UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Green Mountain Power Corporation

Project No. 2674-003
Vermont

ORDER ISSUING NEW LICENSE
(Major Project)

INTRODUCTION

JUL 30 1999

On May 30, 1997, Green Mountain Power Corporation (GMP) filed an application for a new license under Part I of the Federal Power Act (FPA) [1] for the continued operation and maintenance of the 2.4-megawatt (MW) Vergennes Hydroelectric Project No. 2674, located on Otter Creek in the City of Vergennes, Addison County, Vermont. [2]

The Commission issued the original license for the Vergennes Project to GMP on June 29, 1979. [3] The license expired on May 31, 1999. GMP proposes no change in the project's current capacity. For the reasons discussed below, I will issue a new license to GMP for the Vergennes Project No. 2674.

BACKGROUND

On September 23, 1997, the Commission issued a public notice of the application for a major license for the Vergennes Project. [4] Motions to intervene were filed by the Vermont Agency of Natural Resources (VANR) (dated November 3, 1997) and the U.S. Department of the Interior (dated November 13, 1997). No party objected to the issuance of this license. Comments received from interested agencies and individuals

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[1] 16 U.S.C. §797(e).

[2] Otter Creek, a tributary to Lake Champlain, is a navigable waterway of the United States to a point upstream from the Center Rutland Project (FERC Project No.2445), located in Rutland County. See 34 FPC 540, 541 (1965). The Vergennes Project is located at river mile 7.6 and within the navigable portion of Otter Creek.

[3] 7 FERC ¶ 61,323 (1979).

[4] 62 F.R. 50920 (1997).

have been fully considered in determining whether and under what conditions to issue this license.

On February 20, 1998, the Commission issued a public notice that the Vergennes Project was ready for environmental analysis and solicited comments, recommendations, and final terms and conditions. [5] The VANR filed comments on June 1, 1998.

On August 13, 1998, the Commission issued a draft environmental assessment (DEA) for this project based on the staff's independent analysis. The DEA recommended that the project be licensed with the enhancement measures recommended by the licensee and with additional staff-recommended environmental measures. Comments filed on the DEA have been addressed in the final environmental assessment (FEA), which was issued on October 16, 1998, and is attached to this order.

The Commission staff also prepared a Safety and Design Assessment for the project, which is available in the Commission's public file.

PROJECT DESCRIPTION

The Vergennes Project is an existing, licensed hydroelectric facility owned and operated by the Green Mountain Power Corporation, on Otter Creek, about 7.6 miles upstream from Lake Champlain. The total existing installed capacity of the project is 2.4 MW, with average annual generation of 9.45 gigawatt-hours. GMP proposes no structural modifications for the project. The Vergennes Project's principal features consist of: three concrete gravity overflow dams, divided by two instream islands; a 29-foot-long, non-overflow dam and two powerhouses located on the north (Plant 9) and south banks (Plant 9B) of Otter Creek with a total installed capacity of 2.4 MW; an 8.8-mile-long, 133-acre reservoir, and appurtenant facilities. A more detailed description of project works is contained in ordering paragraph (B)(2).

The project will be converted from a daily peaking mode, to run-of-river operation with one generating facility operated remotely from GMP's Dispatch Center located in Colchester, Vermont, and the other two generating units controlled manually by an on-site operator. In the past, the reservoir level fluctuated about 1.5 feet daily during peaking operations; these fluctuations will not occur with run-of-river operation. The project had a dependable generating capacity averaging about 1.3 MW which will be

[5] 63 F.R. 9790 (1998).

reduced to an annual average generating capacity of 1.194 MW, based on the proposed changes for the project.

APPLICANT'S PLANS AND CAPABILITIES

In accordance with Sections 10(a)(2)(C) and 15(a)(2) of the FPA, I have evaluated GMP's record as a licensee for these areas in considering the issuance of a new license: (1) conservation efforts; (2) compliance history and ability to comply with the new license; (3) safe management, operation, and maintenance of the project; (4) ability to provide efficient and reliable electric service; (5) need for power; (6) transmission line improvements; (7) cost effectiveness of the plans; and (8) actions affecting the public.

Here are the findings:

1. Consumption Efficiency Improvement Program (Section 10(a)(2)(C))

Staff has reviewed the details of GMP's conservation program and conclude that GMP is making a good faith effort to conserve electricity, reduce peak-hour demands, and to support the objectives of Section 10(a)(2)(C) of the FPA.

2. The Compliance History, and Plans and Abilities of the Applicant to Comply with the Articles, Terms, and Conditions of Any License Issued to It and Other Applicable Provisions of Part I of the FPA (Sections 15(a)(2)(A) and 15(a)(3)(A))

Staff has reviewed GMP's license application and compliance history with the existing license in an effort to judge its ability to comply with the articles, terms, and conditions of any license issued, and with other applicable provisions of this part of the FPA. Staff concludes that GMP's overall record of making timely filings and compliance with its license is satisfactory.

Based on that review, staff concludes GMP has or can acquire the resources and expertise necessary to carry out its plans and comply with all articles, terms and conditions of a new license.

3. The Plans and Abilities of the Applicant to Manage, Operate, and Maintain the Project Safely (Section 15(a)(2)(B))

The Division of Dam Safety and Inspections has reviewed the project safety of the Vergennes Project and concludes that the dams and other project works are safe and that

GMP's record of managing, operating, and maintaining the project facilities has continuously complied with our standards for project safety.

Staff concludes that GMP's plans to manage, operate, and maintain the project safely are adequate.

4. The Plans and Abilities of the Applicant to Operate and Maintain the Project in a Manner Most Likely to Provide Efficient and Reliable Electric Service (Section 15(a)(2)(C))

GMP has operated the project for more than 88 years to provide a continuous and reliable, stable source of power to meet the energy demands of its customers.

Staff has reviewed GMP's load forecast and resource planning to meet energy and capacity requirements over the long term for efficient and reliable electric service, as well as its plans to maintain the project facilities. Staff concludes that GMP is likely to continue to operate and maintain the project in a manner that provides efficient and reliable electric service under a new license.

5. The Need of the Applicant Over the Short and Long Term for the Electricity Generated by the Project to Serve Its Customers (Section 15(a)(2)(D))

The Project is located in the New England Power Pool (NEPOOL) subregion of the Northeast Power Coordinating Council, as defined by the North American Electric Reliability Council. NEPOOL forecasts an average annual growth rate for 1998 through 2007 of 1.9 percent for the summer peak demand and 1.7 percent for the winter peak demand. These values are higher than last year's corresponding forecasts of about 1 percent and 1.2 percent, respectively. These growth rate projections support the finding of a long-term need for electricity generated by the Vergennes Project.

The Vergennes Project plays an integral role in providing power for more than 82,000 customers in 65 Vermont municipalities and in providing firm power, via the transfer of power, to other New England utilities.

Staff therefore concludes that there is a short and long-term need for the power from the Vergennes Project and that GMP has the ability to meet these power needs.

6. The Impact of Receiving or Not Receiving the Project License on the Operation, Planning and Stability of Applicant's Transmission System (Section 15(a)(2)(E))

GMP does not anticipate that project power flows will significantly influence system losses, although system losses of power are likely to increase if GMP does not receive a license. There would be no need for new construction of transmission facilities or upgrading existing facilities. The Vergennes Project does provide ancillary services such as local voltage/VAR support to the power transmission system in the area. By providing power support to local area loading factors, the power generated by the project offsets deliveries that are required on the area transmission-distribution systems. Loss of power generated by the Vergennes Project could require the acceleration of future transmission upgrades. Therefore, staff concludes there is a positive effect of the continued operation of the Vergennes Project on the local transmission system.

7. Whether the Plans of the Applicant will be Achieved, to the Greatest Extent Possible, in a Cost Effective Manner (Section 15(a) (2) (F))

The conversion of project operation from a peaking mode to a run-of-river mode, in conjunction with mitigation and enhancement measures required by the new license, reduces gross value of the energy produced by $25,200, based on an average cost of power produced by the project of about $37 per megawatt hour (MWh). GMP has determined that the continued operation and relicensing of the Vergennes Project is the least cost alternative available to them.

Staff concludes that the Vergennes Project, as currently configured and as operated as described in this order, will fully develop and use the economical hydropower potential of the site in a cost-effective manner.

8. Actions Affecting the Public

GMP plans to protect and enhance aquatic, aesthetic, recreational, and cultural resources at the project by operating the project in a run-of-river mode; operating the project in a manner that will provide a continuous outflow from Plant 9 to enhance fishery resources using the tailrace area; releasing aesthetic flows at the Vergennes Project dams; implementing recreational measures that would include access for small boats, parking, improved trails, installing signs to interpret the history of Vergennes Falls and the surrounding structures, installing a disabled-accessible fishing platform and portable toilets; and implementing the provisions of the Programmatic Agreement.

WATER QUALITY CERTIFICATION

Under Section 401(a)(1) of the Clean Water Act (CWA) [6], the Commission may not issue a license for a hydroelectric project unless the certifying agency has either issued a water quality certification for the project or has waived certification by failing to act on a request for certification within a reasonable period of time, not to exceed one year. [7] Section 401(d) of the CWA provides that state certification shall become a condition on any federal license or permit that is issued. [8]

On April 15, 1999, the VDEC issued a Section 401 WQC for the Vergennes Project, subject to certain conditions. VDEC's WQC includes 17 conditions, the substantive ones of which we summarize here, and which are attached in full as Appendix A to this order: [9] (a) operate and maintain the project according to the conditions set forth in the WQC; (b) operate the project in a run-of-river mode with specific ratios of dispersion of the daytime flows released over Vergennes Falls during those times when the project is not operating (e.g., generating power); (c) suspend bypass flows during flashboard replacement; (d) develop a project operating plan; (e) develop a monitoring plan for estimating inflows to the impoundment, impoundment levels, and flow releases from the project powerhouses; (f) consult with the Vermont Department of Fish and Wildlife prior to replacing project trashracks at Plants 9 and 9B; (g) provide turbine rating curves to VDEC within two years of license issuance; (h) develop a debris

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[6] 33 U.S.C. § 1341(a)(1).

[7] Section 401(a)(1) requires an applicant for a federal license or permit to conduct any activity that may result in any discharge into navigable waters to obtain from the state in which the discharge originates certification that any such discharge will comply with applicable water quality standards.

[8] 33 U.S.C. § 1341(d).

[9] As we have acknowledged in Kennebec Water Power Company, 81 FERC ¶ 61,254 (1997), we are required by the decision of the United States Court of Appeals in American River, et al. v. FERC, 129 F.3d 99 (1997), to accept all conditions in a water quality certification as conditions on a license even if we believe that the conditions may be outside the scope of Section 401. While we have included certain of the provisions as license articles, all of the Section 401 conditions are conditions to this license. In any event, nothing in the conditions of the water quality certification shall be viewed as restricting the Commission's ability or the licensee's obligation, under the Federal Power Act, to take timely action necessary to protect human life or the environment.

disposal plan in consultation with the VDEC and file the plan with the Commission within 120 days of license issuance; (i) file maintenance and repair work proposals with the VDEC prior to any such work being initiated that could affect water quality or state water quality standards; (j) provide safe public access to the project; (k) construct and maintain recreational facilities consistent with a recreation plan approved by VDEC; (l) implement erosion control measures as necessary and related to recreational use of project lands; (m) allow VDEC to conduct compliance inspections of the project area to ensure WQC conditions are met; (n) post the WQC in the powerhouse; (o) seek VDEC approval of any project changes that would affect the WQC conditions; (p) allow VDEC to reopen the license at any time to assure compliance with the WQC conditions; and (q) provide continuing jurisdiction for the VDEC to alter the terms and conditions of the WQC as needed to ensure state water quality laws are being met.

Section 401(d) of the CWA provides that the state certification shall become a condition on any federal license or permit that is issued. The conditions of the WQC are attached in full as Appendix A of this license order and included as part of this license. Most of the WQC conditions are included in specific license articles in this license order and all our license conditions are consistent with the terms of the WQC.

SECTION 18 FISHWAY PRESCRIPTION

Section 18 of the FPA authorizes the Secretary of the Interior or the Secretary of Commerce to prescribe fishways at Commission-licensed projects. [10] No Section 18 prescriptions were filed.

COASTAL ZONE MANAGEMENT ACT

Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(3)(A), states that the Commission cannot issue a license for a project within or affecting the state's coastal zone, unless the state CZMA agency concurs with the license applicant's certification of consistency with the state CZMA program. The state of Vermont does not have a CZMA program and, therefore, no coastal zone consistency certification is needed for this project.

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[10]Section 18 of the FPA, 16 U.S.C. § 811, states: "The Commission shall require the construction, maintenance, and operation by a licensee at its own expense...such fishways as may be prescribed by the Secretary of Commerce or the Secretary of the Interior, as appropriate."

RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES

Section 10(j) of the FPA [11] requires the Commission, when issuing a license, to include license conditions based on recommendations of federal and state fish and wildlife agencies, submitted pursuant to the Fish and Wildlife Coordination Act, to "adequately and equitably protect, mitigate damages to, and enhance, fish and wildlife (including related spawning grounds and habitat)" affected by the project.

No agency filed timely recommendations pursuant to Section 10(j). The staff evaluated VANR's comments concerning fish and wildlife resources that were filed on June 1, 1998, in the DEA under Section 10(a) because they were filed late. However, all of VANR's recommendations are included in the terms and conditions for this license.

COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA [12] requires the Commission to consider the extent to which a project is consistent with Federal and state comprehensive plans for improving, developing, or conserving waterways affected by the project. Under Section 10(a)(2), Federal and state agencies filed with the Commission 23 plans that address various resources in Vermont. Of these, I identified and reviewed 10 plans relevant to the project. [13] No inconsistencies were found.

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[11] 16 U.S.C. § 803(j)(1).

[12] 16 U.S.C. § 803.

[13] (1) Lake Champlain Fish and Wildlife Policy Committee and Technical Committee. 1981. A strategic plan for development of salmonid fisheries in Lake Champlain. Albany, New York. Waterbury, VT. 19 pp.; (2) Vermont Agency of Environmental Conservation. 1983. Vermont state comprehensive outdoor recreation plan, 1983-1988. Montpelier, VT. June 1983. 195pp. and appendices; (3) Vermont Agency of Environmental Conservation. 1986. Vermont Rivers Study. Waterbury, VT. 236pp.; (4) Vermont Agency of Natural Resources. Department of Environmental Conservation. 1988. Hydropower in Vermont: an assessment of environmental problems and opportunities. Waterbury, VT. May 1988. Two volumes; (5) Vermont Agency of Natural Resources. Department of Forests, Parks and Recreation. 1988. Vermont recreation plan. Waterbury, VT. 128 pp. Plus map, nine supplemental task group reports, and a 52-page resident recreation survey; (6) Vermont Agency of Natural Resources.

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COMPREHENSIVE DEVELOPMENT

Sections 4(e) and 10(a)(1) of the FPA [14] require the Commission, in acting on applications for license, to give equal consideration to the power and development purposes and to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The decision to license this project, and the terms and conditions included herein, reflect such consideration.

In determining whether a proposed project will be best adapted to a comprehensive plan for developing a waterway for beneficial public purposes, pursuant to Section 10(a)(1) of the FPA, the Commission considers a number of public interest factors, including the economic benefits of project power.

Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division, [15] the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. The basic purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and the costs of a project, and reasonable alternatives to project power.

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Department of Forests, Parks and Recreation. Wetlands Steering Committee. 1988. Wetlands component of the 1988 Vermont recreation plan. Waterbury, VT. July 1988. 43 pp.; (7) U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. May 1986. 19 pp.; (8) U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C. 11 pp.; (9) U.S. Fish and Wildlife Service. 1989. Final environmental impact statement--restoration of Atlantic Salmon to New England Rivers. Department of the Interior, New Corner, MA. May 1989. 88 pp.; and (10) National Park Service. 1982. The nationwide rivers inventory. Department of the Interior, Washington, D.C. January 1982. 432 pp.

[14] 16 U.S.C. §§ 797(e) and 803(a)(1).

[15] 72 FERC ¶ 61,027 (1995).

The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

An economic analysis of the Vergennes Project new license, as proposed by the staff, and based on current economic conditions, without future escalation or inflation, would produce an average of 9,455 MWh per year over a 30-year license period. The annual value of this energy is about $286,700 (or about 30 mills per kilowatt-hour (mills/kWh) in 1998 dollars , based on the average cost of alternative capacity and energy in the region. The annual cost of producing this energy is about $349,900 (or about 37 mills/kWh). Therefore, the project, with environmental measures, would produce power at an annual cost of about $63,200 (or about 6.6 mills/kWh) more than the currently available alternative. However, based on the overall record in this proceeding, I conclude that it is in the public interest to license the project and leave to GMP the decision of whether or not to accept a license and to continue operating the project.

The FEA analyzes the effects associated with issuance of a new license for the Vergennes Project. The FEA recommends a variety of measures to protect and enhance the environmental resources, which are adopted, as discussed herein. Staff's recommended environmental measures were developed after considering the comments made by the state and federal resource agencies and other commenting entities.

Based on the review and evaluation of the project, as proposed by the Applicant, and with the additional staff-recommended environmental measures, I conclude that the continued operation and maintenance of the project in the manner required by the license, will protect and enhance fish and wildlife resources, water quality, recreational, aesthetic, and cultural resources. The electricity generated from renewable water power resources will be beneficial because it will continue to offset the use of fossil-fueled, steam-electric generating plants, thereby conserving nonrenewable resources and reducing atmospheric pollution and greenhouse effects. I, therefore, find that the Vergennes Project, with the recommended measures, is best adapted to a comprehensive plan for the use, conservation, and development of the waterway for beneficial public purposes.

I am requiring the licensee to implement at the Vergennes Project, the environmental measures summarized below:

(1) Operate the project in a run-of-river mode to protect and enhance water quality, fishery resources, and recreational resources (Article 401);

(2) Operate the project in a manner that one generating unit of Plant 9 shall be given first priority for use of water diverted from Otter Creek for power production during the period from April 1 to June 15 (to protect walleye and lake sturgeon) and from September 15 to November 15 (to protect landlocked Atlantic salmon). Plant 9B shall commence operating only after flows through Plant 9 exceed 350 cfs (Article 402);

(3) Release minimum flows over the spillways at the Vergennes Project (Article 403);

(4) Develop a monitoring and operations plan to monitor run-of-river operations, first priority use of river flows to Plant 9, and aesthetic flow releases over Vergennes Falls (Article 404);

(5) Implement the provisions of the Programmatic Agreement (Article 405);

(6) Develop and implement a final recreation plan (Article 406); and

(7) Monitor recreation use of the project area (Article 407).

LICENSE TERM

Section 15 of the FPA [16] specifies that any license issued shall be for a term determined to be in the public interest, but the term may not be less than 30 years nor more than 50 years. The Commission's policy establishes 30-year terms for those projects that propose little or no redevelopment, new construction, new capacity, or enhancement; 40-year terms for those projects that propose a moderate amount of redevelopment, new construction, new capacity or enhancement; and 50-year terms for those projects that propose extensive redevelopment, new construction, new capacity or enhancement. [17]

GMP is not proposing redevelopment of the project, nor am I requiring enhancement measures that would justify a longer term. Accordingly, the license for the Vergennes Project will have a term of 30 years.

SUMMARY OF FINDINGS

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[16] 16 U.S.C. § 808(e).

[17] See, City of Danville, Virginia, 58 FERC ¶ 61,318 (1992).

The FEA, issued on October 16, 1998, contains background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment. The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the Safety and Design Assessment, which is available in the Commission's public files for this project. Issuance of this license is not a major Federal action significantly affecting the quality of the human environment.

Based upon a review of the agency and public comments filed on the project, and staff's independent analysis pursuant to Sections 4(e) and 10(a)(2) of the FPA, I conclude that issuing a license for the Vergennes Project, with the required environmental measures and other special license conditions, would not conflict with any planned or authorized development, and would be best adapted to the comprehensive development of Otter Creek for beneficial public uses.

The Director orders:

(A) This license is issued to Green Mountain Power Corporation (licensee) to operate and maintain the Vergennes Project for a period of 30 years, effective June 1, 1999. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands, enclosed by the project boundary shown by Exhibit G.

Exhibit	FERC No.2674-	Showing
1	1006	Project Boundary
2	1007	Project Boundary

(2) Project works consisting of: (a) three concrete overflow dams, each about 10 feet high, with a total length of 231 feet, having a crest elevation of about 132.78 feet above mean sea level (msl), surmounted by 1.5-foot-high flashboards, and a 29-foot-long, non-overflow dam; (b) an 8.8-mile-long, 133 acre surface area reservoir

with a 200 acre-foot usable storage capacity at normal water surface elevation of 134.28 feet msl; (c) the north forebay with trashracks, headgates, and two, 7-foot-diameter steel penstocks; (d) the north powerhouse, known as Plant 9B, having a 1,000-kW generating unit; (e) the south forebay, with trashracks, headgates, two surge tanks, and two, 10-foot-diameter penstocks; (f) the south powerhouse, Plant 9, with two, 700-kw generating units; (g) the generator leads from Plant 9 to the Vergennes substation and the 950-foot-long, 2,400-volt overhead generator leads from Plant 9B to the Vergennes substation; and (h) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of exhibits A and F shown below:

Exhibit A:

Sections (c) and (d), entitled Powerhouses and Substation/Transmission Lines, describing the existing mechanical, electrical and transmission equipment, filed on May 30, 1997, with the application for license.

Exhibit F drawings	FERC No.2674-	Showing
Sheet F-1	1001	Headworks Plan 9&9B
Sheet F-2	1002	9 Powerhouse Plan Elevation & Section
Sheet F-3	1003	9 Headworks Plan Elevation & Section
Sheet F-4	1004	9B Powerhouse Plan Elevation & Section
Sheet F-5	1005	9B Headworks Plan Elevation & Section

(3) All of the structures, fixtures, equipment, or facilities used to operate or maintain the project and located within the project boundary, all portable property that may be employed in connection with the project and located within or outside the project boundary, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) The Exhibits A, F, and G described above are approved and made part of the license.

(D) This license is subject to all the articles, except Article 20, that are set forth in Form L-3 (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States," and the following additional articles:

Article 201. The licensee shall pay the United States an annual charge for the purposes of reimbursing the United States for the cost of administering Part I of the Federal Power Act, as determined by the Commission. The authorized installed capacity for that purpose is 2,400 kilowatts.

Article 202. The licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 203. Pursuant to Section 10(d) of the Federal Power Act, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee shall maintain the amounts established in the project amortization reserve account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly includible in the licensee's long-term debt and

proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 204. If the licensee's project was directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

Article 205. Within 45 days of the date of issuance of the license, the licensee shall file three sets of aperture cards of the approved exhibit drawings. The sets must be reproduced on silver or gelatin 35mm microfilm and mounted on type D (3-1/4" x 7-3/8") aperture cards.

Prior to microfilming, the FERC Drawing Number (2674-1001 through 1007) shall be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number must be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC exhibit (e.g., F-1, G-1, etc.), Drawing Title, and date of this license shall be typed on the upper left corner of each aperture card.

Two sets of aperture cards must be filed with the Secretary of the Commission. The remaining set of aperture cards shall be filed with the Commission's New York Regional Office.

Article 301. Within 90 days of completion of construction of facilities authorized by this license (recreational facilities), the licensee shall file for approval, revised Exhibits F and G to show those project facilities as-built.

Article 401. The licensee shall operate the project in a run-of-river mode for the protection and enhancement of water quality, fisheries, and recreational resources of Otter Creek.

The licensee shall at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured immediately downstream from the project tailrace, shall equal instantaneous inflow to the project.

Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the licensee, including to the extent necessary to facilitate flashboard replacement, or for short periods upon mutual agreement between the licensee and the Vermont Agency of Natural Resources. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 402. The licensee shall operate the Vergennes Project in a manner such that one generating unit of Plant 9 shall be given first priority for use of water diverted from Otter Creek for power production during the period from April 1 to June 15 (to protect walleye and lake sturgeon) and from September 15 to November 15 (to protect landlocked Atlantic salmon). The licensee shall bring one unit of Plant 9 on line first and provide a continuous outflow from Plant 9 at all times that the project is operating during these seasonal time periods. The licensee may commence operation of Plant 9B only after the flows through Plant 9 exceed 350 cfs. The licensee shall specify the operating rule for these two seasonal time periods in the operations and monitoring plan required in Article 404.

Article 403. The licensee shall release the following minimum flows over the spillways at the Vergennes Project for the protection and enhancement of aesthetic and recreational resources of Otter Creek:

Period	Flow
April 1 through October 31	
Daytime	150 cfs
Nighttime	75 cfs
November 1 through December 15	
Daytime	100 cfs
Nighttime	50 cfs

The licensee shall specify the distribution of these releases over the three spillways in the operations and monitoring plan required in Article 404. For the purpose of this article, daytime is defined as one-half hour before sunrise to one-half hour after

sunset. Nighttime is defined as one-half hour after sunset to one-half hour before sunrise.

These flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods upon mutual agreement between the licensee and the Vermont Agency of Natural Resources. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 404. Within 120 days of the date of issuance of the license, the licensee shall file with the Commission, for approval, a monitoring and operations plan to monitor run-of-river operations, first priority use of river flows to Plant 9, and aesthetic flow releases over Vergennes Falls as required respectively by Articles 401, 402, and 403.

The plan shall include, at a minimum;

(1) a schedule for implementing the plan;

(2) a schedule for installing all flow and water level measuring devices;

(3) the identification of the planned locations of the flow measuring devices;

(4) the method of data collection, including the design of each of the recording devices, and provisions for providing data to the regulatory agencies in a timely manner;

(5) the identification of an operating rule for seasonally diverting water from Otter Creek to Plants 9 and 9B;

(6) identification of the proposed apportionment of aesthetic flow releases over the three project spillways during the hours when the project is not operating;

(7) the identification of flow management techniques to be used to address bypass flows and refill of the project impoundment during flashboard replacement; and

(8) a schedule for providing the rating curves depicting the head-flow-to power relationship for the project to the Commission and to the Vermont Department of Environmental Conservation.

The licensee shall prepare the plan after consultation with the U.S. Geological Survey, the Vermont Department of Environmental Conservation, and the City of Vergennes. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

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

Article 405. Upon the effective date of this license, the licensee shall implement the "Programmatic Agreement Among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and the Vermont State Historic Preservation Officer for Managing Historic Properties That May Be Affected By A License Issuing to Green Mountain Power Corporation For the Continued Operation and Maintenance of the Vergennes Hydroelectric Power Project in Vermont," executed on February 4, 1999, including but not limited to the Cultural Resources Management Plan (CRMP) for the project. In the event that the Programmatic Agreement is terminated, the licensee shall implement the provisions of its approved CRMP. The Commission reserves the authority to require changes to the CRMP at any time during the term of the license. If the Programmatic Agreement is terminated prior to Commission approval of the CRMP, the licensee shall obtain Commission approval before engaging in any ground-disturbing activities or taking any other action that may affect any Historic Properties within the project's Area of Potential Effect.

Article 406. Within 60 days of the date of issuance of the license, the licensee shall develop and file a final recreation plan for Commission approval, that includes provisions for, but not necessarily limited to, the following:

(1) installation of directional and interpretive signs for recreation in the project area;

(2) improved access for small boats and parking at Settlers Park;

(3) improved trail, shoreline fishing access, vegetative plantings, and picnic area along the western bank near Plant 9;

(4) construction of a disabled-accessible fishing platform on the western bank near Plant 9;

(5) installation of portable toilet facilities (including disabled-accessible facilities); and

(6) installation of signs interpreting the history of Vergennes Falls and the surrounding historic structures.

The licensee shall develop the final recreation plan in conjunction with the Cultural Resources Management Plan required in Article 405, so that recreational improvements do not conflict with the cultural resources in the project area. The licensee shall construct the facilities after consultation with the Vermont Agency of Natural Resources, the Vermont Division for Historic Preservation, and the City of Vergennes. These facilities shall be shown on as-built drawings filed pursuant to this license.

The licensee shall include with the recreation plan a construction schedule, the entity responsible for operation and maintenance of the facilities, costs for the construction and yearly maintenance of each facility, a discussion of how the recreational facilities are visually compatible with the project area, a description of erosion control measures to be used during construction, documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments and recommendations are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment on the plan before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

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

Article 407. The licensee, after consultation with the Vermont Agency of Natural Resources, the Vermont Division for Historic Preservation, and the City of Vergennes (City), shall monitor recreation use of the project area in the vicinity of the Plant 9

tailrace to determine whether existing parking related to recreational use in the tailrace area is adequate. Monitoring shall begin within six years of the issuance of this license and be reported to the Commission in accordance with Section 8 of the Commission's regulations (18 CFR § 8.11), which requires the filing of "FERC Form No. 80." The report shall include:

(1) annual recreational use figures for the vicinity of the Plant 9 tailrace;

(2) a discussion of the adequacy of the licensee's parking facilities in the Plant 9 vicinity to meet recreation demand, including a discussion regarding the need to provide additional or improved parking at the site;

(3) a description of the methodology used to collect all data;

(4) if there is a need for additional or improved parking facilities, a plan proposed by the licensee to accommodate parking needs at the site;

(5) documentation of consultation with the Vermont Department of Natural Resources, the Vermont Division for Historic Preservation, and the City; and

(6) specific descriptions of how the agencies' and the City's comments are accommodated by the report.

The licensee shall allow a minimum of 30 days for the agencies and the City to comment and to make recommendations prior to filing the report with the Commission.

Article 408. Within 120 days of the date of issuance of the license, the licensee shall file with the Commission, for approval, a debris disposal plan for the Vergennes Project. The plan shall provide for the proper disposal of debris associated with project operation, including trashrack debris.

The licensee shall prepare the plan after consultation with the Vermont Department of Environmental Conservation. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agency, and specific descriptions of how the agency's comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agency to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

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

Article 409. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee also shall have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article.

If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and water for which the licensee may grant permission without prior Commission approval are:

(1) landscape plantings;

(2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; and

(3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the

Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3)sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69 kilovolts or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir.

No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed. If no conveyance was made during the prior calendar year, the licensee shall inform the Commission and the Regional Director in writing no later than January 31 of each year.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all

necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year.

At least 45 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved exhibit R or approved report on recreational resources of an exhibit E; or, if the project does not have an approved exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the

grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

(E) The licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(F) This order is issued under authority delegated to the Director and 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 C.F.R. Section 385.713. The filing of a request for rehearing does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically ordered by the Commission. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

J. Mark Robinson
Director
Division of Licensing and Compliance

Appendix A

Water Quality Certification for the Vergennes Project (FERC No. 2674), Issued by the Vermont Department of Environmental Conservation on April 15, 1999.

Water Quality Certification
(33 U.S.C. §1341)

In the matter of:

Green Mountain Power Corporation
25 Green Mountain Drive
P.O. Box 850
South Burlington, Vermont 05402

APPLICATION FOR VERGENNES HYDROELECTRIC PROJECT

The Water Quality Division of the Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application filed by Green Mountain Power Corporation (the applicant) for the Vergennes Hydroelectric Project. The application was originally filed in May 1997; the application was subsequently withdrawn and refiled with the Department by letter dated April 28, 1998. The application was reviewed under the Vermont Water Quality Standards adopted by the Water Resources Board on April 2, 1997, in accordance with Section 1-01(A) *Applicability*. The application includes the applicant's Federal Energy Regulatory Commission (FERC) license application, filed with FERC under a cover letter dated May 29, 1997.

The Department held a public hearing on April 7, 1999 under the rules governing certification and received testimony during the hearing and, as written filings, until April 12, 1999. Attached as Appendix A is a copy of the Department's responsiveness summary.

The Department, based on the application and record before it, makes the following findings and conclusions:

I. Background/General Setting

1. Otter Creek, Vermont's longest river, flows about one hundred miles from its source at Emerald Lake in Dorset to its mouth at Lake Champlain in Ferrisburgh. The river has been heavily developed for hydroelectric power generation, hosting

seven active dams on the mainstem. Vergennes Dam is the lowest dam in the system, and the only one owned and operated by the applicant. The other dams are owned by Central Vermont Public Service Corporation (CVPS) and OMYA, Inc. The Vergennes Electric Company developed this site in 1911-12 for the Burlington Traction Company, which produced electricity to operate Burlington's trolley system. The Vergennes Electric Company was acquired by a holding company, Peoples Light and Power Corporation, in 1926, and that corporation later became Green Mountain Power Corporation.

2. Vergennes Dam is located at a large natural cascade located at River Mile 7.4, directly downstream of the Vermont Route 22A bridge. The civil works are located entirely within the City of Vergennes. The project impounds a reach of river almost nine miles in length, about three quarters of the way up to the Weybridge hydroelectric dam (River Mile 19.5; normal tailwater elevation 143.3 feet NGVD), which is operated by CVPS. All but nine feet of the total drop (about 46 feet) from the CVPS dam's tailwater to Lake Champlain is harnessed for electrical production by the Vergennes Project.

3. Of Otter Creek's 936 square mile watershed, the project utilizes runoff from an area of 866 square miles.

4. The Federal Energy Regulatory Commission licensed the project on June 29, 1979, with the term of the license running from June 1, 1949 through May 29, 1999. Federal jurisdiction over the project was determined based on the Commission having found in 1965 that the Otter Creek is a navigable waterway.

II. Project and Civil Works

5. The project has powerhouses located on both riverbanks. The main plant, Plant 9, is on the south bank. The powerhouse, built in 1911, is a two-story brick structure. Water is transported about 110 feet to the powerhouse via two 10-foot diameter concrete-encased penstocks that transition into two 9-foot diameter steel penstocks. The powerhouse contains its two original Holyoke Machine Company horizontal Francis turbines, each driving generators with a capacity of 700 kW. The net head at the powerhouse is estimated at 35 feet, reflecting a loss of about two feet from the static head. The penstock entrances are protected by a trashrack 19 feet in length, with a clear spacing between the bars of one inch.

6. Powerhouse 9B, a 1943 reinforced concrete structure, contains a single James Leffel & Company vertical Francis turbine that drives a 1,000 kW generator. From the forebay, two 7-foot steel penstocks carry water to the turbine. The

penstock entrance is protected by a trashrack 16 feet in length and 14 feet high, with a clear spacing between the bars of two inches.

7. The existing dam consists of three concrete overflow sections and one concrete non-overflow section spanning the riverbanks and two midstream islands. The south island is occupied by an abandoned grist mill and a storage building. A pump house formerly used by the municipal water system is located on the smaller north island. The spillway connecting the two islands is 60 feet long, with a crest elevation of 132.78 feet NGVD. An 84-foot section of spillway, crest elevation of 132.52 feet NGVD, connects the Plant 9B forebay with the pumphouse island. The southern spillway, 87 feet in length with a crest elevation of 132.49 feet NGVD, connects the grist mill island with the Plant 9 forebay. Flashboards 1.5 feet in height are normally maintained on the spillways to raise the full impoundment height to elevation 134.28 feet NGVD. Due to the differences in the spillway crest elevations, this results in the side spillway flashboard being set about three inches lower than the center spillway boards. The channel entrance losses for the two plants result in the local headpond elevation being lower by the three-inch difference, so the headpond is maintained at the top of the center flashboards without spillage occurring over the lower side spillway flashboards. The flashboards on the north and south spillways generally fail when overtopped by 2.0 - 2.5 feet of water.

8. The headpond is normally cycled for generation over the 1.5 foot range created by the flashboards. The bedrock formation directly upstream of the dam prevents the headpond from being drawn more than about half a foot below the concrete crest. The average elevation of the bedrock profile at the Vermont Route 22A bridge is about 130 feet NGVD (*Application for License for Major Water Power Project 5 Megawatts or Less for the Vergennes Hydroelectric Project, FERC No. 2674*, May 1997, vol. 1, p. E(4)-6). The headpond is contained within the riverbanks. When full, the headpond has a surface area of about 133 acres and provides about 200 acre-feet of useable storage.

9. The two stations are operated independently. Plant 9B is operated remotely from the applicant's Colchester dispatch center. Plant 9 is a manned station. Personnel adjust the units as necessary during the day; when they leave at the end of the day, the units are left with a fixed gate position, and the dispatch center controls the project discharge via Plant 9B.

10. The plant, with its total installed capacity of 2,400 kW, produces an average annual output of 10,288,000 kWh based on records from 1967 to 1992.

III. River Hydrology and Streamflow Regulation

11. The flow of Otter Creek is regulated by several of the hydroelectric facilities in the basin. Four hydroelectric dams are located on the river mainstem between Vergennes and Middlebury. Starting at Vergennes and going upstream, the four are Weybridge (River Mile 19.5), Huntington Falls (River Mile 21.0), Beldens (River Mile 23.0), and Middlebury Lower (River Mile 24.7). The Weybridge and Middlebury Lower projects are owned by CVPS and are currently going through federal relicensing, lagging the Vergennes Project by about one year. The Huntington Falls and Beldens facilities are owned by OMYA, Inc. and were redeveloped under a license amendment issued in 1986 to increase the installed capacity at both facilities.

12. The Beldens and Huntington Falls plants are operated as strict run-of-the-river facilities. As such, they no longer regulate flows to preferentially generate on peak. CVPS proposes to operate the Middlebury Lower facility to a strict run-of-the-river operation under its new license. The utility, however, proposes to maintain a daily cycle operation at the Weybridge facility except during the spring period, April 15 - June 15. As proposed, the station would maintain a minimum release of 250 cfs; during generation, releases would vary from the single turbine's capacity range of 450 cfs to 1,600 cfs, plus the 125 cfs to be maintained as a bypass flow. (*Application for New License for Major Project (5 MW or Less) - Weybridge Project*, May 1994, Volume I)

13. Other dams in the basin also influence flows at Vergennes. CVPS operates seasonal storage reservoirs at Chittenden Dam and Goshen Dam, in the East Creek and Leicester River watersheds, respectively. Because these dams control only a minor portion of the watershed, the effect on flows in the lower portion of the Otter Creek basin are slight.

14. The Vergennes Project historically has operated as a daily cycle plant with a 1.5-foot operating cycle behind the flashboards. Plant 9 has a hydraulic range of about 140 cfs (single unit at minimum capacity) to 700 cfs (two units at 350 cfs maximum); Plant 9B's single unit has a range of about 200 cfs to 480 cfs. Combined total capacity is about 1,180 cfs. With impoundment cycling, the project has theoretically been able to utilize all flows in a range of 0 to 1,180 cfs. Higher flows are spilled.

15. Under the existing operating rule, one of the units in Plant 9 is used for operation when the generation flow is less than 200 cfs. From 200 cfs to 480 cfs, the Plant 9B unit is used for generation. When generation flows exceed 480 cfs, one of

Plant 9 units is brought on line, and the Plant 9B unit is adjusted to match the flow. For generation flows in excess of 830 cfs, all three units are on line.

16. Since 1903, the U.S. Geological Survey has operated a surface water gaging station (No. 04282500) on Otter Creek in Middlebury. The gage records flows from 73% of the watershed above Vergennes. Based on the gage, the following flow statistics can be estimated for the Vergennes site:

Mean annual flow	1,380 cfs
Annual runoff	21.64 inches
10% exceeds	3,200 cfs
50% exceeds	870 cfs
90% exceeds	360 cfs
7Q10	216 cfs

17. Backwater from Lake Champlain influences the lower reach of Otter Creek up to Vergennes Falls. Lake levels historically have varied over a range of elevations from about 93 feet NGVD to 101 feet NGVD. During a typical year, the lake elevation varies from its spring high of 99 feet NGVD to its fall low of 94 feet NGVD. The minimum riverbed elevation at the project tailraces is 89 feet NGVD. Water levels below the Falls are dependent on the lake level and the river flow; measurements taken by the applicant during 1996 indicate that the project tailwater elevation is ranges from about 0.5 feet to 1.5 feet higher than the lake level.

Applicant proposal for relicensing:

18. The applicant proposes to operate the Vergennes Project as a strict run-of-the-river project. Effectively, this would result in the project maintaining a stable headpond and passing the flows received from the upstream Weybridge Hydroelectric Project without reregulation. Channel storage between the two dams and the influence of the Lemon Fair River, a major intervening tributary of Otter Creek with 89 square miles of watershed area, would tend to dampen Weybridge's peaking effects.

19. The applicant would maintain spillage over the spillways to support aesthetics using the following schedule:

April 1 - Oct. 31	150 cfs daytime and 75 cfs nighttime
Nov. 1 - Dec. 15	100 cfs daytime and 50 cfs nighttime

Dec. 16 - March 31 No special flows

Daytime would be defined as half an hour before sunrise to half an hour after sunset.

20. The relicensing of projects upstream of Vergennes will require all stations to maintain conservation flows. Based on the gage data, extreme drought conditions are on the order of 200-250 cfs. With a project minimum turbine capacity of 140 cfs and the proposed bypass flow schedule, the project will be able to utilize almost all flows less than its maximum capacity of 1,180 cfs.

21. The applicant proposes to automate Plant 9 so that it can be operated remotely similar to Plant 9B.

IV. Standards Designation

22. Otter Creek has been designated by the Vermont Water Resources Board as Class B waters. The Water Resources Board has also designated the entire reach from Huntington Falls Dam to Lake Champlain as warm water fish habitat.

23. Class B stream reaches are managed to achieve and maintain a high level of quality compatible with certain beneficial values and uses. Values are high quality habitat for aquatic biota, fish and wildlife and a water quality that consistently exhibits good aesthetic value; uses are public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation. (Standards, Section 3-03(A) *Class B Waters: Management Objectives*)

24. The dissolved oxygen standard for warm water fish habitat streams is 5 mg/l and 60 percent saturation at all times. Depending on ambient stream temperature conditions, the temperature standard limits increases to values between 1.0 and 5.0 deg F from background. (Standards, Section 3-01(B)(2) *Temperature*) The turbidity standard is 25 NTU. (Standards, Section 3-03(B)(1) *Turbidity*)

25. Under the general water quality criteria, all waters, except mixing zones, are managed to achieve, as in-stream conditions, aquatic habitat with "[n]o change from background conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes." (Standards, Section 3-01(B)(5) *Aquatic Habitat*)

26. Standards Section 2-02(B) *Hydrology: Artificial Flow Conditions* requires that "[t]he flow of waters shall not be controlled or substantially influenced by man-made structures or devices in a manner that would result in an undue adverse effect on any existing use, beneficial value or use or result in a level of water quality that does not comply with these rules." The project dam is a man-made structure that artificially regulates water levels and streamflows.

Present status:

27. By letter dated December 30, 1998, the Department issued, under Section 303(d) of the Federal Clean Water Act, a list of waters considered to be impaired based on water quality monitoring efforts. The so-called "Part A" list indicates that Otter Creek, for the seven mile reach below the Vergennes municipal wastewater treatment facility, has a contact recreation (eg. swimming) impairment due to pathogens that enter the river from periodic treatment lagoon overflows. The reach from the project dam to Lake Champlain is also impaired by mercury contamination, which affects fish consumption.

28. Also by letter dated December 30, 1998, the Department issued a draft four-part list, *List of Priority Surface Waters*. Part F lists those surface waters where water quality or habitat are being altered by flow regulation, obstructions, and other water level manipulations. The reach directly below Vergennes Dam, including Vergennes Falls, is listed for flow impacts on aesthetics and aquatic life support.

V. Water Chemistry

29. Pursuant to requests by the Agency and the U.S. Fish and Wildlife Service, the applicant sampled dissolved oxygen and temperature weekly through the summer of 1996 (June 25 through August 27), at and upstream of the dam. Available data from this study and an earlier 1982 study completed by the Department suggested that dissolved oxygen standards are met on the Lower Otter Creek. Unfortunately, the data had several shortcomings related to the lack of critical low-flow conditions and collection during daylight hours, when algal photosynthetic oxygen production becomes a major influence on the dissolved oxygen regime.

30. The applicant, therefore, performed additional water quality sampling of dissolved oxygen and temperature conditions at the project during the summer of 1997. This data was filed with the Department by letter dated February 2, 1998. Compared to the 1996 date set, the 1997 data was collected during flow conditions that better reflected critical water quality conditions. All samples conformed to the dissolved oxygen standards applicable to warm water fish habitat. During the lowest flows

experienced during summer sampling (about 260 cfs, or 20% above the 7Q10 flow, on August 8, 1997 at 0500), the dissolved oxygen concentration directly upstream of the dam was at saturation (8.7 mg/l). On August 17 at 0515, a sample collected at the same station measured 8.0 mg/l, or 87% saturation.

VI. Aquatic Biota and Habitat

31. Class B waters are managed for high quality habitat for aquatic biota (Standards Section 3-03(A) *Class B Waters: Management Objectives*). Aquatic biota are defined in Standards Section 1-01(B) *Definitions* as "organisms that spend all or part of their life cycle in or on the water." Included, for example, are fish, aquatic insects, amphibians, and some reptiles, such as turtles.

32. Otter Creek is managed to support both cold water and warm water fish. Fish found between Weybridge and Vergennes dams include northern pike, perch, smallmouth bass, brown trout, pan fish, and minnows. Northern pike are especially abundant. Downstream of Vergennes, the river is influenced by Lake Champlain and is managed as part of the overall Champlain ecosystem. Fish found in this reach include the state-listed endangered lake sturgeon (*Acipenser fulvescens*), landlocked Atlantic salmon, steelhead rainbow trout, walleye, pike, and bass.

33. Lake sturgeon use has been documented through sightings and records of the fish having been caught by anglers. Since sightings are generally in the spring, that has been interpreted as evidence that the fish are continuing to exhibit spawning behavior. The fish is being considered for listing as federally endangered.

34. As part of New York State and Vermont's salmonid fishery development plant for Lake Champlain, both steelhead and salmon are stocked downstream of Vergennes Dam. A fishery for these two species exists at the base of the Falls and downstream. There may also be some level of spawning use in this reach.

35. Small spawning runs of walleye enter Otter Creek in the early spring. The most suitable spawning habitat is believed to be nearest the Falls. Post-spawn walleyes also use the lower Otter Creek for feeding, and this use provides an important fishery from mid-May through much of June.

36. An angler survey completed by the applicant indicated that anglers preferred the bass fishery, the spring walleye fishery, and the fall salmon fishery. The most common access was found to be directly below the two powerhouses, with most

use occurring on the Plant 9 side of the river. Anglers showed a preference for fishing during flow releases.

37. Lower Otter Creek also contains a rich diversity of mussel species. On August 15 and 16, 1996, the applicant completed a mussel survey below the dam at the same time it completed substrate mapping. Due primarily to the lack of unconsolidated substrates, there was an absence of live mussels in the first 200 feet below the Falls. Mussels were found to be most common in the Vergennes Falls Park area and across from the city dock. A total of 115 live specimens were found, with the dominant species of the seven being the eastern elliptio (*Elliptio complanata*). Small numbers of three rare species were found: fragile papershell (*Leptodea fragilis*), pink heelsplitter (*Potamilus alatus*), and pocketbook mussel (*Lampsilis ovata*). The Vermont Endangered Species Committee has recently recommended these species for listing as endangered. Another species found at Vergennes, the giant floater (*Pyganodon grandis*), was also found; the Committee is proposing this species for listing as threatened. A state-threatened species found in the late 1970s, black sandshell (*Ligumia recta*) was not recovered; this mussel species in now proposed for listing as endangered. Shells of fluted-shell (*Lasmigona costata*) were also found during the applicant's survey; this species is also proposed for listing as endangered.

38. Plant operations were determined to have very little effect on the distribution of mussels downstream. Mean column velocity measurements were taken at several locations where mussels were found, and the velocities were very low even with the powerhouse operating at a high discharge. The river channel directly below Vergennes Falls is about 500 feet wide and several feet deep. The large waterway area results in the current quickly dissipating below the project tailraces.

Flow needs for fish protection

39. The conversion of the project to a true run-of-the-river operation, with instantaneous inflow equaling instantaneous outflow, reduces the potential project impacts on downstream aquatic habitat. Substrate mapping information obtained by the applicant indicated that the best spawning substrate for walleye and sturgeon exists near the Plant 9 tailrace. The applicant's angler survey data and results from past electrofishing done by the Department of Fish and Wildlife suggests that fish are preferentially attracted to the Plant 9 tailrace when that station is operating. In fact, when neither plant is operating or when only Plant 9B is operating, a relatively small number of salmon are caught when electrofishing is done during the fall run.

40. Based on this information, the applicant has proposed giving Plant 9 first call status during the spring and fall fish runs. Plant 9 would be brought on line first and maintained on line at all times that the project is operating during the seasonal time periods. The time periods under this proposal are April 1 through June 15 and September 15 through November 15.

Fish passage/movement

41. Historically, migratory fish from Lake Champlain ascended many of its tributaries to access spawning waters. To meet the goals of the bistate plan for the development of the Lake's salmonid fishery (*A Strategic Plan for Development of Salmonid Fisheries in Lake Champlain*, NYS Department of Environmental Conservation, October 4, 1977), upstream and downstream passage provisions are being sought at dams on certain Lake tributaries. In Vermont, the Winooski River and the Lamoille River are included in this effort; however, this initiative has not been extended to Otter Creek as the other tributaries present a better opportunity for coldwater fish spawning.

42. Fish injury and mortality due to intake entrainment and trashrack impingement has been investigated. The entrance at Plant 9B was found to present the highest risk due to the faster approach velocity and the larger 2-inch clear spacing between the bars in the trashrack. An approach velocity of 2.6 fps was estimated at a six-inch distance from the rack. As part of the relicensing, the applicant states that consideration will be given to using racks with a one-inch clear spacing at such time as the racks need replacement (*Application for License for Major Water Power Project 5 Megawatts or Less for the Vergennes Hydroelectric Project, FERC No. 2674*, May 1997, vol. 1, p. E(3)-37).

VII. Wildlife and Wetlands

43. Extensive wetlands are associated with the reach of Otter Creek below Vergennes Falls. From the river mouth upstream five miles is a wetland complex designated as the Otter Creek Marsh Wildlife Management Area. The complex includes approximately 1,500 acres of shallow to deep marsh habitat. Dead Creek, a major tributary, enters Otter Creek from the south about half way up the five-mile section.

44. Based on the National Wetland Inventory maps, thirty Class Two wetlands comprising about 50 acres in total area border the impoundment from the City of Vergennes up to the Lemon Fair confluence. The surrounding land use in this area is predominately agricultural. Little if any forested areas remain along this reach of Otter Creek. Most of these wetlands in the impoundment area are emergent, probably dominated by cattails, rushes and sedges. Many areas along the shoreline

of Otter Creek do not have a buffer except for these wetlands. The wetlands filter water from agricultural land runoff before it enters the Otter Creek and act as habitat for wildlife and fish.

45. Due to the proposal to convert the project to run-of-the-river operation, no site specific wetland assessments of the area were completed for this project. Conversion of the project to run-of-the-river will stabilize the water level during normal operations and provide an opportunity for wetlands to become more diverse.

VIII. Rare and Endangered Plants and Animals; Outstanding Natural Communities

The Vermont Endangered Species Law (10 V.S.A. § 5401 to 5403) governs activities related to the protection of endangered and threatened species.

46. As discussed above, the reach below Vergennes Falls provides habitat for several mussel species that are proposed for state listing as endangered or threatened and for the state-endangered lake sturgeon. The relatively recent introduction of zebra mussels in Lake Champlain is a particular concern with respect to the maintenance of populations of the native mussel species.

47. The downstream wetlands contains several rare plant species. Green dragon (*Arisaema dracontium*), last found in the Otter Creek Marsh in 1993, is listed as threatened.

IX. Shoreline Erosion

48. Shoreline reconnaissance for bank erosion problems was completed in September 1996. Under full reservoir conditions, the impoundment depth varies from about 6 to 8 feet upstream of the Vermont Route 22A bridge to less than 3 feet at the upstream project limits, about 8.8 miles from the dam.

49. Cultivated farmland borders the mid and upper sections of the impoundment.

50. The river courses through soils that are classified as Vergennes series in the U.S. Department of Agriculture Soil Survey system. These soils are moderately well drained clays with low permeability and moderate to high erosion potential.

51. During the reconnaissance work, observations were made with the impoundment level set at the spillway crest. Erosion problems were predominantly found in the mid-to-upper portions of the impoundment. Shoreline erosion in the 1.5-foot

operating zone was found to consist primarily of minor laminations within the clayey soils of the riverbank and ice scour that has exposed tree root systems. The investigators concluded that these conditions are typical for streams of this type and unrelated to the impoundment cycling. The most significant erosion stemmed from agricultural use, including cattle paths, cropland management, and lack of vegetative buffers, and from the normal meander progression associated with alluvial streams.

X. Recreational Use

52. The reach of Otter Creek below Vergennes Falls is heavily used for recreation. The City of Vergennes maintains Vergennes Falls Park, which is located on the south bank a short distance below Plant 9. The 6.5-acre park provides a boat ramp, a picnic area, walking paths, and shoreline fishing. On the opposite side of the river, the municipality manages MacDonough Park, which includes a boat docking facility. The facility serves boat traffic to and from Lake Champlain. On the north bank upstream of Vermont Route 22A, the applicant furnishes carry-on boat access and parking at Settlers Park. The applicant also provides directional signage for portaging the dam.

53. The project area contains many historic and archeological resources related to Vergennes' rich history from the War of 1812 through the Industrial Age. The pumphouse on Pumphouse Island dates from 1874 and still houses the waterworks' original Flanders pump; restoration of the pumphouse is underway with assistance from the applicant. Norton Grist Mill (1877), with its former stable, is located on the other island; the mill is owned by the applicant, and repair and stabilization of the mill is included as part of the relicensing proposal.

54. The applicant proposes to complete several recreational improvements as part of the relicensing. Bank fishing access will be improved downstream of Plant 9 with the construction of a fishing platform that will meet Americans with Disabilities Act guidelines. This area will be linked with Vergennes Falls Park through construction of a shoreline path. The Settlers Park boat launch will be made more functional. Additional directional and interpretative signs will be installed; the interpretative signs will include information on the history of the Falls and it development.

55. The district fisheries biologist from the Department of Fish and Wildlife raised a concern that over time the parking on the south side of the river may become inadequate to serve the increasing number of anglers during the walleye run in the

spring. The applicant agreed to continue to monitor use as part of the FERC Form 80 process.

XI. Aesthetics

56. Vergennes Falls is segmented by the two islands into three cascades. These cascades are highly visible from several downstream vantage points, including Vergennes Falls Park and McDonough Park. Measured against natural conditions, past operation, especially with Plant 9B's construction in 1943, has resulted in a substantial loss of spillage over the Falls. With its total hydraulic capacity of 1,180 cfs, the project is able to utilize all of the river flow about two thirds of the time during an average year. During the summer recreational period, June - August, the project is able to prevent spillage over 80% of the time.

57. A special aesthetics flow study, including videotaping, was completed on October 14, 1996 to determine an appropriate level of spillage to restore the aesthetics value of the Falls. A study team comprised of the Vergennes city manager, personnel from the Department, Green Mountain Power Corporation, and the utility's consultant, Gomez and Sullivan Engineers. From four downstream locations, the team completed a qualitative evaluation of a range of special flow releases over the three spillway sections, which were rated individually and collectively at each flow. Observations were made looking at successively lower flows. For each target flow, the true flow rate varied somewhat over the observation period. Also, the end of the observations, it became apparent that the center spillway, although shorter, was discharging more water. The localized drawdown at the entrance channels for the two plants was responsible for reducing the spillage depths over those two spillways relative to the center spillway. The observation flows are shown in the following table.

Table 1. Flows (cfs) observed during aesthetics flow study and consensus ratings.

300	271-327	78-104 G G+ N G	117-129 G G+ G G	70-94 G+ G+ G G-
200	262-274	72-97 G G+ N G+	117-123 G G+ G G	70-75 G+ G+ G+ G-
150	192-223	50-67 G G+ N G+	93-103 G+ G+ G G-	49-54 G+ G+ G G-

100	146-167	31-40 G G N G	78-88 G G G G-	35-39 G G G- G-
50	100-113	19-23 F G- N F+	63-68 G- G- G F+	17-22 G- G- F- F+

Ratings are from four vantage points: in order, Vergennes Falls Park, McDonough Park, below Plant 9B, and below Plant 9. Ratings are Poor, Fair, Good, Excellent, and Not Visible. Where there was a split rating, the higher one is used (eg. G- to G is called G).

58. Aesthetic value was rated from poor to excellent, and judgements were made as to whether the change in value between flows was significantly worse, worse, the same, better, or significantly better. All team members agreed that a substantial reduction in aesthetic values occurred when flows dropped from the target flows of 100 cfs to 50 cfs. The team judged the aesthetic value as having diminished slightly when flows were reduced from the target of 150 cfs to 100 cfs. Department staff on the team were of the opinion that aesthetics was enhanced when target flows increased above 150 cfs, but only slightly. As indicated in Finding 19 above, the primary aesthetics flow proposed by the applicant is 150 cfs. This flow would be provided during the daylight hours from April through October.

59. As part of relicensing, the applicant will be improving the appearance of the Norton Grist Mill. Work will include installing period-appropriate window sash in the building where windows have been removed and replaced with plywood. The historic building is a prominent structure in the Vergennes Falls setting.

XIII. State Comprehensive River Plans

The Agency, pursuant to 10 V.S.A. Chapter 49, is mandated to create plans and policies under which Vermont's water resources are managed and uses of these resources are defined. The Agency must, under Chapter 49 and general principles of administrative law, act consistently with these plans and policies, whenever possible.

Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities (May 1988)

60. The Department publication *Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities* is a state comprehensive river plan. The hydropower study, which was initiated in 1982, indicated that hydroelectric development has a tremendous impact on Vermont streams. Artificial regulation of natural stream flows and the lack of adequate minimum flows at the sites were

found to have reduced to a large extent the success of the state's initiatives to restore the beneficial values and uses for which the affected waters are managed.

61. With respect to the Vergennes Hydroelectric Project, the plan recommended that additional studies be completed with respect to five topics: dissolved oxygen, potential for dewatering of downstream habitat during low lake levels, extent and cause of impoundment siltation, status of recreational development, and need for spillage for aesthetics. All of these topics were considered in relicensing studies at the Department's request.

1993 Vermont Recreation Plan

62. The *1993 Vermont Recreation Plan* (Department of Forests, Parks and Recreation), through extensive public involvement, identified water resources and access as top priority issues. The planning process disclosed that recreational use of surface waters is increasing, resulting in greater concern about water quality, public access to Vermont's waters, and shoreland development.

63. The Water Resources and Access Policy is:

> It is the policy of the State of Vermont to protect the quality of the rivers, streams, lakes, and ponds with scenic, recreational, cultural and natural values and to increase efforts and programs that strive to balance competing uses. It is also the policy of the State of Vermont to provide improved public access through the acquisition and development of sites that meet the needs for a variety of water-based recreational opportunities.

64. Enhancement of access and improved flow management would be compatible with this policy and balance the competing uses of recreation and hydropower. Failure to provide access would exacerbate a critical state recreational problem.

65. Another priority issue identified in the Recreation Plan is the loss or mismanagement of scenic resources. The plan notes "[t]he protection of the scenic and visual resources in Vermont is paramount if Vermont is to maintain its renowned charm and character."

66. The Scenic Resources Protection and Enhancement Policy is:

> It is the policy of the State of Vermont to initiate and support programs that identify, enhance, plan for, and protect the scenic character and rural traditions of Vermont.

XIV. Analysis

Water Chemistry

67. There are no identified problems with respect to dissolved oxygen concentrations. Some slight enhancement may occur, however, due to the applicant's proposal to provide a continuous spillage during the summer and fall. Spillage over the cascade causes turbulent entrainment of oxygen in the water.

Flow Needs in Stream Reaches for Habitat Protection

68. Conversion of the project to run-of-the-river will provide for the protection of downstream habitat. First call operation of Plant 9 in the spring and fall, as proposed, will attract fish to the Plant 9 tailrace and potentially provide enhanced spawning opportunities for walleye and sturgeon. Water levels in the wetlands complex at the Otter Creek Marsh Wildlife Management Area are probably not influenced by project operations; however, conversion to run-of-the-river will assure that no conflicts will occur.

69. Bypass flows will provide localized habitat improvement where highly oxygenated water will exist prior to mixing with the water in the downstream channel. The entrained bubbles in that zone will provide cover for fish.

70. Flashboards are removed in anticipation of high flows. During the refill of the impoundment following flashboard reinstallation, true run-of-the-river operation is not feasible as water will be going into storage. Given that, this certification is being conditioned to allow up to 10% of project inflow to be placed in storage.

Impoundment Habitat

71. No wetlands habitats associated with the impoundment were identified. Impoundment aquatic habitat, including the wetland habitats, will be protected by the cessation of impoundment cycling. Occasional loss of the flashboards will result in the impoundment dropping 1.5 feet, but this relatively small drop in water surface is not expected to result in significant habitat damage.

Screening

72. The 2-inch bar spacing on the Plant 9B trashrack may promote fish entrainment. By condition of this certification, the applicant shall be required to consult the

Department of Fish and Wildlife at the time the trashrack for either plant is scheduled for replacement, and to obtain Department approval for the design.

Recreation and Aesthetics

73. Vermont Water Quality Standards require the protection of existing water uses, including the use of water for recreation. Standards also requires the management of the waters of the State to improve and protect water quality in such a manner that the beneficial uses and values associated with a water's classification are attained. (Standards Section 1-03 *Anti-degradation Policy*)

74. Beneficial values and uses of Class B waters include water that exhibits good aesthetic value and swimming and recreation. (Standards Section 3-03(A) *Class B Waters: Management Objectives*) Standards Section 2-02(B) *Hydrology: Artificial Flow Conditions* prohibits regulation of river flows in a manner that would result in an undue adverse effect on any existing use, beneficial value or use.

75. Conversion of the project to run-of-the-river operation and preferential operation of Plant 9 will enhance angling opportunities below the project.

76. The applicant will be preparing a final recreation plan for the project. By condition of this certification, the applicant shall be required to obtain Department approval of the plan, including related erosion control provisions. The applicant's proposal, with continued access to the river, will provide support for the designated use of recreation.

77. The applicant does not propose any additional parking facilities at this time; however, the adequacy of parking will be monitored as part of the FERC Form 80 process. This is a special concern during the spring walleye fishery.

78. The consensus of the aesthetics study team was that increasing flows above the target flow of 150 cfs did not substantially improve the aesthetics of the Falls. The management objective for Class B waters is to attain good aesthetic value. At the target flow of 100 cfs (actual flow of 146-167 cfs), the three cascades were consensus rated as good; under that condition, the center cascade carried almost twice as much flow as the other two cascades due to the channel entrance head loss discussed in findings 7 and 57. According to the consensus ratings, the center cascade requires disproportionately higher flows to maintain its aesthetic value. A flow distribution similar to that provided during the target flow of 100 cfs will achieve good aesthetic value: 35 cfs for the Plant 9 and Plant 9B cascades and 80 cfs for the center cascade. This certification is being conditioned consistent with

the bypass flow schedule proposed by the applicant, but with the additional constraint that the 150 cfs flow be distributed over the three spillways as 35 cfs/80 cfs/35 cfs. The lower nighttime and late fall/winter flows are acceptable as proposed. The nighttime flow of 75 cfs will maintain the aesthetic integrity of the Falls and provide viewing opportunities under the reduced nighttime visibility, as well as provide white noise that masks the noise from traffic on Vermont Route 22A. Special winter flows for aesthetics are unnecessary as the dominant visible feature during the winter is the ice formation on the falls.

Erosion

79. Erosion, if severe, can impair recreational use and cause turbidity and the discharge of suspended solids, potentially violating the standards for those parameters (Turbidity: Standards Section 3-03(B)(1); Total Suspended Solids: Standards Section 3-01(B)(7)). The applicant identified significant erosion areas along the impoundment; however, the problems appeared to be unrelated to daily cycling of the impoundment for enhanced power production.

Debris

80. The applicant does not provide information on the handling and disposal of trashrack debris and other project related debris. The depositing or emission of debris and other solids to state waters violates the state solid waste laws and Standards, Section 3-01(B)(7) *Settleable solids, floating solids, oil, grease, scum, or total suspended solids*. A plan is being required as a condition of this certification.

General Conclusions

81. The project, if operated consistent with the conditions of this certification, will support the designated uses for Class B waters (Standards Section 3-03(A) *Class B Waters: Management Objectives*); will not have a significant impact on aquatic biota, fish or wildlife such that the existing populations would have their viability impaired (Standards Section 1-03(B)(2)(a) *Anti-degradation Policy: Protection of Existing Uses*); and will not significantly degrade the use of the water body for recreation, fishing, water supply or commercial purposes (Standards Section 1-03(B)(2)(a) *Anti-degradation Policy: Protection of Existing Uses*).

82. As required under Standards Section 2-02 *Hydrology*, the applicant's artificial regulation of flows, if consistent with the conditions of this certification, will not result in an undue adverse effect on any existing or designated use, including high quality habitat for aquatic biota, fish and wildlife. In making this determination, the

Water Quality Policy (10 V.S.A. § 1250) has been considered, including the need to allow beneficial and environmentally sound development.

83. All of the restrictions and conditions set forth herein, in conjunction with the applicant's proposal, are necessary to ensure compliance with all applicable provisions of the Vermont Water Quality Standards and other appropriate requirements of state law.

ACTION OF THE DEPARTMENT

Based on its review of the applicant's proposal and the above findings, the Department concludes that there is reasonable assurance that operation and maintenance of the Vergennes Hydroelectric Project as proposed by the applicant and in accordance with the following conditions will not cause a violation of Vermont Water Quality Standards and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, P.L. 92-500, as amended, and other appropriate requirements of state law:

A. The applicant shall operate and maintain this project consistent with the findings and conditions of this certification, where those findings and conditions relate to protection of water quality and support of designated and existing uses under Vermont Water Quality Standards and other appropriate requirements of state law.

B. **Flow Management.** Except as allowed in Condition C below, the facility shall be operated in a true run-of-the-river mode where instantaneous flows below the project shall equal instantaneous inflow to the impoundment at all times. When the facility is not operating, all flows shall be spilled at the dam. Minimum bypass flows shall be provided in accordance with the following schedule:

April 1 - Oct. 31	150 cfs daytime and 75 cfs nighttime
Nov. 1 - Dec. 15	100 cfs daytime and 50 cfs nighttime
Dec. 16 - March 31	No special flows

The 150 cfs daytime flow shall be apportioned between the spillways with 80 cfs at the center spillway and 35 cfs at each of the two flanking spillways. The 100 cfs daytime flow shall be apportioned similarly. Daytime is one half hour before sunrise through one hour after sunset.

C. **Flow Management during Flashboard Replacement.** To the extent necessary to facilitate flashboard replacement, bypass flows may be suspended. During refill of the impoundment, up to 10% of instantaneous project inflow may be placed in storage.

D. **Plan for Method to Maintain Bypass Flows and Run-of-the-River Operating Conditions.** The applicant shall develop a plan, including descriptions, hydraulic design calculations, an implementation schedule, and

design drawings for the measures to be used to release the bypass flows set forth in Condition B and to maintain a stable headpond with true run-of-the-river operating conditions. After Department approval of the plan, the plan shall be filed with FERC no later than 120 days from the date of license issuance. FERC shall either approve the plan or return the plan to the applicant for revision to incorporate FERC-recommended changes. After revision, the applicant shall submit the plan to the Department for approval of the changes. The plan shall then be filed with FERC for final approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

E. **Monitoring Plan for Impoundment and Flow Management.** The applicant shall develop a plan for continuous monitoring of flow releases at the project (below individual spillways and as discharged from each of the two powerhouses), impoundment levels, and estimated inflows. The applicant shall maintain continuous records of flows and impoundment levels and provide such records on a regular basis as per specifications of the Department. The plan shall be developed in consultation with the Department and the U.S. Fish and Wildlife Service. After Department approval of the plan, the plan shall be filed with FERC no later than 120 days from the date of license issuance. FERC shall either approve the plan or return the plan to the applicant for revision to incorporate FERC-recommended changes. After revision, the applicant shall submit the plan to the Department for approval of the changes. The plan shall then be filed with FERC for final approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

F. **Prevention of Fish Entrainment at Intakes.** Prior to any future replacement of the Plant 9 or Plant 9B trashracks, the applicant shall consult with the Department of Fish and Wildlife with respect to appropriate bar clear spacing and file the trashrack design information with the Department of Environmental Conservation for approval prior to commencement of work.

G. **Turbine Rating Curves.** The applicant shall provide the Department with a copy of the turbine rating curves, accurately depicting the flow/production relationship, for the record within two years of the issuance of the license.

H. **Debris Disposal Plan.** The applicant shall develop a plan for proper disposal of debris associated with project operation, including trashrack debris. The plan shall be developed in consultation with the Department.

After Department approval of the plan, the plan shall be filed with FERC no later than 120 days from the date of license issuance. FERC shall either approve the plan or return the plan to the applicant for revision to incorporate FERC-recommended changes. After revision, the applicant shall submit the plan to the Department for approval of the changes. The plan shall then be filed with FERC for final approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

I. **Maintenance and Repair Work.** Any proposals for project maintenance or repair work, including desilting, drawdowns below the spillway crest to facilitate repair/maintenance work, and tailrace dredging, shall be filed with the Department for prior review and approval, if said work may adversely affect water quality or cause less-than-full support of designated and existing uses of State waters.

J. **Public Access.** The applicant shall allow public access to the project lands for utilization of public resources, subject to reasonable safety and liability limitations. Such access should be prominently and permanently posted so that its availability is made known to the public. Any proposed limitations of access to State waters to be imposed by the applicant shall first be subject to written approval by the Department. In cases where an immediate threat to public safety exists, access may be restricted without prior approval; the applicant shall so notify the Department and shall file a request for approval, if the restriction is to be permanent or long term, within 14 days of the restriction of access.

K. **Recreational Facilities.** Recreational facilities shall be constructed and maintained consistent with a recreation plan approved by the Department. The plan shall be filed with the Department within 60 days of license issuance and shall include an implementation schedule. The applicant is advised to consult with the Department and the City of Vergennes in the development of plans. Where appropriate, the recreation plans shall include details on erosion control. Modifications to the recreation plan shall also be subject to Department approval over the term of the license.

L. **Erosion Control.** Upon a written request by the Department, the applicant shall design and implement erosion control measures as necessary to address erosion occurring as a result of use of the project lands for recreation. Any work that exceeds minor maintenance shall be subject to prior approval by the Department and FERC.

M. **Compliance Inspection by Department.** The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.

N. **Posting of Certification.** A copy of this certification shall be prominently posted within the project powerhouse.

O. **Approval of Project Changes.** Any change to the project that would have a significant or material effect on the findings, conclusions, or conditions of this certification, including project operation, must be submitted to the Department for prior review and written approval where appropriate and authorized by law and only as related to the change proposed.

P. **Reopening of License.** The Department may request, at any time, that FERC reopen the license to consider modifications to the license as necessary to assure compliance with Vermont Water Quality Standards.

Q. **Continuing Jurisdiction.** The Department reserves the right to add and alter the terms and conditions of this certification, when authorized by law and as appropriate to carry out its responsibilities during the life of the project with respect to water quality.

_____

Wallace McLean
Director, Division of Water Quality
for Canute Dalmasse
Commissioner
Department of Environmental Conservation

Dated at Waterbury, Vermont
this 15th day of April, 1999.

BILLING CODE 6717-01-M

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Green Mountain Power Corporation) Project No. 2674-003 - VT

NOTICE OF AVAILABILITY OF ENVIRONMENTAL ASSESSMENT

(October 16, 1998)

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission's) regulations, 18 CFR Part 380 (Order No. 486, 52 F.R. 47897), the Office of Hydropower Licensing has reviewed the application for a new license for the existing Vergennes Hydroelectric Project, located in the city of Vergennes, Addison County, Vermont, and has prepared an Environmental Assessment (EA) for the project. In the EA, the Commission's staff has analyzed the potential environmental effects of the existing project and has concluded that approval of the project, as proposed with additional staff-recommended measures, would not constitute a major federal action significantly affecting the quality of the human environment.

Copies of the EA are available for review in the Public Reference Branch, Room 2-A, of the Commission's offices at 888 First Street, N.E., Washington, D.C. 20426.

Any comments should be filed within 30 days from the date of this notice and should be addressed to David P. Boergers, Secretary, Federal Energy Regulatory Commission, 888 First Street N.E., Room 1-A, Washington, D.C. 20426. Please affix "Vergennes Hydroelectric Project No. 2674" to the top page of all comments. For questions concerning preparation of the EA for this proposed action, please contact Lee Emery, E-mail address, lee.emery@ferc.fed.us, or telephone (202) 219-2779, Federal Energy Regulatory Commission, Office of Hydropower Licensing.

David P. Boergers
Secretary

DC-A-14

ENVIRONMENTAL ASSESSMENT
FOR HYDROPOWER LICENSING

Vergennes Hydroelectric Project

FERC Project No. 2674

Vermont

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Licensing and Compliance
888 First Street, NE
Washington, DC 20426

October 1998

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ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
APE	Area of Potential Effect
cfs	cubic feet per second
CRMP	Cultural Resources Management Plan
CWA	Clean Water Act
DO	dissolved oxygen
EA	environmental assessment
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
GMP	Green Mountain Power Corporation
GWh	gigawatt-hours
Interior	U.S. Department of the Interior
kW	kilowatt
kWh	kilowatt-hour
mgd	million gallons per day
mg/l	milligram per liter
msl	mean sea level
MW	megawatt
NEPA	National Environmental Policy Act
NEPOOL	New England Power Pool
NERC	North American Electric Reliability Council
NHPA	National Historic Preservation Act
NNHP	Nongame and Natural Heritage Program
NPCC	Northeast Power Coordinating Council
National Register	National Register of Historic Places
PA	Programmatic Agreement
REA	Ready for Environmental Analysis
RM	river mile
ROR	run-of-river
SD1	Scoping Document 1
SHPO	State Historic Preservation Office
USGS	U.S. Geological Survey
VAEC	Vermont Agency of Environmental Conservation
VANR	Vermont Agency of Natural Resources
VDEC	Vermont Department of Environmental Conservation
VDFPR	Vermont Department of Forests, Parks and Recreation
VDFW	Vermont Department of Fish and Wildlife
VDHP	Vermont Division for Historic Preservation
VRP	Vermont Recreation Plan
WQC	Water Quality Certification
YOY	Young-of-the-Year

SUMMARY

On May 30, 1997, Green Mountain Power Corporation (GMP) filed an application with the Federal Energy Regulatory Commission (Commission) for a new license for the continued operation and maintenance of the Vergennes Hydroelectric Project, Project No. 2674, located on Otter Creek in the city of Vergennes, Vermont. The project would continue to have an installed capacity of 2.4 megawatts (MW) and would generate about 9.45 gigawatt-hours (GWh) of energy per year.

This environmental assessment (EA) analyzes the effects of the proposed action, the proposed action with additional staff-recommended measures, and no-action. Our analysis shows that the best alternative for the Vergennes Project to reduce or avoid adverse impacts on environmental resources is to issue a new license for the project with the following environmental measures: (1) convert the Vergennes Project from daily peaking to run-of-river (ROR) operation; (2) release aesthetic flows over Vergennes Falls as follows: April 1 through October 31--150 cfs daytime, 75 cfs nighttime; and November 1 through December 15--100 cfs daytime, 50 cfs nighttime; (3) give Plant 9 first call on water and provide a continuous outflow from Plant 9 during use of the project tailrace area by walleye, lake sturgeon, and landlocked Atlantic salmon during their spawning and egg incubation periods; (4) implement recreational enhancements to include: (a) directional and interpretive signs for recreation resources in the project area; (b) improve access for small boats and better define the parking area at Settler's Park; (c) improve the trail, shoreline fishing access, vegetative plantings, and picnic area along the western bank of the falls basin near Plant 9; (d) construct a disabled-accessible fishing platform on the western bank near Plant 9 in accordance with Americans with Disabilities Act guidelines; (e) install signs interpreting the history of the falls and the surrounding structures; and (f) install portable toilet facilities in the area below Vergennes Falls; (5) enhance aesthetics including windows and roof replacement at the former Norton's Grist Mill building located on an island overlooking Vergennes Falls; (6) implement the provisions of a Programmatic Agreement; and (7) develop and implement a plan to monitor ROR operation, aesthetic flow releases, and first priority flows to Plant 9. We discuss these measures in section V and summarize them in section VI of this EA.

Overall, these measures, along with the standard articles provided in any license issued for the project, would protect and

enhance water quality, fishery, terrestrial, aesthetic, recreational, and cultural resources.

Under the provisions of Section 10(j) of the Federal Power Act (FPA), each hydroelectric license issued by the Commission shall include conditions based on recommendations of federal and state fish and wildlife agencies, to adequately and equitably protect, mitigate damages to, and enhance fish and wildlife (including spawning grounds and habitat) affected by the project unless such recommendations are inconsistent with the Federal Power Act or other applicable law. No 10(j) recommendations were filed with the Commission in response to our notice of application ready for environmental analysis.

On May 23, 1997, GMP applied to the Vermont Department of Environmental Conservation (VDEC) for Water Quality Certification (WQC) for the Vergennes Project, as required by Section 401 of the Clean Water Act. GMP withdrew the application and submitted a new request for WQC to the VDEC on April 29, 1998, and the application is pending.

We issued a draft EA on August 13, 1998, with a request for comments from all parties in the proceeding. Comments received on the draft EA have been addressed in section V.C of this EA and in appendix A.

On the basis of our independent environmental analysis, we conclude that issuing a license for the Vergennes Hydroelectric Project as proposed by GMP, with the additional staff-recommended measures, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Licensing and Compliance
Washington, DC

VERGENNES HYDROELECTRIC PROJECT
FERC NO. 2674-003--VERMONT

I. APPLICATION

On May 30, 1997, Green Mountain Power Corporation (GMP or Applicant) filed with the Commission an application for a new major license for the Vergennes Hydroelectric Project, FERC No. 2674. The Vergennes Project is located in Addison County in the city of Vergennes, Vermont, on Otter Creek, about 7.6 miles upstream from Lake Champlain (figure 1). The project would continue to have an installed capacity of 2.4 MW and would generate about 9.45 Gwh of energy per year.

II. PURPOSE AND NEED FOR ACTION

A. Purpose of Action

The Commission must decide whether to license the Vergennes Project and what, if any, conditions should be placed on any license issued. In this EA, we assess the environmental and economic effects of operating the project as proposed by GMP, operating the project as proposed by GMP with additional staff-recommended measures, and no-action.

B. Need for Power

To assess the need for power, we reviewed GMP's present and future use of the project's power, together with that of the operating region in which the project would be located. GMP provides power to more than 82,000 customers in 65 Vermont municipalities. Sales in 1995 included the following classes of service: 32 percent residential, 35 percent commercial, and 33 percent industrial and others. In addition, GMP provides power to firm requirements customers in Vermont on a wholesale basis via wheeling arrangements1/ with other New England utilities

1/ The contracted use of electrical transmission facilities of one or more entities to transmit electrical power to another.

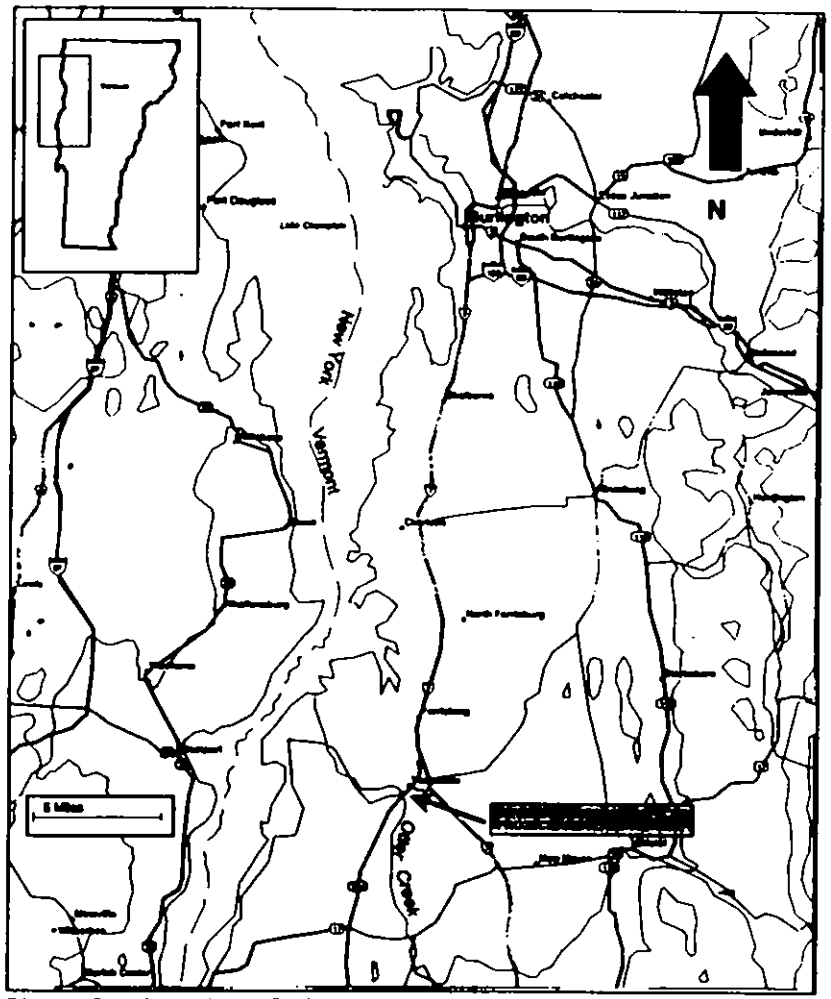

Figure 1. Location of the Vergennes Hydroelectric Project (Source: DeLorme, 1995)

GMP would continue to sell power to its customers if issued a new license

The Vergennes Hydroelectric Project is located in the New England Power Pool (NEPOOL) subregion of the Northeast Power Coordinating Council (NPCC) region of the North American Electric Reliability Council (NERC). NEPOOL annually forecasts electrical supply and demand in the region for a 10 year period. NEPOOL's most recent report on annual supply and demand projections indicates that, for the period from 1997-2007, loads in the NEPOOL area will increase slightly, less than 1 percent annually; however, the planned capacity retirements plus additions will decrease supply slightly resulting in decreased reserve margins. These margins could fall below 15 percent for summer periods by 1998 for each year of the forecast.

The Vergennes Project has historically generated an annual average of about 10,288 GWh of power for GMP. In addition, the project displaces nonrenewable fossil fired generation and contributes to diversification of the generation mix in the NEPOOL region.

We conclude that the present and future use of the Vergennes Project's power, its displacement of nonrenewable fossil-fired generation, and contribution to a resource diversified generation mix support a finding that the power from the project would help meet both the short- and long-term need for power in the NEPOOL region.

III. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

1. Project Description

The Vergennes Project's existing facilities (figure 2) include the following features: (1) three concrete overflow dams, each about 10 feet high, with a total length of 231 feet, and a crest elevation of about 132.78 feet above mean sea level (msl), surmounted by 1.5-foot-high flashboards, and a 29-foot-long, non-overflow dam; (2) an 8.8-mile-long, 133 acre surface area reservoir with a 200 acre-foot usable storage capacity at normal water surface elevation of 134.28 feet msl; (3) the north forebay with trashracks, headgates, and two, 7-foot-diameter steel penstocks; (4) the north powerhouse, Plant 9B, with a 1,000-kilowatt (kW) generating unit; (5) the south forebay, with trashracks, headgates, two surge tanks, and two, 10-foot-diameter penstocks; (6) the south powerhouse, Plant 9, with two, 700-kW

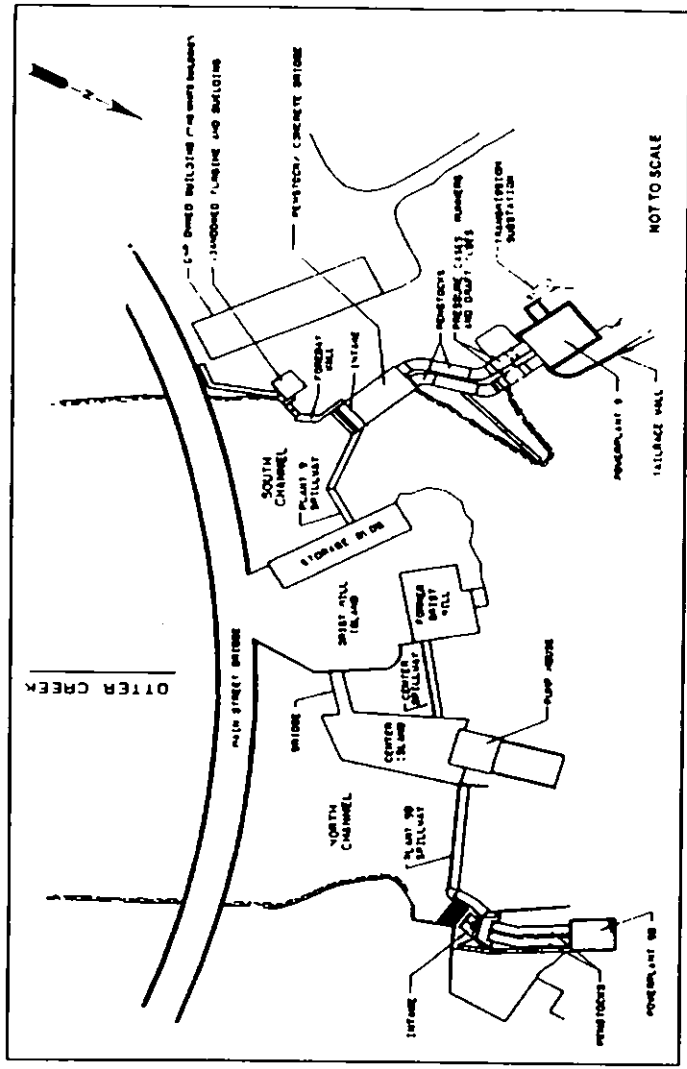

Figure 2. Vergennes Hydroelectric Project No. 2674 Site Plan (Source: modified from GMP, 1997).

generating units; (7) the generator leads from Plant 9 to the Vergennes substation and the 950-foot-long, 2,400-volt overhead generator leads from Plant 9B to the Vergennes substation; and (8) appurtenant facilities.

2. Existing Project Operations

GMP currently operates the Vergennes Project as a daily peaking project with a typical reservoir fluctuation of about 1.5 feet utilizing a 200-acre-feet impoundment storage capacity. The operating range for Plant 9 is between 140 cubic feet per second (cfs) and 700 cfs, and Plant 9B is between 200 and 480 cfs, for a total hydraulic capacity of about 1,180 cfs. The two powerhouses have independent operation systems, with Plant 9B operated remotely from GMP's Colchester, Vermont, Dispatch Center, and Plant 9 controlled manually by on-site operators. The existing average annual generation for both Plant 9 and Plant 9B is 10,288 GWh.

3. Proposed Operations and Environmental Measures

GMP proposes to convert the Vergennes Project from daily peaking to run-of-river (ROR) operation.2/ GMP also proposes additional project operation modifications and several enhancement measures as a result of consultation with the Vermont Agency of Natural Resources (VANR) and the city of Vergennes. GMP proposes the following measures:

- Release aesthetic flows over Vergennes Falls as follows:

April 1 through October 31	150 cfs daytime (½ hour before sunrise to ½ hour after sunset), 75 cfs nighttime
November 1 through December 15	100 cfs (½ hour before sunrise to ½ hour after sunset), 50 cfs nighttime
December 16 through March 31	No aesthetic flows released

2/ Where outflow approximates inflow on an instantaneous basis.

- Give Plant 9 first call on water and provide a continuous outflow from Plant 9 at all times that the project is operating to enhance use of the project tailrace area by walleye, lake sturgeon, and landlocked Atlantic salmon during their spawning and egg incubation periods (April 1 to June 15 and from September 15 to November 15).

GMP also proposes to: (1) develop directional and interpretive signs for recreation in the project area; (2) improve access for small boats and better define the parking area at Settler's Park; (3) improve the trail, shoreline fishing access, vegetative plantings, and picnic area along the western bank of the falls basin (the area immediately below the falls) downstream of Plant 9; (4) construct a disabled-accessible fishing platform on the western bank near Plant 9 in accordance with Americans with Disabilities Act (ADA) guidelines; (5) install signs interpreting the history of the falls and the surrounding structures; and (6) enhance project aesthetics by including windows and roof replacement at the former Norton's Grist Mill building located on an island overlooking Vergennes Falls. GMP proposes that the final designs for the proposed recreation enhancements would be developed post-licensing in consultation with the VANR and the city of Vergennes.

B. Proposed Action with Additional Staff-Recommended Measures

In addition to GMP's proposed actions, the staff recommends several additional environmental enhancement measures, including: (1) develop and implement a plan to monitor compliance with the revised flow regime (ROR operation, resequencing of the operation of Plant 9 for fish attraction flows, and aesthetic flow releases) in consultation with the VANR, U.S. Fish and Wildlife Service (FWS), U.S. Geological Survey (USGS), and the city of Vergennes; (2) provide portable toilet facilities (including disabled-accessible facilities) in the vicinity of the area below Vergennes Falls (the number and location to be determined in consultation with the city of Vergennes); (3) develop final design drawings for the proposed recreational enhancements in consultation with the SHPO, VANR, and the city of Vergennes; and (4) implement the provisions of a Programmatic Agreement (PA).

C. No-action

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license. No measures to protect or enhance existing environmental resources would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation and Interventions

The Commission's regulations require applicants to consult with appropriate state and federal environmental resource agencies and the public before filing a license application. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act (NHPA), and other federal statutes. Pre-filing consultation must be complete and documented in accordance with Commission regulations.

Organizations and individuals may petition to intervene and become a party to subsequent proceedings. On September 23, 1997, we issued a public notice of application for a major license for the Vergennes Project. In response to that notice, the following entities filed motions to intervene, but not in opposition to the proceeding:

Intervenors	Date of Motion
Vermont Agency of Natural Resources	November 3, 1997
U.S. Department of the Interior	November 13, 1997

We address intervenor concerns in the environmental analysis section (section V) of this EA.

On February 20, 1998, we issued a notice of ready for environmental analysis (REA). The VANR filed comments on June 1, 1998, in response to the REA.

On August 13,1998, we issued a public notice for the Vergennes Project stating that the draft EA was available for comment. The following entities provided comments for the Vergennes Project:

Entities	Date of Letter
Green Mountain Power	September 11, 1998
Vermont Agency of Natural Resources	September 17, 1998

We address all environmental concerns in the appropriate sections of this EA.

B. Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. A Scoping Document (SD1) was prepared by the staff and distributed on November 20, 1997, to federal, state, and local resource

agencies, nongovernmental organizations, and other parties to facilitate their participation in the scoping process. Two scoping meetings were publicly noticed and held on December 11, 1997, in the city of Vergennes, Vermont, to request oral comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and the transcripts of these meetings are part of the Commission's public record for the project.

C. Mandatory Requirements

1. Section 18 Fishway Prescription

Section 18 of the Federal Power Act (FPA) states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate. No Section 18 prescriptions were filed in response to the REA notice that was issued for this project on February 20, 1998.

2. Water Quality Certification

Under Section 401(a)(1) of the Clean Water Act (CWA), license applicants must obtain either state certification that any discharge from a project would comply with applicable provisions of the CWA or a waiver of certification by the appropriate state agency. Section 401(a)(1) permits the Commission to deem certification waived if the certifying agency fails to act on a Water Quality Certification (WQC) request within a reasonable period of time, not to exceed 1 year.

On May 23, 1997, GMP applied to the Vermont Department of Environmental Conservation (VDEC) for WQC for the Vergennes Project, as Section 401 of the CWA requires. GMP withdrew the application and submitted a new WQC request to the VDEC on April 29, 1998; the application is pending.

V. ENVIRONMENTAL ANALYSIS

In this section, we provide the general description of the Otter Creek drainage area, including a discussion of environmental resources in the project area that may be subject to cumulative effects from the project when considered in combination with other actions affecting the resources. Then, for each reasource, we describe the affected environment, the environmental effects and recommendations, and the unavoidable adverse effects of the proposed action with staff-recommended measures.

We address in detail those resources that would be affected by the proposed operation of the Vergennes Project, and include analysis of comments by interested parties on proposed operation. Unless mentioned otherwise, the source of our information is the license application (GMP, 1997) and supplemental filings by GMP.

A. General Description of the Otter Creek Drainage Area

Otter Creek originates in East Dorset, Vermont, extends about 100 miles to Lake Champlain, and its river basin has a total drainage area of about 936 square miles. The Vergennes Project is located at the top of a natural falls about 7.6 miles upstream of Lake Champlain. The upper portion of Otter Creek from its origin at river mile (RM) 100, to the village of Proctor, Vermont (RM 60) is characterized by rapid flows and moderately steep gradients. The middle portion of Otter Creek from Proctor to Vergennes (RM 7.6) consists of a mix of slow, meandering stream sections with elevation drops over a series of dams. The lower portion of Otter Creek, from the base of Vergennes dam to Lake Champlain, is generally flat, with water elevations in this reach influenced by seasonal variations of lake levels in Lake Champlain.

Otter Creek is a regulated river consisting of 10 dams over a total distance of about 100 miles (table 1). There are no dams between RM 64 and 27.2; there are five dams in the lower 27 miles between Middlebury and Vergennes. There are four hydroelectric projects located upstream of the Vergennes Project, including: Middlebury Lower (FERC No. 2777), Beldens (FERC No. 2558), Huntington Falls (FERC No. 2558), and Weybridge (FERC No. 2731). The Vergennes Project is the most downstream dam on Otter Creek. The Weybridge Project (about 12 miles upstream from the Vergennes Project), operates in a peaking mode.

Table 1. Dams on Otter Creek and significant tributary dams (Source: GMP, 1997, as modified by staff)

Name	Location	Approx. RM	Height of dam (feet)	Approx impoundment usable storage (acre-feet)
Emerald Lake	Dorset	100	2	22.96
Center Rutland	Rutland	72	10	34.43
Chittendon Reservoir	East Creek, tributary to Otter Creek	N/A	58	1,7217.63
Ripley Mills	Rutland	70.8	4	11.48
Sutherland Falls	Proctor	64.2	7	275.48
Middlebury Lower	Middlebury	27.2	10	45.91
Beldens	New Haven	23.0	24	252.52
Huntington Falls	New Haven	21.0	31	234.16
Weybridge	Weybridge	19.5	36	608.36
Vergennes	Vergennes	7.6	12	200

B. Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality's Regulations for implementing the National Environmental Policy Act (NEPA) (§1508.7), a cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Based on the license application, comments from agencies and other interested entities, and our preliminary analysis, we reviewed all resources to determine if they could be affected in a cumulative manner by the Vergennes Project. We used this review to determine the geographic and temporal scope of our cumulative effects analysis. We identified possible cumulative effects on fisheries resources and cultural resources at the Vergennes Project.

1. Geographic Scope

The geographic scope of our cumulative effects analysis defines the physical limits or boundaries of the proposed action's effects on the fisheries resources and cultural resources.

Our geographic scope of analysis for assessing potential cumulative effects on fisheries resources and cultural resources includes the Otter Creek river basin from Middlebury Lower dam at RM 27 2 to Lake Champlain. The operation of the Vergennes Project and other hydroelectric projects on Otter Creek could cumulatively affect fish because of turbine entrainment mortality or by disrupting spawning success by changing flows during spawning migrations. We chose this geographic scope because of direct and indirect effects of project operations and other activities potentially affecting the resources within the river basin.

2. Temporal Scope

The temporal scope includes a discussion of the past, present, and future actions and their effects on fisheries resources and cultural resources. Based on a license term, the temporal scope looks 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. The historical discussion, by necessity, is limited to the amount of available information for the resource.

C. Proposed Action with Additional Staff-Recommended Measures

1. Water Resources

a. Affected environment:

Water Quantity

Average inflows to the Vergennes Project impoundment range from a low of 610 cfs in September to a high of 3,161 cfs in April, based on prorated stream flow data from a USGS gage station in Middlebury, Vermont (table 2). Average (mean) flows in the river exceed the hydraulic capacity of the project during 5 months of the year. The Vergennes impoundment's current daily fluctuation limit using storage is normally 1.5 feet below its normal full pond water surface elevation of 134.28 feet msl. Plant 9's operating flow range is about 140 to 700 cfs, and the operating flow range for Plant 9B is about 200 to 480 cfs. Total hydraulic capacity of the project turbines is about 1,180 cfs.

Table 2. Vergennes Project annual and monthly flow duration (Source: GMP, 1997, as modified by the staff)

	Median flow (cfs)	Mean flow (cfs)	Maximum flow (cfs)	Minimum flow (cfs)
January	786	1,006	5,315	266
February	851	1,165	6,502	271
March	1,535	1,967	9,017	271
April	2,993	3,161	10,397	266
May	1,806	2,030	8,295	266
June	857	1,034	6,940	135
July	470	671	4,076	123
August	406	639	5,070	119
September	431	610	3,599	126
October	623	946	3,896	155
November	1,026	1,241	3,922	178
December	1,135	1,463	5,663	316
Annual	867	1,316	10,397	119

Derived from USGS Gage No. 04282500, Otter Creek at Middlebury, VT, water years 1960 to 1992, adjusted to 1.293 drainage area ratio.

The maximum flow in Otter Creek was 10,397 cfs as measured at the Middlebury gage, about 20 miles upstream of Vergennes dam, for water years 1960 through 1992. The 7Q10, the lowest flow that can be expected to occur in any given 10-year period for a duration of 7 days, for the Vergennes Project is 204 cfs. There are no consumptive water uses in the immediate project area.

To determine if any sections of the stream below the project were dewatered during low Lake Champlain water levels, GMP conducted a study that compared lake levels with Vergennes tailwater levels. GMP found that, even at the lowest lake level of elevation 93.47 feet (period of record 1960 to 1990), there were no dewatered sections of stream downstream of the dam under any flow conditions.

Water Quality

The Vergennes wastewater treatment facility is located about 1,500 feet downstream of Vergennes dam. Due to this facility's discharges, the Vermont Water Resources Board designates the stretch of the river downstream of the dam to Lake Champlain as a Class B Waste Management Zone, meaning that there are permitted discharges of treated wastes within this stream reach. Lower Otter Creek to Lake Champlain (including Vergennes) also is classified as an Effluent Limitation Segment. Such segments meet water quality standards when effluent standards are applied and no load allocations are necessary. Four other wastewater treatment facilities discharge into Otter Creek upstream of the Vergennes Project (table 3).

Table 3. Summary of pertinent permit effluent limits for Vermont wastewater discharges in the Otter Creek basin (Source: GMP, 1997, as modified by the staff)

Facility	River mile	Flow (mgd)	BOD (mg/l)
Vergennes	7.4	0.66	30; 50
Middlebury	25.2	2.2	30; 50
Proctor	63.8	0.325	30; 50
Rutland	71.0	6.8	30; 50
Wallingford	84.8	0.12	22.5; 37.5

Annual average; mgd= millions of gallons per day

BOD= biological oxygen demand; mg/l= milligrams per liter; the first value is the allowable monthly average, the second value is the allowable daily maximum.

Sediment loads in Otter Creek are high because of the predominance of erodible clay soils and intensive agriculture in the basin. The area below the dam, even relatively close to the powerhouse discharge, is covered with a fine layer of silt that is easily resuspended. Some of this silt probably is resuspended during high flow events, leading to short-term increased turbidity.

The VANR's Water Quality Division requested (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated March 20, 1997) that GMP conduct a study to determine if upstream and downstream dissolved oxygen (DO) concentrations show either actual or potential deficits under critical conditions (high temperature and low flow). As part of GMP's study, it collected grab samples upstream and downstream of

the dam, beginning in the early morning well before sunrise, when DO concentrations are expected to be at daily minimum levels. The study supplemented a DO study that GMP conducted during the summer of 1996, as reported in the license application.

Overall water quality in Otter Creek, as measured during the 1997 DO survey, is excellent, with DO levels in the river averaging full to super-saturation (Aquaterra, 1997). DO concentrations were all above 7.0 milligrams per liter (mg/l) even though all samples were collected before sunrise when DO concentrations are expected to be lowest. DO in the Vergennes impoundment ranged from 8.00 to 11.55 mg/l (91 to 141 percent saturation) in 1997. DO immediately downstream of Vergennes dam ranged from 7.65 to 10.90 mg/l (87 to 133 percent saturation). During 1996, the DO concentrations ranged from 8.00 to 8.85 mg/l (90 to 101 percent saturation) in the impoundment and 7.85 to 8.85 mg/l (89 to 100 percent saturation) immediately downstream of the dam.

The Vergennes Project currently meets all Class B DO criteria for state water quality standards. The VANR indicates that Otter Creek from Weybridge to Lake Champlain, for the purposes of state water quality standards, is considered warmwater fish habitat (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated March 20, 1997). The state DO criteria for warmwater fisheries is 5 mg/l or 60 percent saturation at all times.

b. Environmental effects and recommendations: GMP proposes to convert the Vergennes Project from daily peaking operations to ROR, where outflow approximates inflow on an instantaneous basis. As the VANR requested (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated March 20, 1997), GMP agreed, as a result of negotiations with the VANR and the city of Vergennes, to release the following flows over the dams and waterfalls: 150 cfs daytime (½ hour before sunrise to ½ hour after sunset) and 75 cfs nighttime from April 1 through October 31; 100 cfs daytime and 50 cfs nighttime from November 1 through December 15; and no aesthetic flow from December 16 through March 31 (aesthetic flows are discussed in section V.C.4).

Our Analysis

Water Quantity

The Vergennes Project provides no seasonal storage. The conversion from daily peaking to ROR operation would minimize daily fluctuations of the impoundment and changes in downstream flow.

Conversion of the project to ROR operation would not substantially change water depths in Otter Creek downstream of the project because this reach is predominantly influenced by Lake Champlain water surface elevations (based on our review of hydrographs of Lake Champlain water surface elevations compared to Vergennes tailwater elevations).

Project operations influence the velocity regime immediately downstream of the project powerhouses and dams, which affects the local aquatic habitat. Therefore, we analyze these effects in section V.C.2, Aquatic Resources. We present our analysis of aesthetic flows at the project in section V.C.4, Land Use and Aesthetic Resources.

GMP does not propose to develop and implement a plan to monitor compliance with ROR operation. Resource agencies also have not recommended that GMP develop such a plan. However, we consider a monitoring plan important to document project operation at the Vergennes Project. We recommend an operations monitoring plan be filed for Commission approval that includes a description of the use of generation records, the exact locations and designs of impoundment and downstream water level recording devices, other measures as necessary, and an implementation schedule. The plan should include provisions to furnish the results of the monitoring to the Commission and the resource agencies. Because development and implementation of an operations monitoring plan would reduce the economic benefit of the project, we discuss the need for this plan further in section VII.

Water Quality

Stabilization should reduce localized erosion occurring as a consequence of the approximately ± 1.5 foot daily fluctuation in water levels and therefore reduce turbidity levels and sediment load. The elimination of off-peak low flows would provide for improved assimilation of discharges from the Vergennes wastewater treatment facility located about 1,500 feet downstream of Vergennes dam.

Our review of DO data provided by GMP indicates that existing project operations result in water quality that is in

compliance with applicable state standards. The spilling of 150 cfs over the dams and waterfalls would increase aeration and could slightly increase DO during the low flow summer months.

c. Unavoidable adverse effects: Even with the incorporation of state-of-the-art erosion and sedimentation control measures into the final design of GMP's proposed recreational enhancements, there still may be a minor, short-term increase in sedimentation to Otter Creek.

2. Aquatic Resources

a. Affected environment:

Fisheries Resources

The section of Otter Creek that extends from the Vergennes Project upstream to Middlebury Lower dam (the upstream boundary for the cumulative impact assessment) is characterized by mostly slow water habitats segmented by elevation drops at existing dams. Otter Creek upstream of Middlebury has extensive and highly productive wild trout populations. The Vermont Department of Fish and Wildlife (VDFW) manages this reach of Otter Creek between Vergennes and Middlebury as a mixed warmwater and coolwater fishery. The 12 miles of stream between the Vergennes Project and the next upstream facility, the Weybridge Hydroelectric Project, supports a fishery of primarily warmwater species, including northern pike, yellow perch, smallmouth bass, several panfish species, and a variety of minnows. The VANR indicates that northern pike are particularly abundant in the Vergennes to Weybridge reach (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated June 30, 1995). Coldwater species that are present in this 12-mile portion of the river include brown and rainbow trout, although VDFW considers the presence of trout just upstream of Vergennes dam to be incidental (notes of telephone conversation between Dave Callum, Fisheries Biologist, VDFW, and Michele Dunn, Licensing Coordinator, Gomez & Sullivan Engineers, Utica, NY, dated January 12, 1995).

Water elevations in the reach from the rock falls, on which the dam sits, to the river's confluence with Lake Champlain depends on Lake Champlain levels, and on the river's discharge. Aquatic habitat downstream of the project consists of flat, slow moving water bounded by extensive marshes and forested wetlands. Important fish species below the Vergennes Project include lake sturgeon (a state-listed endangered species), landlocked Atlantic salmon, steelhead trout, walleye, northern pike, and largemouth

and smallmouth bass. Eastern sand darter (a state-listed threatened species), also may occur downstream of the dam according to the Vermont Nongame and Natural Heritage Program (NNHP) (letter from Everett Marshall, Data Manager, NNHP, Waterbury, VT, to Michele Dunn, Licensing Coordinator, Gomez & Sullivan Engineers, Utica, NY, dated January 23, 1995).

The extent to which lake sturgeon enter Otter Creek from Lake Champlain and occur below the Vergennes Project is unclear. Local residents state that they are unaware of sturgeon being seen or caught by anglers in the lower river (scoping meeting transcript, December 11, 1997). The VANR, however, states that lake sturgeon occur in the lower section of Otter Creek and that they have been caught by anglers. Additionally, the VANR notes the occurrence of one individual lake sturgeon observed by VANR biologists in lower Otter Creek in the spring of 1995. The VANR states that adult lake sturgeon exhibiting spawning behavior have been sighted in Otter Creek (primarily by anglers) during spring months (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated June 30, 1995). The VANR reports sightings of lake sturgeon below Vergennes as recently as late May 1998 (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to David Boergers, Secretary, Commission, Washington, DC, dated September 17, 1998).

Management of landlocked Atlantic salmon and steelhead trout below Vergennes is part of the development plans implemented for salmonid fisheries in Lake Champlain. Atlantic salmon and steelhead trout are stocked in the lower river below the Vergennes Project, enhancing an important recreational fishery for these species immediately downstream of the dam. The VANR states that salmon and steelhead may spawn at the base of the dam (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated June 30, 1995). VANR notes that the number of adult salmon and steelhead that return to Otter Creek during spawning runs may increase in future years due to a lamprey (an introduced predator of salmonids and other larger species of fish) control program that is being conducted on Lake Champlain.

An important walleye fishery also exists downstream of the Vergennes Project. Walleye enter Otter Creek from Lake Champlain in early spring to spawn. A fishery for post-spawned walleye that feed in the lower river exists from mid-May through most of June. The VDFW is considering stocking hatchery-reared walleye

prior to the year 2000 as part of a management plan to increase the walleye spawning run downstream of the Vergennes Project.

Results of GMP's spring angler survey indicate that the majority of anglers interviewed (56 percent) fished from shore in the vicinity of the Plant 9 tailrace. Anglers indicated that the Plant 9 tailrace was preferred because of the quality of fishing at this location, the ease of access, and the ability to catch preferred species. Some anglers stated that discharge levels from the powerhouses influenced where they chose to fish. Many anglers interviewed during the spring period reported that they were not targeting any species in particular, but those anglers with a preference often targeted walleye (which can legally be caught beginning on the first Saturday in May). The survey also indicated that fall anglers demonstrated a preference for catching salmon, trout, and, to a slightly lesser extent, walleye.

GMP conducted studies to assess the effects of project operation on the various habitats used by downstream fish populations. During these studies, GMP mapped bathymetry and substrate and developed velocity profiles in the falls basin area. GMP also examined the effect of Lake Champlain water levels on the Vergennes tailrace elevation to determine effects on tailrace depth and velocity distributions. Based on resource agency requests and concerns, the studies focused on spawning habitat for walleye, lake sturgeon, and steelhead trout during the spring and early summer (for Atlantic salmon during the fall) and availability of holding areas for adult salmon and steelhead.

The studies identified spawning habitats for each species of interest using depth and substrate profiles coupled with spot velocity measurements taken when one powerhouse was generating and the other was offline or operating at a reduced level (190 cfs from Plant 9). Hydrographs of Lake Champlain levels, Vergennes tailwater levels, and the thalweg (minimum river bottom elevation) also were used to assess water depths during the specified spawning periods.

Based on the results of GMP's studies, we conclude that there is adequate habitat for walleye and sturgeon spawning during the spring and early summer months. Suitable spawning areas for these species could increase during periods of high flow and spillage. Spawning habitat for Atlantic salmon and steelhead trout downstream of the project is limited, mainly because preferred substrates are sparse. Most substrate suitable for salmon and steelhead spawning (gravel) is embedded with sand or silt, in water that is generally too deep for spawning, or located in areas below the dam that are wetted only during high spring flows. Suitable habitat exists for adult salmon and

steelhead to use as holding areas during their spawning migrations

Mussel Distribution

At the request of the VANR and the FWS, GMP conducted a mussel survey on August 15 and 16, 1996, in conjunction with a substrate mapping survey to establish data on the extent of mussel beds within the project area. The survey focused on the possible presence of the black sandshell mussel, a state-threatened species that was found at the site in the late 1970's, and three other rare mussel species: fragile papershell, pink heelsplitter, and pocketbook mussel.

The mussel survey demonstrated that the freshwater mussel populations downstream of the Vergennes Project are diverse and abundant in areas where appropriate substrate was found (loose, unconsolidated substrates where mussels are able to burrow and overwinter). In the area where the black sandshell mussel was found in the 1970's, specimens collected included, among other species, fragile papershells, pink heelsplitters, pocketbook mussels, and giant floaters, all rare species. No black sandshell mussels were collected. None of the mussels in the Lake Champlain basin, including those identified above, are listed under the federal Endangered Species Act, nor are they presently being considered as candidates (letter from Susanne von Oettingen, Acting Supervisor, FWS, Concord, NH, to Craig Myotte, Assistant Vice President, GMP, South Burlington, VT, dated June 27, 1995).

b. Environmental effects and recommendations:

Fisheries Resources

Instream Flows. Flow releases from the Vergennes Project could affect important habitats for several important fish species. The VANR states that walleye, lake sturgeon, Atlantic salmon, and steelhead trout may use areas downstream of the project for spawning. The VANR also is concerned about holding areas for adult salmonid spawners, feeding areas for post-spawned walleye, and incubation habitat for lake sturgeon. Project operation also may affect rearing habitat for juvenile salmonids. The VANR considers downstream distribution of flows across the river channel the primary flow-related issue given the project's proposed conversion to ROR operation (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated March 20, 1997).

No entity has expressed concern about the effect of project operations on the eastern sand darter, a state-listed threatened species. The preferred habitat for eastern sand darter is sand bottomed areas in streams and rivers and sandy shoals in lakes, sometimes overlain by a thin layer of silt (Scott and Crossman, 1973).

GMP proposes to operate the Vergennes Project as a ROR facility. GMP would also release flows over the dam for aesthetic purposes during the spring and fall. In addition, GMP would maintain outflow from Plant 9 by operating at least one turbine during walleye and sturgeon spawning and incubation periods and during the fall when Atlantic salmon are present until the hydraulic capacity of one unit is reached (350 cfs). When flows exceed 350 cfs through Plant 9, GMP proposes to commence operating Plant 9B. GMP proposes to continue operating one unit at Plant 9 and Plant 9B when flows are between 480 cfs and 830 cfs. When flows exceed 830 cfs, GMP would continue to operate Plant 9B and both units at Plant 9.

The VANR agrees with GMP's proposal to provide continuous outflow from Plant 9 from April 1 to June 15 (walleye and sturgeon spawning and steelhead migration) and September 15 to November 15 (presence of Atlantic salmon adults) (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated March 20, 1997).

Baseload operation (at least 350 cfs or project inflow) of Plant 9 during these times would provide continuous flows to the western side of Otter Creek, which the VANR considers important for walleye, sturgeon, Atlantic salmon, and steelhead fisheries.

In comments provided in response to the draft EA, the VANR clarifies that its definition of first call is to bring Plant 9 on line first and maintain it on line at all times that the project is operating during the seasonal time perids, as described above. The VANR indicates that use of Plant 9B is acceptable when flows exceed 350 cfs (the hydraulic capacity of one unit) via Plant 9 plus spillage for aesthetic purposes (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to David Boergers, Secretary, Federal Energy Regulatory Commission, Washington, D.C., dated September 17, 1998).

Our Analysis

There is a reasonable amount of circumstantial evidence available that sportfish are attracted to the Plant 9 tailrace flows more than to Plant 9B tailrace flows. Anglers most commonly fish along the western shoreline when Plant 9 is

generating, suggesting that, under these conditions, they are more successful in catching fish. Analysis of the VDFW's fall electroshocking data for salmon in the falls basin (the area immediately below the falls) indicates that, when Plant 9 is operating, salmon are often collected; if only Plant 9B is operating or neither plant is operating, fewer salmon are collected. These data demonstrate the importance of flows in this portion of the river to sportfish habitat.

GMP proposes to operate at least one unit of Plant 9 during the spring walleye, lake sturgeon, and steelhead spawning periods and during the fall landlocked Atlantic salmon spawning and congregating period. When the hydraulic capacity of one unit (350 cfs) is reached at Plant 9, GMP proposes to commence operating Plant 9.

GMP's proposed operating rule would avoid the existing sudden shift of water from the western side of the river (Plant 9) to the east side of the river (Plant 9B) when inflows to the project exceed 200 cfs. However, inflows to the project nearly always exceed 200 cfs (see table 2), and the enhancement value of this change in operating rules would be minimal. At project flows between 200 cfs and 480 cfs (or at inflows over 350 cfs during periods of aesthetic flow releases), the operating rule would change from the existing conditions.

GMP's proposed first call on one unit at Plant 9 would provide additional flows to the tailrace along the western side of Otter Creek and would enhance potential spawning habitat for walleye and lake sturgeon in the spring and landlocked salmon in the fall. At project inflows over 480 cfs (or at inflows over 630 cfs during periods of aesthetic flow releases), the operating rule would be essentially the same as the existing conditions.

During the spring (April 1 to June 15), flows are most likely to influence potential spawning of walleye, steelhead, and lake sturgeon. Walleye most likely spawn in April in Otter Creek, although some walleye spawning may also occur in early May. Walleye spawn in high velocity water (2.0 to 3.5 feet per second [fps]) over gravel and cobble at depths of 1.9 to 6.0 feet. Substrate and depth immediately downstream of the project would be suitable for walleye spawning, based on our comparison of GMP's substrate and bathymetric mapping with published criteria presented in GMP's license application. Velocity mapping during November indicated that, when Plant 9 was operating with a discharge of 520 cfs, downstream flows occasionally exceeded 2.0 fps. When Plant 9B was operating at nearly full capacity (473 cfs), downstream flows did not exceed 2.0 fps.

GMP points out that during the spring, there would be substantially higher flows, and corresponding velocities would probably exceed 2.0 fps more frequently. Typical flows during April and May exceed the 1,180 cfs hydraulic capacity of the project (see table 2), meaning that the operating rule for the project would primarily influence walleye spawning during dry years. Nevertheless, at flows less than 1,180 cfs, distributing flows preferentially to Plant 9 (with its higher hydraulic capacity) would increase walleye spawning habitat in the tailrace area. We conclude that, especially during the dry years, spawning success of walleye likely would be enhanced if Plant 9 were operated on a first call basis.

Spawning habitat for steelhead in the tailwaters is limited by the amount of suitable substrate (clean gravel). There is one small area of clean gravel downstream of Grist Mill island that would typically be submerged during the expected April spawning period for steelhead. GMP indicates that this gravel bar would most likely be exposed by June or July, and because egg incubation can take from 1 to 3 months, this gravel may be unsuitable for spawning due to potential dewatering. We consider it likely that this gravel bar would normally remain submerged during egg incubation, which, according to Raleigh et al. (1984), usually takes 28 to 40 days. Incubation time is shorter at higher temperatures and, by late June, temperature measured in the tailwaters during 1996 was about 20°C (7 to 12°C is considered optimal for incubation). If steelhead spawning occurs in the tailwaters, probably most eggs would hatch by the end of May. Although fry would remain in the gravel for about 2 weeks after hatching (Raleigh et al., 1984), based on GMP's typical spring hydrograph, most gravel would still be submerged by mid-June. Successful steelhead egg incubation also requires flows of between 1.6 and 3.0 fps. Velocity mapping indicates that flows near the gravel bar with high Plant 9 flows were nearly 0 fps. Suitable velocities at the gravel bar are more likely to be a function of the amount of water spilling over the western spillway than the operation of Plant 9. We therefore conclude that spawning success of steelhead would be unrelated to the operating rules of the Vergennes Project.

If lake sturgeon spawn in the Vergennes tailwaters, they are likely to seek water that is 1.3 to 4.9 feet deep, but can spawn up to depths of 15.4 feet, at velocities of 0.5 to 3.3 fps over gravel, cobble, and boulder substrates. Spawning typically occurs from early May to mid-June based on published criteria presented in GMP's license application. Our review of GMP's substrate mapping indicates large areas of ledge, sand, and silt in the Plant 9B tailrace, whereas much of the area immediately downstream of the Plant 9 tailrace is gravel, cobble, and boulder. GMP's hydrographs show that water depths in the tailwaters during the spring spawning season average 10 feet,

which is within the upper spawning limit of lake sturgeon. We conclude that preferentially releasing water from Plant 9 during May and through June 15 (first call) would attract any spawning lake sturgeon that may be present in Otter Creek to an area that would enhance the probability of spawning success.

Landlocked Atlantic salmon require similar substrate (clean gravel) as steelhead do for successful spawning. We reviewed GMP's substrate and typical fall week hydrograph and conclude that from September 15 to November 15 the only area of suitable substrate for spawning (the gravel bar downstream of Grist Mill island) normally would be exposed. We therefore consider it unlikely that there would be any successful landlocked salmon spawning immediately downstream of the Vergennes Project. Preferential releases from Plant 9 seem to attract landlocked salmon to the western side of Otter Creek. This concentration of fish may increase the catch per unit of effort for local anglers, but is unlikely to have a bearing on the productivity of the landlocked salmon population. We conclude that operating under GMP's flow regime could provide enhancements to the fall fishery for landlocked salmon.

Our review of GMP's substrate mapping indicates that there may be suitable habitat for the eastern sand darter downstream of the project. However, the local distribution of sand and silt most likely is determined primarily by high flow events, over which GMP has no control. Therefore, we conclude that existing and proposed project operations would have little effect on the habitat for eastern sand darters (if they are present in Otter Creek).

We recommend that GMP specify the operating rules for the Vergennes Project. The rules should incorporate providing continuous outflow from Plant 9 at all times that the project is operating from April 1 through June 15 and September 15 through November 15 to enhance potential spawning habitat for walleye and lake sturgeon and to attract landlocked salmon to the western side of Otter Creek during the fall angling season. The rules should also provide for use of Plant 9B during the spring and fall seasons when flows through Plant 9 exceed 350 cfs (the hyrdaulic capacity of one unit).

As discussed previously, flows of 350 cfs through Plant 9 would enhance potential spawning habitat for walleye, lake sturgeon, and landlocked salmon on the western side of Otter Creek. We consider a plan to document the operation of Plant 9 on a first call basis to be important in confirming the environmental enhancements expected from these flow-related measures. Therefore, we recommend a plan be submitted for Commission approval that includes a description of the use of generation records, the exact locations and designs of

impoundment and downstream water level recording devices, and an implementation schedule. The plan should include provisions to furnish the results of the monitoring to the Commission and the resource agencies.

Fish Entrainment and Impingement. The intake structures for each powerhouse are separated by three overflow dam sections separated by two midstream islands. The Plant 9 intake consists of a trashrack structure with two headgates. The trashracks have 1-inch clear bar spacing. Water velocity on the upstream side of the Plant 9 trashracks at a normal water surface elevation is about 1.8 fps. The Plant 9B intake has a trashrack structure with 2-inch clear bar spacing. The water velocity at the face of the Plant 9B trashracks at normal surface elevation is about 2.6 fps.

GMP does not propose any measures to reduce entrainment-related impacts, other than to consider the installation of 1 inch clear-spaced bar racks at the Plant 9B intake when the existing trashracks are replaced.

The VANR states that Vergennes Project intake velocities are within acceptable limits and would minimize entrainment and impingement of fish. Consequently, the VANR is not now requesting protective measures pertaining to entrainment related impacts for the Vergennes Project (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated March 20, 1997). However, the VANR requests that, when the trashracks at Plant 9B need to be replaced, GMP should consider replacing the existing 2-inch clear-spaced bar racks with bar racks that have a maximum clear spacing of 1.5 inches.

Our Analysis

Most riverine fish entrained at hydroelectric projects are small (less than 8 inches long) (EPRI, 1992). Entrainment of catchable-size sportfish should be minimal at Plant 9 because the trashrack bar spacing is narrow (1-inch clear) and water velocities are less than 2 fps allowing fish to escape entrainment and impingement. Given the proposed project's configuration, fish in the vicinity of the trashracks would be able to escape additional impingement by traveling a short distance at burst swimming speed.3/ Some catchable-size fish could be entrained through the Plant 9B intake, which has a bar spacing of 2-inch clear and intake velocities of about 2.6 fps.

3/ See Beamish (1978) for data on burst swimming speeds for fish.

Although the resource agencies are not pursuing additional downstream fish protection measures at the project, they have requested that GMP consider installing 1.5-inch, clear-spaced bar racks on the intake of Plant 9B when the existing trashracks are replaced. Based on this request, GMP stated that it would consider installing 1-inch, clear-spaced bar racks in the future. The installation of narrow-spaced bar racks with either 1- or 1.5 inch clear bar spacing would not reduce the entrainment of most fish that probably pass through the Plant 9B turbine (i.e., YOY fish less than 8 inches long). Conversely, entrainment of fish that constitute a harvestable component of upstream populations may be reduced with narrower spaced bar racks. In this instance, based on the fish species present, there would be little difference between the 1 inch or 1.5 inch trashracks in protecting the larger sportfish from entrainment.

Turbine mortality of small fish (less than 8 inches long) usually is low (less than 10 percent)(EPRI, 1992). Based on a comparison of the fisheries at the Vergennes Project with other sites for which entrainment studies have been conducted (EPRI, 1992; 1995), we conclude that the turbine mortality rate at the Vergennes Project probably is low because most fish that are entrained are YOY. Further, turbine mortality of adult sportfish should be minimal because the narrow bar spacing and low intake velocities at both powerhouses would limit the entrainment of most catchable-size fish. There are no state- or federally-listed endangered or threatened species upstream of the project that are subject to entrainment and turbine mortality at the project.

Based on our analysis, we conclude that entrainment at the Vergennes Project is not adversely affecting the fisheries resources in Otter Creek, and we find that additional protective measures are not needed at this time. In areas with high debris loading, small spaced racks may clog and cause high velocity hot spots in front of the racks where fish could become impinged. We recommend that the VANR and GMP consult on the appropriate spacing (e.g., 1 or 1.5 inch) when the existing racks are in need of replacement and consider such factors as debris loading and impingement. Any proposal to change the spacing of the trashracks in the future should be submitted to the Commission, along with resource agency comments, as a request to amend the license.

Mussel Distribution

Based on a review of the information made available in the draft application, the VANR concluded that the proposed conversion of the project to ROR adequately addresses any issues related to the protection of the mussel populations at the Vergennes Project (letter from Jeffrey Cueto, Principal

Hydrologist, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated March 20, 1997). No other party has commented on the potential effects of GMP's proposed operations on mussel populations in the project vicinity. We also conclude that the existing diverse and abundant mussel community downstream of the project would not be adversely affected, and may be enhanced, by the proposed operation of the project.

c. Cumulative effects: Turbine entrainment mortality and instream flow fluctuations could have potential cumulative effects that may be adversely affecting Otter Creek fisheries. We selected the 27.1 miles of Otter Creek that extend from Middlebury Lower dam to Lake Champlain as the geographic scope for assessment of cumulative impacts. Five hydroelectric projects (including Vergennes and Middlebury Lower) are located within the selected geographic boundaries. Although some turbine mortality most likely is occurring at each project, we conclude that the cumulative effects are minor for the following reasons:

(1) there is no anadromous fish production upstream of the Vergennes Project (i.e., little to no cumulative mortality of highly migratory fish);

(2) most entrainment probably consists of YOY fish, which usually suffer less than 10 percent mortality during turbine passage; and

(3) fish populations change from primarily warmwater species to coolwater species from downstream to upstream projects (probably due to changes in Otter Creek habitats associated with stream gradient), which likely reduces downstream movements of most species (populations are likely to be local and would not depend on recruitment from upstream or downstream areas).

Instream flow fluctuations produced by the projects within the defined geographic scope may be affecting spawning activities of some species. GMP's proposal to convert to ROR operation would reduce any such impacts downstream of the Vergennes Project. Inflow, however, is controlled by Weybridge, the next upstream project, which operates in a peaking mode. The long distance between these two projects moderates the effects of upstream peaking and the adverse cumulative effects on the resources. The degree of resultant habitat influence of fluctuating flows below Vergennes due to upstream project operations would be minimized by the effects of Lake Champlain backing water up to Vergennes dam.

d. Unavoidable adverse effects: There would continue to be some entrainment of fish at this and other upstream hydropower projects on Otter Creek. Entrainment would likely continue to occur at the Vergennes Project, consisting primarily of YOY centrarchids, with minimal adverse effects on these populations and the existing sport fishery in Otter Creek.

3. Terrestrial Resources

a. Affected environment:

Botanical Resources

The project impoundment is riverine in nature, and the shoreline areas are composed predominantly of forest habitat, although the width of the woody vegetative buffer between the impoundment and active agricultural land varies dramatically. The lower Otter Creek, downstream of the project dam, has extensive palustrine, emergent marshes (designated as PEM by the wetland classification system presented in Cowardin et al., 1979) and floodplain broadleafed, deciduous forests (designated PF01 by the Cowardin et al., 1979, classification scheme). The shoreline of this segment of the river is frequently flooded and influenced by Lake Champlain.

Spring overflows create natural levees that support PF01 swamps. The floodplain forests have been altered by timber harvesting and by cattle grazing (letter from Everett Marshall, Data Manager, Vermont NNHP, Waterbury, VT, to Michele Dunn, Licensing Coordinator, Gomez & Sullivan Engineers, Utica, NY, dated January 23, 1995).

The lowlands behind the natural levees are comprised of palustrine emergent wetlands and palustrine scrub-shrub swamps dominated by broadleafed deciduous vegetation (designated as PSS1 by the National Wetland Inventory), which are rarely visited by people except perhaps for waterfowl hunting. To maintain this type of wetland community, these areas retain standing water or saturated soil conditions throughout the year. These marsh areas along the lower Otter Creek are characterized by the NNHP as the most impressive and most extensive natural community within the lower Otter Creek basin. Species associated with the PEM areas include: giant bur-reed, common arrow-head, narrow-leaved cattail, white water-lily, pickerelweed, and buttonbush. Species identified within the PF01 areas include: silver maple, wood-nettle, white grass, hog-peanut, and ostrich fern.

The NNHP identified several rare plant species growing in the floodplain in the region from the mouth of Otter Creek upstream to Vergennes dam. The species identified include: arrowleaf, cattail sedge, water-hemp, narrow blue-eyed-grass, and

lance leaved loosestrife, and the green dragon. Although all of these species are considered rare in Vermont, only the green dragon is classified as threatened by the state. In addition, the NNHP identified uncommon plants that could potentially occur in the project area, including: within the PEM areas--false hop sedge, slender bulrush, salt marsh bulrush, and Smith's bulrush; along riverine emergent marsh areas (designated REM by the National Wetland Inventory) -May-fruited false loosestrife and marsh horsetail; and within the PF01 areas--false mermaidweed.

Wildlife Resources

The vegetated buffer zone along the project impoundment most likely serves as travel corridor for birds and mammals, which are typically important in agricultural settings where large expanses of open land offer little concealment. The diverse wetlands downstream of the project offer a variety of habitats for migratory water birds as well as many resident mammal species. There are no deer wintering areas within the project area and black bear habitat, considered by the VDFW to be a critical habitat type, also does not occur in the project vicinity. Species of mammals, amphibians, reptiles, and birds likely to be found in the project area are typical of those expected to occur elsewhere in the Champlain Valley.

The NNHP identified potential rare animal species that may exist in the project area, including: osprey (state endangered); the least bittern (state species of concern); fragile papershell mussel (state species of concern); the pink heelsplitter mussel (state species of concern); the giant floater mussel; pocketbook mussel; the eastern sand darter (state threatened); the black sandshell mussel (state endangered); and the lake sturgeon (state endangered). We discuss mussel abundance and distribution (including rare species collected by GMP), lake sturgeon, and eastern sand darter in section V.C.2, Aquatic Resources.

Threatened and Endangered Species

There are no plant or animal species that are federally listed as threatened or endangered known to occur in the project vicinity (personal communication between Pat Weslowski, Senior Preservation Planner, Louis Berger & Associates, Inc., Needham, MA, and Susanne von Oettingen, Acting Supervisor, FWS, Concord, NH, on July 23, 1998).

b. Environmental effects and recommendations: GMP proposes no specific measures pertaining to terrestrial resources and indicates that because Lake Champlain backs up to the base of Vergennes Falls, project operations have little influence on the water surface elevation downstream of the dam. The FWS states that it is unclear as to whether the regulated flows in Otter

Creek had altered the hydrology of the wetlands downstream of the project, particularly because Lake Champlain backs up water into lower Otter Creek (letter from Susanne von Oettingen, Acting Supervisor, FWS, Concord, NH, to Craig Myotte, Assistant Vice President, GMP, South Burlington, VT, dated June 27, 1995). The FWS also indicates that a return to ROR operation may be a step in the direction of restoring any altered wetland hydrology.

Our Analysis

The existing operation of the Vergennes Project as a peaking facility resulted in periods when little flow was released from the project. If releases from the project were the primary factor in determining the downstream water surface elevation, the water level would decrease during periods of reduced flow and riparian wetlands could be adversely influenced. However, accounts of the existing wetlands downstream of the project by the NNHP indicates that they are thriving and support a rich community of plants and wildlife. GMP's proposed conversion to ROR operation would eliminate periods when little flow is released from the project which would further stabilize the downstream water surface elevation compared to existing conditions.

We reviewed the GMP hydrographs that compared the water surface elevation above msl of Lake Champlain as measured at Burlington (about 3 miles north of the confluence of Otter Creek with Lake Champlain) to the Vergennes tailwater elevation as measured in the tailrace of Plant 9. The differences in water surface elevation above msl ranged from about 0.6 to 1.5 feet, which could be accounted for by friction and stream gradient.[4/] The Vergennes Project is located 7.6 miles upstream of Lake Champlain. We conclude that, because the water surface of Lake Champlain is essentially the same as the Vergennes tailwater elevation, lake water surface elevations are responsible for establishing the hydrology of the riparian wetlands for most of the year. In addition, flood events in Otter Creek also are likely to periodically inundate riparian habitat. The limited storage capacity of the Vergennes impoundment would not allow GMP to control flood events either with existing or proposed project operations. We conclude that present and proposed project operations have virtually no bearing on the water surface elevation and the riparian wetland habitat downstream of the project.

4/ Friction associated with the streambed (measured by "Mannings N") can cause flowing water to back up. Gradient (the difference in streambed elevation between two points) causes water to flow in a specific direction.

c. Unavoidable adverse effects: None.

4. Land Use and Aesthetic Resources

a. Affected environment: The Vergennes Project is directly surrounded by land classified by the Addison County Regional Planning Commission as built-up, urban, or residential. Land uses in the project vicinity include agricultural, rural residential, scattered forest lands, brush lands, and light manufacturing, and most lands surrounding the project boundary are privately owned. The project impoundment extends about 9 miles upstream, and it is surrounded primarily by agricultural lands. Water flows over the dam or through the project and enters a basin formed below the falls (falls basin), which covers an area of about 8 surface acres.

The prominent aesthetic features of the project area are the water flow over the dam at the natural rock ledge and the surrounding historic structures and project facilities (see figure 3). Vergennes dam is founded on a natural rock ledge forming a waterfall with a vertical drop of 35 to 40 feet, depending on the water level at the base of the falls. Water is spilled over three concrete sections of the dam (the center, Plant 9, and Plant 9B spillways), which are topped by 1.5-foot flashboards. The sections of the dam that do not receive any overflow are composed of two midstream islands (see figure 2). Located on these islands are two historic structures that contribute to the scenic nature of the area. These structures, Norton's Grist Mill on Grist Mill island and the pumphouse on Center island, were constructed in the late 1800s and have since fallen into disuse and disrepair. The city of Vergennes, with funding support from GMP, recently made improvements to Center island, including new lighting, fencing, and landscaping.

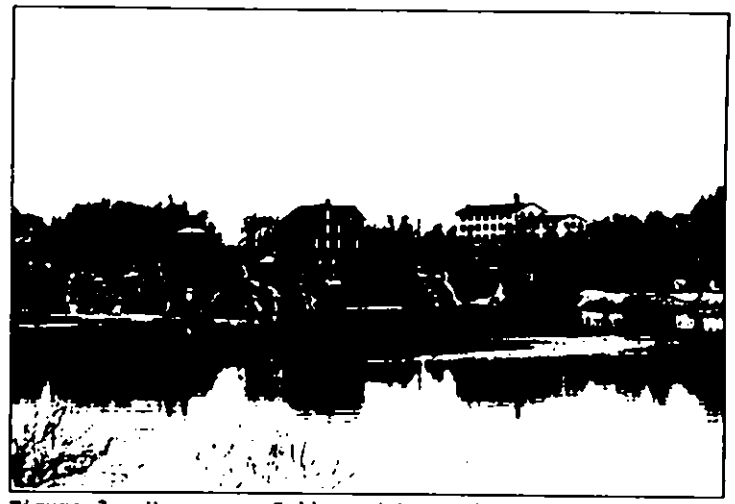

Figure 3. Vergennes Falls and Lower Otter Creek Basin (Source: Louis Berger & Associates, Inc., 1998)

The area below Vergennes Falls (the falls basin) is heavily used by boaters during the summer months, and it provides direct viewing of the scenic Vergennes Falls and historic structures. Boaters can access this area by traveling upriver from Lake Champlain. Two prime shoreline areas in the falls basin are used to view the project's scenic resources: the Vergennes Falls Park, downstream of the dam on the south side of the creek, and the city-owned docking facilities at MacDonough Park on the north side of the river.

GMP currently operates the Vergennes Project as a daily peaking project with a limited daily fluctuation of 1.5 feet. The inflow to the Vergennes Project is controlled by the upstream Weybridge Project. Historically, flows outside of the operating range of the two generating plants (minimum 140 cfs, maximum 1,180 cfs) have been passed over the three spillways except for minor flashboard leakage. There are no low-level outlets or other means of discharge at the spillways other than over the fixed crest spillways or through the generating facilities.

Table 4 summarizes the approximate existing flow exceedance in Otter Creek at the Vergennes Project based on prorated flow data from USGS gaging station No. 04282500 in Middlebury,

Vermont, located approximately 19 miles upstream of the project. The average inflows to the project impoundment range from a low of 610 cfs in September to a high of 3,161 cfs in April.

Table 4. Estimated flows in Otter Creek at the Vergennes Project (Source: Staff)

	Estimated flow exceedance (cfs)				
Month	10%	25%	50%	75%	100%
January	2,025	1,150	800	600	300
February	2,425	1,475	850	600	300
March	3,900	2,800	1,525	800	300
April	4,900	3,850	3,000	2,200	250
May	3,550	2,700	1,800	1,050	350
June	1,850	1,250	850	575	150
July	1,350	700	475	375	150
August	1,350	750	425	300	150
September	1,300	690	430	300	150
October	2,350	1,150	650	375	150
November	2,450	1,750	1,025	650	200
December	2,700	1,800	1,150	800	300

USGS gage at Middlebury prorated to Vergennes site by a factor of 1.293; period of record, water years 1960-1992.

GMP evaluated six different aesthetic enhancement target flows. Due to the hydraulic configuration of the river and power plants, control of the center spillway lagged behind that of the Plant 9 and Plant 9B spillways, and a uniform depth of flow and discharge across each spillway could not be obtained. Subsequently, the actual flows were greater than the targeted flows. The actual flows were computed for the aesthetic flow study period based on measurement of the head on the flashboards and application of a discharge coefficient rating curve for a sharp-crested weir configuration. Table 5 summarizes the target flows and the computed actual flows for the study period.

Table 5. Aesthetic flow study target and actual flows (Source: GMP, 1997)

Target flows	Actual flow range (cfs)
300	271-327
200	262-295
150	192-223
100	146-167
50	100-113

A study team composed of representatives from the VANR, the VDEC, the city of Vergennes, and GMP evaluated the flows. The study team evaluated the effect of various flows over Vergennes Falls based on the dimensions of sound, exposed rockface, and veil effect. The study team was divided in its opinion of the higher target flows of 200 and 300 cfs; some members found that these flows were considerably better than lower flows, others did not see much difference or thought that lower flows were preferable. The study team members generally agreed that the 150 cfs target flow was better than the 100 cfs target flow, though not substantially so. All members thought that the target flow of 100 cfs was substantially better than the 50 cfs target flow.

b. Environmental effects and recommendations: GMP proposes the release of aesthetic flows over Vergennes Falls based on the results of the evaluations conducted during the aesthetic flow study and the subsequent consultation among the VANR, the city of Vergennes, and GMP. From April 1 to October 31, GMP proposes daytime aesthetic flow releases of 150 cfs and nighttime flow of 75 cfs. From November 1 through December 15, GMP proposes a daytime aesthetic flow of 100 cfs and a nighttime flow of 50 cfs. GMP proposes no aesthetic releases from December 16 through March 31. In addition to the aesthetic flow releases, GMP proposes to contribute $40,000 for aesthetic enhancements to Norton's Grist Mill to restore the windows and replace the roof.

The VANR states that the distribution of GMP's proposed aesthetic flows among the three spillways should be determined through post-licensing consultation (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to David P. Boergers, Acting Secretary, FERC, Washington, DC, dated June 1, 1998).

Our Analysis

Table 6 summarizes estimated exceedance flows over Vergennes dam under existing conditions and under GMP's proposed aesthetic flows. GMP's proposed aesthetic flow releases would provide greater and more consistent aesthetic flows over Vergennes dam

from May through October. Proposed aesthetic flows during April would provide a minor increase in aesthetic flow opportunities. Aesthetic flows from November through December 15 would occur about twice as often as they do under the existing conditions. GMP proposes no aesthetic flows from December 16 through March 31, and, therefore, flows over Vergennes dam would remain the same as under existing conditions for this same time period.

The proposed aesthetic flows would enhance the overall aesthetics of Vergennes falls during May through October, the prime recreation season, when the greatest viewing opportunities would occur. As demonstrated during the aesthetic flow study, the distribution of flows over each spillway could vary. We recommend, therefore, that GMP develop an operation and monitoring plan in consultation with the VANR and the city of Vergennes, which determines the allocation of the aesthetic flows over the spillways. We consider documentation of aesthetic flow releases to be important in confirming the environmental enhancements expected from these flow-related measures. We also discuss the operation and monitoring plan in section V.C.1, Water Resources.

GMP's proposed improvements to Norton's Grist Mill would help restore the building's historic character and enhance the overall aesthetic resources of the project area. The proposed fishing access platform in the vicinity of the Plant 9 tailrace, however, could potentially alter the aesthetic and historic character of the area below the dam. We recommend, therefore, that GMP develop the final design for the fishing platform in consultation with the VANR, SHPO, and the city of Vergennes to ensure that the fishway facilities would be compatible with the scenic qualities of the Vergennes Historic District.

Table 6. Estimated occurrence of aesthetic flows over Vergennes dam (Source: Staff)

Veiling flow	Month	GMP's proposal	Existing conditions
3 inches (about 150 cfs)	April	100%	90%
	May	100%	65%
	June	100%	20%
	July	100%	10%
	August	100%	10%
	September	100%	10%
	October	100%	20%
2 inches (about 100 cfs)	November	100%	40%
	December (1-15)	100%	45%
Greater than 0 inch	December (16-31)	55%	55%
	January	30%	30%
	February	40%	40%
	March	65%	65%

Estimated exceedance flows based on USGS Gaging Station No 04282500 located in Middlebury, VT, from water years 1960 to 1992.

Based on provision of daytime flows; proposed nighttime flows are 75 cfs April-October and 50 cfs November-December 15.

5. Recreation Resources

a. Affected environment: The Vermont Rivers Study (VAEC, 1986) designates Otter Creek from North Dorset, roughly 90 miles upstream of the Vergennes Project, to Lake Champlain as a recreational boating area. Primary recreational use in the project area includes shoreline and boat fishing, motor boating, canoeing, picnicking, hiking, and sightseeing.

Within the project vicinity, the city of Vergennes provides many outdoor recreation facilities, including parks, school fields, playgrounds, outdoor pathways, tennis courts, a municipal forest, an ice skating rink, and a swimming pool. Recreation areas downstream of the project area include the Ferrisburg town beach, the lower Otter Creek Wildlife Management Area, access to the little Otter Creek recreation area, and many recreation areas surrounding Lake Champlain.

Settler's Park, owned by GMP and located just upstream of the Vergennes Project, provides limited parking and a car-top boat launch. A canoe portage runs from Settler's Park, crosses Main Street onto a sidewalk running across the Route 22A bridge, and descends to the western bank of the falls basin (see figure 4). Downstream of the Route 22A bridge, located on two midstream islands at Vergennes dam, are the city-owned former Norton's Grist Mill and the former pumphouse. Grist Mill island is connected to the shore from the Route 22A bridge, and Center island is connected to the shore by a footbridge. The city of Vergennes intends to develop the pumphouse on Center island for future recreational and tourism use. The city of Vergennes and GMP recently collaborated on the restoration of the pumphouse on Center island, adding new lights, decorative railings, and landscaping. Both islands and the structures add to the scenic and historical nature of the project area.

The river reach downstream of the project (and below Vergennes Falls) is a popular area for boating and fishing and provides direct access to Lake Champlain. Vergennes Falls Park, a 6.5-acre park owned and operated by the city of Vergennes, is located on the south bank of Otter Creek downstream of the project and extends between the falls and the city of Vergennes wastewater treatment plant. The park offers a system of walking paths, picnic areas, shoreline fishing areas, and a boat launch. Across the river from Vergennes Falls Park, municipal boat docks at MacDonough Park are largely used by boaters from Lake Champlain. Both the boat docks at MacDonough Park and the facilities at Vergennes Falls Park attract many visitors wishing to view the falls at the project. The falls basin area is heavily used by boaters who come upstream from Lake Champlain to view the scenic falls and the historic area.

A 1996 angler study conducted by GMP for the area below the dam showed that, during the spring period, about 56 percent of the fishing occurred along the shoreline bordering Plant 9 and 20 percent occurred on shoreline bordering Plant 9B, about 21 percent occurred along the shorelines adjacent to the city park and city boat dock area, and about 3 percent of the angling was from boats in the falls basin area (see section V.C.3 for more details on the angler survey).

The Vermont Department of Forests Parks and Recreation (VDFPR) prepared a Vermont Recreation Plan (VRP) in 1993, which assesses outdoor recreation resources, needs, and natural

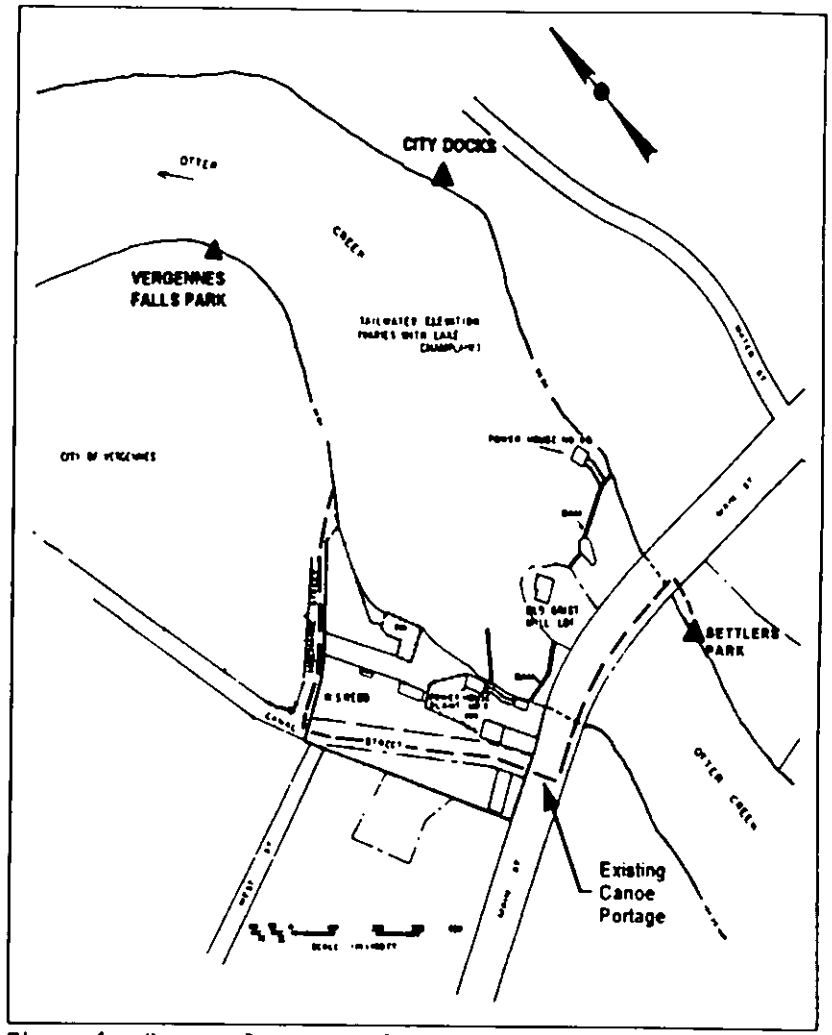

Figure 4. Current Recreation Sites and Features Within the Vergennes Project Area (Source: modified from GMP, 1997)

resources for the state of Vermont. The VRP defined four recreation needs relevant to the project area, including: (1) bicycle paths linking neighborhoods, schools, and commercial areas of towns; (2) signs/marks identifying existing trails; (3) acquiring and protecting open space; and (4) developing new park areas and facilities.

In its 1997 Municipal Development Plan (November 11, 1997), the city of Vergennes identified a number of concerns and recommendations for the area above the falls and the area below the falls. Some of the concerns and recommendations in the area above the falls include: replacing the existing canoe portage route from Settler's Park to the lower river with a route along the western bank that would be less dangerous; changing GMP fencing restrictions to make the pumphouse more accessible to the public; adding additional vehicular parking and access; and adding educational signs about the falls and the hydropower project. In addition, the city of Vergennes proposes to stabilize and restore the pumphouse and link walking trails in the upper basin with those in the falls basin area.

Concerns and recommendations presented in the Municipal Development Plan for the area below the falls include: an over building in the vicinity of the municipal boat docks; removing fallen trees, driftwood, and debris along the shoreline; improving and adding lighting and walkways along the river; adding picnic tables, grills, and a playground; improving the health of vegetation along the shoreline; adding disabled-accessible fishing areas; and keeping boat dockage at current levels to minimize the threat of increased pollution from increased boat traffic. The city of Vergennes also proposes to upgrade the municipal docks at MacDonough Park and to add lighting, picnicking facilities, and walking trails in this area.

b. Environmental effects and recommendations: GMP, in consultation with the VANR and the city of Vergennes, developed proposed recreation enhancement measures, including: (1) development of directional and interpretive signs for recreation in the project area; (2) improved access for small boats and better definition of the parking area at Settler's Park; (3) trail, shoreline fishing access, vegetative plantings, and picnic area improvements along the western bank near Plant 9; (4) construction of a disabled-accessible fishing platform on the western bank near Plant 9 in accordance with ADA guidelines; and (5) installation of signs interpreting the history of the falls and the surrounding structures. GMP proposes to develop the final designs for the proposed recreation enhancements after licensing in consultation with the VANR and the city of Vergennes.

The VANR states that the existing portage route, although not ideal, is adequate, and that the proposed use of the existing stairs on the east side of the river would not be suitable for a new portage route and would be impossible to retrofit. The VANR also states that the current route crossing the Route 22A bridge is acceptable as part of the portage route (letter from Rose Paul, Chief of Policy and Planning, VANR, Waterbury, VT, to Michael Scarzello, Water Resources Engineer, GMP, South Burlington, VT, dated April 25, 1997). The VANR also states concerns that increased fishing pressure during the spring walleye run may necessitate expansion of parking and that monitoring of this issue should occur as part of the post-licensing FERC Form 80 process (letter from Jeffrey Cueto, Principal Hydrologist, VANR, Waterbury, VT, to David P. Boergers, Acting Secretary, FERC, Washington, DC, dated June 1, 1998).

Local citizens commented during the scoping meeting (December 11, 1997) on the effects of the proposed project on recreation resources in the area. Commenters stated that there is a need for public toilet facilities in the shoreline area immediately below Vergennes Falls.

Our Analysis

Public fishing access would be enhanced by the proposed disabled-accessible fishing platform, trail improvements, and improved shoreline access. GMP's angler survey found that the majority of angling (56 percent) occurred in the vicinity of the Plant 9 tailrace. The proposed fishing platform would enhance access for anglers in this area. The proposed fishing platform would be located in a visually significant area and within the Vergennes Historic District (see sections V.C.4.a and V.C.5). Development of final plans in consultation with the VANR, the SHPO, and the city of Vergennes would help ensure compatibility of the facility with the surrounding historic character. In addition, increased fishing and recreational use in this area may lead to the need for increased parking capacity in the vicinity of the falls basin and tailrace area over the term of the license. Monitoring the recreational use of this area as part of the post-licensing FERC Form 80 process would help ensure that adequate parking facilities in this area would be provided over the term of the license.

Picnicking and sightseeing would be enhanced as a result of proposed trail and picnic area improvements. These improvements would make the shoreline more attractive and increase the usable area for picnickers and sightseers by linking the area below Plant 9 to Vergennes Falls Park. These improvements would help support the heavy use of this area that occurs as a result of easy access by boaters from Lake Champlain and the attraction for viewing the aesthetics of the falls and historic area. As noted

during the scoping meeting, toilet facilities are needed within the area below Vergennes Falls during the summer peak period of recreational use. Portable toilet facilities would help meet this need during the high use period.

The proposed directional signs would enhance use for recreationalists who are not familiar with the recreational opportunities in the project area. The proposed interpretive signs would enhance the educational and historical experience of the recreational users within the project area. The proposed directional signs also would enhance and provide a clearer demarcation of the existing canoe portage route. In addition, the proposed signs and recreational enhancements would help facilitate the city of Vergennes enhancement plans for the areas above and below the falls.

The proposed ROR operation would decrease water level fluctuation upstream of the dam and would slightly enhance recreational use along the shoreline areas because exposed shoreline areas would be slightly reduced and water level elevations would be more stable. The proposed aesthetic flows would enhance the recreational experience of recreational boaters, anglers, and shoreline visitors to the falls basin area (see section V.C.4).

We recommend that GMP implement its proposed recreational enhancements. We also recommend that the development of the final design and plan of the proposed recreation enhancements be conducted in consultation with the VANR, SHPO, and the city of Vergennes to ensure compatibility of these enhancements with the existing historic and scenic character of the area. In addition, we recommend that GMP install portable toilet facilities (including disabled-accessible facilities) in the area below Vergennes Falls, the number and location to be determined in consultation with the city of Vergennes. We also recommend that GMP review the potential need for additional parking related to increased recreational use in the tailrace area as part of the post-licensing FERC Form 80 process. GMP's proposed recreational enhancements with our recommended supplemental measures would enhance the recreational opportunities within the project area.

c. Unavoidable adverse effects: None.

6. Cultural Resources

a. Affected environment:

Historical Resources

The Vergennes Project's area of potential effect (APE) includes the land in the vicinity of the dam and powerhouses, and

the shoreline along Otter Creek that is influenced by the operation of the project.

The Vergennes Project facilities are situated within the boundary of the Vergennes Historic District, which was listed in the National Register of Historic Places (National Register) in 1976. The nomination form prepared for the District included as contributing elements the GMP-owned Plant 9 powerhouse, Norton's Grist Mill and storage building (a former horse shed), the Monkton Iron Works tunnel, former Vermont Shade Roller Company building, and former Plant 9 office/storehouse (see figure 2). The Vergennes pumphouse, historically and currently owned by the city of Vergennes, and the former Benton Machine Shop wheelhouse (not owned by GMP), are also contributing elements. An historical assessment, conducted in 1997 in association with GMP's relicensing application process, updated and expanded the identification of elements contributing to the significance of the Vergennes Historic District to include the Vergennes Project dam, Plant 9 intake structure and penstocks, and Plant 9B intake, penstocks, substructure and generating components. The VDHP has not yet commented on GMP's historical assessment.

The project facilities, illustrative of Vermont's hydroelectric plant design and construction to about World War II, represent the continued use of the falls as a source of power. The concrete overflow dam constructed between 1912-1918, with its spillways controlled by timber flashboards, Plant 9 intake installed in 1912 with its vertical gates controlled by cast iron headworks, and Plant 9's riveted steel penstocks, are representative of typical divided-flow installations throughout the State of Vermont during this period and into the 1920's. The construction of an additional generating plant (Plant 9B) in 1943 represents the importance of hydropower to the Vergennes community and illustrates the change and modernization in hydro design and construction.

The former Benton Machine Shop wheelhouse and Norton's Grist Mill and storage building (a former horse shed) are vacant and boarded up. GMP currently leases a portion of the former Vermont Shade Roller Company building (also called the "white building") to B.F. Goodrich for temporary storage of paperwork. The city-owned Vergennes pumphouse, although unused, has been somewhat stabilized and rehabilitated by efforts initiated by the city and funded in part by GMP.

As a revitalization measure, the city of Vergennes' Municipal Development Plan proposes to create a "gateway" to the city in the area around Vergennes Falls, including portions of the Vergennes Historic District. To this end, the city is working with the owners of vacant properties, including GMP as

owner of Norton's Grist Mill and the former Vermont Shade Roller Company building, to find tenants for these properties.

Archeological Resources

The Vermont Archeological Inventory maintained by the Vermont Division for Historic Preservation (VDHP) identifies 19 Native American archeological sites within the project area. The Vermont Archeological Inventory lists only two historic period archeological sites within the project boundary. Sites VT-AD-146 (former Monkton Iron Works) and VT-AD-147 (creamery) were destroyed in the course of constructing the city's wastewater treatment plant located near Vergennes Falls Park, but a portion of a tunnel once associated with the iron works remains extant, and is a contributing element to the Vergennes Historic District. The Monkton Iron Works Company was the first known business operating below the falls on the current site of the Plant 9 powerhouse. This company supplied most of the iron work and ammunition used by Thomas McDonough and his fleet when they defeated the British on lake Champlain in the Battle of Plattsburgh.

A Phase IA archeological survey commissioned by GMP concluded that the full extent of shoreline along the project impoundment should be considered sensitive for Native American archeological sites. The Phase IA archeological survey noted the potential for European-American archeological sites in proximity to the Vergennes Project along both sides of Otter Creek to the upper project limits. The survey did not, however, include location or identification of any specific sites. The VDHP has not yet commented on GMP's Phase IA archeological survey report.

According to a field investigation of the project impoundment (GMP, 1996), the shoreline is experiencing soil erosion and sedimentation, particularly in the middle and upper reaches. One of the Native American sites is located in an area experiencing noticeable erosion. Soil erosion and sedimentation along the Vergennes impoundment is due to, but not limited to, the current peaking mode of project operation, high flow conditions, and erodible clay soils, lack of a buffer zone between the river corridor and adjacent cultivated farmland, and the presence of cattle use along the shoreline.

b. Environmental effects and recommendations: Responding to the VANR's review of its draft license application, GMP agreed to replace the deteriorated windows and roof of Norton's Grist Mill. These actions would contribute to the stabilization and protection of this contributing element in the Vergennes Historic District. GMP also agreed to construct an ADA-compliant fishing access platform on the western bank of Otter Creek between the Plant 9 powerhouse and the city park immediately downstream, an

area which is within the boundary of the Vergennes Historic District.

Our Analysis

Vergennes Falls has been used for hydropower industry since the middle of the 18th century, and electric power has been generated from the falls since the 1890's. The Vergennes Hydroelectric Project, built between 1911 and 1943, possesses significance in the context of hydroelectric power plant design and construction in the state of Vermont. The historic project components meet National Register Criterion C by possessing properties "that embody the distinctive characteristics of a type, period, or method of construction" (GMP, 1997). Continued operation and maintenance of the Vergennes Project with additional staff-recommended measures would maintain its historic facilities for the purpose for which they were originally designed and built, and would therefore, be beneficial to the National Register-listed Vergennes Historic District.

GMP's proposal to operate the project in ROR mode would eliminate the 1.5-foot reservoir drawdown required under the current peaking mode. While elimination of the drawdown may reduce some localized erosion within the fluctuation zone, it would not eliminate it, soils, erodible clay, bank steepness, and stream geometry (see section V.C.1, Water Resources, for further discussion). Consequently, known and as yet unknown archeological sites along the project impoundment may be affected by continued soil erosion.

GMP's proposal to replace the deteriorated roof and windows of Norton's Grist Mill could result in adverse effects on the Vergennes Historic District through alteration of an element contributing to the district's significance. The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, are intended to ensure that rehabilitation measures avoid or minimize actions that may diminish characteristics that qualify Historic Properties for the National Register. Adherence to these guidelines in consultation with the Vermont State Historic Preservation Officer (SHPO) would ensure that adverse effects on the National Register-listed Vergennes Historic District arising from replacement of Norton's Grist Mill's roof and windows would be avoided or minimized.

GMP's proposal to construct a disabled-accessible fishing access platform below the Plant 9 powerhouse would introduce a new structure within the boundary of the Vergennes Historic District. Consultation with the SHPO concerning the design and materials of the platform would avoid introduction of an element out of character with the Historic District that might diminish

the characteristics for which the District has been listed in the National Register.

To protect the Historic Properties and archeological sites, we recommend that a PA be developed and executed pursuant to Section 106 of the National Historic Preservation Act and the regulations of the Advisory Council, 36 CFR Part 800.

The PA would require the licensee to develop, for Commission approval, and, upon approval, implement, a Cultural Resources Management Plan (CRMP). The CRMP would accomplish several purposes, one of which would be to specify a procedure for continued project operation and maintenance without loss of its historic integrity.

c. Cumulative effects: Continuing to operate and maintain the Vergennes Hydroelectric Project, the repair of Norton's Grist Mill, and the addition of a fishing platform, could have potential cumulative effects on the Vergennes Historic District which is an Historic Property of statewide significance. GMP's proposal to continue operating and maintaining the Vergennes Project with our recommended CRMP would maintain the historic character and use of the project facilities, and would therefore provide beneficial cumulative effects by preserving resources of statewide significance over the next 30 to 50 years. GMP's proposal to repair Norton's Grist Mill with our recommended CRMP would have beneficial effects on the Vergennes Historic District by ensuring that any alteration to Norton's Grist Mill would be done in a manner that would preserve the historic integrity of this resource of statewide significance.

GMP's proposal to add a fishing platform with our recommended CRMP would ensure that the fishing platform is designed to be compatible with the historic character of the Vergennes Historic District.

We conclude that GMP's proposed action, along with our recommendations, would have a beneficial cumulative effect on cultural resources by protecting and enhancing the physical characteristics and qualities of historical association that have qualified the Vergennes Historic District for listing in the National Register as a resource of statewide importance.

d. Unavoidable adverse effects: None.

D. No-action

Under the no-action alternative, GMP would continue to operate the project under the terms of the original license. No proposed environmental enhancements would be implemented.

VI. DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of Otter Creek's available water resources to generate hydropower; estimate the economic benefits of the proposed project; and estimate the cost of various environmental protection, mitigation, and enhancement measures and the effects of these measures on project operations.

A. Power and Economic Benefits of the Project

We based the value of the project's power benefits on the costs of operating alternative resources in GMP's system. This value yields a reasonable estimate of project value for the purposes of our economic studies, which are (1) to provide a basis for measuring the economic benefits of proposed project operation and (2) to provide a basis for estimating the cost of replacing power for any staff alternatives that would reduce project generation and/or capacity.

The value of the project power is the cost of the cheapest, most reasonable generation resource available in the region. This resource is a natural gas-fueled combined-cycle electric plant. The cost of new combined-cycle generating capacity is about $109/kW-year (at a fixed charge rate of 14 percent). Our estimate of the fuel cost (based on fuel consumption at a heat rate of 6,200 Btu/kWh) is $16.5 mills/kWh. We estimated the 1998 fuel cost based on information in Energy Information Administration, Supplement to the Annual Energy Outlook, March 1998. At a 90 percent capacity factor, the total cost of firm power and energy would be $30.32 mills/kWh. Table 7 summarizes the values that we use for key parameters in our analysis.

Table 7. Summary of key parameters for economic analysis of GMP's proposed Vergennes Project (Source: Staff)

Parameter	Value
Period of analysis	30 years
Term of financing	20 years
Interest/discount rate	10.0 percent[1]
Escalation rate	0 percent
Federal tax rate	34 percent
Local tax rate	3 percent
Insurance rate	0.25 percent of cost to construct
Operation and maintenance cost (1997)[2]	$264,173
Net investment	$0[3]
Energy value (1998)	16.5 mills/kWh
Capacity value (1998)	109 $/kW-yr
Total power value (alternate generation)	30.32 mills/kWh
Application preparation cost	$570,000

[1] The discount rate of 10 percent is typical for this type of analysis and reflects the cost of borrowing money.

[2] GMP's 1997 FERC Form #1, page 411.

[3] GMP's application did not provide a value for net investment. The staff assumes that the net investment is effectively $0.

We used these assumptions to analyze the economics of the proposed project, which consist of operation of the Vergennes Project with GMP's proposed environmental and safety measures. Table 8 summarizes the annual costs of GMP's proposed enhancements for the Vergennes Project.

Table 8. Summary of annual costs of GMP's proposed enhancements for the Vergennes Project (Source: Staff)

Protection, mitigation, or enhancement measures	Capital cost[1] (1998$)	Operation & maintenance (1998$)	Annual cost (1998$)
Provide first call flows for fish resources	$0	$0	$3,100
Provide seasonal aesthetic flows[2]	$0	$0	$22,100
Recreation enhancements	$166,000	$0	$24,900
Provide improvements to Grist Mill building	$40,000	$0	$6,000
Provide automatic controls	$100,000	$0	$15,000

[1] GMP identified capital improvement and economic assumptions in its application.

[2] GMP proposes to release flows that would result in a loss of 0.103 GWh of energy generation annually.

[3] GMP proposes to provide aesthetic flows that would result in a loss of 0.7299 GWh of energy generation annually.

Based on these assumptions, we estimate that the annual net benefit of GMP's proposed Vergennes Project would be about -$62,000 (-6.56 mills/kWh).

The estimated average annual output of the project would be 9.4551 GWh. This would provide annual power value of $286,700, and an annual net cost of $348,700 for the project.

B. Cost of Environmental Protection, Mitigation, and Enhancement Measures

In this section, we present the annual costs of the proposed action with additional staff-recommended measures.

Based on the proposed action with additional staff-recommended measures, we estimate that the annual benefit would be about 9.45 GWh of energy annually or about -$63,200 (-6.68

mills/kWh). Each measure recommended by the staff could affect project economics through costs (capital expenditures, operation and maintenance, etc.). Table 9 summarizes the costs and net benefits associated with the staff's recommended enhancements.

Table 9. Summary of annual costs of the staff-recommended enhancements for GMP's proposed Vergennes Project (Source: Staff)

Protection, mitigation, or enhancement measures[1]	Capital cost (1998$)	Operation & maintenance (1998$)	Annual cost (1998$)
Develop and implement a plan to monitor ROR, aesthetic flows, first call flows for fish resources	$5,000	$500[2]	$1,300
Execute a PA and develop and implement a CRMP	$5,000	$0	$800

[1] Cost of recommendations for portable toilets and final design drawings for recreation enhancements are considered to be minor and can be accommodated into the recreation development costs that GMP proposes. Costs associated with our first call flow allocations also would be minor.

[2] The staff estimated the O&M costs.

For the Vergennes Project, the enhancements that GMP proposes would increase capital costs by $306,000. In addition to the proposed action, the additional staff-recommended measures would increase capital costs by $10,000.

Table 10 summarizes the capacity, energy, power value, project cost, and net benefits for each of the alternatives for the project. In section VII, Comprehensive Development and Recommended Alternative, we discuss both the economic and environmental basis for the staff-recommended alternative.

Table 10. Summary of net annual benefits of alternatives for GMP's proposed Vergennes Project (Source: Staff)

	GMP's proposed action	Proposed action with additional staff-recommended measures	No-action
Annual generation	9,455 GWh	9,455 GWh	10,288 GWh
Installed capacity	2.4 MW	2.4 MW	2.4 MW
Annual power value ($)	286,700 30.32 mills/kWh	286,700 30.32 mills/kWh	311,900 30.32 mills/kWh
Annual cost ($)	348,700 36.88 mills/kWh	349,900 37 mills/kWh	330,400 32.11 mills/kWh
Net annual benefit ($)	(62,000) (6.56 mills/kWh)	(63,200) (6.68 mills/kWh)	(18,500) (1.79 mills/kWh)

Note: All costs and benefits are levelized over 30 years.

Our evaluation of the economics of the proposed action and the proposed action with additional staff-recommended measures appears to cost more than currently available market pricing or alternative power costs. Based on the record in this proceeding, we conclude that it is in the public interest to license the project, and leave to GMP the decision of whether or not to continue operating the existing project.

C. No-action

Under the no action alternative, the project would continue to operate under the current mode of operation, and no new environmental protection, mitigation, or enhancement measures would be implemented.

The annual cost of the existing project, including carrying charges on application preparation cost is about $330,400 (32.11 mills/kWh), for the existing generation of about 10,288 GWh of energy annually. We estimated that the cost of alternative power is about 30.32 mills/kWh. Therefore, the existing project would produce power at an annual cost of about $-18,500 (-1.79 mills/kWh) more than the currently available alternative.

D. Pollution Abatement

The Vergennes Project would generate about 9.4551 GWh of electricity annually. This amount of hydropower generation, when contrasted with the generation of an equal amount of energy produced by fossil-fueled facilities, avoids the unnecessary emission of atmospheric pollutants. Assuming that the 9.4551 GWh of power produced by the project would be replaced by an equal amount of power produced by natural gas-fired utilities, then generating electrical power equivalent to that produced by the Vergennes Project would require combustion of about 97 million cubic feet of natural gas annually. In addition, removal of pollutants from the emissions produced by burning fossil fuels to those levels presently achievable by state-of-the-art technology would cost about $5,000 (1998$) annually.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which the project is located. When we review a hydropower project, we consider the water quality, fish and wildlife, recreational, and other nondevelopmental values of the involved waterway equally with its electric energy and other developmental values. In determining whether, and under what conditions, to license a project, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

This section contains the basis for, and a summary of, our recommendations to the Commission for the licensing of the Vergennes Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

A. Recommended Alternative

Based on our independent review and evaluation of the proposed action, the proposed action with additional staff-recommended measures, and no-action, we select the proposed action with our additional recommended environmental measures as the recommended alternative.

We recommend this alternative because: (1) issuance of a license would allow GMP to operate the project as a dependable source of electric energy; (2) the 9.4551 GWh project would avoid the need for an equivalent amount of fossil-fuel fired electric generation and capacity, continuing to help conserve these nonrenewable energy resources and reduce atmospheric pollution; and (3) the recommended measures would protect fish and terrestrial resources, improve public use of recreation facilities and resources, improve multiple use and management of project lands, improve aesthetics, and maintain and protect

historic and archeological resources within the area affected by project operations.

We recommend including the following measures in any license issued for the Vergennes Project:

(1) Convert the Vergennes Project from daily peaking to ROR operation, where outflow approximates inflow on an instantaneous basis.

(2) Release aesthetic flows over Vergennes Falls as follows: April 1 through October 31--150 cfs daytime (½ hour before sunrise to ½ hour after sunset), 75 cfs nighttime; November 1 through December 15- 100 cfs (½ hour before sunrise to ½ hour after sunset), 50 cfs nighttime; December 16 through March 31--no aesthetic flows released.

(3) Give Plant 9 first call (bring on line first and provide a continuous outflow at all times that the project is operating) during periods of potential use of the project tailrace area by walleye and lake sturgeon during their spawning and egg incubation periods (April 1 to June 15) and from September 15 through November 15 (the period when landlocked salmon may concentrate in the project tailwaters).

(4) Implement recreational enhancements to include: (1) directional and interpretive signs for recreation in the project area; (2) improve access for small boats and better define the parking area at Settler's Park; (3) improve the trail, shoreline fishing access, vegetative planting, and picnic area along the western bank of the lower Otter Creek in the falls basin near Plant 9; (4) construct a disabled-accessible fishing platform on the western bank near Plant 9 in accordance with ADA guidelines; (5) install signs interpreting the history of the falls and the surrounding structures; (6) install portable toilet facilities in the area below Vergennes Falls; and (7) enhance aesthetics including windows and roof replacement at the former Norton's Grist Mill building on Grist Mill island overlooking Vergennes Falls. The final designs for the recreational enhancements should be developed in consultation with the VANR, SHPO, and the city of Vergennes.

(5) Implement the provisions of a PA to protect Historic Properties and archeological sites.

(6) Develop and implement a plan to monitor ROR operation, aesthetic flow releases, and first call flows to Plant 9 for fish resources in consultation with the VANR, FWS, USGS, and the city of Vergennes. This plan, to be submitted for

Commission approval, should include a description of the use of generation records and the exact locations and designs of impoundment and downstream water level recording devices, and an implementation schedule. The plan should include provisions to furnish the results of the monitoring to the Commission and the resource agencies. Upon Commission approval, GMP should implement the approved plan, including any changes to the plan made by the Commission, according to the approved schedule.

Implementation of these measures would improve recreational and aesthetic opportunities; protect aquatic, terrestrial, and cultural resources in the project area; and provide for the best use of the waterway.

The costs of some of these measures would reduce the net benefit of the project. As discussed in section VI, we estimate that the project as proposed by GMP would cost more than currently available alternative power. Our proposed additional environmental measures would increase this economic gap. Specifically, four of our additional recommended measures would reduce the economic benefits of the project. These include: (1) develop and implement a flow monitoring plan; (2) install portable toilet facilities (including disabled-accessible facilities) in the area below Vergennes Falls; (3) develop final design drawings for recreational enhancements in consultation with the VANR, SHPO, and the city of Vergennes; and (4) implement the provisions of a PA.

1. Develop and Implement a Flow Monitoring Plan

GMP does not propose to monitor ROR operation, first call flows for fish resources, or aesthetic flows. Because habitat suitability, fish passage, aesthetic, and historic resources could be affected by inconsistent flow releases and water surface elevations, compliance with our recommended flow releases and water level management regime should be monitored.

We recommend that GMP develop and implement a monitoring plan for the Vergennes Project that would provide for measuring and reporting ROR flows (see section V.C.1), first call flows for fish resources (see section V.C.2), and aesthetic flows (see section V.C.4). The plan should be developed in consultation with the VANR, FWS, USGS, and the city of Vergennes. We estimate that the current annual cost of this monitoring and documentation of compliance with the recommended flows would be $1,300. The capital cost associated with the preparation of this plan would be modest. Requiring the plan, however, would provide the resource agencies and the Commission with useful and necessary information, and allow the Commission to determine compliance

with operational requirements that may be included in any license that may be issued for the Vergennes Project.

2. Install Portable Toilet Facilities

GMP does not propose to install any toilet facilities. During the scoping process, local residents commented on the need for toilet facilities in the area below Vergennes Falls during the recreation season. Portable toilet facilities would help meet this need during the peak recreation season. We recommend, therefore, that GMP provide portable toilet facilities with the number and location of these facilities to be determined in consultation with the city of Vergennes (see section V.C.5). We estimate that the costs of these facilities would be minor relative to the overall costs of the recreational enhancements.

3. Develop Final Design Drawings for Recreation Enhancements in Consultation with the VANR, SHPO, and the City of Vergennes

GMP proposes to develop final designs for the proposed recreation enhancements in consultation with the VANR and the city of Vergennes. The proposed facilities could affect the historic character of the Vergennes Historic District. We recommend, therefore, in addition to consultation with the VANR and the city of Vergennes, that GMP also consult with the SHPO in the development of the final design of the recreation enhancements (see section V.C.6). We estimate that this consultation would not increase GMP's estimated costs for recreation enhancements. Costs associated with SHPO consultation are included in our estimated costs for the CRMP.

4. Implement the Provisions of a PA

Specifically, GMP has not proposed to develop or implement a PA. However, a proposed CRMP is included in GMP's license application as appendix 4. A PA would contain a stipulation requiring the licensee to prepare, and upon Commission approval, implement, a CRMP, in consultation with the SHPO, addressing the management of Historic Properties and archeological sites within the project's APE and consideration of the effects of recreational enhancements. The proposed CRMP would serve as an outline for the management of Historic Properties and be incorporated into a final CRMP (see section V.C.6). We estimate that the current annual cost of preparing the CRMP would be $800, a relatively minor amount in relation to total costs.

B. Conclusion

Based on our review of the agency and public comments filed on the project, and on our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Vergennes Project as proposed by GMP with additional staff-recommened measures, would provide for the best comprehensive development of Otter Creek.

VIII. CONSISTENCY WITH FISH AND WILDLIFE RECOMMENDATIONS

Under the provisions of Section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations of federal and state fish and wildlife agencies submitted to adequately and equitably protect, mitigate damages to, and enhance fish and wildlife (including spawning grounds and habitat) affected by the project. No 10(j) recommendations were filed by state and federal resource agencies in response to our notice of application ready for environmental analysis. We evaluated the VANR comments that were filed on June 1, 1998, under Section 10(a).

IX. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, and conserving waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed 23 plans that address various resources in Vermont. Ten of these plans address

resources relevant to the Vergennes Project.5/ No conflicts were found with the plans.

X. FINDING OF NO SIGNIFICANT IMPACT

With our recommended protection and enhancement measures, relicensing of the Vergennes Project would protect fish and terrestrial resources, improve public use of recreation facilities and resources, and improve aesthetics. With our recommended consultation with the SHPO, execution of the PA, and development and implementation of a CRMP, no significant effects on cultural resources are expected.

5/ (1) Lake Champlain Fish and Wildlife Policy Committee and Technical Committee. 1981. A strategic plan for development of salmonid fisheries in Lake Champlain. Albany, New York. Waterbury, VT. 19 pp.; (2) Vermont Agency of Environmental Conservation. 1983. Vermont state comprehensive outdoor recreation plan, 1983-1988. Montpelier, VT. June 1983. 195 pp. and appendices; (3) Vermont Agency of Environmental Conservation. 1986. Vermont Rivers Study. Waterbury, VT. 236 pp.; (4) Vermont Agency of Natural Resources. Department of Environmental Conservation. 1988. Hydropower in Vermont: an assessment of environmental problems and opportunities. Waterbury, VT. May 1988. Two volumes; (5) Vermont Agency of Natural Resources. Department of Forests, Parks and Recreation. 1988. Vermont recreation plan. Waterbury, VT. 128 pp. plus map, nine supplemental task group reports, and a 52-page resident recreation survey; (6) Vermont Agency of Natural Resources. Department of Forests, Parks and Recreation. Wetlands Steering Committee. 1988. Wetlands component of the 1988 Vermont recreation plan. Waterbury, VT. July 1988. 43 pp.; (7) Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. May 1986. 19 pp.; (8) U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, DC. 11 pp.; (9) U.S. Fish and Wildlife Service. 1989. Final environmental impact statement - restoration of Atlantic Salmon to New England Rivers. Department of the Interior. Newton Corner, MA. May 1989. 88 pp.; (10) National Park Service. 1982. The nationwide rivers inventory. Department of the Interior, Washington, DC. January 1982. 432 pp.

Based on our independent analysis, issuance of a license for the Vergennes Project as proposed by GMP with additional staff recommended measures would not constitute a major federal action significantly affecting the quality of the human environment.

XI. LITERATURE CITED

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VANR (Vermont Agency of Natural Resources). 1993. Vermont recreation plan. Vermont Agency of Natural Resources, Department of Forests, Parks & Recreation.

XII. LIST OF PREPARERS

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Appendix A: Comments on the Draft Environmental Assessment

Comment letters on the Draft EA issued August 13, 1998, appear in the following order:

Entity	Date of Letter
Green Mountain Power	September 11, 1998
Vermont Agency of Natural Resources	September 17, 1998

Green Mountain Power Corporation

98 SEP 16 AM 10:33

September 11, 1998

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

Re: Vergennes Hydroelectric Project, FERC Project No. 2674-VT -003

Dear Mr. Boergers:

GMP-1 Green Mountain Power Corporation (GMP) has reviewed the FERC's Draft Environmental Assessment (DEA) for the Vergennes Hydroelectric Project (FERC Project No. 2674-VT), dated August 13, 1998, and is hereby filing these comments. The FERC recommended GMP's proposed enhancements with additional staff-recommended measures.

GMP-2 GMP takes exception with one staff-recommended measure. The FERC recommended that both units of Plant 9 be operated on a first call on water basis, from April 1 through June 15. The reason for this recommendation is to enhance potential spawning habitat for walleye and lake sturgeon. GMP proposes to operate at least one unit of Plant 9.

GMP-3 Based on the analysis of the fisheries resources, it was determined that operating one unit at Plant 9 would provide sufficient attraction flows. The Vermont Agency of Natural Resources requested by letter dated March 20, 1998 that GMP maintain outflow from Plant 9 during spring spawning season, which GMP has proposed in the license application.

GMP-4 Energy loss information regarding GMP's proposed flow operation of Plant 9 was compared to the FERC recommendation. GMP's proposal operating one unit at Plant 9 for the period between April 1 and June 15 for walleye and sturgeon spawning as well as the period between September 15 and November 15. Using the FERC recommendation of Plant 9 getting first call on water for its two units (780 cfs) for the period between April 1 and June 15, an additional loss of energy was computed to be 30,000 Kwh. GMP does not believe that this additional loss of energy is justified by the potential small fisheries gain that will be achieved.

GMP-5 Thank you for your consideration of this matter.

Very truly yours,

Craig T. Myotte
Vice President

CTM:mh

Enclosed - 8 copies

cc: Service List

DOCKETED SEP 14 1998

980915-0202-3

Response to Comments of Green Mountain Power Corporation on the Draft Environmental Assessment for the Vergennes Project September 11, 1998

GMP-1 No response required.

GMP-2 Please see our response to VANR-5.

GMP-3 VANR's definition of first call as presented in its letter of March 20, 1997, was not clear. VANR clarified its definition in response to the Draft EA. Please see our response to VANR-5.

GMP-4 In its comments on the draft EA, the VANR indicates that it agrees with GMP's proposal to provide continuous outflow from Plant 9 during seasonal time period by giving first call on water to one unit in Plant 9. Therefore, we agree with your comments and revised our analysis and recommendations in section V.C.2.b accordingly (see our response to VANR-5).

GMP-5 No response required.

ORIGINAL

State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
RELAY SERVICE FOR THE HEARING IMPAIRED
[illegible]
[illegible]

FILED
OFFICE OF THE SECRETARY

98 SEP 21 PM 1:13

FEDERAL ENERGY REGULATORY COMMISSION

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

WATER QUALITY DIVISION
103 South Main Street
Building 10 North
Waterbury, VT 05671-0408

[illegible]
Fax #-802-241-3287

September 17, 1998

COMMENTS ON DRAFT ENVIRONMENTAL ASSESSMENT

VERGENNES HYDROELECTRIC PROJECT
FERC PROJECT NO. 2674 — 003
GREEN MOUNTAIN POWER CORPORATION

VANR-1

David P. Boergers, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1-A
Washington, D.C. 20426

Dear Secretary Boergers:

VANR-1 The Vermont Agency of Natural Resources (Agency) hereby files comments on the Draft Environmental Assessment (draft EA) for the Vergennes Hydroelectric Project, for which a "Notice of Availability of Draft Environmental Assessment" was issued on August 13, 1998. The Agency is substantially in agreement with the conclusions reached by FERC staff in the draft EA. The environmental and public use issues have been thoroughly explored, and we appreciate FERC staff's general support of the mitigation and enhancement measures developed between the licensee, the Agency, and other parties.

Section V.C.2. Aquatic Resources

a. Affected environment:

Fisheries Resources

VANR-2 In this section, on p. 17, lake sturgeon use of the reach below Vergennes Falls is discussed. The text indicates that the Agency had stated in its June 30, 1995 letter to the licensee that sturgeon may be spawning below the project dam. That could be inferred from what we had stated, but technically we only stated that sturgeon have been exhibiting spawning behavior by ascending the river in the spring. This occurs in other major lake tributaries that historically supported

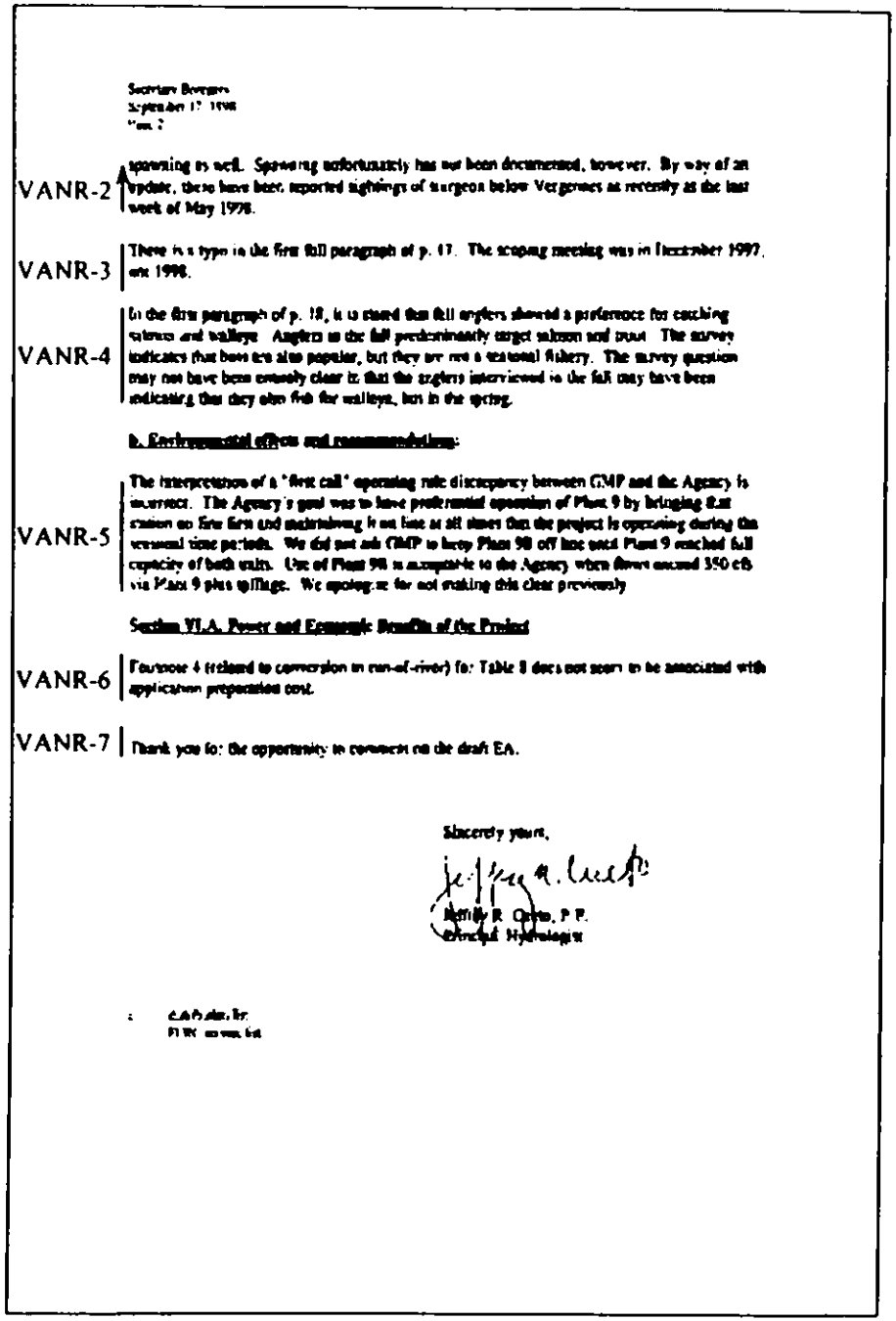
980924-0209-3

Regional Offices · [illegible] · SEP 21 1998

Response to Comments of
the Vermont Agency of Natural Resources
on the Draft Environmental Assessment for the
Vergennes Project
September 17, 1998

VANR-1 No response required.

VANR-2 We have modified the text in section V.C.2.a to reflect your clarification and added new text to reflect more recent sighting of Lake Sturgeon below Vergennes dam.



Secretary Bevington
September 17, 1998
Page 2

spawning as well. Spawning unfortunately has not been documented, however. By way of an update, there have been reported sightings of sturgeon below Vergennes as recently as the last week of May 1998.

VANR-2

There is a typo in the first full paragraph of p. 17. The scoping meeting was in December 1997, not 1998.

VANR-3

In the first paragraph of p. 18, it is stated that fall anglers showed a preference for catching salmon and walleye. Anglers in the fall predominantly target salmon and trout. The survey indicates that bass are also popular, but they are not a seasonal fishery. The survey question may not have been entirely clear in that the anglers interviewed in the fall may have been indicating that they also fish for walleye, but in the spring.

VANR-4

b. Environmental effects and recommendations:

The interpretation of a "first call" operating rule discrepancy between GMP and the Agency is incorrect. The Agency's goal was to have predominant operation of Plant 9 by bringing that station on first and maintaining it on line at all times that the project is operating during the seasonal time periods. We did not ask GMP to keep Plant 9B off line until Plant 9 reached full capacity of both units. Use of Plant 9B is acceptable to the Agency when flows exceed 350 cfs via Plant 9 plus spillage. We apologize for not making this clear previously.

VANR-5

Section VI.A. Power and Economic Benefits of the Project

Footnote 4 (related to conversion to run-of-river) to Table 8 does not seem to be associated with application preparation cost.

VANR-6

Thank you for the opportunity to comment on the draft EA.

VANR-7

Sincerely yours,

Jeffrey R. Crocker, P.E.
Principal Hydrologist

cc: [illegible]

VANR-3 We have corrected the typographical error in section V.C.2.a as suggested.

VANR-4 We reviewed the responses to question 10 of the GMP angler survey and note that fall anglers prefer salmon (34 percent), trout (13 percent), and walleye (8 percent) . We have revised the text in section V.C.2.a accordingly.

VANR-5 Thank you for the clarification on the definition of "first call." While our interpretation of "first call" would have provided some additional habitat benefit, we agree that your definition of "first call" (bringing one unit of Plant 9 on line first and maintaining a continuous outflow of at least 350 cfs from Plant 9 during the seasonal time periods) would provide a continuous and adequate outflow on the western side of the tailrace to enhance fisheries resources. We have revised our analysis and recommendations and modified the text accordingly.

VANR-6 We agree and delete footnote 4.

VANR-7 No response required.

Form L-3
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MAJOR PROJECT AFFECTING NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such

information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights or occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission any direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefitting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and

operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes

of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and

facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.