ORIGINAL

Central Vermont Public Service Corporation

01 NOV -5 PM 1:08
FEDERAL ENERGY REGULATORY COMMISSION

November 2, 2001

David P. Boergers, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Middlebury Lower Hydroelectric Project (FERC No. 2737)-006
Article 403 Project Operations Plan

Dear Secretary Boergers:

Central Vermont Public Service Corporation (CVPS) hereby submits eight (8) copies and one original of the Project Operations Plan required by FERC Order Issuing New License, issued August 1, 2001 for the Middlebury Lower Hydroelectric Project (FERC No. 2737) Article 403. Article 403 requests development of this plan, in consultation with the Vermont Agency of Natural Resources, the U.S. Fish and Wildlife Service, and the U.S. Geological Survey (USGS) within 90 days.

CVPS submitted a draft Project Operations Plan to the consulting agencies on September 27, 2000. CVPS held telephone conference calls to discuss this plan with the VANR and the USFWS on October 11 and 12, respectively. Revised versions of the draft plan, based upon comments received, were resubmitted to these agencies for a final review on October 29th. Comments on the revised draft were received and addressed before this submittal to the Commission. No comments were received from the USGS. The attached consultation record provides documentation of consultations and correspondence.

This plan is intended to provide a framework for compliance with all License Terms and Conditions, including various conditions of the 401 Water Quality certificate. If you have any questions regarding this submittal, please contact me at (802) 747-5707.

Sincerely,

John Greenan (TJO)

John Greenan, P.E.
Project Coordinator

cc: Anton Sidoti, FERC NYRO
M. Scarzello, CVPS
T. Oakes, Kleinschmidt
J. Cueto, VANR
M. Grader, USFWS
B. Mrazik, USGS

01119-0108-3

DOCKETED

Middlebury Lower Hydroelectric Project FERC No. 2737
Draft Project Operations Plan per Article 403

Introduction

On August 1, 2001, the Federal Energy Regulatory Commission (Commission) issued a new license to Central Vermont Public Service Corporation (CVPS) for operation of the 2.25 megawatt (MW) Middlebury Lower Hydroelectric Project, located on Otter Creek in the towns of Middlebury and Weybridge, Addison County, Vermont. Articles 401 and 402 of the new Project license specify how the Project should be operated in a run-of-river mode while also releasing a minimum flow to the bypassed reach of Otter Creek immediately below the Dam. Article 403 requires CVPS to submit a Project operations plan to the Commission within 90 days to describe how the Project would be operated and monitored to comply with the requirements in articles 401 and 402. This plan is due to the Commission by November 1, 2001. A draft plan is included below. This plan is also designed to fulfill the requirements of conditions D and E of the Water Quality Certification for the Project.

Plan for Monitoring

Run-of-River Operation

Run-of-river operation of the project will continue to be monitored through remote observation of the water elevation above the Dam. A pressure transducer is used to monitor water levels in the impoundment. The transducer is located within a stilling well attached to the intake canal wall, and elevation data is continuously recorded (at 15 minute intervals) through the System Control and Data Acquisition (SCADA) system. Documentation of maintaining the impoundment elevation within the 2 inch range (± 1 inch) authorized by the License will document run-of-river operation. A Tetragenics Control System (Programmable Logic Controller – PLC) is currently in place at the Project which utilizes input from the intake canal transducer to increase or decrease generation to maintain a consistent headpond elevation. Records of impoundment levels will be submitted to the VANR on a quarterly basis initially to demonstrate compliance with the run-of-river operation requirement. This period may be extended in the future upon agreement with the VANR.

Minimum Flow

Maintenance of the 157 cfs minimum flow to the Project's bypassed reach will be accomplished primarily by maintaining the water elevation above the top of the Dam elevation to allow for a veiling flow. CVPS has calculated that a water elevation of approximately 0.233 feet above the top of the Dam across its length would result in a flow of approximately 157 cfs. However, CVPS consulted with the VANR and the USFWS about providing all the flow in this fashion and both agencies expressed some concern about the ability to maintain this flow with good consistency. Both agencies also expressed some concern about how accurately a standard weir equation would predict

flow across the Dam and thought that field calibration was needed. The VANR suggested investigating the ability of existing sluice gates on the Dam to provide some portion of this flow to allow for better consistency. The VANR also felt that leakage through the dam should be quantified as it would contribute to fulfilling the required 157 cfs flow. The VANR also requested that CVPS assess the potential lag time for spillage in the event of a normal shut down or an unanticipated outage and determine whether additional steps would be needed to protect habitat. Based on these concerns, CVPS is proposing to conduct some field investigations in 2002 to assess leakage through the dam, evaluate potential for using sluice gates to provide a portion of the flow, calibrate the weir equation for the Project, and determine the effects of plant shutdown on spill rates and fish habitat. This work will be done in conjunction with the VANR and the USFWS. In the interim, CVPS will operate the Project to maintain the impoundment level at or above 0.233 feet above the dam crest at all times.

This field testing will result in a target elevation above the Dam to provide for a veiling flow. Maintaining this water elevation above the Dam will be accomplished through the installation of a new pressure transducer located within a stilling well attached to the rock face adjacent to the power canal or other suitable location. This transducer will be connected to the SCADA system, where the elevation data will be continuously recorded. The new pressure transducer would be needed to ensure that elevation in the River behind the Dam does not differ significantly from elevation in the intake canal. This system would be linked to the existing PLC and ultimately to a new PLC planned at the Project to regulate generation and impoundment levels on an instantaneous basis at all times. Information on the new pressure transducer and PLC will be attached to the final plan as soon as it is available (*i.e.* once the specific model is selected). Pressure transducers will be maintained and calibrated per manufacturer recommendations and by comparing sensor readings to actual staff gage readings and adjusting as necessary.

Inflows

The 401 Water Quality certificate issued for the project by the VANR also requests that inflows be continuously monitored at the Project (condition E). Records of impoundment levels and generation will be recorded continuously and will allow for an accurate accounting of inflows at all times. In addition, USGS maintains a gauge on Otter Creek in Middlebury (#04282500), upstream of the Project, which records continuous data on flows. CVPS will use data from this gage to compare to Project data and provide a check on the accuracy of inflow monitoring. This information will be submitted to the VANR on a quarterly basis initially. This period may be extended in the future upon agreement with the VANR.

Schedule

The monitoring equipment described herein will be installed in the first full construction season following Commission approval of the monitoring plan. CVPS intends to install this equipment and perform initial calibration and other field efforts described above by the end of June 2002.

Other Provisions

The impoundment elevation and unit output data would also be submitted to the VANR on a quarterly basis initially. Turbine rating curves will be supplied to the VANR on or before August 1, 2002 in compliance with condition G of the Project's water quality certificate.

No soil erosion or sediment control measures are proposed since the proposed Project operation will not require or create any soil disturbance.

Middlebury Lower Hydroelectric Project FERC No. 2737
Draft Project Operations Plan per Article 403

Consultation Correspondence

Central Vermont Public Service Corporation

September 27, 2001

Mr. Jeffrey Cueto
VT Agency of Natural Resources
Dept. of Environmental Conservation
103 South Main Street
Waterbury, VT 05676

Mr. John Warner
U.S. Department of Interior
Fish and Wildlife Service
22 Bridge Street, Unit #1
Concord, NH 03301

Mr. Brian R. Mrazik
U.S. Geological Survey
361 Commerce Way
Pembroke, NH 03275

Weybridge Hydroelectric Project (FERC No. 2731) Article 404
Middlebury Lower Hydroelectric Project (FERC no. 2737) Article 403

To the Parties Addressed:

On August 1, 2001, the Federal Energy Regulatory Commission (Commission) issued new licenses to Central Vermont Public Service Corporation (CVPS) for operation of the 3 MW Weybridge Hydroelectric Station and the 2.25 megawatt (MW) Middlebury Lower Hydroelectric Project, both located on Otter Creek in Addison County, Vermont. Several license articles of each license detail minimum flow and operational requirements to be instituted under the new Project licenses.

Article 404 of the Weybridge License (FERC no. 2731) and Article 403 of the Middlebury Lower License (FERC no. 2737) required submittal of Project operations plans to the Commission within 90 days of license issuance. Both plans are due to the Commission by November 1, 2001. The Commission directed CVPS to consult with the VANR, the USFWS, and the USGS in the development of these plans, allowing 30 days for comments on draft plans. Draft plans are attached to this letter. CVPS would like to have a conference call with all interested parties to discuss these plans. We would like to have this call on October 18, 2001 at 10:00 AM and will call you to confirm dates and arrangements. CVPS is requesting written comments from your agency on or before October 26, 2001. Please call me at (802) 747-5207 if you have any questions about these plans or the new FERC licenses. Thank you.

Sincerely,

Michael J. Scarzello, P.E.
Principal Engineer

cc: J. Greenan (CVPS)
T. Oakes (Kleinschmidt)
J. Wallin (MRM)
K. Curavoo (Town of Weybridge)

Telephone Discussion Notes

Date: October 11, 2001
Participants: Mike Scarzello and John Greenan – CVPS, Jeff Cueto – VANR, Tim Oakes – Kleinschmidt
Subject: FERC Compliance Plans – Weybridge (FERC No. 2731) and Middlebury Lower (FERC No. 2737) Hydroelectric Projects

These notes are intended to represent a summary of VANR's major comments and suggested changes on draft flow monitoring plans submitted to them on September 26, 2001.

Middlebury Lower Draft Project Operations Plan per Article 403

- Make sure we reference and address 401 Water Quality Certificate conditions as well as License article conditions.
- Explore using sluice gate at spillway to provide some portion of minimum flow so there is less variability associated with maintaining veiling flow over dam. Include weir equation used and potential difference in flow that may be experienced.
- Check on calibration of flows. If not calibrated during habitat studies, consider some initial calibration and possibly future recalibration. CVPS can use leakage through the Dam in total minimum flow amount, if significant.
- Indicate when new transducer would be expected to be installed.
- Include rating curves for the units at Middlebury Lower.
- Filing of information with VANR should be quarterly – can be less often in the future upon agreement with VANR.
- Include USGS information from Middlebury gage as a check against calculated inflow.
- Address potential lag time for spillage in the event of a normal shutdown or a plant trip and any anticipated effect on downstream habitat.

Weybridge Draft Flow Monitoring Plan per Article 404

- Include schematics that show minimum flow scenarios and anticipated distribution of flows.
- Recognize that plan with respect to diversion structure is preliminary until final design for flow diversion structure is complete.
- Perhaps locate gage closer to Rock Island.
- Discuss operating range of headpond – include taintor gate curves for multiple head pond levels.
- Check on calibration of taintor gate flows. If not calibrated during habitat studies, consider some initial calibration and possibly future recalibration.
- Filing of most information with VANR should be quarterly – can be less often in the future upon agreement with VANR.
- Add information on annual reporting of flow diversion structure as per 401 water quality certificate.

- Note periods when annual calibration would occur (*i.e.* after high flow events or when spring flows recede).
- Consider establishing survey points to monitor debris buildup and changing hydraulics.
- Set up schedule to show sequential list of when things will be occurring.
- Account for changes in volume due to storage and use Middlebury and New Haven gage data for comparison of calculated inflows.
- Explain procedures for implementing each operational enhancement under Article 403 (*i.e.* how will run-of-river operation in spring be controlled).
- Mention fish passage opening provision.
- Explain procedures for ensuring spill during power outages.
- Make sure plan is understandable to operators, now, and in the future.

Tim Oakes

From: Jeffrey Cueto [Jeffc@dec.anr.state.vt.us]
Sent: Tuesday, October 30, 2001 2:37 PM
To: Tim Oakes
Cc: Melissa_Grader@fws.gov; JGreenan@CVPS.com; MSCARZE@CVPS.com
Subject: Middlebury Lower flow mgmt plan

My comments:

1. At some point, the method for calculating inflow from operational data will need to be defined.
2. Can I assume the records will be hourly values? The content and format of the records will need to be discussed. You indicate that we will be getting headpond elevations and generation information. The records need some level of processing to make them useful. Inflow estimates from the operational information should be tabulated along with corresponding gage flows. Outflow (gen plus bypass) needs to be listed, as well as bypass flow.
3. The headpond should be maintained in the 0.233 foot to 0.233 foot plus 2 inches range until the final method for maintaining bypass flows is decided.
4. I thought you were going to note whether the USGS gage flow would have to be prorated up based on watershed. I checked and the 401 says that there is less than one square mile between the gage and the dam. The gage will probably prove out to be a much better source of inflow data.
5. Did you check to see if the bypass flow study provided a relationship between headpond elevation and bypass flows? What was the c value used for the 0.233 foot number?

<'}}}>< <'}}}>< <'}}}>< <'}}}>< <'}}}>< <'}}}><

Jeffrey Cueto, P.E. <'}}}><
VT Department of Environmental Conservation
802/241-3770 FAX 802/241-3287 <'}}}><

><{{{'> ><{{{'> ><{{{'> ><{{{'> ><{{{'> ><{{{'>

Tim Oakes

From: Melissa_Grader@fws.gov
Sent: Thursday, November 01, 2001 3:07 PM
To: Tim Oakes
Subject: Re: Any Comments?

I've looked through the revised Middlebury Lower Monitoring Plan and have two comments:
- FWS requested (per our phone conversation of 10/12) that an O&M section be added which detailed how the monitoring equipment would be calibrated and maintained. I do not see that info in the present draft.
- Please include the dam elevation, and the run, start and stop setpoints for the headond sensor system.

I'll look over the Weybridge Plan first thing in the morning.

Melissa Grader
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service/New England Field Office
c/o GOMP
4R Fundy Road
Falmouth, ME 04032
(207) 781-8364 (207) 781-8369 (FAX)
melissa_grader@fws.gov

"Tim Oakes" <Oakes@KAssociates.com> 11/01/01 02:07 PM

To: "Melissa Grader" <Melissa_Grader@fws.gov>
cc:
Subject: Any Comments?

Melissa:
Any comments on Weybridge and Middlebury Lower Plans? We'd like to try and send to FERC today, if possible. Thanks, Tim.

Tim Oakes

To: Jeffrey Cueto

Cc: Melissa_Grader@fws.gov; JGreenan@CVPS.com; MSCARZE@CVPS.com

Subject: RE: Middlebury Lower flow mgmt plan

Jeff:
Responses to your comments are included below.

-----Original Message-----
From: Jeffrey Cueto [mailto:Jeffc@dec.anr.state.vt.us]
Sent: Tuesday, October 30, 2001 2:37 PM
To: Tim Oakes
Cc: Melissa_Grader@fws.gov; JGreenan@CVPS.com; MSCARZE@CVPS.com
Subject: Middlebury Lower flow mgmt plan

My comments:

1. At some point, the method for calculating inflow from operational data will need to be defined.

This will primarily be accomplished utilizing the pond level information, the bypass flow (weir) equation and the turbine flow equations (rating curves). The exact methods of calculation and conversion factors used would be included with the data in the quarterly reports.

2. Can I assume the records will be hourly values? The content and format of the records will need to be discussed. You indicate that we will be getting headpond elevations and generation information. The records need some level of processing to make them useful. Inflow estimates from the operational information should be tabulated along with corresponding gage flows. Outflow (gen plus bypass) needs to be listed, as well as bypass flow.

The data is recorded in 15 minute intervals. CVPS will process the data by converting MW to cfs as indicated above. Bypass flow will be calculated using field verified weir equations and pond level information. CVPS will compare USGS Middlebury gage flows with the calculations described above.

3. The headpond should be maintained in the 0.233 foot to 0.233 foot plus 2 inches range until the final method for maintaining bypass flows is decided.

CVPS will maintain the impoundment level at or above 0.233 feet above the dam crest to provide at least 157 cfs at all times as an interim method until the final method for maintaining bypass flows is decided. We will add this statement to the plan before submitting to FERC.

4. I thought you were going to note whether the USGS gage flow would have to be prorated up based on watershed. I checked and the 401 says that there is less than one square mile between the gage and the dam. The gage will probably prove out to be a much better source of inflow data.

I believe we thought this was determined during our phone conversation. However, as indicated in the plan, CVPS will use information from this gage to compare to operational calculations.

5. Did you check to see if the bypass flow study provided a relationship between headpond elevation and bypass flows? What was the c value used for the 0.233 foot number?

We used a C value of 3.6 to calculate the 0.233 feet. The bypass flow study lists a 0.24 foot crest release for the 157 cfs flow. However, CVPS plans to field calibrate the equation and will use the calibrated equation to establish head pond level targets.

The plan will be revised as noted above before being submitted to FERC. Thanks, Tim.

<'}}}>< <'}}}>< <'}}}>< <'}}}>< <'}}}>< <'}}}><

Jeffrey Cueto, P.E. <'}}}><
VT Department of Environmental Conservation
802/241-3770 FAX 802/241-3287 <'}}}><

><{{{'> ><{{{'> ><{{{'> ><{{{'> ><{{{'> ><{{{'>

Tim Oakes

To: Melissa_Grader@fws.gov

Cc: Mike Scarzello; John Greenan

Subject: RE: Any Comments?

Melissa:
Responses to your comments are listed below.

-----Original Message-----
From: Melissa_Grader@fws.gov [mailto:Melissa_Grader@fws.gov]
Sent: Thursday, November 01, 2001 3:07 PM
To: Tim Oakes
Subject: Re: Any Comments?

I've looked through the revised Middlebury Lower Monitoring Plan and have two comments:
- FWS requested (per our phone conversation of 10/12) that an O&M section be added which detailed how the monitoring equipment would be calibrated and maintained. I do not see that info in the present draft.

Since specific equipment (*i.e.* head pond level sensor, PLC) has not been selected yet, CVPS does not have specific maintenance requirements available. CVPS will attach this information to the plan as soon as it is available. In general, the head pond level sensor will be checked against staff gage readings to verify accuracy as necessary. We will add a statement to the plan indicating that this type of procedure would be used to ensure the accuracy of readings.

- Please include the dam elevation, and the run, start and stop setpoints for the headond sensor system.

Again, since the head pond level sensor has not been selected yet, we don't have the tolerances/accuracy of the system. The calibration of the weir equation and final method for delivering bypass flows will also factor into the establishment of setpoints. In the interim, CVPS is proposing to operate the Project to maintain an impoundment elevation at or above the 0.233 feet above dam crest that has been calculated for delivery of the 157 cfs minimum flow.

The change noted above will be made to the plan before submittal to FERC. Thanks, Tim.

I'll look over the Weybridge Plan first thing in the morning.

Melissa Grader
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service/New England Field Office
c/o GOMP
4R Fundy Road
Falmouth, ME 04032
(207) 781-8364 (207) 781-8369 (FAX)
melissa_grader@fws.gov

"Tim Oakes"
<Oakes@KAssoc To: "Melissa Grader" <Melissa_Grader@fws.gov>

iates.com> cc:
Subject: Any Comments?
11/01/01
02:07 PM

Melissa:
Any comments on Weybridge and Middlebury Lower Plans? We'd like to try and send to FERC today, if possible. Thanks, Tim.

UNITED STATES OF AMERICA 98 FERC ¶ 62,072
FEDERAL ENERGY REGULATORY COMMISSION

Central Vermont Public Service Corporation) Project No. 2737-006

ORDER MODIFYING AND APPROVING PROJECT OPERATIONS PLAN UNDER ARTICLE 403

(Issued February 5, 2002)

The Central Vermont Public Service Corporation (licensee) filed with the Commission on November 5, 2001, its project operations plan for the Middlebury Lower Project under article 403 of the project license.[1] The Middlebury Lower Project is located on Otter Creek in the towns of Middlebury and Weybridge, in Addison County, Vermont.

Article 403 requires the licensee to prepare, after consultation with the U.S. Fish and Wildlife Service (FWS), the U.S. Geological Survey (USGS), and the Vermont Agency of Natural Resources (VANR), a project operations plan to monitor run-of-river (ROR) operations required by article 401[2] and the minimum flows required by 402.[3] The plan shall include: (1) a schedule for installing all flow and elevation measuring devices; (2) the planned locations of the flow and elevation measuring devices; (3) specific measures that would ensure that the monitoring system would operate under all conditions (including loss of external electric power to the project); (4) the design of the devices, including any pertinent hydraulic calculations, technical specifications of proposed instrumentation, erosion and sediment control measures, as appropriate, and design drawings of the system; (5) and the method of data collection, and provisions for providing data to the regulatory agencies in a timely manner. The licensee is to include

---

1 Order Issuing New License (Major Project), August 1, 2001, 96 FERC ¶ 62, 098.

2 Article 401 requires the licensee to operate the project in a ROR mode. The licensee is to maintain the reservoir surface elevation at 314.5 feet, plus or minus one inch (314.417 to 314.583 feet elevation), and must act to minimize the fluctuation of the reservoir surface at all times by maintaining a project release so that flows immediately downstream from the project are at all times equal to project inflow. Article 401 also limits the rate of refill for reservoir drawdowns to 10 percent of the instantaneous inflow rate.

3 Article 402 requires the licensee to release into the bypassed reach, immediately downstream from the dam, a continuous minimum flow of 157 cfs, as a veiling flow over the crest of the dam, consistent with current operations.

in the filing comments and recommendations from the resource agencies on the proposed plan, and specific descriptions of how the agencies' comments are accommodated by the plan. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on site-specific information. The Commission reserved the right to require changes to the plan. No ground disturbing or land-clearing activities for installation and use of monitoring devices shall begin until the licensee is notified the plan is approved.

LICENSEE'S PROPOSED OPERATIONS PLAN

The licensee proposed to continue monitoring ROR project operation through remote observation of the reservoir surface. A pressure transducer, located in a stilling well attached to the intake canal wall, senses reservoir water elevation. The project's system control and data acquisition (SCADA) system records the elevation data every 15 minutes and transmits the data to a programmable logic controller (PLC) . The collected data will document the licensee's compliance with the ROR reservoir elevation requirement. The PLC uses reservoir elevation data to trigger increases or decreases in generation, to maintain a consistent reservoir elevation. A new PLC would be installed in the future. Records of reservoir elevation demonstrating compliance with the ROR requirement would initially be submitted quarterly to VANR. The period of quarterly reporting may be extended upon consultation with VANR.

The licensee proposed to release the minimum flow of 157 cfs as a veiling flow over the crest of the dam by maintaining the reservoir water elevation above the dam crest. The licensee stated that, in its consultation with the VANR and the FWS, the agencies expressed concern about the accuracy of the standard weir equation to predict flow over the dam crest, and recommended field calibration for the dam crest flow. The VANR suggested investigating the possibility of using existing trash sluice gate on the dam to provide some portion of the minimum flow, for better consistency. The VANR also recommended that leakage through the dam be quantified so that its contribution to the minimum flow could be determined. The VANR expressed concern about the potential lag time between a project shutdown and spillage providing the minimum flow, and suggested the licensee assess whether additional measures would be necessary to protect habitat.

In response to these agency concerns, the licensee proposed to conduct field investigations in 2002 to assess leakage through the dam, to evaluate potential for using sluice gates to provide a portion of the minimum flow, to calibrate the weir equation for the project, and to determine the effects of project shutdown on spill rates and fish habitat. The licensee proposed to undertake this work in conjunction with the VANR

and the FWS. The licensee stated it will maintain the reservoir elevation at or above 0.233 feet above the dam crest[4] at all times in the interim, until the planned field testing establishes a verified reservoir target elevation for providing a veiling flow over the dam.

The planned field testing investigation would result in a verified reservoir target elevation for providing a veiling flow over the dam. Maintaining this water elevation would be accomplished by installing a new (additional) pressure transducer within a stilling well in the reservoir to ensure that the reservoir elevation (which could be different from that in the intake canal, where the current pressure transducer is located) is maintained at the elevation necessary to provide the minimum flow. The new transducer would be linked to the SCADA system and to the existing, and subsequently the new, PLC. The licensee would use this equipment to continually regulate generation and reservoir levels on an instantaneous basis. The pressure transducers would be maintained and calibrated according to manufacturer's recommendations, and by comparing the transducer readings to actual staff gauge readings for calibration.

The licensee noted that the water quality certificate calls for the licensee to continuously monitor project inflow. Records of reservoir elevation and generation would provide an accurate accounting of the inflow to the project. Additionally, a USGS gauge on Otter Creek, upstream from the project at Middlebury will record continuous flow records. The licensee would use the USGS gauge data to compare to project-generated inflow data for accuracy. This information would initially be submitted quarterly to VANR; the period of quarterly reporting may be extended upon consultation with VANR.

The licensee stated that the proposed monitoring equipment would be installed in the first construction season following Commission approval of the proposed plan. The licensee intends to install the equipment and perform initial calibration and other field work noted above by the end of June 2002. The licensee proposed to provide the turbine rating curves to the VANR by August 1 2002, as required by the water quality certificate.

RESOURCE AGENCIES' COMMENTS

---

4 The elevation of the dam crest is 314.5 feet. The licensee proposed to maintain the reservoir elevation at 0.233 or more feet (about 2.8 inches) above the dam crest, for a water surface elevation of 314.733 or above.

The licensee included a record of an October 11, 2001 conference telephone call with representatives of VANR.[5] The licensee's filed plan incorporated the VANR's comments.

Copies of the licensee's October 30, 2001 e-mail consultation with the VANR and the FWS, subsequent to the conference call, were included in the filing. The VANR requested that the licensee define the method for calculating inflow from the operations data. The licensee clarified that the inflow would be calculated from the reservoir level information, the bypass flow (weir) equation, and the turbine flow equations (rating curves). The licensee stated that the data would be recorded at 15-minute intervals. The licensee would convert the megawatts of generation to cfs of flow through the turbine for flow calculations. The licensee would calculate minimum flow using field-verified weir equations and reservoir elevation data, and the licensee would compare the flow data from the Middlebury USGS gauge with its inflow calculations. The licensee also answered VANR questions about the constant it used in its weir equation for flow over the dam crest, and noted that it plans to perform field calibration for the equation to establish reservoir elevation targets.

In e-mail consultation with the FWS dated November 1, 2001, the licensee stated that, because specific monitoring equipment has not been selected yet, no specific maintenance requirements are available for inclusion in the filed plan. Until the equipment is selected, and the tolerances and accuracy known, the licensee cannot provide the reservoir elevations set points for the reservoir elevation measurement system requested by the FWS.

The USGS did not comment on the licensee's proposed plan.

DISCUSSION AND CONCLUSIONS

The licensee's plan and schedule generally meet the requirements of article 403. However, the licensee is unable to supply some of the details at this time. The licensee proposed to conduct field investigations in 2002 to assess leakage through the dam, to evaluate potential for using sluice gate to provide a portion of the minimum flow, to calibrate the weir equation for the project, and to determine the effects of project shutdown on spill rates and fish habitat. The licensee proposed to undertake this work in conjunction with the VANR and the FWS. The licensee should file with the Commission a report of the results of the field investigations to assess leakage through the dam, to calibrate the weir equation for the project, and to determine the effects of

---

5 The USGS and the FWS were invited to participate in the conference call, but did not.

project shutdown on spill rates and fish habitat, and its evaluation of the potential for using sluice gates to provide a portion of the minimum flow. The licensee should file this report with the Commission by November 15, 2002. The licensee should include in the filing, comments and recommendations from the FWS, the USGS, and the VANR on the report. The licensee must allow a minimum of 30 days for the agencies to comment on the report. Based on the results of the monitoring, the Commission should reserve the right to require modifications of project operations and facilities to ensure compliance with the run-of-river (ROR) operations required by article 401 and the minimum flows required by article 402.

The licensee plans to maintain the reservoir elevation at or above 0.233 feet (about 2.8 inches) above the dam crest at all times until the planned field testing establishes a verified reservoir target elevation for providing a veiling flow over the dam. The licensee's calculations indicate this is the minimum reservoir elevation (314.733 feet) necessary to provided the minimum flow of 157 cfs as a veiling flow over the dam. We note that the proposed reservoir elevation is above the reservoir surface elevation range required by article 401.[6] The resource agencies did not comment on the proposed higher elevation. Field investigations to be conducted by the licensee should determine the appropriate operations and reservoir elevation needed to assure that the project is operated in a ROR mode under article 401 while providing the minimum flow required under article 402. The licensee's proposal to maintain the reservoir surface at the higher elevation of 314.733 feet until the completion of the field investigations is acceptable. If the field investigations indicate that the reservoir elevation range required in article 401 is inappropriate, the licensee should request an amendment to article 401 when it files its report on the results of the field investigations.

The licensee proposed to submit specified project data quarterly to VANR. The licensee should provide to the resource agencies all of its project operations data and inflow calculation data and comparisons within 30 day of an agency's request for the data.

The licensee should notify the Commission of any deviation from the project operations requirements of articles 401 or 402, within 30 days of the deviation.

With the modifications discussed above, the licensee's filed plan should meet the requirements of article 403, and assure that the licensee operates the Middlebury Lower

---

6 Under article 401, the licensee is to maintain the reservoir surface elevation at 314.5 feet, plus or minus one inch (314.417 to 314.583 feet elevation), and must act to minimize the fluctuation of the reservoir surface at all times, maintaining ROR project operations.

Project in compliance with the operating requirements of articles 401 and 402. The plan, with the discussed modification should, therefore, be approved.

The Director Orders:

(A) The licensee's project operations plan, filed under article 403 on November 5, 2001, as modified in paragraphs (B) through (E), is approved.

(B) The licensee shall conduct field investigations in 2002 to assess leakage through the dam, to evaluate potential for using sluice gates to provide a portion of the minimum flow, to calibrate the weir equation for the project, and to determine the effects of project shutdown on spill rates and fish habitat. The licensee shall file with the Commission a report of the results of the field investigations to assess leakage through the dam, to calibrate the weir equation for the project, and to determine the effects of project shutdown on spill rates and fish habitat, and its evaluation of the potential for using sluice gates to provide a portion of the minimum flow. The licensee shall file this report with the Commission by November 15, 2002. The licensee shall include in the filing comments and recommendations from the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and the Vermont Agency of Natural Resources, on the report. The licensee must allow a minimum of 30 days for the agencies to comment on the proposed plan. Based on the results of the monitoring, the Commission reserves the right to require modifications of project operations and facilities to ensure compliance with the run-of-river (ROR) operations required by article 401 and the minimum flows required by article 402.

(C) The licensee shall maintain the reservoir surface at the 314.733 feet elevation or higher until the completion of its field investigations. If the field investigations indicate that the reservoir elevation range required in article 401 is inappropriate, the licensee shall request an amendment to article 401 when it files its report on the results of the field investigations required under paragraph (B).

(D) The licensee shall provide to the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and the Vermont Agency of Natural Resources its project operations data and inflow calculation data and comparisons within 30 days of an agency's request for the information.

(E) If the reservoir surface elevation deviates from the requirements of article 401 or the minimum flow deviates from the requirements of article 402, the licensee shall file a report with the Commission within 30 days of th incident. The report shall, to the extent possible, identify the cause, severity, and duration of the incident, and any

observed or reported adverse environmental impacts resulting from the incident. The report shall also include 1) operational data necessary to determine compliance with articles 401 and 402; 2) a description of any corrective measures implemented at the time of the incident and the measures implemented or proposed to ensure that similar incidents do not recur; and 3) comments or correspondence received from the resource agencies regarding the incident. Based on the report and the Commission's evaluation of the incident, the Commission reserves the right to require modifications to project facilities and operations to ensure future compliance.

(F) Unless otherwise directed in this order, the licensee shall file an original and seven copies of any filing required by this order with:

The Secretary
Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12.3
888 First Street, NE
Washington, DC 20426

In addition, the licensee shall serve copies of these filings on any entity specified in this order to be consulted on matters related to these filings. Proof of service on these entities shall accompany the filings with the Commission.

(G) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 CFR § 385.713.

George H. Taylor
Chief, Biological Resources Branch
Division of Hydropower Administration
and Compliance

200409235036 Received FERC OSEC 09/23/2004 05:08:00 PM Docket# P-2737-019

Central Vermont Public Service Corporation

September 23, 2004

Ms. Magalie Roman Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

VIA ELECTRONIC SUBMITTAL

RE: Middlebury Lower Hydroelectric Project, FERC No. 2737
Article 403 Field Investigations - Final Report
Article 401 - Request for Amendment

Dear Secretary Salas:

Central Vermont Public Service Corp. (CVPS) hereby submits a final report on field investigations required by the FERC Order Modifying and Approving Project Operations Plan Under Article 403, issued February 5, 2002 for the Middlebury Lower Project (FERC No. 2737). CVPS has requested and received several extension of time requests to evaluate several options and complete the corresponding work when environmental conditions and schedules allowed. A draft of this report was originally submitted to resource agencies in August of 2003 and again in May 2004. Comments received and correspondence associated with this report are included in Appendix A. The only changes made to the draft report are a new section discussing the results of the investigation of the use of sluice gates to pass a portion of the minimum flow and a confirmation that a new operating elevation of 314.74' will be needed for the Middlebury Lower impoundment. Because this elevation is slightly higher than the licensed elevation of 314.5' (± 1 inch), Article 401 of the Project License will need to be amended as indicated in FERC's February 5, 2002 order.

CVPS in consultation with the resource agencies looked at alternative ways of operating Middlebury Lower to pass the required minimum flow and we are confident that the continued use of the veiling flow originally agreed to will be the best for project operations, aesthetics, and fishery habitat. We appreciate FERC's patience in allowing us to investigate this in a cooperative manner with resource agencies. If you have any questions about this, please call me at (802) 747-5707. Thank you.

Sincerely,

John Greenan (TJO)

John C. Greenan, P.E.
Project Coordinator

cc: J. Cueto (VANR)
M. Grader (USFWS)
B. Mazrik (USGS)

200409235036 Received FERC OSEC 09/23/2004 05:08:00 PM Docket# P-2737-019

Central Vermont Public Service Corporation

Middlebury Lower Hydroelectric Project
(FERC No. 2737)

Article 403 Field Investigations

September 2004

Prepared by:

Kleinschmidt
Energy & Water Resource Consultants

and

MULTIPLE RESOURCE
MANAGEMENT, INC.

200409235036 Received FERC OSEC 09/23/2004 05:08:00 PM Docket# P-2737-019

Central Vermont Public Service Corporation

Rutland, Vermont

Middlebury Lower Hydroelectric Project

(FERC No. 2737)

Article 403 Field Investigations

September 2004

Prepared by:

Kleinschmidt

Energy & Water Resource Consultants

and

MULTIPLE RESOURCE MANAGEMENT, INC.

MIDDLEBURY LOWER HYDROELECTRIC PROJECT
(FERC NO. 2737)

ARTICLE 403 FIELD INVESTIGATIONS

TABLE OF CONTENTS

LIST OF TABLES

APPENDIX A

Consultation Section

MIDDLEBURY LOWER HYDROELECTRIC PROJECT
(FERC NO. 2737)

ARTICLE 403 FIELD INVESTIGATIONS

1.0 INTRODUCTION

This report on field investigations was required by the FERC Order Modifying and Approving Project Operations Plan Under Article 403, issued February 5, 2002 for the Middlebury Lower Project (FERC No. 2737). The February 5th Order directed CVPS to conduct field investigations in 2002 to assess leakage through the dam, to evaluate the potential for using sluice gates to provide a portion of the minimum flow, to calibrate the weir equation for the project, and to determine the effects of project shutdown on spill rates and fish habitat. A draft version of this report was submitted to resource agencies in August 2003 and again in May 2004. CVPS met with the Vermont Agency of Natural Resources on-site to review potential configurations in 2002. Additional discussions and e-mail communications concerning comments on the draft report and overall Middlebury operations are included as Appendix A.

2.0 LEAKAGE THROUGH THE DAM

CVPS completed structural repairs to the dam in 1989. As a result of this work, there is minimal leakage through the project dam and the contribution from leakage is not enough to make any significant difference in spill rates at the Project.

3.0 EVALUATE THE POTENTIAL FOR USING SLUICE GATES TO PROVIDE A PORTION OF THE MINIMUM FLOW

CVPS evaluated the use of the West Dam (upstream) sluiceways to pass a portion of the minimum flow while maintaining a one-inch veiling flow over the dam. Kleinschmidt calculated that 2.6' of the boards in each sluice would need to be removed in order to continue to provide a 1" veiling flow over the dam and meet the minimum flow target in the bypass of 157 cfs. CVPS began operating with this configuration in September 2003 (Photo 1). Flow measurements of this configuration were originally planned for fall of 2003 but had to be postponed because of high river flows. Operational experience in late 2003 and early 2004 was unfavorable as icing created a hazard to personnel attempting to clear ice and debris from the two sluiceways. CVPS concluded that the original plan, to provide all of the flow as a veiling flow over the dam, was preferable when considering all factors.

Photo 1. Sluice gates on West End of Dam with 2.6' of boards removed.

4.0 CALIBRATE THE WEIR EQUATION

In October 2002, Multiple Resource Management (MRM) and CVPS performed field measurements in the Middlebury bypass in order to calibrate the weir equation for the Project. The headpond elevation was set at 314.70' for the first day of testing and 314.74' for the second day of testing. Because of the nature of the Middlebury bypass (braided channels, complex flow patterns), there was no single area that could be used as a gauging site. Instead, two transects were selected about mid-way down the bypass, in an area where flow is almost evenly divided between two channels.

Flow measurement procedures generally followed standard USGS procedures for open-channel flow measurements (Buchanan and Somers, 1976). Each transect location was marked (headpin and tailpin) and a rope marked at one-foot intervals and/or a tape measure was stretched across the transect. Velocity measurements (to the closest .01 foot per second) were taken at 1 to 4 foot intervals across the transect using a Marsh McBirney electronic FlowMate meter model 2000 attached to a top-setting wading rod. Velocity measurements were taken at 0.6 times the depth for depths up to and including two and a half feet. For water depths greater than two and a half feet, velocity measurements were taken at 0.2 and 0.8 times the depth and averaged to yield the mean column velocity. Water depth was recorded to the closest 0.1 foot across the transect. Flow through each "cell" across the river was then calculated and flow from all cells was added to arrive at a total flow measurement for each transect measured. Headpond elevation was recorded before and after each flow measurement to ensure steady state conditions below the Project. Photos 2 through 4 below show some representative shots of the transect locations where measurements were taken.

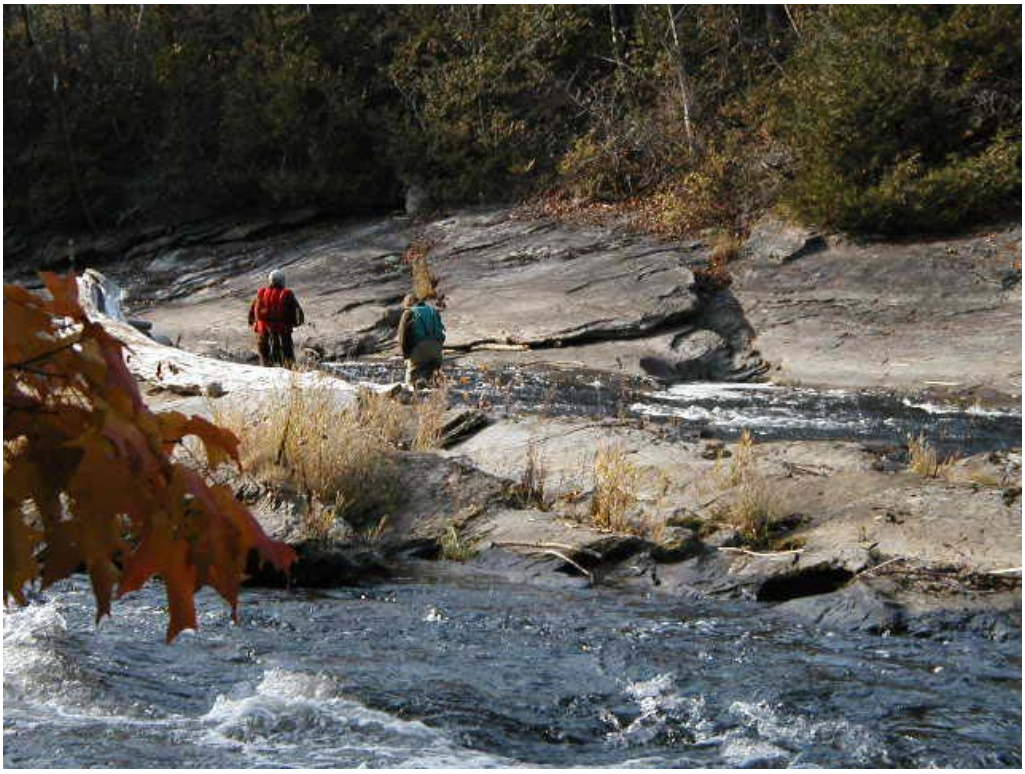


Photo 2. Flow Measurements at the West Transect in Middlebury Lower Bypass.

Photo 3. Flow Measurements at the East Transect in Middlebury Lower Bypass.

Photo 4. East Transect in Middlebury Lower Bypass.

Table 1 shows the results of these measurements and Table 1a shows the results of some more recent measurements that MRM made.

Table 1. Flow measurements in Middlebury Lower Bypass

Date	Spillway Overflow Depth	West Transect Flow (cfs)	East Transect Flow (cfs)	Total	Pond elev.
10-30-02	.20’	53	79	132	314.70’
10-31-02	.24’	67	89	156	314.74’
10-31-02	.24’	63	88	151	314.74’

Table 1a. 2004 Flow measurements in Middlebury Lower Bypass

Date	Spillway Overflow Depth	West Transect Flow (cfs)	East Transect Flow (cfs)	Total	Pond elev.
06-29-04	.20’	51.7	76.2	127.9	314.69’
07-22-04	.24’	71.2	93.6	164.8	314.74’
			101.7	172.9	
				168.8	«Average
07-22-04	.22’	58	80.8	138.8	314.72’
			91.5	149.5	
				144.2	«Average

The most recent measurements show that a .24' spillway overflow depth is approximately 12 cfs higher than required, while a .22' overflow depth is approximately 13 cfs lower than required. The average of the measurements at these two flows was 156.5 cfs, indicating that maintaining a midpoint of ≥314.73' pond elevation would likely accurately ensure that the minimum flow of 157 cfs is met. However, in light of the readings in 2002 and the inherent difficulties in precise flow measurement in these braided channels, CVPS believes that the more conservative elevation of 314.74' will ensure that the required minimum flow will be met or exceeded at all times. Because this elevation is higher than the licensed elevation of 314.5' (± 1 inch), Article 401 of the Project License will need to be amended as indicated in FERC's February 5, 2002 order.

5.0 DETERMINE THE EFFECTS OF PROJECT SHUTDOWN ON SPILL RATES AND FISH HABITAT

This concern, raised by the VANR during review of the Article 403 Project Operations Plan, was investigated in the field in conjunction with the weir calibration studies. CVPS determined that there are no avoidable adverse effects on fish habitat in the project bypass or in the project tailrace that result from project shutdowns. The Project tailrace flows immediately into the impounded area of the downstream Beldens Project (FERC No. 2558) owned and operated by OMYA. Therefore, there are no areas immediately below the powerhouse that are dependent on Project releases to remain watered. In the event of a project shutdown, flow rates increase incrementally into the project bypass through spill. The sluice gate can also be opened as needed to maintain proper pond elevation.

6.0 LITERATURE CITED

Buchanan, Thomas J. and Somers, William P. 1976. Discharge measurements at gaging stations, techniques of water-resources investigations of the United States Geological Survey. United States Government Printing Office, Washington D.C.

APPENDIX A

CONSULTATION

-----Original Message-----
From: Melissa_Grader@fws.gov [mailto:Melissa_Grader@fws.gov]
Sent: Wednesday, August 20, 2003 10:39 AM
To: Greenan, John
Cc: jeffc@dec.anr.state.vt.us; brian.fitzgerald@anr.state.vt.us
Subject: Middlebury Lower Bypass Flow Calibration Report

Hi John,

We have reviewed the draft report sent out on August 7, 2003. In general, it appears that maintaining 0.24' of flow over the spillway will provide the required 157 cfs discharge into the bypass reach. This depth of spill is slightly higher than the one originally proposed to fulfill the bypass flow requirement based solely on calculations using the weir equation (0.233').

The results of the evaluation to use the West Dam sluice gate to provide a portion of the minimum flow requirement (in conjunction with veiling flow over the spillway) should be submitted to VANR and this office prior to filing the final report with the Commission by Sept. 12th, so that we may review and provide recommendations on the report. We assume that the evaluation will be similar to the spillway flow field calibration. Please let us know immediately how you plan to evaluate the sluice gate discharge (and quantify the 1" spillway flow), to ensure that VANR and this office agree with the study design (and avoid the possibility of having to perform additional test flows/measurements).

-Melissa

~~~~~~
Melissa Grader
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service/New England Field Office
c/o CT River Coordinator's Office
103 East Plumtree Road
Sunderland, MA 01375
(413) 548-9138 (phone) (413) 548-9746 (fax) melissa_grader@fws.gov
~~~~~~

-----Original Message-----
From: Greenan, John [mailto:JGreenan@cvps.com]
Sent: Friday, September 26, 2003 12:07 PM
To: melissa_grader@fws.gov
Cc: Scarzello, Mike; Tim Oakes (Tim Oakes); Jeffrey Cueto
Subject: CVPS - Middlebury Lower

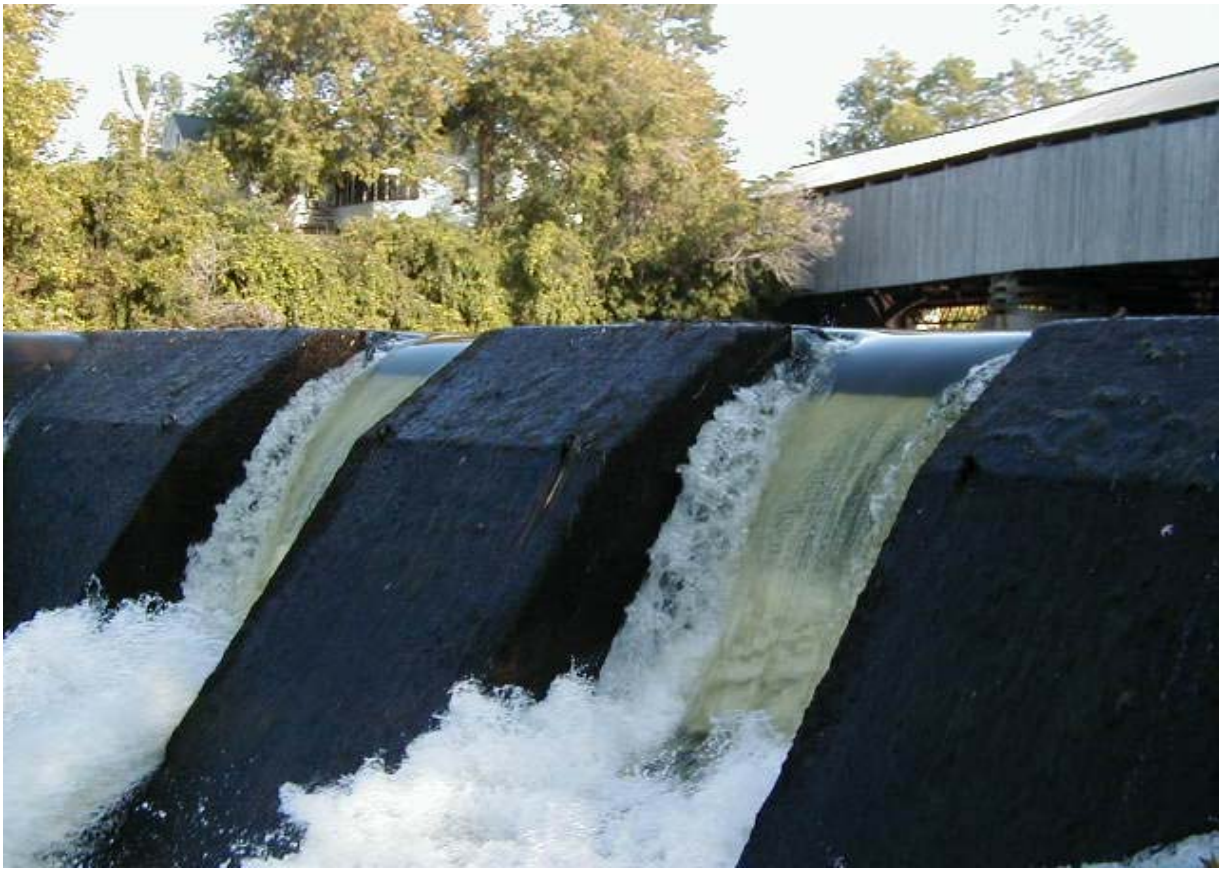
Melissa:

Thanks for your recent comments on our Middlebury Lower field investigations. Since we sent out the report, we have completed calculations to provide the minimum flow using the stoplog sluices on the west dam while still providing a veiling flow over the Dam. According to our calculations, approximately 2.6' of stoplogs removed from each of the two sluices and 1" of overtop will provide the requisite 157 cfs. We recently began operating with this configuration though we have not yet field verified the flow calculations. We have been monitoring river flow and thought base flow might subside to near the 157 cfs bypass flow. That flow scenario would have provided us with an efficient way to view the concept under a known (USGS gauge) flow. Unfortunately we are now into a showery weather pattern and the lowest seasonal river flows have probably already occurred.

In the interest of not losing additional time, we invited Jeff Cueto to view the validity of the overall concept with us, recognizing that some further minor adjustments may be needed based on field calibrations. Jeff plans to join us on site on Tuesday the 30th at 10:00 to look at the sluices and the dam. We will use either the generators or the gate on the east side of the dam to pass any excess water. If Jeff approves of the concept, we will plan to calibrate the flow equations using the same stream gauging techniques used to evaluate the weir equation over the Dam and make field adjustments as needed to further refine either the sluice gate openings or headpond elevation.

I know it is short notice, but you are certainly welcome to join us on the 30th. If you can't join us, we will summarize the site visit in an e-mail. I have attached two photos that show the current configuration of flow through the sluices. Thanks for your ongoing interest.

John Greenan



-----Original Message-----
From: Melissa_Grader@fws.gov [mailto:Melissa_Grader@fws.gov]
Sent: Friday, September 26, 2003 2:06 PM
To: Greenan, John
Cc: Jeffrey Cueto; Scarzello, Mike; Tim Oakes (Tim Oakes)
Subject: Re: CVPS - Middlebury Lower

John,

Thanks for the offer, but if the purpose is to reach agreement on the overall concept, our attendance does not appear necessary. We do not have a problem with the concept of passing the bypass flow through the sluice gates and over the spillway. We do, however, want to see the results of the field calibration that verifies how many logs need to be removed from the sluices, and what pond level results in the required 157 cfs through the bypass.
\

Melissa
~~~~~~
Melissa Grader
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service/New England Field Office
c/o CT River Coordinator's Office
103 East Plumtree Road
Sunderland, MA 01375
(413) 548-9138 (phone) (413) 548-9746 (fax) melissa_grader@fws.gov
~~~~~~

"Greenan, John" <JGreenan@cvps.com> 09/26/03 12:06 PM

To: <melissa_grader@fws.gov>
cc: "Scarzello, Mike" <MScarze@cvps.com>, "Tim Oakes (Tim Oakes)" <Oakes@KAssociates.com>, "Jeffrey Cueto" <jeff.cueto@anr.state.vt.us>
Subject: CVPS - Middlebury Lower

Melissa:

Thanks for your recent comments on our Middlebury Lower field investigations. Since we sent out the report, we have completed calculations to provide the minimum flow using the stoplog sluices on the west dam while still providing a veiling flow over the Dam. According to our calculations, approximately 2.6' of stoplogs removed from each of the two sluices and 1" of overtop will provide the requisite 157 cfs. We recently began operating with this configuration though we have not yet field verified the flow calculations. We have been monitoring river flow and thought base flow might subside to near the 157 cfs bypass flow. That flow scenario would have provided us with an efficient way to view the concept under a known (USGS gauge) flow. Unfortunately we are now into a showery weather pattern and the lowest seasonal river flows have probably already occurred.

In the interest of not losing additional time, we invited Jeff Cueto to view the validity of the overall concept with us, recognizing that some further minor adjustments may be needed based on field calibrations. Jeff plans to join us on site on Tuesday the 30th at 10:00 to look at the sluices and the dam. We will use either the generators or the gate on the east side of the dam to pass any excess water. If Jeff approves of the concept, we will plan to calibrate the flow equations using the same stream gauging techniques used to evaluate the weir equation over the Dam and make field adjustments as needed to further refine either the sluice gate openings or headpond elevation.

I know it is short notice, but you are certainly welcome to join us on the 30th. If you can't join us, we will summarize the site visit in an e-mail. I have attached two photos that show the current configuration of flow through the sluices. Thanks for your ongoing interest.

John Greenan

200409235036 Received FERC OSEC 09/23/2004 05:08:00 PM Docket# P-2737-019

Submission Contents