

Appendix 1

DE 09-255

NH PUC certification of William P. Short III as an independent monitor pursuant to
N. H. Codes of Admin. Rules Puc 2505.09.

Dtd April 7, 2010

THE STATE OF NEW HAMPSHIRE

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Amy L. Ignatius

EXECUTIVE DIRECTOR
AND SECRETARY
Debra A. Howland



PUBLIC UTILITIES COMMISSION
21 S. Fruit Street, Suite 10
Concord, N.H. 03301-2429

Tel. (603) 271-2431

FAX (603) 271-3878

TDD Access: Relay NH
1-800-735-2964

Website:
www.puc.nh.gov

April 7, 2010

William P. Short, III
Consultant
P.O. Box 237173
New York, NY 10023-7173

Re: DE 09-255 William P. Short
Request for Certification as an Independent Monitor Pursuant to Puc 2505.09

Dear Mr. Short:

On November 25, 2009, you submitted an application seeking certification as an independent monitor pursuant to N. H. Codes of Admin. Rules Puc 2505.09. You propose to provide monitoring services for owners of customer-sited sources in New Hampshire that are equal to or greater than 500 kilowatts in gross nameplate generation capacity and qualify for New Hampshire renewable energy certificates (RECs). Staff has reviewed your application to become an independent monitor and recommended approval noting that you meet the requirements set forth in Puc 2505.09.

According to your application you qualify as an independent monitor pursuant to Puc 2505.09 inasmuch as you are certified as an independent third party meter reader in Massachusetts and the NEPOOL generation information system (GIS).

Although you propose to submit monthly data to the NEPOOL GIS, you state that you may file annual data with the Commission. The Commission requires all independent monitors to perform the tasks listed in Puc 2505.09 (h), which includes reporting annual output to the Commission by January 31. In addition, when you provide monitoring service to any New Hampshire source, your relationship with your client and your fee structure must meet the restrictions set forth in Puc 2505.09.

The Commission has reviewed your application for independent monitor status and determined that you have provided the necessary certification demonstrating that you meet the requirements set forth in Puc 2505.09. Therefore, the Commission hereby grants your request to become an independent monitor for customer-sited sources that qualify for New Hampshire RECs.

Sincerely,

A handwritten signature in black ink that reads "Debra A. Howland".

Debra A. Howland
Executive Director

Appendix 2

FERC Project No. 6597
FERC Order Issuing License(major) to Monadnock Paper Mills, Inc.
Dtd August 27, 1984

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION 28 FERC 162, 280

Monadnock Paper Mills, Inc.)

Project No. 6597-000

ORDER ISSUING LICENSE (MAJOR)

(Issued August 27, 1984)

Monadnock Paper Mills, Inc. (Applicant) filed on August 16, 1982, an application for a license under Part I of the Federal Power Act (Act) for the continued operation and maintenance of the Monadnock Paper Mills Hydro Project No. 6597. 1/ The project is located on the Contoocook River in Hillsborough County, New Hampshire, and affects the interests of interstate or foreign commerce.

Notice of the application has been published and comments have been received from interested Federal, State, and local agencies. No protests or petitions to intervene have been received, and none of the agencies objected to issuance of the license. The significant concerns of the commenting agencies are discussed below.

Safety and Adequacy

The project is located on the Contoocook River and consists of a series of four existing concrete gravity dams: Powder Mill Pond, Monadnock, Pierce, and Paper Mill. The project also consists of three existing power stations with a total installed capacity of 1,945 kW.

The Staff's inspection of the project indicates that the dams and appurtenant structures are well maintained and in sound structural condition. Repair work recommended by the U.S. Army Corps of Engineers (Corps) as a result of its Phase I Inspection, and ordered to be done by the New Hampshire Water Resources Board, was completed in 1983.

1/ Authority to act on this matter is delegated to the Director, Office of Hydropower Licensing, under §375.314 of the Commission's regulations, 49 Fed. Reg. 29,369 (1984) (Errata issued July 27, 1984), (to be codified at 18 C.F.R. §375.314). This order may be appealed to the Commission by any party within 30 days of its issuance pursuant to Rule 1902, 18 C.F.R. §385.1902 (1983). Filing an appeal and final Commission action on that appeal are prerequisites for filing an application for rehearing as provided in Section 313(a) of the Act. Filing an appeal 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 directed by the Commission.

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The dams have a significant hazard potential because of their proximity to downstream developments. Stability analyses and past performance indicate that the dams are safe against overturning and sliding under normal maximum pool. However, Article 24 requires the Licensee to determine the downstream consequences of failure under flood load and, if the hazard potential is unacceptable, to submit a plan and schedule for making the dams safe. It is concluded that the project, under the conditions of this license, is safe and adequate.

Recreation

The U.S. Department of the Interior (Interior) stated that the application gives no evidence of consideration for providing public recreational facilities at the project. In particular, Interior believes that the Applicant should investigate the need for canoe portages around the project dams and sites for providing fishing access. The Applicant stated in the Exhibit E that the project is used for canoeing rather than power boating and that the New Hampshire Fish and Game Department stocks trout in the Contoocook River in the vicinity of the project. Article 25 requires the Licensee, in cooperation with the New Hampshire Departments of Fish and Game and Parks and Recreation, to: (1) evaluate the need for and feasibility of developing canoe portages around the project dams and fishing access sites; and (2) if warranted, to construct them and within 1 year of the date of issuance of the license, to file as-built drawings showing the locations and features of the canoe portage trails and fishing access sites. Also under Article 17, the Commission reserves the right to require additional recreational development in the future.

Minimum Flow

Interior recommended that the Applicant be required to ensure an instantaneous minimum flow of 70 cubic feet per second (cfs) or inflow, whichever is less, from the project. Interior stated that this is the historical median August flow on the Contoocook River and should adequately protect aquatic resources. Since the 70 cfs would be from the most downstream development of the four developments in the project, Interior also recommended that a 13 cfs minimum flow be released from each of the three developments upstream. At the Pierce Dam Development, Interior recommended that the minimum flow release be from a notch in the spillway on the east side of the island. The Applicant did not object to Interior's recommendations.

The minimum flow releases recommended by Interior and not objected to by the Applicant will provide adequate protection for the aquatic resources at the project and on the Contoocook River downstream of the project. Therefore, Article 26 requires the Licensee to release the aforementioned minimum flows.

Other Environmental Considerations

A water quality certificate for the project was issued by the New Hampshire Water Supply and Pollution Control Commission on October 20, 1983.

Issuance of this license will authorize continued project operation, which began over 60 years ago. On the basis of the record, and Staff's independent environmental analysis, issuance of a license for the project, as conditioned herein, will not constitute a major Federal action significantly affecting the quality of the human environment.

Other Aspects of Comprehensive Development

The project is not in conflict with any planned or potential development of the Contoocook River and is best adapted to the comprehensive development of the basin upon compliance with the terms and conditions of this license. The power potential at the Powder Mill Pond Dam is undeveloped, and therefore, Article 27 requires the Licensee to submit a feasibility study for installing additional generating capacity and, if additional capacity is feasible, the Licensee shall simultaneously file a plan and schedule and an application to amend this license. The project generates approximately 6 GWh annually, of which 75 percent is utilized by the Monadnock Paper Mills and 25 percent is sold to the Public Service Company of New Hampshire. Under Article 9 of this license, the Commission retains the authority to require the Licensee to install additional generating capacity that may be economically feasible.

It is concluded that, as conditioned in this license, Project No. 6597 is best adapted to a comprehensive plan for development of the Merrimack River basin for beneficial public uses and that issuance of this license is in the public interest.

It is ordered that:

(A) This license is issued to Monadnock Paper Mills, Inc. (Licensee), of Bennington, New Hampshire, under Part I of the Federal Power Act (Act) for a period effective the first day of the month in which this order is issued, and terminating in 30 years from the first day of the month in which this order is issued, for the continued operation and maintenance of the Monadnock Paper Mills Hydro Project No. 6597, located in Hillsborough County, New Hampshire, on the Contoocook River affecting the interests of interstate or foreign commerce. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of the license, and subject to the regulations the Commission issues under the provisions of the Act.

(B) The Monadnock Paper Mills Hydro Project No. 6597 consists of:

(1) All lands, to the extent of the Licensee's interest in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary are shown and described by a certain exhibit that forms part of the application for license and that is designated and described as:

<u>Exhibit G</u>	<u>FERC No. 6597-</u>	<u>Titled</u>
Sheet 1	1	General Location Map
Sheet 2	2	Detailed Location Map
Sheet 3	3	Project Boundary

(2) Project works consisting of four developments including:

(i) (1) Powder Mill Dam, 366 feet long and 18.6 feet high, constructed of concrete with a 228-foot-long spillway section provided with 2-foot-high flashboards; (2) a regulating reservoir with approximately 4 days pondage at a flow of 300 cfs or about mean flow of the river; (3) a 4-foot by 4-foot gated sluiceway at the left of the spillway, and a gatehouse and 4-foot-diameter outlet works pipe, at the right of the spillway, regulating downstream flow.

(ii) (1) Monadnock Dam, 500 feet long and 22 feet high, located 0.8 mile downstream of Powder Mill Dam and constructed of concrete with two spillway sections, 115 feet long and 50 feet long, provided with 2-foot-high flashboards, and with earthen embankments containing concrete core walls at both abutments; (2) a reservoir having minimal pondage; (3) a gated intake structure and powerhouse, located near the left dam abutment, containing two turbine-generator units rated at 125 kW and 300 kW; (4) a tailrace re-entering the river approximately 100 feet downstream of the dam; and (5) appurtenant facilities.

(iii) (1) Pierce Dam, 420 feet long and 28 feet high, located 900 feet downstream of Monadnock Dam and constructed of concrete with two spillway sections, 168 feet long and 122 feet long on a dogleg alignment, provided with 2-foot-high flashboards; (2) a reservoir having minimal pondage; (3) a gated intake structure and powerhouse, located at the right dam abutment, containing two turbine-generator units rated at 220 kW and 550 kW; (4) a tailrace partially encircling an island and re-entering the main channel of the river approximately 600 feet downstream of the main dam; and (5) appurtenant facilities.

(iv) (1) Paper Mill Dam, 280 feet long and 19 feet high, located 1,200 feet downstream of Pierce Dam and constructed of concrete with a 142-foot-long spillway section; (2) a canal headworks, just upstream of the right dam abutment, and a 300-foot-long canal with concrete walls leading to a forebay; (3) an intake structure and a steel penstock, 10 feet in diameter and approximately 200 feet long; (4) a powerhouse containing a turbine-generator unit rated at 750 kW; (5) a tailrace re-entering the river approximately 800 feet downstream of the dam; and (6) appurtenant facilities.

The project also consists of: (v) the 2.3-kV generator leads; (vi) the 2,190-foot-long, 2.3-kV overhead transmission line between the Monadnock Hydro Station and the 2.3-kV mill supply bus at the mill building; (vii) the 2.3-kV facilities connecting the Pierce Hydro Station generation to the 2,190-foot-long line; and (viii) appurtenant facilities to connect project generation to the 2.3-kV mill supply bus.

The combined total generating capacity of the project is 1,945 kW.

The location, nature, and character of these project works are generally shown and described by the exhibit cited above and more specifically shown and described by certain other exhibits that also form a part of the application for license and that are designated and described as:

Exhibit A - Section entitled "Project Description and Proposed Mode of Operation," as shown on pages 11 through 17 of the application.

<u>Exhibit F</u>	<u>FERC No. 6597-</u>	<u>Title</u>
Sheet 1	4	Site Plan - Paper Mill Site
Sheet 2	5	Paper Mill Dam, Plan and Elevation
Sheet 3	6	Paper Mill Dam, Turbine Arrangement

<u>Exhibit F</u>	<u>FERC No. 6597-</u>	<u>Title</u>
Sheet 4	7	Site Plan - Pierce Station
Sheet 5	8	Powerhouse Details, Pierce Station
Sheet 6	9	Site Plan, Monadnock Powder Station
Sheet 7	10	Powerhouse Details, Monadnock Station
Sheet 8	11	Powerhouse Section, Monadnock Station
Sheet 9	12	Powder Mill Dam, Plan, Elevation
Sheet 10	12	Single Line Elec. Diagram
Sheet 11	14	Monadnock Paper Mills Hydroelectric Facility (Dam Sections)

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

(C) Exhibits A, F, and G, designated in ordering paragraph (B) above, are approved and made a part of the license.

(D) This license is also subject to the terms and conditions set forth in Form L-10 (revised October, 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting the Interests of Interstate or Foreign Commerce," attached to and made a part of this license. The license is also subject to the following additional articles:

Article 24. The Licensee shall within 6 months from the issuance date of this license file, for approval of the Director, Office of Hydropower Licensing, a report based on stability and dam break analyses, that identifies and quantifies the hazard to downstream life and property of failure of any susceptible project structure(s). The stability analyses shall determine what flood would cause instability of the structure(s). The dam break analyses

shall encompass floods which could cause dam failure and flood flows up to and including either the PMF or the flood flow where dam failure would cause no significant increase in hazard to downstream life and property. The report shall fully document all reconnaissance and other studies made in its preparation. In the event that failure of any project structure(s) under flood conditions presents a hazard to human life or would cause significant property damage then the Licensee shall simultaneously file, for approval of the Director, Office of Hydropower Licensing, a plan and schedule for modifying the project to ensure that the project can safely pass floods up to and including the PMF.

Article 25. The Licensee shall, in consultation with the New Hampshire Departments of Fish and Game, and Parks and Recreation, evaluate the need for and feasibility of developing canoe portage trails around the project dams and fishing access sites at the project developments within 6 months from the date of issuance of this license. If warranted, the Licensee shall construct the portages and fishing access sites and within 1 year of the date of issuance of the license, shall file with the Commission as-built drawings as necessary to show the locations and features of the canoe portage trails and fishing access sites.

Article 26. The Licensee shall discharge from the Monadnock Hydroelectric Project, a continuous minimum flow of 70 cubic feet per second (cfs), as measured immediately below the tailrace of the Pierce Mill Dam or the inflow to the project, whichever is less, for the protection of aquatic resources in the Contoocook River. Licensee shall also discharge from each of the other three project developments (Powder Mill, Monadnock, and Paper Mill) a continuous minimum flow of 13 cfs or inflow to the developments, whichever is less, for protection of the aquatic resources within the project area. The release from the Pierce Mill Development shall be from a notch in the spillway on the east side of the island. Minimum flows may be temporarily modified if required by operating emergencies beyond the control of the Licensee and for short periods upon mutual agreement between the Licensee and the New Hampshire Fish and Game Department.

Article 27. The Licensee shall, within 1 year from the date of issuance of the license, prepare and file with the Commission a feasibility analysis of installing additional generating capacity at the Powder Mill Pond Dam, taking into account, to the extent reasonable, all benefits including any contribution to the conservation of non-renewable energy resources. If the study shows additional capacity to be economically feasible, the Licensee shall simultaneously file a plan and schedule and an application to amend its license to install that capacity.

Article 28. The Licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 2,600 horsepower.

Article 29. Pursuant to Section 10(d) of the Act, after the first 20 years of operation of the project under license, 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. One half of the project surplus earnings, if any, accumulated after the first 20 years of operation under the license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a project amortization reserve account at the end of each fiscal year. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year after the first 20 years of operation under the license, the amount of that deficiency shall be deducted from the amount of any surplus earnings subsequently accumulated, until absorbed. One-half of the remaining surplus earnings, if any, cumulatively computed, shall be set aside in the project amortization reserve account. The amounts established in the project amortization reserve account shall be maintained until further order of the Commission.

The annual specified reasonable rate of return shall be the sum of the annual weighted costs of long-term debt, preferred stock, and common equity, as defined below. The annual weighted cost for each component of the reasonable rate of return is the product of its capital ratio and cost rate. The annual capital ratio for each component of the rate of return shall be calculated based on an average of 13 monthly balances of amounts properly includable in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rates for long-term debt and preferred stock shall be their respective weighted average costs 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 30. (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 other 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 shall also have continuing responsibility to supervise and control the uses 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, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters 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 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 uses 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-kV 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.

(d) The Licensee may convey fee titles 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 certificates 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 5 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 maximum 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 file 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 paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with Federal and State fish and wildlife or recreational 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 covenants running with the land adequate to ensure that: (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.

(E) The Licensee's failure to file a petition appealing this order to the Commission shall constitute acceptance of this license. In acknowledgment of acceptance of this order and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date this order is issued.

for



Quentin A. Edson
Director, Office of
Hydropower Licensing

Project No. 6597-000

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this order, Monadnock Paper Mills, Inc. this ____ day of _____, 19____, has caused its corporate name to be signed hereto by _____, its President, and its corporate seal to be affixed hereto and attested by _____, its Secretary, pursuant to a resolution of its Board of Directors duly adopted on the ____ day of _____, 19____, a certified copy of the record of which is attached hereto.

By _____
President

Attest:

Secretary

(Executed in quadruplicate)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE
FOR CONSTRUCTED MAJOR PROJECT AFFECTING
THE INTERESTS OF INTERSTATE
OR FOREIGN COMMERCE

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 Power 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 of 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 be 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 may 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 benefited 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 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 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 Commission may prescribe for the 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 benefiting 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. 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 22. 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 23. 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.

Appendix 3

New Hampshire State Water Quality Certification issued to Monadnock Paper Mills, Inc.
Dtd January 31, 2014

Monadnock Paper Mills, Inc.
Attn: Michelle Hamm, Environmental Services Manager
117 Antrim Road
Bennington, NH 03442-4205

WATER QUALITY CERTIFICATION

In Fulfillment of

Section 401 of the United States Clean Water Act (33 U.S.C 1341)

WQC # 2013-FERC-001

Project Name: Monadnock Hydroelectric Project
Project Location: Bennington, Greenfield, Peterborough, and Hancock,
New Hampshire
Affected Waterbody: Contoocook River
Owner/Applicant: Monadnock Paper Mills, Inc.
117 Antrim Road
Bennington, NH 03442-4205

Appurtenant License: Federal Energy Regulatory Commission No. P-6597

Date of Approval: January 31, 2014
(subject to Conditions below)

A. INTRODUCTION

Monadnock Paper Mills, Inc. (the Applicant) owns and operates the Monadnock Hydroelectric Project (i.e., the Activity or Project) and proposes the continued operation of the Activity for hydropower generation.

The Activity consists of a series of four existing concrete gravity dams: Powder Mill Pond, Monadnock, Pierce, and Paper Mill, the latter three having existing power stations with a total installed capacity of 1,945 kW. The project works also include four impoundments and appurtenant facilities, including transmission lines. The Activity is located in Hillsborough County, New Hampshire, with impoundments of facilities sited in the towns of Bennington, Greenfield, Peterborough, and Hancock. According to the Applicant, the Activity boundary follows the normal full pond elevation around each of the project impoundments. The upstream extent of the Activity boundary extends approximately 3.6 miles upstream of the Powder Mill Pond headwaters on the Contoocook River. The downstream extent of the Activity boundary is the Antrim Road Bridge over the Contoocook River. The Federal Energy Regulatory Commission (FERC) issued a license for the Project on August 27, 1984; the license expires on August 1, 2014.

This 401 Water Quality Certification (Certification) documents laws, regulations, determinations and conditions related to the Activity for the attainment and maintenance of NH surface water quality standards, including the provisions of NH RSA

485-A:8 and NH Code of Administrative Rules Env-Wq 1700, for the support of designated uses identified in the standards.

B. WATER QUALITY CERTIFICATION APPROVAL

Based on the facts, findings and conditions noted below, the New Hampshire Department of Environmental Services (DES) has determined that there is reasonable assurance that construction and operation of the Activity will not violate surface water quality standards. DES hereby issues this Water Quality Certification (Certification), subject to the conditions in Section E, in accordance with Section 401 of the United States Clean Water Act (33 U.S.C. 1341) and RSA 485-A:12,III.

C. STATEMENT OF FACTS AND LAW

- C-1. Section 23 of the United States Federal Power Act (Title 16 U.S. Code, Chapter 12, Subchapter I, Section 817(1)) states

“[i]t shall be unlawful for any person, State, or municipality, for the purpose of developing electric power, to construct, operate, or maintain any dam, water conduit, reservoir, power house, or other works incidental thereto across, along, or in any of the navigable waters of the United States, or upon any part of the public lands or reservations of the United States (including the Territories), or utilize the surplus water or water power from any Government dam, except under and in accordance with the terms of a permit or valid existing right-of-way granted prior to June 10, 1920, or a license granted pursuant to this chapter.”

- C-2. Section 4 of the United States Federal Power Act (Title 16, U.S. Code, Chapter 12, Subchapter I, Section 797(e)) authorizes FERC

“[t]o issue licenses to citizens of the United States, or to any association of such citizens, or to any corporation organized under the laws of the United States or any State thereof, or to any State or municipality for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, transmission lines, or other Project works necessary or convenient for the development and improvement of navigation and for the development, transmission, and utilization of power across, along, from, or in any of the streams or other bodies of water over which Congress has jurisdiction...”

- C-3. Section 401 of the United States Clean Water Act (Title 33 U.S. Code, Chapter 26, Subchapter IV, Section 1341) states

“[a]ny applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or

operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate...that any such discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of this title."

C-4. Clean Water Act Section 401(a) states "[n]o license or permit shall be granted until the certification required by this section has been obtained or has been waived...No license or permit shall be granted if certification has been denied by the State..."

C-5. Clean Water Act Section 401(a) and NH RSA 485-A:12,III authorizes DES to verify that the Project maintains compliance with NH surface water quality standards. RSA 485-A:12, III states:

"No activity, including construction and operation of facilities, that requires certification under section 401 of the Clean Water Act and that may result in a discharge, as that term is applied under section 401 of the Clean Water Act, to surface waters of the state may commence unless the department certifies that any such discharge complies with the state surface water quality standards applicable to the classification for the receiving surface water body. The department shall provide its response to a request for certification to the federal agency or authority responsible for issuing the license, permit, or registration that requires the certification under section 401 of the Clean Water Act. Certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide assurance that the proposed discharge complies with applicable surface water quality standards. The department may enforce compliance with any such conditions, modifications, or monitoring requirements as provided in RSA 485-A:22."

C-6. Env-Wq 1700, Surface Water Quality Regulations, effective May 21, 2008, fulfills the requirements of Section 303 that the State of New Hampshire adopt water quality standards consistent with the provisions of the Clean Water Act.

C-7. Env-Wq 1701.02 provides that the surface water quality regulations shall apply to all surface waters and to any person who causes point or nonpoint source discharge(s) of pollutants to surface waters, or who undertakes hydrologic modifications, such as dam construction or water withdrawals, or who undertakes any other activity that affects the beneficial uses or the level of water quality of surface waters.

C-8. Env-Wq 1702.46 defines surface waters as "perennial and seasonal streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams, lakes, or ponds bordering on the state, marshes, water courses and other bodies of water, natural or artificial," and waters of the United States as

defined in 40 CFR 122.2.

- C-9. Env-Wq 1703.01 (c) states that “[a]ll surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters.”
- C-10. Env-Wq 1703.01 (d) states that “[u]nless the flows are caused by naturally occurring conditions, surface water quantity shall be maintained at levels adequate to protect existing and designated uses.”
- C-11. Env-Wq 1703.19 states that:
- “(a) The surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region; and
 - (b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.”
- C-12. In 2010, DES published guidance (hereinafter called the 2010 instream flow guidance or 2010 ISF guidance) for estimating instream flow requirements for the protection of aquatic life for situations. The guidance is available at: <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-3.pdf>.
- C-13. FERC issued a license for the Project on August 27, 1984; the license expires on August 1, 2014. The Applicant applied for a new FERC license on July 31, 2012 (i.e., the final license application). FERC completed an Environmental Assessment of the final license application on July 16, 2013.
- C-14. The US Fish and Wildlife Service (USFWS) has provided recommended conditions for the FERC license for the Monadnock Hydroelectric Project to protect, mitigate damages to, and enhance fish and wildlife resources pursuant to Section 10(j) of the Federal Power Act [16 U.S.C. 803(j)(1)]. The recommended conditions and supporting information were presented in letters from USFWS to FERC dated March 14, 2013, August 13, 2013, and September 18, 2013.
- C-15. In 2007, DES issued a 401 Certification for a National Pollutant Discharge Elimination System permit issued to the Applicant by the U.S. Environmental Protection Agency (Permit No. NH0000230). This permit and certification were relevant to a discharge of treated effluent from paper manufacturing processes, not operation of the Monadnock Hydroelectric Project.
- C-16. On February 1, 2013, the Applicant submitted an application and associated supplemental information for Water Quality Certification to DES. On July 19, 2013, DES requested additional information from the Applicant because the information submitted in the application was insufficient to determine whether water quality standards would be met in all areas affected by the Activity. On August 16, 2013, 28 days after the DES request, the Applicant provided the

information that was requested.

- C-17. DES issued a draft Certification for public comment from December 19, 2013 to January 20, 2014.

D. FINDINGS

- D-1. The Applicant owns and operates the Monadnock Hydroelectric Project, which requires a federal license under Section 23 of the Federal Power Act. The Applicant filed an application for a New Major Project Less than 5 MW to FERC on July 31, 2012.
- D-2. The project requires a Certification under RSA 485-A:12,III and Section 401 of the Clean Water Act.
- D-3. Monitoring requirements are appropriate for this Project during operational and non-operational periods to achieve the goals stated in Section E of this Certification, pursuant to Section 401 of the United States Clean Water Act (Title 33 U.S. Code, Chapter 26, Subchapter IV, Section 1341(d)), which provides that
- “[a]ny certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations and other limitations...and shall become a condition on any Federal license or permit subject to the provisions of this section.”
- D-4. The Monadnock Hydroelectric Project consists of a series of four existing concrete gravity dams: Powder Mill Pond, Monadnock, Pierce, and Paper Mill, the latter three having existing power stations with an approximate total installed capacity of 1,889 kW. The project works also include four impoundments and appurtenant facilities, including transmission lines.
- a. The Powder Mill Pond Dam is a concrete gravity structure consisting of earthen embankments, with concrete core walls. It is 366 feet long and 18.6 feet high, with a 228-foot-long spillway section provided with 2-foot-high flashboards. At the normal pond elevation (677.44 ft NGVD), the dam impoundment contains 1,940 acre-feet, covers approximately 435 acres, and extends upstream 3.6 miles. The total contributing drainage area at the Powder Mill Dam is 184 square miles.
 - b. The Monadnock Dam is located 4,200 feet downstream of the Powder Mill Dam. The Dam is a concrete gravity dam with a segmented spillway section and earthen embankments. It is a total of 500 feet long with a maximum height of 22 feet, with two spillway sections. The dam has a total impoundment area of approximately 5 acres at the normal pool level (665.8 ft NGVD when flashboards are installed), which extends upstream to the toe of the Powder Mill Dam. Water from the impoundment is diverted through a penstock to a powerhouse that contains two

generating units with a combined installed capacity of 423 kW and an operating range of 77 to 587 cfs. After passing through the turbines, the water is discharged back to the river approximately 100 feet downstream of the dam. The bypass channel at this facility is approximately 50 feet long.

- c. The Pierce Dam is located approximately 900 feet downstream from the Monadnock Dam. The Dam is approximately 28 feet high and 420 feet long with two spillway sections. At normal full pool (653.4 ft NGVD when flashboards are installed), the Pierce Dam impoundment covers 7 acres of surface area. Water from the impoundment is diverted through a penstock to a powerhouse that contains two turbines with combined installed capacity of 720 kW and an operating range of 53 to 493 cfs. After passing through the turbines, the water is discharged through a tailrace. The tailrace partially encircles an island and re-enters the main channel of the river approximately 600 feet downstream of the main dam. The bypass channel at this facility is approximately 750 feet long.
- d. The Paper Mill Dam is located 1,140 feet downstream of the Pierce Dam. Paper Mill Dam is a concrete gravity dam that is 280 feet long and 19 feet high. The Dam creates an impoundment that has a total surface area of approximately 5 acres and extends upstream approximately 1,140 feet at full pool elevation (627.6 ft NGVD). An intake structure and a steel penstock, 10 feet in diameter and approximately 200 feet long, diverts water from the impoundment to the powerhouse in the basement of the Monadnock Paper Mill building. The turbine-generator unit has an actual operating capacity of 746 kW and an operating range of 140 to 466 cfs. After passing through the turbine, the water is discharged through a tailrace and re-enters the river approximately 800 feet downstream of the dam. The bypass channel at this facility is approximately 1300 feet long.
- e. Minimum flows are required at the Project as per Article 26 of the 1984 FERC project license. The Project has a required continuous minimum flow through the Project of 70 cfs or inflow (whichever is less) as measured immediately downstream of the Powder Mill Development and at the confluence of the tailrace and bypass reach of the Paper Mill Development. At each of the three downstream developments (Monadnock, Pierce, and Paper Mill), the current license also requires the Applicant to release a year-round minimum flow of 13 cfs, or inflow (whichever is less), in the bypass reach.
- f. Overall, the Project is operated in a seasonal run-of- river mode. The Powder Mill Pond Dam is operated to regulate the flow of the river to the three lower dams for the maintenance of minimum flows and the generation of power at these sites. The downstream dams, Monadnock, Pierce, and Paper Mill, have generating facilities and are operated in a run-of-river mode, taking advantage of flows released by the Powder Mill Pond Dam. When inflow equals or exceeds required minimum flows plus minimum flows needed for generation, the optimum generating flow (300

cfs) for the three hydroelectric developments downstream is released from Powder Mill Pond Dam. When inflow is less than short-term downstream project generation demands, storage ponding and release can be implemented at the dam to allow for optimum power generating efficiency. According to the Applicant, storage ponding and releasing is typically implemented only occasionally at Powder Mill Pond for maintenance activities at the other downstream developments, to maintain minimum flows to downstream developments, to accommodate flood flows, and rarely for meeting short-term energy demands.

While the licensed operating regime allows for daily or weekly storage and release, the Applicant currently operates on a seasonal store and release mode for 6 months of the year. According to the Applicant this operational regime is more closely associated with maintenance, minimum flows, and flood storage, than with generation. During the summer season, the Applicant maintains Powder Mill Pond at normal full pond elevation in support of NH Fish and Game Department (NHFGD) fishery management objectives (i.e., to promote largemouth bass spawning). Likewise the Applicant does not typically manipulate pond levels for power generation in the winter months which allows for ice-over conditions to be maintained for public fishing.

The Applicant typically conducts a drawdown once per year for annual maintenance on the hydro facilities. This drawdown usually lasts approximately one to two weeks (and sometimes longer) depending on the issues that arise. The Applicant has historically refilled the impoundments for the Project by retaining the excess flow above the amount needed for maintenance of minimum outflow requirements. In a letter dated August 16, 2013 to FERC, the Applicant stated that according to the current license, the Applicant must provide state and federal agencies with notification at least 60 days prior to temporary maintenance drawdowns. The notification identifies the level of drawdown necessary, timing and duration, method for ensuring minimum flow requirements are met during drawdown, and the opportunity for agencies to respond to notification. The Applicant proposes to continue this notification procedure under the new license.

- D-5. The Contoocook River, Powder Mill Pond, other impoundments, and unnamed wetlands in the Project area are surface waters of the state under Env-Wq 1702.46. Surface waters that could be potentially affected by this Activity and their associated AU numbers (where available*) include the following:

Assessment Unit (AU)	Water body Name
NHRIV700030104-23	Contoocook River – Bogle Brook Dam to Otter Brook
NHRIV700030106-08	Contoocook River – Otter Brook to Powder Mill Pond
NHLAK700030107-03	Powder Mill Pond

Assessment Unit (AU)	Water body Name
NHRIV700030108-03	Contoocook River – Powder Mill Dam to Monadnock Dam
NHIMP700030108-01	Monadnock Dam
NHIMP700030108-02	Pierce Dam
NHIMP700030108-03	Paper Mill Dam
NHRIV700030108-05	Contoocook River – Paper Mill Dam to upstream of Monadnock Paper Mill NPDES

* DES has assigned Assessment Unit (AU) identification numbers to surface waters that appear on 1:24,000 scale hydrography. Consequently, not all surface waters currently have an AU number. Surface waters that do not have an AU number are still considered surface waters of the State in accordance with Env-Wq 1702.46.

D-6. The surface waters that may be potentially affected by the Activity are all Class B water bodies. Therefore, Class B New Hampshire surface water quality standards apply to the water bodies affected by the Activity. Class B water bodies are considered suitable for fishing, swimming, and, after adequate treatment, as a water supply.

D-7. According to the 2012 list of impaired waters, the following surface waters in the vicinity of the proposed Activity, which have assigned AU numbers, are listed as impaired. All impairments, with the exception of those highlighted in bold (which have approved Total Maximum Daily Load studies), are on the Section 303(d) List.

Assessment Unit (AU)	Water body Name	Cause of Impairment (Designated Use Impaired)
NHRIV700030104-23	Contoocook River – Boglie Brook Dam to Otter Brook	Dissolved Oxygen (AL) Mercury (FC)
NHRIV700030106-08	Contoocook River – Otter Brook to Powder Mill Pond	E.coli (PCR) Aluminum (AL) pH (AL) Mercury (FC)
NHLAK700030107-03	Powder Mill Pond	Chlorophyll-a (PCR) Aluminum (AL) Dissolved Oxygen (AL) Dissolved Oxygen Saturation (AL) Non-Native Plants (AL)
Notes: AL = Aquatic Life, PCR = Primary Recreation, SCR = Secondary Recreation, FC = Fish Consumption, SFC = Shellfish Consumption Impairments highlighted in bold have approved Total Maximum Daily Load studies. All other impairments are on the Section 303(d) List.		

D-8. The Contoocook River within the Activity boundary is impacted by the Activity's four impoundments, three bypass reaches, and three tailraces. In addition, the

regulated river flows from the Project influence the river flows downstream. The impoundments, bypass reaches, and tailraces are created by the presence of the Powder Mill Dam, Monadnock Dam, Pierce Dam, and Paper Mill Dam. The diversion of water through powerhouses during hydroelectric power generation reduces the quantity of water available to bypass reaches. The presence of dams and the subsequent creation of impoundments at each development reduces water velocity and increases river residence time beyond that which occurs under unimpounded conditions. Store and release operations manipulate water levels in Powder Mill Pond. These conditions may promote variable water quality conditions, particularly water temperature and dissolved oxygen, and can foster the development of aquatic plant communities, including phytoplankton that can influence other water quality parameters such as pH and water clarity.

D-9. Water Quality Study. The Applicant studied the water quality of the Contoocook River from upstream of Powder Mill Pond to below the Paper Mill Dam tailrace during 2010 to address the water quality concerns raised by DES and other resource agencies during the pre-filing consultation period. The study consisted of continuous (every 30 minutes for approximately 2 to 3 weeks) measurements of dissolved oxygen and temperature using datasondes as well as monthly grab samples for nutrients, chlorophyll-a, bacteria, pH, alkalinity, and specific conductance. The study was conducted in June, July, August, and September 2010. During this time, the river flow ranged from approximately 30 to 50 cfs, which is approximately half the normal level for this period based on historical observations from 1945-2008. No hydropower was generated during the study because of the low flows.

- a. Dissolved oxygen was compliant with state water quality standards in all areas except Powder Mill Pond. In Powder Mill Pond, dissolved oxygen fell below state standards (no less than 5 mg/L or a daily average of 75% saturation) on one day (4.92 mg/L and 71% daily average percent saturation on July 26, 2013). This result is consistent with the fact that Powder Mill Pond is listed as impaired for dissolved oxygen in the 2012 NH 303(d) List. The minimum dissolved oxygen in the Monadnock impoundment was just above the dissolved oxygen standards (5.20 mg/L and daily average of 77.1% saturation). The minimum dissolved oxygen in the Pierce and Paper Mill impoundments were substantially above the dissolved oxygen standards (6.43 and daily average of 84.5% saturation in the Pierce impoundment and 6.56 mg/L and daily average of 85.1% saturation in the Paper Mill impoundment). Minimum impoundment temperature ranged from 72.2 °F (22.3 °C) to 75.3 °F (24.1 °C). Maximum impoundment water temperatures ranged from 81.8 °F (27.7 °C) to 84.2 °F (29.1 °C).
- b. Temperature measurements from deployed loggers showed a relatively small increase in average temperature from upstream of the project (71 °F) to below the project (73 °F)¹.

1. From Table 4-4, in the July 2012 Final Study Report (p.14 of the 2010 Water Quality Study Report (Revised)).

- c. Nutrient concentrations were highest at the station approximately 1 mile upstream of the Activity, indicating upstream sources of nutrients to Powder Mill Pond. Total phosphorus concentrations ranged from 46 to 106 ug/L upstream of the Activity and 30-48 ug/L downstream. Nitrate and total Kjeldahl nitrogen were only detected upstream of the Activity at 0.1 and 1.59 mg/L, respectively. Ammonia concentrations did not change appreciably from upstream (0.305 mg/L) to downstream of the Activity (0.227-0.26 mg/L).
- d. Chlorophyll-a concentrations were generally low during the study. The highest concentration of 4.76 ug/L was measured in Powder Mill Pond. The measured concentrations do not appear to be representative of conditions in Powder Mill Pond at all times because this water body is listed as impaired for chlorophyll-a on the 2012 NH 303(d) List based on measurements from other studies that exceeded the threshold of 15 ug/L.
- e. Instantaneous measurements of dissolved oxygen and water temperature were taken in the Powder Mill Pond reach and in the bypass channels for the Monadnock and Pierce developments in July, August and September of 2010. Estimated flows ranged from 31 to 56 cfs. The Paper Mill bypass reach was sampled in June and July of 2012. Estimated flows ranged from 31 to 47 cfs. All flow was spilling into the bypass reaches during the sampling events because river flows were too low to generate power. Dissolved oxygen ranged from 6.62 to 8.00 mg/L and temperature ranged from 66.6 °F (19.4 °C) to 75.2 °F (24.0 °C). Monitoring to determine compliance at flows equal to the current minimum allowable bypass flow of 13 cfs and with the 75 percent daily average percent saturation standard [Env-Wq 1703.07 (b)] was not conducted.
- f. Dissolved oxygen and temperature monitoring was not conducted downstream of the Paper Mill facility to determine if state dissolved oxygen standards were met at the minimum flow of 70 cfs.
- g. It is important to note that based on previous studies, Powder Mill Pond is categorized as eutrophic and listed as impaired for dissolved oxygen and chlorophyll-a on the New Hampshire 303(d) List of Impaired Waters. It is also noted that due to the chlorophyll-a and dissolved oxygen violations, a Total Maximum Daily Load study for phosphorus may be conducted for Powder Mill Pond and other reaches of the Contoocook River. Consequently, although samples collected by the Applicant in 2010 did not indicate high chlorophyll-a levels in 2010, historical sampling suggests that sampling conducted under different conditions could result in higher chlorophyll-a levels.
- h. Infrequent occurrences of non-attainment with established dissolved oxygen criteria were observed in Powder Mill Pond in 2010, which is consistent with the impairment for dissolved oxygen in Powder Mill Pond on the 2012 NH 303(d) List. Storing and releasing water from Powder Mill

Pond for hydropower generation has the potential to affect nutrient cycling and dissolved oxygen and chlorophyll-a concentrations. Pollutant loadings from upstream point and nonpoint sources can also impact the concentrations of these parameters. Since 2009, phosphorus loadings from two upstream wastewater treatment plants have been reduced (Jaffrey in 2009 and Peterborough in 2012). The effects of this change in pollutant loading on dissolved oxygen and chlorophyll-a in Powder Mill Pond is unknown.

- i. Based on the above, additional water quality monitoring is warranted to:
 - i. Determine compliance with dissolved oxygen standards (i.e., concentration and daily average percent saturation) in Powder Mill Pond and the Monadnock impoundment, in the river downstream of the Powder Mill Pond dam, in the Pierce and Paper Mill bypass reaches and downstream of the Paper Mill development (i.e., downstream of the confluence of the Paper Mill tailrace and bypass reach) when water levels in Powder Mill Pond are stable and when levels are fluctuated within the full allowable range to generate power and when minimum flows are passed downstream.
 - ii. Determine compliance with chlorophyll-a and nutrient thresholds in Powder Mill Pond under various conditions of operation.

Sampling should be conducted during periods of low flow and high temperature which is when dissolved oxygen is usually lowest and chlorophyll-a the highest. The sampling should include periods when power generation occurs and is absent, as well as when water level in Powder Mill Pond is fluctuated within the full allowable range. Finally, sufficient data should be collected to allow assessments of the surface waters in accordance with the DES Consolidated Assessment and Listing Methodology².

D-10. Freshwater Mussel Study. The Applicant completed a study of freshwater mussels to address concerns raised by DES and other resource agencies during the pre-filing consultation period. The study was conducted in 2010 and consisted of field surveys of the perimeter of each impoundment to a depth of approximately 6 feet and the river reaches below each dam. Ten sites within Powder Mill Pond ranging in size from 0.2 acres up to 3.8 acres were surveyed. Eastern elliptio (*Elliptio complanata*) were found in all sites and were the most dominant species. The eastern floater (*Pyganodon cataracta*) was also found at 3 of the sites in Powder Mill Pond. A single remnant triangle floater shell (*Alasmidont a undulata*) was found in the Pierce reach. Eastern elliptio and eastern floaters are generalists that use pond, lakes and small rivers as preferred habitat. Brook floaters (a state-protected species) were not found during the survey.

2. The 2012 Consolidated Assessment and Listing Methodology is available at <http://des.nh.gov/organization/divisions/water/wmb/swqa/2012/documents/2012-calm.pdf>

The Applicant concluded that, although somewhat lacking in species diversity, the survey results indicate that Activity waters contain healthy mussel populations and also provide a wide range of reproductive hosts for many of the freshwater mussel species found in New Hampshire.

In a letter dated August 13, 2013 to FERC, the USFWS stated that the mussel survey results showed lower densities in beds found at shallower elevations (i.e., in beds more frequently exposed to routine project operations). By limiting pond fluctuations, mussel distribution and/or abundance could increase in the 674.44 to 675.44 (feet NGVD) range.

In a letter dated May 22, 2011, DES commented that the mussel populations described by the Applicant (i.e., mainly one tolerant species with some indication of the presence of two other species) do not necessarily represent a healthy condition.

- D-11. Baseline Fish Survey and Instream Flow Study. The Applicant completed a baseline fish survey and instream flow study to address fisheries concerns raised by DES and other resource agencies during the pre-filing consultation period. The baseline fish survey took place on October 2011 and consisted of electroshocking at four locations in the study area. Aquatic habitat suitability in relation to instream flow was evaluated using the Instream Flow Incremental Methodology (IFIM) modeling approach and a Physical Habitat Simulation Model (PHABSIM). Field data to calibrate the model was collected in July 2011 for the following river flows:

Site/Reach	Low	Mid	High
Powder Mill	23 cfs	63 cfs	117 cfs
Pierce	23 cfs	63 cfs	117 cfs
Paper Mill	15 cfs	63 cfs	109 cfs
Downstream Antrim	26 cfs	62 cfs	105 cfs

The calibration data were used to populate a PHABSIM model to predict habitat over a range of incremental flows from 10 to 120 cfs. In addition, a habitat duration and time-series analysis was completed so that the frequency and duration of various levels of suitable habitat could be evaluated. The results of the studies have been evaluated by fisheries experts at USFWS and the New Hampshire Fish and Game Department (NHFGD) to determine suitable instream flow levels to protect the fisheries resource. It should be noted that the NHFGD manages Powder Mill Pond as a warmwater fishery. Several bass fishing tournaments are held annually on the pond. NHFGD manages the bypass and riverine reaches of the Contoocook River near Bennington, including the project waters of the Monadnock, Pierce and Paper Mill developments as a put and take

trout fishery. Annual stocking of brown and rainbow trout is conducted below the Powder Mill and Monadnock dams.

- a. The range of flows modeled for the study was from 10 cfs to 120 cfs. The median monthly flows in the study area exceed 120 cfs (the upper end of the instream flow study) during all months other than July through October. Therefore, findings from the study are most applicable to the summer and early fall seasons.
- b. Calibration data was collected at 9 transects: two downstream of Antrim, 4 below the Paper Mill dam, 1 below the Pierce dam, and 2 below the Powder Mill dam.
- c. Weighted useable area (WUA) is a common measure used in instream flow studies to represent the aquatic habitats available to aquatic biota. WUA is calculated using the parameters (depth, velocity and substrate) forecast for each cell³ as they relate to the Habitat Suitability Indices (HSI) criteria established for the target species and lifestage of interest. Selected target species for use as indicators of habitat suitability were brown trout (adult and juvenile), longnose dace (adult and juvenile) and benthic macroinvertebrates. For each cell the PHABSIM model rates each parameter based on the HSI criteria from 0.0 to 1.0. These values are then multiplied by the known area of the cell. All the areas are then summed to arrive at a total WUA for each transect. The WUA for each transect is then summed to arrive at the total available habitat for each study site, flow increment and target species. One unit of WUA represents 1 square foot of usable habitat.

Results are often expressed as a percent of maximum WUA which is the WUA at a certain flow divided by the highest WUA modeled for the range of flows studied. Since the range of flows studied only represents summer and early fall conditions, the maximum WUA metric represents the percent of WUA available under summer and early fall conditions, not during the entire year.

- d. Due to the short length of the Monadnock Dam bypass reach (50 feet), the Applicant and consulting agencies did not include this reach in the instream flow study. The Applicant has requested that the existing bypass reach minimum flow requirement (13 cfs) be used for the new FERC license. The USFWS agrees and has recommended that the bypass reach minimum flow for the Monadnock Dam continue to be 13 cfs.
- e. The Pierce bypass channel is the second longest bypass reach (750 feet) and is dominated by high gradient falls, fast flowing pool and riffle complexes strewn with large boulders, and large deep pools. The composite WUA / discharge relationship curve for the target fish species

3. In PHABSIM, a "cell" is an increment of width of a stream channel multiplied by its length to give an area.

for the Pierce dam bypass reach is shown in Figure 9⁴ below. Results of the study indicate that the existing Pierce Dam bypass reach minimum flow requirement (13 cfs) provides approximately 40% of maximum WUA for adult brown trout, 50% of maximum WUA for juvenile brown trout, 65% of maximum WUA for adult longnose dace, 95% of maximum WUA for juvenile longnose dace, and approximately 10% of maximum WUA for benthic macroinvertebrates. The Applicant has requested that the existing minimum flow requirement be used for the new FERC license. However, the USFWS has recommended that the bypass reach minimum flow requirement be increased to 40 cfs. Increasing the bypass reach minimum flow to 40 cfs would result in significant gains in WUA for the majority of species/life stages evaluated (see table below).

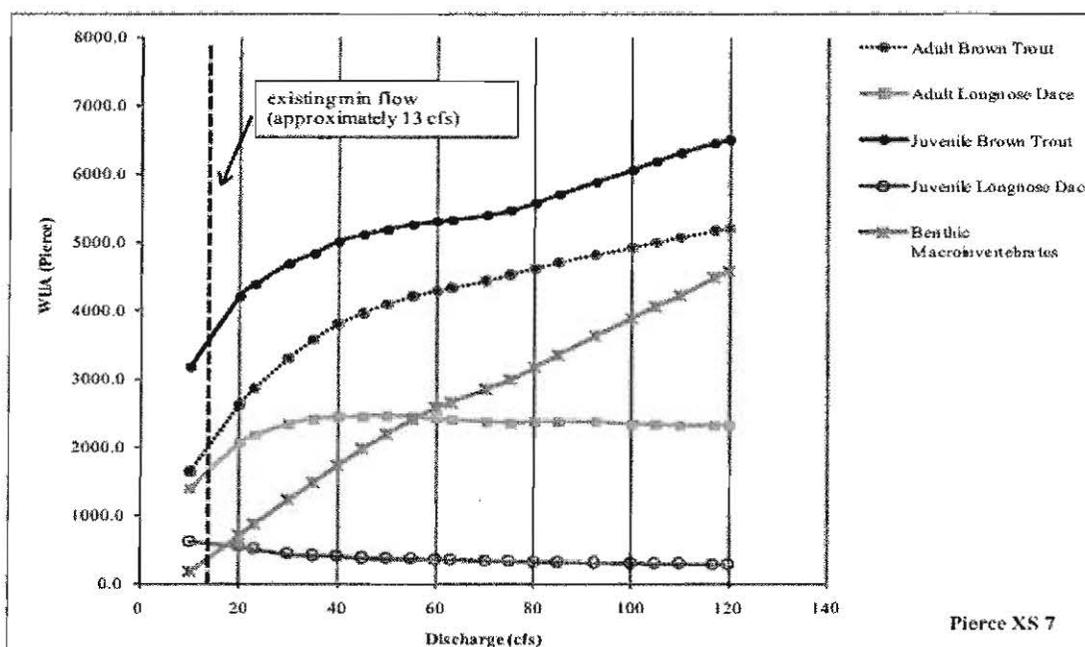


FIGURE 9. COMPOSITE WUA/DISCHARGE RELATIONSHIP FOR THE PIERCE BYPASSED REACH.

Percent of Maximum Weighted Usable Area for Target Fish Species in the Pierce Dam Bypass Reach at Different Flows		
Species	Flow=13 cfs	Flow=40 cfs
Adult Brown Trout	40%	73%
Juvenile Brown Trout	50%	77%
Adult Long Nose Dace	65%	99%
Juvenile Long Nose Dace	95%	65%
Benthic Macroinvertebrates	10%	38%

- f. The Paper Mill dam bypass reach is the longest bypass (1300 feet) and consists primarily of a high gradient bedrock dominated reach below the

4. Figure 9 is from the July 2012 Final License Application.

dam and a low gradient riffle-run-pool habitat complex located immediately upstream of the tailrace. The composite WUA / discharge relationship curve for the target fish species for the Paper Mill dam bypass reach is shown in Figure 8⁵ below. Results of the study indicate that the existing Paper Mill bypass reach minimum flow requirement (13 cfs) provides approximately 50% of maximum WUA for adult brown trout, 64% of maximum WUA for juvenile brown trout, 48% of maximum WUA for adult longnose dace, 71% of maximum WUA for juvenile longnose dace, and approximately 25% of maximum WUA for benthic macroinvertebrates. The Applicant has requested that the existing minimum flow requirement be used for the new FERC license. However, the USFWS has recommended that the bypass reach minimum flow requirement be increased to 60 cfs. Increasing the bypass reach minimum flow to 60 cfs would result in significant gains in WUA for the majority of species/life stages evaluated (see table below).

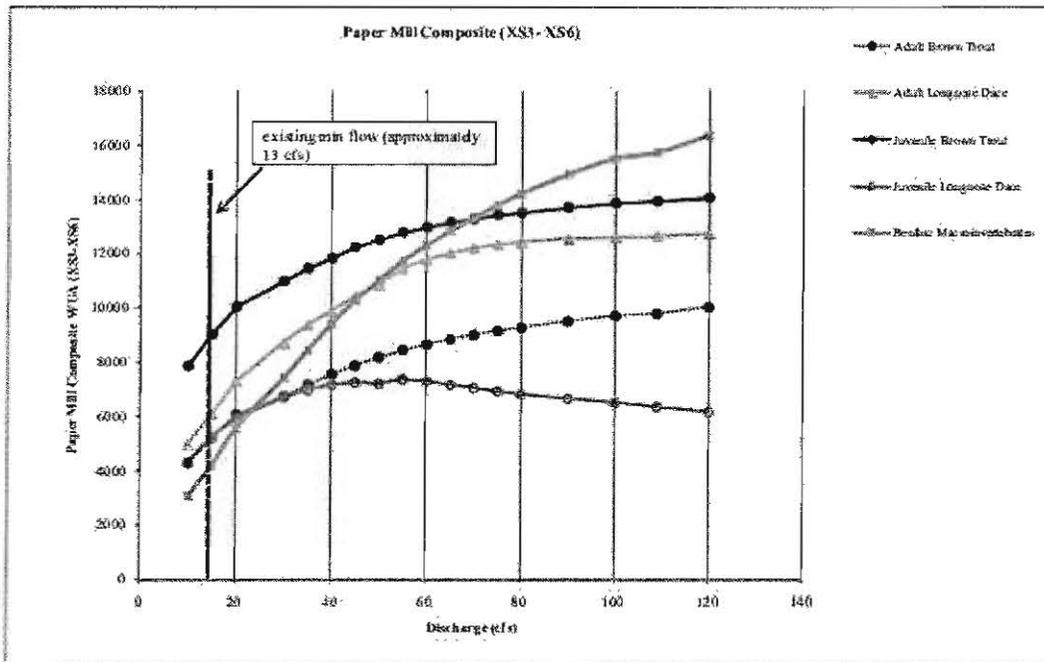


FIGURE 8. COMPOSITE WUA/DISCHARGE RELATIONSHIP FOR THE PAPER MILL BYPASSED REACH.

5. Figure 8 is from the July 2012 Final License Application.

Percent of Maximum Weighted Usable Area for Target Fish Species in the Paper Mill Dam Bypass Reach at Different Flows		
Species	Flow=13 cfs	Flow=60 cfs
Adult Brown Trout	50%	86%
Juvenile Brown Trout	64%	92%
Adult Long Nose Dace	48%	93%
Juvenile Long Nose Dace	71%	99%
Benthic Macroinvertebrates	25%	75%

- g. The results of this study also indicate that the existing instream minimum flow requirement (70 cfs or inflow if less) downstream of the Activity provides approximately 84% of maximum WUA for adult brown trout, 92% of maximum WUA for juvenile brown trout, 99% of maximum WUA for adult longnose dace, 74% of maximum WUA for juvenile longnose dace, and approximately 86% of maximum WUA for benthic macroinvertebrates. The Applicant has requested that the existing minimum flow requirement be used for the new FERC license. The USFWS agrees and has recommended that the minimum flow through the project continue to be 70 cfs (or inflow if less).
- h. The applicant discharges treated effluent to the Contoocook River below the project. Dilution calculations for the discharge permit are based on a 7Q10 low flow in the river of 16.5 cfs. The minimum flow through the project recommended by the applicant and USFWS (70 cfs or inflow) is higher than the 7Q10 and, therefore, should not affect dilution of the treated effluent.
- i. The NHFGD has advised DES (personal communication with Carol Henderson and Executive Director Glenn Normandeau in December 2013), that although the NHFGD recognizes the potential benefit of increasing bypass flows on aquatic habitat and the fish and benthic community in the bypass reaches, their primary concern is the fishery within Powder Mill Pond. Increasing bypass flows could result in more frequent water level fluctuations in Powder Mill Pond to meet the short-term energy demand, which could, in turn, negatively impact the fishery in Powder Mill Pond. With this in mind, the existing minimum bypass flow of 13 cfs at the 3 developments is considered not ideal but acceptable, in this case, by the NHFGD.
- j. Maintaining sufficient instream flows for fisheries is necessary for DES to certify that the water quality standard for biological and aquatic community integrity (Env-Wq 1703.19, see C-11) will be met by the Activity. Based on information above, DES concurs with the USFWS recommendations for minimum flow through the project of 70 cfs and with the NHFGD recommendation to keep existing minimum flow of 13 cfs in the bypass reaches for the Monadnock, Pierce and Paper Mill developments provided that monitoring indicates there is sufficient dissolved oxygen to meet state dissolved oxygen standards at these

minimum flows (see Finding D-9).

D-12. Run of River Operations. Overall, the Activity is operated in a seasonal run-of-river mode with Powder Mill Pond storing and releasing water during certain seasons for maintenance activities at the other downstream developments, to maintain minimum flows to downstream developments (Monadnock, Pierce, and Paper Mill dams), to accommodate flood flows, and rarely for meeting short-term energy demands for generation. The three downstream dams are operated in instantaneous run-of-river mode. During the summer season (May 1 to August 31), the Applicant maintains Powder Mill Pond at normal full pond in support of fishery management objectives (i.e. to promote largemouth bass spawning). Likewise, the Applicant does not typically manipulate pond levels in the winter months (January 1 to February 28), so that ice-over conditions are maintained for public fishing.

- a. The Applicant proposes to continue the current practice of operating Powder Mill Pond in an instantaneous run-of-river mode by maintaining Powder Mill Pond at normal full pool between January 1 and February 28 and between May 1 and August 31 of each year. During the remaining six months in the spring and fall seasons, the Applicant proposes to continue to operate the Powder Mill Pond dam in modified run-of-river mode.
- b. The USFWS has recommended that Powder Mill Pond be maintained at normal full pool from January 1 through February 28 and from May 1 through August 31. The USFWS recommendation is consistent with the Applicant's proposal.
- c. Based on the above information, DES concurs with the Applicant and the USFWS recommendation that Powder Mill Pond be maintained at normal full pool and operated in an instantaneous run-of-river mode from January 1 through February 28 and from May 1 through August 31.

D-13. Powder Mill Pond Water Level Study. The Applicant completed a Drawdown Modeling and Shoreline Habitat Assessment in Powder Mill Pond in 2010. For this study, the Applicant created a bathymetric map of the Powder Mill Pond and maps of abutting wetland communities. The Applicant also reviewed historical records of water surface elevation in the pond between October 1, 2006 and April 30, 2012. This information was used to assess the potential effects of Powder Mill Pond water level management on existing wetland and littoral habitat.

- a. The frequency analysis of average daily Powder Mill Pond water surface elevation showed that the water level was drawn down by 2 feet or less approximately 97.8% of the time. Drawdowns greater than 2 feet occurred 2.2% of the time (approximately 8 days / year on average) and drawdowns greater than 3 feet occurred only 0.2% of the time (approximately 1 day per year on average) over an approximate 5.5 year period. In the last 14 years, the water surface elevation has not been drawn down the full 4-feet authorized in the existing FERC license for the

Activity.

The information from the study is summarized in the table below. The percents of time shown in the table are based on the period October 1, 2006 to April 30, 2012 and include drawdowns for purposes other than power generation, such as flood storage, maintenance, and satisfying minimum flow requirements. According to the Applicant it is impossible to discern from the reservoir elevation data the frequency of drawdown for generation purposes only, however, as indicated in Finding D-4.f, drawdowns to meet short-term power demands are rarely conducted. The maximum number of days per year that the water surface elevation was drawn down more than 2 feet was approximately 18 days in 2011 (from July to November)⁶. According to the Applicant, maintenance drawdowns are conducted once per year and usually last one to two weeks depending on the issues that arise. This suggests that drawdowns greater than 2 feet for power generation and minimum flow have historically occurred no more than approximately 4 to 11 days per year (average of 7 days/year) and much less frequently in most years.

Drawdown Depth from Full Pool in feet	Water Surface Elevation (WSEL) in feet NGVD29	Percent of time* WSEL is at or above this level
0	677.44	58.5%
1	676.44	82.4%
2	675.44	97.8%
3	674.44	99.8%
4	673.44	100%

* Based on records from October 1, 2006 through April 30, 2012. Values include drawdowns for power generation, maintenance, flood storage and minimum flow.

- b. The bathymetric map and digital terrain model showed how different drawdown levels would affect the surface area, volume, and littoral area of Powder Mill Pond. The data from the study are shown in the following table. A drawdown of 2 feet would reduce the lake area by 24%, lake volume by 46%, and littoral area by 28%. A drawdown of 3 feet would reduce the lake area by 34%, lake volume by 64%, and littoral area by 38%.

6. From Table 3-1 in the July 2012 Final License Application.

Draw-down Depth from Full Pool in feet	Lake Surface Area		Lake Volume		Lake Littoral Area*	
	Acres	% of full pool	Acre-feet	% of full pool	Acres	% of littoral area
0	508	100%	1932	100%	449	100%
1	438	86%	1460	76%	378	84%
2	384	76%	1051	54%	325	72%
3	337	66%	691	36%	278	62%
4	291	57%	377	19%	232	52%
5	139	27%	157	8%	79	18%
6	60	12%	66	3%	0	0%
7	35	7%	19	1%		
8	6	1%	1	0%		
9	0	0%	0	0%		

* Littoral area is defined as the lake surface area between 0 and 6 feet in depth (449 acres, which is 508 acres at 0 feet minus 60 acres at 6 feet). Changes in littoral area were estimated from changes in lake surface area.

- c. Studies of the riparian wetlands around the edge of Powder Mill Pond found that existing and historic operations have resulted in a productive system with a diverse array of wetland and aquatic habitats. Given that the conditions in this Certification do not significantly modify existing operations, the effects of operating the Activity in accordance with this Certification on existing wetland and plant communities is expected to be minimal.
- d. The existing FERC license permits a maximum drawdown depth of 4 feet. The Applicant is proposing to change the maximum drawdown at the Powder Mill Pond Development to 3 feet below the permanent crest elevation of the dam (maximum drawdown elevation of 672.44 ft NGVD) except in cases of maintenance or emergency preparedness.
- e. The USFWS has recommended that the maximum drawdown depth for power generation be 2 feet (maximum draw down elevation of 675.44 feet NGVD). To justify this recommendation, USFWS cited the following information:
 - i. Mussel survey results indicate that mussel densities were lower in beds that were more frequently exposed during drawdowns. By limiting the drawdown range, the mussel distribution and/or abundance in Powder Mill Pond could increase. (See Finding D-10 for more information on the mussel study)
 - ii. Limiting drawdowns to 2 feet would protect a significant amount of littoral area from exposure. A 3-foot drawdown would expose 26% of the littoral area. A 2-foot drawdown would expose 19% of the littoral zone. Therefore, a 2-foot drawdown limit would prevent 30 of the 449 acres (or 7%) of the littoral area from being exposed.

- iii. Maintaining Powder Mill Pond at a higher elevation would help to limit the occurrence of variable leaf milfoil. (See Finding D-15 for more information on milfoil infestation in Powder Mill Pond)
- iv. The Applicant has stated that drawdowns in excess of 2 feet occur infrequently. However, there is no guarantee that the Applicant will continue to operate the Activity in the same manner in the future without enforceable limits.
- v. The Baseline Fish Survey found that the majority of the most abundant species in Powder Mill Pond were in the young of year age class. The lack of older, spawning age fish is of concern. Therefore, USFWS disputes the claim that the Powder Mill Pond fishery is well supported despite infrequent drawdowns below 2 feet in the past.
- f. The Applicant currently fluctuates Powder Mill Pond for power generation for 6 months of the year (March and April and September through December).
- g. The NHFGD (personal communication with Carol Henderson in December 2013) recommends that fall drawdowns for lakes be made no later than November 1 (and preferably before October 15) in order to protect hibernating wildlife from exposure. To ensure that drawdowns below 2 feet are not conducted during critical periods (such as fish spawning), the NHFGD has also requested that the Applicant be required to contact them at least 14 days in advance, and receive their approval, prior to drawing Powder Mill Pond down lower than 2 feet. This will help ensure protection of the fishery.
- h. During the spring season (March 1 through April 30), river flows are typically higher than the hydraulic capacity of the turbines in the development. The mean of the daily average flows at the project in March and April are 616 and 948 cfs, respectively. The maximum hydraulic capacity for power generation by the project is 587 cfs (at the Monadnock development). Therefore, it is unlikely that modified run-of-river operations (i.e., storage and release at Powder Mill Pond) will be necessary during most of the spring season.
- i. During the fall season (September 1 through December 31), river flows are lower. The mean of the daily average flows at the project in September, October, November, and December are 130, 204, 313, and 377 cfs, respectively. These flows fall within the operating range of 53 to 587 cfs for the turbines in the downstream developments. Therefore, it is likely that the storage and release of water in Powder Mill Pond during this four-month period would occur more frequently as compared to the months of March and April.
- j. USFWS recommends that Powder Mill Pond be drawn down and refilled gradually during the spring and fall on a weekly or seasonal basis.

- k. As discussed in Finding D-9, water quality impairments (dissolved oxygen and chlorophyll-a) have been documented in Powder Mill Pond. Drawing the pond down excessively and frequently may exacerbate these violations. As a minimum, to prevent conditions from becoming worse, restrictions should be in place to prevent the magnitude and frequency of drawdowns (especially those below 2 feet) from exceeding historical levels.
- l. Based on the above, DES has determined that the following fluctuation requirements in Powder Mill Pond are necessary to support and maintain a balanced, integrated, and adaptive community of organisms per Env-Wq 1703.19.
 - i. Limit the maximum drawdown to 3 feet (except for maintenance and emergency drawdowns) as proposed by the Applicant.
 - ii. To ensure the frequency of drawdowns below 2 feet continue to occur very infrequently and closely match historical practices, require that drawdowns below 2 feet (for any reason) occur no more than approximately 2% of the time over any 5 year period and that drawdowns below 2 feet for power generation occur no more frequently than 7 days in any given year.
 - iii. To protect hibernating wildlife from exposure, require that drawdowns in November and December be limited to no more than 6 inches below the top of the Powder Mill Pond flashboards (i.e., no less than 676.94 feet NGVD). According to the table presented in Finding D-13b, a 6-inch drawdown would expose about 7% of the lake area (35 acres), which is much less than the area that can be currently exposed at a 2 foot drawdown (24% or 124 acres). This should improve survival of hibernating wildlife along the shores of Powder Mill Pond while still providing the Applicant with the some flexibility to operate the pond in a storage and release mode to supplement power generation (which, according to the Applicant, is rarely done for meeting short-term energy demand).
 - iv. To ensure that drawdowns below 2 feet are not conducted during critical fishery periods (such as fish spawning), and except in the case of emergencies, require the Applicant to notify the NHFGD at least 14 days in advance and receive NHFGD approval prior to drawing Powder Mill pond down below 2 feet for any reason. As noted in Finding D-4.f, the Applicant is currently required to provide a 60 day notification for maintenance and proposes to continue this procedure under the new FERC license.

D-14. Ramping Rate Study (Drawdown and Refill). The Applicant completed a Drawdown Modeling and Shoreline Habitat Assessment to address concerns raised by DES and other resource agencies during the pre-filing consultation period. The drawdown modeling consisted of predicting the rate of change for

water levels and shoreline exposure during typical drawdowns.

- a. The drawdown study assumed that 300 cfs would be released from Powder Mill Pond during a typical drawdown. According to the Applicant, this release rate is equivalent to the minimum hydraulic capacity of the three downstream developments (i.e., 300 cfs at Paper Mill), which is likely representative of an optimal release for generation that could occur. This is not the minimum flow needed to generate power. The minimum flows needed to generate power and maintain minimum bypass flows at each facility are 90 cfs at the Monadnock, 70 cfs at the Pierce, and 153 cfs at the Paper Mill facility. The model showed that, for inflows of 100 and 200 cfs, the drawdown would expose littoral area in Powder Mill Pond at rates between 3.5 and 2 acres per hour, respectively. These rates would amount to exposing 19% and 11% of the littoral area in the first 24 hours of the drawdown, respectively.
- b. For a drawdown that lowers the water level by 2 feet while releasing 300 cfs, the maximum rate that the water level would change would be approximately 0.7 inches per hour (or approximately 16 inches per day) over 1.5 days. This calculation assumes no inflow so it is an over-estimate of the typical rate of water level drawdown. For a drawdown that lowers the water level by 2 feet while releasing 300 cfs, and assuming an inflow of 100 cfs, the maximum rate that the water level would change would be approximately 0.5 inches per hour (or approximately 11 inches per day) over 2.2 days.
- c. The drawdown study also modeled how long it would typically take to refill Powder Mill Pond after a drawdown. For the range of daily average flows in September and October, the pond would refill within 1.3 to 6.4 days from a 2-foot drawdown, assuming the minimum flow of 70 cfs continued to be released. The rate of water level change during the refill for this scenario would be between 0.1 and 0.7 inches per hour.
- d. The NHFGD (personal communication with Carol Henderson in December 2013) recommends a maximum drawdown rate of 6 inches per day to allow adequate time for aquatic organisms, such as mussels, to move and stay sufficiently submerged as the water level gradually recedes. This could improve the health and density of the mussel population, especially in the top 2 feet of Powder Mill Pond (elevation 675.44 to 677.44 NGVD) that is most prone to fluctuations. According to the 2010 mussel survey (see Finding D-10), mussel densities were lower in the top 2 feet as compared to deeper waters.

For a drawdown that lowers the water level by 2 feet at a rate of 6 inches per day, and assuming no inflow (which is conservative) the maximum release is estimated to be approximately 110 cfs which still exceeds the minimum flow needed to generate power and maintain minimum bypass flows at the Monadnock (90 cfs) and Pierce (70 cfs) facilities. With increasing inflow, the ability to generate power will also increase. Since

the Applicant has stated that drawdowns for short-term power generation rarely occur, a maximum ramping rate of 6 inches per day during drawdown is not expected to have a significant impact on project operation.

- e. USFWS recommends that Powder Mill Pond be drawn down and refilled gradually during the spring and fall on a weekly or seasonal basis. Further, after flashboard replacement, dam maintenance or emergency drawdown, USFWS recommends the project be operated such that 50 percent of the inflow is passed downstream and refilling of the impoundments with the remaining 50 percent of inflow. USFWS notes that this deviates from the standard agency ratio of 90/10 (pass 90 percent of inflow and refill on the remaining 10 percent) but is warranted in this case due to the wetland resources in Powder Mill Pond. They further recommend that if more than one headpond is drawn down at the same time, the 50/50 protocol should be adjusted on prior consultation with the resource agencies. As stated in Finding D-4.f, this differs from current practice wherein the Applicant has historically refilled the impoundments for the Project by maintaining minimum flow requirements and retaining the remainder of inflow.
- f. Based on information presented above, and to support and maintain a balanced, integrated, and adaptive community of organisms per Env-Wq 1703.19 a maximum ramping rate during drawdowns (except in the case of emergencies) of 6 inches per day should be required. Further to balance the refilling of the impoundments as quickly as possible with downstream flow, refilling of the impoundments after flashboard replacement, dam maintenance or emergency drawdown, should be conducted such that when inflow equals or exceeds 93 cfs, the minimum downstream flow of 70 cfs shall be released and the remainder shall be used for refill. When inflow is less than 93 cfs, 75% of the inflow shall be passed downstream and 25% shall be used for refill.

D-15. Wetlands, Noxious Weeds, and Rare, Threatened and Endangered (RTE) Species. The Applicant completed a study of wetlands, noxious weeds, and RTE species to address concerns raised by DES and other resource agencies during the pre-filing consultation period. The study was completed in 2010 and consisted of field surveys and delineation of jurisdictional wetlands.

- a. Wetlands and submerged aquatic vegetation beds are prevalent throughout the Project, especially within Powder Mill Pond. Powder Mill Pond can be characterized as a typical freshwater pond that provides suitable habitat for a variety of common wildlife species and aquatic wetland plants. Specifically, the most significant wetlands in terms of their habitat value occurred in the sheltered backwater coves along the pond especially those associated with Moose Brook. The surrounding uplands and wetlands in the study area are forested and largely undisturbed, thus invasive plant species were not prevalent.

- b. Variable leaf milfoil was the dominant invasive submerged aquatic vegetation in the study area. Milfoil was concentrated and prevalent in Powder Mill Pond, occurring in dense mats almost uninterrupted along the shoreline. Public boating access to Powder Mill Pond has likely contributed to the introduction and spread of variable leaf milfoil throughout the pond.
- c. There were no direct observations of RTE plants or wildlife in the study area during the 2010 surveys. However, suitable habitat for some RTE wildlife species such as bald eagle and Blanding's turtle was documented in the study area. Some RTE species are known to occur in the study area.
- d. Based on the diversity of aquatic habitats and prevalence of wetlands found at Powder Mill Pond, seasonal drawdowns (less than 2 feet 98% of the time) do not appear to have a significant adverse affect on existing wetlands and aquatic habitats.
- e. In a letter to FERC dated March 14, 2013, the USFWS recommended that the Applicant be required to develop and implement a plan for monitoring and controlling invasive species. Absent sufficient monitoring and control, it is likely that noxious weeds (such as Variable Leaf Milfoil) will become more abundant in Powder Mill Pond. Given the abundance and diversity of native wetlands within the project area, long-term monitoring and control of invasive species should be a high priority.
- f. Based on information presented above, DES believes that invasive species such as variable leaf milfoil present a significant threat to native habitats and wildlife in Powder Mill Pond and that monitoring should be conducted to track the spread of invasive species and that the Activity should be operated in a manner consistent with control efforts.

D-16. Anadromous Fish. The four dams in the Project do not have fishways for upstream fish passage currently. USFWS and NHFGD manage Atlantic salmon and other anadromous fish in rivers of New Hampshire. There are currently no anadromous fish within the project area, nor are there currently any plans to restore anadromous fish to portions of the Contoocook River upstream of Paper Mill Dam. In a letter on March 14, 2013, the USFWS made the following fishways recommendation under Section 18 of the Federal Power Act: "Authority is hereby reserved to the Federal Energy Regulatory Commission to require the licensee to construct, operate, and maintain such fishways as may be prescribed during the term of this license by the Secretary of the Interior pursuant to Section 18 of the Federal Power Act."

E. WATER QUALITY CERTIFICATION CONDITIONS

Unless otherwise authorized by DES, the following conditions shall apply:

- E-1. **Compliance with Certification Conditions.** The Applicant shall operate and maintain the Activity to comply with the conditions of this certification.
- E-2. **Compliance with Water Quality Standards.** The Activity shall not cause or contribute to a violation of New Hampshire surface water quality standards. Should DES determine that the Activity is causing or contributing to violations of surface water quality standards, DES may modify this Certification in accordance with condition E-4 of this Certification.
- E-3. **Approval of Project Changes.** The Applicant shall consult with and receive prior written approval from DES regarding any proposed modifications to the Activity that could have a significant or material effect on the facts, findings or conditions of this Certification, including any changes to project operation or approved plans required by this Certification.
- E-4. **Modification of Certification.** The conditions of this Certification may be amended and additional terms and conditions added as necessary to ensure compliance with New Hampshire surface water quality standards, when authorized by law, and after notice and opportunity for hearing.
- E-5. **Reopening FERC License.** DES may, at any time, request that FERC reopen the license for the Activity to consider modifications to the license if necessary to ensure compliance with New Hampshire surface water quality standards.
- E-6. **Compliance Inspections.** The Applicant shall allow DES to inspect the Activity and its impacts on affected surface waters at any time to monitor compliance with the conditions of this Certification.
- E-7. **Posting of Certification and Operation and Maintenance Plan.** A copy of this Certification and the approved Operation and Maintenance Plan (condition E-10) shall be posted within each of the Project powerhouses within seven days of receiving written approval of the Operations and Maintenance Plan from DES.
- E-8. **Transfer of Certification.** Within 15 days after filing an application with FERC for transfer of ownership of the FERC license, the Applicant shall provide a copy of the application to DES. Within 15 days following a transfer of ownership for the FERC license and/or this Certification, the Applicant shall notify DES in writing of the date of the transfer and provide contact information (legal name, mailing address, email (if available) and phone number) for the new owner.
- E-9. **Project Operation:**
 - a. The Applicant shall operate the project in a seasonal run-of-river mode. During the periods January 1 to February 28 and May 1 through August 31, inflow to the Powder Mill Pond shall equal outflow immediately downstream from the confluence of the Paper Mill bypass reach and tailrace on an instantaneous basis. At all times, fluctuations of the Monadnock, Pierce and Paper Mill impoundment water surface elevations shall be minimized. This operating regime may be temporarily modified for short periods due to operating emergencies beyond the control of the Applicant or other reasons after consulting with DES, the NHFGD and USFWS (see Condition E-9.e below for notification requirements).
 - b. Unless due to operating emergencies beyond the control of the Applicant (such as flashboard failure due to high flows), pre-approved maintenance, or

other reasons specified in the DES approved Operations and Maintenance Plan (see Condition E-10), the Applicant shall maintain the Powder Mill Pond water surface elevation at or above 677.44 feet NGVD (top of flashboards) from January 1 to February 28 and from May 1 through August 31 and at or above 676.94 NGVD (6 inches below the top of flashboards) from November 1 through December 31. At all other times (except for emergencies, pre-approved maintenance or other reasons specified in the DES approved Operations and Maintenance Plan) the elevation shall be kept between 674.44 feet and 677.44 feet NGVD. Drawdowns (for any reason) below 675.44 feet NGVD shall be minimized and shall not occur more frequently than the historical average of approximately 2% of the time over any five year period and no more than 7 days in any given year for meeting short-term power demand. In addition, at all times, the Applicant shall maintain:

- i. The Monadnock impoundment water surface elevation at least one inch above the top of the flashboards (665.88 feet NGVD) when flashboards are in place or at least 1 inch above the dam crest (663.88 feet NGVD) when the flashboards have been temporarily removed due to failure or other reasons;
 - ii. The Pierce impoundment water surface elevation at or above the top of the flashboards (653.4 feet NGVD) or at or above the dam crest (651.4 NGVD) when the flashboards have been temporarily removed due to failure or other reasons; and
 - iii. The Paper Mill impoundment water surface elevation at or above the crest of the dam (627.6 feet NGVD; there are no flashboards at this facility).
- c. Except in the case of emergencies or for other reasons specified in the DES approved Operations and Maintenance Plan (see Condition E-10), the maximum drawdown rate shall be no more than 6 inches per day.
 - d. Flashboards shall be reinstalled as soon as reasonably practicable after failure or temporary removal for other reasons.
 - e. Except as noted below, the Applicant shall notify and receive NHFGD approval prior to drawing Powder Mill Pond down for maintenance or below 2 feet (elevation 675.44) for any reason. Notification shall identify the level of drawdown necessary, timing and duration, and method for ensuring minimum flow and refill requirements are met. Notification shall be provided at least 60 days in advance unless due to operating emergencies beyond the control of the Applicant [such as flashboard failure due to high flows or other situations described in the DES approved Operations and Maintenance Plan (Condition E-10)] in which case notification shall be provided as soon as reasonably practicable but no longer than 24 hours after the emergency event has occurred. DES and NHFGD approval is not required prior to drawing the pond down for emergency situations such as when extreme levels of precipitation are forecasted and it is necessary to draw the pond down to reduce the potential for flooding, or other emergency situations as described in the DES approved Operations and Maintenance Plan.

- f. During periods when the Powder Mill impoundment water surface elevation may fluctuate, the Applicant shall provide a minimum flow of 70 cfs, or inflow (whichever is less), immediately downstream of the Powder Mill Development and at the confluence of the tailrace and bypass reach of the Paper Mill Development. This flow is contingent upon monitoring data which confirms that state water quality standards for dissolved oxygen are attained at this flow downstream of the Paper Mill development. If monitoring indicates that this minimum flow is not sufficient to meet state dissolved oxygen standards, the applicant shall conduct a study to determine the minimum flow that is sufficient to meet state dissolved oxygen standards. The new approved minimum flow shall then become the required minimum flow and the Operations and Maintenance Plan (see Condition E-10) shall be revised accordingly to reflect this change.
- g. The Applicant shall provide the following year-round, continuous minimum flows to the project bypass reaches provided these flows are confirmed to meet state water quality standards for dissolved oxygen (Env-Wq 1702.19):
 - i. 13 cfs, or inflow (whichever is less), at the Monadnock facility;
 - ii. 13 cfs, or inflow (whichever is less), at the Pierce facility; and
 - iii. 13 cfs, or inflow (whichever is less), at the Paper Mill facility.

If monitoring indicates that any of these bypass flows are not sufficient to meet state dissolved oxygen standards, the applicant shall conduct a study to determine the bypass flow that is sufficient to meet state dissolved oxygen standards. The new approved bypass flow shall then become the required minimum flow for that bypass reach and the operations and maintenance plan (see Condition E-10) shall be revised accordingly to reflect this change.

- h. During refilling of the impoundments after flashboard replacement, dam maintenance or emergency drawdown, the Applicant shall operate the project such that when inflow equals or exceeds 93 cfs, the minimum downstream flow of 70 cfs shall be released and the remainder shall be used for refill. When inflow is less than 93 cfs, 75% of the inflow shall be passed downstream and 25% shall be used for refill. If the Applicant anticipates refilling more than one impoundment at once, prior consultation with the DES, NHFGD, and USFWS shall be required so that an appropriate refill regime may be developed. This refill protocol may be modified on a case-by-case basis after consulting with DES, NHFGD, and USFWS and after receiving written approval from DES.

E-10. Operation and Maintenance Plan:

- a. Within two (2) months (or a later date acceptable to DES) from the effective date of the license, the Applicant shall submit to, and obtain DES approval of an Operation and Maintenance Plan for the Activity that describes in detail how the Activity will be operated and maintained to comply with run-of-river, minimum flow and impoundment fluctuation requirements included in this Certification (Condition E-9). The plan shall also include procedures that will be implemented should the Activity not be in compliance with the conditions of this Certification, including notification of appropriate regulatory authorities

and a schedule for implementation of the plan. The Applicant shall then implement the approved plan.

- b. Any proposed modifications to the approved Operation and Maintenance Plan shall be submitted to DES for review and approval. Proposed modifications shall not be implemented until approved by DES. Exceptions to the approved Operation and Maintenance Plan may be granted by DES on a case-by-case basis, as necessary, in consultation with the Applicant, USFWS, and NHFGD.
- c. The Applicant shall notify DES not more than 24 hours after any significant deviations from the approved Operation and Maintenance Plan. The notification shall include an explanation as to why the deviations occurred, a description of corrective actions taken, and how long it will take until the operations will comply with the approved Operation and Maintenance Plan. The Applicant shall maintain a log of deviations. A summary of the deviations shall be submitted annually to DES not later than December 31 of each year. The submittal shall also include the number of days drawdowns below 2 feet (elevation 675.44) occurred in Powder Mill Pond during the year as well as the reason and duration for each drawdown below 2 feet (i.e., power generation, maintenance, flood storage, minimum flow, etc.).

- E-11. **Monitoring and Reporting Plan for Impoundment Level and Flow:** Within three (3) months (or a later date acceptable to DES) from the effective date of the FERC license, the Applicant shall prepare and submit to DES for approval, a plan for monitoring, recording and reporting impoundment water surface elevations, inflows, turbine flows, bypass flows and power generation. To the maximum extent feasible, monitoring and recording of data shall be automated and collected continuously (i.e, at least every hour). The plan shall include a description and design of the mechanisms and structures that will be used, including equipment accuracy, frequency of measurement, the level of automation and any periodic maintenance and/or calibration necessary to ensure the devices work properly. The plan shall also address how data will be recorded to verify proper operations and how these data will be maintained for inspection by DES and other resource agencies. The plan shall also include a schedule for when the plan will be implemented. The Applicant shall consult with DES, NHFGD, and USFWS in developing these plans and shall respond to agency comments. The Applicant shall then implement the DES approved plan.
- E-12. **Water Quality Sampling and Analysis Plan:** The Applicant shall conduct water quality monitoring surveys after the FERC license is reissued. Prior to conducting the surveys a Sampling and Analysis Plan (SAP) shall be developed in consultation with DES, NHFGD, and USFWS, and shall be submitted to DES for approval within two (2) months (or a later date acceptable to DES) from the effective date of the license. The Applicant shall then implement the approved SAP. Unless otherwise authorized or directed by DES, the SAP shall, as a minimum, include the following.
- a. Continuous (at least every 30 minutes) monitoring for dissolved oxygen (concentration and daily average percent saturation) and temperature in Powder Mill Pond and the Monadnock impoundment, in the river downstream of the Powder Mill Pond dam, in the Pierce and Paper Mill bypass channels, and in the river downstream of the Paper Mill

development during periods of low flow and high temperature. Measurements shall include times when the minimum flows are being passed as well as when water levels in Powder Mill Pond are stable and being fluctuated for power generation. If requested by DES, dissolved oxygen and temperature profiles shall also be taken in the impoundments mentioned above.

- b. Monitoring for chlorophyll-a (algae) and nutrients in Powder Mill Pond.
- c. Sampling and laboratory protocols, including quality assurance/ quality control provisions.
- d. Sufficient monitoring to allow the surface waters to be assessed for compliance with these parameters in accordance with the DES Consolidated Assessment and Listing Methodology⁷.
- e. Initiation of data collection during the first low-flow season (i.e., stream flows less than three times 7Q10) after FERC license issuance. Depending on the results of the first year, DES may require additional years of monitoring.
- f. A schedule for filing summary reports, a description of what will be provided in the reports and a schedule for uploading monitoring results into the DES Environmental Monitoring Database (EMD).

E-13. Invasive Species:

- a. The Applicant shall, within six (6) months (or a later date if acceptable to DES) from the effective date of the license, prepare and submit to DES for approval, a plan to monitor invasive plant species, such as variable leaf milfoil (*Myriophyllum heterophyllum*), yellow iris (*Iris pseudacorus*), and purple loosestrife (*Lythrum salicaria*), at the project. The plan shall include, but not be limited to, the following: (1) a description of the monitoring method; (2) frequency of monitoring; (3) a schedule for filing monitoring reports with DES, NHFGD, USFWS, and FERC; and (4) a description of and implementation schedule for providing public information about species. The Applicant shall consult with the DES, NHFGD and USFWS in developing the Invasive Species Monitoring Plan and shall then implement the DES approved plan.
- b. The Applicant shall participate with DES and others in the development of a Long Term Management Plan (LTMP) to control invasive species in Powder Mill Pond and shall comply with any Project operational requirements specified in the DES approved LTMP provided they do not conflict with this Certification.

E-14. Fish Passage. Should the Secretary of the Interior pursuant to Section 18 of the Federal Power Act require the Applicant to construct, operate and maintain any fish passage facilities for the Project, those requirements shall become a condition of this Certification.

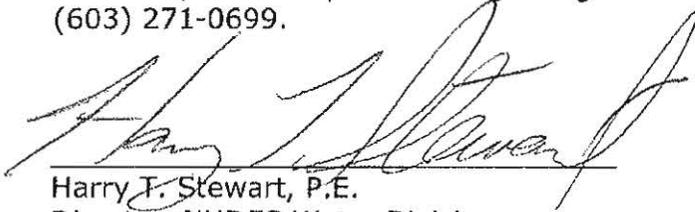
⁷ The 2012 Consolidated Assessment and Listing Methodology is available at <http://des.nh.gov/organization/divisions/water/wmb/swqa/2012/documents/2012-calm.pdf>

F. APPEAL

Any person aggrieved by this decision may appeal to the N.H. Water Council ("Council") by filing an appeal that meets the requirements specified in RSA 21-O:14 and the rules adopted by the Council, Env-WC 100-200. The appeal must be filed directly with the Council within 30 days of the date of this decision and must set forth fully every ground upon which it is claimed that the decision complained of is unlawful or unreasonable. Only those grounds set forth in the notice of appeal can be considered by the Council.

Information about the Council, including a link to the Council's rules, is available at <http://nhec.nh.gov/> (or more directly at <http://nhec.nh.gov/water/index.htm>). Copies of the rules also are available from the DES Public Information Center at (603) 271-2975.

If you have questions regarding this Certification, please contact Owen David at (603) 271-0699.



Harry T. Stewart, P.E.
Director, NHDES Water Division

cc: Samantha Davidson, FERC
Denise P. French, Administrator, Town of Bennington
Pamela L. Brenner, Administrator, Town of Peterborough
Aaron Patt, Administrator, Town of Greenfield
Barbara Caverly, Administrator, Town of Hancock
John Warner, US Fish and Wildlife Service
Carol Henderson, NH Fish and Game Department

Appendix 4

PSNH Interconnection Report Customer Generation for Monadnock Paper Mills
SESD Site No. 070
Dtd May 18, 1992

PSNH INTERCONNECTION REPORT FOR
CUSTOMER GENERATION

Monadnock Paper Mills

SESD SITE NO. 070

P.J. Bradshaw
May 18, 1992

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I. INTRODUCTION

A study has been performed to determine the impact on the PSNH system of all generation located within the generating facility located at Monadnock Paper Mills (hereafter referred to as MPM). All technical analysis was based on the equipment listed under Section II, and the facility arrangement illustrated on partial one-line diagram SK-PJB-070-3. Where actual site-specific data was not readily available, estimated or "typical" values were utilized in any required calculations. Any deviation from the listed equipment or the illustrated configuration may have significant safety and/or technical ramifications. Consequently, if changes are anticipated now or in the future, PSNH should be informed immediately so that the requirements and recommendations contained within the report may be revised where necessary. This procedure will ensure that MPM is informed of PSNH requirements in a timely fashion and should eliminate the delays and expense which could otherwise be experienced by MPM.

II. DESCRIPTION OF MAJOR COMPONENTS

A. Description Of Facilities

MPM is a large industrial customer of PSNH, which supplements its service with its own generation, consisting of 5 synchronous hydro units and one induction, steam driven unit. Total generating capacity is 2,170 KVA. The site is located in Bennington, N.H., and interconnects at 34.5KV to a tap on line 313 which is normally fed radially from Jackman substation. The facility interconnects to the PSNH 34.5 KV system through a 3000 KVA, 34.5-2.4 KV transformer bank, connected in a delta-delta configuration. All units generate at 2.4 KV and connect directly to the 2.4 KV bus, which is also the source of power for the plant's 2400 volt motor load. MPM's 2.4 KV system is an ungrounded delta system.

The 200 KVA steam driven unit and one hydro unit are located in the basement of the main plant. Two more units are located at Pierce Station which is approximately 2,000 feet away. The final two units are located at Monadnock Station, which is approximately 700 feet from Pierce Station. The two stations are connected to the mill by a 2.4 KV overhead distribution line.

Metering at the site consists of 4 meters: KW in, Kvar in, Kw out and Kvar out. The load of the plant is usually high enough that the PSNH system is providing some power. However, during periods when generation exceeds load, MPM does generate power into the system, and sells that power to PSNH.

Typically, all hydro units will be on line when

sufficient water exists and units are available. The 750 KVA unit in the plant itself is usually the first to be started if water is low. However, there are no hard and fast unit commitment procedures. Any combination of units could be running at a given time. None of the units have black-start capability. Without an energized PSNH power supply to synchronize to, none can be brought on line.

With the exception of the recently added 200 KVA induction machine, the generation at MPM has been in service for decades. Each of the machines has some level of fault protection, however the site as presently configured does not meet modern PSNH interconnection requirements for a site of this capacity. The primary concern is the delta-delta transformer that serves as a GSU. Since there is no ground source at MPM, PSNH customers connected phase to ground on the 313 line could be exposed to excessive voltages if generation at the plant continued to run after the breaker at Jackman s/s tripped for a line to ground fault.

Rather than require that each machine at MPM be brought into compliance with today's criteria, this report will specify a protection and control package to be implemented primarily at the interface between PSNH and MPM (See sketch SK-PJB-070-3).

B. Electrical Components

1. Plant Steam Unit

Generator: Toshiba induction, 200 KW, .80 PF, 2400V, 1800 RPM
Turbine: Worthington S2R, 260 HP @ 4000 RPM
Governor: Woodward 505 electronic governor.

2. Plant Hydro

Generator: Electric Machinery synchronous, 750 KVA, 261a, .80 PF, 2200V, 180 RPM.
Exciter: 14 KW, 125V, 112a, 750 RPM
Turbine: Horizontal shaft hydroturbine, 1000 HP

3. Pierce Station #1

Generator: Westinghouse synchronous, 500 KVA, 120a, 2400V, 150 RPM.
Exciter: Westinghouse belt driven, 21KW, 125V, 168a, 1200 RPM.
Turbine: Vertical shaft hydroturbine.

4. Pierce Station #2

Generator: Westinghouse synchronous, 220 KVA, 53a, 2400V, 225 RPM.
Exciter: Westinghouse belt driven, 11.5 KW, 125V, 92a, 1200 RPM.
Turbine: Vertical shaft hydroturbine.

5. Monadnock Station #1

Generator: Electric Machinery synchronous, 125 KVA, 31.5a, .80 PF 2300 V, 180 RPM.

Exciter: Static

Turbine: Vertical shaft hydroturbine.

6. Monadnock Station #2

Generator: Westinghouse synchronous, 375 KVA, 94a, .80 PF, 2300 V, 257 RPM.

Exciter: Westinghouse, shaft mounted, 10 KW, 125V, 80a, 257 RPM, 31.5a

Turbine: Vertical shaft hydroturbine.

7. Generator Stepup Transformer: 3-1000 KVA, 34400-4360Y/2520V, Z=6.05%, configured as Delta-Delta bank.

8. Grounding Bank (new requirement): 3-100 KVA, Z=3.5% - 4.5%. See section IV.A.

9. Three phase vacuum interrupting device (new requirement). See section IV.A.

10. Three phase air break switch (new requirement). See section IV.A.

III. PSNH REQUIREMENTS - GENERAL

A. Safety Considerations

1. The connection of the facility to the PSNH system must not compromise the safety of PSNH's customers, personnel, or the owner's personnel.

2. The generating facility must not have the capability of energizing a de-energized PSNH circuit.

3. An emergency shutdown switch with facility status indicator lights, and a disconnecting device with a visible open shall be made available for unrestricted use by PSNH personnel. The operation of the switch shall cause all of the facility's generation to be removed from service, and shall block all automatic startup of generation until the switch is reset. The status lights, mounted with the shutdown switch, shall be located outdoors at a position acceptable to PSNH operating division personnel. A red light shall indicate that the facility has generation connected to the PSNH system. A green light shall indicate that all generation is disconnected from the PSNH system. The lights shall be driven directly from auxiliary switches located on the breakers tripped by the shutdown switch. The disconnecting device with visible open shall be located between the PSNH system and the facility's generation.

In this instance, the emergency shutdown switch will trip the following breakers (refer to SK-PJB-070-3):

- a. The breaker connecting the 750 KVA hydro to the 2400V switchgear.
- b. The breaker connecting Monadnock and Pierce stations to the 2400V switchgear.
- c. The generator breaker of the 200 KVA induction unit.

This will allow the shutdown switch to disconnect the facility's generation without disconnecting load.

4. The settings for all protective relays required by PSNH will be developed by PSNH at MPM's expense.
5. A crew of PSNH relay technicians will apply settings to and verify the proper functioning of those protective systems required by PSNH. This work will be performed at the MPM's expense.
6. The generating facility has full responsibility for ensuring that the protective system and the associated devices are maintained in reliable operating condition. PSNH reserves the right to inspect and test all protective equipment at the interconnecting point whenever it is considered necessary. This inspection may include tripping of the breakers.
7. The short circuit interrupting device(s) must have sufficient interrupting capacity for all faults that might exist. The PSNH system impedance at the facility will be supplied on request.
8. All shunt-tripped short circuit interrupting devices applied to generators must be equipped with reliable power sources. A D.C. battery with associated charging facilities is considered a reliable source.
9. All synchronous generator facilities must be equipped with battery-tripped circuit breakers.
10. Any protection scheme utilizing AC control power must be designed in a fail-safe mode. That is, all protective components must utilize contacts which are closed during normal operating conditions, but which open during abnormal conditions or when control power is lost to de-energize the generator contactor coil. These schemes may be utilized only with non-latching contactors and may not be used with synchronous generators.

11. A complete set of AC and DC elementary diagrams showing the implementation of all systems required by PSNH must be supplied for PSNH review. These drawings should be supplied as soon as possible so that any non-conforming items may be corrected by MPM without impacting the scheduled completion date of the facility.

12. All voltage transformers driving PSNH-required protection systems must be rated by the manufacturer as to accuracy class, and must be capable of driving their connected burdens with an error not exceeding 1.2 percent.

13. All current transformers driving PSNH-required protection systems must be rated by the manufacturer as to accuracy class and must be capable of driving their connected burdens with an error not exceeding 10 percent.

14. All PSNH-required protective relays, and any other relays which PSNH will be requested to test, must be equipped with test facilities which allow secondary quantity injection and output contact isolation.

15. It is not the policy of PSNH to maintain a stock of protective relays for resale to facility developers. Since many protective devices have delivery times of several months, Developers are strongly advised to order them as soon as possible after PSNH type-approval is received.

16. Protection of the generating facility equipment for problems and/or disturbances which might occur internal or external to the facility is the responsibility of MPM.

17. After acceptance of this report, the facility shall have 6 months to meet the requirements of sections III and IV, including the calibration and testing of all protection and control systems. During that period of time, the existing generation may continue to operate, provided that existing protection and control systems remain fully operational.

B. Service Quality Considerations

1. The connection of the facility to the PSNH system must not reduce the quality of service currently existing on the PSNH system. Voltage fluctuations, flicker, and excessive voltage and current harmonic content are among the service quality considerations.

2. In general, induction generators must be accelerated to "synchronous" speed prior to connection to the PSNH system to reduce the magnitude and duration of accelerating current and resulting voltage drop to PSNH customers to acceptable levels.

3. In general, synchronous generators may not use the "pull-in" method of synchronizing due to excessive voltage drops to PSNH customers.

4. Power factor correction capacitors may be required for some facilities either at the time of initial installation, or, at some later date. The installation will normally be done by the MPM at their expense.

5. Certain facilities having installed capacity similar in magnitude to connected circuit load may require that control modifications be made to tap changers in the electrical vicinity. Should they be necessary, the modification will be made at the Developers' expense.

6. Automatic reclosing of the PSNH circuit after a tripping operation may occur after an appropriate time delay. If voltage blocking of automatic reclosing is required, it will be added at the Developers' expense.

C. Metering Considerations

1. Except for metering and protection/control voltage sensing and generator and/or capacitor contactor supply voltage, no unmetered AC power shall be taken from the PSNH system.

IV. PSNH REQUIREMENTS - SPECIFIC

A. System Configuration and Protection

All equipment to be obtained by MPM must be reviewed and approved by PSNH.

1. The facility must be arranged and equipped as per partial one line diagram SK-PJB-070-3.

2. Device 52 must be a PSNH-approved 3 phase vacuum interrupting device.

3. As shown in sketch SK-PJB-070-3, a three phase air break switch must be installed between the PSNH system and the three phase interrupting device. The BIL rating of the switch should be 150 KV or greater.

4. The following protective functions must be supplied and connected to automatically trip 52. These devices must be utility grade as approved by PSNH.

51/51N Interrupting Device Overcurrents. If the interrupting device is a recloser, the recloser control may be acceptable if equipped with suitable overcurrent protective functions.

27/59 Over/Under Voltage Relay.
47 Negative Sequence Over Voltage Relay.
51N-GB Grounding Bank Neutral Overcurrent Relay.
810/U Over/Under Frequency Relay

5. A grounding bank will be required which conforms to the following specifications:

a. 3-100 KVA matched step transformers (low side voltage 2400V or greater) wired in a delta-grounded wye configuration (wye on the 34.45 KV side.)

b. Bank impedance of the individual transformers should be between 3.5 and 4.5 percent on 100 KVA.

c. Transformers must be 4-bushing models, i.e voltage rating 19920/34500 GRDY - E where "E" is the rated phase to phase voltage on the low voltage side.

6. Device 52 must be equipped with closing permissives such that the PSNH side of 52 must be energized and the MPM side must be deenergized before the device can be closed.

7. If MPM selects a recloser to be used as device 52, then all testing of and application of settings to the control will be performed by PSNH Western Division electricians.

B. System Metering

No changes to existing metering are required at this time. However, changes may be required if MPM installs phase to neutral connected load. PSNH should be informed if such a change is planned.

C. Primary Interconnection

In order to facilitate a straightforward interface, PSNH will sell MPM sufficient distribution plant to mount all required equipment on the source side of the existing primary meter location. MPM will have responsibility for specification, purchase and installation of all new equipment from the plant up to and including the air break switch.

As stated in section IV.A, all equipment to be obtained by MPM must be reviewed and approved by PSNH.

D. System Operation

Automatic Reclosing:

PSNH does not require automatic reclosing of device 52 following a trip due to relay operation. However MPM has expressed a desire to add reclosing in order to restore plant load as soon as possible. PSNH and MPM will investigate this option.

V. PSNH PRICE ESTIMATES

The following estimates for labor, materials, and overheads are supplied as an aid to the MPM for financial planning purposes. Should MPM elect to have PSNH perform any of the work described in the estimates, they will ultimately be billed for the full actual cost of any work performed.

Authorization for PSNH to perform any of the work or supply any of the equipment described below must be forwarded to the Supplemental Energy Sources Department along with a minimum payment covering 50% of the estimated labor and materials cost. PSNH will neither perform work nor order materials until this requirement has been met.

A. System Protection

1. All protective relay materials listed under IV.2 will be purchased by MPM. PSNH must be notified as to exact relay model numbers proposed before ordering so that proper setting capability exists for interfacing with the PSNH system.

SUBTOTAL \$ 0.00

2. Estimated labor for a PSNH crew to test and load check PSNH required relays and to perform trip tests. Also, labor to verify correct connection of the grounding bank.

SUBTOTAL \$1907.00

3. Engineering - Control circuits review, specification review, meetings, system analysis, PSNH required relay settings.

SUBTOTAL \$6643.00

SUBTOTAL - SECTION A: \$ 8550.00

B. System Metering

SUBTOTAL \$ 0.00

C. Primary Interconnection

1. MPM will be responsible for obtaining and installing all equipment up to and including the plant and the air break switch. PSNH must be notified as to exact specifications proposed before ordering.

SUBTOTAL: \$ 0.00

2. Cost to purchase sufficient overhead distribution plant from PSNH to mount all required equipment.

SUBTOTAL: \$ 488.00

3. Cost of labor to set and test 52 recloser control (if applicable: see section IV.A.7).

SUBTOTAL: \$ 355.00

SUBTOTAL - SECTION C: \$ 843.00

GRAND TOTAL (A + B + C): \$ 9393.00

VI. INTERCONNECTION EQUIPMENT OWNERSHIP, OPERATION, AND MAINTENANCE

A. Delivery Point

For the purpose of establishing ownership, operation, and maintenance responsibilities, the location of facility energy delivery to PSNH (the "Delivery Point") must be defined. At this facility, the delivery point is located on the source side of the new three-phase air break switch.

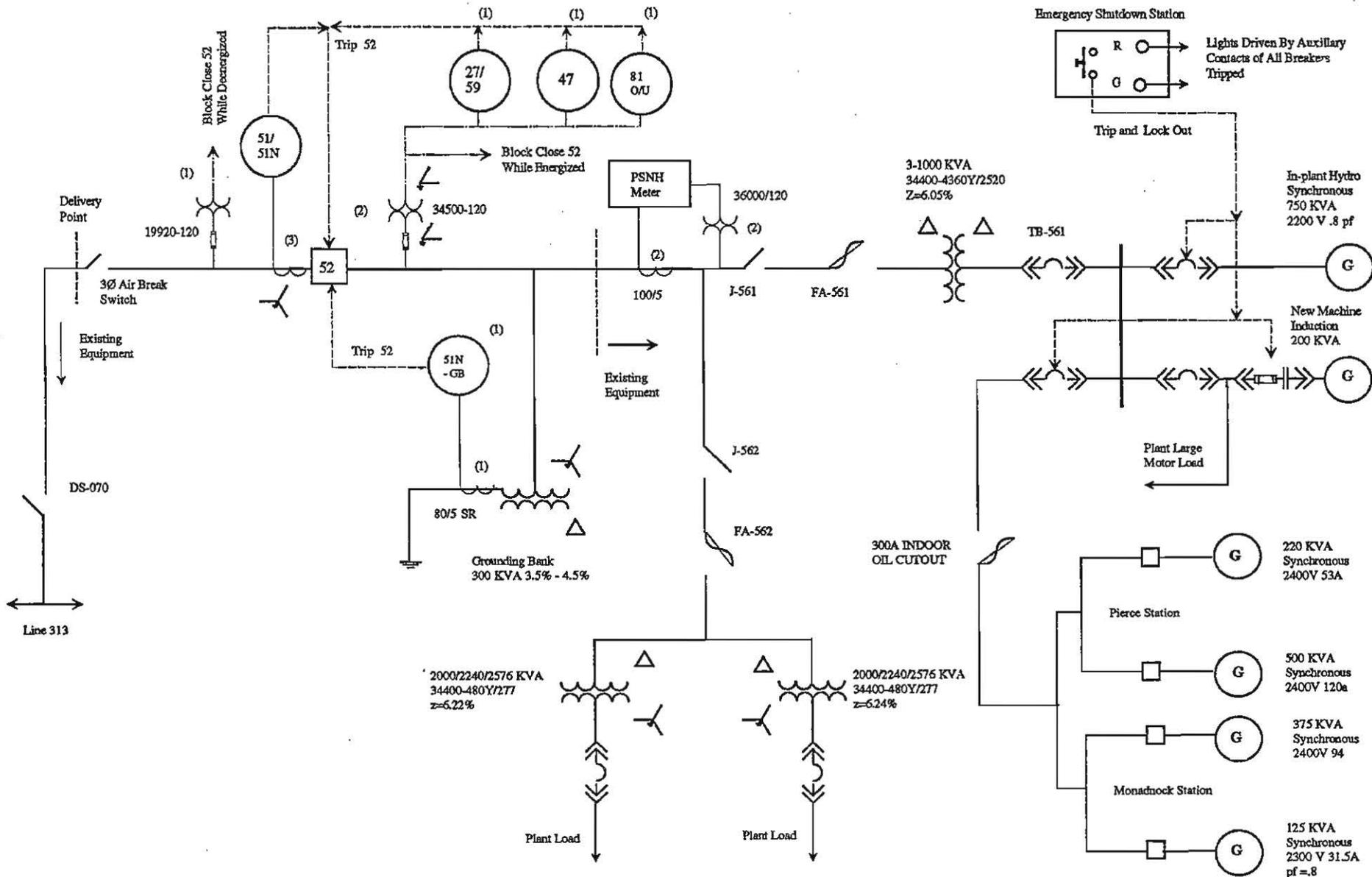
B. Description of Responsibilities

MPM will own and be responsible for maintaining all equipment from the three phase switch into the plant building, with the exception of the primary meter set, which is jointly owned and maintained by PSNH and MPM.

VII. DRAWINGS

Drawing SK-PJB-070-3 is attached.

P.J. Bradshaw
May 18, 1992



SK-PJB-070-3
ONE LINE DIAGRAM - PSNH INTERFACE
WITH MONADNOCK PAPER (SESD # 070)
P.J. BRADSHAW 05/18/92