

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

**Appalachian Power Company**

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**Project No. 2514-186**

**REQUEST FOR REHEARING OF  
OF STUDY PLAN DETERMINATION**

Pursuant to Section 313(a) of the Federal Power Act<sup>1</sup> and Rule 713 of the Rules of Practice and Procedure of the Federal Energy Regulatory Commission (“FERC” or “Commission”),<sup>2</sup> Appalachian Power Company (“Appalachian”), licensee and potential applicant for new license for the Byllesby-Buck Hydroelectric Project No. 2514 (“Project”), hereby requests rehearing of the Study Plan Determination (“SPD”) issued by the Commission’s Director of the Office of Energy Projects (“Director”) on November 18, 2019.<sup>3</sup> Specifically, Appalachian requests rehearing of the Director’s determination that Appalachian’s Water Quality Study must be expanded to include *continuous* turbidity monitoring during the study period.

As discussed herein, the Director’s determination is in error, is arbitrary and capricious, and is not supported by substantial evidence in the record. While several agencies mentioned turbidity in passing, no agency, including FERC, filed a study or information request supported by the Commission’s study criteria set forth in 18 C.F.R. § 5.9(b) for a turbidity monitoring component of the Water Quality Study. The Director also did not provide any additional information or evidence to support the need for a costly and unnecessary expansion of Appalachian’s turbidity monitoring proposal. Further, the Director failed to explain why

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<sup>1</sup> 16 U.S.C. § 825l(a).

<sup>2</sup> 18 C.F.R. § 385.713 (2019).

<sup>3</sup> Letter Order, Terry L. Turpin, Director, Office of Energy Projects, Study Plan Determination for the Byllesby-Buck Hydroelectric Project, Project No. 2514-186 (issued November 18, 2019), at pgs. B-7 to B-8.

Appalachian's proposed level of effort described in its revised Water Quality Study would not be sufficient to meet the purported information needs, failed to address the additional level of effort and cost to implement its determination, and made assertions regarding the purported purpose of the turbidity monitoring, the causes of turbidity, and the potential effects of turbidity that are unsupported by the record.

Accordingly, Appalachian respectfully requests the Commission to grant rehearing and remove from the SPD the requirement to conduct *continuous* turbidity monitoring. In the alternative, Appalachian requests the Commission to approve the revised Water Quality Study attached hereto as Appendix A, which includes redline additions to the revised Water Quality Study intended to provide further detail regarding Appalachian's monthly, multi-parameter data collection efforts. Appalachian's proposal set forth in Appendix A would gather sufficient information regarding potential turbidity effects as it relates to Project operations and would cost significantly less to implement than the *continuous* monitoring required by the Director in the SPD. Because the Director raised the issue of continuous turbidity monitoring *sua sponte*, and such a request was not made by any agency or by Commission staff previously, it is appropriate for Appalachian to offer Appendix A as an alternative to the Director's SPD in this request for rehearing.

## **I. STATEMENT OF ISSUES AND SPECIFICATIONS OF ERRORS**

Pursuant to Rule 713(c)(2) of the Commission's Rules of Practice and Procedure,<sup>4</sup> Appalachian states that the matter raised herein presents the following issue:

Whether the Director's modifications in the SPD to the turbidity monitoring component of the Water Quality Study are in error, unsupported by substantial evidence, arbitrary and capricious, and inconsistent with the Commission's regulations. 16 U.S.C. § 825/;

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<sup>4</sup> 18 C.F.R. § 385.713(c)(2).

18 C.F.R. § 5.9(b)(1)-(7); *City of Centralia v. FERC*, 213 F.3d 742, 748 (D.C. Cir. 2000).

## II. BACKGROUND

The Project is located on the New River in Carroll County, Virginia, and consists of two riverine developments: Byllesby and Buck. Each development includes a dam, powerhouse, forebay, tailrace, and bypassed reach. Appalachian is the owner and licensee of the Project, and the existing license expires on February 29, 2024.

### A. Pre-Application Document

On January 7, 2019, Appalachian initiated the Integrated Licensing Process (“ILP”), pursuant to Part 5 of the Commission’s regulations,<sup>5</sup> by submitting to FERC a Notice of Intent to seek a new license for the Project and a Pre-Application Document (“PAD”). The PAD included a brief description of Appalachian’s proposed studies for the Project, which were based on the issues identified during consultation with resource agencies, tribes, and other stakeholders, and included a proposal to conduct a Water Quality Study to monitor dissolved oxygen (“DO”), water temperature, and water level at a location upstream of the Byllesby reservoir and at a location downstream of each powerhouse tailrace.<sup>6</sup> In addition, Appalachian proposed that the Water Quality Study would include depth profile measurements once per calendar month to measure temperature, DO, acidity (“pH”), and specific conductance using a portable Hydrolab or similar data sonde at three locations spaced evenly across the forebay of each development.<sup>7</sup>

On May 7, 2019, Virginia Department of Game and Inland Fisheries (“VDGIF”) and U.S. Department of the Interior, Fish and Wildlife Service (“FWS”) filed comments on the PAD and

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<sup>5</sup> 18 C.F.R. Part 5.

<sup>6</sup> Pre-Application Document for the Byllesby-Buck Hydroelectric Project, FERC Project No. 2514, at pgs. 6-3 to 6-4 (filed January 7, 2019).

<sup>7</sup> *Id.*

the proposed studies described therein. With respect to their comments on the proposed Water Quality Study, the full extent of VDGIF's and FWS's comments related to turbidity is the following:<sup>8</sup>

In addition, the [water quality] study needs to examine turbidity effects of project operations.

Neither agency accompanied this information request with the study criteria itemized in 18 C.F.R. § 5.9(b), which are factors that Commission staff must consider *before* requiring a potential license applicant to develop any information or study requests.<sup>9</sup> Commission staff did not file comments on the PAD and did not inform Appalachian of the need for any information or study requests related to water quality.<sup>10</sup>

### **A. Proposed Study Plan**

On June 21, 2019, Appalachian filed with FERC a Proposed Study Plan ("PSP") that included eight studies, including a Water Quality Study.<sup>11</sup> Appalachian's proposed Water Quality Study included two components, identified as "Tasks." Task 1 proposed continuous water

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<sup>8</sup> VDGIF Comments on Pre-Application Document, Scoping Document 1, and Study Requests (filed May 7, 2019); FWS Review of Pre-Application Document, Scoping Document 1, and Request for Studies (filed May 7, 2019).

<sup>9</sup> 18 C.F.R. § 5.9(b) states as follows (emphasis added): "Any information or study request *must*:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
- (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
- (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
- (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
- (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
- (6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge; and
- (7) Describe consideration of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs."

<sup>10</sup> 18 C.F.R. § 5.9(a) states that comments on the PAD, "*including those by Commission staff*, must be accompanied by any information gathering and study requests." (emphasis added).

<sup>11</sup> Proposed Study Plan, at pgs. 40-46 (filed June 21, 2019).

temperature and DO monitoring for a five-month period (from May 1 to September 30, 2020) using multi-parameter water quality instrumentation (*i.e.*, sondes) at eight locations that encompassed the upper reaches of the Byllesby reservoir, locations near the Byllesby and Buck dams, locations in each tailrace below the Byllesby and Buck powerhouses, and two locations in each of the bypassed reaches.<sup>12</sup> Although Appalachian did not specify which model sonde it would use, Appalachian's consultant developed the Water Quality Study and associated cost estimate assuming the use of Onset HOBO Dissolved Oxygen Loggers ("HOBO logger") (or equivalent) at each monitoring location. The HOBO logger is the industry-standard for measuring water temperature and dissolved oxygen, and each unit has a list price of \$1,250.<sup>13</sup> The HOBO logger is small and ranges in size from 1.56 inches to 10.5 inches, and therefore is capable of being placed *in situ* for the purpose of continuous monitoring, even if the logger must be collocated with a permanent structure (where feasible) or weighted to provide protection during high-flow events.

Task 2 proposed monthly monitoring during the same five-month period of temperature, DO, pH, and specific conductance using a single, portable, multi-parameter data sonde, such as an OTT HydroMet Hydrolab MS5 Multiparameter Mini Sonde ("Hydrolab MS5"), at three locations spaced evenly across the forebay of each reservoir above Byllesby and Buck dams.<sup>14</sup> In addition, to accommodate the agencies' one-sentence information requests regarding turbidity monitoring as part of the Water Quality Study, Appalachian added to Task 2 the measurement of chlorophyll *a* and turbidity in the forebay of each development.<sup>15</sup> A multi-parameter data sonde equivalent to the Hydrolab MS5 is the industry-standard for measuring water quality parameters beyond water

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<sup>12</sup> *Id.* at pgs. 42-43.

<sup>13</sup> Specifications and price information for the HOBO logger is provided in Appendix B hereto.

<sup>14</sup> Proposed Study Plan, at pg. 46 (filed June 21, 2019).

<sup>15</sup> *Id.*

temperature and dissolved oxygen.<sup>16</sup> Each Hydrolab unit costs approximately \$10,000 to purchase, or a unit can be rented for approximately \$1,500 per month.<sup>17</sup>

Although the Hydrolab MS5 is an excellent tool for multi-parameter water quality monitoring, it is undesirable for monitoring only water temperature and dissolved oxygen levels because it is significantly more expensive than other instruments (*e.g.*, the HOBO logger) that are capable of monitoring water temperature and dissolved oxygen levels. The Hydrolab unit is also much larger and more conspicuous than other instruments (at 30 inches long), and thus may be visible to members of the public, making it vulnerable to vandalism or theft. The size also makes the Hydrolab unit vulnerable to damage or displacement due to debris or high river flows. These factors are particularly concerning given the higher cost of replacing each unit.

In the PSP, Appalachian estimated that its level of effort to complete the Water Quality Study, inclusive of Tasks 1 and 2, would be approximately 400 hours and would cost approximately \$60,000.<sup>18</sup>

On September 18, 2019, VDGIF filed comments on the PSP pursuant to 18 C.F.R. § 5.12, which requires that “[a]ny proposed modifications to the potential applicant’s proposed study plan *must* address the criteria in § 5.9(b).” (emphasis added). VDGIF’s comments on the PSP state *in full* with respect to comments on the Water Quality Study and the turbidity component thereof:<sup>19</sup>

Finally, VDGIF staff mentioned concerns about downstream turbidity effects of the Project in our May 7 comments, but this study fails to provide a plan for assessing turbidity effects.

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<sup>16</sup> Specifications for the Hydrolab MS5 data sonde are included in Appendix B hereto.

<sup>17</sup> While price information for this multi-parameter logger is not listed online, Appalachian’s estimates are based on past experiences of Appalachian personnel and consultants.

<sup>18</sup> Proposed Study Plan, at pg. 46 (filed June 21, 2019).

<sup>19</sup> VDGIF Comments on Proposed Study Plans, at pg. 2 (filed Sept. 18, 2019).

This comment was VDGIF's first reference to its desire to modify the Water Quality Study to gather information related to *downstream* turbidity effects. As with its prior comments, VDGIF did not provide supporting information based on the criteria set forth in 18 C.F.R. § 5.9 to support its new request for information related to *downstream* turbidity effects of Project operations. Neither FWS' nor FERC staff's comments on the PSP mention Appalachian's proposal to measure turbidity monthly as part of the Water Quality Study, nor did either request modifications to the Water Quality Study related to turbidity.<sup>20</sup>

## **B. Revised Study Plan**

On October 18, 2019, Appalachian filed its Revised Study Plan ("RSP") with the Commission.<sup>21</sup> The revised Water Quality Study provided additional detail regarding Task 1 and Task 2, and expanded to ten the number of locations where sondes would be located for continuous temperature and DO monitoring (Task 1) and for monthly monitoring of other parameters, including turbidity (Task 2).<sup>22</sup> In the RSP, Appalachian provided a refined estimate for the level of effort to complete the revised Water Quality Study, including the expanded scope to conduct turbidity (and other) measurements monthly at all ten locations with a single, portable multi-parameter measuring device (*e.g.*, Hydrolab MS5), of approximately 500 hours and at an estimated cost of \$110,000.

In response to the RSP, VDGIF's *only* comment on the revised Water Quality Study related to turbidity is the following statement:<sup>23</sup>

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<sup>20</sup> See FWS Review of Proposed Study Plans (filed Sept. 18, 2019); FERC Staff Comments on the Proposed Study Plan and Additional Information Requests for the Byllesby-Buck Hydroelectric Project (issued Sept. 19, 2019).

<sup>21</sup> Revised Study Plan for the Byllesby-Buck Hydroelectric Project (No. 2514), Project No. 2514-186 (filed October 18, 2019).

<sup>22</sup> *Id.* at 63-67. Notably, the two additional locations did not include the downstream tailraces for the developments because those locations were already proposed as part of the original eight sampling locations.

<sup>23</sup> VDGIF Comments on Revised Study Plans, at pg. 3 (filed Nov. 4, 2019).

Finally, we appreciate the inclusion of data collection on both turbidity and chlorophyll a at the Project reservoirs.

Similarly, FWS' only comment on the revised Water Quality Study related to turbidity is the following statement:<sup>24</sup>

Data collection for both turbidity and chlorophyll a at the Project reservoirs are important improvements that have been made for the RSP.

### **C. Director's Study Plan Determination**

On November 18, 2019, the Director issued the SPD. With respect to the Water Quality Study, the Director characterized the agencies' comments on the RSP as noting "improvement," but further explained that the agencies' "concern remains regarding the mobilization of impoundment sediment deposits during project operation, which could result in increased turbidity in downstream reaches that disrupts ecological processes and negatively affects angling and recreation use."<sup>25</sup> As recounted above, the topics encompassed by this quote are found in none of the agencies' comments on the Water Quality Study.

Based on this mischaracterization, the Director significantly expanded the scope and cost of the turbidity monitoring component of the revised Water Quality Study to require *continuous*, instead of monthly, monitoring of turbidity and to require Appalachian to maintain a log of daily drag rake operations to "facilitate an evaluation of the relative role of (natural) high-flow events versus drag rake operations in causing turbidity spikes."<sup>26</sup> The Director further states that the "results of this study could inform the development of potential license requirements (e.g., the optimal timing of drag rake operation in terms of maintaining desirable turbidity levels during

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<sup>24</sup> FWS Review of Revised Study Plans, at pg. 3 (filed Nov. 4, 2019).

<sup>25</sup> SPD at pg. B-7.

<sup>26</sup> *Id.* at pgs. B-7, B-8.



prime angling periods),” and cites 18 C.F.R. § 5.9(b)(5), which requires an *agency* to explain the nexus between an information request or a study request and project operations.<sup>27</sup>

Finally, the Director concludes that the cost to conduct continuous turbidity monitoring at ten locations for the study period would be “minimal” and field efforts related to turbidity monitoring would be “minimal because the turbidity sensors would be added to the same sondes that would be used for continuous monitoring of temperature and DO.”<sup>28</sup>

As explained below, the Director’s conclusions regarding the informational value of continuous turbidity monitoring have no support in the record, fundamentally misunderstand the proposal and the technology necessary to conduct the study, and underestimates the level of effort and cost to conduct continuous turbidity monitoring.

### III. REQUEST FOR REHEARING

Appalachian respectfully requests rehearing of the Director’s SPD.<sup>29</sup> Actions of the Commission, including the Director’s SPD, must be supported by substantial evidence and may not be arbitrary and capricious.<sup>30</sup> The Director’s determination that Appalachian’s revised Water Quality Study must be expanded to include *continuous* turbidity monitoring at ten sampling sites is in error, is arbitrary and capricious, and is not supported by substantial evidence.

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<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> Order No. 2002-A clarified that once the Director makes a study plan determination pursuant to 18 C.F.R. § 5.13(c), that determination may then be appealed to the Commission in a request for rehearing pursuant to Rule 713 of the Commission’s Rules of Practice and Procedure (18 C.F.R. § 385.713). *Hydroelectric Licensing Under the Federal Power Act*, Order No. 2002-A, 106 FERC ¶ 61,037, at P 17 (2004). See also *Duke Power*, 117 FERC ¶ 61,303, at P 12 (2006).

<sup>30</sup> 16 U.S.C. § 825l(b); *City of Centralia v. FERC*, 213 F.3d 742, 748 (D.C. Cir. 2000); *Bangor Hydro-Electric Co. v. FERC*, 78 F.3d 659,663 (D.C. Cir. 1996).

**A. The Record Does Not Include a Single Request to Include Continuous Turbidity Monitoring as an Element of the Water Quality Study**

The record fails to support the basis for continuous turbidity monitoring because no agency, including FERC, requested continuous turbidity monitoring (and therefore no agency filed support for such a request based on the study criteria in 18 C.F.R. § 5.9). The Director's *sua sponte* inclusion of this requirement in the SPD is the first time that this element has been raised as a desired component of the Water Quality Study.

The Director also failed to provide adequate justification in accordance with the study plan criteria, as required by 18 C.F.R. § 5.9, to support the need for the information for which it seeks. The Director points to 18 C.F.R. § 5.9(b)(5) when explaining that the results of continuous monitoring of turbidity at ten locations (most of which are nowhere near the drag rakes) could be used to inform potential license conditions, including the timing of the operation of the drag rake.<sup>31</sup> However, the requirement in the regulations is for the Commission (or any agency that requests information or a study) to address *all* of the study criteria listed in 18 C.F.R. § 5.9(b). Since no agency had previously filed this information, and the SPD is the first time this issue is being raised, the Director was obligated to provide support for its new information or study request. Because it failed to do so, the turbidity monitoring requirement described in the SPD should be rejected on rehearing.

The Director also erred in its reliance on a number of assertions that are not supported by the record. First, the Director states that, while the agencies acknowledge the revised Water Quality Study is an "improvement," "concern remains regarding the mobilization of impoundment sediment deposits during the project operations."<sup>32</sup> This assertion has no support in the record.

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<sup>31</sup> SPD at pg. B-8.

<sup>32</sup> *Id.* at pg. B-7

The *full extent* of VDGIF's and FWS' comments on the turbidity component of the Water Quality Study presented in the PAD, PSP, and RSP are as follows:

VDGIF and FWS (PAD): "In addition, the [water quality] study needs to examine turbidity effects of project operations."

VDGIF (PSP): "Finally, VDGIF staff mentioned concerns about downstream turbidity effects of the Project in our May 7 comments, but this study fails to provide a plan for assessing turbidity effects."

VDGIF (RSP): "Finally, we appreciate the inclusion of data collection on both turbidity and chlorophyll a at the Project reservoirs."

FWS (RSP): "Data collection for both turbidity and chlorophyll a at the Project reservoirs are important improvements that have been made for the RSP."

It is an extraordinary leap for the Director to deduce from the above quotes in the record that (1) "concern remains regarding the mobilization of impoundment sediment deposits during project operation," (2) "[t]he results of this study could inform the development of potential license requirements (e.g., the optimal timing of drag rake operation in terms of maintaining desirable turbidity levels during prime angling periods), (3) the cost of turbidity monitoring would be "minimal," and (4) the level of effort would be "minimal because the turbidity sensors would be added to the same sondes that would be used for continuous monitoring of temperature and DO."<sup>33</sup>

These assertions by the Director must be found to be arbitrary and capricious. As demonstrated by the agencies' above-quoted comments on Appalachian's Water Quality Study, the agencies never once mentioned the drag rake,<sup>34</sup> angling, turbidity spikes, continuous versus monthly monitoring, the number of locations to be monitored (other than a reference to "downstream"), the cost of the study, or the types of sensors to be used. While Appalachian

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<sup>33</sup> *Id.* at pgs. B-7, B-8.

<sup>34</sup> Appalachian notes that the Director's references to filings that describe the Project's drag rakes are not part of the record of the current proceeding.

mentioned the general types of sensors it anticipated using, it made clear that the sensor used for temperature and DO is different and less costly than the sensor that is required for other parameters, including turbidity.

Moreover, in each iteration of the ILP study development process, Appalachian tried to respond to the agencies' one-sentence information requests on the Water Quality Study. In response to the agencies' comments on the PAD, Appalachian added monthly monitoring of turbidity to the forebays. In response to VDGIF's comments on the PSP, Appalachian added monthly monitoring of turbidity to all ten sampling sites, which included the previously identified downstream tailrace locations. In each case, Appalachian attempted to respond to the information provided in the agencies' comments on the Water Quality Study; however, because information and study criteria have never been submitted to support the request for turbidity monitoring as part of the Water Quality Study, Appalachian could only guess at what the agencies (and now the Director) is trying to understand by adding turbidity monitoring to the Water Quality Study.

For these reasons, the Director's unsupported requirement that Appalachian conduct continuous turbidity monitoring should be rejected on rehearing.

**B. The Cost and Level of Effort Associated with the Continuous Turbidity Monitoring is Not "Minimal."**

The Director also erred when it concluded that the cost and level of effort to conduct continuous turbidity monitoring would be minimal. As discussed above, to accomplish the goals of its Water Quality Study, Appalachian planned to deploy different monitoring instruments for different purposes. The less expensive HOBO loggers would be deployed at each of ten monitoring sites to record water temperature and dissolved oxygen levels, and a more expensive Hydrolab sonde would be moved from site to site to record additional water quality parameters,

including turbidity, on a monthly basis. Thus, Appalachian's equipment needs for the revised Water Quality Study would be ten HOBO-type loggers and one Hydrolab sonde.

The SPD radically changed the instrument requirements for the Water Quality Study. Appalachian will no longer be able to use HOBO loggers at the ten monitoring sites, as those instruments can only measure water temperature and DO levels. Instead, to continuously monitor turbidity, Appalachian will be required to rent or purchase Hydrolab MS5 sondes for each of the ten sites. In addition, Appalachian has concerns that placing large sondes *in situ*, like the Hydrolab MS5, in a flashy river like the New River will result in higher rates of damage and other problems with the probes. Appalachian's additional cost to rent nine additional Hydrolab MS5 units for five months would be a cost of about \$67,500, which is much more than the Director's estimate of \$10,000 to \$15,000.<sup>35</sup>

Moreover, these estimates do not address the additional level of effort and labor that will be required by Appalachian and its consultants to maintain these larger sondes *in situ* at various river levels, do not include the cost of lost or damaged sondes, and do not include the additional level of effort to address data gaps as a result of such issues. For these reasons, it was error for the Director to conclude that the added cost and level of effort to conduct continuous turbidity monitoring would be "minimal."

### **C. The Commission Should Adopt the Revised Water Quality Study Set Forth in Appendix A In Lieu of the Turbidity Monitoring Described in the SPD**

Appendix A hereto is a redline version of Appalachian's revised Water Quality Study that includes additional detail regarding Appalachian's proposal to conduct monthly temperature monitoring. This additional detail addresses some of the topics mentioned by the Director, such as coordinating the operation of drag rakes with the monthly monitoring effort in order to capture

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<sup>35</sup> SPD at B-8.

a representative range of powerhouse operations. However, as described herein, because neither Commission staff nor agencies have submitted a study or information request supported by the criteria set forth in 18 C.F.R. § 5.9(b), Appalachian's revisions are its best guess as to the study elements that address the Commission's and agencies' information needs. Appalachian is confident that its proposal would *more precisely* meet the information needs of FERC and the agencies.

#### IV. CONCLUSION

For the reasons set forth herein, the Director's significant expansion of Appalachian's proposed Water Quality Study to require *continuous* turbidity monitoring is in error, is arbitrary and capricious, and is not supported by the record. Therefore, the Commission should grant rehearing and reject this component of the SPD. In lieu of the Director's turbidity monitoring requirement, the Commission should accept the revised Water Quality Study set forth in Appendix A hereto.

Respectfully submitted,

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## **APPENDIX A**

### **Revised Water Quality Study (with redline)**

## 5 Water Quality Study

### 5.1 Study Requests

The Commission's March 8, 2019 SD1 identified the following environmental resource issues to be analyzed in the EA for the Project relicensing.

- Effects of continued Project operation and maintenance on water quality, including dissolved oxygen (DO) and water temperature, upstream and downstream of each development, including the Buck bypass reach.
- Whether there is a need for an increase in minimum flow release requirements.

In Section 6.2.2 of the PAD, Appalachian proposed to conduct a Water Quality Study within the Study Area. More specifically, depending on sampling location, Appalachian proposed to monitor temperature, DO, water level, depth profiles, pH, and specific conductance. No formal study requests were received regarding water quality; however comments were received from VGDIF, USFWS, Virginia Tech, and NRC, which are summarized as follows:

- USFWS, VDGIF, and NRC recommended that this study include a thermal aspect that considers how the Project affects the thermal regime of the New River and potential effects on coolwater endemic fishes.
- USFWS, VDGIF, and NRC recommended that this study also consider turbidity and chlorophyll a.
- VDEQ and Virginia Tech recommended that PCB concentrations in sediment deposits behind the dams be investigated.
- Virginia Tech recommended that water level loggers be installed at several locations in the Project boundary (including above and below the powerhouses and in the bypass reaches) for continuous monitoring over a minimum one year period.

Additional comments related to this study were received from USFWS and VDGIF in response to Appalachian's filing of the PSP. These comment are summarized as follows:

- The USFWS and VDGIF noted that vertical temperature and DO profiles may need to be completed bi-weekly and that one season of sampling within the tailrace may not adequately capture the highs and lows over the license terms, especially the dry years.

In addition to the formal comments filed, the following points relevant to this study plan were discussed at the PSP meeting on July 18, 2019:

- VDGIF noted they would prefer that the level loggers are installed in the fall of 2019 to ensure the best data is gathered in case 2020 is too dry or too wet. Appalachian noted if

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2020 is not a suitable year for collecting water quality data, the 2021 field season would be used.

- FERC noted importance of annotating water quality results using summaries and graphs in study report to note project operations and inflow conditions.
- Discussion of drag rake operation relative to sediment disturbance/release. Clarify that the rake is not intended to clear sediment, but that some sediments are incidentally scraped/mobilized during operation.

On November 18, 2019, the Commission issued a Study Plan Determination for the Project, requiring modification of the Water Quality Study proposed by Appalachian in the RSP (October 18, 2019 version) as follows:

- In each forebay, data sondes are to be placed as close to the surface and bottom of the water column as possible, and their locations are to remain fixed to ensure the data collected is representative of the maximal degree of stratification that occurs in the forebays.
- Appalachian is to perform additional turbidity monitoring and logging of drag rake operations during any turbidity monitoring period, to assess the effects of drag rake operation on downstream turbidity at each development.

## 5.2 Goals and Objectives

Appalachian's proposed study employs standard methodologies that are consistent with the scope and level of effort of water quality monitoring conducted at hydropower projects in the region. Appalachian believes that this study will provide sufficient information to support an analysis of the potential Project-related effects on water quality. The goals and objectives of this study are to:

- Gather baseline water quality data sufficient to determine consistency of existing Project operations with applicable Virginia state water quality standards and designated uses.
- Provide data to determine if the Byllesby and Buck impoundments undergo thermal and/or DO stratification and, if so, determine the presence and location of the metalimnion.
- Provide data to support a Virginia Water Protection Permit application (Clean Water Act Section 401 Certification).
- Provide information to support the evaluation of whether additional or modified protection, mitigation, and enhancement measures may be appropriate for the protection of water quality at the Project's developments.

## 5.3 Study Area

The Study Area for the Water Quality Study is shown on Figure 1-4, and includes the reservoirs, bypass reaches, and tailwaters downstream of Byllesby and Buck dams.

## 5.4 Background and Existing Information

Existing relevant and reasonably available information regarding water quality in the Project vicinity was presented in Section 5.3 of the PAD (Appalachian 2019). The PAD included historical water quality data collected in support of the existing license and recent water quality data collected during mussel salvage and relocation efforts, and other data collection efforts. These data indicate that temperatures and DO concentrations did not differ between impoundments and tailraces, and no evidence of thermal stratification was observed in either impoundment. Data from the historical studies also demonstrated that the Project waters meet the state water quality standards, including temperature maximums and DO minimums.

On August 29, 2019, a site visit was conducted by HDR for Appalachian to attempt to collect pre-relicensing study season water quality data and evaluate field logistics associated with potential water quality monitoring locations for the Byllesby and Buck developments. During the site visit, a calibrated multiparameter water quality data sonde was used to collect depth profiles in each development's forebay and also spot measurements in each development's tailwater. These data are summarized on Figure 5-1 for Byllesby and Figure 5-2 for Buck. Flow during the site visit was approximately 1,500 cfs measured at the New River at Ivanhoe, Virginia USGS gage (03165500) which is typical of average flow conditions in August at this location (mean monthly discharge for August as shown in Table 4-2 is 1,495 cfs; 1929 – 2019).

During the site visit, the Byllesby forebay elevation was in the normal operating range,<sup>3</sup> however, the Buck forebay elevation was approximately 9 feet lower than the normal operating range<sup>4</sup> to facilitate construction activities associated with installation of the new Obermeyer gates.

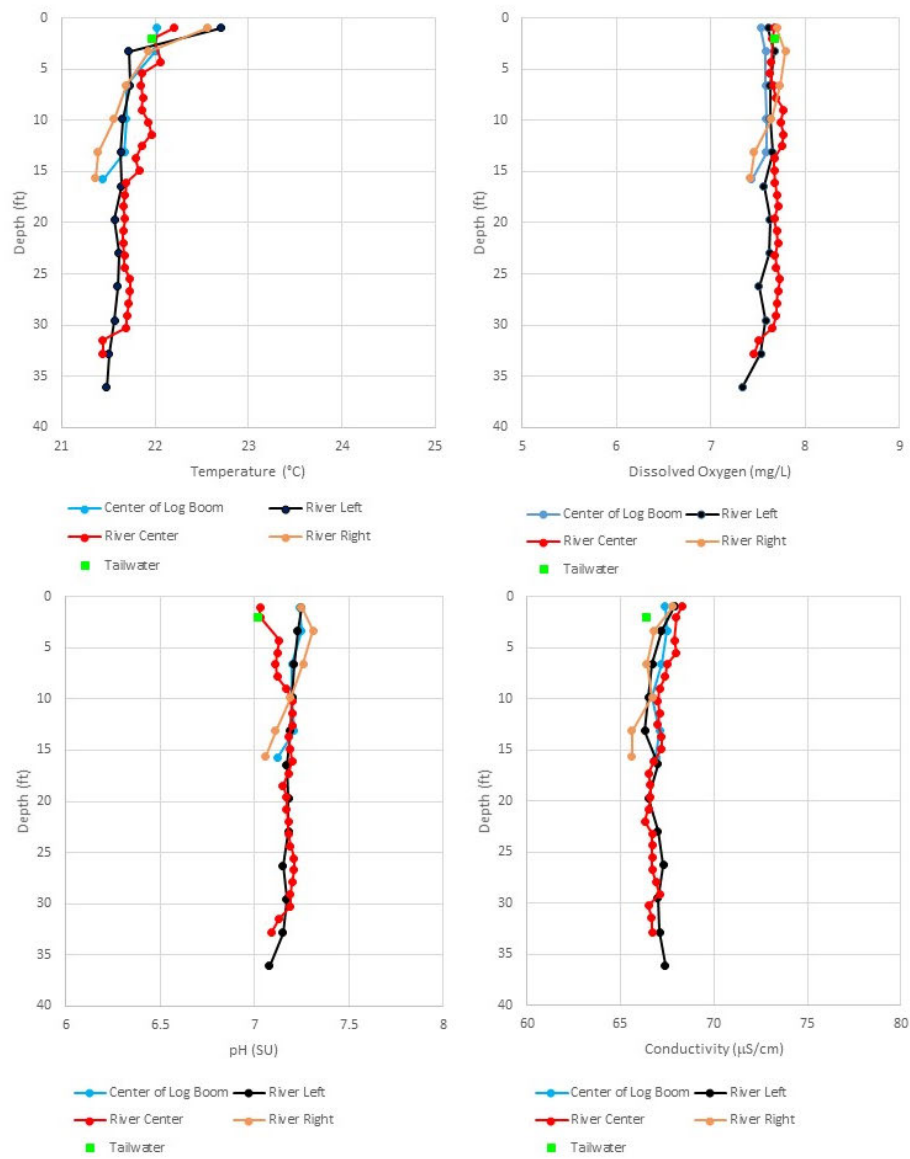
All water quality measurements during the site visit were within applicable Virginia state water quality standards. As Figure 5-1 and Figure 5-2 indicate, the depth profiles in each forebay did not show any significant difference in water quality from top to bottom, or from side-to-side. Given that these depth profiles were collected during peak summer conditions and under a relatively low flow, it is not expected that there would be differences in water quality from side-to-side in the forebay areas during the summer months. The tailwater measurements were reflective of the water quality in each forebay.

<sup>3</sup> Normal operating range for the Byllesby impoundment is between 2,078.2 – 2,079.2 feet above mean sea level.

<sup>4</sup> Normal operating range for the Buck impoundment is between 2,002.4 – 2,003.4 feet above mean sea level. During the August 29, 2019 water quality sampling site visit, the forebay elevation was approximately 1994 feet above mean sea level, or approximately 9 feet below the normal operating range.

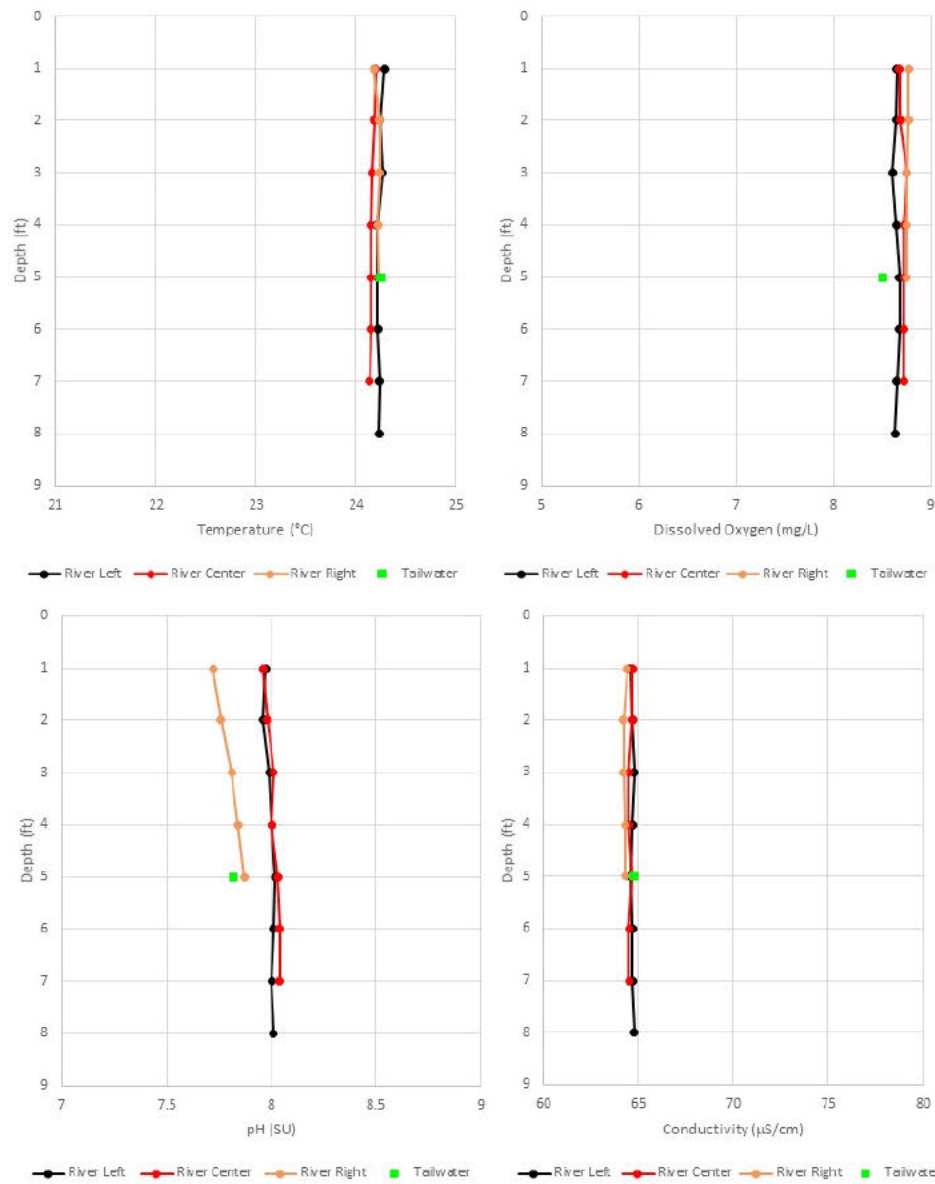
Byllesby-Buck Hydroelectric Project  
Revised Study Plan

Figure 5-1. Water Quality Parameters for Byllesby



Byllesby-Buck Hydroelectric Project  
Revised Study Plan

Figure 5-2. Water Quality Parameters for Buck



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Byllesby-Buck Hydroelectric Project  
Revised Study Plan

Multiple segments of the New River are listed as impaired for aquatic life or recreation uses due to *E. coli* concentrations. However, the source of *E. coli* is not associated with the Project and it is expected that continued operation of the Project will have no effect on *E. coli* concentrations in the New River.

From 2003 to 2006, VDEQ collected 209 samples to evaluate organic chemicals in sediment (VDEQ 2018). A low percentage of stream miles had concentrations above the Probable Effects Concentration and sampling has since been suspended due to low concentrations and high sampling costs.

A TMDL study for PCBs was performed for VDEQ by Virginia Tech in the New River watershed and a draft TMDL was developed and last updated in September 2018. According to results of the TMDL study, the PCB impaired segment of the New River in Virginia is located downstream of the Project, beginning where U.S. Interstate 77 crosses the river, and continuing downstream to where the river crosses the Virginia/West Virginia state line (Virginia Tech 2018).

No dredging of reservoir sediment is proposed by Appalachian at this time, nor does Appalachian propose any construction or maintenance activities that could cause the mobilization of reservoir sediments. It is noted that prior dredging activities (1997 and 2014) and associated constituent testing received approval for placement of dredged sediments which were then used for the creation of an emergent wetland upstream of Byllesby and for offsite beneficial reuse.

FERC staff requested that Appalachian provide the results of any PCB testing conducted in support of previous sediment removal projects at the Project (1997 and 2014) in the RSP. Appalachian has reviewed available files and documentation for the Project and provides the following additional information.

Extensive sediment core sampling and testing was conducted during the 1997 dredging at Byllesby. Appalachian is unable to locate the original report or data for this testing; however, the Clean Water Act Section 404 permit issued by USACE for this project includes several agency letters and references to the 1997 toxicity testing, including VDEQ concurrence that the tested material was essentially clean. Documentation of agency consultation in this permit also notes that Appalachian was certain no dredging had been done within the 30 years prior to this effort. A copy of this permit and associated documentation was filed with FERC on October 21, 1997 and is available on FERC's eLibrary.<sup>5</sup>

Permits issued for the dredging conducted at Byllesby in 2014 did not include specific requirements to test the material. Appalachian did, however, perform testing according to the U.S. Environmental Protection Agency (USEPA) SW-846 Test Method 1311: Toxicity Characteristic Leaching Procedure on composite samples from within the forebay. While not specifically tested for PCBs, these tests resulted in no actionable levels for heavy

<sup>5</sup> Accession number 19971021-0377



metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Furthermore, based on the material composition removed (sand, gravel, etc.), Appalachian does not believe PCB's would be present in the dredged material as PCB's do not have an affinity to bind to such coarse-grained material.

As stated in the PAD, any necessary future dredging and disposal would be coordinated with the U.S. Army Corps of Engineers and VDEQ pursuant to license Article 12 to obtain any required permits and approval. Although prior testing indicated the material was safe for other uses, Appalachian understands that proposed new dredging authorization may require additional testing for constituents of concern in the sediments being proposed for dredging prior to, and depending on the results of such testing, determining the appropriate fate of the material.

## 5.5 Project Nexus

The Byllesby and Buck developments are operated in a run-of-river mode under all flow conditions, with operation of the two developments closely coordinated. Due to the small size and short retention time of the Project reservoirs, the lack of thermal stratification demonstrated by past studies, and the mode of operation, Appalachian does not expect that operation of the Project affects ambient water quality in the New River above or below the Project.

The Project impounds water at the Buck and Byllesby dams. Meteorological and hydrological conditions (flow) and operation of the Project, including diversion of flows to the powerhouse for generation and resultant reduction of flows to the bypass reaches, may combine to impact water quality parameters such as temperature and DO in the Project reservoirs, powerhouse tailraces, and bypass reaches.

## 5.6 Methodology

### 5.6.1 Task 1 – Continuous Water Temperature and DO Monitoring

Appalachian proposes to monitor temperature and DO using multiparameter water quality instrumentation (i.e. sondes e.g., Onset® HOBO® Dissolved Oxygen Logger (or equivalent)) at the following locations:

- One location in the upstream extent of the Byllesby reservoir
- Two locations in the Byllesby forebay (upper and lower portion of the water column)
- One location in the Byllesby tailrace below the powerhouse
- One location in the Byllesby bypass reach (approximate mid-point)
- Two locations in the Buck forebay (upper and lower portion of the water column)
- One location in the Buck tailrace below the powerhouse
- Two locations in the Buck bypass reach (one upstream area and one downstream area)

Byllesby-Buck Hydroelectric Project  
Revised Study Plan

The approximate locations are depicted on Figure 5-3 and Figure 5-4. Appalachian expects to verify these locations during the initial field deployment and will communicate any substantive changes to the VDEQ and other interested relicensing participants.

All water quality monitoring locations will be geo-referenced using GPS. GPS locations will be included in a GIS database layer to support the documentation and reporting of collected data and to facilitate comparisons with future monitoring efforts.

Water temperature and DO data sondes will be deployed for a single season, from May 1, 2020 through September 30, 2020 and will collect data at 15 minute intervals. Each of the data sondes will be cleaned and calibrated prior to deployment and checked each month during data retrieval. As necessary, protective measures may be employed, such as weighting the data sondes or attaching them to permanent structures (where feasible) to maintain position during high flow events. Note the data sondes deployed in the tailwater and bypass reach locations will also collect temperature and DO data during the flow test events described in the Flow and Bypass Reach Aquatic Habitat Study (Section 4). If a data sonde is lost due to vandalism or a high flow event, Appalachian will replace the instrumentation one time only.

Data sondes deployed in the Byllesby and Buck forebays will be set at two discrete depths to determine the existence and extent, if any, of thermal and DO stratification.

The upper data sonde will be placed approximately 3 feet below the surface of the reservoir and the lower data sonde will be placed approximately 3 feet above the bottom of the reservoir at each forebay monitoring location.

**Deleted:** Based on the August 29, 2019 site visit described above, the depth of the Byllesby forebay at approximately the mid-point of the spillway structure is approximately 35 feet. As a result, the upper data sonde will be placed approximately 12 feet below the surface and the lower data sonde will be placed approximately 24 feet below the surface. The depth of the Buck forebay near the center of the intake channel is approximately 17 feet.<sup>6</sup> As a result, the upper and lower data sondes will be placed at approximately 6 feet and 12 feet below the surface, respectively.



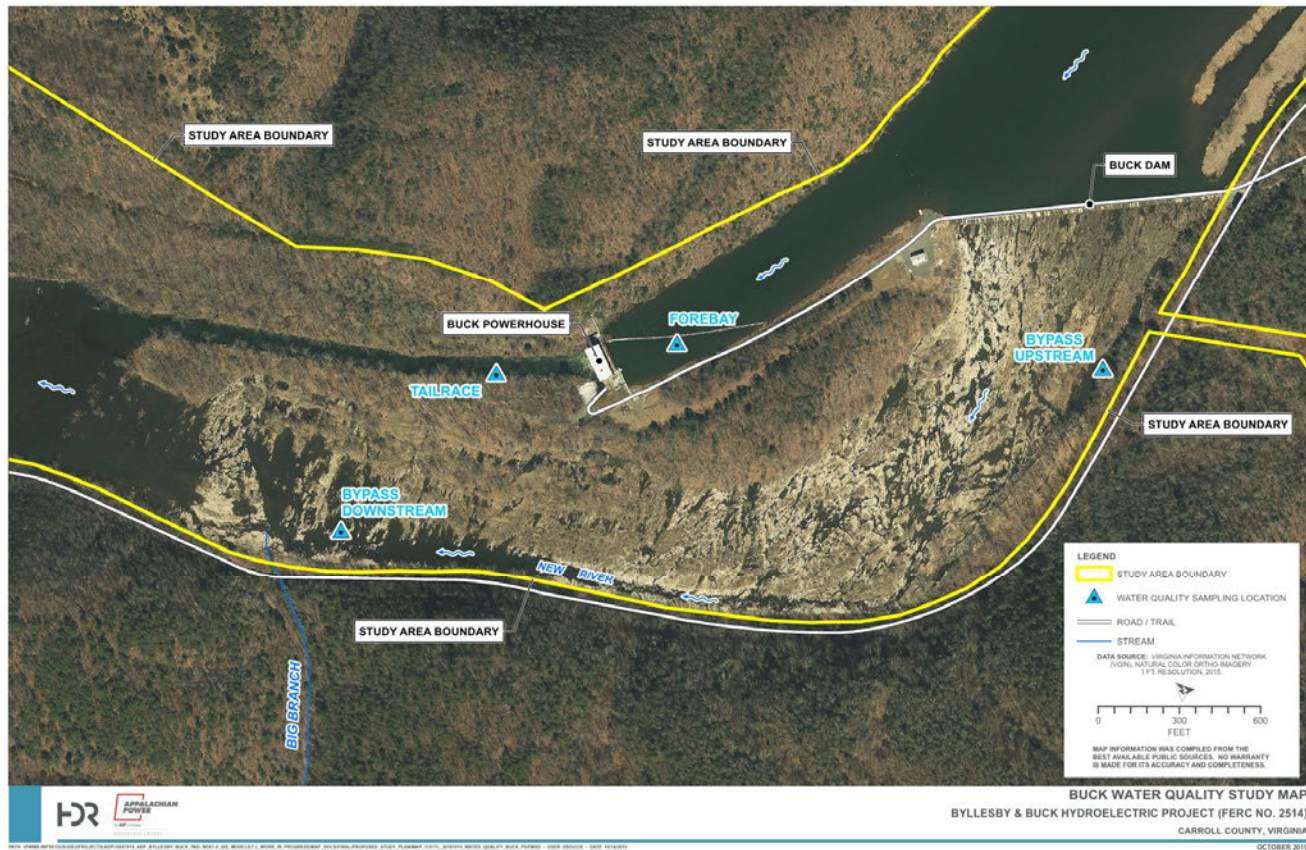
Figure 5-3. Byllesby Water Quality Study Locations



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Figure 5-4. Buck Water Quality Study Locations



### 5.6.2 Task 2 – Monthly Water Quality Monitoring

In addition to continuous monitoring, once per calendar month (May through September), in situ water quality measurements of temperature, DO, pH, and specific conductance will be collected at each of the locations described above with a Hydrolab (e.g., OTT HydroMet® Hydrolab® MS5 Multiparameter Mini Sonde, or equivalent) or similar data sonde. At the forebay monitoring locations, depth profiles will be collected each month. If it appears that brief periods of stratification may be occurring, collection of forebay depth profiles may be increased to bi-weekly.

Chlorophyll a will also be measured in the forebay of each development during the monthly sampling events. Chlorophyll a will be collected via grab samples at a single depth of approximately one meter and samples will be subsequently analyzed at an off-site laboratory.

Individual water quality measurements (temperature, DO, pH, conductivity) will also be collected during fisheries and macroinvertebrate field sampling events.

**Deleted:** Note the depths of the data sondes (used for continuous monitoring) may be adjusted, if necessary, during the study based on a comparison of the continuous temperature and DO results with the monthly depth profile measurements. In addition,

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**Deleted:** Turbidity will also be measured at a single depth of approximately one meter using a portable turbidity meter at each of the continuous water quality monitoring locations. Turbidity measurements will be recorded in Nephelometric turbidity units.¶

### 5.6.3 Task 3 – Turbidity Monitoring

Appalachian will conduct a study to evaluate the potential impact that Project operations in particular drag rake operations, may have on turbidity concentrations in the Project tailraces. The study will be conducted over a two-day period under relatively low flow conditions. During this study period, a Hydrolab or similar data sonde equipped with a turbidity sensor will be installed at each of the locations listed below (which coincide with the continuous monitoring locations shown in Figures 5-3 and 5-4) to continuously record turbidity concentrations (in Nephelometric turbidity units) at 5-minute intervals.

- One location in the upstream extent of the Byllesby reservoir (to characterize background turbidity levels)
- One location in the Byllesby forebay (approximate mid-depth)
- One location in the Byllesby tailrace below the powerhouse
- One location in the Buck forebay (approximate mid-depth)
- One location in the Buck tailrace below the powerhouse

During this study period, Appalachian will operate the generating units and trash (drag) rakes at each Project under a pre-determined range of normal operating regimes. The timing of these operations will be recorded. Turbidity data collected will be evaluated against trash rake operation and powerhouse generation in an effort to help determine any differences in downstream turbidity concentrations resulting from station operations versus naturally occurring background conditions.

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### 5.7 Analysis and Reporting

Results of this study will be summarized in a final study report. Appalachian anticipates that the Water Quality Study report will include Project information and background, a depiction and descriptive narrative of the Study Area, methodology, results, analysis, and discussion. In addition, stakeholder correspondence and/or consultation will be included, as well as any literature cited. Raw data will be provided in appendices to the study report.

### 5.8 Schedule and Level of Effort

The preliminary schedule for this study is outlined in Table 5-1. The estimated level of effort for this study is approximately 500 hours. Appalachian estimates that the Water Quality Study will cost approximately \$130,000 to complete. If the proposed study period is deemed anomalous due to abnormally wet and/or cool weather conditions, a second study year may be necessary to capture water quality conditions representative of typical summer conditions. Additionally, if the water quality data collected during the proposed study period does not meet the goals and objectives described in Section 5.2, a second year of data collection may be necessary.

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Table 5-1. Proposed Water Quality Study Schedule

Task	Proposed Timeframe for Completion
Study Planning and Existing Data Review	January – March 2020
Continuous and Monthly Water Quality Monitoring (DO and temperature)	May – September 2020
Distribute Draft Study Report with the ISR	November 2020

## **APPENDIX B**

### **Water Quality Monitoring Equipment Specifications**



## HOBO Dissolved Oxygen Data Logger

Part # U26-001

**\$1250** USD

 This item ships FREE!

**This logger requires HOBOWare Pro software and either a U-DTW-1 Waterproof Shuttle or the Base-U-4 Optic USB Base Station for configuration and data offload. Please see compatible items below.**

## Overview

Measure oxygen concentrations in lakes, streams, rivers, estuaries, and coastal waters with the HOBO U26 Dissolved Oxygen Data Logger. This affordable and precise data logger is recommended for aquatic biology and hydrology research projects. The HOBO U26 uses RDO® Basic (Rugged Dissolved Oxygen) optical DO sensor technology and is easy to maintain.

Includes:

- U26-001 data logger
- DO sensor cap
- Protective Guard
- Calibration Boot with sponge

Our HOBO U26 Dissolved Oxygen logger has been part of a multi-year evaluation of DO loggers and sensors by the Alliance for Coastal Technologies (ACT), and the results have been published online. This provides an un-biased report of how our U26 performs in lab and field conditions. Note that our response letter with our added recommendations is attached at the end of this report on pages 58 and 59.

[Click here to read.](#)

### Highlighted Features

- Affordable, high performance dissolved oxygen (DO) monitoring with 0.2 mg/L accuracy

- Optical DO sensor technology for long-lasting calibration with less maintenance
- HOBOWare Pro's Dissolved Oxygen Assistant software corrects for measurement drift from fouling; provides salinity-adjusted DO concentrations and percent saturation
- Optical USB interface for high-speed, reliable data offload
- Easy-to-replace DO sensor cap lasts six months

**NOTE:** For DO measurements in saltwater, an adjustment for salinity is required. For waters with small changes in salinity (<2 ppt), a salinity meter reading typically provides enough accuracy. For environments with greater salinity changes, we generally recommend the HOB0 U24-002-C conductivity logger. If you need DO in Percent Saturation, barometric pressure data is required, which can be logged with a HOB0 Water Level Data Logger (U20-001-04).

### In what environment does this data logger operate?

This data logger operates in an underwater environment.

### What measurements does this data logger support?

The U26-001 data logger supports the following measurements: Dissolved Oxygen and Temperature [www.onsetcomp.com](http://www.onsetcomp.com) • 1-800-LOGGERS (564-4377)

## Detailed Specifications

### HOB0 Dissolved Oxygen Data Logger

#### Dissolved Oxygen

<b>Sensor Type:</b>	Optical
<b>Measurement Range:</b>	0 to 30 mg/L
<b>Calibrated Range:</b>	0 to 20 mg/L; 0 to 35°C (32 to 95°F)
<b>Accuracy:</b>	± 0.2 mg/L up to 8 mg/L; ± 0.5 mg/L from 8 to 20 mg/L
<b>Resolution:</b>	0.02 mg/L
<b>Response Time:</b>	To 90% in less than 2 minutes
<b>DO Sensor Cap Life:</b>	6 months, cap expires 7 months after initialization

#### Temperature


<b>Temperature Measurement/Operating Range:</b>	-5 to 40°C (23 to 104°F); non-Freezing
<b>Temperature Accuracy:</b>	0.2°C (0.36°F)
<b>Temperature Resolution:</b>	0.02°C (0.04°F)
<b>Response Time:</b>	To 90% in less than 30 minutes

#### Logger

<b>Memory:</b>	21,700 sets of DO and temperature measurements (64 KB total memory)
<b>Logging Rate:</b>	1 minute to 18 hours
<b>Time Accuracy:</b>	±1 minute per month at 0 to 50°C (32 to 122°F)
<b>Battery:</b>	3.6 V lithium battery; factory replaceable
<b>Battery Life:</b>	3 years (at 5 minute logging)
<b>Download Type:</b>	Optical

Dissolved Oxygen Data Logger: HOBO U26 by Onset

Page 3 of 3

<b>Depth Rating:</b>	100 m (328 ft)
<b>Wetted Materials:</b>	Black Delrin®, PVC, EPDM o-rings, silicone bronze screws; rated for saltwater use
<b>Size:</b>	39.6 mm diameter x 266.7 mm length (1.56 x 10.5 inches)
<b>Weight:</b>	464 g (16.37 oz)
<b>Environmental Rating:</b>	IP68
	The CE Marking identifies this product as complying with all relevant directives in the European Union (EU).

[www.onsetcomp.com](http://www.onsetcomp.com) • 1-800-LOGGERS (564-4377)



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# Hydrolab MS5 - Multiparameter Mini Sonde

Lightweight multi-probe with four ports available for water quality sensors



The Hydrolab MS5 multiparameter selection of Hydrolab sensors on multiprobe designed for either process monitoring. Its compact housing for space applications.

Product type:	Attended
Parameters measured:	Temperature, Dissolved Oxygen, Turbidity, Rhodamine Chloride
Product highlights:	The Hydrolab sensor package well
Interface:	SDI-12, RS-485

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<b>Sensors</b>	<b>Measures up to 10 parameters simultaneously</b>
<b>Electrical</b>	
Internal	8 AA batteries (with available internal battery pack option)
Communications	RS-232, SDI-12, RS-485
Memory	Up to 120,000 measurements
<b>User Interface</b>	
PC Software	Hydras3 LT
Pocket PC Software	(Optional) TDS Recon with Hydras 3 LT Pocket
<b>General</b>	
Sonde Depth Rating	200 m (656 ft)
Diameter	4.4 cm (1.75 in.)



### **CERTIFICATE OF SERVICE**

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list in this proceeding in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure.

Dated at Washington, D.C. this 18<sup>th</sup> day of December, 2019.

/s/ Carlos L. Sisco

Carlos L. Sisco

Senior Paralegal

Winston & Strawn LLP

1700 K Street, N.W.

Washington, DC 20006-3817

202-282-5000

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