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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Appalachian Power Company

Project No. 739-022

ORDER ISSUING NEW LICENSE

(December 27, 2011)

Article 402. Erosion Monitoring. The Erosion Monitoring 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 Erosion Monitoring Plan, filed June 29, 2009, and shall include the following modifications:

- (a) add the Skyline Soil and Water Conservation District as a consulted party on the Erosion Technical Review Committee; and
- (b) include quantitative method(s) (*i.e.*, bank pins) for monitoring erosion in the New River downstream from Claytor dam.

Appalachian Power Company
Claytor Project No. 739

Erosion Monitoring Plan

June 2009

Background:

The Erosion Study prepared for the relicensing of the Claytor Project identified the effects of project operations on erosion of the shoreline of the Claytor reservoir and the riverbanks downstream of the dam to the U.S. 460 bridge near Glen Lyn, VA. This was accomplished through a combination of field reconnaissance, GIS analysis and numerical modeling. For the reservoir, potential causes of erosion that were studied include water level fluctuations, wind wave and boat wakes.

The COSMOS numerical shoreline erosion model showed that the effects of wind-wave and boat wakes were the main shoreline erosion mechanisms, and the boat wakes were, by far, the most important erosion mechanism on the lake. While operational changes in water level act to adjust the location of interaction between waves and the shoreline profile, the water level fluctuations alone is not the cause of shoreline erosion. Approximately 31% of the shoreline around Claytor Lake is now under some form of erosion protection. The majority of the unprotected shoreline with bare slope faces (and therefore identified as “actively eroding”) are limestone bedrock scarps around the lake, but they are eroding at a very low rate (i.e. on a geologic timescale) of retreat through solutional processes. The more erodible sapprolite or sand shorelines may be eroding at rates of up to 0.5 meters per year where they are subject to high-energy wave climates. A shoreline height of 3 to 4 feet was most common, and this reflected the removal of topsoils and sapprolite from underlying bedrock in most cases. It is likely that much of this erosion took place during the early phases of the project and is taking place at a lower rate now that most wave action is against the more resistant underlying rock. However, these bedrock faces are in direct contact with the water, and generally steep and clear of vegetation, so they were classified as actively eroding, even though the present rate of retreat is very low, due to the resistant nature of the bedrock.

Areas of accelerated erosion immediately downstream from Claytor Dam in the New River, were identified, but operational effects on erosion appear limited to the zone of fluctuating water level from Claytor dam to Radford, VA as a result of flow releases. ‘Hotspots’ of accelerated erosion were identified along the banks of the New River, but these were associated with disturbance from landowner activities such as overgrazing and cattle trampling the riverbank, and with geologic constructions on river channel dimensions, as opposed to the general background fluctuations from project operations. The river channel downstream from Claytor dam to the Town of Radford has approximately 2-3 feet high zone at the bottom of the river banks where the banks are eroding and tree roots are exposed. As would be expected, the overall pattern of bank erosion is sporadic, being lower in wider, slower moving sections of the river and higher in more constrained sections of the river.

1. Monitoring of Erosion:

Under the new license, Appalachian is proposing to continue monitoring the erosion along the shoreline of the reservoir and the riverbanks downstream of the dam as described below:

- a) The Erosion Monitoring Plan will be implemented within one year of the Commission's approval of the Erosion Monitoring Plan.
- b) **Methods for Monitoring Lake Erosion:** A detailed topographic survey will be conducted on the specified slope at each monitoring location. Data will be collected to provide full coverage of the bank from top to bottom. GPS data and photographs of each site will also be collected. The topographic survey will provide contour elevation data for the land surface in the area being mapped for comparison to previous surveys. Detailed topographic control elevation information (2 foot intervals) of the shoreline was obtained as part of the relicensing efforts.
- c) **Methods of Monitoring Downstream of Claytor Dam:** Photographic documentation of areas downstream of Claytor Dam will be collected for comparison to the previous year's photos. GPS data will be collected to ensure that the same sites are monitored each year.
- d) **Locations to be Monitored:**

Reservoir: Areas identified as having the more erodable sand or sapprolite soils as shown in the revised Shoreline Material Classification Mapping developed as part of the Claytor Relicensing Erosion Study will be monitored to document shoreline conditions and erosion. These sites cover a range of existing conditions along the shoreline including varying degrees of scarp heights, wind and wake conditions. Maps showing the location for future monitoring sites (as denoted by white dot) are provided in Appendix A of this plan.

Downstream: Ten sites below Claytor Dam as shown on the map in Appendix B will be monitored to document riverbank conditions. These are the same sites (Nos. 1 – 10) that were monitored in the Erosion Study completed as part of the relicensing efforts. These sites extend 11.6 miles downstream of the dam.