UNITED STATES OF AMERICA 58 FERC ¶ 62,114
FEDERAL ENERGY REGULATORY COMMISSION

Niagara Mohawk Power Corporation Project No. 9222-001
New York

ORDER ISSUING LICENSE
(Minor Project)
(Issued February 10, 1992)

Niagara Mohawk Power Corporation (NIMO) filed a license application under Part I of the Federal Power Act (Act) to construct, operate and maintain the Yaleville Project located on the Raquette River, a navigable waterway of the United States, in St. Lawrence County, New York. 1/ NIMO proposes to continue to operate the existing unlicensed powerhouse, with an installed capacity of 700 kilowatts (kW), and to construct a new powerhouse with an installed capacity of 800 kW.

Notice of the application has been published. The U.S. Department of the Interior (Interior) and the New York Department of Environmental Conservation (DEC) filed late motions to intervene. Interior stated that, because of recent changes in the Commission's administrative procedures, it should be granted party status to protect its interests. Interior included as part of its motion a prescription for fishways pursuant to section 18 of the Act, and did not object to issuance of the license. DEC requested that it be granted party status. On February 4, 1992, Interior was granted late intervention and DEC was denied late intervention. Comments received from interested agencies and individuals have been fully considered in determining whether to issue this license.

Section 18 - Fishway Prescription and Reservation of Authority

In its letter dated December 5, 1991, Interior prescribes downstream fishways pursuant to section 18 of the Act for the existing powerhouse and any new powerhouse. 2/ 3/ 4/

1/ 8 FPC 569.

2/ Interior includes the following requirements in the prescription:

- fishways necessary to provide safe and efficient downstream passage of walleye and other fish should be constructed, operated and maintained by the licensee at its own expense;

- the licensee should develop functional design drawings of downstream fishways for the existing powerhouse

Staff notified Interior by letter dated December 10, 1991, that in Order 533-A, issued November 22, 1991, the Commission revised its definition of fishway, and its applicability to section 18 fishway prescriptions. 5/ Specifically, staff

and any new powerhouse, and the licensee should develop plans and schedules for fishway construction, operation, maintenance, and evaluation - the design should include the following:

- è permanent trashracks extending to the bottom of the channel, angled 45 degrees or less to the direction of inflow at the turbine intakes, with maximum clear space openings of 1 inch between bars, an approach velocity of 2 fps or less for each trashrack, and a fish bypass sluiceway at the downstream end of each trashrack;
- ù flows through the sluiceway should equal at least 20 cfs or 2 percent of the maximum hydraulic capacity of the powerhouse, whichever is greater;
- ù the fishway for downstream passage at the existing powerhouse must be operable within one year of issuance of a license and the fishway at the new powerhouse must be operable prior to commencement of electrical energy production at that powerhouse;
- ù the fishways should operate in accordance with the plan whenever power is generated, unless written permission is received from the FWS in advance, to not operate the fishways;
- ù the licensee should provide FWS and DEC personnel access to the project site and project records for inspection and compliance purposes; and
- ù the Secretary of Interior reserves the authority to prescribe the construction, operation, and maintenance of fishways for upstream fish passage pursuant to section 18 of the Act.

3/ Section 18 of the Act provides: "The Commission shall require construction, maintenance, and operation by a licensee at its own expense of ... such fishways as may be prescribed by the Secretary of Commerce or the Secretary of Interior as appropriate."

4/ In this letter Interior stated that this prescription supersedes previous fishway recommendations.

5/ Section 4.30(b)(9)(iii) states, in pertinent part, a fishway is: "any structure, facility, or device used for the passage of fish through, over, or around the project works of a

requested Interior to provide evidence that the fish species occurring in the project area meet this definition, which requires that fish passage of a population is necessary for the life cycle of the fish species.

Interior responded in a letter dated December 23, 1991, concerning its fishway prescription for walleye and other fish. The letter cites references to information that walleye migration occurs within rivers in New York.

I find that Interior's prescription for downstream fishways is not appropriate under section 18. None of the fish species occurring in the Racquette River in the vicinity of the proposed project, as identified in Interior's December 23, 1991 letter, include species where passage of a population is necessary for the life cycle of the fish species. The identified fish species in the project vicinity do not have a bona fide need to migrate past the obstacles presented by the existing and proposed hydropower project. Such a need would be apparent if there were justification provided by Interior to show that upstream fish passage for any of the identified fish species was needed in conjunction with the need for downstream fish passage. Interior provided no evidence in this reqard; none of the identified fish species need to migrate upstream or downstream at the project where passage of a population is necessary for the life cycle of the fish species. 6/

I conclude that downstream fish passage structures are not needed at either the existing or the proposed powerhouses at this project because: (1) a high-quality resident fishery has developed alongside extensive hydroelectric development on the Raquette River; (2) there is no substantial evidence that seasonal migration of walleye and smallmouth bass is a necessary component of either species' life history, no indication that summer or winter habitat is a limiting factor stimulating

migratory behavior in walleye or smallmouth bass in the Raquette

hydropower project, such as fish ladders, fish locks, fish lifts, and elevators, and similar physical contrivances, where passage of a population is necessary for the life cycle of a fish species; and those screens, barriers, and similar devices that operate to guide fish to a fishway; and

flows within the fishway necessary for its operation."

6/ Interior, in their October 10, 1991 letter related to 10j issues, stated that "there is extensive evidence that walleye and smallmouth bass undergo periodic movements downriver. Although the importance of the seasonal migrations to the fish populations is still not clear, safe

passage should be provided for these downriver movements."

River, and no indication that any seasonal migration that may occur cannot successfully take place in the reaches between projects 7/; (3) there is potential for downstream fish passage at this project through spillage without the installation of specific fish passage structures 8/; and (4) the Kaplan turbine that would be installed at the new powerhouse would be less damaging to any fish that may be entrained than the older, Francis turbines of the existing powerhouse.

Finally, Interior, in its December 5, 1991 letter, requests its authority to prescribe the construction, operation, and maintenance of fishways for upstream fish passage pursuant to section 18 of the Act be reserved. The Commission's practice has been to include license articles which reserve Interior's authority to prescribe fishways when fishways are not prescribed by Interior at the time of project licensing. At this time, Interior has not provided evidence, under the Commission's fishway definition in Order 533-A, that any of the identified fish species in the Racquette River need to migrate either upstream or downstream at the project where the passage of a population is necessary for the life cycle of the fish species. If, in the future, Interior can provide evidence that fishways are needed, according to the Commission's fishway definition, for fish species that may occur in the Racquette River at that future time, then it would be appropriate for the Commission to require the licensee to construct, operate, and maintain such fishways as may be prescribed by the Secretary of the Interior pursuant to section 18 of the Act. Therefore, article 405 of this license reserves authority to the Commission for requiring fishways as may be prescribed by the Secretary of the Interior.

Nevertheless, as the Commission has discussed in Order 533-A, fish and wildlife recommendations not involving section 18 fishway prescriptions are subject to the procedures set forth in section 10(j) of the Act. I have therefore, considered Interior's prescription for downstream fishways as a

recommendation for fish protection at the project associated with potential fish entrainment, as discussed below under the section entitled Recommendations of Federal and State Fish and Wildlife Agencies.

7/ Although there is some evidence that walleye and smallmouth bass move seasonally between winter and summer habitats, there is no evidence that this is true for Raquette River walleye and smallmouth bass.

8/ As stated in section G.3. of the EA, page 11, walleye and smallmouth bass may migrate downstream to over-wintering areas during late fall. Based on the hydraulic capacity of the proposed Yaleville Project, spillage would occur 20 to 25 percent of the time during the month of October.

Comprehensive Development

Sections 4(e) and 10(a)(1) of the Act, require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a proposed project, recreation, fish and wildlife, and other nondevelopmental values of the waterway are considered equally with power 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.

1. Recommended Alternative

Based on staff's independent review and evaluation of the proposed project, the agency recommendations, and the no-action alternative as documented in the EA and the Safety and Design Assessment (S&DA), 9/ I have selected the licensing of the proposed project with the additional mitigative and enhancement measures required in this license as the preferred option. I selected this option because: (1) with mitigation, the environmental effects of constructing and operating the new powerhouse and continuing the operation of the old powerhouse would be minor; (2) the proposed enhancement measures would benefit environmental and recreational resources; and (3) the additional electricity that would be generated from the new powerhouse would be beneficial because it would reduce the use of fossil-fueled, electric generating plants, conserve nonrenewable energy resources, and reduce atmospheric pollution and global warming.

The mitigative and enhancement measures that I am requiring include: (1) preparation of a final sediment and erosion control plan that includes installation of silt fences during construction, revegetation of disturbed areas, and disposal of the existing mill ruins; (2) immediate run-of-river project operation to minimize upstream and downstream water-level fluctuations for the protection and enhancement of aquatic resources; (3) preparation of a flow monitoring plan to ensure compliance with run-of-river operation; (4) installation of a trashrack set at 90 degrees (perpendicular) to the direction of

flow with 2-inch bar spacing, and a 2.0 feet per second (fps) approach velocity at the proposed new powerhouse for the protection of resident fishes (see staff's Alternative 4, table 1
in the EA); and (5) construction of recreation facilities to provide public access to the Raquette River at the project.

9/ Staff has prepared a Safety and Design Assessment for the Yaleville Project No. 9222-001, which is available in the Commission's public file associated with this project.

2. Developmental and Nondevelopmental Uses of the Waterway

Licensing the Yaleville project with staff's required measures would provide several benefits. The existing powerhouse would continue to provide annual generation of about 3,820 megawatthours (MWh) of electricity. The new powerhouse would provide an additional 5,350 MWh each year for a total annual project output of 9,170 MWh. The additional 5,350 MWh/year would be beneficial, since it would reduce the need for producing energy from fossil-fueled, electric-generating plants, thus conserving nonrenewable energy resources and reducing atmospheric pollution. 10/

Cleaning-up the existing mill ruins and revegetating disturbed areas as part of the overall erosion and sedimentation control plan would protect and enhance the aesthetic quality of the site. Run-of-river operation would maintain the natural volume and periodicity of water flow below the project and would minimize water-level fluctuations in the impoundment. Finally, the provision of recreation facilities where none currently exist would improve public access to the Raquette River.

With the exception of operating the project in a run-of-river mode immediately, and installing our required trashrack design at the new powerhouse, NIMO has agreed to the aforementioned mitigative and enhancement measures and has included the costs associated with these measures in project cost estimates. As stated in section G.2. of the EA, the cost of operating run-of-river immediately, rather than waiting until the new powerhouse is completed, is insignificant (a total of $285 over the anticipated 2-year construction period). I also considered the costs of alternative designs to the trashrack design that I am requiring. These alternatives vary considerably and are, therefore, discussed in detail below.

Project Economics and Alternative Trashrack Designs Considered

Staff performed an economic analysis of the proposed new Yaleville powerhouse and of the various trashrack design alternatives. NIMO's proposed construction of the new powerhouse

10/ The production of power via fossil fuel combustion equivalent to the power that would be produced at the proposed new powerhouse would release about 1.20 tons of sulfur dioxide, 10.30 tons of nitrous oxides, 1.03 tons of carbon monoxide, and 6,243 tons of carbon dioxide into the atmosphere annually. Sulfur dioxide and nitrous oxide are considered significant contributors to the production of acid rain. Carbon dioxide is considered to be a significant contributor to global warming.

and the necessary modifications to the existing structures would cost about $3.9 million at 1994 price levels, the year that NIMO expects to place the new powerhouse in operation. The levelized value of the new capacity and energy would total about $623,000 per year. The levelized annual cost of the new construction and energy production would total about $622,000 per year for the term of the license. Therefore, the investment in the proposed new capacity would be close to the economic break-even point. Any significant addition in cost to the proposed enlargement of the project would make it more expensive than the cost of alternative generation, and thus, would increase the cost of electricity to the ratepayers.

Staff analyzed the costs and benefits of 5 trashrack designs at the new powerhouse. 11/ The costs of NIMO's proposal and the alternatives are as follows:

	Approach Velocity	Angle	Bar Spacing	Capital Cost	Annual Levelize Cost
Proposed	1.5-2.0 fps	90è	3"	$ 30,000	$ 3,460
Alt. 1	2.52 fps	90è	1"	$ 99,000	$25,500
Alt. 2	2.0 fps	45è	1"	$253,000	$43,200
Alt. 3	2.52 fps	90è	2"	$ 87,000	$24,100
Alt. 4	1.5-2.0 fps	90è	2"	$ 34,000	$ 3,900

Alternatives 1, 2, and 3 include a sluiceway for downstream fish passage which I conclude is unnecessary because none of the identified fish species need to migrate downstream of the project. The average annual energy loss from the 25 cfs that NIMO estimates would be needed to operate the sluiceway would be about $14,100 per year. This amount is included in the annual cost figures for Alternatives 1, 2, and 3.

The annual cost of Alternative 4 is essentially the same as

($440 more) NIMO's proposed trashrack design for the new powerhouse. This is not a significant cost difference, and would

11/ Section G.3. of the EA, entitled Fish Protection, discusses the effectiveness of five trashrack designs at preventing fish entrainment and impingement and at moving fish downstream. NIMO's original proposal and Alternative 1 would provide the least protection from fish being entrained and impinged. Alternatives 2 and 3 would provide the greatest fish protection and downstream fish movement. Alternative 4, although not containing a sluiceway for downstream fish passage, would protect a broad range of fish from entrainment and impingement because of its bar spacing and approach velocity.

allow the new facility to operate near the break-even point. The annual cost for Alternatives 1-3, $25,500, $40,300, and $24,100, respectively, would be significant, and would render the new facility uneconomical.

Regarding the installation of trashrack design Alternative 4 12/ at the new powerhouse, I have determined that it is more important to prevent entrainment and impingement of a broad range in size of fish, especially for larger-sized walleye, than to provide fish passage. The installation of trashracks having a 2-inch bar spacing, oriented at a 90-degree angle to the river flow with an approach velocity of 2.0 fps, would protect fish from entrainment and impingement without rendering the new powerhouse development uneconomical.

3. Recommendations of Federal and State Fish and Wildlife Agencies

Section 10j of the Act requires the Commission to include license conditions based on recommendations of federal and state fish and wildlife agencies submitted pursuant to the Fish and Wildlife Coordination Act for the protection, mitigation, and enhancement of fish and wildlife. The EA for the Yaleville Project addresses the concerns of federal and state fish and wildlife agencies and the license includes conditions consistent with the recommendations of the agencies, with the exception of the design of the trashracks to provide fish protection and passage at both the existing and proposed powerhouses. 13/

In the EA, staff recommended Alternative 4, a trashrack at the new powerhouse that is oriented perpendicular to the flow, with 2-inch bar spacing, and an approach velocity of 2.0 fps or less. Staff also recommended no modifications to the existing trashrack at the existing powerhouse.

In a letter dated August 27, 1991, to Interior, staff made a

preliminary determination, pursuant to section 10j of the Act, that Interior's recommendation for the design of trashracks at the existing and proposed powerhouses was inconsistent with sections 313 and 10(a) of the Act.

12/ This design would require the installation of a trashrack set at 90 degrees (perpendicular) to the direction of flow with 2-inch bar spacing, and a 2.0 fps approach velocity.

13/ Interior's criteria for the design of the trashracks at both powerhouses would include 45-degree angled trashracks with a bar spacing of one inch or less, and an intake velocity of 2 fps or less. In addition, Interior's recommendation included fish bypass chutes to pass fish downstream that are diverted by the trashracks.

In response to the preliminary determination, Interior in its October 10, 1991, letter did not identify other options or alternatives for the new powerhouse. However, Interior stated that they were willing to discuss alternatives at the existing powerhouse, recognizing the difficulty in retrofitting a generic design to an existing facility.

On October 18, 1991, staff, FWS, DEC, and NIMO participated in a 10(j) telephone conference meeting. During the meeting, staff accepted FWS's offer to analyze the project configuration to see if there were less costly fish protection alternatives which might be used at the project.

In a letter dated November 8, 1991, FWS provided their analysis of fish passage and protection alternatives. FWS stated in their letter that, based on their analysis, FWS still recommended trash racks, according to their criteria, at both the existing and new powerhouses. However, the FWS provided an alternative trashrack design at the existing powerhouse that included full depth racks with 1-inch clear spacing, angled perpendicular to the flow, with an approach velocity of 2 fps or less, plus a fish bypass facility incorporating the existing ice sluice. FWS stated that this alternative would be acceptable due to the relatively narrow width of the turbine intakes and the difficulty of retrofitting an existing facility.

Staff reviewed both FWS's conceptual design and cost estimate and NIMO's design and costs, and concluded neither design would accomplish the FWS's objective to guide fish to the downstream sluice at the new powerhouse. NIMO estimated that it would cost about $227,000 to construct an angled trashrack and downstream fish bypass for the new Yaleville powerhouse that would meet FWS criteria and pass fish downstream. The FWS estimated that it would cost about $102,500 to construct an angled trashrack and downstream fish bypass structure. 14/

To make the angled trashrack function effectively to direct

fish in an open reservoir setting, a flow-directing structure,

14/ The differences in the costs are as follows. NIMO's design and cost estimate includes constructing a retaining wall to support the river bank. This design would allow the area in front of the angled trashrack to be excavated to provide an unobstructed approach channel for even flow distribution to the trashrack. NIMO's cost estimate includes the cost of excavating the approach channel. FWS's design does not provide for such a retaining wall or for excavation of a uniform approach channel to the trashrack. These differences constitute almost all of the cost difference between NIMO's and FWS's estimated costs.

such as a training wall, must be constructed adjacent to the trashrack and extend out from the dam at a 90-degree angle. 15/

Staff estimated that it would cost at least an additional $26,000 to construct such a training wall to properly direct the flows to the proposed angled trashrack. NIMO's cost estimate properly reflects the other work that would be necessary to construct an angled trashrack that would perform its intended function. Therefore, staff estimates that it would cost about $253,000 to construct an angled trashrack for the new powerhouse site that would direct, protect, and pass fish as recommended by FWS. The total cost of the recommended mitigation measure would be about $43,000 annually.

4. Conclusion

I conclude, on balance, that for the new powerhouse the installation of trashrack design Alternative 4 would be in the best public interest. Although the trashrack design alternatives that include a sluiceway would provide safer downstream fish passage and protection, any small reduction in entrainment and impingement of fish with such designs are not warranted because the fish don't migrate downstream to complete their life cycle. Furthermore, the slight reduction would not justify losing the additional power benefits that would result from making the new powerhouse development uneconomical. Therefore, I am requiring, Alternative 4 - a trashrack oriented at 90 degrees to the direction of flow, with 2-inch spacing between the bars and an approach velocity of 2 feet per second or less, as stipulated in article 404 of this license. Regarding the existing powerhouse, I further conclude, based on the analysis in the EA (sections G.3 and H.2), that the existing trashrack provides adequate protection against entrainment and impingement, downstream fish passage structures are not needed, and no additional measures are needed.

15/ Water flows along the path of least resistance. Unless it is in a channel or is otherwise directed, water will approach the face of a trashrack at different angles, depending on the powerhouse flow, the total river flow, and the river channel topography. The trashrack at the new Yaleville powerhouse would be in an open reservoir setting rather than a closed approach channel. The training wall must extend out far enough from the trashrack that, in combination with the river bank on the opposite side, it will make an artificial channel that will direct the flow to approach perpendicular to the face of the powerhouse and approach the trashrack at the intended angle.

Section 10(a)(2) of the Act requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under section 10(a)(2), federal and state agencies filed 13 comprehensive plans that address various resources in New York. Of these, the staff identified and reviewed 4 plans relevant to this project. 16/ No conflicts were found.

Based on the review of the agency and public comments filed on this project, and on staff's independent analysis of the proposed project pursuant to sections 4(e), 10(a)(1) and 10(a)(2) of the Act, the proposed Yaleville Project is best adapted to a comprehensive plan for the proper use, conservation, and development of the Raquette River and other project-related resources.

Project Safety

The New York Regional Office (NYRO) staff inspected the project on April 20, 1989. The NYRO classified the dam as a low-hazard structure, based on the height, volume of the impoundment and the downstream conditions. The NYRO qualified its judgment by stating that the classification was subject to further evaluation of the design flood level for possible impacts to the downstream highway bridge, located about 300 feet downstream from the dam.

The existing spillway dam, flood gate structure, forebay wall and intake structure, which were reconstructed in 1976 and 1977, are in excellent condition. The existing powerhouse, dating from 1922, is in good condition. The concrete training wall, separating the tailrace from the river, shows the effects of deterioration in some locations, but does not constitute a hazard to the public.

The flood of record for the Raquette River in the project vicinity was about 16,000 cubic feet per second (cfs), according

to data from the United States Geological Survey. Regional flood frequency studies of the USGS indicate that a flood with a 100-year frequency would peak at about 19,000 cfs. Staff considers a

16/ New York State Wild, Scenic, and Recreational River System Act, 1985, New York State Department of Environmental Conservation; Regulation for Administration and Management of the Wild, Scenic, and Recreational Rivers System in New York State excepting the Adirondack Park, 1986, New York State Department of Environmental Conservation; People, Resources, Recreation, 1983, New York State Office of Parks, Recreation, and Historic Preservation; The Nationwide Rivers Inventory, 1982, Department of the Interior.

flood of this magnitude suitable for the project's inflow design flood.

The flood passage capacity at the Yaleville Project is about 20,000 cfs, with the flashboards out, and with 6 feet of flood surcharge over the crest of the spillway. This peak flow would leave about one foot of freeboard on the existing and proposed earth dikes running upstream on both banks. I conclude that the project's flood passage capacity is adequate for the low-hazard dam.

Staff has analyzed the stability of the project's spillway dam, forebay wall, gate structure and powerhouse for the loading conditions specified by the Commission's Engineering Guidelines. All structures are stable with adequate factors of safety. I conclude that the Yaleville Project is safe and adequate for continued operation, and that the proposed new powerhouse will be adequately designed, and would pose no threat to public safety if constructed and maintained according to good engineering practice.

Summary of Findings

An EA was issued for this project. 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 EA attached to this order. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if constructed, operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the S&DA.

Therefore, I conclude that the project would not conflict with any planned or authorized development, and would be best adapted to comprehensive development of the waterway for beneficial public uses.

The Director orders:

(A) This license is issued to Niagara Mohawk Power Corporation (Licensee), for a period of 50 years, effective February 1, 1982, to construct, operate and maintain the Yaleville Project. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands shown by exhibit G:

Exhibit G-	FERC No. 9222-	Showing
1	5	Project Site

(2) Project works consisting of: (a) an existing concrete gravity overflow dam about 170 feet long and 13 feet high, with proposed 2-foot-high flashboards at the crest; (b) an existing concrete gravity flood gate structure, originally 75 feet long, but proposed to be shortened to 49 feet, composed of two stop log gates 15 feet long and 10 feet high, one electrically operated lift gate for water surface control, about 11 feet long by 10 feet high, and three intermediate piers about 3 feet wide and 15 feet high; (c) a proposed concrete powerhouse at the northeast end of the gate structure, about 45 feet long, 24 feet wide, and 60 feet high, equipped with one horizontal axis Kaplan unit with a capacity of 800 kilowatts (kW); (d) an existing 67-foot-long intake with 4 timber slide gates, each 10 feet long; (e) an existing concrete and brick powerhouse on the southwest bank, 66 feet long, 37 feet wide and 43 feet high, equipped with two dissimilar open flume Francis units with a total capacity of 700 kW; (f) an existing forebay canal for the existing powerhouse, about 60 feet wide and 275 feet long, connecting with the southwest end of the overflow dam; (g) a reservoir with a surface area of 95 acres and a storage volume of about 720 acre-feet, at a normal water surface elevation of 305.2 feet NGVD; (h) an existing tailrace at the existing powerhouse, about 25 feet wide and 140 feet long; (i) a proposed earth dike extending 200 feet upstream from the abutment of the new powerhouse; (j) a proposed 4.16/23-kilovolt (kV) step-up transformer for the new powerhouse, connecting to a proposed 23-kV transmission line 300 feet long;

(k) an existing 2.3/23-kV transformer for the old powerhouse, connecting to an existing transmission line 70 feet long; and (l) appurtenant facilities.

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

Exhibit A:

Pages A.2-1 through A.3-1 of Exhibit A, describing the proposed mechanical, electrical and transmission equipment, filed on October 26, 1988, with the application for license.

Exhibit F Drawing	FERC No.	Description
Sheet 1	9222-1	General Plan of Project, Dam & Flood Gates

Sheet 2	9222-2	Retaining Walls
Sheet 3	9222-3	Westside Powerhouse
Sheet 4	9222-4	Eastside Powerhouse

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

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

(D) The following sections of the Act are waived and excluded from the license for this minor project:

4(b), except the second sentence; 4(e), insofar as it relates to approval of plans by the Chief of Engineers and the Secretary of the Army; 6, insofar as it relates to public notice and to the acceptance and expression in the license of terms and conditions of the Act that are waived here; 10(c), insofar as it relates to depreciation reserves; 10(d); 10(f); 14, except insofar as the power of condemnation is reserved; 15; 16; 19; 20; and 22.

(E) This license is subject to the articles set forth in Form L-14, (October 1975), entitled "Terms and Conditions of License for Unconstructed Minor Project Affecting Navigable Waters of the United States", except article 15, and the following additional articles:

Article 201. The Licensee shall pay the United States an annual charge for the purpose of reimbursing the United States for the cost of administration of Part I of the Act, as determined by the Commission. From February 1, 1982, to January 31, 1992, the authorized installed capacity for that purpose is 940 horsepower. Effective February 1, 1992, the authorized

installed capacity for that purpose is 2,000 horsepower.

Article 202. The Licensee shall clear and keep clear to an adequate width all 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 result from maintenance, operation, 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 lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized

representative of the Commission and in accordance with appropriate federal, state, and local statutes and regulations.

Article 301. The Licensee shall commence construction of the project works within two years from the issuance date of the license and shall complete construction of the project within four years from the issuance date of the license.

Article 302. Before starting construction, the Licensee shall review and approve the design of contractor-designed cofferdams and deep excavations and shall make sure construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting construction of the cofferdam, the Licensee shall submit one copy to the Commission's Regional Director and two copies to the Commission (one of these copies shall be a courtesy copy to the Commission's Director, Division of Dam Safety and Inspections), of the approved cofferdam construction drawings and specifications and the letters of approval.

Article 303. The Licensee shall, at least 60 days prior to the start of construction, submit one copy to the Commission's Regional Director and two copies to the Commission (one of these shall be a courtesy copy 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 Commission may require changes in the plans and specifications to assure a safe and adequate project. If the Licensee plans substantial changes to location, size, type, or purpose of the water retention structures, powerhouse, or water conveyance structures, the plans and specifications must be accompanied by revised Exhibit F and G drawings, as necessary.

Article 304. The Licensee, within 90 days of completion of construction, shall file for approval by the Commission, revised

Exhibits A, F, and G, to describe and show the project as built, including all facilities determined, by the Commission, to be necessary and convenient for transmission of all of the project power to the interconnected transmission system.

Article 401. The Licensee shall prepare a final erosion and sediment control plan which, at a minimum, consists of the sediment control plan filed July 26, 1990, and the following additions and modifications.

(1) Silt fences shall be installed to control sediment runoff at the construction staging areas, disposal site, and recreation facility construction sites.

(2) All areas disturbed during construction shall be revegetated to provide final stabilization of all lands, and shrubbery

indigenous to the area shall be planted around the project substation to improve the appearance of the facility.

(3) The remnants of a paper mill located on the east side of the river shall be cleaned-up and disposed of in conjunction with on-site disposal of spoil material.

(4) Control measures shall be inspected daily during the construction period and shall be immediately maintained or repaired as necessary.

(5) A schedule shall be included that shows when, in relation to the various construction phases, the control measures would be implemented and maintained.

The Licensee shall file the final plan and the final drawings, specifications, and schedule for implementing the plan along with the final project drawings and specifications required by article 302. The final drawings, specifications, and schedule for the plan shall be prepared in consultation with the Soil Conservation Service and the New York State Department of Environmental Conservation. The filing shall also include documentation of agency consultation. 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.

The Commission reserves the authority to require changes to the final plan, drawings, specifications, and schedule to ensure proper control of erosion and discharge of sediment to wetlands and watercourses, and adequate protection of the environmental, scenic, and cultural values of the project area. The Licensee shall implement the controls, and restore and revegetate disturbed areas according to the final plan, drawings, specifications, and schedule, including any changes required by the Commission.

Article 402. The Licensee shall operate the project in a

run-of-river mode for the protection of water quality and aquatic resources in the Raquette River. The Licensee shall at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured immediately downstream from the project tailrace, approximate the sum of inflows to the project reservoir. Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Licensee or for short periods upon mutual agreement between the Licensee, the U.S. Fish and Wildlife Service (FWS), and the New York State Department of Environmental Conservation (DEC). If the flow is so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 403. The Licensee, after consultation with the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service (FWS), and the New York State Department of Environmental Conservation (DEC), shall develop a plan to install streamflow monitoring equipment in the project's reservoir and Raquette River to monitor compliance with the run-of-river mode of operation as stipulated by article 402. The plan shall include, but not be limited to, an implementation schedule, the proposed location, design, and calibration of the monitoring equipment, the method of flow data collection, and a provision for providing flow data to the USGS, the FWS, and the DEC within 30 days from the date of the agency's request for the data.

The Licensee shall include documentation of consultation with the agencies before preparing the plan, copies of agency comments or recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how all the agency comments were 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.

The Licensee shall file the plan with the Commission for approval at least 90 days prior to any land-disturbing activities and, upon approval, shall implement the streamflow monitoring plan. The Commission reserves the right to require changes to the plan.

Article 404. The Licensee, for the conservation and development of existing fish and wildlife resources, shall install trashracks at the new powerhouse project intake. The trashracks shall have 2-inch spacings between bars, shall be designed to provide an approach velocity, measured at the trashrack no greater than 2 feet per second, and shall be oriented 90 degrees to the direction of flow.

The Licensee shall consult with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service on the final design of the project intake and trashrack. The Licensee, within 6 months after completion of

construction, shall file with the Commission as-built drawings of the project intake and trashrack.

Article 405. The Licensee, before starting any land-clearing or ground-disturbing activities within the project boundaries, other than those specifically authorized in this license, including recreation developments at the project, shall consult with the State Historic Preservation Officer (SHPO).

If the Licensee discovers previously unidentified archeological or historic properties during the course of constructing or developing project works or other facilities at

the project, the Licensee shall stop all land-clearing and ground-disturbing activities in the vicinity of the properties and consult with the SHPO.

In either instance, the Licensee shall file for Commission approval a cultural resource management plan (plan) prepared by a qualified cultural resource specialist after having consulted with the SHPO. The plan shall include the following items: (1) a description of each discovered property indicating whether it is listed on or eligible to be listed on the National Register of Historic Places; (2) a description of the potential effect on each discovered property; (3) proposed measures for avoiding or mitigating effects; (4) documentation of the nature and extent of consultation; and (5) a schedule for mitigating effects and conducting additional studies. The Commission may require changes to the plan.

The Licensee shall not begin land-clearing or land-disturbing activities, other than those specifically authorized in this license, or resume such activities in the vicinity of a property, discovered during construction or operation, until informed that the requirements of this article have been fulfilled.

Article 406. Prior to the commercial operation of the new generating unit, the Licensee shall construct and provide for the operation and maintenance of the recreation facilities shown on sheet 1-A, Conceptual Plan for Recreation Facilities, in Exhibit-E of the Licensee's application. Specifically, the Licensee shall provide the following: (1) a canoe portage with put-in and take-out areas to accommodate car-top boats; (2) a parking area; and (3) a picnic area.

The Licensee shall construct the facilities after consultation with the New York Department of Environmental Conservation (DEC). Additionally, within 6 months from the completion of the new generating unit, the Licensee shall consult

with the Commission's New York Regional Office (NYRO), and the DEC to identify tailrace areas at the new generating unit that are safe for fishing. If no hazardous tailrace areas are identified by the NYRO and the DEC, the Licensee shall permit fishing access along the entire length of the project's east bank tailrace and shall install appropriate handrails or fencing to ensure public safety. The Licensee shall consider the needs of the disabled in the final designs for all recreation facilities at the project.

The recreation facilities shall be shown on the as-built drawings filed pursuant to this license. The Licensee shall file a report with the as-built drawings which shall include the entity responsible for operation and maintenance of the facilities and documentation of consultation and copies of

comments and recommendations on the report after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the report. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the report with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

Article 407. (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, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and

waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1) inspect

the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

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

conveyed.

(d) The Licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land

conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the Licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

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

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

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

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

(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.

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

(G) This order is issued under authority delegated to the Director and constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. □385.713.

Fred E. Springer
Director, Office of
Hydropower Licensing

ENVIRONMENTAL ASSESSMENT

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

Date: August 20, 1991

Yaleville Hydroelectric Project

FERC Project No. 9222-001

A. APPLICATION

1. Application type: Minor License
2. Date filed with the Commission: October 26, 1988
3. Applicant: Niagara Mohawk Power Corporation
4. Water body: Raquette River River basin: St. Lawrence
5. Nearest city or town: Village of Norwood
6. County: St. Lawrence State: New York

B. PURPOSE AND NEED FOR POWER

The Yaleville Hydroelectric Project, as proposed, would generate about 9,170 megawatthours (MWh) of electric energy per year, an increase of 5,350 MWh/year over the project's current output. The project would consist of an existing powerhouse on the southwest side of the river with an installed capacity of 700 kilowatts (kW), and a new powerhouse on the northeast side with an installed capacity of 800 kW. This energy would be used by the Niagara Mohawk Power Company (NIMO) to serve its customers.

The Yaleville Project was constructed in 1940. The spillway, dam, flood gate structure, forebay, and existing powerhouse intake structure were rebuilt in 1976 and 1977. Fifty years plus of project operation, and the continued use of its power by NIMO, verify a short-term and long-term need for the Yaleville project's power.

When compared with electric generation methods which derive their primary energy from fossil fuels, hydropower has unique virtues. These virtues are most impressive when viewed in light of the public's concern about acid rain, global warming, the uncertainty of the cost and availability of foreign oil, and the costs of complying with the new Clean Air Act.

C. PROPOSED PROJECT AND ALTERNATIVES

1. Description of the proposed action (see figure 2.)

Existing development. The existing project features consist of the following: (1) a concrete gravity overflow dam about 170 feet long and about 13 feet high; (2) a 75-foot-long concrete gravity flood gate structure with 4 bays; (3) an 80-acre impoundment with a storage volume of 520 acre-feet at a normal water surface elevation of 303.2 feet National Gage Vertical Datum (NGVD); and (4) an access road.

The existing generating facilities are located on the southwest side of the river and consist of: (1) a forebay canal about 60 feet wide and 275 feet long connected to the overflow dam; (2) a 67-foot-long intake with 4 timber slide gates, each 10 feet long; (3) a trashrack with 2.5-inch clear bar spacing set perpendicular to the direction of flow; (4) a concrete and brick powerhouse 66 feet long and 37 feet wide equipped with one 500-kW Francis turbine and one 200-kW Francis turbine; and (5) a 2.3/23-kilovolt (kV) transformer connected to a 70-foot-long, 23-kV transmission line and substation.

Proposed development. NIMO proposes to install 2-foot-high flashboards at the dam crest, creating a slightly larger reservoir with a surface area of 95 acres and a storage volume of about 720 acre-feet at a normal water surface elevation of 305.2 feet NGVD. NIMO would shorten the existing flood gate structure to 49 feet and construct the new facilities in this space at the northeast end of the gate structures.

The proposed facilities consist of: (1) a concrete powerhouse about 45 feet long and 24 feet wide equipped with one

800-kW Kaplan turbine; (2) an intake and a trashrack with 3-inch-clear bar spacing set perpendicular to the direction of flow; (3) an electrically-operated lift gate; (4) a dike extending 200 feet upstream from the abutment of the powerhouse; and (5) a 4.16/23-kV transformer connected to a 23-kV, 300-foot-long overhead transmission line connected to the existing substation.

NIMO proposes to change project operation from a pulsing to a run-of-river mode. For project inflows between 200 cubic feet per second (cfs) and 975 cfs, the proposed new 800-kW unit would be operated. This would occur about 17 percent of the time. When flow exceeds 975 cfs, both of the older, existing 500-kW and 200-kW units would be used first at a combined hydraulic capacity of about 720 cfs. The new unit would operate at a variable capacity to balance outflow to inflow. The combined capacity of all of the project units would be about 1,780 cfs. Thus, the two powerhouses would operate together within an inflow range of 975 to 1,780 cfs. This would occur about 47 percent of the time. When inflow exceeds 1,780 cfs, both powerhouses would operate at

maximum capacity, and excess water would be spilled via the control sluice, flood gates, and the main spillway. Spillage would occur about 36 percent of the time at the enlarged Yaleville project.

2. Applicant's proposed mitigative measures.

During construction, NIMO proposes to use upstream and downstream cofferdams. NIMO has filed a sediment control plan for the project that outlines proposed measures for controlling erosion and sedimentation during cofferdam construction and removal, project construction, on-site spoil disposal, and site restoration (Niagara Mohawk Power Corporation, 1990).

To protect the aquatic resources in the Raquette River, NIMO proposes to: (1) operate the project in a run-of-river mode once the new powerhouse is completed; (2) provide an unidentified interim minimum flow from the existing project; and (3) install an intake trashrack, with 3-inch bar spacing, at the new powerhouse.

For aesthetic resources NIMO proposes to: (1) clean-up and dispose of the on-site mill ruins in conjunction with its spoil disposal operations; and (2) plant shrubs around the existing substation.

To enhance public access and recreation opportunities, NIMO would provide a canoe portage, picnic area, parking area, and tailrace fishing access.

3. Federal lands affected.

X No.

4. Alternatives to the proposed project.

a. X No reasonable action alternatives have been found.

b. Alternative of no action.

Under the no-action alternative (maintaining existing

conditions), NIMO would not be able to construct the proposed new powerhouse or provide any enhancement measures. There would be no change in the existing environment at the project site and no additional power generated.

D. CONSULTATION AND COMPLIANCE

1. Fish and wildlife agency consultation (Fish & Wildlife Coordination Act).

a. U.S. Fish & Wildlife Service (FWS): X Yes. No.
b. State(s): X Yes. No.
c. National Marine Fisheries Service X Yes. No.

2. Section 7 consultation (Endangered Species Act).

a. Listed species: X None. Present:
b. Consultation: X Not required.
Required; completed: / / .

Remarks: Except for occasional transients, no federally listed endangered species occur in the project area (William Patterson, Regional Environmental Officer, Office of Environmental Project Review, Department of the Interior letter dated May 30, 1989).

3. Section 401 certification (Clean Water Act).

Not required.

X Required; applicant requested certification by letter dated 10/24/88, and the certifying agency acknowledged the request was received on 11/14/88 in accordance with state filing procedures.

Status: X Waived; section 401 certification is waived if not acted upon by the certifying agency within 1 year from the date of that agency's receipt of the request (See Commission order no. 464, issued February 11, 1987).

4. Cultural resource consultation (Historic Preservation Act).

a. State Historic Preservation Officer : X Yes No.
b. National Park Service (NPS): X Yes No.
c. National Register status: X None Eligible or listed.
d. Council: X Not required. Completed: .

e. Further consultation: X Not required. Required.

5. Recreational consultation (Federal Power Act).

a. U.S. Owners: Yes. X No.
b. NPS: X Yes. No.
c. State(s): X Yes. No.

6. Wild and scenic rivers (Wild and Scenic Rivers Act).

Status: X None Listed.

7. Land and Water Conservation Fund lands and facilities (Land and Water Conservation Fund Act).

Status: X None. Designated.

E. COMMENTS

1. The following agencies and entities provided comments on the application in response to the public notice dated 04-05-89.

Commenting agencies and other entities	Date of letter
Department of the Interior	May 30, 1989
National Marine Fisheries Service	June 7, 1989
U.S. Fish and Wildlife Service	August 10, 1990

F. AFFECTED ENVIRONMENT

1. General description of the locale.

a. Description of the St. Lawrence River Basin

The St. Lawrence River drains the area between Lake Ontario and Lake Champlain, New York. The total drainage area of the St. Lawrence River in the United States is 5,539 square miles. This represents a small portion of the basin's total (U.S. plus Canada) drainage of 303,000 square miles. Basin topography varies from 4,621 feet mean sea level (msl) at Santanoni Peak to the low rolling hills of the St. Lawrence valley lowland. The climate of the St. Lawrence River Basin consists of cold winters and cool, wet summers. The St. Lawrence is divided into seven sub-basins: the Oswegatchie, Grass, Raquette, St. Regis, Salmon, and Chateaugay, plus several small streams along the St. Lawrence River itself (Federal Energy Regulatory Commission, 1966).

The Raquette River originates from several high lakes in the Adirondack Mountains of New York. The Raquette flows north then southwest before emptying into the St. Lawrence River at the U.S.-Canadian Border. The Raquette River is used intensively for hydropower generation. The Yaleville project is the fourth of 20 hydropower developments on the river below Carry Falls reservoir (see figure 3). The Yaleville project is located between river miles 23 and 27, about 1 mile northwest of the village of Norwood, New York. The drainage area above the project is about 1,047 square miles.

b. Number of major and minor licensed, and exempted projects in the Raquette River Basin as of July 25, 1991.

Major Licensed - 16; Minor Licensed - 0; Exempted - 3

c. Number of pending license applications in the basin as of July 25, 1991.

Minor License - 1 (Yaleville)

d. Target resource.

A target resource is an important resource that may be cumulatively affected by multiple development within the basin. We have identified the resident walleye and smallmouth bass fishery as a target resource for the Raquette River. The Raquette River is recognized regionally and statewide as a high quality sport fishery. The 1988 New York Statewide Angler Survey indicated that, of the coolwater sport fishes in New York, walleye and bass are the species of choice. The survey also found that about 7,530 anglers fished the Raquette River during 1988 (New York State Department of Environmental Conservation, 1990). The importance of this high-quality sport fishery is discussed further in sections F.2.i and G.3.

We also note that this high quality fishery has developed despite the presence of intense hydroelectric development on the Raquette River. As discussed in section I, we conclude that operation of the new powerhouse at the Yaleville Project may cause a minor increase in cumulative impacts to the resident walleye and smallmouth bass fishery in the Raquette River.

2. Descriptions of the resources in the project impact area (Source: Niagara Mohawk Power Corporation, 1988, application, exhibit E, unless otherwise indicated).

a. Geology and soils: The existing project structures are built on dolostone. The soils at the project construction site are thin, loamy soils that have been altered by the addition of fill and other past construction activities. There is an existing, stone access road at the site. The proposed borrow site is an existing, privately-operated gravel pit. The reservoir banks are vegetated and stable, and consist of cobble to boulder-size rocks with intermixed sandy gravel (Niagara Mohawk Power Corp, 1990).

b. Streamflow: Flows are estimated from NIMO's flow duration curve.

low flow: 850 cfs; flow parameter: flow exceeded 90 percent of the time.

high flow: 3,700 cfs; flow parameter: flow exceeded 10 percent of the time.

average annual flow: 1,915 cfs.

c. Water quality: The New York State Department of Environmental Conservation (DEC) classifies the Raquette River at the proposed project site as class B non-trout waters. Class B waters have a best usage of primary contact recreation and any other use except as a source of drinking water and culinary or food processing purposes. For class B non-trout waters, the minimum allowed dissolved oxygen (DO) concentration is a daily average of 5.0 milligrams per liter (mg/l), and at no time should DO concentrations fall below 4.0 mg/l. DO concentrations in the Raquette River downstream from the Yaleville Project have improved over the past 50 years to at least a minimum of 6.7 mg/l (about 85 percent saturation).

d. Fisheries: Anadromous: X Absent. Present.
Resident: Absent. X Present.

The Raquette River in the vicinity of the proposed project is managed by the DEC as a mixed coolwater-warmwater fishery. Resident species include smallmouth bass, walleye, northern pike, yellow perch, rock bass, brown bullhead, pumpkinseed, carp, redhorse sucker, and white sucker.

e. Vegetation: The area around the proposed project is rural, agricultural, and forested. According to Kuchler (1964), the natural vegetation of the area is maple-beech forest. Common tree species in the area include red maple, beech, white and yellow birch, hemlock, cherry, ash, basswood, aspen, spruce, and fir. The predominant vegetation type along the proposed project's reservoir shoreline is shrubland.

There are numerous wetlands along the Raquette River and its tributaries. Four parcels of land, totalling 26.5 acres, adjacent to the proposed project's reservoir have been designated as wetlands by the FWS. Another state-designated wetland of

about 32 acres is contiguous with the proposed project reservoir.

There are also small undesignated wetland areas. Two of the federally-designated wetlands, 3.2 and 11.1 acres in size, are palustrine forested, broad-leaved, seasonal. 17/ The remaining two wetlands, 6.4 and 5.8 acres in size, are palustrine forested broad-leaved, seasonal, saturated. These wetlands are dominated by broad-leaved deciduous trees such as red maple, silver maple, green ash, black ash, and willows. The understory is commonly buttonbush, leatherleaf, and blueberry. The soil in these wetlands is seasonally flooded or saturated (i.e. high water table, but without surface water) generally during the

17/ Wetland classification follows Cowardin, et al. (1979)

early part of the growing season (Niagara Mohawk Power Corporation, 1990; Cowardin et al., 1979).

f. Wildlife: Wildlife associated with habitats in the proposed project area include: deer, skunk, raccoon, mink, coyote, opossum, beaver, river otter, muskrat, eastern cottontail rabbit, porcupine, eastern chipmunk, as well as a variety of other rodents, small carnivores, and bats. Conspicuous birds that may be found in the area include great blue herons, Canada geese, mallards, red-winged blackbirds, hawks, mourning doves, swallows, sparrows, as well as a number of other waterfowl, songbirds, and raptors. Also present in these habitats are a number of reptile and amphibian species and a very large number of invertebrates (e.g. insects, crustaceans, spiders, worms, millipedes, snails).

g. Cultural: National Register (listed and eligible) properties have not been recorded, but an 1892, pin-connected lenticular metal truss bridge located immediately downstream of the project is eligible. However, the State Historic Preservation Officer (SHPO) states that the project does not appear to be affecting the bridge (letter from Julia Stokes, Deputy Commissioner for Historic Preservation, New York State Office of Parks, Recreation, and Historic Preservation, Albany, New York to James F. Morgan, Environmental Analyst, Niagara Mohawk Power Corporation, Syracuse, New York, January 13, 1989).

h. Aesthetics: The project is situated in a relatively undeveloped river setting. The existing 75-acre impoundment, which fluctuates more than 2 feet on a daily basis, is bordered by woods, brushland, and farmland. The pulsing operation of the existing powerhouse dewaters a 400-foot segment of river between the dam and powerhouse and a free-flowing reach of river below the powerhouse during the maximum 8-hour storage cycle. The ruins of a paper mill complex are located on the east riverbank across from the powerhouse and substation. A few nearby homes and a scattering of trees, shrubs, and grassy areas combine to give the landscape a rural residential/industrial appearance.

i. Recreation: Fishing, boating, and canoeing are the predominant recreational uses of the Raquette River. The fisheries resource has both a regional and statewide

significance. During the 1976-77 season, the Raquette River attracted an estimated 6,094 anglers who caught about 12,850 fish. This figure increased to about 7,530 anglers for calendar year 1988 (New York Department of Environmental Conservation, 1990). Sixty-eight percent of the anglers in 1976-77 were from outside the region. The primary gamefish include walleye, smallmouth bass, northern pike, yellow perch, rock bass, pumpkinseed, and brown bullhead. The Yaleville project site reportedly receives some light use in the form of walking and bank fishing.

There are currently no formal recreation facilities at the project site. However, there are several public recreation facilities in the vicinity of the project. The village of Norwood maintains a park upstream of the project which has a boat launch, beach, playground, and picnic area. There is also a public boat launch upstream of the project that provides access for trailered boats. Within 10 miles of the project, there is a State Park and a State Wildlife Management Area. New York State Comprehensive Outdoor Recreation Plan (SCORP) data predict that outdoor recreation facility use in St. Lawrence County will increase, but that none of the facility categories will approach full use by the year 2000.

j. Land use: Lands surrounding the project are classified as forestland, brushland, wetlands, and agricultural. There is some residential development southeast of the project.

k. Socioeconomics: The economy of St. Lawrence County, New York, is based on manufacturing, dairy farming, mining, education, and tourism (Federal Energy Regulatory Commission, 1988).

G. ENVIRONMENTAL ISSUES AND PROPOSED RESOLUTIONS

There are 8 issues addressed below.

1. Erosion and sedimentation: The major land-disturbing construction activities would be the excavation of approximately 96 cubic yards of rock during construction of the powerhouse, construction of a 200 foot-long dike along the eastern shore upstream of the powerhouse, and modification of the tailrace. The powerhouse and tailrace construction activities would all take place within cofferdams. Other land-disturbing activities would occur during cofferdam installation and removal, disposal of excess materials, use of construction staging areas, use of access roads, and construction of the new recreation facilities.

NIMO's proposal to use cofferdams to dewater the powerhouse

and tailrace construction area would provide the primary site protection during construction of those new features. At our request, NIMO consulted the Soil Conservation Service (SCS) and filed a sediment control plan containing its proposed methods for cofferdam construction and dewatering, disposal of construction debris and excavated material, and site restoration (Niagara Mohawk Power Corporation, 1990).

We believe that the types of control measures that NIMO proposes to use during the construction period would reduce potential erosion and sedimentation problems resulting from construction of the powerhouse and tailrace to minor levels. However, our review of the plan found that it doesn't provide for sediment runoff control at construction staging areas, the

disposal site, and at recreation facility construction sites, or for final stabilization of all disturbed lands with vegetative cover. Because moderate, short-term sedimentation impacts could occur without such controls, we believe they should be added to the plan. We also believe the plan should be modified to require daily inspection of control measures throughout the construction period.

Our review of the preliminary plan also found that it doesn't clearly describe when each of the control measures would be installed and maintained. Installation and maintenance of control measures should be an integral part of project construction. Thus, we believe the plan should be modified to include a schedule that shows when the control measures would be installed and maintained in relation to the various project construction phases.

Further, the control plan doesn't contain final drawings and specifications for the proposed control measures. For the controls to be successfully implemented, NIMO should first complete the final project design and then base the final drawings and specifications for implementing the site-specific controls on the final project design.

We therefore recommend that the control plan be modified as described above and the final drawings and specifications for implementing the controls be prepared in consultation with the SCS and the DEC, and be based on the final project design.

2. Project operation: NIMO would install 2-foot-high flashboards on the spillway crest to raise the reservoir's surface elevation and gain additional head. Upon completion of the new powerhouse, NIMO would operate the enlarged project in a run-of-river mode (for specifics on project operation, see Section C.1.). Until the new powerhouse is completed, NIMO proposes to continue operating in a pulsing mode and to release an interim minimum flow.

The Department of the Interior (Interior) recommends that the project be operated in a run-of-river mode and that flows greater than or less than the hydraulic capacity of the project be discharged over the dam. In the interim, before completion of the new powerhouse, Interior recommends that NIMO provide a continuous minimum flow from the project for the conservation and development of the existing fishery in the Raquette River. Further, Interior recommends that, for the protection of fish and wildlife resources in the Raquette River, NIMO consult with the U.S. Fish and Wildlife Service (FWS) and the New York Department of Environmental Conservation (DEC) at least 30 days before initiating any action that would result in the interruption of downstream flows or drawdown of the project impoundment. The DEC

did not provide comments on the application in response to the public notice. 18/

Operating the project in a run-of-river mode would maintain the natural volume and periodicity of streamflow below the project, thus protecting aquatic resources in the Raquette River downstream. Operating in this mode would also minimize fluctuations of the reservoir surface elevation and reduce the potential for erosion of the reservoir shoreline. Conversion to a run-of-river mode of operation upon issuance of a license, rather than at completion of the new powerhouse, would result in a negligible loss of power generation while providing for the conservation and development of the existing fishery. Therefore, we recommend that NIMO operate in an instantaneous run-of-river mode immediately upon issuance of a license to operate the Yaleville Project.

Instantaneous run-of-river operation may be temporarily modified if required by operating emergencies beyond NIMO's control or for short periods of time upon mutual agreement between NIMO and the DEC. In some instances, it may not be possible for NIMO to notify the DEC and the FWS at least 30 days prior to the licensee's initiating actions that may interrupt downstream flows or the drawdown of the impoundment. However, we recommend that the licensee notify the DEC and the FWS at least 30 days in advance before initiating any planned interruptions to downstream flows or drawdowns to the project impoundment.

To ensure compliance with a run-of-river mode, NIMO should be required to consult with the DEC, the FWS, and the U.S. Geological Survey to develop a flow monitoring plan. Implementation of this plan would ensure compliance with the required instantaneous run-of-river operation. The plan should discuss methods of flow data collection and should describe the proposed location, design, and calibration of the flow monitoring devices. The plan should include an implementation schedule and a provision for providing flow data to the consulted agencies

within 30 days from the date of an agency's request for the data.

3. Fish protection: To reduce entrainment through the project's turbines, and as a guide for downstream fish passage at both the existing powerhouse and the proposed new powerhouse, Interior recommends the installation of trashracks set at a 45-degree angle or less to flows at the entrance to the turbine intake, with a clear spacing between the trashrack bars of

18/ Although the DEC did not provide comments in response to the public notice, correspondence between the DEC and NIMO indicates that, had the DEC provided comments, their recommendations for this project would have been the same as Interior's.

1-inch, an approach velocity of 2 feet per second (fps) or less, and sufficient flows for the effective operation of a downstream fish bypass structure. The DEC did not provide comments on the application in response to the public notice.

At the new powerhouse, NIMO proposes to install an intake trashrack with a spacing between the trashrack bars of 3 inches. NIMO does not propose to provide downstream fish passage facilities at the Yaleville Project. The trashrack structure would be oriented 90 degrees (perpendicular) to the angle of flow and slightly skewed from vertical. At the existing powerhouse, NIMO proposes to maintain its existing trashrack; this trashrack has a spacing of 2.5 inches between the trashrack bars and an approach velocity of about 1.5 fps.

In response to our request for information to evaluate other fish protection facilities at the project, NIMO provided 2 alternative designs for a project intake trashrack structure to be installed at both the existing project powerhouse and the new powerhouse (Niagara Mohawk Power Group, 1990). These 4 options are described below.

One trashrack structure designed for the existing powerhouse consists of a 26-foot-high trashrack set at an angle of 60 degrees to the direction of flow, 2 3/8 inch spacings between the trashrack bars, and a removable trashrack insert extending to a depth of 14 feet with 1-inch spacings between the bars, leading to a fish bypass sluice located at the downstream end of the trashracks. This design (alternative 1) would have an approach velocity in excess of 2 fps. An alternative design (alternative 2) provided by NIMO is similar to the design of alternative 1 except that the approach velocity would be less than 2 fps. The slower approach velocity for alternative 2 is accomplished by increasing the surface area of the trashrack structure.

At the new powerhouse, NIMO also provided 2 alternative designs for the trashrack structure. The first design (Alternative 1) consists of a trashrack set at an angle of 90 degrees to the direction of flow, 1 inch spacings between the trashrack bars for the upper 14 feet and 2 3/8 inches for the lower 12 feet, and two 2-foot-wide fish bypass slots located to the left and right of the center of the trashrack. The slots in the trashrack structure would lead to a fish bypass sluice located directly behind the trashrack structure. Alternative 1 would have an approach velocity in excess of 2 fps.

Another alternative design (Alternative 2) provided by NIMO consists of a similar trashrack structure set at a 45 degree angle to flow, leading to a fish bypass sluice located at the downstream end of the trashracks, with an approach velocity less than 2 fps. This design conforms to Interior's recommended design criteria for trashracks.

Interior says it will not oppose alternative trashrack designs that do not conform to its guidelines provided NIMO monitors the effectiveness of the installed trashrack structure at passing fish downstream. NIMO, however, states that the walleye and smallmouth bass fishery in the Raquette River is exceptionally good and that this fishery developed in the presence of the existing operation of the hydropower project at Yaleville as well as other hydropower projects on the Raquette River. NIMO maintains that the presence of a high quality fishery in the Raquette River indicates that this project has had no adverse effects on walleye and smallmouth bass populations in the Raquette River.

The Raquette River has 20 operating hydroelectric projects. The operation of these projects has reduced the Raquette River from a free flowing riverine habitat to a series of lentic habitats with short, interspersed, riverine habitats. The loss of riverine habitat can reduce fish populations by decreasing the available riverine spawning habitat favored by smallmouth bass and walleye. In addition, losses to the resident fishery can occur because of fish entrainment and impingement mortality at the hydroelectric projects.

The available evidence indicates that past operation of the existing powerhouse at Yaleville has had no noticeable effect on the quality of the fishery in the Raquette River in the project's immediate vicinity. As stated previously in section F.2.i, angler harvest of walleye in the Raquette River was 12,850 fish during the 1976-1977 season. In addition, 68 percent of the 6,094 anglers who fished the Raquette River resided outside of the Raquette River region (Kretser and Klatt 1981). The public's willingness to travel to fish the Raquette River provides further evidence of the value of the existing sport fishery. However, although all flows for power generation now go through the existing powerhouse; in the future, (with the new turbine) flows up to 1,780 cfs would be apportioned between the existing

powerhouse (46.3 percent by volume) and the proposed new powerhouse (53.7 percent by volume). When flows exceed the minimum hydraulic capacity of the project, the new powerhouse would be used for generation 100 percent of the time and the old powerhouse would be used 83 percent of the time. Spillage would occur 36 percent of the time at the enlarged Yaleville Project. The addition of the new powerhouse would more than double the volume of flows used for power generation at the Yaleville Project. The volume of flows used for generation at the existing powerhouse, however, would not change.

Operation of the new powerhouse could cause increased impingement and entrainment-related mortalities and injuries to resident fish above current levels. Mortality or injury would occur as a result of fish being struck by turbine blades, pressure changes, sheer forces in turbulent flows, and water

velocity accelerations (Knapp et al, 1982). The design of the project intake structure would affect the amount of project-induced fish injury or mortality during periods when fish are present at the site.

Trashracks have been used at hydropower plants to deter fish from entering project intakes. Intake velocity and size of bar spacings on trashracks can influence entrainment rates (Bell, 1986). The influence of bar spacings on fish entrainment is related to the size of the fish. For a given size fish, the greater the spacings between trashrack bars the greater the chances of the fish passing through the trashrack and being entrained through the turbine. For example, trashracks with a 1-inch clear spacing between the bars would exclude walleye at least 6.3 inches in length. Similarly, a 2-inch spacing between the bars would exclude walleye at least 12.6 inches in length.

The velocity of water, as measured immediately in front of the trashrack intake, influences potential impingement on the trashrack in much the same manner as the trashrack bar spacings influence fish entrainment through the turbines. For a given species, there is a positive relationship between fish size (i.e. length) and swimming ability. Therefore, the greater the intake velocity the larger a fish must be to escape impingement against the trashrack bars. Flow velocities that are too high can impinge a fish against a trashrack structure.

Using the relationship V=KLe where (V=velocity, and L= fork length) Jones, Kiceniuk, and Bamford (1974) calculated K and e for walleye as 13.04 and 0.51, respectively, at a critical swimming speed. Critical swimming speed was defined as the maximum velocity a fish could maintain for 10 minutes. Applying this equation and solving for fork length, we calculate that a fish must be at least 8 inches long to overcome an approach velocity of 2.0 fps. At an approach velocity of 2.52 fps, a fish must be at least 12.6 inches in length to avoid impingement.

Therefore, the design for a trashrack structure with a 1-inch bar spacing and a approach velocity of 2.52 fps could potentially impinge walleye between 12.6 inches and 6.3 inches in length. Walleye less than 6.3 inches in length could successfully avoid impingement by passing through the trashrack bars and walleye greater than 12.6 inches would be able to escape. It should be pointed out that the estimate of critical swimming speed for walleye is conservative. For example, while the calculated critical swimming speed of a 12 inch-long walleye is about 2.46 fps, the calculated burst speed, as calculated by Bainbridge (1961) is over 9.5 fps.

Increasing the width of the spacing between the trashrack bars would increase the numbers of fish potentially entrained through the turbine at the new powerhouse. A review of 26 turbine mortality studies (12 Kaplan turbine sites and 14 Francis

turbine sites) indicates average turbine mortality at sites with installed Kaplan turbines is 14.3 percent as compared to 24.1 percent at sites with installed Francis turbines (Eicher, 1987).

These entrainment studies have been primarily concerned with salmonid mortality. However, an entrainment mortality study performed at the Millville Hydro Station (FERC No. 2343) on the Shenandoah River, West Virginia found that 2 percent of the total smallmouth bass entrained through the 840 kW Francis type turbine were killed due to blade contact. An additional 20 percent of smallmouth bass entrained died within 24 hours after passing through the turbine; this additional mortality was related to turbine induced pressure changes and sampling gear (Energy and Environmental Management, Inc. 1987). When corrected for sampling gear mortality, the mortality rate for smallmouth bass due to entrainment declined to between 10 and 15 percent.

For a given species, factors that influence entrainment mortality at hydroelectric projects include: fish size, number of turbine blades, revolutions per second, cross-sectional area of the water passage, and blade or bucket angle (Cada 1990). Further, runner elevation, cavitation, and turbine efficiency influence pressure induced fish mortality.

Since NIMO's proposed Kaplan turbine runs at a peak efficiency over a wide range of flows and at relatively slow revolutions per minute and is of a double regulated design, we believe that NIMO's proposed turbine, when compared to other designs, would minimize the potential for entrainment mortality and injury to fish passing through the new turbine.

Since there are no anadromous fish in the Raquette River, fish passage facilities are intended for resident walleye and smallmouth bass. There is evidence to indicate that some riverine smallmouth bass in northern latitudes undertake seasonal migrations between winter and summer habitats. Langhurst and Schoenike (1990) investigated seasonal movement of smallmouth bass inhabiting the Embarrass River, Wisconsin. Radio telemetry data showed that Embarrass River adult smallmouth bass typically

migrated from upstream river reaches to downstream over-wintering areas. Radio-tagged smallmouth bass travelled up to 109 kilometers (67.6 miles). Further, angler tag-return data indicated that smallmouth bass moved from over-winter areas to over-summer areas sometime between late April and late May. No evidence was found to suggest that young-of-the-year smallmouth bass undertake a similar migration. In fact, the data seems to suggest that young-of-the year smallmouth bass inhabited upstream areas on a year-round basis (Langhurst and Schoenike, 1990).

Holland, et al. (1984) summarized studies on the interpool movement of fish passing dams on the Upper Mississippi River. The information reported indicates that the percent tagged walleye passing dams in the Upper Mississippi River ranged from

to 39 percent. In addition, other species evaluated by Holland et al. (1984) that did not exhibit significant interpool movement included smallmouth bass, largemouth bass, northern pike, and crappie. However, some of these data were limited to specific seasons. This would suggest that not all walleye and smallmouth bass would be expected to migrate downstream, and thus be subjected to entrainment mortality.

Typical smallmouth bass over-winter habitat consists of deep pools with little or no current. In late fall, Munther (1970) observed smallmouth bass in pools at least 13 feet-deep near the edge of the current. In addition, no smallmouth bass were found at depths less than 8 feet. However, Todd and Rabeni (1989) found no correlation between depth preference and season for smallmouth bass in Missouri. These difference could be a result of climatic differences between study areas. Therefore, it would appear that migrational patterns of smallmouth bass vary between locales. Summer habitat for smallmouth bass has been characterized as consisting of some form of cover (log jams and boulders) and moderate depths of 1.5 feet to 5 feet (Todd and Rabeni, 1989).

Typical walleye over-winter habitat consists of pools 5 to 10 feet deep with low current velocity. Walleye generally prefer slightly higher current velocity in the summer, as compared to winter, and variable depths. In addition, radio-telemetry data from the Ceder River in Iowa indicates that walleye may undertake seasonal movements up to 35 kilometers (21.7 miles) between summer and winter habitats (Paragamian, 1989).

Comparison of fish protection design alternatives

New Powerhouse: A comparison of NIMO's proposal and four alternative designs for a trashrack structure at the proposed new powerhouse is presented here with a discussion of their

effectiveness at preventing fish entrainment and impingement. Three of the alternatives incorporate a downstream fish passage structure (Alternatives 1,2, and 3). The trashrack design alternatives are summarized in Table 1 and Figure 1.

Table 1. Trashrack design at the existing powerhouse and comparison of trashrack design alternatives for the Yaleville Project (FERC No. 9222-001) at the new powerhouse.

	NIMO's Existing	NIMO's Proposal	Alt. 1 NIMO	Alt. 2 Interior	Alt. 3 Staff	Alt. 4 Staff
Bar Spacing (inches)	2.5	3	1	1	2	2
Approach Velocity (feet per second)	1.5	1.5-2.0	2.52	< 2.0	2.52	1.5-2.0
Angle	90è	90è	90è	45è	90è	90è
Bypass Structure	none	none	sluice	sluice	sluice	none
Potential Effects on walleye	<15.7" fish could be entrained.	<18.8" fish could be entrained.	<6.3" fish could be entrained.	<6.3" fish could be entrained.	<8" fish could be entrained.	<12.6" fish could be entrained.
	negligible impingement	fish could be impinged.	negligible impingement	fish could be impinged.	6.3"-12.6" fish could be impinged.	6.3"-8" negligible impingement
					>8" fish	

			>18.8" fish could stay in the impoundment.	could stay in the impoundment.	are passed via the sluice or could stay in the impoundment.	>12.6" fish are passed via the sluice or could stay in the impoundment.
	<8" fish could stay in the impoundment.	>15.7" fish could stay in the impoundment.				
Annual Cost	$0	$3,460	$25,500	$40,300	$24,100	$3,900

NIMO's proposed trashrack structure would physically prevent walleye larger than 18.8 inches in length from being entrained through the new powerhouse turbine. Walleye larger than 8 inches in length may be able to escape entrainment and impingement

because their swimming ability is greater than NIMO's proposed approach velocity. Since walleye less than 8 inches in length may not be able to overcome NIMO's proposed approach velocity, they could potentially be entrained through the new turbine.

Alternative 1 would physically prevent walleye larger than 6.3 inches from being entrained through the new powerhouse turbine. Walleye larger than 12.6 inches would be able to overcome the 2.52-fps approach velocity and thus avoid entrainment and impingement. Walleye between 6.3 and 12.6 inches could potentially be impinged against the trashrack structure because they would be unable to slip through the trashrack bar spacings and would not be able to overcome the 2.52-fps approach velocity. However, the provision of a downstream fish bypass structure (i.e., sluice) would offer walleye some escape from turbine entrainment.

Similarly, Alternative 2 (Interior's recommendation) would physically prevent walleye larger than 6.3 inches from being entrained. Walleye larger than 8 inches would be able to avoid entrainment and impingement because their swimming ability would allow them to overcome a 2-fps approach velocity, or they could be passed downstream via the fish bypass sluice. But, walleye between 6.3 and 8 inches could potentially be impinged against the trashrack because they would be unable to slip through the trashrack bar spacings and would not be able to overcome the 2-fps approach velocity.

Alternative 3 is an improvement on Alternative 1. Increasing the clear spacings between the trashrack bars would reduce the potential for 6.3 to 12.6-inch-long walleye to be impinged against the trashrack structure. With 2-inch bar spacings, walleye less than 12.6 inches in length would be able to pass through the spacings between the trashrack bars or bypass the turbine via the fish bypass sluice.

Alternative 4 improves upon NIMO's proposed trashrack by narrowing the clear spacings between the trashrack bars. Two-inch clear spacings between the trashrack bars would physically prevent walleye 8 inches in length from being entrained through the new turbine. In addition, an 8-inch-long walleye would possess a swimming ability that should enable it to escape

impingement and entrainment by overcoming the 2-fps approach velocity.

Based on our analysis, Alternatives 2 and 3 would result in insignificant impacts to the fishery resource. Although Alternative 2, conforming to Interior's recommended criteria, would be slightly more effective at minimizing possible entrainment than Alternative 3, Alternative 3 would be more effective at minimizing impingement. Because impingement causes

Figure 1. Size of fish that could be entrained or impinged at the existing powerhouse and with various trashrack alternatives at the new powerhouse.

greater fish mortality than entrainment 19/, we prefer trashrack designs that minimize impingement.

Also, Alternatives 2 and 3 are designed with a downstream sluice which would offer walleye and smallmouth bass some escape from turbine entrainment. Alternative 2 would provide a degree of guidance to fish migrating downstream. Incorporating a bypass sluice at the downstream end of the trashrack would provide a safer passage alternative than entrainment through the turbine. In addition, the sweeping velocity of the flow parallel to the angled trashrack face would provide additional guidance to downstream migrants. Alternative 3, while providing little or no guidance to downstream migrants, would provide a safe downstream

fish passage alternative. However, downstream migrants may experience delays in migrating because safe passage would be dependent on fish finding the bypass orifice on their own.

19/ Research investigating fish impingement often equates fish impingement with angling mortality, suggesting that impingement at a powerplant intake results in nearly 100 percent mortality, whereas entrainment offers fish at least some probability of survival.

Overall, both Alternatives 2 and 3 would result in insignificant impacts to the fishery resource.

We have also determined that flows needed to operate any downstream fish bypass structure would be between 20 and 29 cfs, based upon 2-3 percent of the total hydraulic capacity of the new turbine. Two percent of the total hydraulic capacity of a project has been commonly used to determine the flow required to operate downstream fish bypass structures. NIMO, however, estimates that a 16-cfs flow would be sufficient for the effective operation of the fish bypass structure.

Alternative 4 would be as effective as Alternative 2 or 3 at preventing entrainment and impingement. In contrast to Alternative 2 or 3, implementation of Alternative 4 would result in a minor impact to aquatic resources because Alternative 4, which does not include a downstream fish passage structure, would not allow for the safe passage of fish around the new powerhouse. Although flows in the Raquette River would exceed the maximum hydraulic capacity of the project 36 percent of the time, these flows occur mostly in the spring months. As previously stated, walleye and smallmouth bass may migrate downstream to winter holding areas during the fall months when higher flows are not as likely to occur. A further discussion on the trashrack designs and associated costs along with our recommendation for the new powerhouse is provided in section H.

Existing Powerhouse: An analysis of approach velocity, swimming speed, and trashrack bar spacings at the trashrack at the existing powerhouse indicates that the 2.5 inches bar spacing would physically prevent walleye larger than 15.7 inches from being entrained through the existing turbines. In addition, a walleye larger than 4.6 inches in length should possess a swimming ability that would enable it to avoid entrainment through the existing turbines at an approach velocity of 1.5 fps.

While walleye less than 15.7 inches could potentially be entrained through the existing turbines, impingement of walleye against the existing trashrack bars should not occur. Therefore, due to the low approach velocity, less frequent usage, smaller volume of flows used for generation as compared to the new powerhouse, and probable low entrainment and mortality rates associated with smallmouth bass and walleye, we believe that the existing trashrack structure provides adequate protection against impingement and entrainment. A further discussion on the trashrack designs along with our recommendation for the existing powerhouse is provided in section H.

4. Other Facilities to Protect Fish and Wildlife: Interior recommends that NIMO modify project structures or operation to conserve and develop fish and wildlife, as prescribed by Interior or by the state agencies. Standard article 11, which would be included in any license issued for this project, affords the

resource agencies the opportunity to recommend changes in project structures or operation for the conservation and development of fish and wildlife resources. Interior further recommends that, whenever it wishes, it may construct or improve fish and wildlife facilities at the project, at its own expense. Standard article 12, which also would be included in any project license, allows Interior to construct or to improve fish and wildlife facilities at its own expense.

5. Terrestrial Resources: As a result of the proposed powerhouse, tailrace, dike, and access road construction, 1.6 acres of upland vegetation and associated wildlife habitats would be disturbed or permanently displaced. NIMO proposes to plant grass in upland areas disturbed by project construction. Planting grass would serve to help control erosion in the construction area.

Raising the reservoir's elevation by 2 feet would inundate 1.1 acres of reservoir shoreline and associated habitats. The water surface increase would also raise the water level in 3.3 acres of the 26.5 acres of federally-designated wetlands in the proposed project's impact area.

The 1.1 acres that would be flooded would be converted from terrestrial to aquatic habitat for the life of the project. The water surface elevation fluctuation is 2.3 feet. The proposed operation would reduce the typical daily reservoir water surface elevation fluctuation to 0.33 feet. The frequency of fluctuation would also be reduced from 15 percent to 5 percent of the time. Often wetlands along reservoir shorelines are adversely affected where project operation results in short-term, daily or weekly reservoir water surface elevation fluctuation, alternately flooding and dewatering wetlands. The proposed project would reduce the reservoir water surface elevation fluctuation to a negligible amount as far as the wetlands are concerned.

Both the FWS and the DEC conclude that the proposed project would not affect state or federally-designated wetlands (letters from William Patterson, Regional Environmental Officer, Office of Environmental Project Review, Department of the Interior, Boston, Massachusetts, May 30, 1989, and Murdock M. MacKenzie, Chief, Alternate Energy Section, New York Department of Environmental Conservation, Albany, New York, March 7, 1989). We conclude that impacts to terrestrial resources and associated wildlife habitats would be very minor, and confined to the immediate area of the proposed construction activities. Accordingly, no additional mitigative or enhancement measures for terrestrial resources are necessary.

6. Cultural resources: The pin-connected lenticular metal truss bridge is the only eligible property that has been identified at or near the proposed project. We agree with the

State Historic Preservation Officer's (SHPO) recommended no-effect determination (letter from Julia S. Stokes, Deputy Commissioner for Historic Preservation, New York State Office of Parks, Recreation and Historic Preservation, Albany, New York, January 13, 1989).

Nevertheless, there is still the possibility that there could be undiscovered properties in the project area that could be adversely affected by project construction or operation. Therefore, if properties are found during project construction or operation, or if NIMO undertakes ground-disturbing activities other than those described in NIMO's application and subsequent filings, NIMO should take the following action: (a) consult with the SHPO; (b) based on consultations with the SHPO, prepare a plan describing the appropriate course of action and a schedule for carrying it out; (c) file the plan for Commission approval; and (d) take the necessary steps to protect the properties until notified by the Commission that all of these requirements have been satisfied.

7. Aesthetics: In response to recommendations from the DEC, NIMO has reconfigured the transmission system connections for its additional generating facilities to minimize visual impacts and auditory disturbances to existing private dwellings on the east side of the river. The revised arrangement eliminates the need for an additional substation at the site. The required transmission line from the new powerhouse to the existing on-site substation, located on the west side of the river, would be suspended from an existing utility pole located on an island immediately downstream of the dam. NIMO intends to plant shrubbery around the existing substation to improve its appearance (Niagara Mohawk Power Corporation, 1990).

The DEC states that the revised transmission facility arrangement and shrubbery plantings would satisfy its aesthetic concerns (personal communication, Bruce Zeisel, Senior Environmental Analyst, New York Department of Environmental Conservation, Albany, New York, April 3, 1991). We agree that no

adverse aesthetic effects to adjacent residents would be caused by the new transmission line and that the planting of shrubbery indigenous to the area would improve the appearance of the existing substation. Although the transmission line river crossing is visually undesirable, the fact that other utility lines already cross the river at this point makes it an aesthetically acceptable solution.

The DEC recommends that the on-site paper mill ruins be cleaned-up and the appearance of the project area be improved (comments by Murdock MacKenzie, Chief, Alternate Energy Section, New York Department of Environmental Conservation, September 1, 1987, site visit). NIMO intends to clean up and dispose of the mill ruins in conjunction with its on-site spoil disposal

operations and to revegetate all areas disturbed during construction (see section G.1). These measures would protect and enhance the aesthetic quality of the site and, therefore, should be implemented as part of the licensee's site restoration efforts.

8. Recreation facilities: NIMO proposes a conceptual plan for recreation facilities at the project that includes a canoe portage (with a put-in and take-out), picnic area, and parking area. Interior and the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) consider the plan acceptable.

In a March 7, 1989, letter, the DEC generally approves the recreation plan, but asks for access to accommodate a wider range of boating needs. The DEC says that bank fishing should be allowed along the full length of the proposed new tailrace, and suggests replacing the proposed concrete retaining wall on the east bank of the tailrace with 1:2 sloped rip-rap along the entire shoreline reach now occupied by mill ruins. The DEC also requests boating access to the Yaleville impoundment.

NIMO's response to the DEC states that tailrace fishing access would be provided at the proposed canoe put-in, which would be cut into the bank to create a safe fishing area. NIMO also says that the proposed canoe portage could also be used for cartop boat access to the Yaleville impoundment. Finally, NIMO states that using sloping rip-rap versus the concrete retaining wall, as proposed, would add off-site disposal and installation costs to the project, and that allowing public access to the immediate tailrace would not be safe.

The NIMO plan would enhance public access and recreation opportunities on the Raquette River since there are currently no recreational facilities at this site. However, NIMO's plan to restrict bank fishing access (for safety reasons) should be limited to those areas that are identified hazards. Since the east powerhouse would be a new development, such hazardous areas could only be identified once the project is operational. The

entire east bank tailrace might be made safe and accessible through the provision of fencing or handrails.

Therefore, we recommend that NIMO construct the recreation facilities as proposed, which include a canoe portage with put-in and take-out, parking area, and picnic area. Additionally, once the project is operational, NIMO should consult with the Commission's New York Regional Office and the DEC regarding tailrace areas that should be restricted for safety reasons. If no such areas are identified, NIMO should provide safe fishing access along the entire east bank tailrace.

H. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the Federal Power Act (Act), require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a proposed project, recreation, fish and wildlife, and other nondevelopmental values of the waterway are considered equally with power 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.

1. Recommended Alternative

We (the staff) examined the proposed project, the proposed project with Interior's and our additional mitigative and enhancement measures, and the no-action alternative (maintaining existing conditions). The recommended option is to issue a license with our additional mitigative and enhancement measures. We recommend this option because: (1) with mitigation, the environmental effects of constructing and operating the new powerhouse would be minor; (2) the proposed enhancement measures would benefit environmental and recreational resources; and (3) the additional electricity that would be generated from a renewable resource would be beneficial because it would reduce the use of fossil-fueled, electric generating plants, conserve nonrenewable energy resources, and reduce atmospheric pollution and global warming.

Our analysis and the Safety and Design Assessment evaluates and compares the effects of constructing and operating NIMO's proposal, and discusses measures we recommend to protect, mitigate, and enhance environmental resources at the project. The mitigative and enhancement measures that we recommend include: (1) preparation of a final sediment and erosion control plan that includes installation of silt fences during construction, revegetation of disturbed areas, and disposal of the existing mill ruins; (2) immediate run-of-river project operation to minimize upstream and downstream water-level fluctuations for the protection and enhancement of aquatic resources; (3) preparation of a flow monitoring plan to ensure

compliance with run-of-river operation; (4) installation of a trashrack set at 90 degrees (perpendicular) to the direction of flow with 2-inch bar spacing, and a 2.0 feet per second (fps) approach velocity at the proposed new powerhouse for the protection of resident fishes (see staff's Alternative 4, table 1); and (5) construction of recreation facilities to provide public access to the Raquette River at the project.

2. Developmental and Nondevelopmental Uses of the Waterway

With the exception of operating the project in a run-of-river mode immediately, and installing our recommended trashrack design at the new powerhouse, NIMO has agreed to the recommended

mitigative and enhancement measures and has included the costs associated with these measures in project cost estimates. As stated in section G.2., the cost of operating run-of-river immediately, rather than waiting until the new powerhouse is completed, is insignificant (a total of $285 over the anticipated 2-year construction period). The costs of the alternative trashrack designs vary considerably and are, therefore, discussed in detail below.

We performed an economic analysis of the proposed new Yaleville powerhouse and of the various trashrack design alternatives. NIMO's proposed construction of the new powerhouse and the necessary modifications to the existing structures would cost about $3.9 million at 1994 price levels, the year that NIMO expects to place the new project in operation. The levelized value of the new capacity and energy would total about $623,000 per year. The levelized annual cost of the new construction and energy production would total about $622,000 per year for the term of the license. Therefore, the investment in the proposed new capacity would be close to the economic break-even point. Any significant addition in cost to the proposed enlargement of the project would make it more costly than the expense of alternative generation, and thus, would increase the cost of electricity to the ratepayers.

We have analyzed the costs and benefits of 5 trashrack designs at the new powerhouse. The costs of NIMO's proposal and the alternatives are as follows:

	Approach Velocity	Bar Angle	Bar Spacing	Capital Cost	Annual Levelized Cost
Proposed	1.5-2.0 fps	90è	3"	$ 30,000	$ 3,460
Alt. 1	2.52 fps	90è	1"	$ 99,000	$25,500
Alt. 2	2.0 fps	45è	1"	$227,000	$40,300
Alt. 3	2.52 fps	90è	2"	$ 87,000	$24,100
Alt. 4	1.5-2.0 fps	90è	2"	$ 34,000	$ 3,900

Alternatives 1, 2, and 3 include a sluiceway for downstream fish passage. The average annual energy loss from the 25 cfs that NIMO estimates would be needed to operate the sluiceway would be about $14,100 per year. This amount is included in the annual cost figures for Alternatives 1, 2, and 3.

The annual cost of Alternative 4 is $440 more than NIMO's proposed trashrack design for the new powerhouse. This is not a significant additional cost, and could be incurred while still allowing the new facility to operate near the break-even point. The annual cost for Alternatives 1-3, $25,500, $40,300, and $24,100, respectively, would be significant, and would render the new facility uneconomical.

As discussed in section G.3., Fish protection, the effectiveness of the five trashrack designs at preventing fish entrainment and impingement and at moving fish downstream varies. NIMO's original proposal and Alternative 1 would provide the least protection from fish being entrained and impinged. Alternatives 2 and 3 would provide the greatest fish protection and downstream fish movement. Alternative 4, although not containing a sluiceway for downstream fish passage, would protect a broad range of fish from entrainment and impingement because of its bar spacing and approach velocity.

We do not believe that downstream fish passage structures are needed at either the existing or the proposed powerhouse at this project because: (1) a high-quality resident fishery has developed alongside extensive hydroelectric development on the Raquette River; (2) there is no substantial evidence that seasonal migration of walleye and smallmouth bass is a necessary component of either species' life history, nor have we any indication that summer or winter habitat is a limiting factor stimulating migratory behavior in walleye or smallmouth bass in the Raquette River 20/; (3) there is potential for downstream fish passage at this project through spillage without the installation of specific fish passage structures 21/; and (4) the Kaplan turbine that would be installed at the new powerhouse would be less damaging to any fish that may be entrained than the older, Francis turbines of the existing powerhouse (see section G.3.).

We conclude, on balance, that for the new powerhouse the installation of trashrack design Alternative 4 would be in the best public interest because it would prevent entrainment and impingement of most fish (we expect only minor adverse effects) without rendering the new powerhouse development uneconomical. Although the trashrack design alternatives that include a sluiceway would provide safer downstream fish passage, any small reduction in entrainment and impingement of fish with such designs would not justify losing the additional power benefits that would result from making the new powerhouse development uneconomical. Therefore, we are recommending Alternative 4 - a

trashrack oriented at 90 degrees to the direction of flow, with

20/ Although there is some evidence that walleye and smallmouth bass move seasonally between winter and summer habitats, there is no evidence that this is true for Raquette River walleye and smallmouth bass.

21/ As stated previously in section G.2., walleye and smallmouth bass may migrate downstream to over-wintering areas during late fall. Based on the hydraulic capacity of the proposed Yaleville Project, spillage would occur 20 to 25 percent of the time during the month of October.

two-inch spacing between the bars and an approach velocity of two feet per second or less. Regarding the existing powerhouse, we conclude, based on our analysis in sections G.3 and H.2, that the existing trashrack provides adequate protection against entrainment and impingement and that downstream fish passage structures are not needed.

Licensing the Yaleville project with our recommended measures would provide several benefits. The existing powerhouse would continue to provide annual generation of about 3,820 MWh of electricity. The new powerhouse would provide an additional 5,350 MWh each year for a total annual project output of 9,170 MWh. The additional 5,350 MWh/year would be beneficial, since it would reduce the need for producing energy from fossil-fueled, electric-generating plants, thus conserving nonrenewable energy resources and reducing atmospheric pollution. 22/ Cleaning-up the existing mill ruins and revegetating disturbed areas as part of the overall erosion and sedimentation control plan would protect and enhance the aesthetic quality of the site. Run-of-river operation would maintain the natural volume and periodicity of water flow below the project and would minimize water-level fluctuations in the impoundment. Finally, the provision of recreation facilities where none currently exist would improve public access to the Raquette River.

Based on our review of the agency and public comments filed on this project, and on our independent analysis pursuant to sections 4(e), 10(a)(1) and 10(a)(2) of the Act, we find that the proposed Yaleville Project is best adapted to a comprehensive plan for the proper use, conservation, and development of the Raquette River and other project-related resources.

22/ The production of power via fossil fuel combustion equivalent to the power that would be produced at the proposed new powerhouse would release about 1.20 tons of sulfur dioxide, 10.30 tons of nitrous oxides, 1.03 tons of carbon monoxide, and 6,243 tons of carbon dioxide into the atmosphere annually. Sulfur dioxide and nitrous oxide are considered significant contributors to the production of acid rain. Carbon dioxide is considered to be a significant contributor to global warming.

I. ENVIRONMENTAL IMPACTS

1. Assessment of impacts expected from the applicant's proposed project (P), with the applicant's proposed mitigation and any conditions set by a federal land management agency; the proposed project with any additional mitigation recommended by the staff (Ps); and any action alternative considered (A). Assessment symbols indicate the following impact levels:

O = None; 1 = Minor; 2 = Moderate; 3 = Major;
A = Adverse; B = Beneficial; L = Long-term; S = Short-term.

Resource	Impact P	Impact Ps	Impact A	Resource	Impact P	Impact Ps	Impact A
a. Geology-Soils	2AS	1AS		f. Wildlife	0	0	
				g. Cultural:			
b. Streamflow	1BL	1BL		Archeological	0	0	
c. Water quality:							
Temperature	0	0		Historical	0	0	
Dissolved							
oxygen	0	0		h. Aesthetics	1AS/2BL		
Turbidity and							
sedimentation	2AS	1AS		i. Recreation	2BL	2BL	
d. Fisheries:							
Anadromous	0	0		j. Land use	0	0	

Resident	1AL	1AL	k. Socioeconomics	0	0
e. Vegetation	0	0			

Remarks: a. and c. Moderate, short-term erosion, sediment, and turbidity impacts would result from project construction activities using NIMO's proposed control measures. Our recommendation to modify the control plan, prepare the final drawings and specifications for implementing the plan in consultation with appropriate resource agencies, and base the control measures on the final project design would ensure that the control measures, when implemented, would reduce the potential for erosion, sediment, and turbidity impacts to minimal levels.

b. Operating the project run-of-river, as opposed to pulsing, would result in the flows in the Raquette River more closely resembling the natural inflow to the project.

d. Stabilizing the impoundment elevation would benefit resident fish. Minor, adverse effects to the resident fishery

would occur as a result of entrainment and impingement mortality at the new powerhouse. Installing our recommended trashrack at the new powerhouse would lessen these impacts. This minor impact would slightly increase cumulative adverse affects to walleye and smallmouth bass on the Raquette River. 23/

h. Minor, adverse, aesthetic effects would be caused during the construction period as a result of: (1) the noise and dust from on-site machinery and equipment operation; (2) increased vehicular traffic to and from the project site; and (3) the unsightly appearance of construction laydown areas, exposed earthworks, cofferdams, and construction debris. The aesthetic quality of the project area would be improved as a result of: (1) the clean-up of the mill ruins; (2) the planting of shrubbery around the existing substation; and (3) the proposed run-of-river operation of the project. These beneficial, long-term, aesthetic effects would be only slightly offset by the minor visual intrusion caused by the transmission line river crossing.

i. Providing public access facilities where none currently exist would be a long-term benefit for users of the project area.

J. PRELIMINARY DETERMINATION OF CONSISTENCY WITH FISH AND WILDLIFE RECOMMENDATIONS.

Pursuant to section 10(j) of the Act, we are making a preliminary determination that the recommendations of the Federal and state fish and wildlife agencies are inconsistent with the purpose and requirements of Part I of the Act or other applicable law. Specifically, we believe that Interior's recommendation that trashracks and downstream fish passage structures be installed and maintained at both the existing powerhouse and at the new proposed powerhouse and that the trashrack design at both powerhouses include 45-degree angled trashracks with a bar spacing of 1 inch or less, an intake velocity of 2 feet per

second (fps) or less, and fish bypass chutes to pass fish downstream may be inconsistent with section 10(a) and 313 of the Act. This recommendation is inconsistent with section 10(a) because the additional costs associated with this recommendation would make the proposed enlargement of the project more costly

23/ Since walleye and smallmouth bass reside at many points along the Raquette River, not all fish would be subject to the cumulative mortality of the 20 hydroelectric projects on the river. Also, only a portion of the entire population would be subject to impingement and entrainment because, as suggested by Langhurst and Schoenike (1990), not all individuals would undertake seasonal movement between summer and winter habitat.

than the expense of alternative generation, and thus would make the project financially infeasible.

The recommendation for downstream fish passage structures lacks substantial evidence pursuant to section 313 (b) of the Act. Since there are no anadromous fish in the Raquette River in the project vicinity, it is our understanding that downstream fish passage facilities are recommended for protection of walleye and smallmouth bass in the Raquette River. Although there is some evidence to indicate that walleye and smallmouth bass undertake seasonal movements between summer and winter habitats, especially if habitat type is limiting, we have no indication that this is true for walleye and smallmouth bass in the Raquette River. Further, walleye and smallmouth bass have no migratory life history requirement, nor have we any indication that summer or winter habitat is a limiting factor which may stimulate migratory behavior in walleye or smallmouth bass populations in the Raquette River. Therefore, we believe that downstream fish passage structures (i.e., fish bypass chutes) are not justifiable at the project.

In lieu of Interior's recommendations, we will recommend, for inclusion in any license issued by the Commission, that the licensee install, operate, and maintain a trashrack at the new powerhouse that is oriented perpendicular to flows, with 2-inch spacings between the trashrack bars, and an approach velocity of 2.0 fps or less. We further recommend that no modifications to the existing trashrack at the existing powerhouse are necessary.

K. CONCLUSION

1. X Finding of No Significant Impact. Approval of the recommended alternative [H(3)] would not constitute a major federal action significantly affecting the quality of the human environment; therefore, an environmental impact statement (EIS) will not be prepared.

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Form L-14
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR
UNCONSTRUCTED MINOR 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 works shall be constructed 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.

Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibets insofar as necessary to

show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations 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 a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any features or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work 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 allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee

shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such

properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States

Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and suf-
ficient 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 7. 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 8. The Licensee shall, after notice and opportunity
for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power

systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 9. 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 10. 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 11. 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 12. 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 13. 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 14. 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 the 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 15. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, 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. Upon approval of the clearing plan 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 statues and regulations.

Article 16. 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 17. 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 pro-

ject 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 18. 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 19. 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.

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