74 FERC ¶ 62,087

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Niagara Mohawk Power Corporation) Project No. 11408-000

ORDER ISSUING ORIGINAL LICENSE
(Major Project)

FEB 21 1996

Niagara Mohawk Power Corporation (NIMO), filed a license application under Part I of the Federal Power Act (FPA) for the expansion, continued operation and maintenance of the 38.4-megawatt (MW) Salmon River Project located on the Salmon River in Oswego County, New York. The project would generate approximately 114,690 megawatthours (MWh) of electricity annually. The Salmon River is a navigable waterway of the United States. 1/

Notice of the application has been published. Motions to intervene were filed by the New York State Department of Environmental Conservation (NYSDEC), the Department of the Interior (Interior), Thomas Herbert, Village of Pulaski, New York Rivers United, and the Town of Richland. No entity objected to issuance of this license. Comments received from interested agencies and individuals have been fully considered in determining whether or under what circumstances, to issue this license.

The staff issued a Draft Environmental Assessment (DEA) for this project on November 9, 1994. The staff analyzed and considered all the comments filed on the DEA in preparing the Final Environmental Assessment, which is attached to and made part of this license order. The Commission's staff also prepared a Safety and Design Assessment (S&DA), which is available in the Commission's public file associated with this project.

BACKGROUND

A. Project Description

1/ Niagara Mohawk Power Corporation, 39 FERC ¶ 62,075 (1987) and 39 FERC ¶ 62,076 (1987), order denying appeal, 45 FERC ¶ 61,404 (1988), order granting reh'g, 53 FERC ¶ 61,329 (1990)(finding Salmon River not navigable and licensing not necessary), rev'd, New York Dept. of Environ. Conservation v. FERC, 932 F.2d 56 (2nd Cir. 1992)(finding Salmon River navigable).

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The Salmon River Project presently consists of two developments: (1) the 28.75-MW Bennetts Bridge development, and (2) the 7.5-MW Lighthouse Hill development, which is located about 1 mile downstream of the Bennetts Bridge powerhouse. The total existing installed capacity of the Salmon River Project is 36,250 Kw.

NIMO proposes to install a new 2,150 Kw base-flow generating unit at the Lighthouse Hill Dam to utilize the continuous year-round base flow of between 185 and 335 cfs downstream of the Lighthouse Hill Development. NIMO proposes to release a minimum flow of 20 cfs from the Bennetts Bridge Development to the bypass reach from July 1 to September 30 for aesthetic purposes, and 7 cfs for the remainder of the year for aquatic habitat. The total installed capacity with the addition of the new base flow generating unit will be 38,400 Kw.

A detailed project description is contained in ordering paragraph (B)(2).

B. Water Quality Certification

By letter dated April 27, 1993, NIMO requested Section 401 water quality certification (WQC) from the NYSDEC, as required by the Clean Water Act. The NYSDEC received this request for WQC on April 28, 1993.

On April 28, 1994, the NYSDEC issued a WQC which states, "The Department [NYSDEC] makes this certification provided that the terms and conditions of the attached Settlement Agreement [Settlement Offer], signed by the Department [NYSDEC], NIMO, New York Rivers United, the Adirondack Mountain Club and Trout Unlimited are met".

The Settlement Offer 2/ (Attachment A to the Final EA) has 17 terms and conditions (stipulations) grouped as follows: (1) concerns downstream of Lighthouse Hill (four stipulations), (2) concerns from Lighthouse Hill upstream (seven stipulations), (3) management of lands outside the FERC project boundary (three stipulations), and (4) miscellaneous.

2/ This order incorporates all of the provisions of the Settlement Offer into various license articles, except for the sales of, and conveyance of easements in, properties outside the project boundary for non-project purposes. Such sales and conveyances are not included as license provisions because they were not agreed to by the licensee to mitigate the environmental effects, or enhance the environmental resources, of this specific project.

The WQC states that the Department [NYSDEC] reserves the right to reconsider the entire [Section 401] Certification if there is a significant change in the scope of the proposal or project as licensed, or in the event the referenced application or Settlement Agreement are amended.

This condition in effect gives the State the opportunity to revisit its certification. However, Section 401(a)(3) of the Clean Water Act sets out the exclusive manner in which State certifications may be modified and makes clear that the process is initiated by the federal licensing or permitting agency, not the State.3/ Thus, the Commission determines whether proposed license amendments require new water quality certification. 4/ Therefore, we believe that this condition, which gives the State authority beyond that provided for in the Clean Water Act, is beyond the scope of Section 401 of the Clean Water Act and thus should not be included in a license. 5/

C. Coastal Zone Management Program

The proposed Salmon River Project, located about 12 miles outside of New York's coastal zone boundary, may affect coastal resources. The New York Department of State (NYDS) is responsible for reviewing the proposed project for consistency with the state's Coastal Management Program (CMP). Under the Coastal Zone Management Act of 1972, before we can issue a license, the NYDS must: (1) find the project consistent with the CMP or (2) waive the requirements by failing to act in a timely manner.

On August 30, 1994, the NYDS concurred with the consistency certification information provided by NIMO, and found the Salmon River Project consistent with the CMP.

3/ There is an exception in cases where the licensee makes changes to the construction or operation of the facility without first notifying the relevant federal authorities.

4/ The Commission's regulations, 18 C.F.R. § 4.38(7)(iii) (1993), provide that, if an applicant seeks to amend its application or license, it must make a new request for water quality certification if the amendment would have a material adverse impact in the discharge from the project. We make the determination as to whether a material adverse impact will result from the amendment and, thus, whether a new certification is necessary. See, e.g., 57 FERC ¶ 61,261 (1991), reh'g denied, 61 FERC ¶ 61,215 (1992).

5/ See Tunbridge Mill, 68 FERC ¶ 61,078 (July 1994) and Consumers Power Company, 68 FERC ¶ 61,077 (July 1994).

D. Section 18 Fishway Prescription

Historically the 110-foot-high Salmon River Falls, located on the reach of the Salmon River between the Salmon River Reservoir and the Bennetts Bridge powerhouse, provide a natural barrier to upstream movement of fish from Lake Ontario to the Salmon River above the falls. With the construction of the Lighthouse Hill dam in 1930, the dam became a deterrent to upstream fish movement on the Salmon River.

No resource agency currently requires upstream or downstream fish passage facilities for the Salmon River Project. Interior stated that provisions for upstream and downstream fish passage facilities are not necessary. However, since management objectives are subject to change over the term of the license, Interior reserves its authority, under Section 18 of the FPA, to prescribe fishways in the future. NIMO does not oppose a reservation clause that would permit consideration of fishway facilities in the future.

I recognize that future fish passage needs and management objectives cannot always be predicted at the time of license issuance. Section 18 of the FPA provides the Secretary of the Interior the authority to prescribe fishways. 6/ Although fishways may not be recommended by Interior at the time of project licensing, upon receiving a specific request from Interior, it is appropriate for the Commission to include a license article which reserves Interior's prescription authority. 7/ Therefore, Article No. 406 of this license reserves Interior's authority to prescribe fishways.

E. Recommendations of Fish and Wildlife Agencies

Pursuant to Section 10(j) of the FPA, we make a determination that the recommendations of the federal and state fish and wildlife agencies are consistent with the purposes and requirements of Part I of the FPA and applicable law. Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations of federal and state fish and wildlife agencies, for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. We have addressed the concerns of the federal and state fish and wildlife agencies and the license includes conditions consistent with the recommendations of the agencies.

6/ Section 18 of the FPA states that the Commission shall require such fishways as may be prescribed by the Secretary of Commerce or the Secretary of the Interior as appropriate.

7/ Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

F. Comprehensive Plans

Section 10(a) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving waterways affected by the project. Under Section 10(a)(2) of the FPA, federal and state agencies filed 19 comprehensive plans that address various resources in New York. Of these, we identified and reviewed seven plans relevant to the proposed Salmon River Project.8/ No inconsistencies were found.

G. Comprehensive Development

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a hydropower project, the recreational, fish and wildlife resources, and other non-developmental values of the involved waterway are considered equally with its electrical energy and other developmental values. In determining whether, and under what conditions, a hydropower license should be issued, the Commission must weigh the various economic and environmental values involved in the decision.

Based on staff's independent review and evaluation of the Salmon River Project, recommendations of the agencies and other interested parties, and the no-action alternative as documented in the FEA, I have selected issuing a license for the Salmon River Project as the preferred option. I have selected this option because: (1) the required environmental enhancement measures would mitigate adverse impacts to, protect, or enhance fishery resources, water quality, vegetation, wetlands, wildlife, recreational resources, and cultural resources; (2) the 114,690 Mwh of electric energy that would be generated annually from a renewable resource would be beneficial because it would

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8/ Fisheries Enhancement Plan for the Salmon River, 1994, New York State Department of Environmental Conservation; New York wild, scenic, and recreational river system act, 1985, New York State Department of Environmental Conservation; Regulation for management of the wild, scenic, and recreational river system act, 1986, New York State Department of Environmental Conservation; People, Resources, Recreation, 1983, New York State Office of Parks, Recreation, and Historic Preservation; Final environmental impact statement - restoration of Atlantic salmon to New England rivers, 1989, Department of the Interior; Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service, undated, U.S. Fish and Wildlife Service; The nationwide rivers inventory, 1982, Department of the Interior.

reduce the use of fossil-fueled, steam-electric generating plants, conserve non-renewable energy resources, and reduce atmospheric pollution.

The enhancement measures being required include:

(1) soil erosion control measures for the proposed construction and enhancement of recreational facilities; (2) release flows from the Lighthouse Hill development: 185 cfs from May 1 through August 31, 335 cfs from September 1 through December 31, and 285 cfs from January 1 through April 30; (3) scheduled discharge changes from Lighthouse Hill Reservoir must be ramped up or down in increments to ensure angler safety; (4) a stream flow and reservoir elevation gaging and monitoring plan; (5) a water temperatures monitoring plan; (6) fish protection from entrainment; (7) provision of flows for the Salmon River Fish Hatchery, (up to 22 cfs); (8) a wetlands enhancement plan; (9) a 20-cfs minimum flow release to the Bennetts Bridge bypassed reach July 1 through September 30, and 7 cfs for the remainder of the year; (10) modification of the streambed to distribute the flow over the Salmon River Falls for aesthetics; (11) establishment of natural buffer zones to screen proposed recreational facilities, and improve scenic views; (12) utilization of visually compatible colors on project features and screen project features; (13) a Programmatic Agreement to protect cultural resources; (14) provision of fishing and canoe and car-top boat and fishing access, parking, picnic tables, trails, and a campground; (15) provision of public access to informal fishing access, installation of signs, and installation of a boat launch; (16) periodic review of recreational use at the project; (17) flow releases at least five weekends per year for whitewater users and fishing enhancement.

The Project as proposed by NIMO and based on current economic conditions without future escalation or inflation, would cost about $3,884,000 (33.86 mills/Kwh) and would produce about 114.69 GWh of energy annually having a current value of about $6,171,000 (53.81 mills/Kwh) for a current net annual power benefit of about $2,287,000 (19.94 mills/Kwh). As licensed with our required mitigation measures, the project still produce about 114.69 Gwh of energy annually, at a current net annual benefit of about $1,919,000.

H. Term of License and Back Annual Charges

Because the Salmon River Project will involve a moderate amount of development at an existing dam, i.e., the addition of capacity and the construction of recreational facilities and a change in flow releases, the term of this license will be 40 years. According to Commission policy, we will recoup an amount equivalent to annual charges,that would have been assessed if the project had been licensed as of April 1, 1962 9/.

I. Summary of Findings

Background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment are contained in the attached EA. Issuance of the license is not a major federal action significantly affecting the quality of the human environment.

The project will be safe if operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the S&DA.

I conclude that the Salmon River Project does not conflict with any planned or authorized development, and is best adapted to the comprehensive development of the Salmon River for beneficial public use.

The Director Orders:

(A) This license is issued to the Niagara Mohawk Power Corporation (licensee) for a period of 40 years, effective the first day of the month in which it is issued, to construct, operate and maintain the Salmon River Project. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and to the regulations the Commission issues under the provisions of the FPA.

(B) Project consists of:

(1) All lands, to the extent of NIMO's interests in those lands, as shown on exhibits G-1 (Sheet 1) through G-12 (Sheet 12) (FERC Drawing Numbers 11408-7 through 11408-18) of the application.

9/ See, 58 FERC ¶ 61,318.

Exhibit G	FERC No.	Showing
G-1	11408-7	General Location
G-2	11408-8	Bennett's Bridge Project Boundary
G-3	11408-9	Bennet's Bridge Project Boundary
G-4	11408-10	Bennett's Bridge Project Boundary
G-5	11408-11	Bennett's Bridge Project Boundary
G-6	11408-12	Bennett's Bridge Project Boundary
G-7	11408-13	Bennett's Bridge Project Boundary
G-8	11408-14	Bennett's Bridge Project Boundary
G-9	11408-15	Bennett's Bridge Project Boundary
G-10	11408-16	Lighthouse Hill Detail Map
G-11	11408-17	Lighthouse Hill Project Boundary
G-12	11408-18	Lighthouse Hill Project Boundary

(2) Project works consisting of:

Bennetts Bridge Development

(1) a 607-foot-long and 45-foot-high concrete gravity dam with a reinforced concrete intake structure 92 feet long by 39.5 feet wide by 53 feet high, consisting of (a) a 107-foot-long non-overflow section with crest elevation at 942 feet (USGS); (b) a 244-foot-long ungated spillway section with crest elevation at 935 feet, equipped with 2-foot-high flashboards; and (c) a 256-foot-long gated spillway section with crest elevation at 926 feet, with eleven 11.5-foot-high by 20-foot-wide Taintor gates; (2) an impoundment with gross storage capacity of 66,000 acre-feet, maximum surface area of 3,550 acres and normal maximum surface elevation at 937 feet; (3) three earth dikes 100, 1,330 and 695 feet long located along the south shore of the impoundment; (4) a 10,000-foot-long conduit system consisting of (a) a concrete tunnel section 650 feet long and 12 feet in diameter; (b) a reinforced plastic pipeline section 7,790 feet long and 12 feet in diameter; (c) a steel pipeline section 1,200 feet long and 11.5 feet in diameter; (d) a differential surge tank 105 feet high; (e) a steel distributor 200 feet long and 12 feet in diameter; and (f) four steel penstocks, each 330 feet long and 8 feet in diameter, with associate shut-off and air valves ; (5) a concrete/brick/steel powerhouse 206 feet long and 70 feet wide, containing four turbine-generator units with a total installed capacity of about 28,750 kilowatts (Kw); (6)

three existing 12-kilovolt (kV) transmission lines with a total length of 17,300 feet; and (7) appurtenant facilities.

Lighthouse Hill Development

(1) a 382-foot-long concrete gravity dam consisting of (a) a 155-foot-long and 59-foot-high non-overflow section with crest elevation at 656 feet (USGS); (b) a 43-foot-long and 53-foot-high un-gated spillway section with crest elevation at 650 feet controlled by a 1-foot-high flashboards; and (c) a 184-foot-long and 46-foot-high spillway section with crest elevation at 643 feet, gated with eight 20-foot-wide by 7-foot-high Taintor gates equipped with 1-foot-high flashboards; (2) an impoundment with gross storage capacity of 3,200 acre-feet, maximum surface area of 170 acres with normal maximum surface elevation at 651 feet; (3) a 324-foot-long and 40-foot-high earthen dike with crest elevation at 656 feet; (4) three 17-foot-wide by 8-foot-high by 62-foot-long concrete penstocks; (5) a 15-foot-long sluice gate section; (6) a 125-foot-long concrete/brick/steel powerhouse with an intake structure, containing two existing turbine-generator units with a total installed capacity of about 7,500 Kw, and one new 2,150 Kw turbine-generator unit; (7) a 40-foot-wide and 2,800-foot-long tailrace channel; (8) a 400-foot-long, 12-Kv transmission line; and (9) appurtenant facilities.

The project works generally described above are more specifically described in exhibit A of the license application and shown by exhibit F:

Exhibit A:

Pages A-2 through A-9 describing the existing mechanical, electrical and transmission equipment, filed April 28, 1993.

Exhibit F:

Exhibit F	FERC No.	Showing
Sheet 1	11408-1	Bennetts Bridge Development General Plan - Dikes, Dam, Intake & Spillway Plans, Elevations and Sections
Sheet 2	11408-2	Bennetts Bridge Development Intake & Storage Building Plan, Elevations and Sections
Sheet 3	11408-3	Bennetts Bridge Development Pipeline, Surge Tank and Valve Houses

		Plans, Elevations, Sections, Details & Profile
Sheet 4	11408-4	Bennetts Bridge Development Powerhouse Plan, Elevation and Sections
Sheet 5A	11408-5	Lighthouse Hill Development General Plan - Dike, dam, Spillway and Intake Plan, Elevation and Sections
Sheet 6	11408-6	Lighthouse Hill Development Powerhouse Plan and Sections

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

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

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

Article 201. The licensee shall pay the United States the following annual charges:

1. From April 1, 1962, to January 31, 1996, for the purpose of reimbursing the United States for the cost of Administration of Part I of the FPA, 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 36,250 Kw.

From February 1, 1996, through January 31, 2036, for the purposes of reimbursing the United States for the Commission's administrative costs, pursuant to Part I of the Federal Power Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized

existing installed capacity for that purpose is 36,250 kilowatts (Kw).

In addition to the above charge a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized proposed additional capacity for that purpose is 2,150 Kw. This annual charge shall be effective as of the date of commencement of operation of the new capacity.

Article 202. Within 45 days of the date of issuance of the license, the licensee shall file an original set and two duplicate sets of aperture cards of the approved exhibit drawings. The set of originals shall be reproduced on silver or gelatin 35mm microfilm. The duplicate sets shall be copies of the originals made on diazo-type microfilm. All microfilm shall be mounted on type D (3-1/4' X 7-3/8") aperture cards.

Prior to microfilming, the FERC Drawing Number (11408-1 through 11408-18) shall be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number shall be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (e.g., F-1, G-1, etc.), Drawing Title, and date of this license shall be typed on the upper left corner of each aperture card.

The original and one duplicate set of aperture cards shall be filed with the Secretary of the Commission, ATTN: DPCA/ERB. The remaining duplicate set of aperture cards shall be filed with the Commission's New York Regional Office.

Article 203. Authority is reserved to the Commission, in the context of any licensing, relicensing, or license or exemption amendment proceeding involving projects located on the Salmon River and its tributaries, to require the licensee, in a proceeding specific to this license, to conduct studies, modify minimum flow releases or facilities, or otherwise make reasonable provisions for modifying project facilities or operation as necessary to mitigate or avoid cumulative effects to the salmonid fishery, recreational fishing, wetlands, dependent wildlife and recreational whitewater boating as identified in Section VB of the Environmental Assessment.

Article 301. The licensee shall commence installation of the new base-flow unit in the Lighthouse Hill powerhouse and associated work within two years from the issuance date of the license and shall complete the installation within four years from the issuance date of the license.

Article 302. The licensee shall at least 60 days prior to start of installation, submit one copy to the Commission's Regional Director and two copies to the Director, Division of Dam

Safety and Inspections of the final contract drawings and specifications for pertinent features of the project, such as water retention structures, powerhouse, and water conveyance structures. The Director, Division of Dam Safety and Inspections may require changes in the plans and specifications to assure a safe and adequate project.

Article 303. The licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days prior to start of construction of the cofferdam, the licensee shall submit to the Commission's Regional Director and Director, Division of Dam Safety and Inspections, one copy each of the approved cofferdam construction drawings and specifications and the letter(s) of approval.

Article 304. The licensee shall within 90 days of completion of installation of the new base-flow unit at the Lighthouse Hill powerhouse and associated work file for approval by the Commission, revised Exhibits A, F and G to describe and show the new base-flow unit and associated work as built.

Article 401. The licensee shall operate the Salmon River Project as specified in the Offer of Settlement filed with the Commission on January 27, 1994. The Offer of Settlement requires that the project be operated according to Rule Curve 16, as described in the Water Budget Model, submitted May 5, 1993, and modified on June 16, 1993 and August 9, 1993. Following Rule Curve 16 will provide for the protection and enhancement of aquatic resources, water quality, fisheries, aesthetic resources, and recreation resources in the Salmon River basin. The Offer of Settlement requires;

(1) a continuous year-round base flow from the Lighthouse Hill Reservoir while maintaining target water surface elevations in the Salmon River Reservoir, as follows:

Month	Base Flow (cfs) at Lighthouse Hill	Target Water Surface Elevation (ft) at Salmon River Reservoir
January	285	935
February	285	932
March	285	923
April	285	926
May	185	936
June	185	936
July	185	936
August	185	935
September	335	933
October	335	930

November	335	930
December	335	931

Target water surface elevations for Salmon River Reservoir would be measured at Bennetts Bridge. Base flows would be released directly from the Lighthouse Hill development, except for the 22 cfs which would be released from the Salmon River Fish Hatchery.

Target water surface elevations for Salmon River Reservoir may not be achievable during periods of high or low inflows. High-flow and low-flow periods are defined when the water surface elevation at Salmon River reaches the following limits:

Month	High-flow Trigger Elevation (ft)	Low-flow Trigger Elevation (ft)
January	936	925
February	933	925
March	937	920
April	937	920
May	937	920
June	937	920
July	937	920
August	936	920
September	934	918
October	931	918
November	931	918
December	932	925

During high-flow or low-flow periods, base flows should take precedence over reservoir elevations. However, base flows could be less than the required amount during extreme drought or emergency conditions.

(2) providing flow from the Lighthouse Hill Reservoir to Salmon River Fish Hatchery, not to exceed 22 cfs;

(3) ramping flows when changes to the releases are not the result of increased inflow. The flow would be ramped by increasing flows in increments of 400 cfs or less every 24 hours when base flows are greater than 185 cfs, and increments of 200 cfs or less when base flows are 285 cfs or less. Down-ramping, or decreasing flows, would occur on a 12-hour basis according to the same flow schedule;

(4) releases for whitewater boating activities at least five weekends per year from Lighthouse Hill for whitewater users, as specified in the attachment to the Offer of Settlement

dated August 9, 1993 and amendment filed with the Commission by letter dated May 9, 1994. These flows should be provided as follows: one weekend in June-400 cfs; two-weekends in July-750 cfs; the first full-weekend in August-750 cfs; and the first weekend in September-750 cfs.

(5) releasing, at the Bennetts Bridge dam into the Bennetts Bridge bypass reach, a continuous minimum flow of 20 cfs July 1 through September 30, and 7 cfs for the remainder of the year.

These flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods of time upon mutual agreement between the licensee, the New York State Department of Environmental Conservation (NYSDEC), and U.S. Fish and Wildlife Service (FWS). If the flow is so modified, the licensee shall notify the Commission, the NYSDEC and the FWS as soon as possible, but no later than 10 days after each such incident.

Article 402. Within 6 months from the issuance of this license, in order to monitor the flows and operating mode required by article 401, the licensee shall prepare and file for Commission approval, a comprehensive plan for monitoring stream flows and reservoir water surface elevations. The plan shall include, but not be limited to: (1) the use of existing and/or the installation of new staff gages, reservoir surface level monitoring devices, and recording stream gaging equipment as needed; (2) operating and maintaining the stream flow gage at Pineville; and (3) a schedule for implementing the plan which includes the date for completed installation of all monitoring devices.

The licensee shall prepare the flow monitoring plan in consultation with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service. The licensee shall allow a minimum of 30 days for agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

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

Article 403. Within 6 months from the issuance of this license, the licensee shall prepare and file for Commission approval a final plan to install, operate, and maintain water temperature gages on the Salmon River. The plan should include a water temperature monitor at Lighthouse Hill Reservoir; the results of a feasibility analysis for installing a water

temperature monitor at Pineville; and a proposal that the licensee collect and analyze water temperature data from all monitors, including a temperature gage to be installed by the New York State Department of Environmental Conservation (NYSDEC) at the Salmon River Fish Hatchery.

The licensee shall prepare the temperature monitoring plan in consultation with the NYSDEC and the U.S. Fish and Wildlife Service. The licensee shall allow a minimum of 30 days for agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

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

Article 404. The licensee shall implement their proposal for fish protection at the Lighthouse Hill Development and Bennetts Bridge Development, by replacing the existing 3.75-inch-spaced trashracks at Lighthouse Hill with 1.0-inch-spaced trashracks within 4 years from the issuance of this license, and installing 1.0-inch-spaced trashracks at Bennetts Bridge when the existing 1.5-inch-spaced trashracks wear out.

At least 90 days before installation of the trashracks at either Lighthouse Hill or Bennetts Bridge, the licensee shall file a final plan and installation schedule with the Commission. The Commission reserves the right to require changes to the facilities and schedule. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 405. The licensee shall continue to participate in the New York State Department of Environmental Conservation's (NYDEC's) sea lamprey control program by providing periodic flow releases of about 36 cfs from Lighthouse Hill, when requested by the NYSDEC, to facilitate chemical treatment of the Salmon River with lampricide.

This flow release may be modified upon mutual agreement between the licensee, the NYDEC, and U.S. Fish and Wildlife Service. The licensee shall notify the Commission of any proposed changes and, upon Commission approval, implement the modified flow. In the event there is a disagreement on the timing or amount of flows, the licensee shall, as soon as possible but no later than 10 days after the disagreement, notify the Commission. Based on the information available at that time, the Commission will make a determination on an appropriate flow release for sea lamprey control.

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

Article 406. Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of, such fishways, as may be prescribed by the Secretary of the Interior, pursuant to Section 18 of the Federal Power Act.

Article 407. Within 6 months from the issuance of this license, the licensee shall file with the Commission for approval a plan for enhancing wetland OR-18, associated with Lighthouse Hill reservoir. The plan shall include, at a minimum, the following:

(a) The elements of the "Outline Wetland Enhancement Plan for the Lighthouse Hill Reservoir Wetland OR-18, Salmon River Hydroelectric Project FERC Project No. 11408, Oswego County, New York", filed May 11, 1994;

(c) identification of the location and acreage of wetlands to be enhanced;

(d) a description of procedures to be used to enhance wetlands;

(e) a description of the monitoring program to evaluate the effectiveness of the wetland enhancement program;

(f) a proposal to provide recommendations to the agencies and the Commission for alternative wetland enhancement, if monitoring indicates that the implemented wetland enhancement is not successful; and

(g) schedules for the proposed wetland enhancement, the monitoring program, filing the results of the monitoring program and filing recommendations for any alternative wetland enhancement.

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

The Commission reserves the right to require changes to the plan. No construction shall begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 408. Within 6 months from the issuance of this license, the licensee shall file a final plan to modify the streambed at the top of Salmon River Falls to better distribute the minimum flow releases required in Article 401, item 5, over the falls. The plan should ensure that the required modifications are as physically and visually compatible as possible with the falls' natural and cultural features, and are as effective as possible in aesthetically distributing the required minimum flow releases over the falls.

The plan should include two small weirs constructed with indigenous ledge material. The weirs shall be placed in the two low lying areas of the river channel immediately above the falls. One of the weirs shall have a maximum height of 1 foot at its center and shall be about 8 feet long. The other weir shall have a maximum height of 2 feet at its center and shall be about 23 feet long. The natural ledge material used to construct the weirs shall be fastened in place with rebars, without being visible, so that the material will not wash downstream during spring flooding. The plan should also include a construction schedule.

The licensee shall prepare the streambed modification plan and construction schedule in consultation with the National Park Service, the Fish and Wildlife Service, and the New York State Department of Environmental Conservation. The licensee shall allow a minimum of 30 days for agencies to comment and to make recommendations before filing the final plan and construction schedule with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. No construction shall begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 409. The licensee shall, in the course of normally scheduled maintenance, repaint the 1,200-foot-long aboveground segment of the Bennetts Bridge pipeline in order to improve its visual compatibility with the surroundings. The licensee shall paint the pipeline a flat, dark brown color that blends with the dominant natural colors of the landscape.

Article 410. The Licensee's Proposed Landscape Plan filed on January 27, 1994 -- is approved and made a part of this license. The licensee shall implement provisions of the approved landscape plan within 6 months from issuance date of this license to screen the Lighthouse Hill powerhouse, substation, and transmission line complex from adjacent roadside viewpoints.

Article 411. The licensee shall implement the "Programmatic Agreement Among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and the New York State Historic Preservation Officer, for Managing Historic Properties That May Be Affected By A License Issuing to Niagara Mohawk Power Corporation For the Continued Operation of the Salmon River Hydroelectric Power Project in New York," executed on January 13, 1995, including but not limited to the Cultural Resources Management Plan for the project. In the event that the Programmatic Agreement is terminated, the Licensee shall implement the provisions of its approved Cultural Resources Management Plan. The Commission reserves the authority to require changes to the Cultural Resources Management Plan at any time during the term of the license. If the Programmatic Agreement is terminated prior to Commission approval of the Cultural Resources Management Plan, the Licensee shall obtain Commission approval before engaging in any ground disturbing activities or taking any other action that may affect any historic properties within the Project's area of potential effect.

Article 412. Within 6 months from the license issuance, the licensee shall file with the Commission, for approval, and, upon approval, implement a recreation plan that includes, but is not limited to:

(1) providing fishing access, canoe and car-top boat access, parking, picnic tables, and trails at the proposed Hogback Road campground along the Lighthouse Hill Reservoir;

(2) providing fishing access at the existing Lighthouse Hill day use area at the eastern end of the Lighthouse Hill Reservoir and Bennetts Bridge tailrace area;

(3) ensuring continued public access to the Falls Road day use area at the west end of the Salmon River Reservoir; enhancing the informal fishing access at the Salmon River Reservoir by improving access trails and installing signs on the south shore, just west of the Route 17 bridge near Redfield; and installing a boat launch in the Redfield area of the Salmon River Reservoir;

(4) establishing natural buffer zones to screen the recreational facilities from view by waterway users, and selectively

clearing some trees to open up scenic views of the waterway to recreation facility users;

(5) providing final site plans for the facilities;

(6) indicating the entity or entities responsible for operating and maintaining the facilities;

(7) discussing how the design of the facilities take into consideration the guidelines established by the Architectural and Transportation Barriers Compliance Board (36 C.F.R. Part 1191);

(8) establishing erosion and sediment control measures and measures for revegetation of disturbed areas to be implemented during and after construction of the new recreational facilities; and

(9) providing a schedule for constructing the facilities.

The licensee shall file the plan after consultation with the New York State Department of Environmental Conservation, the National Park Service, and the Natural Resources Conservation Service. The licensee shall include with the plan copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. No land-disturbing or land-clearing activities shall begin until the licensee is notified that the plan is approved. Upon approval, the licensee shall implement the plan, including any changes required by the Commission.

Further, the Licensee shall consult with the NYSDEC and the NPS during the development of methods for collecting the periodic FERC Form 80 data. Licensee shall provide NYSDEC copies of the completed data for their review and comment, and any received shall be filed with the Commission along with the completed FERC Form 80.

Article 413. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority

only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, 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 type of use and occupancy of project lands and water for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69 kilovolts or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed. If no conveyance was made during the prior calendar year, the licensee shall so inform the Commission and the Regional Director in writing no later than January 31 of each year.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted,

and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

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

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

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

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to insure 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; and (iii) the grantee shall not unduly restrict public access to project waters.

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

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

exhibit G or K drawings would be filed for approval for other purposes.

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

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

(F) This order is issued under authority delegated to the Director and constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of this order, pursuant to 18 C.F.R. § 385.713. The filing of a request for rehearing does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically ordered by the Commission. The licensee's failure to file a request for rehearing shall constitute acceptance of this license.

Fred E. Springer
Director, Office of
Hydropower Licensing

FINAL ENVIRONMENTAL ASSESSMENT FOR HYDROPOWER LICENSE

Salmon River Hydroelectric Project

FERC Project No. 11408-000

New York

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review
888 First Street, NE
Washington, D.C. 20426

February 16, 1996

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SUMMARY

On April 28, 1993, the Niagara Mohawk Power Corporation (NIMO) filed an original license application with the Federal Energy Regulatory Commission (Commission) for the existing Salmon River Hydroelectric Project, a major project with an installed capacity of 39.7 megawatts (MW). The project is located on the Salmon River, near the Village of Altmar in Oswego County, New York (see figure 1), and consists of two hydroelectric developments, the Bennetts Bridge development and the Lighthouse Hill development, located downstream of the Bennetts Bridge development. The two developments generate a combined total of 118,232,000 kilowatthours (kWh), annually.

NIMO revised the project application on January 27, 1994, by filing an Offer of Settlement (Settlement Offer) with the Commission in its licensing proceedings. NIMO negotiated the Settlement Offer with two of the interested parties in the licensing proceedings: the New York State Department of Environmental Conservation (NYSDEC) and New York Rivers United. The Adirondack Mountain Club and Trout Unlimited have also signed the Settlement Offer.

The Settlement Offer contains NIMO's final environmental mitigation proposals, including its proposed rule curve for operating the project (Rule Curve 16), as well as final proposed schedules for minimum base flow, aesthetic flow, and recreational whitewater flow releases which are based on Rule Curve 16.

NIMO proposes to install a 2.15-MW (nameplate rating) turbine-generator unit in the empty turbine bay in the Lighthouse Hill powerhouse. The purpose of the new unit would be to provide minimum flows (base flows) needed to protect and enhance downstream fishery resources, water quality, aesthetic conditions, and recreational opportunities. The new unit would increase the project's installed capacity to 41.85 MW. However, because of proposed operational changes for environmental enhancement purposes, the average annual generation for both developments with the proposed new unit would decrease from 118,232,000 kWh to 114,690,000 kWh.

By letter dated April 27, 1993, NIMO requested Section 401 water quality certification (WQC) from the NYSDEC, as required by the Clean Water Act. The NYSDEC received this request for WQC on April 28, 1993. On April 28, 1994 the NYSDEC issued a Section 401 WQC for the Salmon River Project.

The Federal Energy Regulatory Commission (Commission) issued the Salmon River Project Draft Environmental Assessment (DEA) for comment on November 18, 1994. In response, we received five comment letters. The comment period ended on December 19, 1994, and some comments were filed after that date. However, we

have reviewed and responded to all comment letters received on the DEA. The sections of the Final Environmental Assessment (EA) that have been modified as a result of comments are identified in the our responses to the letters of comment (see Appendix B).

This FEA analyzes the effects associated with issuing an original license for the Salmon River Project under the Federal Power Act (FPA), and recommends terms and conditions to become a part of any license issued.

Based on our consideration of all relevant developmental and nondevelopmental resource interests, we recommend that 15 measures be included in any license issued for the Salmon River Project to protect, mitigate adverse impacts to, and enhance environmental resources. These measures are discussed in section VI.A., and summarized in section VIII. of the FEA.

Overall, these environmental measures along with standard articles provided in any license issued for the project would protect, enhance, or mitigate for adverse impacts to geology and soils, fish and wildlife resources, water quality, recreational resources, and cultural resources in the project area. In addition, electricity generated from the proposed project would reduce the use of fossil-fueled electric generating plants, conserve non-renewable energy resources, and reduce atmospheric pollution. Denying the license -- meaning that all of the power that would have been produced by the Salmon River Project would not be realized and no measures would be implemented to enhance existing environmental resources -- has also been considered.

Based on our independent review and evaluation of the Salmon River Project, agency recommendations, and the no-action alternative, we recommend issuing an original license for the Salmon River Project, with staff-recommended enhancement measures. We select this option because: (1) our required measures would protect and enhance water quality, fishery, recreational, and cultural resources; and (2) the 114,690,000 kWh of electric energy that would be generated annually from a renewable resource would continue to reduce the use of fossil-fueled, steam-electric generating plants, conserve nonrenewable energy resources, and reduce atmospheric pollution.

Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations of Federal and state fish and wildlife agencies, for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. In this FEA, we have addressed the concerns of the Federal and state fish and wildlife agencies and made recommendations consistent with those of the agencies.

Based on our independent environmental analysis, we conclude in the FEA that issuing an original license for the Salmon River

Project would not constitute a major Federal action significantly affecting the quality of the human environment.

FINAL ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING, DIVISION OF PROJECT REVIEW

Salmon River Hydroelectric Project
FERC Project No. 11408-000--New York
February 16, 1996

INTRODUCTION

The Federal Energy Regulatory Commission (Commission) issued the Salmon River Hydroelectric Project Draft Environmental Assessment (DEA) for comment on November 9, 1994. In response, we received four coment letters. Those who commented are listed in section IV.C., Comment on the DEA. All timely-filed comment letters were reviewed by the staff. The sections of the Final Environmental Assessment (FEA) that have been modified as a result of comments received are identified in the staff responses to the right of the letters of comment, in appendix B.

I. APPLICATION

On April 28, 1993, the Niagara Mohawk Power Corporation (NIMO) filed an application for an original license for the existing Salmon River Hydroelectric Project, a major project with an installed capacity of 39.7 megawatts (MW). The project is currently unlicensed. The project site is located on the Salmon River near the Village of Pulaski in Oswego County, New York (Figure 1). The project would not occupy any United States lands. On January 27 (2 filings), February 28, March 28, May 10, and May 11, 1994, NIMO supplemented its application.

Offer of Settlement

NIMO revised the project application on January 27, 1994, by filing an Offer of Settlement (Settlement Offer) with the Commission in its licensing proceedings.[1] The Settlement Offer is included as Attachment A to this final environmental assessment (FEA). The Settlement Offer was signed by NIMO on December 22, 1993, by the New York State Department of Environmental Conservation (NYSDEC) on January 6, 1994, by New York Rivers United on January 10, 1994, by the Adirondack Mountain Club on April 1, 1994, and by Trout Unlimited on April 8, 1994.

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[1] Filed pursuant to 18 CFR Section 385.602(b).

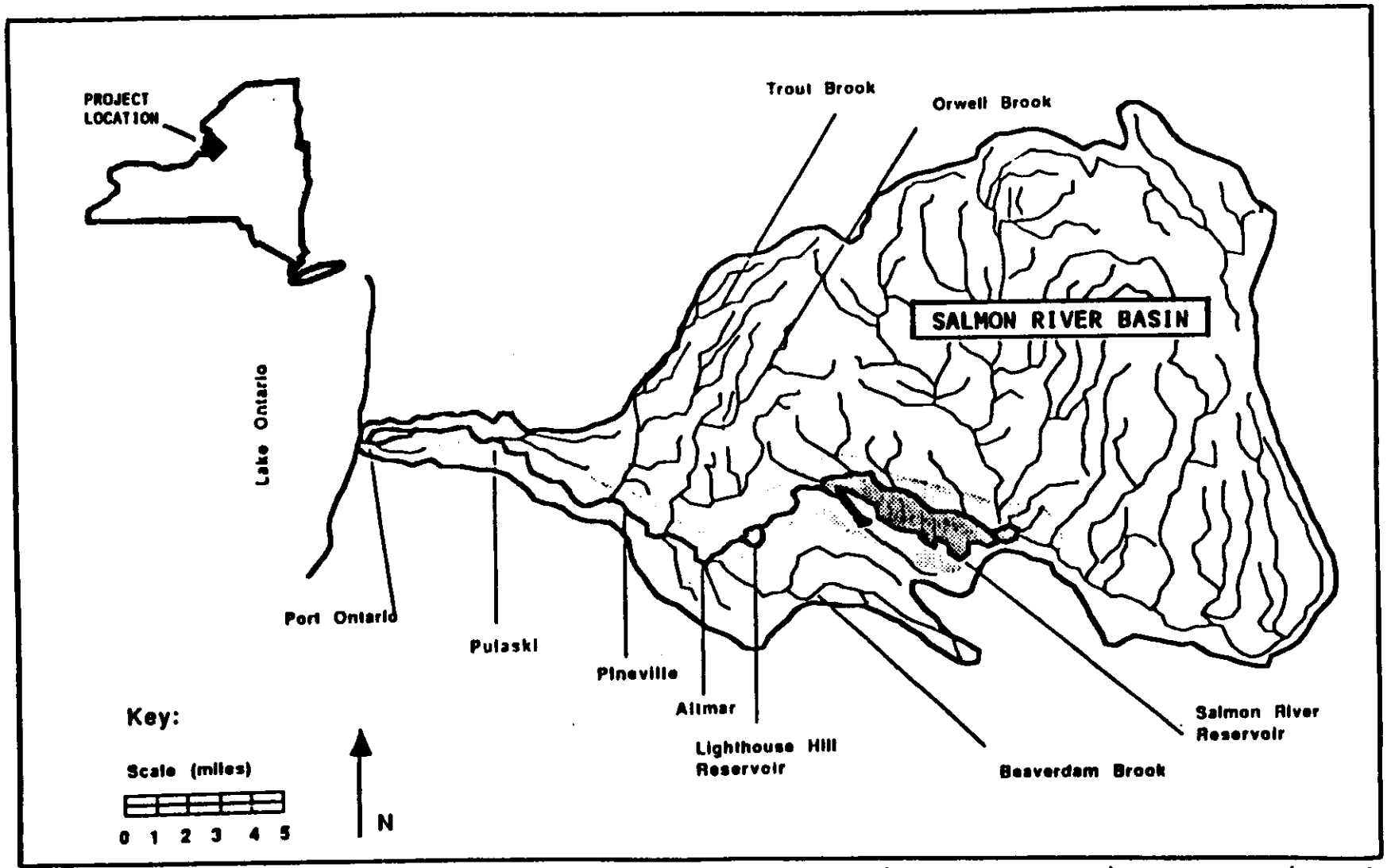

Figure 1. Location of the Salmon River Hydroelectric Project: Salmon River Reservoir and Lighthouse Hill Reservoir. (Source: FERC staff; as modified from Niagara Mohawk Power Corporation, April 28, 1993, application for license for the Salmon River Hydroelectric Project, FERC No. 11408-000).

II. PURPOSE AND NEED FOR ACTION

A. Purpose of Action

This FEA analyzes the effects associated with the proposed continued operation of the Salmon River Project (as revised by the Settlement Offer) and alternatives to the proposed project, makes recommendations to the Federal Energy Regulatory Commission (Commission) on whether to issue a license, and if so, recommends terms and conditions to become a part of any license issued. The Federal Power Act (FPA) provides the Commission with the exclusive authority to license nonfederal water power projects on navigable waterways and Federal lands.

In deciding whether to issue any license, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife resources (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality. This FEA reflects the above considerations.

B. Need for Power

NIMO's customers have benefitted from the low-cost, hydropower energy -- which produces no atmospheric pollution -- from the Bennetts Bridge development since 1920 and from the Lighthouse Hill development since 1936. As proposed in the application and supplemental filings, the two developments would have a combined nameplate rating of 38.4 MW (the combined installed capacity would be approximately 41.85 MW), and an estimated average annual energy generation of 114,690,000 kilowatthours (kWh).

NIMO is a reporting member of the New York Power Pool (NYPP) Subregion of the Northeast Power Coordinating Council (NPCC) region. Each year the Planning Committee of the NYPP prepares a report of load and capacity data (actual and projected) which coordinates and combines data submitted by its reporting-party member utilities. These annual reports, required by the United States Department of Energy and the North American Electric Reliability Council, are referred to by the electric power industry and by others as the DOE Form OE-411 Report, or more compactly as "The OE-411 Report." The OE-411 Reports provide actual data for the year preceding the reporting year and projected data and information for the reporting year and for the remaining years of a 10-year planning period.

In addition to being well-represented in NPCC's OE-411 Report, the NYPP published a report (dated July 1, 1993) which complements the NPCC OE-411 Report. Volume 2 of this report gives load and capacity data for the Member Electric Systems of the NYPP for a 20-year planning period from 1993 to 2012, inclusive. We shall refer to this report as "The July 1 Report."

Table I-6, which appears on page 12 of Volume 2 of The July 1 Report, gives projections for summer peak loads for the NYPP Member Electric Systems for each of the 20 years from 1993 to 2012. Table I-6 data are base-line plus Class I DSM impacts[2] achieved prior to January 1, 1993.

Table I-6 projects the Non-DSM Peak Load for NIMO to be 6,080 MW in 1993 and to increase to 7,963 by 2012. These two projected values of summer peak load yield an annual compound growth rate of 1.4 percent for NIMO.

Since NIMO and the its customers have benefitted from the low-cost hydropower for more than 70 years in the case of the Bennetts Bridge development and for more than 55 years in the case of the Lighthouse Hill development; and since a 1.4-percent average annual growth-rate in summer peak-demand is forecast, it is the opinion of staff that the need of NIMO and its customers for the Salmon River Project power is adequately established.

III. PROPOSED ACTION AND ALTERNATIVES

A. Applicant's Proposal

1. Project Description

a. Project Features

Existing Features

The existing project (see Figure 2) consists of two developments: (A) the Bennetts Bridge hydroelectric development, and (B) the Lighthouse Hill hydroelectric development which is located about 1 mile downstream of the Bennetts Bridge powerhouse.

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[2] Class I DSM (demand-side management impacts) is defined to include programs which permanently reduce load or shift load on a fixed schedule and requires no communications between utility dispatcher and the customer. It would include the categories of conservation, alternate fuels and such peak-load management programs as thermal storage and time-of-day rates.

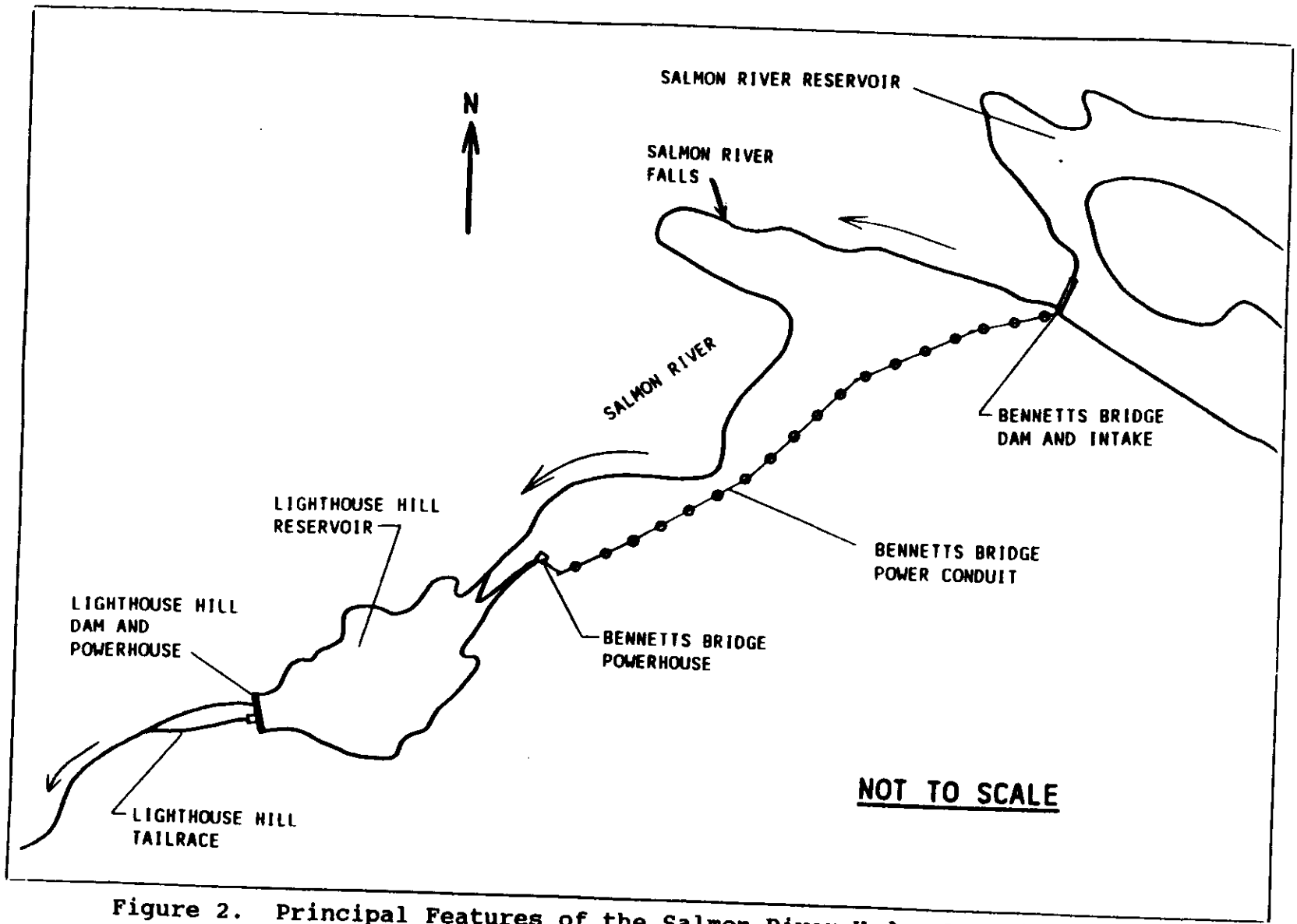

Figure 2. Principal Features of the Salmon River Hydroelectric Project. (Source: FERC Staff).

The Bennetts Bridge hydroelectric development consists of: (1) a 607-foot-long and 45-foot-high concrete gravity dam with a reinforced concrete intake structure 92 feet long by 39.5 feet wide by 53 feet high, consisting of (a) a 107-foot-long non-overflow section with crest elevation at 942 feet above mean sea level (MSL); (b) a 244-foot-long un-gated spillway section with crest elevation at 935 feet, equipped with two-foot-high flashboards; and (c) a 256-foot-long gated spillway section with crest elevation at 926 feet, with eleven 11.5-foot-high by 20-foot-wide Taintor gates; (2) an impoundment (Salmon River Reservoir) with gross storage capacity of 66,000 acre-feet, maximum surface area of 3,550 acres, and normal maximum surface elevation at 937 feet; (3) three earth dikes 100, 1,330, and 695 feet long located along the south shore of the impoundment; (4) a 10,000-foot-long conduit system consisting of (a) a concrete tunnel section 650 feet long and 12 feet in diameter; (b) a reinforced thermosetting resin plastic pipeline section 7,790 feet long and 12 feet in diameter; (c) a steel pipeline section 1,200 feet long and 11.5 feet in diameter; (d) a differential surge tank 105 feet high; (e) a steel distributor 200 feet long and 12 feet in diameter; and (f) four steel penstocks, each 330 feet long and 8 feet in diameter, with associate shut-off and air valves; (5) a concrete-brick-steel powerhouse 206 feet long and 70 feet wide, containing four turbine-generator units with a total nameplate capacity of about 28.75 MW (installed capacity of about 31.5 MW); (6) three 12-kilovolt (kV) transmission lines with a total length of 17,300 feet; and (7) appurtenant facilities.

The Lighthouse Hill hydroelectric development consists of: (1) a 382-foot-long concrete gravity dam consisting of (a) a 155-foot-long and 59-foot-high non-overflow section with crest elevation at 656 feet MSL; (b) a 43-foot-long and 53-foot-high un-gated spillway section with crest elevation at 650 feet controlled by 1-foot-high flashboards; (c) a 184-foot-long and 46-foot-high spillway section with crest elevation at 643 feet, gated with eight 20-foot-wide by 7-foot-high Taintor gates equipped with 1-foot-high flashboards; (2) an impoundment with a gross storage capacity of 3,200 acre-feet, maximum surface area of 170 acres with normal maximum surface elevation at 651 feet; (3) a 324-foot-long and 40-foot-high earthen dike with crest elevation at 656 feet; (4) three 17-foot-wide by 8-foot-high by 62-foot-long concrete penstocks; (5) a 15-foot-long sluice gate section; (6) a 125-foot-long concrete-brick-steel powerhouse with an intake structure, containing two existing turbine-generator units with a total nameplate capacity of about 7.5 MW (installed capacity of about 8.2 MW), and space for one 2.15 MW future unit; (7) a 40-foot-wide and 2,800-foot-long tailrace channel; (8) a 400-foot-long, 12-kV transmission line; and (9) appurtenant facilities.

Proposed Features

NIMO proposes to install a 2.15-MW (nameplate rating) turbine-generator unit in the empty turbine bay in the Lighthouse Hill powerhouse. The proposed unit would be capable of discharging flows between 160 and 450 cubic feet per second (cfs).

b. Project Operation

In the Settlement Offer (see Attachment A), NIMO proposes to operate the project in a modified peaking mode according to Rule Curve 16. Flow releases from Bennetts Bridge would be modified to include bypassed reach base flows to protect and enhance aesthetic conditions, aquatic, and terrestrial resources. Net bypassed and hydroelectric flows from Bennetts Bridge would be re-regulated by Lighthouse Hill dam. The purpose of the new unit at Lighthouse Hill would be to provide minimum flows (base flows) needed to protect and enhance downstream fishery resources, water quality, aesthetic conditions, and recreational opportunities.

NIMO's proposed flow releases and allocations for protection and enhancement of environmental resources are outlined below in section III.A.2.b.

2. Proposed Enhancement Measures

NIMO's proposed environmental enhancement measures were presented over a period of time via several document filings, beginning with the application filed April 28, 1993, and culminating in the final revisions to the proposals contained in the Settlement Offer filed on January 27, 1994, (Attachment A).

a. Construction. NIMO's proposed construction-related environmental enhancement measures are as follows:

- Provide fishing and recreational access:
  - Lighthouse Hill Reservoir - fishing, canoe, and car-top boat access, parking, picnic tables, and trails at the proposed Hogback Road campground; fishing access at the existing Lighthouse Hill day use area at the eastern end of reservoir and Bennetts Bridge tailrace area.
  - Salmon River Reservoir - continue to allow public access to the Falls Road day use area at the west end of the reservoir; formalize and enhance existing informal fishing access by improving access trails and installing signs on the south shore, just west of the Route 17 bridge near Redfield; and install a boat launch in the Redfield area of the reservoir.

- Modify the streambed at the top of Salmon River Falls (see figure 2) to better distribute flows over the falls.

- Keep the clearing of vegetation and the disturbance of other natural landscape features and conditions to a minimum when constructing proposed recreational facilities, and to restore or stabilize land areas that are cleared or disturbed during construction.

- Provide natural buffer zones to screen proposed recreational facilities from view by waterway users, and selectively clear some trees to open up scenic views of the waterway to recreation facility users.

- Use a visually compatible color when repainting the aboveground segment of the Bennetts Bridge pipeline in the future.

- Plant evergreen trees along County Route 22 to screen views of the Lighthouse Hill powerhouse, substation, and associated facilities.

b. Operation. NIMO's proposed operation-related environmental enhancement measures are as follows:

- Establish a Flow Management Advisory Team (FMAT), consisting of representatives from state and Federal agencies, local interest groups, and NIMO.

  The FMAT would function to keep abreast of the changing conditions that may affect river flows and coordinate requests to the Commission for changes in flows, releases, and other water-related issues.

- Provide continual base flows downstream of the project (i) to protect the downstream fishery, (ii) to provide releases for paddling recreationists, and (iii) to enhance aesthetic conditions:

  - measure flows at the Salmon River Fish Hatchery, which draws water from the Lighthouse Hill impoundment;

  - provide flow releases according to a schedule to be based on "Rule Curve 16" which was developed in consultation with resource agencies: 185 cfs May 1 through August 31; 335 cfs September 1 through December 31; and 285 cfs January 1 through April 30;

  - release low flows (flows between 160 and 450 cfs) through the proposed new base flow unit in the Lighthouse Hill powerhouse.

- Modify fluctuations of the Salmon River and Lighthouse Hill Reservoirs, using the proposed new Rule Curve 16, and thereby enhance wetlands and dependent wildlife.

- Reduce the extent of the March drawdown of the Salmon River Reservoir, maintain a higher and more stable reservoir level May through July, and increase late summer reservoir elevations an average of 4 feet over historical levels, in accordance with proposed Rule Curve 16 to enhance aesthetic resources.

- Use gradual flow increases and decreases (ramping) during scheduled discharge changes from Lighthouse Hill: increases - once every 24 hours (hrs) in increments of 200 and 400 cfs (changes would continue to occur before midnight to ensure angler safety); decreases - once every 12 hrs in 400-cfs increments.

- Provide flows needed by the New York State Department of Environmental Conservation's (NYSDEC) Salmon River Fish Hatchery, up to 22 cfs, via an existing pipeline from Lighthouse Hill reservoir to the hatchery (the pipeline currently provides 22 cfs to the hatchery regardless of need); flows in excess of hatchery needs would go through the new base flow unit at the powerhouse.

- Provide the following flow releases at least five weekends per year from Lighthouse Hill for whitewater users and fishing enhancement, as specified by stipulation I.B of the Settlement Offer: one weekend in June-400 cfs; two weekends in July-750 cfs; the first full weekend in August-750 cfs; and the first weekend in September-750 cfs.

- Replace the existing 3.75-inch-spaced trashracks at Lighthouse Hill with 1-inch trashracks within four years of license issuance; install 1-inch-spaced trashracks when the existing 1.5-inch trashracks at Bennetts Bridge need to be replaced.

- Release 87,600 cfs-hrs per year as year-round aesthetic flows to the Bennetts Bridge bypassed reach. A continuous 20-cfs minimum flow release would be provided to the reach July 1 through September 30; 7 cfs would be provided for the remainder of the year.

- Operate and maintain the existing flow monitoring gage on the Salmon River at Pineville.

- Establish, operate, and maintain a temperature monitor at Lighthouse Hill reservoir; investigate the feasibility of temperature monitoring at the Pineville gaging station; and collect and compile temperature data from the Lighthouse

Hill monitor, the Pineville monitor (if and when installed), and a monitor to be established by the NYSDEC at the Salmon River Fish Hatchery.

B. No-Action Alternative

Because the project is not licensed, we define no-action as not issuing a license to operate the existing hydroelectric developments. Under this alternative, NIMO would not be allowed to operate the hydroelectric developments and could ultimately be required to remove the dams and generating facilities. No enhancement measures would be implemented to protect, mitigate adverse impacts to, or enhance existing environmental resources.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

The following entities commented and/or intervened on the application subsequent to the public notice, which was issued on March 9, 1994. All comments become part of the record and are considered during our analysis of the Salmon River Project.

Commenting agencies and other entities	Date of letter
Department of the Interior	04-29-94
New York State Department of Environmental Conservation	05-06-94

Intervenor	Date of motion
New York State Department of Environmental Conservation	11-12-93
Department of the Interior	12-17-93
Thomas Herbert	02-14-94
Village of Pulaski	04-12-94
New York Rivers United	04-26-94
Town of Richland	04-28-94

The NYSDEC, the Department of the Interior (Interior), Mr. Herbert, the Village of Pulaski, New York Rivers United, and the Town of Richland intervened only to be parties to the proceedings and do not oppose the licensing of the Salmon River Project.

B. Offer of Settlement

NIMO negotiated the Settlement Offer (Attachment A) with two of the interested parties in the licensing proceedings: the NYSDEC and New York Rivers United. The Adirondack Mountain Club and Trout Unlimited have also signed the Settlement Offer.

NIMO invited all other state and federal resource agencies or other interested parties to sign the Settlement Offer. Although none has formally signed, the other invited agencies and parties who commented and made recommendations to the Commission on the project have supported and encouraged adoption of the stipulations contained in the Settlement Offer.

C. Comments on the Draft Environmental Assessment

The following entities commented on the DEA issued November 9, 1994:

Commenting Entities	Date of Letter
New York Department of Environmental Conservation	12/16/94
Niagara Mohawk Power Corporation	12/20/94
New York Rivers United	12/22/94
U.S. Environmental Protection Agency	12/21/94

D. Water Quality Certificate Conditions[3]

By letter dated April 27, 1993, NIMO requested Section 401 water quality certification (WQC) from the NYSDEC, as required by the Clean Water Act. The NYSDEC received this request for WQC on April 28, 1993.

On April 28, 1994 the NYSDEC issued a WQC which states, "The Department [NYSDEC] makes this certification provided that the terms and conditions of the attached Settlement Agreement [Settlement Offer], signed by the Department [NYSDEC], NMPC [NIMO], New York Rivers United, the Adirondack Mountain Club and Trout Unlimited are met". We interpret this statement to mean that the NYSDEC intends the terms and conditions of the Settlement Offer should be treated as being terms and conditions of the WQC.

The Settlement Offer (Attachment A) has 17 terms and conditions (stipulations) grouped as follows: (1) concerns downstream of Lighthouse Hill (four stipulations), (2) concerns from Lighthouse Hill upstream (Seven stipulations), (3) management of lands outside the FERC project boundary (three stipulations), and (4) miscellaneous. We believe the following 11 stipulations of the Settlement Offer are those intended to be terms and conditions of the WQC:

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[3] Commission staff is aware of PUD No. 1 of Jefferson County v. Washington Department of Ecology (U.S. Sup. Ct. No. 92-1911, May 31, 1994). As appropriate, the license order in this proceeding will address the relevance of the issues discussed in Jefferson County.

I. CONCERNS DOWNSTREAM OF LIGHTHOUSE HILL
   A. Base Flows
   B. Ramping
   C. Flushing Flows
   D. Whitewater Releases

II. CONCERNS FROM LIGHTHOUSE HILL UPSTREAM
   A. Fishing/Recreational Access
   B. Fish Protection/Passage
   C. Wetlands/Reservoir Fluctuations
   D. Minimum/Aesthetic Flows
   E. Temperature Monitoring
   F. Flow Monitoring

The WQC contains an additional condition not found in the Settlement Offer. This condition states:

> The Department [NYSDEC] reserves the right to reconsider the entire [Section 401] Certification if there is a significant change in the scope of the proposal or project as licensed, or in the event the referenced application or Settlement Agreement are amended.

This condition in effect gives the State the opportunity to revisit its certification. However, Section 401(a)(3) of the Clean Water Act sets out the exclusive manner in which State certifications may be modified and makes clear that that process is initiated by the federal licensing or permitting agency, not the State. [4] Thus, the Commission determines whether proposed license amendments require new water quality certification. [5] Therefore, we believe that this condition, which gives the State authority beyond that provided for in the Clean Water Act, is

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[4] There is an exception in cases where the licensee makes changes to the construction or operation of the facility without first notifying the relevant federal authorities.

[5] The Commission's regulations, 18 C.F.R. § 4.38(7)(iii) (1993), provide that, if an applicant seeks to amend its application or license, it must make a new request for water quality certification if the amendment would have a material adverse impact in the discharge from the project. We make the determination as to whether a material adverse impact will result from the amendment and, thus, whether a new certification is necessary. See, e.g., Joseph M. Keating, 57 FERC ¶ 61,261 (1991), reh'g denied, 61 FERC ¶ 61,215 (1992).

beyond the scope of Section 401 of the Clean Water Act and thus should not be included in a license. [6]

E. Section 18 Fishway Prescription

The 110-foot-high Salmon River Falls, located on the Bennetts Bridge development bypassed reach of the Salmon River between the Salmon Hill Reservoir and the Bennetts Bridge powerhouse (see figure 2), provided a natural historical barrier to upstream movement of fish from Lake Ontario to the Salmon River above the falls. At present, the Lighthouse Hill dam deters upstream fish movement from the Salmon River to the Lighthouse Hill Reservoir, and the Salmon River Falls continues as a barrier to upstream fish movement beyond the 2.3-mile-long segment between the falls and the Lighthouse Hill Reservoir.

No resource agency currently requires upstream or downstream fish passage facilities for the Salmon River Project. Interior stated that provisions for upstream and downstream fish passage facilities are not necessary. However, since management objectives are subject to change over the term of the project, Interior reserves its authority, under Section 18 of the FPA, to prescribe fishways in the future. NIMO does not oppose a reservation clause that would permit consideration of fishway facilities in the future.

We recognize that future fish passage needs and management objectives cannot always be predicted at the time of license issuance. Section 18 of the FPA provides the Secretary of the Interior the authority to prescribe fishways. [7] Although fishways may not be recommended by Interior at the time of project licensing, upon receiving a specific request from Interior, it is appropriate for the Commission to include a license article which reserves Interior's prescription authority. [8] Therefore, staff recommends that a license article be included which reserves Interior's authority to prescribe fishways.

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[6] See Tunbridge Mill, 68 FERC ¶ 61,078 (July 1994) and Consumers Power Company, 68 FERC ¶ 61,077 (July 1994).

[7] Section 18 of the FPA states that the Commission shall require such fishways as may be prescribed by the Secretary of Commerce or the Secretary of the Interior as appropriate.

[8] Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

F. Coastal Zone Management Act

The proposed Salmon River Project, located about 12 miles outside of New York's coastal zone boundary, may affect coastal resources. The New York Department of State (NYDS) is responsible for reviewing the proposed project for consistency with the state's Coastal Management Program (CMP). Under the Coastal Zone Management Act of 1972, before we can issue a license, the NYDS must: (1) find the project consistent with the CMP or (2) waive the requirements by failing to act in a timely manner.

On August 30, 1994, the NYDS concurred with consistency certification information provided by NIMO, and found the Salmon River Project consistent with the CMP.

V. AFFECTED ENVIRONMENT

A. General Description of the Salmon River Basin (sources: Niagara Mohawk Power Corporation, 1993, application, exhibit E; Van Diver, 1985)

The Salmon River is located in north-central New York state in the eastern section of the Lake Ontario basin (Figure 1). The river is about 50 miles long and drains an area of about 276.5 square miles. At the Bennetts Bridge and Lighthouse Hill developments of the Salmon River Project, the drainage areas are 191 and 198 square miles, respectively. The Salmon River Reservoir is the largest body of water in the basin.

The Salmon River originates in Lewis County on the Tug Hill Plateau and drops 1,550 feet as it flows westward down the southwestern slope of the plateau and across the Ontario Lowlands to Lake Ontario. Elevations in the basin range from as high as 1,867 feet above mean sea level (MSL) near the crest of the Tug Hill Plateau to about 250 feet MSL at Lake Ontario.

The upper half of the river, including the project reach and the Bennetts Bridge and Lighthouse Hill developments, flows on the Tug Hill Plateau, a small portion of the Appalachian Plateau Province which projects northward between the southwest Adirondack Mountains to the east, and the Ontario Lowlands to the west. The Tug Hill Plateau is a tilted mesa (cuesta) consisting of a sequence of sedimentary rock layers that tilt gently southwestward away from the Adirondacks due to the uplifting of the Adirondack dome. The plateau is separated from the Adirondacks by the Black River valley, which extends northward along the eastern edge and westward around the northern end of the plateau.

The topography of the plateau consists of flat to undulating uplands that slope gently to the southwest. These tableland

areas are commonly glacier-scoured, hard sandstone bedrock surfaces with thin deposits of glacial till. Consequently, the southwestern slope of the plateau approximates the gentle southwesterly dip (or tilt) of the bedrock layers.

The maximum local relief in the Salmon River Basin and the general project vicinity is about 300 feet, represented primarily by glacial depositional features such as moraine ridges and hills. One of these, a wide end moraine, extends generally southeast-to-northwest across the Bennetts Bridge development. The primary erosional feature in the project area is a 150- to 200-foot-deep gorge cut into bedrock by the Salmon River along the lower two-thirds of the Bennetts Bridge bypassed reach. At the head of the gorge is the 110-foot-high by 210-foot-wide Salmon River Falls, which is located about 1 mile downstream of the Bennetts Bridge dam (see figure 2).

The lower portion of the Salmon River from about the vicinity of the Lighthouse Hill development flows across the Ontario Lowlands plain. The maximum local relief on the plain ranges from 100 to 300 feet. The topography on the Ontario Lowlands ranges from flat-to-hummocky-to-undulating -- a glacial moraine topography. Drainage patterns tend to be irregular, and choked pockets of swamps and marshy wetland areas are common. The most prominent depositional land features near the Salmon River are some east-to-west oriented drumlins (glacial till hills formed beneath a glacier, elongated in the direction of ice flow). Other features of the plain include ridges and low rolling hills formed by thick glacial till deposits, as well as eskers, kames, terraces, and outwash plains formed by glacial meltwater stream deposits.

The Ontario Lowlands are traversed by the Salmon River floodplain channel which has entrenched itself in the glacial overburden deposits and upper bedrock layers. In the City of Pulaski, the river has further entrenched itself by cutting a small gorge into the bedrock.

Adjacent to Lake Ontario, where the Ontario Lowlands become more and more submerged by the lake, shoreline gravel barrier bars backed by marshes and lagoons are common where streams enter the lake. The mouth of the Salmon River is one of these -- a drowned river mouth characterized by a barrier bar along the Lake Ontario shore which has been cut by the river channel, and a lagoon which occupies the partially drowned river floodplain for about the first mile or so upstream from the barrier bar. To provide a stable, navigable channel where the river flows from the lagoon to Lake Ontario, the U.S. Army Corps of Engineers has modified the mouth of the river by channel dredging and by construction of two breakwaters extending lakeward from the shore north and south of the mouth.

Because of its location adjacent to the eastern end of Lake Ontario, the climate of the Salmon River Basin is characterized by cold snowy winters and cool wet summers. Mean monthly average temperatures in the project vicinity generally range from the upper teens and low 20-degrees (Fahrenheit) during the winter to the upper 60s during the summer. NIMO reports that from 1963 through 1981, the extreme air temperatures recorded at the Bennetts Bridge development were -34 and 100 degrees Fahrenheit.

High annual precipitation in the Salmon River Basin results when rain and snow are released from moisture-laden prevailing westerly winds from Lake Ontario passing eastward across the Lake Ontario Lowlands and up the slope of the Tug Hill Plateau. NIMO reports the following conditions at the Bennetts Bridge development, about 18 miles east of the lake: a mean annual precipitation of 50.4 inches with monthly averages ranging from 3.6 inches during July to 5.2 inches during November; a mean annual snowfall of 193 inches ranging from a low of 83 inches during the winter of 1982-1983 to 388.5 inches during the winter of 1976-1977.

The Salmon River Basin is largely rural and heavily forested. Historically, the economy was based mainly on agriculture and timbering. Now, the majority of the land is undeveloped with the remaining land use being residential. The basin is well suited to year-round recreational activities with its many streams and lakes. Principal recreational activities include boating (whitewater and flatwater), fishing, hunting, picnicking, swimming, camping, hiking, and nature study.

B. Scope of Cumulative Effect Analysis

1. Resources Affected in a Cumulative Manner

We believe that the salmonid fishery, recreational fishing, wetlands and dependent wildlife, and recreational whitewater boating can be affected in a cumulative manner by the Salmon River hydro project and other activities on the Salmon River.

2. Geographic Scope of Analysis

The geographic scope of analysis defines the physical limits or boundaries of the proposed actions' effects on the resources. Because the proposed action affects each resource differently, the geographic scope for each resource varies.

Resources analyzed for cumulative effects

For salmonid fishery, the geographic scope of analysis will encompass the mainstem of the Salmon River. The salmonid fishery has both local and regional significance, because salmonids which utilize the Salmon River supplement fish populations throughout

Lake Ontario. We recognize that fishery enhancements in the Salmon River will provide benefits to the salmonid fishery throughout its entire range. Therefore, for salmonid resources, we focused on the Salmon River as the geographic scope for our analysis. This geographic scope is particularly important because the project's operation directly impacts the Salmon River Fish Hatchery and NYSDEC's ongoing salmonid stocking program in the Salmon River.

For recreational fishing, the geographic scope of analysis will encompass the mainstem of the Salmon River. This geographic scope is important because recent trends indicate that angler fishing days along the Salmon River have increased from 5,700 in 1973 to 180,000 in 1989 due to the fish stocking programs by the NYSDEC. These numbers reflect an increasing local and regional importance of the Salmon River recreational fishing resource.

For wetlands and dependent wildlife, the geographic scope of the analysis will also be the mainstem of the Salmon River (including the project impoundments). We chose this geographic scope because of the effects of the project operations (reservoir drawdowns and fluctuating reservoir and river water surface elevations) on the location and amounts of wetlands and littoral zone habitats.

For recreational whitewater boating, we will focus our analysis on the mainstem Salmon River. However, we will also consider regional recreational whitewater boating resources, taking into account such comprehensive plans and reports as NIMO's "System-wide Whitewater Recreation Plan." We chose this focus because whitewater boating resources and opportunities are of regional importance requiring paddling recreationists to drive to various locations at different times of the year in order to find adequate flows in the rivers, as well as varying degrees of challenge.

3. Temporal Scope of Analysis

The temporal scope includes a discussion of past, present, and future actions and their effects on the salmonid fisheries, recreational fishing, wetlands and dependent wildlife, and recreational whitewater boating. Based on the term of the proposed license, the temporal scope will look 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. The historical discussion will, by necessity, be limited to the amount of available information for the aforementioned resources. We've identified the present resource conditions based on the license application (as supplemented), the Settlement Offer, and comments made prior to and during the scoping process. We will document these in the FEA.

C. Resources

1. Geological and Soil Resources

Bedrock at the Salmon River Project is primarily the sandstone (Oswego Sandstone) that caps the Tug Hill Plateau. The exception to this is some outcropping of some interbedded siltstone and shales belonging to the underlying Pulaski Formation. These latter occur on the eastern (upstream) half of the northern shore of the Lighthouse Hill reservoir. They also comprise the lower rock strata within the gorge that extends downstream from the Salmon River Falls to the vicinity of the Bennetts Bridge powerhouse just upstream of the Lighthouse Hill reservoir. Erosion of the shales and siltstones, especially the softer shale strata, has been the means by which the overlying harder sandstones are undercut causing upstream migration of the falls and headward enlargement (lengthening) of the gorge.

Except for the coarse alluvial gravels, cobbles, and boulder deposits in the Bennetts Bridge bypassed reach of the river, unconsolidated material in the project area is primarily stony glacial till derived from nearby sandstones. The till occurs as both shallow ground moraine deposits which typify most of the relatively flat topographic areas of the Tug Hill Plateau, and as the thicker glacial end moraine deposits that form the hills and ridges which extend cross the project area development areas, and constitute the islands and peninsulas within the Salmon River Reservoir.

The shorelines of the Salmon River and Lighthouse Hill Reservoirs range from shallow to steep banks. They have all been eroded to the extent that finer-sized (clay, silt, and fine sand-size) components of the stony glacial till have been washed away by wave action over time, leaving behind coarser sands, gravels, and cobbles. There are no reported unstable banks or shoreline erosion problems at either reservoir.

2. Water Resources

Stream Flow

Prior to 1993 there were no U.S. Geological Survey (USGS) stream flow gages on the Salmon River. The best estimate of historical flows in the basin is provided by NIMO's Salmon River Water Budget Model, which estimated flows at Bennetts Bridge for run-of-river, historical, and the proposed operating modes using 17 years of generation/flow records (Niagara Mohawk Power Corporation, 1994a).

The historic mode represents operations prior to 1986, i.e. peaking at both developments. Since 1986, NIMO has been operating the Salmon River in an experimental mode, modifying

flows from Bennetts Bridge to facilitate flow analyses. Under historical operation, flows were:

- greater than 1,000 cfs about 20 percent of the time;
- less than 75 cfs about 20 percent of the time;
- between 75 cfs and 1,000 cfs about 60 percent of the time.

Typical reservoir inflow during spring averaged 1,500 cfs, but flows in excess of 7,000 cfs were not unusual. Flows exceeded the project's hydraulic capacity (1,800 cfs) about 7 percent of the time. The minimum flows below Bennetts Bridge have been as low as 40 cfs (18-22 cfs through turbine leakage and 22 cfs via the hatchery pipeline).

The run-of-river flows estimated by the Salmon River Water Budget Model are the simulated flow conditions as they would occur naturally without modification by either existing or proposed project operation; daily outflow at both developments would approximately equal daily inflow. These are discussed in section VI.A.2.a.ii.

Rule Curve 16 is NIMO's proposed operating mode. Rule Curve 16 would maintain a continuous year-round base flow from the Lighthouse Hill reservoir while attempting to meet target water surface elevations in the Salmon River Reservoir, as measured at Bennetts Bridge. Base flows would be released directly from the Lighthouse Hill development, except for the 22 cfs used by and released through the Salmon River Fish Hatchery. The flows which would occur under Rule Curve 16 are discussed in section VI.A.2.a.ii.

Water Quality

Water quality analyses performed on the Salmon River indicate that water quality is generally good. Although long-term monitoring has not been conducted, recent data have consistently shown water quality for the Salmon River meets or exceeds its classification standards.

The Salmon River, with the exception of the freshwater estuary (Selkirk Pond), is classified by the NYSDEC as Class C(t), meaning its designated use is for fishing, primary and secondary contact recreation, fish propagation and survival. Trout Brook, Orwell Brook, and Beaverdam Brook, tributaries to the Salmon River, are also classified C(t). Class C(t) requires dissolved oxygen concentrations (DO) not less than 5 milligrams per liter (mg/l) at any time, and a minimum daily average of 6.0 mg/l.

Water quality parameters have been periodically sampled throughout the Salmon River watershed. Data collected by the USGS from July 1971 through May 1975 indicated that no chemical

characteristics of the Salmon River were outside the range recommended for state waters. Sediment analysis of the lower river at Port Ontario, conducted by the U.S. Environmental Protection Agency in 1977, indicated concentrations of toxic materials in the sediments did not exceed recommended levels. Data collected by the Salmon River Cooperative Advisory Board in 1977, for at least 13 water quality parameters, showed excellent water quality in both the Salmon River and its tributaries. The NYSDEC rated water quality "Fair" from samples collected during 1989 and 1990, largely because of the presence of mercury, lead, and iron in the water, and because of a fish consumption advisory in effect at the time.

Water Temperature

Water temperature studies were conducted between 1985 and 1988 downstream of the Lighthouse Hill reservoir. In addition, NIMO collected temperature data in 1986 and 1987 from five stations on the Salmon River, and three of its tributaries. These studies showed mainstem water temperature in the Salmon River ranging from 0 degrees Celsius (°C) to 27.5 °C throughout the year. Typically, in the fall (August, September, and October) water temperature decreased upstream to downstream. In the spring (March, April, and May) temperature generally increased from upstream to downstream. In other months there was little variation or no discernable trend. Lighthouse Hill, the most upstream station, was the least variable. Pulaski, the most downstream station, was the most variable. During fall, Lighthouse Hill was the warmest because upstream reservoirs are less affected by cooling than river sections. During the spring months, the downstream sections near Pulaski were warmest, as the cool headwaters warmed while moving downstream.

Water Uses

There are no known users of the Salmon River for irrigation. The only known out-of-stream water use within the project study area is by the NYSDEC Salmon River Fish Hatchery (see section VI.A.3.ix.). There are four dischargers on the Salmon River which hold New York State Pollutant Discharge Elimination System permits (NYSPDES); the Pulaski Sewage Treatment Plant, Schoeller Technical Papers, Unity Village, and the NYSDEC Salmon River Fish Hatchery. Private developer, Richard Champney, and Four Seasons Recreation Area have applied for NYSPDES permits. None of these dischargers are known to significantly impact the river's water quality.

Fish Consumption Advisories

Fish consumption advisories by the New York State Department of Health (NYSDOH) are still in effect for fish captured in the Salmon River and Lake Ontario. According to the health advisory

published by the NYSDEC in the New York State 1993-94 Fishing Regulations Guide, to minimize potential adverse health impacts, the NYSDOH recommends that no one eat more than one meal (one-half pound) per week of any fish from any of the state's freshwaters (includes all project waters). The NYSDOH recommends that no one should eat any smallmouth bass taken from the Salmon River between the mouth of the river and the Salmon River Reservoir. For fish taken from Lake Ontario and the Salmon River between the mouth of the river and the Salmon River Reservoir, the NYSDOH recommends that: (a) women of childbearing age, infants, and children under the age of 15 should not eat any fish species; (b) no one should eat any American eel, channel catfish, lake trout, chinook salmon, or coho salmon over 21 inches long, rainbow trout over 25 inches long, brown trout over 20 inches long, or carp of any length; and (c) no one should eat more than one meal per month of white perch, white sucker, or coho salmon 21 inches long or less, rainbow trout 25 inches long or less, or brown trout 20 inches long or less.

3. Fishery Resources

We identified salmonid fisheries as a resource that could be cumulatively affected in the Salmon River Basin.

Historical Fishery: [9]

In the early 1800's the Atlantic Salmon runs in the Salmon River were considered the best among all the New York streams tributary to Lake Ontario. Eventual extinction of the resource by 1900 was reportedly due to deforestation, dams, pollution related to the lumber industry, and exploitation of the declining resource. Construction of the Bennetts Bridge development, in 1913, and the Lighthouse Hill development, in 1930, changed the hydraulic characteristics of the Salmon River. After 1940 the Salmon River fishery was established as follows:

Salmon River Downstream of the Hydropower Projects:

Estuary (Selkirk Pond): The Salmon River below the hydropower projects has two distinct fishery habitats, the Selkirk Pond estuary and the reach between the estuary and the Lighthouse Hill development. Because the estuary is contiguous with Lake Ontario, it contains a fish community which differs greatly from the remainder of the lower river. Species include largemouth bass, smallmouth bass, rock bass, pumpkinseed,

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[9] Abstracted from Exhibit E of application for the Salmon River Project (Niagara Mohawk Power Corporation, 1993) and the Fisheries Enhancement Plan for the Salmon River (Kozuchowski et al., 1994).

bluegill, northern pike, yellow perch, brown bullhead, and black crappie. A 1977 survey collected forty-three fish species near the mouth of the Salmon River.

Lower River: Prior to 1940, thirty-one species of fish were identified downstream of the hydropower projects. Smallmouth bass reproduction and fishing were very good below Pulaski. Limited brown trout and rainbow trout fishing occurred above Pulaski during spring and summers when water temperatures remained cool.

In 1956, Atlantic salmon stocked 2 miles below Lighthouse Hill were found to have grown well. In 1968, the NYSDEC initiated a Pacific salmon and steelhead stocking program in the Salmon River and tributaries below Lighthouse Hill. The following fish have been stocked in the Salmon River and its tributaries:

- Between 1968 and 1981: about 4.5 million coho salmon, chinook salmon, and steelhead.
- Between 1982 and 1991: about 9.9 million coho salmon, chinook salmon, rainbow trout, and brook trout.
- In 1992: about 177,000 steelhead, 94,100 coho salmon, and 667,000 chinook salmon.

A 1976-77 survey ranked the Salmon River twelfth in the state for angler use and fifth in state for numbers of salmon caught. In 1977, however, salmonid stocking was significantly reduced due to health concerns associated with high levels of polychlorinated biphenyls discovered in Lake Ontario fish. The NYSDOH initiated an education program, health advisories, and fish consumption restrictions in 1976-77. Stocking resumed to previous levels in 1979.

In 1988 the Salmon River ranked fifth in state for angler use, with an estimated 58,600 anglers, and sixth highest in state for angler expenditures, estimated at $13,683,560.

A 1992 angler survey shows a diminished fishery in the Salmon River (40% fewer anglers and 20% fewer chinook salmon in 1992 than 1989). The diminished fishery is partially due to changes in the states' snagging regulations incurred in 1992, and partially due to reported declines of salmon populations in Lake Ontario. Recent investigations of fish populations in Lake Ontario indicate a decline in the forage base, possibly caused by a decline in nutrients and/or a predator-prey imbalance in the system.

Tributaries Downstream of Project: Orwell Brook, Beaverdam Brook, Trout Brook, and Spring Brook are major tributaries to the Salmon River below the hydroelectric developments. Prior to 1940, these tributaries were noted to have excellent water

quality and provided habitat for natural reproduction of brook trout and other native species. Throughout the 1980's and 1990's these tributaries continue to provide excellent habitat for brook trout, and additionally steelhead, coho salmon, and chinook salmon. The tributaries have a diversity of other fish, at least 18 species include suckers, shiners, darters, dace, american eels, and lamprey.

Hydroelectric Project Impoundments: The Salmon River has two major impoundments, the Lighthouse Hill and Salmon River Reservoirs.

Prior to 1940, sixteen species of fish were collected from Lighthouse Hill. Between 1934 and 1938, the NYSDEC stocked about 1,355 fingerling brown trout each year in Light House. Between 1968 and 1981, about 4,500 brown trout, between 4.5 inches and 9.5 inches, were stocked each year. Stocking of rainbow trout began in 1982 and continues at a rate of 4,300 fish per year, 8.5-inch to 11.25 inches. Summer water temperatures at Lighthouse Hill are typically too warm to support a rainbow trout fishery throughout the year, however, summer holdovers are common. The present fish population includes brown trout, rainbow trout, yellow perch, pumpkinseed, and brown bullhead.

Prior to 1940, seventeen species of fish were collected from the Salmon River Reservoir. By the 1950's brook, rainbow, and brown trout provided a substantial fishery which produced trophy catches. The introduction of yellow perch and largemouth bass eventually diminished the trout fishery. In 1967 the reservoir was drawn down and rotenone was applied to eliminate yellow perch, largemouth bass and rough fish, and allow re-establishment of brook trout. This effort was unsuccessful as an assessment of temperature conditions in the reservoir indicated suitable cool water trout habitat was limited. The NYSDEC discontinued management of the Salmon River Reservoir for coldwater fish in the 1970's and plans no further stocking of fish. The reservoir is considered a good self-sustaining largemouth bass fishery, but is dominated by stunted yellow perch. Other species present in small populations include rock bass, brown bullhead, pumpkinseed, and occasional rainbow, brown, and brook trout.

Bennetts Bridge Bypassed Reach: The only flow that goes through the bypassed reach between reservoirs is 3- to 5-cfs leakage flow from the Bennetts Bridge dam and flow from a small tributary below the dam. There is little suitable habitat for fish in this section.

Headwater Tributaries: Headwater tributaries to the Salmon River include the North Branch of the Salmon River, the Mad River, East Branch of the Salmon River, Penncock Brook, Coey Creek, and others. Prior to 1940 natural reproduction of brook and rainbow trout was good in the headwaters, however, growth was

notedly slow. Currently, Penncock Brook and Coey Creek support good populations of brook trout. Additionally, other headwater tributaries support brown and rainbow trout. Brook and rainbow trout have been stocked in the headwaters by the NYSDEC since the 1980's.

4. Terrestrial Resources

The project area is included in the beech-maple forest region as defined by Braun (1950). This region is characterized by the development of a climax forest in which beech and sugar maple are the dominant trees of the canopy. Today, the region is mostly farm country. Drainage projects have made available large areas of former swamp forest. Shelford (1963) found that animals in these forests are white-tailed deer, wapiti, gray wolf, mountain lion, black bear, bobcat, gray fox, raccoon, eastern chipmunk, white-footed mouse, pine vole, short-tailed shrew, and others. The wapiti, gray wolf, and the mountain lion, however, have been driven away from the project area.

The Salmon River drainage basin is primarily rural, with a considerable portion being very sparsely populated woodlands, wetlands, and successional forests (brushlands and fields). The climax habitat is deciduous forest with extensive ground cover. Vegetative cover is primarily second-growth mixed deciduous forests comprised of sugar maple, yellow birch, American beech, with interspersed eastern hemlock and white pine. The coastal downstream portion of the basin, near the mouth of the Salmon River at Lake Ontario, consists of a beach-dune complex. Stabilized dunes have an oak-pine vegetative cover while active dunes are pioneered by beach grass.

Some vegetation has established within the stream channel of the 3.5-mile bypassed reach of the Salmon River. Most of this vegetation has established within the rubble along the braided stream channels because of the limited flows (i.e., generally leakage flows of 3 cfs) that have historically occurred within the bypassed reach. This vegetation is characterized by a mixture of small trees (3 inches or less in diameter), shrubs, and herbaceous plants. Typical species include willows, alders, and a variety of herbaceous species. The additional vegetative cover provides habitat for reptiles and amphibians, particularly snakes and frogs.

Mammals, birds, reptiles, and amphibians expected to be found in the project area and downstream include most of those common to the northeastern U.S. Typical resident species likely to occur in the forested areas include white-tailed deer, gray fox, raccoon, opossum, gray squirrel, red squirrel, eastern chipmunk, ruffed grouse, great horned owl, blue jay, chickadees, nuthatches, crows, and woodpeckers. Various snakes, frogs, toads, and salamanders also occur. A variety of migratory birds

inhabit the area on a seasonal basis, including thrushes, wood warblers, swallows, vireos, and finches.

Wetlands

We identified wetlands and dependent wildlife as a resource that could be cumulatively affected in the Salmon River Basin. The diversity of wetlands that occurs throughout the project area provides a variety of beneficial values to the basin. Wetlands are important for providing fish and wildlife habitats; for maintaining ground water supplies and water quality; for protecting shorelines from erosion; for storing floodwaters and trapping sediments that can pollute waterways; and for modifying climatic changes (Dahl, 1990).

Both the NYSDEC and U.S. Fish and Wildlife Service (FWS) have mapped wetlands on and around the Salmon River Reservoir, Lighthouse Hill reservoir and along the Salmon River downstream to its confluence with Lake Ontario. The NYSDEC has designated 16 wetlands (greater than 12.4 acres as required by state law) and the FWS has mapped 225 wetlands, representing 55 types, through its National Wetlands Inventory (NWI). The NWI wetlands have not been mapped for approximately the upper third of the Salmon River Reservoir.

Of the 225 FWS-mapped wetlands (representing 55 different wetland types), five sites (representing two types) are classified as lacustrine [10] and are found on the reservoirs; 26 sites (representing 6 types) are riverine and represent the Salmon River proper; and the remaining 191 sites (representing 46 types) are classified as either palustrine forested, palustrine scrub/scrub, palustrine emergent, or palustrine unconsolidated bottom. Based on NYSDEC mapping, these wetlands total about 3,430 acres.

A particular wetland (OR-18), located north of and adjacent to the Lighthouse Hill reservoir, has been identified as a wetlands enhancement site in the Settlement Offer. It consists of three separate, but connected pools totaling 55 acres: lower (4 acres), middle (10 acres), and upper (41 acres). The lower and middle pools, 4 acres and 10 acres in size, respectively, are hydraulically-connected to Lighthouse Hill reservoir. Water levels in the lower and middle pools are controlled by the backwater effect of Lighthouse Hill reservoir through a culvert on Hogs Back Road. The upper pool, although connected by a stream channel between it and the middle pool, is hydraulically

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[10] Wetland classifications are those used by Cowardin, et. al. (1979).

isolated from the middle and lower pools. This separation occurs primarily because of the higher gradient of the connecting channel, and because of beaver dams on the channel that additionally elevate the upper pool. (Niagara Mohawk Power Corporation, 1994f).

Wildlife species typically inhabiting the reservoirs, the river and associated wetlands include the otter, muskrat, mink, ducks, geese, loons, herons, shorebirds, snakes, turtles, and frogs. The waterfowl and shorebirds utilize the project area wetlands mainly during fall and spring migration periods.

Threatened and Endangered Species

Except for occasional transient individuals, no federally listed or proposed threatened or endangered species are known to exist in the project impact area (letter to J.L. Sabattis from L.P. Corin, U.S. Fish and Wildlife Service, Cortland, New York, January 25, 1993).

5. Aesthetics

The project area is rural in character and is dominated by water, small hamlets, and forestland. The terrain of the area is gentle with no dominant landforms. The Salmon River landscape is distinctive because, in comparison to other areas of the Erie-Ontario Lowland physiographic region, its features exhibit greater visual variety and are of unusual or outstanding visual quality. The 110-foot-high and 210-foot-wide Salmon River Falls is the most notable natural and scenic landscape feature of the project area.

The 3,550-acre Salmon River Reservoir is almost entirely surrounded by woodland, with summer residences and camps located along its north shoreline. Wooded islands and the topographic variation of the surrounding wooded hillsides create scenic views of the landscape from County Route 17 and from the various public access points on the reservoir. Along the south shore and east end of the reservoir are marshy back-bay areas that provide variation to the open-water views of the landscape. Presently, operation of the Bennetts Bridge development results in large seasonal drawdowns in the reservoir's water level (a maximum reduction of 23 feet in surface elevation and 1,850 acres in surface area), which affect the scenic value of its shoreline.

The Lighthouse Hill Reservoir is smaller (170 acres) than the Salmon River Reservoir and its shorelands are almost completely undeveloped. The reservoir may be viewed from various points along County Route 22, which passes along its south shore. Views of the reservoir and surrounding hills and woodlands also exist along Hogback Road to the north. The reservoir's water surface elevation fluctuates a maximum of six feet under the

present operation of Lighthouse Hill development, but only 12 percent of its water surface area (20 acres) is affected.

Scenic views of the 17-mile-long reach of the Salmon River downstream of the Lighthouse Hill development are available from several points along adjacent highways and bridge crossings. Historically, this river reach has experienced diurnal high- and low-flow episodes from the tandem operation of the project's existing facilities in a store-and-release mode. However, in recent years, NIMO has used Lighthouse Hill Reservoir storage to re-regulate Bennetts Bridge peaking releases into steadier, round-the-clock base flows. This re-regulating mode of operation has significantly improved the aesthetic value of the downstream river landscape.

About 3 miles of the Salmon River stream channel are bypassed by the Bennetts Bridge development. All flows are diverted from this bypassed river reach, except for leakage from Bennetts Bridge dam (estimated to be 2.5 cfs), and for short periods when: (a) inflow is greater than the hydraulic capacity of the development's turbine hydraulic capacity (this occurs about 7 percent of the time), and (b) the development's impoundment is at or near full pond conditions.

Salmon River Falls physically separates the upper and lower segments of the bypassed reach (see figure 2). The upper segment follows the bottom of a relatively wide and shallow valley; the lower segment is confined to a steep-sided gorge from about 150 to 200 feet in depth. Graffiti, rock etchings, and well-worn trails at the falls confirm a history of public use dating to the early 1900s. The National Park Service (NPS) states that the top of the falls has a high cultural and even historic value, which has become a part of the attraction to the area (letter to Gregg Carrington from Drew Parkin, Chief, Division of Rivers and Special Studies, North Atlantic Region, National Park Service, Boston, Massachusetts, July 21, 1993). NIMO has recently transferred ownership of the lands surrounding the falls area to the State of New York for development of a scenic overlook.

Overall, views of the project's existing facilities are limited by their relatively low profile, vegetation and hills, and a lack of elevated vantage points. Where views of these facilities are clear and unobstructed, they are typically of short duration, are generally not from areas of high recreational or scenic value, and are not subject to a significant number of viewers. Project facilities having the most visual contrast with their surroundings are: (a) the section of aboveground pipeline east of Bennetts Bridge powerhouse; (b) the Bennetts Bridge surge tank; (c) the Lighthouse Hill gatehouse; and (d) the Lighthouse Hill powerhouse, substation, and associated transmission lines (Niagara Mohawk Power Corporation, 1994a).

6. Cultural Resources

Cultural resource studies in the project's area of potential effect have revealed that the Bennetts Bridge development, its dam and powerplant, is eligible for listing on the National Register of Historic Places (National Register). Bennetts Bridge is eligible according to National Register criterion C, [11] because of its contribution to the period of innovation and experimentation which characterized hydroelectricity between 1895 and 1920. During this period, the Salmon River was described in the Engineering Record as the next best source of water power in the state, after the Niagara River.

Constructed in 1913-14, the Bennetts Bridge dam and hydroelectric plant, situated in a rural setting along the Salmon River, consists of a concrete dam, about two miles of conduit including a differential surge tank to convey water from the dam and reservoir to the powerplant, and the powerhouse containing four generating units. The dam, surge tank, and powerhouse remain intact, functioning, and largely unmodified since construction. In 1980, the original 7,800-foot, 12-foot-diameter wood stave pipeline was replaced with a pipeline made of fiberglass reinforced plastic.

Essentially one room on the inside, open to the roof, with a gallery about 12 feet above the main floor, the powerhouse was constructed of reinforced-concrete columns connected with heavy concrete beams. All intake pipes, draft tubes, and discharge tunnels are under the powerhouse. Its tailrace extends under the building, expanding to a 75-foot-wide, rock-lined, open channel merging with the Lighthouse Hill reservoir about 950 feet downstream. On-going maintenance has required some modifications to the building and equipment, but without loss of integrity.

7. Recreation and Land Use

We identified recreational fishing as a resource that could be cumulatively affected in the Salmon River Basin.

Sportfishing is the most significant recreational activity in the Salmon River reach downstream of the project. Trends indicate that since 1973 angler fishing days along the Salmon River have increased from 5,700 to 180,000 in 1989 (Niagara Mohawk Power Corporation, 1993, application, Table E 5-4). The improved fishery is a result of river and lake stocking programs by the NYSDEC and others. The operation of the NYSDEC Salmon River Fish Hatchery since 1981 has resulted in a cumulative

[11] See the National Register evaluation criteria at 36 CFR 60.

beneficial effect on the successful recovery of the Salmon River fishery.

Local expenditures associated with fall fishing on the Salmon River have increased from $62,000 in 1973, to $10,024,000 in 1989. The percent of out-of-state anglers increased dramatically from 1% in 1973 to 65.5% in 1989 (Kozuchowski et al., 1994). These figures reflect the growing regional importance of the Salmon River recreational resources.

Fishing in the project area, upstream of the hatchery, is less intensive, but notable. Other recreational activities such as boating, swimming, hiking, picnicking, camping, cross country skiing, and snowmobiling are common occurrences on project land.

We identified recreational whitewater boating as a resource that could be cumulatively affected in the Salmon River Basin.

Recreational boating, unrelated to fishing, such as canoeing, rafting, and tubing, has been a popular activity below the Lighthouse Hill powerhouse. Whitewater rafting occurred on the river from 1982 to 1989 between Pineville (river mile (RM) 11) and Port Ontario (RM 1). The river derived its popularity for boating from its relatively safe class II-III whitewater [12] that provides excellent water for beginners and for training purposes.

At flows near 750 cfs or less the river is class II from Pineville to Pulaski. At higher levels (1,000-1,400 cfs) portions of this river segment provide class III whitewater. Although the lower half of this river segment is more challenging, NIMO says that paddlers have stated that the rating for river difficulty doesn't exceed class III, even at near flood conditions (Niagara Mohawk Power Corporation, 1994a, additional information response 8, Paddling Feasibility Study). Rafting trips occurred from June to mid-August carrying approximately 500 people a week, grossing approximately $10,000 annually. The rafting was discontinued when the mode of operation for Lighthouse Hill power station was changed. Since that time NIMO has cooperated with sponsors of boating and rafting events by releasing water to accommodate various events. Some of these events have become very popular annual occurrences (Kozuchowski et al., 1994). The annual tube race, for example, draws about 200-300 participants.

The number of commercial sportsmen that use the Salmon River are as follows: (a) 39 licensed hunting guides are located in New York State region 6 and 7, which encompass the entire Salmon

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[12] International Scale of Difficulty.

River; (b) two licensed whitewater guides in New York State region 7, which encompasses the primary raftable segment of the Salmon River (from Lighthouse Hill powerhouse to Port Ontario) and; (c) 73 licensed fishing guides are also found in New York State region 7, most of which are drift boat operators.

Existing recreational facilities within the project area are as follows:

- Jackson Road fishing access site on the Salmon River Reservoir is a public boat launch site on NIMO property leased by NIMO to the NYSDEC. The area includes a gravel ramp for launching boats transported by cartop or light trailers and a small parking area for cars and trailers.

- Little America fishing access site on the Salmon River Reservoir is a public boat launch site on NIMO property leased by NIMO to the NYSDEC. The area includes a gravel ramp for launching boats transported by cartop or light trailers and a small parking area for cars and trailers.

- Falls Road Day-use area on the Salmon River Reservoir is a recreation area operated and maintained by NIMO. The area includes a ramp for launching boats transported by cartop or light trailers and a picnic area with trash receptacles.

- Upon request, NIMO allows groups, such as the Boy Scouts, to camp at several locations around the reservoir such as at Falls Road and the Huckleberry Island areas.

- Most of the Salmon River Project is available for hunting and fishing with the exception of areas that are deemed unsafe.

- Oswelewgois Club is a club that requires membership, leases land at the eastern end of the Salmon River Reservoir under the provisions of an agreement for acquiring reservoir property when the project was constructed. The original agreement allowed the club exclusive rights to the reservoir. In 1935, some of these rights were relinquished, leaving exclusive rights to the upper third of the reservoir. To date, the club has only exercised their rights to exclusive use upstream of Redfield bridge.

NIMO has developed a public safety program that includes a telephone hotline that offers information about the times that river levels are expected to rise and fall at various points on the river. Since 1977, NIMO has received over 660,000 calls on the hotline. As part of this program, NIMO also posts signs that warn visitors of various potential hazards, such as rapidly changing water levels.

There are many other recreational opportunities provided in the vicinity of the project which are not directly associated with the project, such as: (a) eight sites along the Salmon River have been leased by NIMO to the NYSDEC between the Villages of Pulaski and Altmar for the purpose of providing public fishing access; (b) numerous state landholdings available to the public along the river; (c) Salmon River Fish Hatchery located about 1.5 miles downstream of the Lighthouse Hill development which provides tours and interpretive displays; (d) Selkirk Shores State Park located in Port Ontario at the confluence of the Salmon River and Lake Ontario; (e) Salmon River and Chateaugay State Forests; (f) Pine Grove Boat Launch Area in Port Ontario; (g) the Noble Shores private camps; (h) Four Seasons Recreation Area; (i) Cedar Pine Campground; (j) Pineville Campground; (k) Selkirk Yacht Club; and (l) Lighthouse Marina.

VI. ENVIRONMENTAL ANALYSIS

A. Proposed Action

1. Geological and Soil Resources

a. Environmental Impacts and Recommendations

No erosion and sedimentation would occur as a result of installation of the proposed new turbine-generator unit at the Lighthouse Hill development. The new unit would be installed in the existing spare turbine bay in the powerhouse, and all construction activities would take place within the existing powerhouse. No cofferdams or earthwork would be necessary because the existing upstream and downstream stop-log gates would be used to dewater the spare turbine bay during construction.

Project-related erosion and sedimentation would occur as a result of land-clearing and ground-disturbing activities associated with construction and enhancement of recreation facilities; we expect that only minor, short-term erosion and sedimentation would occur.

Our Recommendation: To ensure that erosion and sedimentation would be kept to minimal levels, we recommend that the final construction plans for the proposed construction and enhancement of recreational facilities include appropriate soil erosion control measures. These measures should be designed in consultation with the Natural Resources Conservation Service.

b. Summary of Effects and Unavoidable Adverse Impacts: Some minor erosion and sediment loss would be unavoidable during construction and enhancement of the proposed recreational facilities.

2. Water Resources

a. Environmental Impacts and Recommendations:

i. Water Quality

NIMO's proposed flows are expected to have minimal impact on the overall DO concentrations in the Salmon River. The effect on water temperature is discussed in section VI.A.3., Aquatic Resources.

ii. Flows

NIMO developed the Salmon River Water Budget Model, which simulates daily inflow, reservoir elevations, generation, storage, and outflow for the two developments. This model, which is based on 17 years of generation/flow records, was used to simulate project operations for three operating scenarios: run-of-river, historical, and Rule Curve 16.

Run-of-river simulates flow conditions as they would occur naturally without modification by either existing or proposed project operation; daily outflow at both developments would approximately equal daily inflow. Under run-of-river operation:

- maximum daily flow would be 18,230 cfs,
- average annual flow would be 607 cfs,
- average monthly flows would range from 173 cfs in August to 1,803 cfs in April.

The historic mode represents operations prior to 1986, i.e. peaking at both developments. Since 1986, NIMO has been operating Salmon River in an experimental mode, modifying flows from Bennetts Bridge to facilitate flow analyses. Under historic operation (see also section V.C.2.), flows were:

- greater than 1,000 cfs about 20 percent of the time;
- less than 75 cfs about 20 percent of the time;
- between 75 cfs and 1,000 cfs about 60 percent of the time.

Rule Curve 16 is NIMO's proposed operating mode. Under stipulation I.A. of the Settlement Offer, NIMO proposes to provide continuous base flows from the Lighthouse Hill development as described in Rule Curve 16. Stipulation I.A. also specifies that the Bennetts Bridge development remain as a seasonal store and release facility operating in a peaking mode, that the Lighthouse Hill development operate as a store and release facility operating in a daily re-regulating mode, and that base flows less than 450 cfs be made through the proposed new base flow unit to be installed in the spare bay in the Lighthouse Hill powerhouse.

Under Rule Curve 16:

- maximum daily flow would be 11,130 cfs;
- average annual flow would be 607 cfs;
- average monthly flows would range from 245 cfs in August to 1,533 cfs in April.

Rule Curve 16 would maintain a continuous year-round base flow from the Lighthouse Hill reservoir while attempting to meet target water surface elevations in the Salmon River Reservoir (see table 1).

Table 1. Salmon River Project base flows and target water surface elevations, by month, for Rule Curve 16 (Source: Staff, based on Niagara Mohawk Power Corporation, 1994a).

Month	Lighthouse Hill Base Flow (cfs)	Salmon River Reservoir Target Elevation (ft)
January	285	935
February	285	932
March	285	923
April	285	926
May	185	936
June	185	936
July	185	936
August	185	935
September	335	933
October	335	930
November	335	930
December	335	931

Target elevations would be measured at Bennetts Bridge. Base flows would be released directly from the Lighthouse Hill development, except for the 22 cfs released from the Salmon River Fish Hatchery.

Because base flow requirements would take precedence over reservoir elevations, target elevations may not be achievable during periods of high or low inflows. However, only during

extreme drought conditions or emergency conditions would the base flow be less than the required amount.

Adjustments to the base flow would be determined after considering: (a) the flow required for that month, (b) the Salmon River Reservoir elevation, and (c) inflow to the reservoir. When the reservoir elevation is low, or reservoir elevation is normal and inflows are low, the base flow would be maintained from Lighthouse Hill until the reservoir approached normal elevation. During periods of low inflow, reservoir elevations below the target might be necessary to maintain the required base flow.

When reservoir elevations are high and inflows normal, a release greater than the base flow, but lower than hydraulic capacity (1,800 cfs at Bennetts Bridge), would be maintained.

When reservoir elevation and inflows are high, a release greater than the base flow, but lower than hydraulic capacity (1,800 cfs at Bennetts Bridge), would be maintained. During flood conditions, additional flows through the Taintor gates may be necessary.

Our Recommendation: We recommend that NIMO be required to implement the specifications of stipulation I.A. of the Settlement Offer because of the beneficial effects that would occur to fish habitat (see section IV.A.3.a.i.), reservoir elevations (see section VI.A.3.a.vi.), operation of the Salmon River Fish Hatchery (see section VI.A.3.a.ix.), wetlands in the Salmon River Reservoir and in the river downstream of the Lighthouse Hill reservoir (see section VI.A.4.a.ii.), the aesthetic quality of the Salmon River and Lighthouse Hill reservoir shorelines (see section VI.A.5.a.i.), the aesthetic value of the Salmon River downstream of the Lighthouse Hill powerhouse (see section VI.A.5.a.ii.), and fishing and recreational boating on the Salmon River downstream of Lighthouse Hill (see section VI.A.7.a.ii.). (See also section VIII).

a. Environmental Impacts and Recommendations:

3. Fishery Resources

b. Unavoidable Adverse Impacts:

None

i. Effect on Fisheries Habitat Downstream of Developments

The Salmon River supports a good self-sustaining coldwater/coolwater/warmwater fishery dominated by chinook, coho, steelhead, and brown trout. The amount of flow released from the Salmon River Project and timing of releases affect fish habitat, and migration of fish in the Salmon River. Resource agencies requested that NIMO study the feasibility of a continuous base flow below Lighthouse Hill, study the feasibility of ramping flows at Lighthouse Hill to reduce large and sudden rates of change in flow, and study the effects of alternative flows on aquatic habitat.

Between 1985 and 1987, an instream flow incremental methodology (IFIM) study was conducted along a 17-mile segment of the Salmon River below Lighthouse Hill to (a) identify optimum habitat for fisheries in the Salmon River, and (b) evaluate the effect of alternative operating regimes (run-of-river, historical, and Rule Curve 16) on the fisheries and other aquatic resource uses. The study included 24 transects representing 80% of the study area. Target fish species were selected to represent the species and life stages endemic to the aquatic community. Four life-history stages (fry, juvenile, spawning, and adult) were modeled for longnose dace, white sucker, common shiner, and Atlantic salmon. Flows between 25 cfs and 2,900 cfs were modeled and a habitat-duration analysis was conducted to determine average annual habitat for each target species and life stage.

Results of the IFIM study showed (a) the optimum flow for all species/life stages in the Salmon River for the entire year is between 400 and 500 cfs, (b) a minimum flow of 350 cfs is needed to permit salmonid movement, (c) bank-to-bank wetted surface area occurs at 350 to 400 cfs (d) water temperatures would be best moderated at 350 to 400 cfs or greater, and (e) professional drift boat fishermen would need a minimum of 350 cfs, preferably greater, in the fall to operate their drift boats.

The dominant criteria for determining seasonal minimum flow releases in the Salmon River is the availability of water. Flow odeling studies showed that available storage could not consistently provide uninterrupted minimum flows in the range of

400 to 500 cfs, the optimum flow for all fish species and life stages. An uninterrupted minimum flow is the primary resource agency objective for enhancing aquatic resources in the Salmon River. Focusing on this objective and other aquatic resource needs (i.e recreation, wildlife, water quality) seasonal flows of 285 cfs January 1 through April 30, 185 cfs May 1 through August 31, and 335 cfs September 1 through December 31 (Rule Curve 16) looks reasonable. NIMO proposes to provide these flows through a new minimum flow turbine installed at the Lighthouse Hill development.

The benefits of Rule Curve 16 to fisheries habitat on an average annual basis is graphically presented in figure 3.

In summary, Rule Curve 16 provides the following benefits:

- For all four evaluation species, a significant increase in average annual habitat over historical operation (51 vs 13 acres), and a minor increase in average annual habitat over run-of-river operation (57 vs 51 acres).

- During low flow periods, greater habitat than run-of-river and historical operation (55, 38, and 30 acres respectively).

- Maintains current level of flushing flows (periodic flow releases needed to keep the stream channel clear of debris and sedimentation). The NYSDEC determined that flushing flows, as currently provided, create no adverse impacts associated with silt deposits.

Our Recommendation: Because of these benefits to downstream fisheries habitat, as well as the several benefits that would accrue to other resources with the project operating according to Rule Curve 16 (see sections VI.A.2.a.ii. and VIII), we are recommending that NIMO implement the requirements of stipulation I.A. of the Settlement Offer (Attachment A).

ii. Ramping

Extreme and sudden changes in flows, as planned for whitewater boating releases, could be detrimental to aquatic habitat and the fisheries. Stipulation I.B. of the Settlement Offer (Attachment A) requires that any changes in flows be subject to gradual, incremental flow changes (ramping). NIMO proposes gradual flow changes (up or down) where possible, and would avoid releases during critical periods (i.e. no releases above 350 cfs in June to protect spawning or in late August to avoid premature upstream migration of salmonids). Flow changes, except in rare cases of high inflows, would be made in increments of 400 cfs or less, and changes of that magnitude would occur

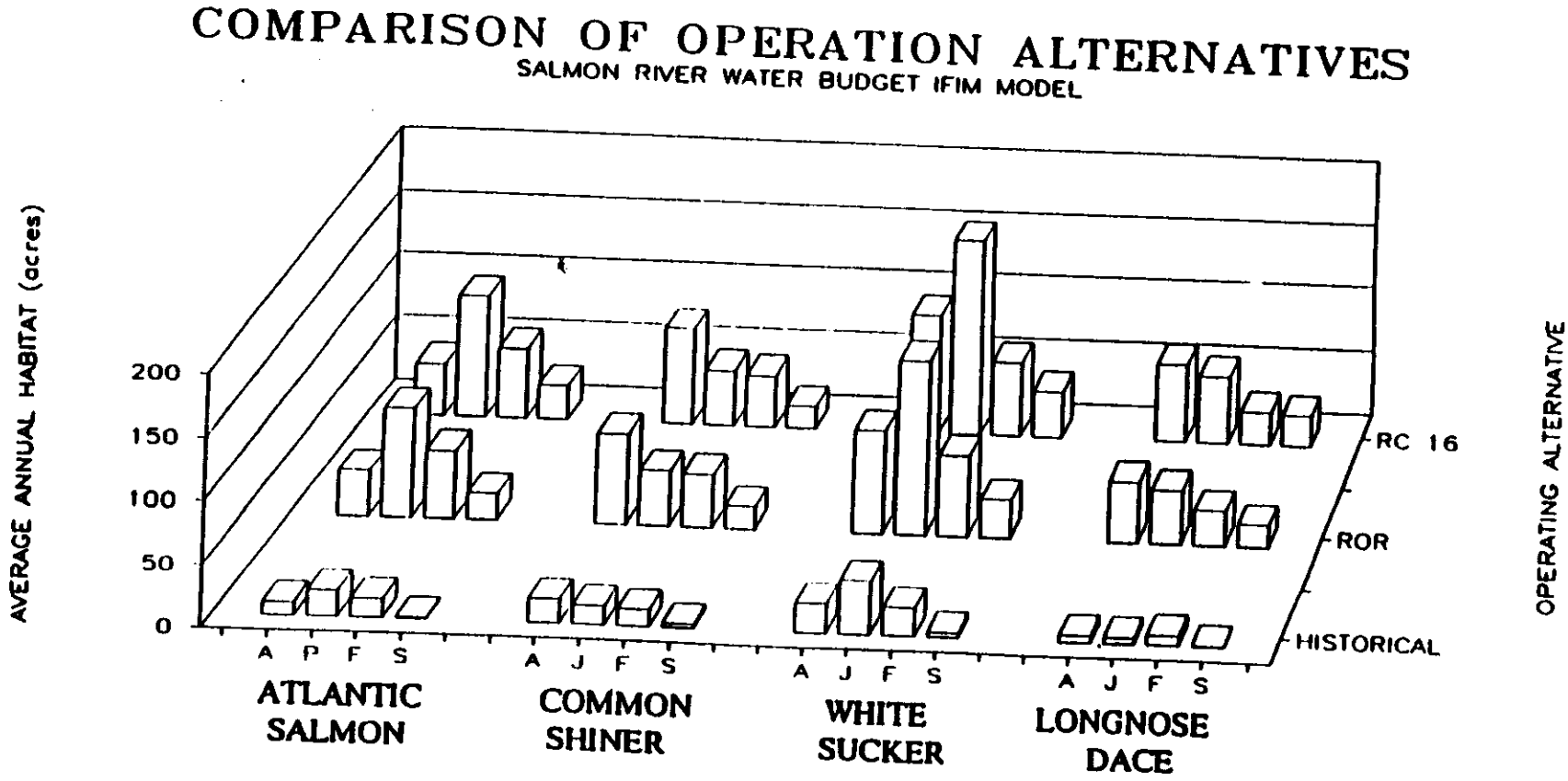

Figure 3. Summary of Salmon River Water Budget IFIM Model results - comparison of average annual habitat for historical, run-of-river (ROR), and proposed rule curve (RC 16) operation alternatives. (A=adult, P=parr, J=juvenile, F=fry, S=spawning). (Source: Niagara Mohawk Power Corporation, 1994a).

only every 24 hours. When the base flow is 185 cfs, the first incremental change up would be 200 cfs, and 400 cfs thereafter.

Our Recommendation: By ramping flows, the frequency and duration of flow releases would be similar to storm-based flow events that would otherwise occur naturally. We agree that the stipulations of the Settlement Offer regarding ramping flows are appropriate and we recommend that the Commission include a license article for ramping flows in any license issued for the Salmon River Project (see section VIII).

iii. Streamflow Gaging

Prior to 1993 there have been no USGS stream flow gages on the Salmon River. River flows were primarily synthesized from hydropower generation and project operation records. In 1993 NIMO installed a USGS-type streamflow gage at Pineville, at RM 11.5, which is downstream of the Lighthouse Hill and Salmon River Reservoirs. The gage is operated cooperatively with the USGS.

Our Recommendation: The Settlement Offer requires NIMO to continue operating and maintaining the streamflow gage at Pineville (see stipulation II.F. of Attachment A). We agree that this gage is important for monitoring river flows. However, we believe a more comprehensive stream flow and reservoir elevation gaging plan is necessary. Therefore, we recommend that NIMO prepare for Commission approval, and upon approval, implement a comprehensive gaging and monitoring plan (see section VIII).

iv. Effect on Temperature

Spawning runs of salmonids and other fish are dependent on environmental cues, including water temperature and flow. Water temperature and varying flows, as modified by operation of the Salmon River Project, could adversely affect the salmonid fishery of the Salmon River. For example, upstream migration of Pacific salmon can be induced prematurely with sudden increases in flows and sudden changes in temperature.

The Settlement Offer requires NIMO to conduct temperature monitoring at Lighthouse Hill reservoir and investigate the feasibility of a temperature monitor at the Pineville flow gaging station (see stipulation II.E. of Attachment A). In addition, NIMO would collect and compile temperature data from NYSDEC's Salmon River Fish Hatchery.

We believe the stipulations of the Settlement Offer, which require a continuous base flow (and provision for ramping changes in flows) would decrease water temperature fluctuations and help moderate water temperatures throughout the Salmon River. With the flows identified by Rule Curve 16, adverse temperature-

related impacts on the fishery are not expected. We recognize, however, that water temperature can vary substantially from year to year due to localized effects, thus water temperature and its effect on the fishery can not always be predicted.

Because water temperature, and associated flows, are critical components for sustaining salmonid populations, water temperature monitoring should be conducted to assure temperature criteria for fisheries are consistently met under all flow releases. Should the results of monitoring indicate the fishery is being adversely affected, it would be appropriate for any party to petition the Commission for a change in flows to moderate temperature effects. In addition, temperature-related effects may also be addressed through the Flow Management Advisory Team (FMAT) established as part of the Settlement Offer.

Our Recommendation: We agree that this stipulation of the Settlement Offer, to monitor water temperature in the Salmon River, is appropriate. We recommend that NIMO consult with the agencies to develop and finalize a plan to install, operate, and maintain temperature gages on the Salmon River (see section VIII).

v. Effect on Bennetts Bridge Bypassed Reach

Rule Curve 16 would have minimal effect on flows in the Bennetts Bridge bypassed reach, therefore the limited fishery in the bypassed reach would not change. Under historical operation the reach receives only leakage flows, estimated at 3 to 5 cfs. Under stipulation II.D. of the Settlement Offer (Attachment A), the proposed flow in the bypassed reach is 7 cfs, 24 hrs per day for 275 days per year (October 1 through June 30) and 20 cfs, 24 hrs per day for 90 days per year (July 1 through September 30). The flow is intended primarily for aesthetics at the Salmon River Falls and flows correspond to periods when most sightseers would be in the area (see section VI.A.5.).

Our Recommendation: Because of the benefits that would accrue to the aesthetic values to the Salmon River Falls and the associated Bennetts Bridge bypassed reach, we are recommending implementation of the requirements of stipulation II.D. of the Settlement Offer (see sections VI.A.5. and VIII).

vi. Effect on Reservoir Elevations

The project reservoirs currently exhibit yearly fluctuations through storage and release of water. Lighthouse Hill reservoir has an average annual drawdown of 6 feet and Salmon River Reservoir has an average annual drawdown of 23 feet. Reservoir fluctuations can have a detrimental effect on fish populations. Fluctuations which occur during spring spawning can affect fisheries through loss of habitat, direct egg mortality,

desertion of nests, disruption of spawning activity, or reduction of benthic invertebrate populations. The adverse effects of drawdowns can be minimized by the timing and duration of the drawdown. As a management objective, maintenance of reservoir elevations is secondary to providing downstream base flows to support the trout and salmonid fishery.

NIMO conducted a field study in May and September 1993 to examine reservoir habitat which would be affected by drawdown and to determine the effects of alternative operation scenarios. Reservoir head-duration tables and reservoir surface area duration tables from the Salmon River Water Budget Model were used as the basis for fluctuation and drawdown analyses. The results are summarized in table 2.

Rule Curve 16 would have the following effects: (a) the Salmon River Reservoir would have an average annual fluctuation of 6 feet with the highest water level in May and lowest water level in October. A 6-foot drawdown exposes 600 acres (about 20%) around the perimeter of the reservoir which is 3,150 acres at normal elevation. The drawdown eliminates all flooding of terrestrial vegetation, and reduces cover in most littoral areas, but provides habitat for fall migrating shorebirds and increases shoreline recreation access; (b) Rule curve 16 would keep the Salmon River Reservoir near full elevation (933 to 934 feet MSL) from May through July, thereby preserving spawning fish and waterfowl nesting habitat during the most critical reproduction period; (c) Rule Curve 16 would increase late summer elevations (up to 4 feet greater than historical) which could affect recreation and aesthetics; (d) Moderate fall drawdowns would continue to occur; and (e) Rule Curve 16 would preserve a continuous base flow needed for the trout and salmonid fishery downstream.

Table 2. Effect of alternative operating modes on water surface elevations for the Salmon River and Lighthouse Hill Reservoirs (Source: Staff, based on reservoir fluctuation studies submitted by Niagara Mohawk Power Corporation, on July 27, 1993 and January 27, 1994).

	Normal annual range for water surface elev. (feet MSL)*	Normal annual change in water surface elev. (feet)	Reservoir surface area at minimum drawdown (acres)*	Reservoir surface area at maximum drawdown (acres)*	Percent of maximum reservoir surface area
		Salmon River Reservoir			
Run-of-River	934 - 935	1	3150	2700	97%
Rule Curve	924 - 935	11	3150	1300	68%
Historical	921 - 934	13	2700	1300	59%
		Lighthouse Hill Reservoir			
Run-of-Rive-Riverrrr					
Rule Curve	645 - 651	6	-	-	12%
Historical	645 - 651	6	-	-	12%

* Based on 90% and 10% duration flows

Run-of-river operation provides the most stable Salmon River Reservoir with changes in elevation generally less than 1 foot throughout the year and changes in surface area less than 3 percent of the total acreage. Comparatively, fluctuations under Rule Curve 16 and historical operation would be about 11 to 13 feet. Run-of-river operation, however, would not provide the continuous base flows essential for the trout and salmonid fishery downstream, thus would not meet management objectives.

For Lighthouse Hill Reservoir, under Rule Curve 16 average annual 6-foot fluctuations in the reservoir water surface elevation would continue, however, the extent of drawdown would be reduced in all months, particularly in June through October when average fluctuations would be reduced by 2 to 4 feet.

Our Recommendation: Under Rule Curve 16, fluctuations in Salmon River Reservoir would be reduced and fluctuations in Lighthouse Hill Reservoir would continue. We believe, however, Rule Curve 16 adequately protects the reservoir fisheries while maintaining adequate continuous base flows to support the riverine fisheries resources in the Salmon River. Rule Curve 16

provides enhancement over historical operation by maintaining higher water levels in early summer and using a more moderate drawdown in late summer/fall. In addition, Rule Curve 16 fulfills the resource agency's primary management objective to protect and enhance the important recreational trout and salmonid fishery in the Salmon River.

Therefore, we recommend that NIMO operate the project according to the Water Budget Model and Rule Curve 16, as specified in stipulation I.A. of the Settlement Offer (Attachment A).

vii. Effect on Entrainment & Turbine Mortality

The NYSDEC annually stocks coldwater gamefish upstream of the project and a diverse resident fish community is present in the project area. Studies of entrainment mortality on fishes indicate that fish can be entrained, injured, and killed when passing through hydropower turbines and mortality rates can range from 5 to 23 percent for entrained fish (Energy and Environmental Management, 1986 and 1987). Operation of the proposed project could have a similar effect, resulting in an impact on the local fishery.

To reduce the potential for project-related fish mortality, NIMO proposes to (a) replace the existing 3.75-inch-spaced trashracks at Lighthouse Hill with 1-inch trashracks within four years of license issuance, at a cost of about $300,000 (1993 dollars), and (b) install 1-inch-spaced trashracks when the existing 1.5-inch trashracks at Bennetts Bridge wear out. Trashracks at Bennetts Bridge would need to be replaced about the year 2017, at a cost of about $200,000 (1993 dollars). Water velocities at the face of both trashracks would not exceed 2.0 feet per second (fps).

Trashracks have been used at hydropower plants to discourage fish from entering project intakes. Design criteria, such as placement, intake approach velocity, bar spacing, and angle of the trashrack to the flow can influence the ability of a trashrack to act as a physical fish entrainment barrier and reduce entrainment rates (Bell, 1986; Boreman, 1977; Hansen et al., 1977). For example, studies performed by the University of South Dakota on the Missouri River showed that most warmwater fish, from a young age, can sustain swimming speeds from 1.0 to 3.6 fps for extended periods of time (Schmulbach et al., 1977). Therefore, NIMO's proposed intake velocity of less than 2.0 fps would be low enough for most fish to avoid entrainment and impingement at the trashrack. The 1.0-inch bar spacing would prevent entrainment of larger fish at greatest risk of turbine injury or mortality. Survival of entrained fish generally decreases with increasing fish length (Cada, 1990). Small fish could pass through the trashrack and turbine unharmed.

While 1-inch open bar spacings would prevent entrainment of larger fish that would have the greatest risk of turbine injury or mortality, some project-related fish mortality, particularly for smaller fish, would continue. Fishery management objectives for the project area focus primarily on salmonids located downstream of the project dams (Kozuchowski et al., 1994). Therefore, the impact to the fishery is not expected to be significant. As proposed, the trashracks would be a cost effective method of protecting stocked gamefish and resident fish and would minimize entrainment-related mortality and injury, particularly for brown trout which are stocked upstream of the project.

Our Recommendation: Replacing the trashracks, as described above, is part of the Settlement Offer. We agree that this provision (see stipulation II.B. of Attachment A) of the Settlement Offer is appropriate and recommend that the NIMO develop and implement a final plan for fish protection which incorporates the design components identified in the January 27, 1994 filing with the Commission. The plan should include, at a minimum, functional design drawings of the trashrack and an installation schedule.

viii. Sea Lamprey Control

Adult sea lamprey are parasitic on fishes, particularly salmon and trout. In the Great Lakes, sea lamprey have been responsible for large declines in salmonid and trout populations. In 1971 the NYSDEC initiated a sea lamprey control program. Generally, every three years the NYSDEC chemically treats the river with lampricide. To facilitate chemical application, NIMO has provided a constant 36 cfs flow for a short duration from Lighthouse Hill.

The lamprey control program has successfully improved salmon populations, as demonstrated by angler surveys. Between 1973 and 1975, angler trips to the Salmon River increased from 5,680 to 22,649 trips and angler expenditures increased from $62,100 to $444,000.

The Settlement Offer does not specifically address lamprey control, however, NIMO has proposed to continue their participation in the program by providing flows, as necessary, for the application of lampricide. Controlling lamprey has both local and regional significance as lamprey spawned in the Salmon River can affect salmonids in the Salmon River, Lake Ontario, and the Great Lakes. Effective lamprey control is vital to maintaining local and regional salmonid populations.

Our Recommendation: There is no defined schedule for lamprey control; lampricide is applied on an as-needed basis. Providing approximately 36-cfs flows about once every three years

for lampricide application would have negligible effect on project operations or net benefits. Therefore, we recommend that NIMO continue their participation in the lamprey control program by providing periodic flow releases, when requested by the NYSDEC, for the control of sea lamprey.

ix. Effect on Salmon River Fish Hatchery

The Salmon River Fish Hatchery, which was completed in 1980, is located on Beaverdam Brook just east of the Village of Altmar, about 1.7 miles from the Lighthouse Hill development on Beaverdam Brook and about 0.5 mile upstream of the confluence of the brook and the river. The hatchery is the primary source of salmonids for stocking in Lake Ontario. About 3.2 million chinook salmon, 300,000 coho salmon, 650,000 steelhead, 300,000 brown trout, and 100,000 Atlantic salmon are raised there each year (Kozuchowski et al., 1994).

The Salmon River Fish Hatchery receives, by gravity feed pipeline, a maximum of 22 cfs (10,000 gallons per minute) directly from the Lighthouse Hill reservoir. The 1.7-mile-long, 24-inch pipeline currently provides 22 cfs to the hatchery regardless of need, which may be less at times. After passing through the hatchery, water flows into Beaverdam Brook which empties into the Salmon River about 2.0 miles downstream of the Lighthouse Hill development. The hatchery flow currently supplements the 22-cfs leakage flows from Lighthouse Hill when Lighthouse Hill is not generating (i.e., during maximum hatchery withdrawals, about 44 cfs would be available below Lighthouse Hill).

The Settlement Offer requires that NIMO provide up to 22 cfs to the fish hatchery, with flows in excess of actual hatchery needs available to be passed through the new base flow unit at the Lighthouse Hill powerhouse (see stipulation I.A. of Attachment A). Other sources of water previously utilized by the hatchery (well water and pumping from Beaverdam Brook), have not consistently provided the best mix of water needed by the hatchery. The Lighthouse Hill reservoir is a readily available source of "good quality" water which can be utilized by the hatchery and returned to the river. Under the Settlement Offer, the hatchery flows will continue to supplement minimum flows in the Salmon River. In addition, flows not required by the hatchery could be used for generation.

Our Recommendation: Operation of the fish hatchery, and its flow needs, is critical to maintaining and enhancing the salmonid populations in both the Salmon River and Lake Ontario. The hatchery has both local and regional significance as salmon produced there contribute to a cumulative beneficial effect to the Salmon River, Lake Ontario, and the Great Lakes fisheries. Hatchery production is vital to maintaining local and regional

salmonid populations. Therefore, we agree that this stipulation of the Settlement Offer is appropriate and recommend it be included in a license article for any license issued for the Salmon River Project.

x. Flow Management Advisory Team

One requirement of the Settlement Offer is to establish a Flow Management Advisory Team (FMAT) to keep abreast of the changing conditions that may affect river flows and coordinate requests to the Commission for changes in flows, releases, and other water-related issues (see stipulation IV.D. of attachment A). The FMAT would initially consist of 17 parties, as follows:

Party	No. of votes
Niagara Mohawk Power Corporation	1
NYS Dept. of Environmental Conservation	1
U.S. Fish & Wildlife Service	1
National Park Service	1
NYS Office of Parks, Recreation & Historic Preservation	1
American Whitewater Affiliation	1
New York Rivers United	1
Trout Unlimited	1
Adirondack Mountain Club	1
Oswego County River Guides	1
Oswego County Fed. of Sportsmen's Clubs	1
Oswego County Legislators	1
Village of Pulaski, Mayor	1
County Legislator, Albion	1
Town of Redfield, Supervisor	1
Pulaski/Eastern Shore Chamber of Commerce Salmon River Fishery Committee	1

The operation of the Salmon River Project and management objectives for the Salmon River are complex and diverse. We recognize that future plans can not always be identified at the time of licensing and it would be appropriate to periodically review the adequacy of licensed flows in meeting the Salmon River's diverse resource needs.

We believe the FMAT could be instrumental in monitoring the effectiveness of flow requirements and evolving hydropower, ecological, and recreational needs in the Salmon River Basin. At minimum, the FMAT would provide a communication network for the interest groups. At best, and only under the condition of no dissenting votes, the FMAT would serve as a unified group in requesting from the Commission changes in the license conditions. We believe it is important to stress that if FMAT members can't agree, individual groups may still act independently.

Our Recommendation: We recognize that the FMAT would be implemented among parties as part of the Settlement Offer. We do not see the need, however, to require establishing the FMAT as a condition of license. We see the merits of the FMAT approach and encourage all parties to pursue this effort, as outlined in the Settlement Offer, to facilitate NIMO's post-licensing requests to the Commission for changes in flows or project operation. In the event that, some time in the future, the management objectives for Salmon River change or the licensed flows are shown to be inadequate to meet management objectives, the FMAT could petition the Commission for a change in any flow requirement in the license. Upon review of the conditions and facts at that time, the Commission would make a decision to amend the license based on the best public interest.

b. Unavoidable Adverse Impacts:

None

4. Terrestrial Resources

a. Environmental Impacts and Recommendations:

i. Vegetation and Wildlife Resources

Construction of the recreational site on Lighthouse Hill reservoir adjacent to Hogback Road would require the clearing or disturbance of about 2 acres of deciduous forest vegetation and associated wildlife. The enhancement of the existing informal fishing access on the south side of the Salmon River reservoir by improving access trails and installing signs would require little or no clearing or disturbance of existing deciduous forest vegetation and associated wildlife.

The additional flows proposed for the bypassed reach (i.e., 20 cfs from July 1 through September 30 and 7 cfs from October 1 through June 30) would inundate the vegetation within the bypassed reach resulting in a loss of terrestrial habitat. Such effects, however, are expected to be minor.

Our Recommendation: Refer to section VI.A.1. (Geology and Soils). Revegetating disturbed areas immediately after project-related construction would restore the vegetative cover in those areas, and minimize the length of time wildlife habitat would be lost.

ii. Wetlands

Rule Curve 16 Enhancements

Operating the project according to Rule Curve 16 would result in less fluctuation and higher reservoir elevations for the Salmon River reservoir, on the average, than historic

operations. The proposed operation would enhance many of the wetlands associated with the Salmon River Reservoir by reducing the area of the drawdown zone and increasing reservoir water-surface elevations throughout the year (Niagara Mohawk Power Corporation, 1994a) (see also section VI.A.3.).

Under Rule Curve 16, the riverine wetlands along the Salmon River mainstem downstream of Lighthouse Hill reservoir would be enhanced by the increased minimum flow, which would insure that about 53% more river area (riverine wetland) would remain wetted than under historical operations. Also, palustrine wetlands that have benefitted from periodical pulses of water under historical operations would receive very similar seasonal high waters under the proposed rule curve 16. (Niagara Mohawk Power Corporation, 1994a).

Our Recommendation: Refer to section VI.A.2.a.i. (Water Resources) and section VI.A.3.a.vi. (Effect on reservoir elevations).

OR-18 Wetland Enhancement

In addition to the aforementioned wetlands enhancements that would result from project operation under Rule Curve 16, NIMO proposes further wetlands enhancements on the OR-18 wetland at the Lighthouse Hill reservoir. These enhancements are described in a wetlands enhancement plan dated May 1994, that was prepared jointly with the NYSDEC (Niagara Mohawk Corp., 1994f).

The objective of the wetland enhancement plan is to enhance the ecosystem in the OR-18 lower and middle pools and connecting channels. Expected enhancements include: (a) increased benthic macroinvertebrate biomass and diversity; (b) increased aquatic macrophyte biomass and diversity; and (c) increased reproduction of fishes requiring shallow, low velocity habitat for spawning and incubation. Other possible enhancements include increased brood production by waterfowl and water birds, and increased use by reptiles, amphibians, and mammals.

The wetlands enhancements on OR-18 would be accomplished by constructing a water level control structure north of and adjacent to the Hogs Back Road box culvert. The water control structure would be constructed at elevation 650.0 feet MSL, which is one foot below the normal pool level at Lighthouse Hill reservoir. The intent of this design is to allow free passage of water and organisms, including fish, when Lighthouse Hill reservoir is at or near normal pool elevation.

NIMO has included a study plan in its wetland enhancement plan that is designed to assess the success of the wetland enhancement plan. The study plan provides for the performance of both a baseline evaluation before placement of the water level

control structure and a follow-up evaluation three years after placement of the water control structure. Further, NIMO proposes to prepare a Phase 1 report describing the results of baseline studies and a Phase 2 report on the results of the follow-up evaluation.

Our recommendation: We agree with the wetlands enhancement plan for the OR-18 wetland and recommend that it be approved as part of any license issued. However, since the plan did not contain a time schedule for implementing the various measures proposed, we recommend that the license contain a condition requiring that the wetlands enhancement plan to be filed with the Commission contain a time schedule. A schedule is needed to ensure that the wetlands enhancement plan is implemented and the results are reported to the Commission in a timely manner.

b. Summary of Effects:

Construction of the proposed recreational facilities would result in the removal and/or disturbance of about 2 acres of vegetation and associated wildlife. Additional flows through the bypassed reach would result in the loss of vegetation and associated wildlife. The modifications of Salmon River Reservoir water levels, the additional flows in the Salmon River downstream of Lighthouse Hill Reservoir, and the enhancements on the OR-18 wetland would enhance existing wetlands. Consequently, a beneficial cumulative effect on wetlands within the Salmon River Basin would occur.

c. Unavoidable Adverse Impacts:

None

5. Aesthetics

a. Environmental Impacts and Recommendations

i. Aesthetic effects on reservoir shorelines due to proposed changes in reservoir operations.

NIMO proposes to change its project operations in order to balance the competing water resource interests and values of the Salmon River. The proposed changes, collectively referred to as Rule Curve 16, are based on the results of NIMO's extensive Water Budget Model analyses, its comprehensive reservoir fluctuation and instream flow studies, and its consultations and negotiations with resource agencies and other concerned parties. Under proposed Rule Curve 16, existing base flows and reservoir target elevations for the Bennetts Bridge development would be modified to accommodate new base flow requirements proposed downstream of Lighthouse Hill, and the continued peaking mode of operation at Bennetts Bridge would be re-regulated on a daily basis at the

Lighthouse Hill development by using reservoir storage and an appropriate sequencing of its generating units.

The signatories to the Settlement Offer (see footnote 2) agree to the provisions of the proposed Rule Curve 16 (see Attachment A). Interior recommends that the measures contained in the Settlement Offer, which includes proposed Rule Curve 16, be incorporated in any license issued for the project.

The changes in reservoir fluctuation that would result from implementing proposed Rule Curve 16 would enhance the aesthetic quality of the reservoirs' shorelines and adjacent littoral zones by reducing the exposure of unsightly structures, stumps, debris, and mudflats. Overall, Rule Curve 16 reduces the maximum annual drawdown of Salmon River Reservoir by four feet; maintains a higher, more stable water surface elevation from May through July; and increases late summer water levels an average of four feet over historical levels. For the Lighthouse Hill Reservoir, maximum annual water level fluctuations would continue to be six feet under Rule Curve 16; however, average monthly fluctuations would be significantly reduced, particularly from June through October (two- to four-foot reductions) (Niagara Mohawk Power Corporation, 1994a).

Our Recommendation: Giving due weight to the aesthetic effects of the proposed base flow releases in our balancing considerations, we recommend in the Comprehensive Development section that NIMO be required to implement Rule Curve 16.

ii. Effects on the aesthetic value of the Salmon River due to proposed base flow releases from the Lighthouse Hill powerhouse.

The primary objective of proposed Rule Curve 16 (see section VI.A.5.a.i.) is to provide continual base flows to the 17-mile-long reach of the Salmon River downstream of the Lighthouse Hill development to enhance the fishery (see section VI.A.3.). The minimum base flows that would be provided under Rule Curve 16 are 185 cfs May 1 through August 31, 335 cfs September 1 through December 31, and 285 cfs January 1 through April 30. These minimum base flows would also enhance the aesthetic value of the river landscape by providing steadier flows that would be perceived as being closer to the river's natural flow patterns.

iii. Effects on the aesthetic value of Salmon River Falls and the associated bypassed reach due to proposed flow releases from Bennetts Bridge dam and proposed streambed modifications at the top of the falls.

In response to resource agency requests for minimum flows in the Bennetts Bridge bypassed reach, NIMO proposes to release from

Bennetts Bridge dam: (a) 20 cfs from July 1 through September 30 for aesthetic enhancement purposes; and (b) 7 cfs for the remainder of the year for aquatic habitat enhancement purposes. NIMO also proposes to modify the streambed at the top of Salmon River Falls with natural ledge material to better distribute these bypassed reach flow releases over the falls (Niagara Mohawk Power Corporation, 1994a).

The signatories to the project Settlement Offer (see footnote 2) agree to the above minimum flow and streambed modification proposals to enhance aesthetic and aquatic habitat conditions in the bypassed reach (see stipulation II.D. of Attachment A). Interior agrees that the above measures significantly address the aesthetic flow issue involving Salmon River Falls, and recommends that NIMO work closely with the NPS and the FWS in developing the final design for modifying the streambed at the top of the falls. The NPS's acceptance of the flow regime and streambed modification proposals for the bypassed reach is contingent on: (a) the use of indigenous ledge material for the streambed modification work; and (b) the placement and fastening of the ledge material without causing any adverse visual impact either from above the falls or from the proposed viewing area (letter to Gregg Carrington from Drew Parkin, Chief, Rivers and Special Studies, North Atlantic Region, National Park Service, Boston, Massachusetts, November 4, 1993).

The proposed minimum flows are equal to a total of 90,024 cfs-hours per year, which is consistent with the total annual water volume allocated to the bypassed reach in Rule Curve 16 (see section VI.A.5.a.i.). The July 1 through September 30 period for the proposed 20-cfs release corresponds to the timeframe that most sightseers would be in the area. The July 1 date for starting the proposed 20-cfs release was chosen because black fly season occurs between late May and early June, and most family vacations occur after schools dismiss for the summer in the second or third week of June. The September 30 date for ending the proposed 20-cfs minimum flow was chosen because of the large influx of anglers in September and the fall foliage color usually reaches its peak in September (Niagara Mohawk Power Corporation, 1994a).

The proposed minimum flow amounts for the bypassed reach are based on the results of NIMO's instream flow demonstration conducted on May 24, 25, and 26, 1993. During the demonstration, flows of 7.3, 21.6, 62.4, and 119 cfs (as measured at the falls, <u>without</u> any modifications to the streambed above the falls) were observed from four locations within the bypassed reach. A flow of 31.6 cfs (as measured at the falls, <u>with</u> modifications to the streambed above the falls) was also observed from the same four locations. The streambed modifications that were in place during the 31.6-cfs flow demonstration consisted of two temporary weirs constructed of locally gathered boulders and rubble. The purpose

of the two temporary weirs was to demonstrate the feasibility of providing a veil of falling water over the falls that is similar in appearance to the veiling effect provided at a higher flow amount, but without the weirs.

The NPS points out that, based on its review of a videotape of the flow demonstration: (a) the 119-cfs flow over the falls is the most dramatic; (b) the 62-cfs flow offers the same relative aesthetic benefits as the higher, 119-cfs flow; (c) the 62-cfs flow is substantially more desirable than the 22-cfs flow due to the significantly larger curtain and dispersement of spill over the falls; and (d) the 32-cfs flow, with the streambed modified, is visually similar to the 62-cfs flow (letter to Gregg Carrington from Drew Parkin, Chief, Division of Rivers and Special Studies, North Atlantic Region, National Park Service, Boston, Massachusetts, July 21, 1993).

NIMO has filed with the Commission a report on the results of its flow demonstration, including photographs and a videotape of the various flows observed (letter and enclosures from Jerry Sabattis, P.E., Licensing Coordinator, Niagara Mohawk Power Corporation, Syracuse, New York, July 9, 1993). We agree with the NPS's flow demonstration comments noted above, based on our review of the report.

NIMO says that its proposed streambed modifications would consist of two small weirs placed in the low lying areas immediately above the falls. One weir would have a maximum height of one foot at its center and would be about eight feet long. The other weir would have a maximum height of two feet at its center and would be about 23 feet long. The natural ledge material that would be used to construct the weirs would be fastened in place with rebar (reinforcement bar), without being visible, so that it would not wash downstream during spring flooding (letter from Jerry Sabattis, P.E., Licensing Coordinator, Niagara Mohawk Power Corporation, Syracuse, New York, August 27, 1993).

We believe that the NIMO's proposed streambed modifications, as described above, would borrow from the natural form, line, color, and texture of the landscape to such an extent so as not have an adverse visual impact on the falls. Any modifications at the falls should be done in consultation with the NYSDEC. We also agree with Interior's recommendation that NIMO should consult with the NPS and the FWS in developing the final design for any modifications to the streambed at the top of the falls in order to ensure that the modifications would be as visually compatible as possible with the falls' natural and cultural features, and would be effective in improving the distribution of spillflows over the falls.

Providing flow releases to the Bennetts Bridge bypassed reach for aesthetic and aquatic habitat purposes is a relatively low-priority objective in the project's Water Budget Model (see section VI.A.5.a.i.). Therefore, any alternative flow regimes considered for the bypassed reach are limited to a total release of about 90,000 cfs-hours per year, as allocated in Rule Curve 16. Given this total water volume limitation, releases greater than the proposed 20-cfs flow for aesthetics would be of a lesser duration than proposed (i.e., less than 92 days) and/or would require a lesser minimum flow amount for aquatic habitat (i.e., less than 7 cfs).

NIMO and the resource agencies generally agree that a constant flow is ecologically more desirable than a pulsing flow in the bypassed reach (letter from Jerry Sabattis, P.E., Licensing Coordinator, Niagara Mohawk Power Corporation, Syracuse, New York, August 27, 1993). We agree. Also, we conclude that the proposed July-through-September period for aesthetic flow releases is reasonable and should not be reduced in order to increase the proposed 20-cfs aesthetics flow amount.

Our Recommendation: Giving due weight in our balancing considerations to the aesthetic effects described above, we recommend in the Comprehensive Development section that Niagara Mohawk be required to implement the flow releases and streambed modifications, as proposed, for the Bennetts Bridge bypassed reach.

iv. Protection and enhancement of aesthetic values through the provision of shoreline buffer zones and scenic vistas. The recreational facilities that are proposed as part of the project are also included in NIMO's Comprehensive Land Management Program for the Salmon River Properties (see sections III.A.2. and VI.A.7.). Consistent with the plan's land management goals and strategies, NIMO proposes to establish natural buffer zones to screen the proposed recreational facilities from view by waterway users, and to selectively clear some trees to open up scenic views of the waterway to recreation facility users.

Our Recommendation: These measures would be effective in protecting and enhancing the scenic and aesthetic character of the river landscape. Therefore, we recommend that NIMO be required to include these measures in its final recreation plan, as recommended in the Recreation and Land Use section and the Comprehensive Development section.

v. Visual enhancement of existing project facilities.

The Bennetts Bridge surge tank is visible from many locations within the project area (up to 2 miles away) because of its size (185 feet high and 50 feet in diameter) and its vertical configuration. NIMO says that for these same reasons, there is

no practical means of visually blending this structure in better with the surroundings. NIMO also says that although the surge tank is the most visible project facility, in many locations its appearance does not contrast that dramatically with the surroundings. Its weathered wood siding and metal roof borrow from the visual elements of the landscape (Niagara Mohawk Power Corporation, 1994a). We agree with NIMO's visual assessment of the Bennetts Bridge surge tank.

The Lighthouse Hill gatehouse and dam are also large and visible from various locations across the open water of the upstream reservoir. NIMO says that because of their location directly on the reservoir, screening these structures is not a viable option. The visual impact of the dam and gatehouse is reduced by their relatively low profile, non-reflective gray color, and linear orientation which mirrors the reservoir shoreline and horizon. NIMO also says that the visual contrast of these project structures is reduced by their distance from the various viewing locations, the presence of other buildings in the area, and their clear association with the power generation function of the reservoir (Niagara Mohawk Power Corporation, 1994a). We agree with NIMO's visual assessment of the Lighthouse Hill gatehouse and dam.

The 1,200-foot-long aboveground section of the Bennetts Bridge pipeline visually contrasts with the surrounding landscape, due to its light blue-green color, glossy finish, large size (11.5 feet in diameter), and linear form. However, views of this section of the pipeline are available from only one location along County Route 30. The visual impact of this exposed pipeline section is reduced by the screening effect of roadside vegetation, and the distance separating it from the viewer location (800 to 1,000 feet) (Niagara Mohawk Power Corporation, 1994a).

NIMO says that although the visual impact of the exposed pipeline section is minimal, its contrast with the surrounding landscape can be easily reduced by changing its color. NIMO points out, as illustrated in a before-and-after photographic study of the pipeline included in its January 27, 1994, filing of additional information, that painting the pipeline a non-reflective, dark brown color would make the pipeline appear as a shadow at the base of the adjacent woods, rather than an unnaturally colored structure (Niagara Mohawk Power Corporation, 1994a). NIMO proposes to repaint this pipeline section such a color in the future, during the course of normally scheduled maintenance.

Views of the Lighthouse Hill powerhouse, substation, and transmission line complex are available from County Route 22. The lines, forms, colors, and textures of these project facilities all contrast sharply with the visual character of the

area. NIMO proposes to plant staggered rows of 3- to 4-foot-tall evergreen trees along County Route 22 -- as illustrated in a series of visual simulations included its January 27, 1994, filing of additional information -- to screen these facilities from view (Niagara Mohawk Power Corporation, 1994a). To achieve the greatest screening effect in the shortest possible time, NIMO also proposes that a relatively fast growing evergreen species, such as Austrian Pine, be used in these plantings.

NIMO's visual simulations show that its proposed planting of 3- to 4-foot-tall Austrian Pines, or other fast-growing evergreen tree species, would begin to have a beneficial screening effect after 10 to 15 years.

Our Recommendation: We agree that painting the aboveground section of the Bennetts Bridge pipeline a dark brown color that borrows from the dominant natural colors of the landscape would improve its visual compatibility. However, considering the estimated cost of this measure (see Developmental Analysis section) in comparison to the aesthetic benefit that would be gained, we conclude that this measure isn't warranted at this time. However, we recommend that NIMO be required to use a more visually compatible color when repainting the pipeline in the future during the course of normally scheduled maintenance (at no additional cost).

Considering the estimated cost of NIMO's visual screening proposal (see Developmental Analysis section) and the aesthetic benefits that would result, we conclude that the proposed plantings are warranted. Therefore, we recommend that NIMO be required to implement the visual screening measures, as proposed.

In summary, we recommend that NIMO (a) use a visually compatible color when repainting the exposed section of the Bennetts Bridge pipeline in the future during the course of normally scheduled maintenance, and (b) that NIMO's the Lighthouse Hill powerhouse, substation, and transmission line complex from adjacent roadside viewpoints.

b. Summary of Effects

- The impoundment fluctuation and base flow provisions of Rule Curve 16 would have a moderate long-term beneficial effect on the aesthetic value of the Salmon River corridor landscape.

- The minimum flows and streambed modifications proposed for the Bennetts Bridge bypassed reach would have a moderate long-term beneficial effect on the aesthetic value of Salmon River Falls and on the visual integrity of the bypassed

river segments located upstream and downstream of the falls.

- The shoreline buffer zones and scenic vistas that would be provided as part of the proposed recreation facilities would have a moderate long-term beneficial effect on aesthetic landscape values.

- The proposed painting of the aboveground segment of the Bennetts Bridge pipeline and the proposed planting of evergreens at the Lighthouse Hill development would have minor long-term beneficial effects on the aesthetic value of the landscape.

b. Unavoidable Adverse Impacts:

None

6. Cultural Resources

a. Environmental impacts and recommendations:

Issuing a license to NIMO to continue operating the project could have effects both beneficial and adverse. Inasmuch as the Bennetts Bridge development is an historic property, issuing a license to continue operating and maintaining the Project's works under the protection afforded by Section 106 of the National Historic Preservation Act, is generally to be considered a beneficial effect.

In itself, however, continuing to operate the Project under the protections afforded by Section 106 of the National Historic Preservation Act does not ensure that no adverse effects would ensue. Adverse effects could inadvertently occur during routine daily activities in the absence of an operation and maintenance plan designed to hold intact the property's historic integrity. Issuing NIMO a new license to continue operating the project without such a plan, we would have to conclude, would overall adversely affect the historic properties.

We are developing a Programmatic Agreement, generally required under Section 106 of the National Historic Preservation Act in cases of anticipated adverse effect, which we would execute with the Advisory Council on Historic Preservation and the New York State Historic Preservation Officer.

Our Recommendation: Since the Programmatic Agreement would require the NIMO to design an operation and maintenance plan designed to hold intact the Bennetts Bridge development's historic integrity, we recommend that any license issued for the project incorporate the Programmatic Agreement and its stipulations.

No studies designed to identify archaeological sites have been conducted in the Salmon River Project's area of potential effects. Until NIMO's proposed project configuration is altered to pose a jeopardy to any such sites as may occur in the project's area of potential effects, however, no such studies are warranted.

b. Summary of Effects and Unavoidable Adverse Impacts

There would be no adverse effects on cultural resources at the Salmon River Project because the protection of those resources would be ensured by implementation of the stipulations of the Programmatic Agreement.

7. Recreation and Land Use

a. Environmental Impacts and Recommendations

Along with the signatories of the Settlement Offer, several entities representing recreational interests have commented favorably on the provisions of the Settlement Offer. The NPS, Fred Kuepper-Riverkeeper, American Whitewater Affiliation, and the Oswego County Federation of Sportsmen's Clubs filed letters dated April 29, 1994, and May 5, 9, and 16, 1994, respectively, supporting the Settlement Offer.

Four primary issues were identified during the scoping process regarding recreational concerns. These issues are: (i) the need for enhancing public fishing, boating, and other recreational activities at the reservoirs; (ii) the effects of the proposed base flows on fishing and recreational boating on the Salmon River below Lighthouse Hill; (iii) the need to enhance whitewater paddling opportunities on the Salmon River below Lighthouse Hill; (iv) the effects of implementing the Comprehensive Land Management Program for the Salmon River Properties as it relates to the project area. Each of these issues are addressed below.

i. The need for enhancing public access for fishing and boating on the Salmon River.

NIMO proposes several measures for enhancing public fishing and boating access at the project, including:

- Lighthouse Hill Reservoir - fishing and canoe and car-top boat access, parking, picnic tables, and trails at the proposed Hogback Road campground; fishing access at the existing Lighthouse Hill day use area at the eastern end of reservoir and Bennetts Bridge tailrace area.

- Salmon River Reservoir - continue to allow public access to the Falls Road day use area at the west end of the

reservoir; formalize and enhance existing informal fishing access by improving access trails and installing signs on the south shore, just west of the Route 17 bridge near Redfield; and install a boat launch in the Redfield area of the reservoir.

The project record indicates a present need to improve public access at the project. This is evidenced by the trends of angler fishing, discussed in section V.C.7. of this FEA and also by concerns expressed by the entities consulted during the license application process. During the consultation process, that involved meetings and written documentation with numerous Federal and State agencies, regional planning boards, and local governments, a commonly expressed concern has been the need for public access to the Salmon River and improvements for boat access and for bank fishing.

As previously mentioned, sportfishing is a significant recreational activity that is steadily growing in popularity on the Salmon River downstream of the project. Trends indicate that angler fishing has increased tremendously since 1973. As stated by the Oswego County Federation of Sportsmen's Clubs in its letter filed with the Commission on May 16, 1994, "Today, the Salmon River corridor and basin has changed dramatically with an increased and more mobile population and the growth of many small industrial/commercial businesses. At this time, the area still retains many of the qualities and resources that drew its earliest populations."

NIMO states in its application that the 1989 New York State Comprehensive Outdoor Recreation Plan indicates that recreational use of the fishing and boating facilities in Oswego County are being used almost to capacity (Niagara Mohawk Power Corporation, application, page E.5-12). While this is a county-wide estimate of use versus capacity, and does not necessarily reflect needs and demands in the project area, the Salmon River was ranked fifth in angler use on a state-wide basis in 1989 (Kozuchowski et al., 1994).

Our Recommendation: NIMO's proposed recreational enhancement measures and the provisions of the Settlement Offer (see Attachment A) satisfy the concerns for public access for boating and fishing in the project area. We agree with the recreational proposal in stipulation II.A. of the Settlement Offer. Implementing such provisions would result in a long-term beneficial effect on public recreational resources. We, therefore, recommend that NIMO implement the provisions of stipulation II.A. of the Settlement Offer.

To ensure that the information collected accurately portrays the effectiveness of project recreational facilities in providing for public fishing and boating needs as the demand for additional

access facilities increases in the future, we recommend that NIMO consult with the NYSDEC and the NPS during the development of methods for collecting the periodic FERC Form 80 data (required by Section 8.11 of the Commissions regulations). We also recommend that the NYSDEC be provided copies of the completed data for their review and comment, and that their comments be filed with the Commission along with the completed FERC Form 80.

ii. The effects of the proposed base flows on fishing and recreational boating on the Salmon River below Lighthouse Hill

Under stipulation I.A. of the Settlement Offer (see Attachment A), NIMO proposes to provide the following continual base flows below the Lighthouse Hill powerhouse to enhance the fishery (see section VI.A.3.a.i.):

January 1 through April 30	285 cfs
May 1 through August 31	185 cfs
September 1 through December 31	335 cfs

These flows would have the potential to affect recreationists using the river segment below the Lighthouse Hill powerhouse to the river's confluence with Lake Ontario.

Fisherman, especially bank fisherman who account for the majority of anglers on the river, could experience improved fishing conditions as a result of the proposed base flows.

As described in section VI.A.3.a.i. of this FEA, the fishery resources are expected to improve. Further, compared to the historical mode of operation when flows during the recreational season varied tremendously and were unpredictable, fishermen and other river users would benefit by knowing a certain amount water that would be released in the river, especially during August when flows are typically low. Flow duration curves indicate that, historically, during the low flow recreational season (July and August), flow amounts ranged from about 23 cfs to about 1,200 cfs (1,200 cfs, occurring less than 5% of the time) (Niagara Mohawk Power Corporation, 1993, application, Exhibit B).

Drift boat fishermen, including commercial drift boat fishing guides, are concerned that the base flows may not be enough for their purposes. [13] According to NIMO's paddling

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[13] A creel survey cited by Mr. Les Wedge of the NYSDEC during the April 27, 1994, agency scoping meeting in Syracuse, New York, shows that less than 1% of the total angling trips to the Salmon River between August 17, and December 4, 1989, were by drift boat

feasibility study report, drift boaters state that they need at least 350 cfs for their operations (Niagara Mohawk Power Corporation, 1994a, additional information response 8, Paddling Feasibility Study). The fall season is considered the best time for drift boat fishing, however our analysis considers the potential effects for the entire year.

We conclude that, depending on the time of year and the type of water year, the overall effect of implementing the proposed base flow plan may have a minor adverse to minor beneficial effect on drift boaters for the following reasons: (a) the primary objective for the plan is to improve the fisheries to benefit anglers; and (b) flow duration curves indicate that the float fisherman may benefit from the proposed base flow plan especially during the fall fishing season.

Our independent review of the flow duration curves indicates that flows in the river would exceed 350 cfs under the proposed flow plan more than under the historic flow plan; contrary to the suggestion that the proposed base flow releases from Lighthouse Hill may not be adequate for drift boat purposes on a year-round basis. Furthermore, the record suggests that flows would be higher than the base flow about 100% of the time during the months of September through November, and about 80% of the time in April.

During the public scoping meeting held on April 26, 1994, in Pulaski, New York, representatives of the commercial drift boat guides stated their concern about the flows and requested that they be represented on the FMAT. At that meeting NIMO agreed to add to this team a representative for the commercial drift boat guides. (See section VI.A.3.x.).

Our Recommendation: The provisions of the Settlement Offer would satisfy the concerns for fishing and boating opportunities. We agree with the base flow proposal. Implementing such a provision would result in cumulative beneficial effects on recreational fishing and boating resources due to a more constant flow release, rather than the historical flow regime that had abrupt changes in flow volume and velocity and was generally unpredictable. We, therefore, recommend that NIMO provide the base flows specified by the provisions of stipulation I.A. of the Settlement Offer.

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anglers. Of the estimated 180,400 days spent by fishermen during the period, 1,300 were by drift boat users. It should be noted, however, that the drift boat fishermen accounted for $153,500, or roughly 1.5%, of the estimated $10,024,500 total expenditures made by Salmon River fishermen during the period. (Connelly et al., 1990).

iii. The need for enhancing use of the river by whitewater paddling recreationists on the Salmon River below the Lighthouse Hill powerhouse.

In 1991, NIMO completed a System-wide Whitewater Recreation Plan (SWRP) that considers the potential for whitewater boating opportunities at all of its projects. The Salmon River, below Lighthouse Hill powerhouse, was determined to be an appropriate river segment for whitewater activities. NIMO consulted with the whitewater interest groups uring the preparation of this plan. Under stipulation I.D. of the Settlement Offer (see Attachment A), NIMO proposes to provide scheduled flows below Lighthouse Hill to accommodate whitewater boating on days specified in attachments 1 and 2 of the Settlement Offer. NIMO, by letter dated May 9, 1994, revised their proposed whitewater release schedule by clarifying that they propose a whitewater release the first full weekend of August. NIMO has proposed to consider additional flow releases during high flow years, if practical.

NIMO conducted a Paddling Feasibility Study below the Salmon River Project on August 7-8, and September 11-12, 1993. The study identified the range of paddlable flows and gathered information on how to use the limited volume of water designated for whitewater use. The study involved over seventy participants representing various interests such as private paddlers, commercial rafters, and fishing guide services. Study results indicate that enjoyable paddling occurred with flows that ranged from 750 cfs to 1,400 cfs and most of the participants preferred to have several weekends for these flow releases during the summer as opposed to having one or two weekends with large volume releases (i.e. 1,400 cfs). NIMO proposes the following releases from Lighthouse Hill to accommodate whitewater boating interests:

1) Provide an annual total of approximately 120,000 cfs-hours of water releases for recreational purposes.

2) A minimum of 2 weeks would be provided between whitewater releases, thus promoting stability of the managed fishery.

3) The following release schedule for recreational purposes on the Salmon River:

DATE	RELEASE FLOW-cfs	PURPOSE
June (one weekend)	400	Fishery/Whitewater
July (two weekends)	750	Whitewater
August (1st weekend)	750	Tube Race/Whitewater
September (1st weekend)	750	Onset of Salmon run/

and Whitewater

4) There are possibilities for more and/or larger releases during wet years. Possible uses of extra water during wet years could be: (a) continue to release water for an extra day on a scheduled release weekend; (b) increase the amount of water released during a scheduled release; and (c) provide an additional release weekend (if it won't conflict with the NYSDEC recommendation to have two weeks between whitewater releases.

Our Recommendation: Implementing the proposed whitewater release plan would be a long-term benefit to paddlers of various skill levels using a wide variety of non-motorized watercraft. The increased number of paddlers using the river prior to the 1986 change in NIMO's operation change at the Salmon River Project, as discussed in section V.C.7., suggests that the river would likely receive as much or more use by paddlers when whitewater flows are resumed. Nationwide, participation in whitewater rafting and kayaking activities has been increasing tremendously since 1980 (President's Commission on Americans Outdoors, 1986, pp. 112 and 113).

Further, because the river is conducive to training novice paddlers, there would likely be additional opportunities for local outfitters to offer lessons during the summer season (especially July and August) when, water levels historically have been unpredictable, but usually too low to consider floating. The scheduled releases would make it possible to schedule lessons in advance for a specific weekend.

Therefore, we recommend implementation of the proposed whitewater release plan. It should be noted that these special whitewater flow releases would not constitute a dollar cost to NIMO; the flows would be released through the turbine-generator units at the Lighthouse Hill powerhouse and the power generated would be sold to Niagara Mohawk's customers.

iv. The effects of implementing the Comprehensive Land Management Program for the Salmon River Properties as it relates to the project area.

In stipulation III.A. of the Settlement Offer (see Attachment A), NIMO proposes certain easements and land sales as recreational enhancement measures **outside** the proposed project boundaries, but located in the immediate vicinity of the project. Specifically, the proposed easements outside the project boundaries include providing the NYSDEC with: (a) permanent easements to all NYSDEC fishing access locations along the Salmon River downstream of the Lighthouse Hill development; (b) fishing easements along most of NIMO's property on the lower Salmon River downstream of the Lighthouse Hill development; (c) a 200-foot-

wide conservation easement along the downstream river corridor and; (d) other easements such that a trail system can be developed along the entire corridor. In addition to these easements, under stipulation III.A., Niagara Mohawk would sell to the NYSDEC (directly or through a third party): (a) an area south of the Salmon River Reservoir; (b) the area surrounding and including the Salmon River Falls; and (c) the existing angler parking areas and one additional area downstream of the Lighthouse Hill development.

According to the terms of stipulation III.A., NIMO would provide these through its Comprehensive Land Management Program for the Salmon River Properties (Program). NIMO developed the Program, and the associated Land Use Plan, as outgrowths of extensive studies and cooperation with state and local entities that began in 1987.

We note that NIMO's key objectives for the Program and Land Use Plan are to attain the highest and best use of its lands and to provide stewardship of the resources through cooperative efforts with the NYSDEC and others to protect the river and reservoirs as well as to make the lands available for public enjoyment. NIMO uses the ongoing Program to effectively manage approximately 7,000 acres of landholdings along the Salmon River. Niagara Mohawk's landholdings and associated Land Use Plan extend far beyond the Salmon River Project boundaries. Many of the enhancements proposed by NIMO in the Salmon Project application, as supplemented, are only components of the Land Use Plan. For this reason, the Land Use Plan, in its entirety, was not included in the Settlement Offer. See section VI.A.5.iv. for our discussion of the Program regarding aesthetic resources.

We do not recommend requiring any of the stipulation III.A. enhancement measures in the provisions of any license issued for the project. However, we see no conflict between the stipulation III.A. enhancement measures and our recommended measures.

We respect the commitment of NIMO and the other parties to the Settlement Offer to establish the stipulation III.A. enhancements as measures which are not in conflict with the Commission's statutory authority. We believe that it is admirable on NIMO's part to go beyond what any project license would require by agreeing with the other parties to provide those enhancements.

However, the parties must recognize that, because none of stipulation III.A. enhancement measures would be part of any license issued for the project, they would be beyond the Commission's jurisdiction to enforce.

b. Summary of Effects

If the proposed base flow and whitewater flow plans are implemented and the proposed recreational facilities are constructed, the resulting recreational enhancements would provide more opportunities for a wider spectrum of recreationists than is available at present.

b. Unavoidable Adverse Impacts:

None

B. No-Action Alternative

As previously stated, under the no-action alternative, NIMO would not be allowed to operate the hydroelectric developments and could ultimately be required to remove the dams and generating facilities. None of NIMO's proposed measures, agency recommendations, or staff recommended environmental measures discussed above would be implemented to protect or enhance existing environmental resources.

VII. DEVELOPMENTAL ANALYSIS

A. Economic Considerations

NIMO states that the Bennetts Bridge development historically generated on average about 92,969,000 kWh of energy annually, and the Lighthouse Hill development about 25,263,000 kWh of energy annually. Based on that, the Salmon River Project generated in the past about 118,232,000 kWh of energy annually without any environmental enhancement measures (Niagara Mohawk Power Corporation, 1994a). With the proposed environmental enhancement measures and the new 2.15-MW turbine generator unit at the Lighthouse Hill development, annual energy generation for the project would be reduced from 118,232,000 kWh to 114,690,000 kWh (Niagara Mohawk Power Corporation, 1994a). However, with the proposed enhancements, but excluding the new unit, which would produce about 1,651,000 kWh per year, the annual energy generation would have been reduced to 113,039,000 kWh.

The Salmon River has not been gaged until recently (NIMO installed a USGS gage downstream of the Lighthouse Hill development only in January 1993) and the reservoir inflows were estimated on historical generation and headwater data taken from hand-written operator log sheets with generation data recorded on an hourly basis. Therefore, NIMO developed a computer model ("Water Budget Model"), in order to determine the availability of flows in the Salmon River basin. The model was used to evaluate the historical flow regime on the Salmon River on an hourly and

daily basis, to determine the best allocation of the water resources to satisfy competing uses, to determine the effect that various operational regimes would have on the energy generation of the project, and to determine the magnitude and duration of base flows (requested by the resource agencies) that could be continually maintained. A modified run-of-river operation was also analyzed by the Water Budget Model. The Water Budget Model showed that the energy loss with the run-of-river operation would be much higher than the energy losses with the proposed operational regime.

NIMO states that the proposed minimum flow release to the Bennetts Bridge bypassed reach would decrease energy generation by about 1,830,000 kWh. This energy loss would result from releasing minimum bypassed reach flows of 20 cfs from July 1 to September 30 for aesthetic purposes, and 7 cfs for the remainder of the year for aquatic habitat. NIMO also states that the proposed base flow/pond level stabilization would decrease the energy generation by about 3,400,000 kWh. This energy loss would result from releasing minimum flows or continuous year-round base flows of 285 cfs from January 1 through April 30, 185 cfs from May 1 through August 31, and 335 cfs from September 1 through December 31 (known as Rule Curve 16) downstream of the Lighthouse Hill development. As a result of implementing both proposals, the total energy loss at the Salmon River Project would be about 5,230,000 kWh.

On August 7, 1995, NIMO informed us that the Salmon River project is not fully depreciated. As of December 1994 the project's net book value or outstanding sunk project cost is about $14,955,000. The cost of licensing in sum of $257,000 and studies in sum of $444,000 are included in that sum.

NIMO, in consultation with the resource agencies, proposes the following environmental enhancement measures on the entire Salmon River corridor (the annual operation costs are based on the Staff's estimates): (1) base flow unit installation at Lighthouse Hill development to cost $3,984,000 in 1993 dollars; no additional operation and maintenance cost is assumed by NIMO. We adjusted this cost to $3,094,000 by subtracting the costs for escalation, indirect cash flow, and funds needed during construction, and then discounted by 10 percent to 1994 dollars, or to $3,403,400 present value; (2) installation of new trashracks at Lighthouse Hill to cost $300,000 (Niagara Mohawk Power Corporation, 1994c) with an estimated annual operation cost of $100,000; (3) Hogback Road boat access, Stage I - at Lighthouse Hill to cost $17,000 with an estimated annual operation cost of $1,000; (4) Hogback Road campground, Stage 2 - at Lighthouse Hill to cost $39,000 with an estimated annual operation cost of $1,000; (5) Redfield fishing access, at Salmon River Reservoir to cost $17,000 with an estimated annual operation cost of $1,000; (6) installation of a 5-foot-diameter

discharge pipe to release minimum flow at Bennetts Bridge bypass reach to cost $22,600 with an estimated annual operation cost of $5,000; (7) planting of trees along County Road No. 22 to cost $2,600 with an annual operation cost of $500; and (8) repainting the pipeline at Bennetts Bridge to cost $27,000.

(1) base flow unit installation at Lighthouse Hill Development to cost $3,984,000. This cost was adjusted by the staff to $3,094,000 by subtracting the costs for escalation, indirect cash flow, and the funds during construction. This new unit would not increase the existing operation and maintenance cost, according to NIMO; (2) installation of new trashracks at Lighthouse Hill to cost $300,000 (revised, see additional information dated February 24, 1994) with an estimated annual operation cost of $100,000; (3) Hogback Road boat access, Stage I - at Lighthouse Hill to cost $17,000 with an estimated annual operation cost of $1,000; (4) Hogback Road campground, Stage 2 - at Lighthouse Hill to cost $39,000 with an estimated annual operation cost of $1,000; (5) Redfield fishing access, at Salmon River Reservoir to cost $17,000 with an estimated annual operation cost of $1,000; (6) installation of a 5-foot-diameter discharge pipe to release minimum flow at Bennetts Bridge bypass reach to cost $22,600 with an estimated annual operation cost of $5,000; (7) planting of trees along County Road No. 22 to cost $2,600 with an annual operation cost of $500; and (8) repainting the pipeline at Bennetts Bridge to cost $27,000.

Our independent economic studies are based on current electric power conditions. We do not consider future inflation or escalation of prices. The project costs include carrying charges on the book value or net investment, operation and maintenance costs, insurance, taxes, and the administrative and general expenses. We assumed a capacity value of $109/kW-year (at a fixed charge rate of 14 percent), which is based on a Combined-Cycle Combustion Turbine plant - cheapest, most reasonable, capacity addition available. We assumed a total operation and maintenance (O&M) expense of $257,000 in 1995. The O&M estimate was submitted to us by NIMO on August 7, 1995.

We evaluated the economic benefits of the project as it presently operates--with outstanding debt of $14,955,000 but without any proposed environmental enhancements (and without the base-flow unit) for a 30 year license period with estimated operation start in January 1996. We also evaluated the project economic benefits with the environmental enhancements proposed by NIMO, including the base-flow unit, and environmental enhancements proposed by the resource agencies.

The annual project cost, without environmental enhancement measures, over the 30-year licensed period, would be about $3,550,000 in 1995 dollars or about 30 mills/kWh. We estimate the gross value of the power in the region, to be about 53.81

mills/kWh [14]. The gross energy value is only about 17.9 mills/kWh, while the balance of the gross power value (35.91 mills/kWh) is due to the relatively large dependable capacity of the project, which is equal to the project's installed capacity.

The project's net economic benefit without any enhancement measures would be about $2,521,000 annually or about 21.32 mills/kWh.

Table 3 shows the reduction of the project's economic benefits that would result from the various enhancement measures we evaluated. The annual total cost of our recommended enhancement measures would be about $346,000 or about 2.95 mills/kWh. The levelized net benefits of the project would drop from $2,521,000 annually to about $2,175,000 annually ($2,521,000 - $346,000 = $2,175,000).

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[14] Our estimate of the cost of the alternative energy component of the power value is based on the projected cost of energy generation in combined-cycle combustion turbine plants, in the Middle Atlantic Census Division of the country, published by the Energy Information Administration (EIA) in their Annual Energy Outlook for 1995. Our estimate of the amount of fuel that would be displaced by the hydroelectric generation is based on the fuel consumption of a combined-cycle plant, operating at a heat rate of 6,200 Btu/kWh.

Table 3. The economic impacts, or costs, of the various enhancement measures considered.

	Enhancement Measures	Annual Costs of Environmental Measures	Cost in mills/kWh
1	Base Flow Unit at Lighthouse Hill and Pond Level Stabilization	$234,000	2.04
2	New Trashracks at Lighthouse Hill	$92,000	0.78
3	Hogback Road Boat Access, Stage 1 - at Lighthouse Hill	$5,000	0.04
4	Hogback Road Campground, Stage 2 - at Lighthouse Hill	$4,000	0.03
5	Redfield Fishing Access at Salmon River Reservoir	$2,000	0.02
6	Minimum Flows-Bennetts Bridge Bypassed Reach	$27,000	0.23
7	Planting of Trees Along County Road No. 22	$1,000	0.01
8	Repainting the Pipeline at Bennetts Bridge	$3,000	0.02
	Total:	$368,000	3.17

The project, as proposed by NIMO and based on current economic conditions without future escalation or inflation, (if licensed as NIMO proposes) would cost about $3,884,000 annually (33.86 mills/kWh) and would produce about 114.69 GWh of energy annually having a current value of about $6,171,000 (53.81 mills/kWh) for a current net annual power benefit of about $2,287,000 (19.94 mills/kWh). If licensed with recommended mitigation measures, the project would still produce about 114.69 GWh of energy annually, at a current net annual benefit of about $1,919,000 ($2,287,000 - $368,000 = $1,919,000). If the project

were retired, NIMO would still have to pay carrying charges on its outstanding undepreciated investment in the project facilities, as well as having to pay the cost of obtaining alternative power. Having to pay the carrying charges on the net project investment would make the current net annual benefit about -$1,376,280 (-12 mills/kWh). Thus licensing the project with our conditions would be more economical than project retirement by a margin of about $3,295,280 ($1,919,000 + 1,376,280 = $3,295,280) annually.

B. Polution Abatement Benefits

Besides economic benefits, the Salmon River Project provides air pollution reduction benefits by displacing the generation from fossil-fueled generating resources. This benefit results, obviously, from the fact that hydropower generation produces no atmospheric pollution.

As a result of an agreement between the resource agencies and the applicant, the minimum release of water during one of the release schedule periods would be reduced. This would increase the volume of stored water available for generation. As a result, the estimated average annual generation would be increased from 113,245,000 kWh to 114,690,000 kWh.

Since, according to the DOE Electric Power Monthly, 98 percent of the electric energy generated by NIMO is produced by coal-fired plants, we assume that the 114,690,000 kWh of electric energy that would be generated annually by the Salmon River Hydropower Project would be replacing an equivalent amount of annual generation by available coal-fired plants. The generation of 114,690,000 kWh of energy would require the combustion of approximately 48,100 tons of pulverized bituminous coal annually.

Using facts presented in the preceding paragraph, we conclude that continued operation of the Salmon River Hydro Project would make it unnecessary to burn about 48,100 tons of coal annually; and could thereby avoid the production of the atmospheric pollutants which listed below:

Oxides of sulfur.....940 tons
Oxides of nitrogen.....434 tons
Carbon monoxide.....22 tons
Carbon dioxide.....110,950 tons
Particulates (fly ash).....2,880 tons

VIII. COMPREHENSIVE DEVELOPMENT ANALYSIS

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a hydropower project, the recreational, fish and wildlife resources, and other nondevelopmental values of the involved waterway are considered equally with its electrical energy and other developmental values. In determining whether, and under what conditions, a hydropower license should be issued, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

Based on our independent review and evaluation of the proposed Salmon River Project, recommendations of the agencies and other interested parties, and the no-action alternative as documented in this FEA, we have selected the proposed Salmon River Project, with staff-recommended enhancement measures, as the preferred option.

We recommend this option because: (1) issuance of a license would provide a beneficial, dependable, and inexpensive source of electric energy; (2) the recommended environmental enhancement measures would mitigate adverse impacts to, protect, or enhance fishery resources, water quality, vegetation, wetlands, wildlife, recreational resources, and cultural resources; (3) the 114,690,000 kWh of electric energy that would be generated annually from a renewable resource would be beneficial because it would reduce the use of fossil-fueled, steam-electric generating plants, conserve non-renewable energy resources, and reduce atmospheric pollution; and (4) the proposed project would remain economical with our recommended environmental enhancement measures.

Our preferred alternative includes the following enhancement measures:

(1) incorporate appropriate soil erosion control measures in the final construction plans for the proposed construction and enhancement of recreational facilities;

(2) operate the project according to the specifications of stipulation I.A. of the Settlement Offer: provide continuous base flows (which flows should include flows of up to 22 cfs which would be provided to the Salmon River Hatchery) from the Lighthouse Hill development while meeting target water surface elevations in the Salmon River reservoir according to the schedule described in Rule Curve 16: 185 cfs from May 1 through August 31, 335 cfs from September 1 through December 31, and 285 cfs from January 1 through April 30;

(3) use gradual flow increases and decreases (ramping) during scheduled discharge changes (changes that are not a result of high reservoir inflow) from Lighthouse Hill, as designated by stipulation I.B of the Settlement Offer: releases should be ramped up or down in increments of 400 cfs except when the base flow is 185 cfs in which case the first increment up should be 200 cfs and each subsequent increment should be 400 cfs; increases should be made once every 24 hours, and should be made before midnight to ensure angler safety; decreases should be made once every 12 hours;

(4) prepare and implement a comprehensive stream flow and reservoir elevation gaging and monitoring plan;

(5) develop and implement a plan to monitor water temperatures in the Salmon River;

(6) develop and implement a final plan for fish protection which includes, at a minimum, functional design drawings for trashracks and an installation schedule;

(7) provide flows needed by the Salmon River Fish Hatchery up to 22 cfs, with flows in excess of hatchery needs going through the new base flow unit at powerhouse;

(8) develop a time schedule for implementing the various measures proposed in the OR-18 wetlands enhancement plan, which is recommended to be approved as part of any license issued;

(9) implement the flow releases and streambed modifications for the Bennetts Bridge bypassed reach, as designated in stipulation II.D. of the Settlement Offer: provide a continuous (24-hours-per-day) 20-cfs minimum flow release to the reach July 1 through September 30, and provide 7 cfs to the reach for the remainder of the year; and modify the streambed at the top of Salmon River Falls with natural ledge materials to distribute the flow over the falls;

(10) include in the final recreation plan, measures for establishing natural buffer zones to screen proposed recreational facilities from view by waterway users, and selectively clearing some trees to open up scenic views of the waterway to recreation facility users;

(11) use a visually compatible color when repainting the exposed section of the Bennetts Bridge pipeline in the future during the course of normally scheduled maintenance, and visuallly screen the Lighthouse Hill powerhouse, substation, and transmission line complex from adjacent roadside viewpoints;

(12) implement the stipulations of the Programmatic Agreement to protect cultural resources;

(13) implement the provisions of stipulation II.A. of the Settlement Offer by developing and implementing a final recreation plan that, at a minimum, provides:

- at Lighthouse Hill Reservoir - fishing and canoe and car-top boat access, parking, picnic tables, and trails at the proposed Hogback Road campground; fishing access at the existing Lighthouse Hill day use area at the eastern end of reservoir and Bennetts Bridge tailrace area;

- at Salmon River Reservoir - continued public access to the Falls Road day use area at the west end of the reservoir; formalization and enhancement of existing informal fishing access by improvement of access trails and installation of signs on the south shore, just west of the Route 17 bridge near Redfield; and installation of a boat launch in the Redfield area of the reservoir;

(14) providing completed data for the periodic FERC Form 80 data (required by Section 8.11 of the Commissions regulations) to the NYSDEC for review and comment, and filing the NYSDEC's comments with the Commission along with the completed FERC Form 80; and

(15) provide the following flow releases at least five weekends per year from Lighthouse Hill for whitewater users and fishing enhancement, as specified by stipulation I.B of the Settlement Offer: one weekend in June-400 cfs; two weekends in July-750 cfs; the first full weekend in August-750 cfs; and the 1st weekend in September-750 cfs.

Based on our environmental analyses, we believe the environmental benefits that would result from requiring the above measures are justified, given the associated costs reflected in table 3.

IX. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving waterways affected by the project. Under Section 10(a)(2) of the FPA, federal and state agencies filed 19 comprehensive plans that address various resources in New York. Of these, we identified and reviewed seven plans relevant to the proposed Salmon River Project.[15] No inconsistencies were found.

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[15] Fisheries Enhancement Plan for the Salmon River, 1994, New York State Department of Environmental Conservation; New York wild, scenic, and recreational

X. CONSISTENCY WITH FISH AND WILDLIFE RECOMMENDATIONS

Pursuant to Section 10(j) of the FPA, we make a determination that the recommendations of the federal and state fish and wildlife agencies are consistent with the purposes and requirements of Part I of the FPA and applicable law. Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations of federal and state fish and wildlife agencies, for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. We have addressed the concerns of the federal and state fish and wildlife agencies and made recommendations consistent with those of the agencies.

XI. CONCLUSION

With the exception of installing the proposed base flow turbine-generator unit in the existing bay in the Lighthouse Hill powerhouse, the project is constructed and operating. The installation activities would take place within the existing facility.

Constructing the proposed recreational facilities would result in the removal and/or disturbance of about 2 acres of vegetation and associated wildlife, and result in minor, short-term increases in soil erosion until disturbed areas are revegetated and stabilized.

Operating the Salmon River Project in the proposed modified peaking mode according to Rule Curve 16 would protect and enhance the aquatic, wetland, wildlife, aesthetic, and recreational resources in the project reservoirs, the Bennetts Bridge bypassed reach, and downstream of the project.

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river system act, 1985, New York State Department of Environmental Conservation; Regulation for management of the wild, scenic, and recreational river system act, 1986, New York State Department of Environmental Conservation; People, Resources, Recreation, 1983, New York State Office of Parks, Recreation, and Historic Preservation; Final environmental impact statement - restoration of Atlantic salmon to New England rivers, 1989, Department of the Interior; Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service, undated, U.S. Fish and Wildlife Service; The nationwide rivers inventory, 1982, Department of the Interior.

The flows provided from the Lighthouse Hill reservoir to the Salmon River Fish Hatchery would enable the hatchery to continue to maintain and enhance the salmonid populations in the Salmon River and Lake Ontario.

Providing continuous flow releases to the Bennetts Bridge bypassed reach and modifying the streambed to better distribute flows over the head of Salmon River Falls would have a moderate long-term beneficial effect on the aesthetic value of Salmon River Falls and on the visual integrity of the bypassed river segments located upstream and downstream of the falls.

Establishing natural shoreline buffer zones to screen proposed recreational facilities from waterway users, and selectively clearing trees to open up scenic views of the waterway to recreation facility users would have a moderate long-term beneficial effect on aesthetic landscape values.

Implementing the provisions of the Programmatic Agreement would protect and enhance the cultural resources at the project.

Enhancing public fishing and boating access at the Salmon River and Lighthouse Hill reservoirs by implementing the final recreation plan would have a moderate long-term beneficial effect on recreational use at the reservoirs.

Implementing the whitewater flow release plan would have a moderate long-term beneficial effect on use of the Salmon River by paddlers of various skill levels using a wide variety of non-motorized watercraft.

XII. FINDING OF NO SIGNIFICANT IMPACT

On the basis of the record and this final environmental assessment, issuance of a license for the Salmon River Project would not constitute a major federal action significantly affecting the quality of the human environment.

XIII. LITERATURE CITED

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_____. 1994a. Additional information on the application for initial license for the Salmon River Project, a major water project, FERC No. 11408, New York. January 27, 1994.

_____. 1994b. Filing of Settlement Offer for the application for initial license for the Salmon River Project, a major water project, FERC No. 11408, New York. January 27, 1994.

_____. 1994c. Additional information on the application for initial license for the Salmon River Project, a major water project, FERC No. 11408, New York. February 28, 1994.

_____. 1994d. Responses to March 2, 1994, request for additional information on the application for initial license for the Salmon River Project, a major water project, FERC No. 11408, New York. March 28, 1994.

_____. 1994e. Responses to requests for additional information on the application for initial license made at scoping meetings for the Salmon River Project, a major water project, FERC No. 11408, New York. May 10, 1994.

_____. 1994f. Additional information -- outline of a wetland enhancement plan for the Lighthouse Hill reservoir wetland OR-18 -- on the application for initial license for the Salmon River Project, a major water project, FERC No. 11408, New York. May 11, 1994.

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U.S. Fish and Wildlife Service and Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. May 1986. 19 pp.

XIV. LIST OF PREPARERS

Peter A. Leitzke -- Environmental Coordinator, Geological and Soils Resources (Geologist; M.A., Geological Sciences).

Mary Golato -- General Description of the Salmon River Basin (Project Manager; B.S., American Studies).

Dr. C. Frank Miller -- Need For Power (Electrical Engineer; Doctor of Engineering).

Patrick K. Murphy -- Terrestrial Resources (Wildlife Biologist; M.S., Wildlife Management).

Steven G. Naugle -- Aesthetic Resources (Landscape Architect; B.S., Landscape Architecture).

Brian Romanek -- Recreation and Land Use (Environmental Protection Specialist; M.A. Recreation and Parks).

Dennis Tarnay -- Project Description, Developmental Analysis (Civil Engineer; M.S., Civil Engineering).

Monte J. TerHaar -- Water Resources, Fishery Resources (Environmental Engineer; M.S., Environmental Engineering; M.S., Aquatic Biology).

ATTACHMENT A

Salmon River Project No. 11408

Settlement Offer

December 9, 1993

INTRODUCTION

The purpose of this document is to highlight, summarize and document the areas of agreement that exist between the signators with regard to the prospective operation and maintenance of the Salmon River Project (FERC Project No. 11408). This document is intended as a summary of all areas of agreement and it is not meant to replace the detailed license application exhibits, studies, reports, meeting minutes and other consultation records that have been and will be developed for the project and submitted to consulted resource agencies and the FERC.

The Salmon River Project consists of the Bennetts Bridge and Lighthouse Hill Developments located in the Towns of Redfield and Orwell, Oswego County, New York. The Bennetts Bridge and Lighthouse Hill powerhouses are located 18 and 17 miles from the confluence of the Salmon River and Lake Ontario, respectively.

I. CONCERNS DOWNSTREAM OF LIGHTHOUSE HILL

A. Base Flows

The signators agree that: a continual base flow will be provided as described in the *Water Budget Model* submitted to the agencies on May 5, 1993 (Rule Curve 15), as modified as a result of meetings with river conservation groups on June 16, 1993 and August 9, 1993 (Rule Curve 16). The meeting minutes are attached.

Bennetts Bridge Development will remain as a seasonal store and release facility that operates in the peaking mode. Lighthouse Hill Development will operate as a store and release facility that operates in a daily re-regulating mode. Base flows below 450 cfs will be made through a new base flow unit that will be located in the spare bay of the Lighthouse Hill powerhouse as described in the *Minimum Flow Unit, Phase II - Conceptual Study Report* submitted to the resource agencies on May 5, 1993.

Rule Curve 16 will result in continual base flows downstream of the Great Lakes Fish Hatchery of 285 cfs January through April, 185 cfs May through August, and 335 cfs September through December, assuming 22 cfs of the required base flow is to be provided on a year-round basis from the Great Lakes Fish Hatchery.

B. **Ramping**

The signators agree that: a prescribed gradual rate of change (up or down) will occur when changes to the base flow are not a result of high reservoir inflow as described in the *Water Budget Model* dated May 5, 1993 and modified by the June 16 and August 9, 1993 meetings.

Scheduled releases from Lighthouse Hill (releases that are not a result of high reservoir inflow) will be ramped up or down in increments of 400 cfs. However, when the base flow is 185 cfs the **first** increment (up) will be 200 cfs and each subsequent increment will be 400 cfs thereafter. Up-ramping will occur on a 24-hour basis. Down-ramping will occur on a 12-hour basis.

C. **Flushing Flows**

The signators agree that: as discussed at the joint agency meeting on March 2, 1993, the historical operational mode has not created any adverse impacts associated the deposit of silts downstream of Lighthouse Hill. The proposed operational mode is similar (on an annual and spring run-off flow distribution basis) and no problems are anticipated. However, if silt deposition substantially increases after the proposed operational mode is implemented, Niagara Mohawk will develop a study plan in cooperation with the NYSDEC to determine the amount of silt deposition using "gravel baskets".

D. **Whitewater Releases**

The signators agree that: releases for whitewater activities will be provided at least five weekends per year. The details of the amount and timing of the releases are highlighted in the attached June 16 and August 9, 1993 meeting minutes.

II CONCERNS FROM LIGHTHOUSE HILL UPSTREAM

A. Fishing/Recreational Access

The signators agree that: fishing access at Lighthouse Hill Reservoir will be provided at the existing Lighthouse Hill day-use area and at the proposed Hogback Road campground. Access will be provided at the Salmon River Reservoir at the existing Falls Road day-use area and at the proposed boat launch in Redfield, as documented in Exhibit E of the license application.

B. Fish Protection/Passage

The signators agree: Niagara Mohawk will replace the existing trashracks with 3.75-inch clear spacing with new trashracks with 1-inch clear spacing at the Lighthouse Hill Development within four years of receiving the license. Furthermore, Niagara Mohawk will replace the existing trashracks with 1.5-inch clear spacing with trashracks with 1-inch clear spacing at the Bennetts Bridge Development when the existing racks are replaced.

C. Wetlands/Reservoir Fluctuations

The signators agree that: the effects of the various operating modes on the reservoir levels are adequately evaluated in the *Water Budget Model* dated May 5, 1993 and the *Phase 1 - Preliminary Data Analysis, Reservoir Fluctuation Study* dated July 14, 1993. Phase 2 of the reservoir fluctuation study is scheduled to be completed by December 31, 1993. (Preliminary results from the field work indicate that the water level stabilization proposed as part of Rule Curve 16 will be adequate to protect and enhance the reservoir wetlands.)

The signators agree: to investigate the feasible alternatives for the provision of water level stabilization for the wetland located north of the Lighthouse Hill Reservoir if the water levels in the wetland are hydraulically controlled by the water level in the reservoir as determined by the Phase 2 reservoir fluctuation study.

D. Minimum/Aesthetic Flows

The signators agree that: releases into the Bennetts Bridge bypassed reach will be provided for aesthetic and environmental purposes. The releases at the Bennetts Bridge dam will be 24-hours-per-day and will be 20 cfs July through September and 7 cfs for the remainder of the year. The top of the Salmon River Falls will be modified with natural ledge material to distribute the flow over the falls.

The signators agree that: no releases into the Lighthouse Hill bypassed reach will be made for aesthetic or environmental purposes.

E. **Temperature Monitoring**

The signators agree that: Niagara Mohawk will establish, operate and maintain a temperature monitor at the Lighthouse Hill Reservoir for NYSDEC's use in managing the fishery resources downstream of Lighthouse Hill. Niagara Mohawk will investigate the feasibility of Niagara Mohawk installing another temperature monitor at the gaging station in Pineville, New York. Likewise, the NYSDEC has indicated that they would establish and operate a temperature monitor in the Salmon River at the Great Lakes Fish Hatchery. Niagara Mohawk will collect and compile temperature data from all temperature monitors.

F. **Flow Monitoring**

The signators agree that: Niagara Mohawk will operate and maintain the existing streamflow gage located on the Salmon River at Pineville.

III MANAGEMENT OF LANDS OUTSIDE THE FERC PROJECT BOUNDARY

A. Land Management

The signators understand that: through the *Comprehensive Land Management Program for the Salmon River Properties* Niagara Mohawk will provide to the NYSDEC: (1) permanent easements to all NYSDEC fishing access locations along the Salmon River downstream of the Lighthouse Hill Development, (2) fishing easements along most of Niagara Mohawk's property on the lower Salmon River downstream of the Lighthouse Hill Development, (3) a 200-foot-wide conservation easement along the downstream river corridor, (4) other easements such that a trail system can be developed along the entire river corridor, and Niagara Mohawk will sell to the NYSDEC (directly or through a third party): (5) the area south of the Salmon River Reservoir, (6) the area surrounding and including the Salmon River Falls, and (7) the existing angler parking areas and one additional area downstream of the Lighthouse Hill Development. These properties are outside the FERC project boundaries.

B. Water-use Payments

The signators understand that: currently Niagara Mohawk receives annual payments (a remittance of about $20,000 per year) from the NYSDEC for water withdrawn (via pipeline) from the Lighthouse Hill impoundment for use at the Great Lakes Fish Hatchery. Niagara Mohawk agrees to manage this money in support of NYSDEC's proposed land management plan for the Salmon River corridor (part of Niagara Mohawk's *Comprehensive Land Management Program for the Salmon River Properties*). Although these remittances will be managed by Niagara Mohawk, the money will be used by the NYSDEC for the proposed trail and park system within the Salmon River corridor.

C. Fishing/Recreational Access

The signators agree that: fishing/recreational access downstream of the Lighthouse Hill Development will be provided through the *Comprehensive Land Management Program for the Salmon River Properties*.

IV MISCELLANEOUS

A. Water Quality Certification

The NYSDEC and Niagara Mohawk agree that: there are no other areas of concern and that the areas of agreement set forth herein will not become part of the terms and conditions of any subsequently issued §401 water quality certificate for the Salmon River Project (No. 11408), save and except for those matters relating to water quality as set forth in 6 NYCRR Parts 701-704 and which are consistent with the court decisions in Niagara Mohawk v. NYSDEC, ___NY2d___ (November 11, 1993); Matter of Power Authority v. Williams, 60 N.Y.2d 315; Matter of de Rham v. Diamond, 32 N.Y.2d 34; and PUD No. 1 of Jeff. Co. V. Washington, ___U.S.___ (if and to the extent decided prior to issuance of the §401 water quality certificate) and which shall be incorporated in any subsequently issued §401 water quality certificate.

B. Enforceability

This Offer of Settlement shall be considered a Memorandum of Understanding between DEC and Niagara Mohawk, which shall be enforceable by either party to the extent that this settlement offer is accepted and approved by FERC and incorporated into the terms and conditions of any federal license issued for the Salmon River hydropower project.

C. Cooperation

The signators agree that: each and all will abide by and support the agreements and understanding commemorated herein in the context of their participation in the Salmon River Project No. 11408 docket before the FERC.

D. Flow Advisory Committee

The signators agree that: Niagara Mohawk and the NYSDEC, in order to keep abreast of changing conditions that may affect river flows, will empanel a Flow Advisory Committee representative of the various interests in the Salmon River corridor and participate in same. The purpose of the Flow Advisory Committee would be to recommend changes that affect the flow and water-related issues on the Salmon River, as more specifically detailed in Attachment 5.

V SIGNATORS

NIAGARA MOHAWK POWER CORPORATION

By: T. H. Baron
T. H. Baron

Title: Vice President - Fossil & Hydro Generation
Date: December 22, 1993

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

By: Thomas Jorling
by designation
Title: Commissioner
Date: January 6, 1994

By: Bruce R. Carpenter
Bruce R. Carpenter

Title: Executive Director, New York Rivers United
Date: January 10, 1994

By: _____

Title: _____
Date: _____

By: _____

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Date: _____

By: _____

Title: _____
Date: _____

Salmon River Project No. 11408

List of Studies*

(as of July 19, 1993)

1. *Draft - Visual Inspection of the Salmon River*, December 3, 1984, Niagara Mohawk Power Corporation.

2. *Data for Initial Consultation*, 1987, Niagara Mohawk Power Corporation.

3. *Phase 1 Report - Salmon River Corridor Study*, July 1988, Niagara Mohawk Power Corporation.

4. *Phase 2/3 Report - Salmon River Corridor Study*, January 1990, Niagara Mohawk Power Corporation.

5. *Interim Summary Report - Salmon River Corridor Study*, January 1991, Niagara Mohawk Power Corporation.

6. *System-wide Whitewater Recreation Plan*, March 6, 1991, Niagara Mohawk Power Corporation.

7. *November 1992 System-wide Whitewater Recreation Plan Status Report*, November 1992, Niagara Mohawk Power Corporation.

8. *Salmon River Research Project*, December 31, 1991, ESEERCO and Niagara Mohawk Power Corporation.

9. *A Comprehensive Land Management Program for the Salmon River Properties*, October 1992, Niagara Mohawk Power Corporation.

10. *Minimum Flow Unit, Phase II - Conceptual Study Report*, January 1993, Niagara Mohawk Power Corporation.

11. *Selected Photographs of the Bennetts Bridge Bypassed Reach*, March 31, 1993, Niagara Mohawk Power Corporation

12. *Application for Major License for the Salmon River Project*, Volumes 1 and 2, April 27, 1993, Niagara Mohawk Power Corporation.

Salmon River Project No. 11408
List of Studies * - continued
(as of July 19, 1993)

13. *Final - Habitat Analysis Report*, April 28, 1993, Niagara Mohawk Power Corporation.

14. *Scope of Work for an Aesthetic Flow Study/Habitat Evaluation*, April 29, 1993, Niagara Mohawk Power Corporation.

15. *Work Plan for a Reservoir Fluctuation Investigation for the Salmon River Project*, April 29, 1993, Niagara Mohawk Power Corporation.

16. *Water Budget Model*, May 5, 1993, Niagara Mohawk Power Corporation.

17. *Aesthetic Flow Study* (video), June 22, 1993, Niagara Mohawk Power Corporation.

18. *Visual Inspection of the Bennetts Bridge Bypassed Reach*, July 2, 1993, Niagara Mohawk Power Corporation.

19. *Project Overview* (video), July 9, 1993, Niagara Mohawk Power Corporation.

20. *Phase 1 - Preliminary Data Analysis, Reservoir Fluctuation Study*, July 14, 1993, Niagara Mohawk Power Corporation.

* The list of studies, together with the initial license application submittal of Niagara Mohawk, constitute the record of evidence upon which the agreements in this Settlement Offer are premised. All of the studies have been supplied to the FERC and parties to the proceeding requesting same.

Attachment 1
June 16, 1993 Meeting Minutes

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST SYRACUSE N Y 13202/TELEPHONE (315) 474-1511

July 6, 1993

To: Attached Attendance List

Subject: Salmon River Project - FERC Project No 11408
Meeting on June 16, 1993
(NYSDEC, AWA, ADK, TU, Niagara Mohawk, and IA)
Transmittal of Meeting Minutes

Dear Addressee:

Please find enclosed a copy of the minutes of our meeting on June 16, 1993. A copy of these minutes will be forwarded to the Federal Energy Regulatory Commission (FERC) soon.

Thank you for attending the meeting, I look forward to talking with you soon. If you have any questions or comments, please feel free to call me at 315-428-5583.

Very truly yours,

Gregg Carrington, P.E.
Licensing Engineer

GEC/lr

Enclosure

xc: Sam Hirschey - Niagara Mohawk (w/o enclosure)

GECM-SR187B.3LR

SALMON RIVER PROJECT

FERC Project No. 11408

SERVICE LIST

Mr. Dave Clark
National Park Service
15 State Street
Boston, MA 02109

Mr. Leonard Corin
U.S. Fish & Wildlife Service
3817 Luker Road
Cortland, NY 13045

Mr. Louis Concra
NYS Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233

MEETING MINUTES

Salmon River Project
FERC Project No. 11408

SUBJECT:	Special Releases for Recreation
DATE:	June 16, 1993, 9:00 am
PLACE:	New York Department of Environmental Conservation Syracuse, New York
ATTENDEES:	Cliff Creech - NYSDEC Peter Skinner - AWA (et al) Jerry Hargrave - Adirondack Mountain Club Don Shields - Trout Unlimited Gregg Carrington - Niagara Mohawk Gary Schoonmaker - Niagara Mohawk John Homa - IA Elizabeth Conners - IA Todd Waddell - IA

Areas of Discussion

The purpose of the meeting was to determine if additional recreational releases were possible given the availability of the water resources in the Salmon River basin. The following items were discussed:

1. Given the base flows and the special recreational releases proposed in license (license proposal), no additional recreational releases could be provided without draining the Salmon River Reservoir. The base flows proposed in the license application are 300 cfs January through April, 200 cfs May through August, and 350 cfs September through December. The three 24-hour recreational releases proposed in the license application and the System-wide Whitewater Recreation Plan were 700 cfs, 1,000 cfs and 1,400 cfs (74,400 cfs-hours total).

   All parties agreed that draining the Salmon River Reservoir (below elevation 918 feet) was undesirable because the project would have to shut down and consequently, downstream base flows would not be available.

2. The New York State Department of Environmental Conservation (NYSDEC) summarized the management goals and objectives for the Salmon River basin. Most of these objectives were highlighted in a letter dated June 14, 1993 from the NYSDEC to the AWA.

3. Given that no other special release can be made as per the license proposal, the NYSDEC agreed to slightly reduce the downstream base flow requirements so that the proposed recreational releases could be properly ramped up (24-hour increments) and ramped down (12-hour increments). See Table 1 (attached) for a comparison of AWA and NYSDEC ramping plans.

4. Given license proposal and assuming a reduction of 15 cfs from each of the monthly base flows, Niagara Mohawk presented Rule Curve 16. Based on the Water Budget Model, Niagara Mohawk determined the volume of water that is available for recreational releases. See Table 2 (attached) for the assumptions used in Rule Curve 16. Given the 17-year period of record (1970 through 1986), it was determined that at a minimum, a total of five weekend releases were possible. These releases were:

Month	Weekend	Flow (cfs)
June	4	400 (half unit)
July	2	750 (one unit - efficient gate)
July	4	750
August	2	750
September	1	750

Based on the management objectives described by the NYSDEC, all special releases should be separated by at least two weeks (unless the releases are small and ramped very slowly) and special releases should not be made the third and fourth weekends in August to prevent the premature migration of salmon. The fourth weekend in July was scheduled to occur concurrently with the "Ringgold Tube Race". The first weekend in September was scheduled to initiate the fall salmon run.

5. During high flow years (when the Salmon River Reservoir was higher than normal), the following allocation schemes (for the "excess" volume of water) were discussed:

   a. Continue the release for an extra day.

   b. Increase the magnitude of the release (one and a half or two units) which would also result in an extra day of releases.

c. Provide an additional weekend of releases (unscheduled) between the scheduled releases. This option was determined to be the least desirable because of the magnitude (400 cfs) and ramping requirements necessary to protect the downstream ecosystem.

6. The only "unresolved" issues were: (a) the logistics of the paddling feasibility study, (b) what constitutes a high/low flow year, and (c) the details of how releases would be allocated during low/high flow years.

Everyone would like to complete the paddling study this year. Niagara Mohawk agreed to provide the necessary releases at various times and to provide the evaluation forms. The whitewater groups need to talk with their members (July 4 weekend) to determine the best weekend for the first set of releases (350/500 cfs). Niagara Mohawk will contact the whitewater groups when there is enough water available for the last set of releases (750/1400 cfs). A release of one and a half units has been scheduled for August 7, 1993 for the "Ringgold Tube Race". The whitewater groups will be there on August 7, 1993 to evaluate the release.

Table 1
Solomon River Project
Proposed Ramping Plans

AWA (c)

Hours at 400 cfs	Hours at 750 cfs	Hours at 1150 cfs	Hours at 1450 cfs	Volume	(a) Number Releases	(b) Number Releases
45	0	0	0	9000	21	13
9	36	0	0	21600	9	5
9	6	12	0	16500	12	7
9	6	6	24	40800	5	3
72	48	18	24	87900 cfs-hours		

AWA - Adjusted (d)

Hours at 400 cfs	Hours at 750 cfs	Hours at 1150 cfs	Hours at 1450 cfs	Volume	(a) Number Releases	(b) Number Releases
45	0	0	0	9000	21	13
9	36	0	0	21600	9	5
9	27	12	0	28050	7	4
9	30	9	24	56850	3	2
72	93	21	24	115500 cfs-hours		

NYSDEC (e)

Hours at 400 cfs	Hours at 750 cfs	Hours at 1150 cfs	Hours at 1450 cfs	Volume	(a) Number Releases	(b) Number Releases
45	0	0	0	9000	21	13
36	36	0	0	27000	7	4
36	36	12	0	38400	5	3
36	36	36	24	91200	2	1
153	108	48	24	165600 cfs-hours		

Footnotes: (a) Assuming 191,400 cfs-hours available
(b) Assuming 117,000 cfs-hours available
(c) 3 hours up and down - 4 adjustments per day.
(d) 3 hours up, 6 hours down, 2 adjustments per day.
(e) 24 hours up, 12 hours down, 1 adjustment per day.

Table 2
Salmon River Project
Proposed Whitewater Releases

Month	Base	Days	Hours	Hours at 400 cfs	Hours at 750 cfs	Hours at 1150 cfs	Hours at 1450 cfs	Avg Base Flow (cfs)	Volume
Jan	285	31	744	0	0	0	0	285.0	0
Feb	285	28.25	678	0	0	0	0	285.0	0
Mar	285	31	744	0	0	0	0	285.0	0
Apr	285	30	720	0	0	0	0	285.0	0
May	185	31	744	0	0	0	0	185.0	0
Jun	185	30	720	45	0	0	0	198.4	9000
Jul	185	31	744	72	72	0	0	260.5	54000
Aug	185	31	744	36	36	0	0	222.7	27000
Sep	335	30	720	36	36	0	0	359.0	27000
Oct	335	31	744	0	0	0	0	335.0	0
Nov	335	30	720	0	0	0	0	335.0	0
Dec	335	31	744	0	0	0	0	335.0	0
		365.25	8766	189	144	0	0	Total:	117000 cfs-hours

Attachment 2
August 9, 1993 Meeting Minutes

MEETING MINUTES

Salmon River Project
FERC Project No. 11408

SUBJECT: Special Releases for Recreation
Salmon River Flow Advisory Team

DATE: August 9, 1993, 9:00 am

PLACE: New York Rivers United
Rome, New York

ATTENDEES:
Cliff Creech - NYSDEC
Dave Bryson - USFWS
Peter Skinner - AWA (et al)
Bob Glanville - AWA
Bruce Carpenter - NY Rivers United
Gregg Carrington - Niagara Mohawk

Areas of Discussion

The purpose of the meeting was to discuss the possibility of additional recreational releases given the availability of the water resources in the Salmon River basin. Also, the idea of a Salmon River Flow Advisory Team was discussed. The following items were discussed:

1. Given the base flows and the five weekend recreational releases proposed, no additional recreational releases could be provided without draining the Salmon River Reservoir. All parties understand that draining the Salmon River Reservoir (below elevation 914 feet) was unacceptable because the project would have to shut down and consequently, downstream base flows would not be available.

Given the 17-year period of record (1970 through 1986), it was determined that at a minimum, a total of five weekend releases were possible. These releases were:

Month	Weekend	Flow (cfs)
June	4	400 (half unit)
July	2	750 (one unit - efficient gate)
July	4	750
August	2	750
September	1	750

Based on the management objectives described by the NYSDEC, all special releases should be separated by at least two weeks (unless the releases are small and ramped very slowly) and special releases should not be made the third and fourth weekends in August to prevent the premature migration of salmon. The fourth weekend in July was scheduled to occur concurrently with the "Ringgold Tube Race". The first weekend in September was scheduled to initiate the fall salmon run.

2. AWA had several questions concerning the Water Budget Model (computer program) that was supplied to them on July 26, 1993. Based on the 17 year period analyzed, Niagara Mohawk determined that the proposed base flow and recreational releases could not be increased without draining the reservoir. In addition, the reservoir target elevations could not be lowered (i.e. by recreational releases) without the reservoir being drained. Therefore, based on the results of the Water Budget Model it was concluded that additional scheduled recreational releases could not be made. However, Niagara Mohawk did indicate that unscheduled generation/recreational releases were possible during high flow years and when practical, these unscheduled releases could be made immediately before or after the scheduled recreational releases (i.e. on Fridays or Mondays). This would result in the two-day events being extended to three or more days. The logistics of this would have to be fine-tuned after the implementation of the base flows.

3. Non-routine Operation - The definition of what constitutes a high-flow year and a low-flow year were discussed. Niagara Mohawk indicated that except for March and April, a high-flow period could be considered as any time that the reservoir elevation was greater than one foot above the target elevation (upper action trigger). The upper action triggers for March and April can be considered any time that the reservoir exceeds an elevation of 937 feet. Low flow periods could be considered as any time that the reservoir elevation drops below a particular level (lower action trigger). The monthly lower action triggers were defined as follows:

Month	Target Elevation (feet)	Upper Trigger Elevation (feet)	Lower Trigger Elevation (feet)
January	935	936	925
February	932	933	925
March	923	937	920
April	926	937	920
May	936	937	920
June	936	937	920
July	936	937	920
August	935	936	920
September	933	934	918
October	930	931	918
November	930	931	918
December	931	932	925

4. Routine Operation - Routine operation is essentially any time that the reservoir is between the upper and lower action triggers, except emergency conditions. Emergency conditions can be considered any time that the safety of the downstream river users, the hydro facilities, or the environment are in jeopardy. Niagara Mohawk in cooperation with local authorities will determine the necessity of emergencies associated with downstream river users. Niagara Mohawk will determine the necessity of emergencies associated with the safety of the hydro facilities. The New York State Department of Environmental Conservation in consultation with Niagara Mohawk will determine the necessity of emergencies associated with the environment.

Any time that the reservoir is above the target elevations and releases greater than the base flows are possible, Niagara Mohawk will attempt to make the releases before or after the scheduled whitewater releases. However, during peak power demand periods or when spillage is imminent, it may be necessary to make the releases at other times.

General operating guidelines are described in the license application and the Water Budget Model. Normal Elevation (defined within the guidelines) is any time that the reservoir elevation is within one foot of the target elevation (+/-). Generally, additional releases (greater than the base flow) will not be continued when the reservoir level falls below the target elevation (due to the previous days operation).

5. Priorities for non-routine flow management were discussed (handout). Comments and recommendations will be incorporated into a revised list by the NYSDEC.

6. Salmon River flow management advisory team details were discussed (handout). Comments and recommendations will be incorporated into a revised description by the NYSDEC. It was agreed that: (a) the goals and objectives of the advisory team should be consistent with the vision/mission statement promoted by Niagara Mohawk and the resource agencies, (b) the local municipalities will have three representatives on the team and the special interest groups will have two representatives on the team, (c) the terms "consensus" and "majority" used in the description of the team will be replaced with something like "100 percent agreement", and (d) the executive committee, if used, will consist of the NYSDEC and Niagara Mohawk.

7. Exhibit B of the final license application will be affected by changes associated with the proposed recreational (whitewater) releases (Rule Curve 16) and therefore, the Federal Energy Regulatory Commission should be notified of these changes (as soon as everyone concurs with the proposed operation of the project).

8. The final signed version of the formation of the Salmon River Flow Advisory Team will be forwarded to the FERC.

Attachment 3
Rule Curve 15

Table 1
Salmon River Project
Proposed Salmon River Reservoir Elevations

Month	Rule Curve 15 and 16 Target Elevation (Feet)	Rule Curve 15 Average Monthly Elevation (Feet)	Rule Curve 16 Average Monthly Elevation (Feet)
January	935	932.0	932.2
February	932	931.0	931.2
March	923	925.6	925.8
April	926	930.7	930.8
May	936	933.8	933.9
June	936	934.1	934.2
July	936	933.1	932.8
August	935	931.3	930.3
September	933	929.6	928.5
October	930	928.2	927.6
November	930	929.3	929.1
December	931	930.8	930.8

1. Rule Curve 15 corresponds to base flows of: 300 cfs - January through April, 200 cfs - May through August, and 350 cfs - September through December.

2. Rule Curve 16 corresponds to base flows of: 285 cfs - January through April, 185 cfs - May through August, and 335 cfs - September through December.

3. Based on 1970 - 1986 period of record.

RULE CURVE 15
SALMON RIVER
BENNETTS BRIDGE
1970-1986

OF OCCURENCES AND PERCENT OF TIME EQUALLED OR EXCEEDED
FOR EACH MONTH AND ANNUALLY

17 5 70 936.500000000000000

HEAD	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
918 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
919 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	4 .992	0 1.000	0 1.000	0 1.000	0 1.000	3 .994	0 1.000	7 .999
920 **	0 1.000	0 1.000	4 .992	0 1.000	0 1.000	7 .978	0 1.000	0 1.000	2 .996	14 .973	5 .984	0 1.000	32 .994
921 **	0 1.000	0 1.000	32 .932	2 .996	0 1.000	4 .971	0 1.000	13 .975	10 .976	28 .920	10 .965	0 1.000	99 .978
922 **	0 1.000	0 1.000	86 .769	5 .986	0 1.000	5 .961	0 1.000	4 .968	25 .927	24 .875	1 .963	0 1.000	150 .954
923 **	0 1.000	0 1.000	158 .469	14 .959	0 1.000	5 .951	20 .962	5 .958	12 .904	8 .860	1 .961	0 1.000	223 .918
924 **	1 .998	2 .996	27 .417	19 .922	0 1.000	3 .945	0 .962	8 .943	11 .882	17 .827	2 .957	0 1.000	90 .903
925 **	6 .987	8 .979	26 .368	21 .880	15 .972	2 .941	7 .949	1 .941	16 .851	11 .806	20 .918	8 .985	141 .880
926 **	6 .975	16 .945	29 .313	84 .716	8 .956	0 .941	4 .941	10 .922	27 .798	7 .793	6 .906	2 .981	199 .848
927 **	7 .962	31 .880	30 .256	31 .655	9 .939	0 .941	0 .941	32 .861	44 .712	17 .761	24 .859	0 .981	225 .812
928 **	35 .896	26 .826	18 .222	20 .616	35 .873	1 .939	4 .934	55 .757	44 .625	93 .584	24 .812	15 .953	370 .752
929 **	49 .803	26 .771	21 .182	23 .571	27 .822	6 .927	15 .905	47 .668	30 .567126	.345105	.606	40 .877	515 .669
930 **	115 .584	53 .660	29 .127	38 .496	24 .776	5 .918	44 .822	32 .607	56 .457149	.063280	.057171	.552	996 .509
931 **	64 .463177	.288	24 .082	37 .424	24 .731	18 .882	69 .691	66 .482	72 .316	17 .030	21 .016262	.055	851 .372
932 **	28 .410	89 .101	12 .059	32 .361	10 .712	35 .814	64 .569	58 .372102	.116	7 .017	4 .008	11 .034	452 .299
933 **	56 .304	9 .082	8 .044	31 .300	27 .660	34 .747	55 .465	52 .273	43 .031	6 .006	1 .006	4 .027	326 .246
934 **	85 .142	15 .050	7 .030	28 .245	26 .611	72 .606	42 .385	81 .120	9 .014	3 .000	3 .000	5 .017	376 .186
935 **	70 .009	5 .040	9 .013	35 .176110	.402193	.227130	.139	62 .002	3 .008	0 .000	0 .000	6 .006	623 .085
936 **	5 .000	19 .000	7 .000	90 .000212	.000116	.000	73 .000	1 .000	4 .000	0 .000	0 .000	3 .000	530 .000
MEAN	932.0	931.0	925.6	930.7	933.8	934.1	933.1	931.3	929.6	928.2	929.3	930.8	930.8
# OF DAYS	527	476	527	510	527	510	527	527	510	527	510	527	6205

AVERAGE MONTHLY AND ANNUAL HEADS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	WTYR	CLYR
1970 **	933.2	931.7	922.7	929.6	935.3	935.1	935.8	933.3	928.6	929.8	929.7	930.9		
1971 **	930.2	927.8	923.3	928.7	936.3	935.6	934.2	931.9	928.7	923.5	922.7	929.0	.0	931.3
1972 **	931.1	931.2	923.8	929.4	936.2	936.1	936.0	934.7	930.4	928.3	930.0	930.8	930.6	929.3
1973 **	934.8	932.6	932.1	928.7	929.8	932.6	931.0	928.5	923.7	921.6	926.4	931.6	930.3	931.5
1974 **	934.7	931.4	925.7	928.3	934.3	935.6	935.5	934.6	931.5	928.7	929.5	930.7	930.3	929.4
1975 **	932.8	931.9	924.4	928.7	935.9	935.3	932.1	930.4	931.3	930.1	929.9	930.9	930.9	931.7
1976 **	929.9	931.6	928.6	934.5	934.7	935.6	935.7	934.7	932.4	930.2	929.7	930.7	931.0	931.1
1977 **	933.2	932.2	927.8	934.2	935.3	934.4	932.6	933.1	933.0	930.8	930.0	931.1	932.4	932.3
1978 **	933.7	931.6	923.4	931.0	936.0	935.8	933.4	928.3	929.8	929.0	928.9	930.6	932.2	932.3
1979 **	934.7	930.4	926.7	933.8	935.8	934.7	931.4	928.7	932.0	929.9	930.6	931.1	931.2	930.9
													931.4	931.6
1980 **	930.3	927.4	923.0	931.7	928.7	930.8	930.4	930.7	926.6	924.2	930.0	930.7	929.3	928.7
1981 **	927.2	929.0	926.1	928.6	926.8	922.0	924.3	922.8	922.1	925.7	930.0	929.2	926.1	926.1
1982 **	929.5	929.5	923.2	931.0	936.0	935.9	934.7	932.1	929.3	929.4	930.1	931.1	930.5	931.0
1983 **	932.6	931.7	924.8	925.8	933.6	935.3	932.3	931.8	931.6	929.9	930.1	932.0	930.8	931.0
1984 **	931.1	933.3	924.9	932.5	935.9	935.6	935.6	933.9	932.8	929.0	929.5	931.6	932.3	932.1
1985 **	934.6	932.0	930.1	930.4	932.2	933.3	932.0	927.9	927.1	929.5	930.5	930.5	930.8	930.8
1986 **	929.8	931.8	925.2	935.0	931.9	935.8	935.8	935.0	932.7	930.6	930.0	930.9	931.9	932.0

AVERAGE MONTHLY HEADS RANKED AND % = TO OR >

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	**	934.059	933.059	932.059	935.059	936.059	936.059	935.059	934.059	932.059	930.059	930.059	932.059
2	**	934.118	932.118	930.118	934.118	936.118	935.118	935.118	934.118	932.118	930.118	930.118	931.118
3	**	934.176	932.176	928.176	934.176	936.176	935.176	935.176	934.176	932.176	930.176	930.176	931.176
4	**	934.235	931.235	927.235	933.235	935.235	935.235	935.235	934.235	932.235	930.235	930.235	931.235
5	**	933.294	931.294	926.294	932.294	935.294	935.294	935.294	933.294	931.294	929.294	930.294	931.294
6	**	933.353	931.353	926.353	931.353	935.353	935.353	935.353	933.353	931.353	929.353	930.353	931.353
7	**	933.412	931.412	925.412	930.412	935.412	935.412	934.412	933.412	931.412	929.412	930.412	930.412
8	**	932.471	931.471	925.471	930.471	935.471	935.471	934.471	932.471	931.471	929.471	929.471	930.471
9	**	932.529	931.529	924.529	930.529	935.529	935.529	933.529	931.529	930.529	929.529	929.529	930.529
10	**	931.588	931.588	924.588	929.588	934.588	935.588	932.588	931.588	929.588	929.588	929.588	930.588
11	**	931.647	931.647	924.647	929.647	934.647	935.647	932.647	930.647	929.647	928.647	929.647	930.647
12	**	930.706	931.706	923.706	928.706	933.706	934.706	932.706	930.706	928.706	928.706	929.706	930.706
13	**	930.765	930.765	923.765	928.765	932.765	934.765	932.765	928.765	928.765	928.765	929.765	930.765
14	**	929.824	929.824	923.824	928.824	931.824	933.824	931.824	928.824	927.824	925.824	929.824	930.824
15	**	929.882	928.882	923.882	928.882	929.882	932.882	931.882	928.882	926.882	924.882	928.882	930.882
16	**	929.941	927.941	922.941	928.941	928.941	930.941	930.941	927.941	923.941	923.941	926.941	929.941
17	**	927****	927****	922****	925****	926****	921****	926****	922****	922****	921****	922****	928****

MONTHLY AND ANNUAL FLOW DURATION CURVES

USGS GAGE NO. - RULE CURVE 15
DRAINAGE AREA - 194.0 SQ. MI.
YEARS OF RECORD - 1/70 - 12/86
RIVER NAME - SALMON RIVER
LOCATION - BENNETTS BRIDGE, NY

OF OCCURENCES AND PERCENT OF TIME EQUALLED OR EXCEEDED
FOR EACH MONTH AND ANNUALLY

22 6 72 11132.000000000000000

FLOW	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
91 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
92 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
93 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
94 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
95 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
96 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
97 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
98 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
99 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
100 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
110 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
120 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
130 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
140 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
150 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
160 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
170 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
180 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
190 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
200 **	0 1.000	0 1.000	0 1.000	0 1.000331	.372411	.194465	.118476	.097	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000
210 **	0 1.000	0 1.000	0 1.000	0 1.000 2	.368 6	.182 1	.116 3	.091	0 1.000	0 1.000	0 1.000	0 1.000	1683 .729
220 **	0 1.000	0 1.000	0 1.000	0 1.000 4	.361 3	.176 1	.114 1	.089	0 1.000	0 1.000	0 1.000	0 1.000	12 .727
230 **	0 1.000	0 1.000	0 1.000	0 1.000 1	.359 0	.176 1	.112 1	.087	0 1.000	0 1.000	0 1.000	0 1.000	9 .725
240 **	0 1.000	0 1.000	0 1.000	0 1.000 2	.355 2	.173 0	.112 1	.085	0 1.000	0 1.000	0 1.000	0 1.000	3 .725
250 **	0 1.000	0 1.000	0 1.000	0 1.000 2	.351 1	.171 2	.108 1	.083	0 1.000	0 1.000	0 1.000	0 1.000	5 .724
260 **	0 1.000	0 1.000	0 1.000	0 1.000 0	.351 1	.169 1	.106 2	.080	0 1.000	0 1.000	0 1.000	0 1.000	6 .723
270 **	0 1.000	0 1.000	0 1.000	0 1.000 0	.351 5	.159 3	.101 0	.080	0 1.000	0 1.000	0 1.000	0 1.000	4 .722
280 **	0 1.000	0 1.000	0 1.000	0 1.000 2	.347 2	.155 0	.101 0	.080	0 1.000	0 1.000	0 1.000	0 1.000	8 .721
290 **	0 1.000	0 1.000	0 1.000	0 1.000 4	.340 1	.153 1	.099 1	.078	0 1.000	0 1.000	0 1.000	0 1.000	4 .721
300 **456	.135346	.273137	.740 63	.876 3	.334 2	.149 0	.099 1	.076	0 1.000	0 1.000	0 1.000	0 1.000	7 .719
													1008 .557

FLOW	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANN	
310 **	1	.133	0	.273	1	.738	1	.875	1	.332	3	.143	7	.085	0	.076	0	1.000	0	1.000	0	1.000	0	1.000	14	.555
320 **	0	.133	2	.269	3	.732	1	.873	0	.332	3	.137	3	.080	0	.076	0	1.000	0	1.000	0	1.000	0	1.000	12	.553
330 **	0	.133	1	.267	1	.731	0	.873	5	.323	0	.137	0	.080	1	.074	0	1.000	0	1.000	0	1.000	0	1.000	8	.551
340 **	1	.131	3	.261	2	.727	0	.873	3	.317	1	.135	1	.078	0	.074	0	1.000	0	1.000	0	1.000	0	1.000	11	.550
350 **	0	.131	0	.261	3	.721	0	.873	0	.317	0	.135	0	.078	0	.074455		.108362		.313228		.553269		.490	1317	.337
360 **	2	.127	0	.261	7	.708	3	.867	2	.313	5	.125	1	.076	0	.074	1	.106	2	.309	8	.537	5	.480	36	.332
370 **	0	.127	2	.256	3	.702	0	.867	4	.306	2	.122	1	.074	3	.068	0	.106	3	.304	9	.520	1	.478	28	.327
380 **	2	.123	0	.256	1	.700	1	.865	4	.298	6	.110	1	.072	0	.068	0	.106	1	.302	4	.512	8	.463	28	.323
390 **	1	.121	4	.248	1	.698	0	.865	2	.294	1	.108	0	.072	2	.065	1	.104	3	.296	2	.508	2	.459	19	.320
400 **	1	.120	0	.248	2	.694	0	.865	4	.287	1	.106	0	.072	0	.065	0	.104	3	.290	3	.502	5	.450	19	.317
410 **	2	.116	2	.244	1	.693	0	.865	3	.281	3	.100	0	.072	0	.065	0	.104	3	.285	3	.496	3	.444	20	.313
420 **	0	.116	2	.239	0	.693	0	.865	4	.273	3	.094	2	.068	0	.065	0	.104	0	.285	7	.482	5	.435	23	.310
430 **	1	.114	0	.239	2	.689	1	.863	4	.266	0	.094	1	.066	0	.065	0	.104	3	.279	4	.475	5	.425	21	.306
440 **	3	.108	1	.237	1	.687	2	.859	2	.262	0	.094	1	.065	0	.065	1	.102	1	.277	7	.461	1	.423	20	.303
450 **	2	.104	0	.237	2	.683	0	.859	3	.256	0	.094	0	.065	0	.065	1	.100	7	.264	9	.443	4	.416	28	.298
460 **	0	.104	2	.233	2	.679	0	.859	5	.247	1	.092	0	.065	2	.061	0	.100	0	.264	2	.439	5	.406	19	.295
470 **	1	.102	0	.233	0	.679	1	.857	0	.247	2	.088	0	.065	0	.061	0	.100	1	.262	2	.435	6	.395	13	.293
480 **	0	.102	0	.233	4	.672	1	.855	2	.243	2	.084	1	.063	1	.059	0	.100	2	.258	3	.429	4	.387	20	.290
490 **	0	.102	1	.231	1	.670	2	.851	2	.239	0	.084	0	.063	0	.059	2	.096	1	.256	2	.425	4	.380	15	.288
500 **	0	.102	0	.231	1	.668	0	.851	2	.235	0	.084	1	.061	1	.057	0	.096	2	.252	4	.418	2	.376	13	.286
510 **	0	.102	1	.229	3	.662	1	.849	2	.231	0	.084	0	.061	2	.053	1	.094	0	.252	6	.406	2	.372	18	.283
520 **	1	.101	2	.225	1	.660	0	.849	3	.226	2	.080	2	.057	3	.047	2	.090	1	.250	6	.394	3	.366	26	.278
530 **	2	.097	4	.216	0	.660	0	.849	3	.220	1	.078	0	.057	3	.042	0	.090	4	.243	2	.390	4	.359	23	.275
540 **	2	.093	0	.216	3	.655	0	.849	4	.213	0	.078	1	.055	0	.042	0	.090	2	.239	4	.382	2	.355	18	.272
550 **	1	.091	3	.210	1	.653	1	.847	0	.213	3	.073	0	.055	1	.040	1	.088	2	.235	3	.376	3	.349	19	.269
560 **	0	.091	1	.208	0	.653	1	.845	2	.209	0	.073	0	.055	1	.038	0	.088	2	.231	3	.371	3	.343	13	.267
570 **	3	.085	1	.206	3	.647	2	.841	0	.209	1	.071	0	.055	0	.038	0	.088	1	.230	1	.369	3	.338	15	.264
580 **	0	.085	1	.204	1	.645	1	.839	1	.207	1	.069	1	.053	1	.036	0	.088	0	.230	4	.361	2	.334	13	.262
590 **	2	.082	1	.202	0	.645	1	.837	0	.207	0	.069	2	.049	0	.036	0	.088	1	.228	8	.345	3	.328	18	.259
600 **	2	.078	0	.202	1	.643	1	.835	1	.205	0	.069	0	.049	1	.034	0	.088	2	.224	1	.343	2	.324	11	.258
610 **	0	.078	0	.202	1	.641	0	.835	2	.201	0	.069	1	.047	1	.032	1	.086	0	.224	4	.335	2	.321	12	.256
620 **	0	.078	1	.200	0	.641	1	.833	0	.201	0	.069	0	.047	0	.032	0	.086	2	.220	0	.335	2	.317	6	.255
630 **	0	.078	1	.197	0	.641	0	.833	0	.201	0	.069	2	.044	1	.030	0	.086	1	.218	2	.331	4	.309	11	.253
640 **	0	.078	2	.193	2	.638	0	.833	2	.197	1	.067	1	.042	0	.030	1	.084	0	.218	2	.327	4	.302	15	.250
650 **	1	.076	1	.191	2	.634	1	.831	0	.197	0	.067	1	.040	0	.030	0	.084	1	.216	2	.324	5	.292	14	.248
660 **	0	.076	0	.191	1	.632	1	.829	0	.197	3	.061	1	.038	0	.030	0	.084	0	.216	4	.316	6	.281	16	.246
670 **	2	.072	2	.187	1	.630	0	.829	3	.192	0	.061	0	.038	0	.030	0	.084	1	.214	3	.310	1	.279	13	.244
680 **	0	.072	0	.187	2	.626	0	.829	3	.186	0	.061	1	.036	1	.028	1	.082	1	.213	5	.300	2	.275	16	.241
690 **	1	.070	0	.187	2	.622	1	.827	0	.186	0	.061	2	.032	0	.028	0	.082	1	.211	1	.298	3	.269	11	.239
700 **	2	.066	1	.185	1	.620	1	.825	1	.184	1	.059	0	.032	0	.028	0	.082	3	.205	1	.296	3	.264	14	.237
710 **	0	.066	1	.183	1	.619	2	.822	1	.182	3	.053	1	.030	0	.028	0	.082	1	.203	2	.292	2	.260	14	.235
720 **	0	.066	1	.181	2	.615	0	.822	0	.182	0	.053	0	.030	0	.028	0	.082	0	.203	6	.280	1	.258	10	.233
730 **	0	.066	1	.179	1	.613	0	.822	0	.182	0	.053	0	.030	0	.028	0	.082	1	.201	3	.275	3	.252	9	.232
740 **	1	.065	1	.176	0	.613	0	.822	0	.182	0	.053	1	.028	0	.028	0	.082	2	.197	2	.271	1	.250	8	.230
750 **	1	.063	1	.174	1	.611	0	.822	1	.180	1	.051	0	.028	1	.027	1	.080	0	.197	1	.269	3	.245	11	.229
760 **	4	.055	0	.174	1	.609	0	.822	0	.180	1	.049	0	.028	0	.027	0	.080	1	.195	0	.269	2	.241	9	.227
770 **	1	.053	0	.174	1	.607	2	.818	1	.178	0	.049	0	.028	0	.027	0	.080	0	.195	2	.265	1	.239	8	.226
780 **	2	.049	0	.174	0	.607	0	.818	0	.178	0	.049	1	.027	0	.027	0	.080	2	.192	3	.259	1	.237	9	.224
790 **	0	.049	1	.172	0	.607	0	.818	0	.178	0	.049	0	.027	0	.027	0	.080	1	.190	0	.259	1	.235	3	.224
800 **	0	.049	0	.172	0	.607	1	.816	1	.176	0	.049	0	.027	0	.027	0	.080	0	.190	1	.257	1	.233	4	.223

FLOW	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANN	
810 **	0	.049	0	.172	1	.605	0	.816	0	.176	0	.049	0	.027	0	.027	0	.080	0	.190	3	.251	3	.228	7	.22
820 **	0	.049	0	.172	0	.605	0	.816	1	.175	0	.049	0	.027	0	.027	1	.078	0	.190	1	.249	0	.228	3	.22
830 **	0	.049	0	.172	1	.603	0	.816	0	.175	0	.049	1	.025	0	.027	0	.078	1	.188	0	.249	0	.228	3	.22
840 **	1	.047	0	.172	0	.603	0	.816	1	.173	1	.047	0	.025	0	.027	1	.076	1	.186	2	.245	1	.226	8	.22
850 **	1	.046	0	.172	0	.603	0	.816	2	.169	0	.047	1	.023	0	.027	0	.076	2	.182	0	.245	0	.226	6	.21
860 **	0	.046	1	.170	2	.600	0	.816	1	.167	0	.047	0	.023	0	.027	0	.076	1	.180	2	.241	0	.226	7	.21
870 **	0	.046	1	.168	1	.598	0	.816	0	.167	1	.045	1	.021	1	.025	0	.076	0	.180	2	.237	1	.224	8	.21
880 **	0	.046	1	.166	0	.598	0	.816	1	.165	1	.043	0	.021	0	.025	0	.076	1	.178	1	.235	0	.224	5	.21
890 **	0	.046	0	.166	0	.598	0	.816	2	.161	0	.043	0	.021	0	.025	1	.075	0	.178	5	.225	4	.216	12	.21
900 **	2	.042	0	.166	2	.594	0	.816	2	.157	0	.043	0	.021	0	.025	1	.073	0	.178	0	.225	3	.211	10	.21
910 **	1	.040	1	.164	0	.594	1	.816	0	.157	1	.041	0	.021	0	.025	0	.073	0	.178	0	.225	1	.209	5	.21
920 **	0	.040	0	.164	0	.594	2	.810	0	.157	0	.041	0	.021	0	.025	0	.073	0	.178	1	.224	3	.203	6	.21
930 **	0	.040	1	.162	0	.594	2	.806	0	.157	0	.041	0	.021	0	.025	0	.073	1	.176	2	.220	0	.203	6	.20
940 **	1	.038	1	.160	1	.592	1	.804	2	.154	0	.041	0	.021	0	.025	0	.073	0	.176	0	.220	1	.201	7	.20
950 **	0	.038	0	.160	1	.590	0	.804	1	.152	1	.039	0	.021	0	.025	0	.073	1	.175	1	.218	1	.199	6	.20
960 **	0	.038	0	.160	0	.590	0	.804	0	.152	0	.039	0	.021	0	.025	0	.073	0	.175	1	.216	1	.197	2	.20
970 **	0	.038	0	.160	0	.590	0	.804	0	.152	0	.039	0	.021	0	.025	0	.073	0	.175	1	.214	0	.197	1	.20
980 **	2	.034	1	.158	0	.590	0	.804	0	.152	0	.039	1	.019	1	.023	0	.073	0	.175	0	.214	1	.195	6	.20
990 **	0	.034	0	.158	0	.590	0	.804	1	.150	0	.039	0	.019	0	.023	0	.073	0	.175	1	.212	0	.195	2	.20
1000 **	2	.030	3	.151	7	.577	4	.796	4	.142	3	.033	1	.017	1	.021	4	.065	9	.157	13	.186	11	.175	62	.19
1100 **	0	.030	3	.145	6	.565	3	.790	6	.131	3	.027	2	.013	1	.019	2	.061	4	.150	6	.175	5	.165	41	.18
1200 **	2	.027	1	.143	5	.556	2	.786	4	.123	0	.027	2	.009	2	.015	0	.061	9	.133	4	.167	5	.156	36	.18
1300 **	1	.025	0	.143	4	.548	2	.782	1	.121	3	.022	2	.006	1	.013	1	.059	2	.129	5	.157	8	.140	30	.17
1400 **	0	.025	3	.137	4	.541	4	.775	25	.074	5	.012	3	.000	7	.000	1	.057	4	.121	6	.145	6	.129	68	.16
1500 **	11	.004	54	.023283		.004331		.125	4	.066	0	.012	0	.000	0	.000	0	.057	2	.118	3	.139	3	.123	691	.05
1600 **	0	.004	0	.023	0	.004	2	.122	4	.059	2	.008	0	.000	0	.000	27	.004	62	.000	71	.000	62	.006	230	.01
1700 **	0	.004	1	.021	0	.004	3	.116	1	.057	0	.008	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	5	.01
1800 **	0	.004	0	.021	0	.004	2	.112	1	.055	0	.008	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	3	.01
1900 **	0	.004	2	.017	0	.004	1	.110	1	.053	0	.008	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	4	.01
2000 **	0	.004	0	.017	0	.004	2	.106	1	.051	0	.008	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	3	.01
2100 **	0	.004	2	.013	0	.004	2	.102	0	.051	1	.006	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	5	.01
2200 **	0	.004	2	.008	0	.004	4	.094	0	.051	0	.006	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	6	.01
2300 **	1	.002	0	.008	0	.004	3	.088	2	.047	2	.002	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	8	.01
2400 **	0	.002	0	.008	0	.004	0	.088	4	.040	0	.002	0	.000	0	.000	0	.004	0	.000	0	.000	0	.006	5	.01
2500 **	1	.000	1	.006	1	.002	3	.082	0	.040	0	.002	0	.000	0	.000	0	.004	0	.000	0	.000	1	.004	6	.01
2600 **	0	.000	0	.006	0	.002	2	.078	1	.038	0	.002	0	.000	0	.000	0	.004	0	.000	0	.000	0	.004	3	.01
2700 **	0	.000	0	.006	0	.002	5	.069	0	.038	0	.002	0	.000	0	.000	0	.004	0	.000	0	.000	0	.004	5	.01
2800 **	0	.000	0	.006	0	.002	0	.069	0	.038	0	.002	0	.000	0	.000	0	.004	0	.000	0	.000	0	.004	0	.01
2900 **	0	.000	0	.006	0	.002	3	.063	1	.036	0	.002	0	.000	0	.000	0	.004	0	.000	0	.000	0	.004	4	.01
3000 **	0	.000	0	.006	0	.002	3	.057	0	.036	0	.002	0	.000	0	.000	0	.004	0	.000	0	.000	0	.004	3	.00
3100 **	0	.000	0	.006	0	.002	1	.055	1	.034	0	.002	0	.000	0	.000	1	.002	0	.000	0	.000	0	.004	3	.00
3200 **	0	.000	0	.006	0	.002	3	.049	0	.034	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	3	.00
3300 **	0	.000	0	.006	0	.002	6	.037	1	.032	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	7	.00
3400 **	0	.000	1	.004	0	.002	2	.033	1	.030	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	4	.00
3500 **	0	.000	0	.004	0	.002	0	.033	2	.027	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	2	.00
3600 **	0	.000	0	.004	0	.002	3	.027	1	.025	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	4	.00
3700 **	0	.000	0	.004	0	.002	2	.024	2	.021	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	4	.00
3800 **	0	.000	0	.004	0	.002	2	.020	0	.021	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	2	.00
3900 **	0	.000	0	.004	0	.002	3	.014	0	.021	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	3	.00
4000 **	0	.000	1	.002	0	.002	0	.014	1	.019	0	.002	0	.000	0	.000	1	.000	0	.000	0	.000	0	.004	3	.00

FLOW	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANN	
4100 **	0	.000	0	.002	0	.002	1	.012	0	.019	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.003
4200 **	0	.000	0	.002	0	.002	1	.010	3	.013	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	4	.003
4300 **	0	.000	0	.002	0	.002	0	.010	1	.011	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.003
4400 **	0	.000	0	.002	0	.002	0	.010	0	.011	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.003
4500 **	0	.000	0	.002	0	.002	1	.008	1	.009	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	2	.002
4600 **	0	.000	0	.002	0	.002	0	.008	0	.009	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.002
4700 **	0	.000	0	.002	0	.002	0	.008	1	.008	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.002
4800 **	0	.000	0	.002	0	.002	0	.008	0	.008	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.002
4900 **	0	.000	0	.002	1	.000	0	.008	0	.008	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.002
5000 **	0	.000	0	.002	0	.000	0	.008	1	.006	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.002
5100 **	0	.000	0	.002	0	.000	0	.008	0	.006	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.002
5200 **	0	.000	0	.002	0	.000	1	.006	0	.006	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.002
5300 **	0	.000	0	.002	0	.000	0	.006	0	.006	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.002
5400 **	0	.000	0	.002	0	.000	0	.006	0	.006	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.002
5500 **	0	.000	0	.002	0	.000	0	.006	0	.006	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.002
5600 **	0	.000	0	.002	0	.000	0	.006	0	.006	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.002
5700 **	0	.000	0	.002	0	.000	0	.006	2	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	2	.001
5800 **	0	.000	0	.002	0	.000	0	.006	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
5900 **	0	.000	0	.002	0	.000	1	.004	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.001
6000 **	0	.000	0	.002	0	.000	0	.004	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6100 **	0	.000	0	.002	0	.000	1	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.001
6200 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6300 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6400 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6500 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6600 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6700 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6800 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
6900 **	0	.000	0	.002	0	.000	0	.002	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7000 **	0	.000	0	.002	0	.000	1	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7100 **	0	.000	0	.002	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.001
7200 **	0	.000	0	.002	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7300 **	0	.000	0	.002	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7400 **	0	.000	1	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7500 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.001
7600 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7700 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7800 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
7900 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
8000 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
8100 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
8200 **	0	.000	0	.000	0	.000	0	.000	0	.002	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
8300 **	0	.000	0	.000	0	.000	0	.000	1	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.001
8400 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.000
8500 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.000
8600 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.000
8700 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.000
8800 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.000
8900 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.000
9000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.000

FLOW	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANN
9100 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	1	.002	1	.00
9200 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
9300 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
9400 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
9500 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
9600 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
9700 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
9800 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
9900 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
10000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.002	0	.00
11000 **	0	.000	0	.000	0	.000	0	.000	0	.000	1	.000	0	.000	0	.000	0	.000	0	.000	0	.000	1	.000	1	.00
12000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	1	.00
13000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
14000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
15000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
16000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
17000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
18000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
19000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
20000 **	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.000	0	.00
MEAN	374.8		556.4		1083.2		1533.0		574.8		306.0		248.4		245.7		452.7		581.4		672.6		678.2		607.9
# OF DAYS	527		476		527		510		527		510		527		527		510		527		510		527		6205

AVERAGE MONTHLY AND ANNUAL FLOWS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	WTYR	CLYR
1970 **	300.0	387.5	593.1	1327.6	361.9	200.0	232.4	213.2	350.0	683.0	689.0	441.6	.0	480.6
1971 **	300.0	300.0	560.4	1108.4	2032.9	206.0	200.0	200.0	350.0	350.0	350.0	478.1	591.7	538.6
1972 **	300.0	300.0	729.3	1191.1	1501.0	1107.6	513.8	295.5	392.7	350.0	697.6	626.5	627.0	668.1
1973 **	556.1	807.4	1719.8	1132.9	200.0	200.0	200.0	200.0	350.0	350.0	385.6	1008.7	584.8	591.6
1974 **	462.6	497.4	999.1	1410.2	628.8	200.0	363.8	427.8	372.9	398.2	769.7	601.9	593.0	594.1
1975 **	324.9	590.8	1074.1	1001.2	871.8	253.4	200.0	200.0	696.6	681.5	767.4	642.2	580.7	608.0
1976 **	300.0	683.5	1443.5	1852.1	620.5	349.0	259.2	344.9	497.7	967.6	515.9	421.8	701.8	686.7
1977 **	426.6	746.0	1560.8	2460.1	200.0	200.0	200.0	223.2	885.1	961.8	1078.7	720.3	750.7	801.9
1978 **	527.8	503.3	761.5	1765.2	814.1	248.1	200.0	200.0	361.8	405.3	357.1	379.2	678.0	542.4
1979 **	480.8	453.3	1411.5	1765.7	381.6	200.0	200.0	200.0	408.0	700.5	733.4	753.0	553.0	640.7
1980 **	300.0	300.0	795.9	1625.0	200.0	200.0	200.0	200.0	350.0	501.5	700.6	679.5	529.5	503.7
1981 **	300.0	963.1	1029.0	1333.7	200.0	200.0	200.0	200.0	350.0	515.3	631.0	350.0	550.4	517.9
1982 **	300.0	300.0	813.0	1932.5	404.4	477.0	203.8	200.0	350.0	346.5	833.3	854.1	538.4	585.2
1983 **	300.0	554.8	1100.8	949.3	279.2	290.8	200.0	200.0	350.0	556.7	783.3	1051.7	522.1	550.9
1984 **	300.0	1120.5	931.6	1655.4	674.6	277.3	325.0	200.0	614.3	450.9	547.3	1433.9	702.8	706.8
1985 **	593.1	596.7	1530.5	1567.4	200.0	200.0	200.0	200.0	350.0	636.9	957.5	416.3	656.2	619.3
1986 **	300.0	355.0	1360.2	1982.5	200.0	392.1	325.5	473.2	666.9	1008.9	636.3	670.6	671.2	698.0

AVERAGE MONTHLY FLOWS RANKED AND X = TO OR >

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	**	593.059	1120.059	1719.059	2460.059	2032.059	1107.059	513.059	473.059	885.059	1008.059	1078.059	1433.059
2	**	556.118	963.118	1560.118	1982.118	1500.118	477.118	363.118	427.118	696.118	967.118	957.118	1051.118
3	**	527.176	807.176	1530.176	1932.176	871.176	392.176	325.176	344.176	666.176	961.176	833.176	1008.176
4	**	480.235	746.235	1443.235	1852.235	814.235	349.235	325.235	295.235	614.235	700.235	783.235	854.235
5	**	462.294	683.294	1411.294	1765.294	674.294	290.294	259.294	223.294	497.294	683.294	769.294	753.294
6	**	426.353	596.353	1360.353	1765.353	628.353	277.353	232.353	213.353	408.353	681.353	767.353	720.353
7	**	324.412	590.412	1100.412	1655.412	620.412	253.412	203.412	200.412	392.412	636.412	733.412	679.412
8	**	300.471	554.471	1074.471	1625.471	404.471	248.471	200.471	200.471	372.471	556.471	700.471	670.471
9	**	300.529	503.529	1029.529	1567.529	381.529	205.529	200.529	200.529	361.529	515.529	697.529	642.529
10	**	300.588	497.588	999.588	1410.588	361.588	200.588	200.588	200.588	350.588	501.588	689.588	626.588
11	**	300.647	453.647	931.647	1333.647	279.647	200.647	200.647	200.647	350.647	450.647	636.647	601.647
12	**	300.706	387.706	813.706	1327.706	200.706	200.706	200.706	200.706	350.706	405.706	631.706	478.706
13	**	300.765	355.765	795.765	1191.765	200.765	200.765	200.765	200.765	350.765	398.765	547.765	441.765
14	**	300.824	300.824	761.824	1132.824	200.824	200.824	200.824	200.824	350.824	366.824	515.824	421.824
15	**	300.882	300.882	729.882	1108.882	200.882	200.882	200.882	200.882	350.882	350.882	385.882	416.882
16	**	300.941	300.941	593.941	1001.941	200.941	200.941	200.941	200.941	350.941	350.941	357.941	379.941
17	**	300****	300****	560****	949****	200****	200****	200****	200****	350****	350****	350****	350****

Attachment 4
Rule Curve 16

RULE CURVE 16
SALMON RIVER
BENNETTS BRIDGE
1970-1986

OF OCCURENCES AND PERCENT OF TIME EQUALLED OR EXCEEDED
FOR EACH MONTH AND ANNUALLY

17 5 70 936.500000000000000

HEAD	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
914 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.0
915 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.0
916 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	2 .996	0 1.000	2 1.0
917 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	3 .990	0 1.000	3 .9
918 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	1 .988	0 1.000	1 .9
919 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	2 .996	19 .964	8 .973	0 1.000	29 .9
920 **	0 1.000	0 1.000	1 .998	0 1.000	0 1.000	0 1.000	0 1.000	13 .975	22 .953	29 .909	5 .963	0 1.000	69 .9
921 **	0 1.000	0 1.000	27 .947	2 .996	0 1.000	8 .973	0 1.000	4 .964	9 .906	12 .854	1 .961	0 1.000	63 .9
922 **	0 1.000	0 1.000	87 .782	4 .988	0 1.000	5 .963	4 .992	5 .954	8 .890	13 .829	2 .957	0 1.000	128 .9
923 **	0 1.000	0 1.000	155 .488	14 .961	0 1.000	6 .951	15 .964	7 .941	16 .859	13 .805	11 .935	5 .991	242 .9
924 **	0 1.000	0 1.000	30 .431	17 .927	0 1.000	2 .947	8 .949	1 .939	27 .806	6 .793	12 .912	4 .983	107 .8
925 **	3 .994	4 .992	23 .387	22 .884	11 .979	3 .941	2 .965	22 .898	26 .755	0 .793	5 .902	1 .981	122 .8
926 **	7 .981	14 .962	28 .334	82 .724	11 .958	0 .941	2 .941	37 .827	46 .665	19 .757	7 .888	0 .981	253 .8
927 **	8 .966	18 .924	34 .269	30 .665	9 .941	0 .941	1 .939	60 .713	32 .602	28 .704	14 .861	2 .977	236 .7
928 **	20 .928	34 .853	24 .224	23 .620	21 .901	0 .941	13 .915	33 .651	46 .512	92 .529	20 .822	16 .947	342 .7
929 **	47 .839	23 .805	20 .186	24 .573	30 .844	3 .935	29 .860	36 .583	37 .439	108 .324	106 .614	32 .886	495 .6
930 **	109 .632	54 .691	26 .137	31 .512	33 .782	4 .927	47 .770	62 .465	44 .353	142 .055	283 .059	174 .556	1009 .4
931 **	79 .482	178 .317	26 .087	37 .439	18 .748	18 .892	65 .647	55 .361	57 .241	13 .030	22 .016	264 .055	832 .3
932 **	33 .419	103 .101	15 .059	39 .363	16 .717	23 .847	65 .524	34 .296	74 .096	7 .017	4 .008	10 .036	423 .2
933 **	48 .328	9 .082	8 .044	29 .306	27 .666	38 .773	47 .435	37 .226	34 .029	6 .006	1 .006	5 .027	289 .2
934 **	89 .159	15 .050	6 .032	28 .251	21 .626	75 .625	49 .342	71 .091	8 .016	3 .000	3 .000	5 .017	373 .1
935 **	79 .009	5 .040	10 .013	35 .182	102 .433	199 .235	126 .102	47 .002	4 .006	0 .000	0 .000	6 .006	613 .0
936 **	5 .000	19 .000	7 .000	93 .000	228 .000	120 .000	54 .000	1 .000	3 .000	0 .000	0 .000	3 .000	533 .0
MEAN	932.2	931.2	925.8	930.8	933.9	934.2	932.8	930.3	928.5	927.6	929.1	930.8	930
# OF DAYS	527	476	527	510	527	510	527	527	510	527	510	527	62

AVERAGE MONTHLY AND ANNUAL HEADS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	WTYR	CLYR
1970 **	933.3	931.8	922.9	929.7	935.5	935.1	935.6	932.8	927.7	929.6	929.8	930.9		
1971 **	930.4	928.3	923.4	928.8	936.3	935.6	933.6	930.4	926.7	921.1	920.3	928.1	.0	931.2
1972 **	931.3	931.5	923.9	929.5	936.2	936.1	935.9	934.7	930.2	928.1	930.0	930.9	930.3	928.6
1973 **	934.9	932.7	932.3	928.9	929.9	932.9	930.7	927.2	921.7	919.4	925.1	931.6	929.9	931.5
1974 **	934.8	931.5	925.8	928.7	934.4	935.7	935.2	934.5	931.4	928.8	929.7	930.8	930.0	928.9
1975 **	933.1	932.0	924.5	928.8	935.9	935.3	931.5	928.8	929.7	930.2	930.0	930.9	930.7	931.8
1976 **	930.1	931.8	928.7	934.6	934.9	935.6	935.4	934.5	932.3	930.2	929.7	930.7	930.7	930.9
1977 **	933.4	932.2	927.9	934.3	935.5	934.7	932.3	932.1	932.9	930.9	930.0	931.1	932.4	932.4
1978 **	933.8	931.7	923.5	931.0	936.1	935.8	932.7	926.6	927.9	928.6	928.8	930.6	932.2	932.3
1979 **	934.7	930.5	926.9	933.9	935.9	934.7	930.8	927.1	930.8	929.9	930.6	931.1	930.9	930.6
1980 **	930.5	927.9	923.2	931.8	929.1	931.3	930.2	929.7	925.0	922.6	930.0	930.8	931.1	931.4
1981 **	927.6	929.5	926.3	928.7	926.9	922.5	923.9	921.1	919.8	923.9	930.0	929.3	929.2	928.5
1982 **	930.0	930.3	923.4	931.0	936.0	936.0	934.1	930.7	927.4	927.7	929.9	931.1	925.8	925.8
1983 **	932.8	931.8	924.9	925.8	933.7	935.3	931.7	930.4	929.8	929.8	930.1	932.1	930.2	930.6
1984 **	931.2	933.5	924.9	932.5	935.9	935.6	935.4	932.9	932.7	929.1	929.7	931.6	930.4	930.7
1985 **	934.6	932.1	930.2	930.6	932.6	933.9	932.0	926.8	925.6	929.0	930.6	930.6	932.2	932.1
1986 **	930.2	931.9	925.3	935.1	932.2	935.9	935.7	934.9	932.6	930.6	930.1	930.9	930.7	930.7
													932.0	932.1

AVERAGE MONTHLY HEADS RANKED AND % = TO OR >

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	**	934.059	933.059	932.059	935.059	936.059	936.059	935.059	934.059	932.059	930.059	930.059	932.059
2	**	934.118	932.118	930.118	934.118	936.118	935.118	935.118	934.118	932.118	930.118	930.118	931.118
3	**	934.176	932.176	928.176	934.176	936.176	935.176	935.176	934.176	932.176	930.176	930.176	931.176
4	**	934.235	932.235	927.235	933.235	935.235	935.235	935.235	934.235	932.235	930.235	930.235	931.235
5	**	933.294	931.294	926.294	932.294	935.294	935.294	935.294	932.294	931.294	929.294	930.294	931.294
6	**	933.353	931.353	926.353	931.353	935.353	935.353	935.353	932.353	930.353	929.353	930.353	931.353
7	**	933.412	931.412	925.412	931.412	935.412	935.412	934.412	932.412	930.412	929.412	930.412	930.412
8	**	933.471	931.471	925.471	930.471	935.471	935.471	933.471	930.471	929.471	929.471	929.471	930.471
9	**	932.529	931.529	924.529	930.529	935.529	935.529	932.529	930.529	929.529	928.529	929.529	930.529
10	**	931.588	931.588	924.588	929.588	934.588	935.588	932.588	930.588	927.588	928.588	929.588	930.588
11	**	931.647	931.647	924.647	929.647	934.647	935.647	931.647	929.647	927.647	928.647	929.647	930.647
12	**	930.706	931.706	923.706	928.706	933.706	934.706	931.706	928.706	927.706	928.706	929.706	930.706
13	**	930.765	930.765	923.765	928.765	932.765	934.765	931.765	927.765	926.765	927.765	929.765	930.765
14	**	930.824	930.824	923.824	928.824	932.824	933.824	930.824	927.824	925.824	923.824	929.824	930.824
15	**	930.882	929.882	923.882	928.882	929.882	932.882	930.882	926.882	924.882	922.882	928.882	930.882
16	**	929.941	928.941	923.941	928.941	929.941	931.941	930.941	926.941	921.941	921.941	925.941	929.941
17	**	927****	927****	922****	925****	926****	922****	923****	921****	919****	919****	920****	928****

MONTHLY AND ANNUAL FLOW DURATION CURVES

USGS GAGE NO. - Rule Curve 16
DRAINAGE AREA - 194.0 SQ. MI.
YEARS OF RECORD - 1970-1986
RIVER NAME - Salmon River
LOCATION - Bennetts Bridge

OF OCCURENCES AND PERCENT OF TIME EQUALLED OR EXCEEDED
FOR EACH MONTH AND ANNUALLY

22 6 72 11132.000000000000000

FLOW	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
91 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
92 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
93 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
94 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
95 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
96 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
97 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
98 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
99 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
100 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
110 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
120 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
130 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
140 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
150 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
160 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
170 **	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
180 **	0 1.000	0 1.000	0 1.000	0 1.000318	.397	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.00
190 **	0 1.000	0 1.000	0 1.000	0 1.000	3 .391407	.202	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	318 .94
200 **	0 1.000	0 1.000	0 1.000	0 1.000	3 .385	2 .198	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	410 .88
210 **	0 1.000	0 1.000	0 1.000	0 1.000	3 .380	6 .186	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	0 1.000	5 .88
220 **	0 1.000	0 1.000	0 1.000	0 1.000	3 .374	3 .180	0 1.000489	.072	0 1.000	0 1.000	0 1.000	0 1.000	9 .88
230 **	0 1.000	0 1.000	0 1.000	0 1.000	2 .370	0 .180	0 1.000	2 .068	0 1.000	0 1.000	0 1.000	0 1.000	495 .80
240 **	0 1.000	0 1.000	0 1.000	0 1.000	3 .364	2 .176	0 1.000	0 .068	0 1.000	0 1.000	0 1.000	0 1.000	4 .80
250 **	0 1.000	0 1.000	0 1.000	0 1.000	1 .362	2 .173	0 1.000	1 .066	0 1.000	0 1.000	0 1.000	0 1.000	5 .79
260 **	0 1.000	0 1.000	0 1.000	0 1.000	1 .361	0 .173481	.087	1 .065	0 1.000	0 1.000	0 1.000	0 1.000	4 .79
270 **	0 1.000	0 1.000	0 1.000	0 1.000	1 .359	5 .163	2 .083	0 .065	0 1.000	0 1.000	0 1.000	0 1.000	483 .72
280 **452	.142335	.296124	.765 61	.880	2 .355	2 .159	0 .083	0 .065	0 1.000	0 1.000	0 1.000	0 1.000	8 .71
290 ** 0	.142	2 .292	3 .759	1 .878	4 .347	1 .157	1 .082	2 .061	0 1.000	0 1.000	0 1.000	0 1.000	976 .56
300 ** 0	.142	1 .290	0 .759	0 .878	4 .340	2 .153	0 .082	0 .061	0 1.000	0 1.000	0 1.000	0 1.000	14 .56
													7 .55

FLOW	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
310 **	0 .142	0 .290	2 .755	0 .878	1 .338	2 .149	4 .074	0 .061	0 1.000	0 1.000	0 1.000	0 1.000	9 .557
320 **	0 .142	3 .284	4 .748	1 .876	0 .338	4 .141	4 .066	0 .061	0 1.000	0 1.000	0 1.000	0 1.000	16 .555
330 **	0 .142	3 .277	2 .744	0 .876	2 .334	0 .141	0 .066	1 .059	0 1.000375	.288223	.563259	.509	865 .415
340 **	2 .139	3 .271	1 .742	0 .876	4 .326	1 .139	1 .065	0 .059	0 1.000	0 .288	1 .561	6 .497	19 .412
350 **	0 .139	0 .271	3 .736	0 .876	1 .324	0 .139	0 .065	1 .057446	.086	4 .281	2 .557	3 .491	480 .335
360 **	2 .135	0 .271	4 .729	3 .871	3 .319	5 .129	1 .063	0 .057	0 .086	0 .281	7 .543	4 .484	29 .330
370 **	0 .135	2 .267	3 .723	0 .871	3 .313	2 .125	0 .063	2 .053	0 .086	0 .281	9 .525	5 .474	26 .326
380 **	2 .131	0 .267	3 .717	1 .869	4 .306	6 .114	1 .061	0 .053	0 .086	2 .277	3 .520	6 .463	28 .322
390 **	1 .129	2 .263	2 .713	1 .867	2 .302	1 .112	0 .061	1 .051	0 .086	1 .275	3 .514	1 .461	15 .319
400 **	1 .127	0 .263	2 .710	0 .867	6 .290	1 .110	0 .061	0 .051	0 .086	3 .269	3 .508	6 .450	22 .316
410 **	2 .123	1 .261	0 .710	0 .867	3 .285	2 .106	0 .061	1 .049	0 .086	3 .264	5 .498	3 .444	20 .312
420 **	1 .121	2 .256	1 .708	0 .867	3 .279	3 .100	1 .059	0 .049	0 .086	1 .262	6 .486	6 .433	24 .308
430 **	0 .121	0 .256	2 .704	0 .867	4 .271	0 .100	1 .057	0 .049	1 .084	1 .260	4 .478	3 .427	16 .306
440 **	3 .116	1 .254	1 .702	2 .863	2 .268	1 .098	0 .057	0 .049	0 .084	1 .258	5 .469	4 .419	20 .303
450 **	2 .112	0 .254	1 .700	0 .863	2 .264	0 .098	0 .057	1 .047	1 .082	8 .243	10 .449	5 .410	30 .298
460 **	0 .112	2 .250	2 .696	0 .863	5 .254	1 .096	0 .057	1 .046	0 .082	2 .239	3 .443	1 .408	17 .295
470 **	1 .110	0 .250	0 .696	1 .861	0 .254	2 .092	0 .057	0 .046	0 .082	1 .237	2 .439	4 .400	11 .293
480 **	0 .110	0 .250	5 .687	1 .859	1 .252	2 .088	1 .055	1 .044	0 .082	2 .233	5 .429	3 .395	21 .290
490 **	1 .108	1 .248	0 .687	1 .857	2 .249	1 .086	1 .053	1 .042	0 .082	0 .233	1 .427	5 .385	14 .288
500 **	0 .108	1 .246	1 .685	0 .857	3 .243	0 .086	1 .051	0 .042	0 .082	0 .233	8 .412	3 .380	17 .285
510 **	0 .108	1 .244	4 .677	1 .855	2 .239	0 .086	0 .051	0 .042	1 .080	0 .233	5 .402	2 .376	16 .282
520 **	0 .108	2 .239	1 .676	0 .855	3 .233	1 .084	2 .047	2 .038	1 .078	1 .231	6 .390	3 .370	22 .279
530 **	2 .104	4 .231	0 .676	1 .853	1 .231	1 .082	0 .047	2 .034	0 .078	3 .226	3 .384	7 .357	24 .275
540 **	1 .102	0 .231	4 .668	0 .853	4 .224	0 .082	1 .046	2 .030	0 .078	2 .222	3 .378	1 .355	18 .272
550 **	0 .102	3 .225	1 .666	1 .851	1 .222	3 .076	0 .046	1 .028	1 .076	2 .218	4 .371	4 .347	21 .269
560 **	0 .102	2 .221	0 .666	0 .851	3 .216	0 .076	0 .046	0 .028	0 .076	0 .218	3 .365	1 .345	9 .267
570 **	3 .097	1 .218	2 .662	3 .845	0 .216	1 .075	0 .046	0 .028	0 .076	1 .216	1 .363	3 .340	15 .265
580 **	1 .095	1 .216	0 .662	1 .843	1 .214	1 .073	0 .046	1 .027	0 .076	0 .216	2 .359	6 .328	14 .263
590 **	2 .091	1 .214	0 .662	0 .843	0 .214	0 .073	1 .044	0 .027	0 .076	2 .213	7 .345	3 .323	16 .260
600 **	2 .087	0 .214	1 .660	0 .843	1 .213	0 .073	0 .044	0 .027	1 .075	2 .209	2 .341	0 .323	9 .259
610 **	0 .087	3 .208	0 .660	0 .843	2 .209	1 .071	1 .042	0 .027	0 .075	0 .209	3 .335	2 .319	12 .257
620 **	2 .083	1 .206	1 .658	1 .841	1 .207	0 .071	0 .042	0 .027	0 .075	1 .207	0 .335	1 .317	8 .255
630 **	0 .083	1 .204	0 .658	1 .839	0 .207	0 .071	1 .040	0 .027	2 .071	1 .205	3 .329	4 .309	13 .253
640 **	0 .083	2 .200	2 .655	0 .839	1 .205	1 .069	1 .038	0 .027	0 .071	0 .205	2 .325	6 .298	15 .251
650 **	1 .082	1 .197	2 .651	2 .835	1 .203	0 .069	1 .036	0 .027	0 .071	1 .203	2 .322	6 .287	17 .248
660 **	0 .082	0 .197	2 .647	0 .835	0 .203	3 .063	0 .036	0 .027	0 .071	0 .203	3 .316	5 .277	13 .246
670 **	2 .078	1 .195	1 .645	0 .835	2 .199	0 .063	0 .036	0 .027	0 .071	0 .203	2 .312	1 .275	9 .244
680 **	0 .078	0 .195	3 .639	0 .835	4 .192	0 .063	1 .034	0 .027	0 .071	0 .203	4 .304	2 .271	14 .242
690 **	1 .076	0 .195	2 .636	2 .831	1 .190	0 .063	2 .030	0 .027	0 .071	1 .201	0 .304	3 .266	12 .240
700 **	2 .072	1 .193	1 .634	1 .829	1 .188	0 .063	0 .030	0 .027	0 .071	1 .199	1 .302	3 .260	11 .239
710 **	0 .072	0 .193	1 .632	1 .827	1 .186	3 .057	1 .028	0 .027	0 .071	3 .194	2 .298	1 .258	13 .236
720 **	0 .072	1 .191	2 .628	0 .827	0 .186	0 .057	0 .028	0 .027	0 .071	0 .194	5 .288	1 .256	9 .235
730 **	0 .072	0 .191	1 .626	0 .827	1 .184	2 .053	0 .028	2 .023	0 .071	3 .188	4 .280	3 .250	16 .232
740 **	2 .068	1 .189	0 .626	0 .827	0 .184	0 .053	1 .027	0 .023	0 .071	2 .184	3 .275	1 .249	10 .231
750 **	1 .066	1 .187	0 .626	0 .827	1 .182	1 .051	0 .027	0 .023	1 .069	0 .184	4 .267	2 .245	11 .229
760 **	4 .059	1 .185	1 .624	0 .827	0 .182	0 .051	0 .027	0 .023	0 .069	2 .180	1 .265	2 .241	11 .227
770 **	1 .057	0 .185	2 .620	2 .824	1 .180	1 .049	2 .023	0 .023	0 .069	0 .180	2 .261	1 .239	12 .225
780 **	2 .053	0 .185	0 .620	0 .824	0 .180	0 .049	1 .021	0 .023	0 .069	0 .180	1 .259	1 .237	5 .224
790 **	0 .053	0 .185	0 .620	0 .824	0 .180	0 .049	0 .021	0 .023	0 .069	2 .176	0 .259	1 .235	3 .224
800 **	0 .053	0 .185	0 .620	1 .822	1 .178	0 .049	0 .021	0 .023	0 .069	0 .176	1 .257	1 .233	4 .223

FLOW	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANN	
810 **	0	.053	0	.185	1	.619	0	.822	0	.178	0	.049	0	.021	0	.023	0	.069	1	.175	2	.253	3	.228	7	.222
820 **	1	.051	1	.183	0	.619	0	.822	1	.176	0	.049	0	.021	0	.023	2	.065	0	.175	1	.251	0	.228	6	.221
830 **	0	.051	0	.183	1	.617	2	.818	0	.176	0	.049	0	.021	0	.023	0	.065	1	.173	0	.251	0	.228	4	.221
840 **	1	.049	0	.183	1	.615	0	.818	0	.176	1	.047	0	.021	0	.023	0	.065	0	.173	3	.245	1	.226	7	.220
850 **	1	.047	0	.183	0	.615	0	.818	3	.171	0	.047	1	.019	0	.023	0	.065	2	.169	1	.243	0	.226	8	.218
860 **	0	.047	0	.183	2	.611	0	.818	1	.169	0	.047	0	.019	0	.023	0	.065	1	.167	1	.241	0	.226	5	.217
870 **	0	.047	1	.181	1	.609	0	.818	0	.169	1	.045	1	.017	1	.021	0	.065	0	.167	2	.237	1	.224	8	.216
880 **	0	.047	1	.179	0	.609	0	.818	0	.169	1	.043	0	.017	0	.021	1	.063	1	.165	1	.235	0	.224	5	.215
890 **	0	.047	0	.179	1	.607	0	.818	3	.163	0	.043	0	.017	0	.021	0	.063	1	.163	5	.225	4	.216	14	.213
900 **	2	.044	0	.179	2	.603	0	.818	2	.159	0	.043	0	.017	0	.021	1	.061	0	.163	0	.225	3	.211	10	.211
910 **	1	.042	1	.176	0	.603	0	.818	0	.159	1	.041	0	.017	0	.021	0	.061	0	.163	0	.225	1	.209	4	.211
920 **	0	.042	1	.174	0	.603	2	.814	0	.159	0	.041	0	.017	0	.021	0	.061	0	.163	1	.224	3	.203	7	.210
930 **	1	.040	0	.174	0	.603	2	.810	1	.157	0	.041	0	.017	0	.021	0	.061	1	.161	1	.222	1	.201	7	.209
940 **	1	.038	1	.172	1	.602	1	.808	1	.156	0	.041	0	.017	0	.021	1	.059	0	.161	1	.220	0	.201	7	.207
950 **	0	.038	0	.172	0	.602	0	.808	0	.156	1	.039	0	.017	0	.021	0	.059	1	.159	1	.218	0	.201	3	.207
960 **	0	.038	0	.172	0	.602	0	.808	0	.156	0	.039	0	.017	0	.021	0	.059	0	.159	1	.216	1	.199	2	.207
970 **	0	.038	0	.172	0	.602	0	.808	0	.156	0	.039	0	.017	0	.021	0	.059	1	.157	1	.214	0	.199	2	.206
980 **	2	.034	0	.172	0	.602	0	.808	0	.156	0	.039	1	.015	0	.021	0	.059	0	.157	0	.214	0	.199	3	.206
990 **	0	.034	0	.172	0	.602	0	.808	1	.154	0	.039	0	.015	0	.021	0	.059	0	.157	1	.212	1	.197	3	.205
1000 **	2	.030	7	.158	6	.590	3	.802	4	.146	2	.035	1	.013	1	.019	1	.057	7	.144	12	.188	12	.175	58	.196
1100 **	0	.030	3	.151	6	.579	5	.792	5	.137	3	.029	2	.009	1	.017	1	.055	3	.139	8	.173	4	.167	41	.189
1200 **	1	.028	1	.149	5	.569	2	.788	5	.127	1	.027	1	.008	2	.013	0	.055	7	.125	6	.161	4	.159	35	.184
1300 **	0	.028	1	.147	4	.562	2	.784	2	.123	2	.024	1	.006	1	.011	1	.053	7	.112	4	.153	7	.146	32	.179
1400 **	2	.025	1	.145	5	.552	4	.776	26	.074	6	.012	2	.002	1	.009	0	.053	3	.106	5	.143	7	.133	62	.169
1500 **	11	.004	58	.023289		.004331		.127	4	.066	0	.012	1	.000	5	.000	2	.049	2	.102	2	.139	4	.125	709	.054
1600 **	0	.004	0	.023	0	.004	2	.124	4	.059	2	.008	0	.000	0	.000	24	.002	54	.000	71	.000	63	.006	220	.019
1700 **	0	.004	0	.023	0	.004	3	.118	0	.059	0	.008	0	.000	0	.000	0	.002	0	.000	0	.000	0	.006	3	.018
1800 **	0	.004	0	.023	0	.004	2	.114	1	.057	0	.008	0	.000	0	.000	0	.002	0	.000	0	.000	0	.006	3	.018
1900 **	0	.004	2	.019	0	.004	0	.114	1	.055	0	.008	0	.000	0	.000	0	.002	0	.000	0	.000	0	.006	3	.017
2000 **	0	.004	1	.017	0	.004	2	.110	1	.053	0	.008	0	.000	0	.000	0	.002	0	.000	0	.000	0	.006	4	.017
2100 **	0	.004	1	.015	0	.004	3	.104	0	.053	1	.006	0	.000	0	.000	0	.002	0	.000	0	.000	0	.006	5	.016
2200 **	0	.004	2	.011	0	.004	5	.094	1	.051	0	.006	0	.000	0	.000	0	.002	0	.000	0	.000	0	.006	8	.015
2300 **	1	.002	1	.008	0	.004	2	.090	2	.047	2	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.006	8	.013
2400 **	0	.002	0	.008	0	.004	1	.088	4	.040	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	1	.004	6	.012
2500 **	1	.000	1	.006	0	.004	2	.084	0	.040	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	4	.012
2600 **	0	.000	0	.006	0	.004	2	.080	1	.038	0	.002	0	.000	0	.000	0	.002	0	.000	0	.000	0	.004	3	.011
2700 **	0	.000	0	.006	0	.004	6	.069	0	.038	0	.002	0	.000	0	.000	1	.000	0	.000	0	.000	0	.004	7	.010
2800 **	0	.000	0	.006	0	.004	0	.069	0	.038	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	0	.010
2900 **	0	.000	0	.006	0	.004	3	.063	1	.036	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	4	.010
3000 **	0	.000	0	.006	1	.002	3	.057	0	.036	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	4	.009
3100 **	0	.000	0	.006	0	.002	0	.057	1	.034	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	1	.009
3200 **	0	.000	0	.006	0	.002	3	.051	0	.034	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	3	.008
3300 **	0	.000	0	.006	0	.002	6	.039	1	.032	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	7	.007
3400 **	0	.000	1	.004	0	.002	2	.035	1	.030	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	4	.006
3500 **	0	.000	0	.004	0	.002	0	.035	2	.027	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	2	.006
3600 **	0	.000	0	.004	0	.002	3	.029	1	.025	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	4	.005
3700 **	0	.000	0	.004	0	.002	2	.025	1	.023	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	3	.005
3800 **	0	.000	0	.004	0	.002	3	.020	0	.023	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	3	.005
3900 **	0	.000	0	.004	0	.002	3	.014	0	.023	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	3	.004
4000 **	0	.000	1	.002	0	.002	0	.014	2	.019	0	.002	0	.000	0	.000	0	.000	0	.000	0	.000	0	.004	3	.004

FLOW	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
4100 **	0 .000	0 .002	0 .002	1 .012	0 .019	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .003
4200 **	0 .000	0 .002	0 .002	1 .010	3 .013	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	4 .003
4300 **	0 .000	0 .002	0 .002	0 .010	0 .013	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .003
4400 **	0 .000	0 .002	0 .002	0 .010	1 .011	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .003
4500 **	0 .000	0 .002	0 .002	1 .008	1 .009	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	2 .002
4600 **	0 .000	0 .002	0 .002	0 .008	0 .009	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .002
4700 **	0 .000	0 .002	0 .002	0 .008	1 .008	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .002
4800 **	0 .000	0 .002	0 .002	0 .008	0 .008	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .002
4900 **	0 .000	0 .002	1 .000	0 .008	0 .008	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .002
5000 **	0 .000	0 .002	0 .000	0 .008	1 .006	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .002
5100 **	0 .000	0 .002	0 .000	0 .008	0 .006	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .002
5200 **	0 .000	0 .002	0 .000	1 .006	0 .006	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .002
5300 **	0 .000	0 .002	0 .000	0 .006	0 .006	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .002
5400 **	0 .000	0 .002	0 .000	0 .006	0 .006	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .002
5500 **	0 .000	0 .002	0 .000	0 .006	0 .006	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .002
5600 **	0 .000	0 .002	0 .000	0 .006	2 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .002
5700 **	0 .000	0 .002	0 .000	0 .006	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	2 .001
5800 **	0 .000	0 .002	0 .000	1 .004	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
5900 **	0 .000	0 .002	0 .000	0 .004	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .001
6000 **	0 .000	0 .002	0 .000	1 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6100 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .001
6200 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6300 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6400 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6500 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6600 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6700 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6800 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
6900 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7000 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7100 **	0 .000	0 .002	0 .000	0 .002	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7200 **	0 .000	0 .002	0 .000	1 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7300 **	0 .000	0 .002	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .001
7400 **	0 .000	1 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7500 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .001
7600 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7700 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7800 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
7900 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
8000 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
8100 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
8200 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
8300 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
8400 **	0 .000	0 .000	0 .000	1 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .001
8500 **	0 .000	0 .000	0 .000	0 .000	0 .002	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	1 .000
8600 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .000
8700 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .000
8800 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .000
8900 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .000
9000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .004	0 .000

FLOW	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
9100 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	1 .002	1 .00
9200 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
9300 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
9400 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
9500 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
9600 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
9700 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
9800 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
9900 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
10000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .000	0 .000	0 .000	0 .000	0 .000	0 .002	0 .00
11000 **	0 .000	0 .000	0 .000	0 .000	0 .000	1 .000	0 .000	0 .000	0 .000	0 .000	0 .000	1 .000	1 .00
12000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	1 .00
13000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
14000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
15000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
16000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
17000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
18000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
19000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
20000 **	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .000	0 .00
MEAN	366.3	557.7	1090.1	1530.4	573.2	306.7	297.0	258.8	442.5	550.1	663.2	670.8	607.9
# OF DAYS	527	476	527	510	527	510	527	527	510	527	510	527	6205

AVERAGE MONTHLY AND ANNUAL FLOWS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	WTYR	CLYR
1970 **	285.0	398.2	587.3	1328.1	371.6	198.0	262.9	223.0	359.0	634.7	691.5	440.2	.0	480.5
1971 **	285.0	285.0	588.6	1101.2	2041.6	204.2	262.0	223.0	359.0	335.0	335.0	415.4	595.6	538.7
1972 **	285.0	292.1	751.9	1191.1	1500.7	1107.7	321.9	299.4	397.1	335.0	696.6	626.5	620.5	668.2
1973 **	555.1	799.9	1721.3	1139.4	185.0	198.0	262.0	223.0	359.0	335.0	335.0	995.2	590.0	591.4
1974 **	465.5	497.4	987.5	1395.2	652.0	198.0	372.2	440.9	364.5	376.3	783.7	595.0	587.2	593.8
1975 **	331.9	590.8	1074.0	1001.1	866.1	258.1	262.0	223.0	611.1	675.8	771.8	636.9	580.1	608.1
1976 **	285.0	706.5	1438.2	1844.1	633.5	348.7	293.9	310.7	497.7	967.1	516.4	419.5	701.8	687.0
1977 **	429.1	746.0	1551.6	2467.6	185.0	198.0	262.0	223.0	840.9	958.5	1082.2	718.4	730.8	801.9
1978 **	529.8	491.0	772.7	1765.2	811.7	250.1	262.0	223.0	359.0	335.0	344.8	377.4	684.9	542.6
1979 **	482.4	441.5	1418.7	1757.7	393.7	198.0	262.0	223.0	359.0	665.1	730.4	755.3	549.1	640.9
1980 **	285.0	285.0	814.5	1627.9	185.0	198.0	262.0	223.0	359.0	432.8	700.6	671.3	532.4	503.1
1981 **	285.0	987.8	1028.5	1335.2	185.0	198.0	262.0	223.0	359.0	495.1	574.9	335.0	551.1	517.3
1982 **	285.0	285.0	856.6	1931.5	405.4	476.8	263.8	223.0	359.0	335.0	771.1	854.6	539.6	586.5
1983 **	285.0	560.7	1110.5	949.3	279.2	289.6	262.0	223.0	359.0	458.8	789.2	1051.7	522.2	550.9
1984 **	285.0	1133.4	935.0	1650.9	678.5	277.6	363.0	223.0	555.4	434.3	557.9	1436.7	695.3	706.9
1985 **	582.9	608.0	1528.5	1556.9	185.0	198.0	262.0	223.0	359.0	571.5	957.5	407.3	661.4	618.4
1986 **	285.0	373.1	1366.3	1975.0	185.0	417.4	351.6	448.9	665.4	1009.0	636.3	669.7	665.7	698.8

AVERAGE MONTHLY FLOWS RANKED AND % = TO OR >

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	**	582.059	1133.059	1721.059	2467.059	2041.059	1107.059	521.059	448.059	840.059	1008.059	1082.059	1436.059
2	**	555.118	987.118	1551.118	1975.118	1500.118	476.118	372.118	440.118	665.118	967.118	957.118	1051.118
3	**	529.176	799.176	1528.176	1931.176	866.176	417.176	363.176	310.176	611.176	958.176	789.176	993.176
4	**	482.235	746.235	1438.235	1844.235	811.235	348.235	351.235	299.235	555.235	675.235	783.235	854.235
5	**	465.294	706.294	1418.294	1765.294	678.294	289.294	293.294	223.294	497.294	665.294	771.294	755.294
6	**	429.353	607.353	1366.353	1757.353	652.353	277.353	263.353	223.353	397.353	634.353	771.353	718.353
7	**	331.412	590.412	1110.412	1650.412	633.412	258.412	262.412	223.412	364.412	571.412	730.412	671.412
8	**	285.471	560.471	1074.471	1627.471	405.471	250.471	262.471	223.471	359.471	493.471	700.471	669.471
9	**	285.529	497.529	1028.529	1556.529	393.529	204.529	262.529	223.529	359.529	458.529	696.529	636.529
10	**	285.588	490.588	987.588	1395.588	371.588	198.588	262.588	223.588	359.588	434.588	691.588	626.588
11	**	285.647	441.647	934.647	1335.647	279.647	198.647	262.647	223.647	359.647	432.647	636.647	594.647
12	**	285.706	398.706	856.706	1328.706	185.706	198.706	262.706	223.706	359.706	376.706	574.706	440.706
13	**	285.765	373.765	814.765	1191.765	185.765	198.765	262.765	223.765	359.765	335.765	557.765	419.765
14	**	285.824	292.824	772.824	1139.824	185.824	198.824	262.824	223.824	359.824	335.824	516.824	415.824
15	**	285.882	285.882	751.882	1101.882	185.882	198.882	262.882	223.882	359.882	335.882	344.882	407.882
16	**	285.941	285.941	588.941	1001.941	185.941	198.941	262.941	223.941	359.941	335.941	335.941	377.941
17	**	285****	285****	587****	949****	185****	198****	262****	223****	359****	335****	335****	335****

AVERAGE MONTHLY AND ANNUAL FLOWS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	WTYR	CLYR
1970 **	285.0	398.2	587.3	1328.1	371.6	198.0	262.9	223.0	359.0	634.7	691.5	440.2		
1971 **	285.0	285.0	588.6	1101.2	2061.6	204.2	262.0	223.0	359.0	335.0	335.0	415.4	.0	480.5
1972 **	285.0	292.1	751.9	1191.1	1500.7	1107.7	521.9	299.4	397.1	335.0	696.6	626.5	595.6	538.7
1973 **	555.1	799.9	1721.3	1139.4	185.0	198.0	262.0	223.0	359.0	335.0	335.0	995.2	620.5	668.2
1974 **	465.5	497.4	987.5	1395.2	652.0	198.0	372.2	440.9	364.5	376.3	783.7	595.0	590.0	591.4
1975 **	331.9	590.8	1074.0	1001.1	866.1	258.1	262.0	223.0	611.1	675.8	771.8	636.9	587.2	593.8
1976 **	285.0	706.5	1438.2	1844.1	633.5	348.7	293.9	310.7	497.7	967.1	516.4	419.5	580.1	608.1
1977 **	429.1	746.0	1551.6	2467.6	185.0	198.0	262.0	223.0	840.9	958.5	1082.2	718.4	701.8	687.0
1978 **	529.8	491.0	772.7	1765.2	811.7	250.1	262.0	223.0	359.0	335.0	344.8	377.4	730.8	801.9
1979 **	482.4	441.5	1418.7	1757.7	393.7	198.0	262.0	223.0	359.0	665.1	730.4	755.3	684.9	542.4
													549.1	640.9
1980 **	285.0	285.0	814.5	1627.9	185.0	198.0	262.0	223.0	359.0	432.8	700.6	671.3		
1981 **	285.0	987.8	1028.5	1335.2	185.0	198.0	262.0	223.0	359.0	693.1	574.9	335.0	532.4	503.1
1982 **	285.0	285.0	856.6	1931.5	405.4	476.8	263.8	223.0	359.0	335.0	771.1	854.6	551.1	517.3
1983 **	285.0	560.7	1110.5	949.3	279.2	289.6	262.0	223.0	359.0	458.8	789.2	1051.7	539.6	586.5
1984 **	285.0	1133.4	935.0	1650.9	678.5	277.6	363.0	223.0	555.4	434.3	557.9	1436.7	522.2	550.9
1985 **	582.9	608.0	1528.5	1556.9	185.0	198.0	262.0	223.0	359.0	571.5	957.5	407.3	695.3	706.9
1986 **	285.0	373.1	1366.3	1975.0	185.0	417.4	351.6	448.9	665.4	1009.0	636.3	669.7	661.4	618.4
													665.7	698.8

AVERAGE MONTHLY AND ANNUAL FLOWS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	WYYR	CLYR
1970 **	285.0	398.2	587.3	1328.1	371.6	198.0	262.9	223.0	359.0	634.7	691.5	440.2	.0	480.5
1971 **	285.0	285.0	588.6	1101.2	2041.6	204.2	262.0	223.0	359.0	335.0	335.0	415.4	595.6	538.7
1972 **	285.0	292.1	751.9	1191.1	1500.7	1107.7	521.9	299.4	397.1	335.0	696.6	626.5	620.5	668.2
1973 **	555.1	799.9	1721.3	1139.4	185.0	198.0	262.0	223.0	359.0	335.0	335.0	993.2	590.0	591.4
1974 **	465.5	497.4	987.5	1395.2	652.0	198.0	372.2	440.9	364.5	376.3	783.7	595.0	587.2	595.8
1975 **	331.9	590.8	1076.0	1001.1	866.1	258.1	262.0	223.0	611.1	675.8	771.8	636.9	580.1	608.1
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1977 **	429.1	746.0	1551.6	2467.6	185.0	198.0	262.0	223.0	840.9	958.5	1082.2	718.4	730.8	801.9
1978 **	529.8	491.0	772.7	1765.2	811.7	250.1	262.0	223.0	359.0	335.0	344.8	377.4	684.9	542.6
1979 **	482.4	441.5	1418.7	1757.7	393.7	198.0	262.0	223.0	359.0	665.1	730.4	755.3	549.1	640.9
1980 **	285.0	285.0	814.5	1627.9	185.0	198.0	262.0	223.0	359.0	432.8	700.6	671.3	532.4	503.1
1981 **	285.0	987.8	1028.5	1335.2	185.0	198.0	262.0	223.0	359.0	493.1	574.9	335.0	551.1	517.3
1982 **	285.0	285.0	856.6	1931.5	405.4	476.8	263.8	223.0	359.0	335.0	771.1	854.6	539.6	586.5
1983 **	285.0	560.7	1110.5	949.3	279.2	289.6	262.0	223.0	359.0	458.8	789.2	1051.7	522.2	550.9
1984 **	285.0	1133.4	935.0	1650.9	678.5	277.6	363.0	223.0	555.4	434.3	557.9	1436.7	695.3	706.9
1985 **	582.9	608.0	1528.5	1556.9	185.0	198.0	262.0	223.0	359.0	571.5	957.5	407.3	661.4	618.4
1986 **	285.0	373.1	1366.3	1975.0	185.0	417.4	351.6	448.9	665.4	1009.0	636.3	669.7	665.7	698.8

Attachment 5
The Salmon River Flow Management Advisory Team

THE SALMON RIVER FLOW MANAGEMENT ADVISORY TEAM

The Salmon River system is one of New York's most valuable aquatic resources. Although the lower 18 miles is nationally known for supporting the most intensively utilized trophy trout and salmon fishery in the Northeast, the upstream seasonal storage facilities are an important source of cost effective power generation for the region and significant water based multiple use opportunities occur throughout. Generally undeveloped, rural and wooded, the river corridor supports a remarkable diversity of water based resources including Lake Ontario-contiguous and remote wooded wetlands, strong rapids and placid pools, a 110-foot high natural waterfall set in a dramatically beautiful gorge, two scenic reservoirs and hundreds of miles of uncompromised water quality in the upper river and tributary streams where wild trout abound.

Not only is resident wildlife correspondingly diverse and abundant, seasonal migrations of Lake Ontario fishes, waterfowl, raptors, shorebirds and songbirds are remarkable along the corridor, particularly in the lower river and in the areas of the Port Ontario wetland and Salmon River Reservoir.

Water management is a critical key in both maintaining the quality and diversity of the aquatic systems and their associated recreational use and in the maintenance and enhancement of an indigenous aquatic community in the lower river. Since the control of river flow and reservoir water levels are seated in

the conditions of a single Federal license for decades, it is essential not only to make the best decisions balancing generation and environmental needs beforehand, but to also continuously monitor compliance and effectiveness and to periodically reevaluate decision criteria and action in an environment of increasing knowledge and changing hydropower, ecological and recreational needs. These latter requirements are best addressed by a representative body specifically created for that purpose.

THE SALMON RIVER FLOW MANAGEMENT ADVISORY TEAM shall be the focus and sounding board for flow and water related issues on the Salmon River and shall be responsive to both power generation and environmental needs while fostering the enhancement and maintenance of diverse, high quality recreational activity. Specifically, the vision and mission of the team are:

VISION

- Help make the Salmon River corridor America's premier sportfishing and recreational area.
- Demonstrate the compatibility of power generation, environmental resources and recreational interests on the Salmon River corridor.
- Help the Salmon River corridor evolve into a year-round family-oriented recreational opportunity that promotes a healthy, broad-based economy for the local area while enhancing and protecting the environment and quality of life for the community.

MISSION

- Recommend flows through the Salmon River Project such that a self-sustaining indigenous fishery can develop in the downstream river corridor.
- Assist in the development of a year-round trout and salmon sport fishery in the downstream river corridor.
- Make provision for enhanced recreational boating use on the Salmon River and its reservoirs.
- Encourage development of high-quality and environmentally-sensitive recreational opportunities throughout the entire river basin.
- Provide input to enhance the scenic character of the Salmon River including the Salmon River Reservoir, the Salmon River Falls area and the downstream river corridor.
- Provide input to river corridor planning efforts to meet common goals and objectives.
- Provide opportunity for growth and diversification of the area's economic base.
- Do all of the above in a balanced fashion such that the river resource, as it has for decades, continues to provide low-cost electricity for the electric customers of Niagara Mohawk - at the same time enhancing recreational opportunity and supporting a healthy ecosystem.

The Salmon River Flow Management Advisory Team shall include as members representatives of those parties involved in the original FERC license negotiating process as follows, with the stated allocation of vote(s):

Party	Vote
Niagara Mohawk Power Corporation	1
NYS Department of Environmental Conservation	1
U.S. Fish and Wildlife Service	1
National Park Service	1
NYS Office of Parks, Recreation & Historic Preservation	1
American Whitewater Affiliation	1
New York Rivers United	1
Trout Unlimited	1
Adirondack Mountain Club	1

Additionally, local municipal interests shall be represented by a coalition of the elected officials of Oswego County, towns and/or villages in the Salmon River Corridor who shall appoint a total of five (5) members with one vote each.

Changes in membership structure or vote allocation may be permitted only by motion passed with no dissenting vote(s).

The team shall act through correspondence of members or through meeting participation by members or their designee of record. Proxies are prohibited and no single person may represent more than one membership or recognized coalition.

Failure by a member to respond within 15 working days of receipt of a motion through correspondence shall constitute an abstention. Absence of a member or their designee of record from a meeting vote shall constitute an abstention.

Meetings may be called at any time by majority request, however, should two or more members so request, a meeting will be called within the calendar year if none are otherwise scheduled.

The team shall, as a minimum, annually review Niagara Mohawk monitoring reports/submittals to FERC on river flow, reservoir level, lower river water temperature, releases to the Bennett's Bridge bypass reach (Salmon River Falls section) and departures from S.O.P. affecting flow management.

The team may similarly act to effect changes in the FERC license or to correspond with the FERC only by motion passed with no dissenting vote(s). Such rights and privileges to petition the FERC by individual team members and their organizations are not curtailed, but in exercising them they may not state or suggest that they act upon the behalf of, represent, or enjoy the support of, the Salmon River Flow Management Advisory Team.

An executive committee consisting of the team members representing Niagara Mohawk and the Department of Environmental Conservation shall together conduct the administration of the team, accomplishing correspondence, meeting notice and minutes, preparing team recommendations and providing other administrative support as necessary for the timely and effective functioning of the team.

The executive committee shall also act on behalf of the team to advise upon immediate or emergency flow management needs or opportunities when the immediacy of circumstances precludes full team participation. Such actions shall be reported in writing to all team members with two weeks.

SALMON RIVER FLOW MANAGEMENT ADVISORY TEAM

Priorities for Non-Routine Flow Management*

A. Discretionary Use of Additional Water: Salmon River Reservoir Level Exceeds Upper Action Trigger

Priority	Action
1	Maintain or enhance hydropower production consistent with 2 and 3.
2	Maintain or enhance fishery quality in the lower river.
3	Enhance midsummer whitewater opportunity.
4	Retain Salmon River Reservoir level above trigger if significant environmental benefit(s) would accrue.
5	Temporarily enhance microhabitat (carrying capacity) for indigenous species in lower river.
6	Enhance aesthetics at Salmon River Falls.

B. Required Reductions in Water Use: Salmon River Reservoir Level is Below Lower Action Trigger

Priority	Action
1	Reduce or eliminate release to Salmon River Falls, <u>if</u> resultant savings is significant to other goals.
2	Reduce releases for hydropower generation that are beyond needs for planned base flow and multiple use in the lower river.
3	Reduce midsummer whitewater releases.
4	Reduce releases for fishery quality in the lower river.

Priority	Action
5	Maintain Salmon River Reservoir level below the seasonal ecological target level should that level exceed the lower action trigger. (Seasonal ecological target levels differing from the lower action trigger may result from the Reservoir Fluctuation Study underway.)
6	Reduce microhabitat for the aquatic community in the lower river by temporarily reducing base flow.
7	Compromise lower river macrohabitat (water quality) by severely reducing base flow.

*NOTE: These priorities for flow management are to guide discretionary or necessary action during periods of stored water surplus or shortage as determined by the water level at Salmon River Reservoir, consistent with legal requirements.

Actions in response to emergency conditions and those required for facility maintenance are exempt, though reasonable compliance is required. Emergencies shall include imminent or continuing jeopardy to water quality as well as that to human life, health, safety, project facilities or downstream property.

Upper and lower action triggers are defined in the August 9, 1993 Meeting Minutes, page 2 - Attachment 2 to the Offer of Settlement.

ATTACHMENT B

APPENDIX B - LETTERS OF COMMENT ON THE DRAFT ENVIRONMENTAL ASSESSMENT AND STAFF RESPONSES

The Federal Energy Regulatory Commission (Commission) issued the Salmon River Project Draft Environmental Assessment (DEA) for comment on November 18, 1994. In response, we received five comment letters. Those comment letters are listed below and reproduced on succeeding pages in this appendix. The comment period ended on December 19, 1994, and some comments were filed after that date. However, we have reviewed and responded to all comment letters received on the DEA. The sections of the Final Environmental Assessment (EA) that have been modified as a result of comments are identified in the our responses to the right of the letters of comment.

I) New York State Department of Environmental Conservation (dated December 16, 1994)

II) Niagara Mohawk Power Corporation (dated December 20, 1994)

III) New York Rivers United (Dated December 22, 1994)

IV) Environmental Protection Agency - Region II (Dated March 21, 1995)

New York State Department of Environmental Conservation
Division of Regulatory Affairs - Room 514
50 Wolf Road, Albany, New York 12233-1750
Telephone: (518) 457-2224

Langdon Marsh
Acting Commissioner

December 16, 1994

Ms. Lois Cashell
Secretary
Federal Energy Regulatory Commission
825 North Capital Street, N.E.
Washington, DC 20426

RE: FERC Project # 11408-000, Niagara Mohawk Power Corporation, Salmon River Hydroelectric Project.

Dear Secretary Cashell

Attached are the original and 8 copies of the comments of the New York State Department of Environmental Conservation concerning the Environmental Assessment for the Salmon River Hydroelectric Project. If FERC staff have any questions concerning these comments, I may be reached at (518) 457-0787.

Sincerely Yours

Bruce Zeisel

Bruce Zeisel
Environmental Analyst I
Division of Regulatory Affairs

cc: Service List
Mary Galato

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 4

To Bob Bell	From Bruce Zeisel
Co. FERC	Co. NYS DEC
Dept. Project Mgt	Phone # 518 457 0787
Fax # 202 219 0125	Fax # 518 457 5965

DEC-19-1994 12:03 FROM DEPT OF ENV. CONS. ALBANY TO 8868575202219012S P.02

NIAGARA MOHAWK POWER CORPORATION PROJECT No. 11408.000
SALMON RIVER HYDROELECTRIC PROJECT

COMMENTS OF THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION ON THE NOVEMBER 9TH DRAFT ENVIRONMENTAL ASSESSMENT FOR THE SALMON RIVER HYDROELECTRIC PROJECT.

On page 13 of the Environmental Assessment, FERC asserts that the condition in New York State's Water Quality Certificate "in effect gives the State the opportunity to revisit its certification. New York State will assert its right to protect water quality by revoking or modifying, as appropriate, any water quality certificate wherein the original conditions have been violated as a result of project modifications not encompassed by the certificate issued. The state maintains its perogatives, descretion and authority to issue or deny a water quality certificate for the protection of the state's water quality.

On page 53, FERC staff request comment on an alternative flow regime for the Salmon River Falls reducing the proposed releases from 7 cfs to 3 cfs for the period October through June to affect an increase in releases over the falls from 20 to 32 cfs during July through September. The requested comments were:

a) Could this alternative be accomodated within rule curve 16

b) The comparative costs of proposed flows and this alternative in terms of dependable capacity and energy production, and

c) comparative benefits of the proposed and alternative flow regimes in ecological and aesthetic enhancement.

While the Department defers to Niagara Mohawk's expertise in response to a) and b), our staff hold the opinion that saving water prior to spring runoff to be used later is not feasible since it would increase the liklihood of spillage. This additional water (held in reserve for increased flows in July through September) would require reservoir levels higher than dictated by rule curve 16. Niagara Mohawk should address this issue.

A priority of use for water exceeding that available in Rule Curve 16 was prepared as a guide for the Flow Management Advisory Team (attached). This indicates that enhancement of the falls is the lowest priority use for additional water. However if Niagara Mohawk determines it could accomodate the suggested reallocation of water destined to spill over the falls without adversely impacting the schedule of downstream flows, the Department will not object.

I) New York State Department of Environmental Conservation (dated December 16, 1994)

DEC.1. We believe any and all rights delegated to the state under Section 401 Clean Water Act would be preserved. To further clarify, any significant modifications to the project or operations would require an amendment to the license. As noted on page 13, footnote No. 5, any proposed amendment to the project license that would have a material adverse effect on water quality in the discharge from the project would require a new state water quality certification.

DEC.2. We appreciate your comments on this alternative.

After reviewing all agency comments, we find no substantial reason to recommend a 3 cfs minimum flow in the Bennetts Bridge bypassed reach. We recommend a 7 cfs minimum flow. A 7 cfs flow provides a balanced allocation of flows for all resource needs, preserving aquatic habitat in the bypassed reach and maintaining adequate flows for aesthetics at the falls. Further changes in flows are best evaluated by the Flow management Advisory Team which was established as part of the Settlement Offer.

Part C of the request for comments asked respondents to compare benefits of the proposed and alternative flow regimes in ecological and aesthetic enhancement. In the absence of IFIM type data for the bypassed reach, it is impossible to know the relative ecological value of 3 versus 7 cfs releases. However, either is better than the leakage historically available. The bypass reach has severe habitat limitations that may not be substantially enhanced by either 3 or 7 cfs.

The National Park Service recommended 32 cfs over the falls as much more aesthetically pleasing than 20 cfs. Given the probable minor impact of reducing releases during the fall and winter, DEC will not object to the FERC suggested alternative, provided the previously stated condition (that there is no adverse affect on the ability to provide the schedule of downstream flows as per rule curve 16) is met.

ORIGINAL

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/ 300 ERIE BOULEVARD WEST, SYRACUSE, NEW YORK 13202-4250/ TELEPHONE (315) 474-1511

'94 DEC 20 PM 2:45

December 19, 1994

Honorable Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

Re: Salmon River Project No. 11408
Draft Environmental Assessment Comments

Dear Secretary Cashell:

Niagara Mohawk Power Corporation has reviewed the *Notice of Availability of Draft Environmental Assessment* (draft EA) dated November 18, 1994 and has prepared several minor comments for your consideration. Overall, the draft EA was accurate and reflected most of the areas of concern that were highlighted in the Settlement Agreement between Niagara Mohawk and other interested parties.

Page iv - replace "except for the 22 cubic feet per second" with "except for up to 22 cubic feet per second" to indicate that there are instances where less than 22 cfs will be taken. NIMO 1

Page 14 - "Niagara Mohawk does not oppose a reservation clause that would permit consideration of fishway facilities in the future." This should read: "Niagara Mohawk does not oppose a reservation clause that would permit consideration of fishway facilities in the future providing that the prescribing Department (Interior or Commerce) establish a reasoned basis for the prescription taking into account economic considerations consistent with NEPA." NIMO 2

Page 9 and 38 - As stated in the *Water Budget Model* dated May 5, 1993, Attachment 5, Page 3, "The rate of change of releases for the Lighthouse Hill Development would be increased or decreased gradually (ramping) when changes to the releases are not the result of increased inflow (runoff). Generally, ramping would occur: (a) towards the end of each month where the target elevation increases or decreases in the following month and (b) the releases at Lighthouse Hill are expected to increase or decrease by more than 400 cfs in the following month." In general, the Salmon River is a "flashy" river and as a result, Niagara Mohawk's Regional Control Center may need to make changes to the releases in increments greater than 400 cfs to assure the safety of downstream river users and property owners. NIMO 3

94122029

DEC 20 1994

5

II) Niagara Mohawk Power Corporation (Dated December 19, 1994)

NIMO.1. Comment Noted. EA changed as you suggested

NIMO.2. Comment Noted. No changes in the EA needed

NIMO.3. Changes have been made to reflect the stipulations of the Settlement Offer

Page 53 - Niagara Mohawk is not opposed to minor changes in the minimum/aesthetic flows providing that the total water budget for this purpose is not exceeded. As such, a minimum flow combination of 3.5 cfs for 273 days and 30 cfs for the remaining 92 days would be equivalent in volume to the flows previously proposed. The resource agencies may wish to comment on this proposal. NIMO 4

Page 55 - Niagara Mohawk has already prepared and submitted a visual resource management plan for the FERC's and the resource agencies' review and comment (see AIR reply dated October 13, 1993). Niagara Mohawk will complete the tree plantings within four years of license issuance and the penstock will be painted with a flat earth-tone color (as illustrated) next time the penstock needs to be painted (as part of Niagara Mohawk's ongoing maintenance program). NIMO 5

Page 61 - The exact timing of the whitewater releases has been changed as per our letter to the FERC dated May 9, 1994, page 2. NIMO 6

Pages 65 - 66 - "In our life-cycle Economic analysis we used the alternative energy values projected for the New York/New Jersey Region by the Energy Information Administration." Niagara Mohawk believes that these regional values are inappropriate for evaluating Niagara Mohawk hydro projects. On November 1, 1994, Niagara Mohawk filed with the FERC under docket for Project No. 11408 (and various other dockets) a summary of the latest long run avoided costs (LRAC) projections issued by the New York Public Service Commission. Moreover, in connection with its recent comments on a draft environmental analysis on Niagara Mohawk's Oswego Falls Project No. 5984, Niagara Mohawk submitted to the FERC an evaluation using Firm Marginal Energy Costs (FMEC). The FERC's "life-cycle Economic Analysis" should consider FMEC projections to account for Niagara Mohawk specific energy values. NIMO 7

If there are any questions pertaining to this submittal, please do not hesitate to call the undersigned at (315) 428-5582. Please note that Gregg Carrington will be leaving Niagara Mohawk on December 23, 1994 and all future correspondence should be directed me.

Very truly yours,

Jerry L. Sabattis

Jerry Sabattis, P.E.
Licensing Coordinator

Attachments

cc: Attached Service List
G. Carrington, M. Murphy - Niagara Mohawk

NIMO.4. Comment Noted. See DEC2

NIMO.5. Comment Noted. We revised Sections VI.A.5 and VIII of the EA to Incorporate your comment

NIMO.6. Comment Noted. See revised Sections VI.A.7 and VIII of the EA.

NIMO.7. See revised text.

NEW YORK RIVERS UNITED
199 Liberty Plaza, Marine Midland Bank Bldg.
Rome, New York 13440 • (315) 339 2097

December 22, 1994

Honorable Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

COPY

94 DEC 28 AM 11:22

Re: Salmon River Project No. 11408
Draft Environmental Assessment Comments

Dear Secretary Cashell:

New York Rivers United has reviewed the Draft Environmental Assessment for Hydropower Licence; Salmon River Hydroelectric Project; FERC No. 11408 and has prepared comments for your consideration. Overall, the draft EA was accurate and reflected most of the areas of concern that were highlighted in the Settlement Agreement between Niagara Mohawk and the other parties.

New York Rivers United believes the creation of the Flow Management Advisory Team is an important aspect of the settlement agreement. The FMAT provides for future management of all the varied aspect of the Salmon River that relate to flow issues. As the FERC license duration is several decades, it is likely conditions on the river will change, or ways to better manage the system will be developed. Thus the FMAT is integral to the optimization of the Salmon River for multiple goals.

The protection of riparian habitat and other land within the river corridor is an significant part of the settlement agreement, yet receives no mention in the EA. While the lands transferred to the New York State Department of Conservation are outside of the FERC project boundaries, the protection of these lands will preserve the river corridor and ultimately maintain the high quality of the Salmon River.

New York Rivers United is opposed to the proposed alternative for minimum flow distribution in the Bennetts Bridge bypassed reach. Reducing the flow to 3 cubic feet per second is not acceptable for the restoration and maintenance of the ecosystem in the bypassed reach. The 7 cfs is a absolute minimum; NYRU could not support any minimum flow below 7 cfs.

While the FERC has taken the position that the bypassed reach flow is not a high priority, NYRU feels that the bypassed reach is important. Through the negotiations that led to the settlement, water for Atlantic salmon restoration, whitewater releases, and power production received priority over the bypassed reach. NYRU desires that any

III) New York Rivers United (Dated December 22, 1994

NYR.1. In Section VI.A.7.a.iv we address the effects of implementing the Comprehensive Land Management Program for the Salmon River Properties.

NYR.2. Comment Noted. We recommend the minimum flows in the Bennetts Bridge bypassed reach stipulated in the settlement Offer.

additional waters be allocated to the bypassed reach when possible for aesthetic and ecological purposes.

New York Rivers United thanks you for the opportunity to provide you with comments on the Draft Environmental Assessment.

Sincerely,

Bruce Carpenter
Executive Director

ORIGINAL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

JACOB K. JAVITS FEDERAL BUILDING

NEW YORK, NEW YORK 10278-0012

OFFICE OF THE SECRETARY
FED. ENERGY REGULATORY COMMISSION
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MAR 21 1995

Lois Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

Re: FERC Project No. 11408-000

Dear Ms. Cashell:

The Environmental Protection Agency (EPA) has reviewed the environmental assessment (EA) for the proposed original licensing of the Salmon River Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 11408-000, located in Oswego County, New York. The existing project consists of two hydroelectric developments, Bennetts Bridge and Lighthouse Hill. The proposed project involves the installation of a 2.15 MW turbine generator in the Lighthouse Hill powerhouse, modification of the streambed at the top of the Salmon River Falls, and construction of fishing and recreation area access at both the Salmon River and Lighthouse Hill reservoirs. Based on our review, we offer the following comments.

The EA states that the proposed project will have an overall beneficial cumulative effect on wetlands. However, the document does not substantiate this position. Specifically, the acreage and value of wetlands to be impacted is not provided in the EA; we note that the EA states that wetlands have not been delineated for the upper third of the Salmon River Reservoir. Furthermore, mitigation for wetlands losses has not been provided. EPA-1

We recommend that a wetlands delineation be performed for the entire project area using the 1987 Army Corps of Engineers Manual, that wetlands values be assessed, and that the final EA address the impact of the proposed project on wetlands. The final EA should also describe efforts to avoid, mitigate, and minimize wetlands losses and impacts. EPA recommends compensatory mitigation, providing at least a 1:1 value replacement, for all unavoidable wetlands losses.

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IV) Environmental Protection Agency - Region II (Dated March 21, 1995)

EPA.1. Comment Noted. The proposed action would not result in adverse effects to wetlands. The proposed flow regime, Rule curve 16, and the proposed enhancement of wetland OR-18 would enhanced wetlands associated with the Salmon River, Salmon River reservoir, and Lighthouse Hill reservoir by reducing water surface elevation fluctuations (sections VI.A.3.vi, VI.A.4). Consequently, we conclude that mitigation for wetland losses is not necessary nor is there any benefit to delineating and assessing values of all wetlands associated with the project.

Thank you for the opportunity to comment. If you have any questions concerning this letter, please contact Daisy Mather of my staff at (312) 264-6720.

Sincerely yours,

Laura J. Livingston, Assistant Chief
Environmental Impacts Branch

Project No. 11408-000

Form L-3
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

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

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

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

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

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

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

sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

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

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

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

determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

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

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

Article 11. Whenever the Licensee is directly 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 United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other

project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties 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. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

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

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

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

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

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove

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

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

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