UNITED STATES OF AMERICA 110 FERC ¶62,091
FEDERAL ENERGY REGULATORY COMMISSION

Central Vermont Public Service Corporation) Project No. 2731-032

ORDER MODIFYING AND APPROVING CALIBRATION AND FLOW VERIFICATION PLAN AND RECOMENDATIONS UNDER ARTICLE 402 AND APRIL 12, 2002 ORDER[1]

(February 01, 2005)

The Central Vermont Public Service Corporation (licensee) filed with the Commission on October 9, 2002, its calibration and flow verification plan and schedule for the diversion structure at the Weybridge Project under article 402 of the project license.[2] The licensee supplemented its filing on May 12, 2003, March 8 and May 20, 2004,[3] and January 18, 2005. The Weybridge Project is located on Otter Creek in the towns of Weybridge and New Haven, in Addison County, Vermont.

BACKGROUND

Article 402 required the licensee to prepare, after consultation with the U.S. Fish and Wildlife Service (FWS) and the Vermont Agency of Natural Resources (VANR), a plan for construction of the diversion structure at the downstream end of Rock Island.[4] The structure is to distribute flows of 125 cubic feet per second (cfs) to the east and west channels around Wyman Island during non-generation periods, and to pass 125 cfs to the west channel during generation and to allow fish movement through the structure. The April 12, 2002 order approved the licensee's diversion structure plan. Paragraph (B) of the order required the licensee to file for Commission approval a plan to calibrate the diversion structure to assure that it will provide the required minimum flows. In

[1] Order Modifying and Approving Diversion Structure Construction Plan under Article 402 and Amending February 13, 2002 Order, 99 FERC ¶ 62,042.

[2] Order Issuing New License (Major Project), August 1, 2001, 96 FERC ¶ 62, 097.

[3] This report is the first of five annual reports required by condition F of the water quality certificate.

[4] Rock Island bisects the dam and extends downstream from the dam, separating the west, bypass channel from the main, tailrace channel on the east side of the island.

conjunction with the calibration of the diversion structure, the licensee is to verify that the flow in the west channel around Wyman Island is at least 125 cfs. The licensee was to file for Commission approval, the results of the calibration and flow verification. The licensee must include documentation of consultation with the resource agencies in its filing of the calibration and flow verification results. The Commission reserved the right to require changes in the plan.

Immediately downstream from the project dam there are several small islands, and one larger one, Wyman Island, that partition river flow. The small Rock Island divides the dam and extends downstream, dividing the tailrace from the bypassed reach of the river. The diversion structure extends from the downstream end of Rock Island to the next small island at the entrance to the west channel around Wyman Island.

The diversion structure includes a control weir with stoplog slots at the diversion structure's downstream end, at the entrance to the west channel. A 15-feet-wide by 3.5-feet-high notch in the control weir passes water from the pool formed by the control weir and the diversion structure downstream into the west channel around Wyman Island.

The diversion structure provides for fish movement through a vertical concrete slot in the diversion structure. When the bypass flow release is 125 cfs, the licensee calculated 10 cfs or less flows through the slot. When generation ceases and the bypass flow release is 250 cfs, a maximum of 15 cfs is expected to flow through the fish movement slot. The fish movement slot is expected to function under all flow conditions.

LICENSEE'S CALIBRATION PLAN AND REPORTED RESULTS

The licensee completed construction of the diversion structure in August 2002. The licensee stated that some preliminary flow measurements of flows through the diversion structure were done in 2001, with inconclusive results. The licensee waited until the diversion structure construction was completed, when more accurate measurements could be taken with all taintor gate flow diverted through the diversion structure.

The licensee filed an annual report on May 12, 2003, providing the results of the licensee's 2002 diversion structure calibration and flow verification. The licensee calibrated the diversion structure by opening the taintor gate to discharge 125 cfs into the bypassed channel. The licensee compared measured open channel and measured weir flows to the 125 cfs flow release predicted by the taintor gate flow equation as the first step of the calibration and verification process. Measurements were then taken with the fish passage section of the diversion structure closed and the flow measurement taken at the control weir. The licensee considered the results of its calibration measurements to be suitably close to the target of 125 cfs to validate the gate equation for the flow release.

At a later date with higher project inflows,[5] the licensee compared the 250 cfs target flow release predicted by the taintor gate equation to measured flows. With the gate predicted by the gate equation to release of 250 cfs, the licensee took measurements further downstream at two transects, one on either side of the downstream end of Wyman Island.

When the project is not generating, water released from the taintor gate into the bypassed reach (250 cfs) has a higher surface elevation than water in the tailrace. Due to this elevational difference, a portion of the water released from the control weir flows around the islands in the west channel around Wyman Island, and runs "upstream" to the upstream juncture of the channels around Wyman Island, where it flows into the east channel. Measurements indicated this reverse flow ranged from 34 to 37 cfs, and that between 93 and 98 cfs continue to flow down the west channel to the confluence of the channels on either side of Wyman Island. The reverse flow occurs whenever there is no generation flow in the tailrace, and is an important factor in determining diversion weir height adjustment, to provide the required flows in the specified channels. The sum of flows measured in the east and west channels around Wyman Island were greater than the required 250 cfs,[6] with about two-thirds of the flow in the east channel. Therefore, the licensee focused on diverting sufficient water to meet the target flow of 125 cfs in the west channel around Wyman Island. The third test, with all the horizontal timbers in place to their full height of 20.5 inches,[7] gave a measured flow of 138 cfs in the west channel around Wyman Island.

The licensee assessed whether the target flow of 125 cfs in the west channel around Wyman Island occurred when the project was generating and the taintor gate released 125 cfs into the bypassed reach. With the project generating at minimum capacity (700 kW), minimal reverse flow occurred at the upstream end of Wyman Island. With the minimum generation, and the taintor gate providing 125 cfs in the bypassed reach, the licensee measured a measured flow of 120 cfs in the west channel around Wyman Island. Because this was the least flow volume that generation would contribute to flows in the west channel, the licensee concluded that the diversion successfully apportions flows as required.

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[5] The licensee performed the125 cfs gate equation calibration measurements during low summer flows on August 30, 2002. The licensee performed additional equation calibration measurements at increased flows on September 19 and 20, and October 1, 2002.

[6] 277 cfs at a diversion structure height of 9.5 inches, and 269 cfs at a diversion structure height of 11.5 inches.

[7] The 20.5-inch height is the maximum possible height of the diversion structure timbers.

The licensee's report on the calibration indicated that, with the 250 cfs flowing from the taintor gate into the bypassed reach in the absence of generation, in order to shunt the required 125 cfs flow into the west channel around Wyman Island, the horizontal timbers need to be at nearly their full design height of 20.5 inches. At this height, the stated goal of assuring a flow of at least 125 cfs in the west channel around Wyman Island is achieved. However, the 20.5-inch height created unanticipated problems: high velocities scouring the old west channel entrance that may exacerbate the reverse flow condition; high velocities scouring the tailrace channel at the diversion structure; greater backwater effect within the bypassed reach, diminishing riffle/ cascade habitat; less flow directly below the diversion structure negatively affecting habitat and aesthetics; greater head differential between bypassed reach and tailrace and resulting greater velocities in the fish movement slot; and greater attractive nuisance potential: easier to walk across diversion structure.

The licensee noted that many of these problems are not present at the lower 11.5-inch horizontal timber height, which provides about 80 percent of the target minimum flow in the west channel around Wyman Island. With the diversion structure adjusted to the lower 11.5-inch height, the risk of structural failure decreases, less maintenance would be required, and the negative aesthetic impact of the structure is lessened. The licensee stated habitat would benefit by the lengthened riffle area in the bypassed reach, and the greater wetted habitat area immediately below the diversion structure appeared to offset the reduced flow in the west channel around Wyman Island. The licensee recommended continued operation of the diversion structure with the 11.5-inch horizontal timber height.

A report filed by the licensee March 8, 2004 discussed the functioning of the diversion weir under the atypical conditions occurring at the project during 2003, including an extended shutdown period from early June through late December 2003. The shutdown prevented the licensee from making the planned fall 2003calibration measurements.

The licensee proposed to evaluate the pool observed to be developing downstream from the diversion structure to determine whether energy dissipation measures are needed. It also planned to complete flow calibration measurements in 2004, verify flows released by a new minimum flow release gate, and assess any changes in the flow pattern around the diversion structure.

Commission staff’s preliminary analysis, issued May 4, 2004, proposed a diversion structure height intermediate between the 11.5-inch and 20.5-inch heights used for the 2002 flow calibration and verification measurements, with the intention of assuring that the article 402 minimum flow requirements are met. The licensee’s May 20, 2004 filing responded to the staff’s preliminary analysis, requesting to delay the

recommended diversion structure height adjustment until high spring flows subsided, when the licensee proposed to perform further measurements at the 11.5 height for comparison to the 2002 measurements. The licensee proposed to follow the 2004 measurements with an on-site meeting with the resource agencies' representatives and FERC staff to reassess the functioning of the diversion structure and discuss options.

The licensee, representatives from the resource agencies, and Commission staff attended the site visit and on-site meeting October 5, 2004. The licensee filed with the Commission on January 18, 2005, a meeting summary documenting the October meeting. Meeting on site, participants reviewed results of past calibration measurements as well as a map of the area downstream from the project dam showing location of the reverse flow effect. The results indicated that the reverse flow around the upper end of Wyman Island makes it difficult to attain the specified 125 cfs flow in the west channel at the downstream end of Wyman Island when the project is not generating and, instead, releasing the 250 cfs minimum release. Meeting participants observed flows downstream from the project with a low generating flow and 125 cfs release in the bypassed reach from several locations, including flow over the diversion structure, the west channel at the downstream end of Wyman Island, the west channel at upper end of Wyman Island, and the control weir. Observations at these locations were repeated with the non-generation release of 250 cfs being partitioned by the diversion structure.

RESOURCE AGENCY CONSULTATION

The licensee's May 12, 2003 filing documented its request for the resource agencies comments regarding the results of the diversion structure calibration and the licensee's subsequent recommendations. A second report, filed March 8, 2004, was also provided to the resource agencies for comment. The FWS and the VANR did not provide comments on the reports and recommendations.

In November 2003, representatives from the FWS and VANR informed Commission staff via e-mail of their intention to make a site visit in 2004 to observe the diversion structure. The agencies preferred to defer their comments until the licensee gathered calibration data in summer and fall 2004 and submitted a report later in the calendar year.

At the October 5, 2004 on-site meeting attended by Commission staff, resource agency representatives participated in the discussion about diversion structure height adjustments and resulting flow distributions. Participants agreed that the diversion structure was performing well in achieving the goal of enhancing habitat in the west channel around Wyman Island. Resource agency representatives agreed that performance of the diversion structure, and the flows that resulted with the structure adjusted to the 11.5-inch-height, were adequate.

The agencies further agreed that the licensee should continue as planned the annual calibration and flow verification measurements for the first five years of diversion structure operation. Thereafter, the licensee may need to perform calibration monitoring at five-year intervals to determine whether the structure continues to function as agreed upon, in consideration of possible but infrequent hydrologic events that might change the local channel morphology at the project. Monitoring at 5-year intervals would detect channel bed changes that could result in changes in flow volumes into the west channel around Wyman Island. While such changes are not anticipated, they could occur and would then need to be addressed.

All parties agreed that 80 percent of the required minimum flow in the west channel, released with the existing diversion structure height of 11.5 inches, would be accepted as adequate. Meeting participants further agreed that the current reduced minimum flow released into the west channel, as provided by the 11.5-inch diversion structure height, could be permanently incorporated into the license at the end of the initial 5-year monitoring period.

DISCUSSION AND CONCLUSIONS

The licensee's filings provided for calibration of the diversion structure and flow verification and presented the results of the calibration and verification measurements taken in 2002 and 2004.[8] The calibration data indicate that the diversion structure generally functions as intended. The height of the diversion structure can be adjusted to provide a flow of 125 cfs in the west channel around Wyman Island but with some unforeseen, unintended consequences. In view of the unanticipated problems with the diversion structure at full height (20.5 inches), the licensee proposed to use the 11.5-inch height, that results in release of about 80 percent of the required minimum flow in the west channel around Wyman Island during periods of non-generation. While a diversion structure adjustment that provides 80 percent of the required minimum flow does not meet the flow release requirements of article 402, all of the parties involved agreed that the flows provided were adequate to achieve the habitat improvements intended under article 402.

The licensee should maintain the diversion structure at the 11.5-inch height.. The licensee should proceed with the annual calibration and flow verification measurements

[8] No calibration measurements were taken in 2003, due to an extended shutdown period during the second half of the year for the purpose of replacement of electrical switch gear, difficulties in refurbishing a bearing, and installation of a new minimum flow gate, and because high flows from a fall 2003 storm caused the release of all the diversion structure timbers.

of the diversion structure for the first five years of operation, as planned.[9] By February 28 of the year following each of the remaining three years of the five initial measurement years, the licensee should provide the results of the calibration and flow verification to the FWS and the VANR for their review and comment. The licensee should file, with the Commission by April 30 following each of the three remaining of the five initial measurement years, the results of its annual calibration measurements, including documentation of resource agency consultation and agencies' comments.

At the end of the initial five years of diversion structure operation, and provided that the flow conditions in the river channels downstream from the project dam continue to be as they were in 2004, the licensee should file, with the Commission for approval, a request to amend article 402 of the project license to reflect lesser minimum flows that have been agreed upon as adequate to provide fish habitat in the west channel around Wyman Island, including the resource agencies comments and recommendations on the amendment request.

To ensure that the diversion structure provides and continues to provide the required minimum flows, the licensee should perform diversion structure calibration and flow verification at 5-year intervals for the duration of the license. By February 28, of each fifth year, the licensee should provide the results of the calibration and flow verification to the FWS and the VANR for their review and comment. Beginning in 2013, the licensee should file with the Commission, by April 30 following each of these intervals, the results of its 5-year calibration measurements, including documentation of resource agency consultation and agencies' comments. The Commission should reserve the right to require the licensee to take actions to comply with, to demonstrate compliance with the minimum flow requirements of article 402, or to revise flows release requirements if conditions change.

With the modifications discussed above, the licensee's filed plan should meet the requirements of paragraph (B) of the April 12, 2002 order and article 402, and ensure that the structure performs according to the requirements of article 402. The plan, with the discussed modifications should, therefore, be approved.

The Director Orders:

(A) The licensee's calibration and flow verification plan and schedule for the diversion structure at the Weybridge Project filed with the Commission on October 9, 2002, under article 402, and supplemented with filings on May 12, 2003, March 8 and May 20, 2004, and January 18, 2005, as modified in paragraphs (B) through (D), is approved.

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[9] Measurements remain to be taken in 2005, 2006 and 2007, with annual reports of the results and recommendations to be filed in 2006, 2007 and 2008.

(B) The licensee shall maintain the diversion structure at the 11.5-inch height.. The licensee shall proceed with annual calibration and flow verification measurements of the diversion structure for the first five years of operation. By February 28 of 2006, 2007, 2008 (that is, following each of the remaining three of the five initial measurement years), the licensee shall provide the results of the calibration and flow verification to the U.S. Fish and Wildlife Service (FWS) and the Vermont Agency of Natural Resources (VANR) for their review and comment. The licensee shall file, with the Commission by April 30 of 2006, 2007, 2008, the results of its annual calibration measurements, including documentation of resource agency consultation and agencies' comments.

(C) At the end of the initial five years of diversion structure operation, and provided that the flow conditions in the river channels downstream from the project dam continue to be as they were in 2004, the licensee shall file, for Commission approval by April 30, 2008 a request to amend article 402 of the project license to reflect lesser minimum flows that have been agreed upon as adequate to provide fish habitat in the west channel around Wyman Island, including the comments and recommendations of the FWS and the VANR on the amendment request.

(D) To ensure that the diversion structure provides and continues to provide the required minimum flows, the licensee shall perform diversion structure calibration and flow verification at 5-year intervals for the duration of the license. By February 28, of each fifth year, the licensee shall provide the results of the calibration and flow verification to the FWS and the VANR for their review and comment. Beginning in 2013, the licensee shall file, for Commission approval, by April 30 following of each of these 5-year intervals, the results of its 5-year calibration measurements, including documentation of resource agency consultation and agencies' comments. The Commission reserves the right to require the licensee to take actions to comply with, to demonstrate compliance with the minimum flow requirements of article 402, or to revise flow release requirements if conditions change.

(E) 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.

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