowns for short periods of time will be allowed for the maintenance of dam structures following prior consultation with Virginia Department of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, Virginia Department of Environmental Quality. Friends of Claytor Lake and marinas on the lake will be notified. Commission will be notified within 10 days of this type of drawdown.

E. Variance Process

It is important to have a process that allows for consultation with stakeholders for periods that are not typical, non-emergency drawdowns, or for extreme events. Under the new license, Appalachian is proposing to obtain the ability to consult with state agencies, stakeholders that live on Claytor Lake and stakeholders downstream from the project as appropriate to determine if a variance to this plan is needed. Appalachian is requesting that the language in the new license to include the following:

Appalachian may request that discharge flows and reservoir elevations be temporarily modified (less than 45 days) from those described by this Plan upon mutual agreement between the licensee and the Virginia Department of Environmental Quality (VDEQ), in consultation with the Virginia Department of Game and Inland Fisheries and Virginia Department of Conservation and Recreation, following appropriate public input as determined by VDEQ. If flows or elevations are so modified, licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident. Appalachian will provide agencies 30 days to review requests for a variance unless agencies agree to a shorter review time.

3. Flood Operations

Claytor Project is not a flood control project. However, if high inflow (greater than plant capacity) is expected, Appalachian may lower the reservoir to 1841 feet to provide additional inflow storage and release this flow downstream over a longer period of time. The intent of this is to lessen flooding events downstream. The reservoir would hold an additional 21,000 acre-ft of water between elevation 1841' and 1846'. This type of drawdown is typically short in duration (less than 2 days) and would not require a variance as described in Section 2.D or E. Notifications of changes in operation due to heavy inflow events will be implemented as follows:

A. Notification of Lowering of Reservoir and Operation of Spillway Gates

a. Claytor Reservoir:

The Claytor Reservoir elevation may be reduced to 1844 feet NGVD at any time when inflow is greater than plant capacity without prior notice as this is within normal operating levels during a year. If the reservoir elevation is going to be lowered below 1844 feet to 1841 feet, the following notifications will be made prior to lowering the reservoir:

- 1) Claytor Lake State Park (Virginia Department of Conservation and Recreation)
- 2) Virginia Department of Game and Inland Fisheries
- 3) Virginia Department of Environmental Quality

- 4) Rock House Marina
- 5) Conrad Brothers Marina
- 6) French Marina
- 7) Friends of Claytor Lake

If elevations are so modified, licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident.

Note: While these notifications will be made prior to lowering the reservoir, all shoreline property owners on Claytor Lake need to be aware that water levels can be lowered to 1841 feet at some point during the course of a normal year. In addition, water levels can increase above 1846 feet NGVD during periods of high inflow.

b. Downstream of Claytor Dam:

Appalachian maintains a notification sheet for downstream areas as part of its Claytor Emergency Action Plan (EAP) – Condition C (Non-failure Flood Notification List). Appalachian first notifies National Weather Service and Bluestone Dam when plant capacity is 100%. If operating the spillway gates is anticipated, these agencies are contacted again along with Radford City Police, VA Dept of Emergency Management, WV Div. of Homeland Security and Emergency Management, Radford Filtration Plant, and Radford Army Ammunition Plant. When the spillway gates are operated, the above listed agencies are recontacted along with the Pulaski, Montgomery, and Giles County Sheriffs, Radford University Police and the Towns of Narrows and Glen Lyn. These groups continue to be contacted at various stages of increased flow during the flood event. There are also contacts for downstream businesses and residents that are included in the notification list. Appalachian will continue to provide these contacts under the term of the new license. This notification sheet is updated annually as part of the Claytor EAP.

4. Project Operations Monitoring

A. Measurement of Water Levels

Forebay (reservoir) and tailrace (below dam) water level transducers provided upstream and downstream of Claytor dam record both elevations continuously. The elevations are monitored at the Roanoke Operations Center (ROC) located in Virginia and at the American Electric Power System Control Center located in Columbus, Ohio. In addition to the electronic devices, there are staff gages located upstream and downstream that are calibrated with the transducers. Cameras are located at that dam to give a continuous visual indication of forebay and tailrace elevations to the centers.

B. Measurement of Flows

Discharges from Claytor dam are based on discharge curves for the units. The ROC monitors discharges and adjusts unit operations as needed to meet required flows.

Downstream river flows are measured at the USGS river gages at Radford (USGS Gage No. 03171000) and Glen Lyn(USGS Gage No. 03176500).

Inflows into the project are monitored at USGS River gages located at Allisonia (No. 03168000) and Galax (No.03164000.) Appalachian maintains equipment that is located inside these USGS gage houses, and flow and stage information is transmitted continually back to the ROC. The flow at Galax is multiplied by a drainage area ratio of 1.75 to give an approximation of inflow into the project. Operators monitor this inflow and the reservoir water levels to ensure that the water within the project is being appropriately processed.

C. Reporting Criteria

Under the new license, the required flows will be measured at the Claytor dam. The Roanoke Operations Center will monitor flows on an hourly basis and make adjustments to meet the downstream required flows as needed. If the average hourly flow does not meet the required minimum flow in Section 2.A. or if reservoir levels fall outside those listed in Section 2.B., then Appalachian will notify the Commission within 10 days following the incident.

5. Management Plan Review and Update

Appalachian is proposing that a Water Quality / Water Management Plan Technical Review Committee be established with representatives from the Virginia Department of Game and Inland Fisheries, Virginia Department of Environmental Quality, Virginia Department of Conservation Recreation, Friends of Claytor Lake, Friends of the New River, county governments, representatives from downstream recreation organizations/outfitters and other interested stakeholders as appropriate.

A. Annual Review:

The Technical Review Committee will meet each year to review the Water Management Plan. This review will provide an opportunity for the stakeholders to recommend minor modifications to the plan that would be within the operations limitations of Section 2.B – Plant Operations and Reservoir Level Fluctuations. Any requests for special recreation releases as described in Section 2.C. Provisions for Downstream Recreation Flows will be discussed at this time.

B. Five Year Review:

A broader review of the Water Management Plan will be conducted every five years following the issuance of the license. This review will provide an opportunity to discuss the need for modifications to the plan that would require Commission approval.

A report will be filed with the FERC within six months following the update meeting and will include consultation with the above listed stakeholders. The report will contain the following for the five year reporting period:

- a. Summary of lake level fluctuations
- b. Summary of flow releases from Claytor
- c. Generation records for Claytor
- d. Discussion of how project operations compares to license requirements, including a record and explanation of any deviations from such requirements
- f. Proposed modifications to the Water Management Plan for Commission approval
- g. Consultation Documentation
- h. Summary of any variances issued, including the circumstances under which each was requested and the actions taken during each variance period.
- i. Discussion of any declared drought events and the steps taken to adjust operations, if applicable.
- j. Discussion of any known or reported safety concerns related to project operations that occurred during the reporting period.