

## **51 FERC ¶62,314, Holyoke Economic Development and Industrial Corporation, , Project No. 10806-000 - Massachusetts, (Jun. 29, 1990)**

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**Holyoke Economic Development and Industrial Corporation, , Project No. 10806-000 - Massachusetts [63,510]**

**[¶62,314]**

**Holyoke Economic Development and Industrial Corporation, , Project No. 10806-000 - Massachusetts Order Issuing License (Minor Project)**

**(Issued June 29, 1990)**

**Fred E. Springer, Director, Office of Hydropower Licensing.**

Holyoke Economic Development and Industrial Corporation filed a license application under Part I of the Federal Power Act (Act) to construct, operate and maintain the Station No. 5 Project located on the second level canal on the west bank of the Connecticut River, in Hampden County, Massachusetts. The Connecticut River is a navigable waterway of the United States.<sup>1</sup>

Notice of the application has been published. No protests were filed in this proceeding, and no agency objected to issuance of this license. Comments received from interested agencies and individuals have been fully considered in determining whether to issue this license. A motion to intervene was filed by the Holyoke Water Power Company (HWP) in order to be a party in this proceeding. HWP also requests that any license issued which utilizes HWP's Holyoke Canal System water be conditioned to require cooperation with HWP as the licensee for the Hadley Falls Project No. 2004. Article 202 is included to provide for appropriate cooperation.

### *Comprehensive Planning*

Sections 4(e) and 10(a)(1) of the Act require the Commission to consider and balance in the public interest, all uses of the waterway on which a project is proposed. Neither we nor the resource agencies have identified any conflicts between development and operation of the Station No. 5 Hydroelectric Project, as proposed by EDIC and (a) the environmental values of the project area or (b) other beneficial public uses of the waterway.

The proposed project would generate about 2,009 megawatthours (MWh) of electric energy per year. This power would displace fossil-fueled electric power plant generation, improve air quality, and conserve fossil fuels.

We have evaluated the effects of the proposed project on the resources of the project area and have found that the proposed project would have only minor, short-term adverse impacts as a result of resuspension of sediments during construction activities and project start-up.

No alternative was identified that would better use the project resources in terms of providing power and environmental benefits without significant environmental cost. We considered one alternative to licensing the Station No. 5 Hydroelectric Project -- no action. We concluded that denying the project application is not the recommended alternative for two reasons. (1) The environmental effects of rehabilitating and operating the project would be minor and short-term. (2) The electricity generated from a renewable resource would be used by Holyoke Electric, thus reducing the use of existing fossil-fueled generating plants and thereby conserving nonrenewable primary energy resources and reducing atmospheric pollution.

Section 10(a)(2) of the Act requires the Commission to also 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 eight

comprehensive plans that address various resources in Massachusetts. Of these, we identified and reviewed four plans relevant to this project.<sup>2</sup> No conflicts were found.

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Based upon a review of the agency and public comments filed in this proceeding, and on our independent analysis pursuant to Sections 4(e), 10(a)(1), and 10(a)(2) of the Act, we conclude that the Station No. 5 Hydroelectric Project is best adapted to a comprehensive plan for the Connecticut River.

*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 Safety and Design Assessment attached to this order.

The Director, Office of Hydropower Licensing, concludes 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 Holyoke Economic Development and Industrial Corporation (licensee), for a period of 40 years, effective the first day of the month in which this order is issued, to construct, operate and maintain the Station No. 5 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, enclosed by the project boundary shown by exhibit G:

Exhibit G-	FERC No.	Showing
Sheet 1	10806-4	Project Boundary
Sheet 2	10806-5	Project Boundary

(2) Project works consisting of: (a) a gated intake with trashracks located on the Second Level Canal of the Holyoke Water Power Company; (b) two 75-foot-long, 6.5-foot-diameter, steel penstocks; (c) a refurbished single-runner, vertical Kaplan turbine connected to a 790-kW generator; (d) a 375-foot-long, 16.5-foot-wide by 11-foot-high arched brick-lined tailrace tunnel; (e) a steel gate where the tailwater empties into the Connecticut River; (f) a 4.8-kilovolt, 370-foot-long interconnection with the Holyoke Gas and Electric Department's underground service line, and (g) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of exhibits A and F recommended for approval in the attached Safety and Design Assessment.

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

(C) The exhibit G described above and those sections of exhibits A and F recommended for approval in the attached Safety and Design Assessment 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) [reported at 54 FPC 1876], 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 the following annual charge, effective the first day of the month in which this license is issued:

For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 1,050 horsepower.

*Article 202.* The licensee shall cooperate with the licensee for Project No. 2004 in order that the conditions of Article 16 of the license for Project No. 2004 can be fulfilled.

*Article 203.* The licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary

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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 2 years from the issuance date of the license and shall complete construction of the project within 4 years from the issuance date of the license.

*Article 302.* The licensee, at least 60 days before start of construction, shall submit one copy, to the Commission's Regional Director and two copies to the Director, Division of Dam Safety and Inspections, of the final contract drawings and specifications for pertinent features of the project, such as the power facilities, water conveyance structures, and all necessary transmission facilities. The Director, Division of Dam Safety and Inspections, may require changes in the plans and specifications to ensure a safe and adequate project.

*Article 303.* The licensee, within 90 days of completion of construction, shall file for Commission approval, 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 system.

*Article 304.* The licensee shall review and approve the design of contractor-designed cofferdams and deep excavations before the start of construction and shall ensure that construction of the cofferdams and deep excavations is consistent with the approved design. At least 30 days before start of construction of any cofferdam, the licensee shall submit to the Commission's Regional Director, and the Director, Division of Dam Safety and Inspections, one copy each of the approved cofferdam construction drawings and specifications and letter(s) of approval.

*Article 401.* The licensee, after consulting with the Massachusetts Division of Fisheries and Wildlife (DFW) and the U.S. Fish and Wildlife Service (FWS), but at least 90 days prior to the start of project construction, shall file for Commission approval a schedule for undertaking any in-water rehabilitation construction work and silt cleaning operations that ensures that in-water rehabilitation construction work and silt cleaning operations do not occur during spawning runs of anadromous fish species. The Commission reserves the right to require changes to the schedule.

*Article 402.* The licensee, after consulting with the Massachusetts Division of Fisheries and Wildlife (DFW) and the U.S. Fish and Wildlife Service (FWS), shall develop a plan for installing, operating, and maintaining

a trashrack structure to reduce entrainment of anadromous fish. The licensee, at least 90 days prior to the start of project construction, shall file for Commission approval functional design drawings of the project trashrack structure and a plan and schedule for installing the trashrack. This filing shall include, but not be limited to: (1) specifications of the size of the openings between the trashrack bars, which are not to exceed 1 inch, and the maximum intake approach velocity; (2) a description of the methods and schedule for installing the trashrack; and (3) documentation of consultation with DFW and FWS and written comments and recommendations from these agencies on the plan and schedule. The Commission reserves the right to require changes to the functional design drawings and the construction schedule. The licensee shall file as-built drawings of the trashrack pursuant to article 303.

*Article 403.* Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretary of the Interior pursuant to section 18 of the Federal Power Act.

*Article 404.* The licensee, before starting any activities within the project boundaries, other than those specifically authorized in this license, with the potential for affecting properties listed on or eligible for listing on the *National Register of Historic Places* -- in particular the Holyoke canal system and the Valley Paper Company's existing mill works--shall consult with the Massachusetts 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 land-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 prepared by a qualified cultural resource specialist after having consulted with the SHPO. The management 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*

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*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, until informed that the requirements of this article have been fulfilled.

*Article 405.* (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) noncommercial 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) nonproject 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

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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) nonproject 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 is final unless appealed to the Commission by any party within 30 days from the issuance date of this order. Filing an appeal does not stay the effective date of this order or any date specified in this order. The licensee's failure to appeal this order shall constitute acceptance of the license.

**Environmental Assessment**  
**Federal Energy Regulatory Commission**  
**Office of Hydropower Licensing**  
**Division of Project Review**  
**June 25, 1990**  
**Station No. 5 Hydroelectric Project**  
**FERC Project No. 10806-000**

**[63,515]**

*A. Application*

1. Application type: Minor license, existing dam
2. Date filed with the Commission: June 15, 1989
3. Applicant: City of Holyoke, Economic Development and Industrial Corporation (EDIC)
4. Water body: Holyoke canal River basin: Connecticut
5. Nearest city or town: Holyoke (See figure 1.) <sup>1</sup>
6. County: Hampden State: Massachusetts

## B. Purpose and Need for Action

### 1. Purpose.

The Station No. 5 Hydropower Project would generate an estimated 2,009 megawatthours (MWh) of electric energy per year, which would be sold to and used by the City of Holyoke Gas and Electric Department (Holyoke Electric) in its system.

### 2. Need for power.

A need for the power produced from a proposed project can be defended only when an alternative source capacity and energy equal to that of the proposed project would be needed to meet forecasted future load growth and to maintain adequate reserve margins required for reliability of power supply, in the event the proposed project cannot be developed. In such cases, the need can be that of a reliability council area, an area "islanded" by transmission constraints, an individual electric utility, or an industry with special requirements.

The proposed project, if developed, would have a capacity of only 790 kilowatts (kW). This capacity and the associated energy would be purchased by Holyoke Electric. Holyoke Electric is currently purchasing large amounts of power from sources with high-capacity facilities, such as NEPEX, Northeast Utilities, Central Maine Power, and others; and, as a result could easily purchase additional power equivalent to the output of the proposed project. We cannot, therefore, claim there is a need for the power output of the proposed project to enable any utility to meet its system load or reserve requirements.

We can claim there is always a need for power from new renewable resources, such as the proposed project, to displace fossil-fueled power generation and its related atmospheric pollution, and to provide long-term economic benefits to Holyoke Electric's customers.

## C. Proposed Project and Alternatives

### 1. Description of the proposed action. (See figure 2.)

The existing facilities were installed in the Valley Paper Company Building in 1931 and remained in good working order until 1972. However, the project has not been operated since that time, and now requires some rehabilitating, particularly at the intake structure.

EDIC proposes to remove the gates, penstock opening frames, gate guides and support framework, trashrack support structure, trashrack platform, and the top beams and panels of the ice fender; install new concrete headwalls with guides for new slide gates, to be made of aluminum or steel, with manual operators and mounting frames; install a new steel trashrack in a new mounting structure made of wood or steel; sandblast and waterproof the penstocks; and remove rock debris that has accumulated in the existing tailrace tunnel. The cost of rehabilitating the project is estimated to be \$807,000.

The proposed project would consist of the following new and existing facilities: (1) a new gated intake with new trashracks located on the second level of the Holyoke canal; (2) two existing 75-foot-long, 6.5-foot-diameter, steel penstocks; (3) a refurbished 1931 single-runner, vertical Kaplan turbine directly coupled to a rewound 790-kW generator; (4) an existing 375-foot-long, 16.5-foot-wide by 11-foot-high arched brick-lined tailrace tunnel that terminates at a large concrete outfall structure; (5) an existing steel slide gate operated by threaded stem operators that provide closure of the tailrace tunnel at the Connecticut River; (6) an existing 4.8-kilovolt, 370-foot-long underground cable interconnecting with Holyoke Electric's distribution system; and (7) other necessary facilities. The Holyoke Water Power Company (HWPC) controls flows from the Connecticut River into the canal system under a FERC major license granted to the Hadley Falls Project, Project No. 2004.

### 2. Applicant's proposed mitigative measures.

EDIC proposes to use a steel, sheet-pile cofferdam to dewater the intake construction site, and to schedule work on the intake structure and silt removal during low-flow periods, if possible, during the annual dewatering of the Holyoke canal. The proposed project's intake opening plans include restoring trashracks with 1-inch slot width spacing between bars.

### 3. Federal lands affected.

No.

4. Alternatives to the proposed project.

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- a. No reasonable action alternatives have been found.
- b. Alternative of no action.

The alternative to the proposed action is denial of a license to redevelop and operate the proposed project. Although that would have little effect on the adequacy of electric power supply for the City of Holyoke or for the surrounding area, it would have effects that are not in the public interest. Approximately 2,000 MWh's of the Connecticut River's renewable and nonpolluting energy would be needlessly foregone every year. Moreover, the equivalent energy would have to come, largely or totally, from fossil-fueled plants -- amounting to a failure to reduce both the consumption of non-renewable energy resources and atmospheric pollution.

**D. Consultation and Compliance**

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

- a. U.S. Fish & Wildlife Service: Yes.
- b. State(s): Yes.
- c. National Marine Fisheries Service: Yes.

2. Section 7 consultation (Endangered Species Act).

- a. Listed species: Present.
- b. Consultation: Not required.

Remarks: The federally listed endangered shortnose sturgeon under the jurisdiction of the National Marine Fisheries Service (NMFS) inhabits the lower segment of the Connecticut River from the river's mouth upstream to the Holyoke dam. A small landlocked population is found in the pool above the Holyoke dam (Taubert, 1980). Dadswell *et al.* (1984) estimated that between 800 and 1,000 shortnose sturgeon inhabit the lower portion of the Connecticut River, below Holyoke. By letter dated April 13, 1989, the NMFS states that the project is not likely to adversely affect the shortnose sturgeon. Further, the NMFS reports that due to the proposed 1-inch trashrack spacing, any sturgeon which might enter the canal would be prevented from entrainment into the project (personal communication, Chris Mantzaris, staff, National Marine Fisheries Service, Gloucester, Massachusetts, June 13, 1989).

3. Section 401 certification (Clean Water Act).

Required; applicant requested certification on 05/31/89.

Status: Granted by the certifying agency on 08/16/89.

4. Cultural resource consultation (Historic Preservation Act).

- a. State Historic Preservation Officer: Yes.
- b. National Park Service: Yes.
- c. *National Register* status: Eligible or listed.
- d. Council: Not required.
- e. Further consultation: Not required.

Remarks: The project is adjacent to the Holyoke canal System, a property listed in the *National Register of Historic Places*; and in the Valley Paper Company's existing mill works, an eligible property. The project would not affect the canal system, the mill works, or any other *National Register* or eligible properties. The SHPO concurs with this finding (letter from Valerie A. Talmage, Executive Director, Massachusetts Historical Commission, and State Historic Preservation Officer, Boston, Massachusetts, November 1, 1988).

5. Recreational consultation (Federal Power Act).

- a. U.S. Owners: No.
- b. National Park Service: Yes.
- c. State(s): Yes.

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

Status: None.

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

Status: None.

E. *Comments*

1. The following agencies and entities provided comments on the application or filed a motion to intervene in response to the public notice dated 03/20/89.<sup>2</sup>

*Commenting agencies and other entities--Date of letter*

Department of the Army, New England Division Corps of Engineers--March 20, 1990

Department of the Interior--March 22, 1990

*Motions to intervene--Date filed*

Holyoke Water Power Company--03/28/90

2. The applicant did not respond to the comments or motion(s) to intervene.

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F. *Affected Environment*

1. General description of the locale. (See figure 3.)

a. Description of the Connecticut River Basin.

The Connecticut River Basin, with a drainage area of 11,765 square miles, is the largest river basin in New England. Extending from the northernmost part of New Hampshire to Long Island Sound, the river basin has a maximum length in a north-south direction of about 280 miles and a maximum width of about 62 miles. The total drainage area of the basin is 11,765 square miles. The principal tributaries to the main stem Connecticut River, by state, are the Passumpsic, White, West, Ottauquechee, and Black Rivers in Vermont; the Ammonoosuc, Mascoma, Ashuelot, and Sugar Rivers in New Hampshire; the Millers, Deerfield, Chicopee, and Westfield Rivers in Massachusetts; and the Farmington River in Connecticut.

This complex of rivers and tributaries constitutes one of the most extensively developed hydropower systems in the U.S. There is now a major effort by federal, state, and private sectors to restore Atlantic salmon to the Connecticut River Basin.

The project is located in a heavily industrialized setting between the second level of the Holyoke canal system and the Connecticut River. The climate is typical of inland Connecticut and Massachusetts with an average temperature of 49.8 degrees Fahrenheit and an average annual precipitation of 44.39 inches.

b. Number of major and minor licensed, and exempted projects in the Connecticut River basin as of June 5, 1990.

Major licensed 37

Minor licensed 46

Exempted 45

c. Number of pending applications for major or minor licenses, and for exemptions in the Connecticut River basin as of June 5, 1990.

Pending major license 2

Pending minor license 3

Pending exemption 2

d. Cumulative impacts.

A target resource is an important resource that may be cumulatively affected by multiple development within a basin.<sup>3</sup>

We have identified Atlantic salmon and American shad as target resources in the Connecticut River Basin (Federal Energy Regulatory Commission, 1986). These and other anadromous fish species are known to migrate upstream and downstream in both of two yearly periods -- from April through July, and again during September and October. <sup>4</sup>

Atlantic salmon and American shad were selected because of the regional significance and geographic distribution of this species within the river basin. This anadromous fishery resource is described below in section F(2d). We discuss impacts to Atlantic salmon and American shad in section G.

## 2. Descriptions of the resources in the project impact area <sup>5</sup>

a. *Geology and soils*: Bedrock in the project area is interbedded sandstone, shale, conglomerate, and basaltic lava. The glacial till deposits that lie on the glaciated surface of the bedrock are overlain by varied glacial lake deposits. The original dry, sandy, surface soils in the project area have been highly altered by construction of the project and by fill and construction activities associated with urban development of the area.

b. *Streamflow*: Waterflow in the canal system is controlled at the canal gatehouse to supply necessary water to various hydropower and industrial facilities along the canal. The amount of flow entering the canal system ranges from no flow, when the gatehouse is shut down, to 5,155 cubic feet per second, which is the maximum hydraulic capacity of the canal.

c. *Water quality*: The Connecticut River upstream of Holyoke dam is classified as Class B water by the Massachusetts Division of Water Pollution -- i.e., suitable for primary and secondary contact recreation and fish and wildlife resources. Class B water must have dissolved oxygen (DO) levels greater than 5.0 milligrams per liter (mg/l) and a pH between 6.5 and 8.0. The water in the Holyoke canal

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system is classified as Class C -- i.e., suitable for secondary contact recreation and fish and wildlife resources, and must have a DO level greater than 5.0 mg/l and a pH between 6.5 and 9.0 standard units. Water in the project area conforms to the state water quality standards.

#### d. *Fisheries*:

Anadromous: Present.

Anadromous fish species found in the Connecticut River in the vicinity of the project include American shad, Atlantic salmon, blueback herring, sea lamprey, striped bass, shortnose sturgeon, and American eel (catadromous).

Resident: Present.

Resident fish species found in the Connecticut River in the vicinity of the project include carp, channel catfish, smallmouth bass, largemouth bass, spottail shiner, white perch, bluegill, rainbow trout, and brown trout.

e. *Vegetation*: The project would be located in an urban area. Vegetation in the immediate area of the project consists of weedy grasses and forbs. Near the river is a strip of trees consisting of immature red and sugar maple, box elder, birch, ash, and hickory. Also present are shrubs -- viburnum and poison ivy.

f. *Wildlife*: Available habitat restricts species present to urban tolerant species such as squirrels, mice, raccoons, rats, cardinals, and sparrows.

g. *Cultural*: There are properties listed on, or eligible for listing on, the *National Register of Historic Places* in the project impact area. They are the Holyoke canal system and the Valley Paper Company's existing mill works.

Description: The canal system, a contributing element in the Holyoke Canal Historic District, is listed on the *National Register of Historic Places* and is within the area of the project's potential environmental impact. The portion of the canal in the project area was constructed between 1854 and 1857. The existing mill works are eligible for listing on the *National Register*.

h. *Visual quality*: The project is in an industrial area. Its appearance is consistent with that of the surrounding buildings and structures.

i. *Recreation*: The immediate project area receives no significant recreational use because of its location in a highly industrialized area. No recreational facilities are located at the project. Recreational facilities are currently available at Riverside Park 2.4 miles downstream, at Jones Park 1.7 miles upstream, and at the Hadley Falls Hydroelectric Project 0.4 miles upstream.

j. *Land use*: The proposed project is located in an industrial setting consisting of mill buildings, a 3-level canal system providing water for power generation, and access roads and bridges.

k. *Socioeconomics*: The socioeconomic well-being of the area is influenced by industrial and urban development.

#### G. *Environmental Issues and Proposed Resolutions*

There are 6 issues addressed below.

1. *Construction-related sedimentation*: Although EDIC reports that no bottom sediments would be excavated or dredged from the tailrace, some minor disturbance of sediments would occur when rock debris is removed from the tailrace. Out of a concern for the effects of resuspended sediments on water quality and migrating anadromous fish, MDFW recommends that EDIC schedule its in-water construction around upstream and downstream anadromous fish migrations (letter from Mark Tisa, Coordinator, Anadromous Fish Program, Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Field Headquarters, Westborough, Massachusetts, October 12, 1988).

EDIC proposes to use a cofferdam for its in-water construction, and to schedule in-water construction to coincide with periods when flows are low, and anadromous fish are not migrating upstream or downstream -- i.e., any time of the year other than mid-April to mid-July and during the months of September and October. The licensee after consulting with the MDFW and the U.S. Fish and Wildlife Service (FWS), should file for Commission approval a schedule for undertaking any in-water rehabilitation construction work and silt cleaning operations that ensures that such work does not conflict with spawning runs of anadromous fish species.

2. *Cumulative impacts on Atlantic salmon and American shad resulting from developing several hydropower projects in the Connecticut River Basin*: Atlantic salmon and American shad are currently a primary target species for a major federal, state, and private sector restoration effort. The goal of the restoration program is to provide and to maintain a sport fishery for Atlantic salmon and American shad in the Connecticut River, and to restore and maintain spawning populations in selected tributaries (Federal Energy Regulatory Commission, 1986).

The basin's seaward-migrating salmon smolts, adult shad, and juvenile shad pass numerous hydropower developments where

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they may become entrained and impinged, during the months indicated below. <sup>6</sup>

*Migrating species and life stage--Months when downstream migration occurs*

adult Atlantic salmon (post-spawning)--November to mid-April <sup>7</sup>

Atlantic salmon smolt--April and May

adult American shad--June and July

juvenile American shad--September and October

The more hydropower facilities outmigrating fish have to pass, the greater the risk of fish losses. Among these hydropower facilities are the Holyoke dam and the canal system.

When river discharges are high and water is flowing over the dam, migrating fish pass downstream with little or no delay (Northeast Utilities Service Company, 1984). On the other hand, outmigrating fish would be entrained into the canal system by high flows entering the canal if they arrive at the dam when flashboards, permitting little or no spillage, are in place. Once in the canal, escape is very difficult. Fish can then be entrained in the turbines of hydropower plants operating along the canal.

On February 26, 1988, the Commission ordered the HWPC to spill water over Holyoke dam when salmon smolts are migrating downstream (Federal Energy Regulatory Commission, 1988a). [HWPC is the licensee

for the Hadley Falls Project (FERC Project No. 2004) and the entity that controls the dam and the water going into the canal.] Spilling water over the Holyoke dam allows migrating salmon smolts to pass safely downstream in the spill, instead of entering the canal system.

Canal users and the HWPC have since implemented an economic dispatch agreement, in which the HWPC passes all flow downstream at the Holyoke dam, shuts down the canal, and sells the users electricity, instead of water, when salmon smolts are migrating downstream. EDIC expects to participate in this agreement, if feasible; and if not, EDIC expects to pursue a new agreement with HWPC to embody an identical arrangement. Since the proposed project would not operate during the period the canal is shut down, the project would not affect the outmigrating salmon smolt during the period the canal is shutdown.

3. *Project-related fish mortality and the use of trashracks:* Operation of the proposed project could cause impingement and entrainment-related mortalities to anadromous fish -- American shad, blue back herring, and possibly the endangered short-nose sturgeon. As fish pass through the turbines, mortality or injury would occur as a result of being struck by turbine blades, pressure changes, shear forces in turbulent flows, and water velocity accelerations (Knapp *et al.*, 1982). The design of the project intake structure would reduce project-induced fish injury or mortality. Trashracks have been used at hydropower plants to discourage fish from entering project intakes. The size of bar spacing of the trashracks can influence entrainment rates (Bell, 1984).

The MDFW (letter from Mark Tisa, Coordinator, Anadromous Fish Program, Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Field Headquarters, Westborough, Massachusetts, October 12, 1988) recommended that for the protection of anadromous fish -- Atlantic salmon and American shad -- trashrack bar spacing should not exceed 1 inch.

To protect anadromous fish, EDIC has proposed to replace the existing trashrack at the facility with a new trashrack with 1-inch bar spacing. We conclude that the trashrack design, as proposed, would protect anadromous fish resources in the project area and would minimize entrainment-related mortality and injury to anadromous fish. Therefore, a trashrack with a maximum bar spacing of 1-inch should be installed at the project intake. The licensee, after consultation with the MDFW and the FWS, should file for Commission approval functional design drawings for the proposed trashrack, including a schedule for construction.

4. *Reservation of authority to prescribe fishways:* The Department of the Interior (Interior) requests that its authority to prescribe the construction, operation and maintenance of fishways, pursuant to section 18 of the Act, be reserved for any project licensed at Station No. 5 Hydroelectric Project.

Section 18 of the Act provides the Secretary of the Interior the authority to prescribe

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fishways.<sup>8</sup> Although fish passage facilities may not be recommended by Interior at the time of project licensing as is the case for the Station No. 5 Hydroelectric Project, the Commission should include license articles which reserve Interior's prescription authority.<sup>9</sup> We recognize that future fish passage needs and management objectives cannot always be predicted when the license is issued. Therefore, any license issued for the project should be conditioned to reserve Interior's authority to prescribe fishways.

5. *Screening the tailrace:* Interior states that, should the tailrace discharge pose an attraction problem for anadromous fish in the future, section 18 of the Federal Power Act (Act) will allow the Secretary of the Interior to prescribe tailrace screening should it be necessary.

Although few salmon have been reported in the project area the potential for project-related impacts to this resource could increase as Atlantic salmon returns improve. The success of Atlantic salmon returns reported downstream of the proposed project demonstrate the potential for improved salmon returns at the proposed project area in the near future.

We conclude that screens should only be considered an appropriate fishway component if they were prescribed by Interior in the future to reduce the attraction of migrating fish to the tailrace and to direct these fish to upstream passage facilities. In this instance, the purpose of tailrace screens at the Station No. 5 Hydroelectric Project would be to enhance Atlantic salmon movement upstream in the Connecticut River to the existing Holyoke fish lift facilities located at the Holyoke dam, upstream of the project.



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Turbidity and sedimentation ..... 1AS

d. Fisheries:

    Anadromous ..... 1AL

    Resident ..... 1AL

e. Vegetation ..... 0

f. Wildlife ..... 0

g. Cultural:

    Archeological ..... 0

    Historical ..... 0

h. Visual quality ..... 0

i. Recreation ..... 0

j. Land use ..... 0

k. Socioeconomics ..... 0

Explanation of item c. Project construction would cause some minor short-term sedimentation and turbidity. There would be some minor short-term resuspension of silt after project start-up.

Explanation of item d. There would be some minor entrainment of fish in the project area.

2. Impacts of the no-action alternative.

Under the no-action alternative, there would be no rehabilitation of project facilities or changes to the existing physical components of the area. Electrical power that would be generated by the proposed hydroelectric project would have to be generated from other available sources or offset by conservation measures.

*1. Recommended Alternative*

Proposed project (including proposed, required, and recommended mitigative measures).

1. Comprehensive Development -- Reason(s) for selecting the recommended alternative.

We recommend the proposed project (including proposed, required, and recommended mitigative measures) because it would develop the hydroelectric potential of the site and would produce electrical energy without significantly affecting the existing environmental conditions.

Sections 4(e) and 10(a)(1) of the Federal Power Act (Act) require the Commission to consider and balance in the public interest, all uses of the waterway on which a project is proposed. Neither we nor the resource agencies have identified any conflicts between development and operation of the Station No. 5 Hydroelectric Project, as proposed by EDIC and (a) the environmental values of the project area or (b) other beneficial public uses of the waterway.

The proposed project would generate about 2,009 MWh of electric energy per year. This power would displace fossil-fueled electric power plant generation, improve air quality, and conserve fossil fuels.

We have evaluated the effects of the proposed project on the resources of the project area and have found that the proposed project would have only minor, short-term adverse impacts as a result of resuspension of sediments during construction activities and project start-up.

No alternative was identified that would better use the project resources in terms of providing power and environmental benefits without significant environmental cost. We considered one alternative to licensing the Station No. 5 Hydroelectric Project -- no action. We concluded that denying the project application is not the recommended alternative for two reasons. (1) The environmental effects of rehabilitating and operating the project would be minor and short-term. (2) The electricity generated from a renewable resource would be used by Holyoke Electric, thus reducing the use of existing fossil-fueled generating plants and thereby conserving nonrenewable primary energy resources and reducing atmospheric pollution.

Section 10(a)(2) of the Act requires the Commission to also 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 eight comprehensive plans that address various resources in Massachusetts. Of these, we identified and reviewed four plans relevant to this project.<sup>10</sup> No conflicts were found.

Based upon a review of the agency and public comments filed in this proceeding, and on our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the Act, we conclude that the Station No. 5 Hydroelectric Project is best adapted to a comprehensive plan for the Connecticut River.

## 2. Unavoidable Adverse Impacts of the Recommended Alternative

A minor amount of short-term resuspension of silt would be unavoidable during removal of

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rock debris from the tailrace and during project start-up.

### J. Conclusion

Finding of No Significant Impact. Approval of the recommended alternative [H(2)] 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.

### K. Literature Cited

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Linweave, Inc. 1988. Application for minor license for the Crocker Mill, A and B Wheels, Hydroelectric Project, FERC Project No. 2758, Massachusetts. November 28, 1988.

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**Safety and Design Assessment**  
**Station No. 5 Hydroelectric Project**  
**FERC Project No. 10806-000, MA**

**June 12, 1990**

*Project Design*

Holyoke Economic Development and Industrial Corporation (Holyoke Corporation) proposes to develop the project on the second level of a three-level canal system, owned and operated by the Holyoke Water Power Company (HWPC), licensee for Hadley Falls Project No. 2004, on the west bank of the Connecticut River. The generating equipment would be installed in a building belonging to the Valley Paper Company.

The project works would consist of: (1) a gated intake with new trashracks located on the Second Level Canal of the HWPC project; (2) two 75-foot-long, 6.5-foot-diameter steel penstocks; (3) a refurbished single-runner, vertical Kaplan turbine connected to a 790-kilowatt (kW) generator; (4) a 375-foot-long, 16.5-foot-wide by 11-foot-high arched, brick-lined tailrace tunnel; (5) a steel gate where the tailwater empties into the Connecticut River; (6) a 4.8-kilovolt (kV), 370-foot-long underground cable interconnecting with the Holyoke Gas and Electric Department's distribution system; (7) certain underground portions of the Valley Paper Company building that would accommodate the generating and other equipment; and (8) other necessary facilities.

Holyoke Corporation acquired the project property along with deeded water rights to the former hydropower site in order to redevelop the project.

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*Project Safety*

The proposed project would not include a dam or other water-impounding structures. All flows to the project site would be delivered by the Holyoke Second Level Canal, owned and operated by HWPC.

Our New York Regional Office (NYRO), in a Preliminary Inspection Report dated September 21, 1989, cited no deficiencies in the proposed operation and stated that the proposed project would have no downstream hazard potential. Since there are no water-impounding structures, we conclude there are no safety related problems.

We conclude the project would be safe and adequate if built and operated according to the terms and conditions of a license.

#### *Water Resource Planning*

The power plant would contain a single generating unit. The gross head at the site ranges from 15 to 34 feet, depending upon the tailwater elevation, resulting in a weighted average head of 28 feet. The turbine design head is 26 feet and its hydraulic capacity is estimated to be 299 cubic feet per second (cfs). The project would be operated remotely in a run-of-river mode, and would generate about 2,009 megawatt-hours (MWh) of energy annually at a plant factor of about 29 percent.

The proposed project is located on the second level of a three-level canal system owned and operated by the HWPC, on the west bank of the Connecticut River. Flows from the Connecticut River are impounded by Holyoke Dam (licensed to HWPC as part of Hadley Falls Project No. 2004) and diverted through an intake structure into the first-level canal. Flows in the first-level canal are diverted through various industrial plants and gate structures into the second-level canal from which the project would get its flows to operate. HWPC operates its own hydropower projects at the Holyoke dam and elsewhere in the canal system.

Flows to the proposed project would be available by deeded purchase rights for specific amounts from HWPC. Deeded entitlements to water from HWPC's canal system are measured in millpowers (a millpower is the flow calculated from an equation based on gross head). For a gross head of 28 feet at this project, 1 millpower equals 26.7 cfs.

The proposed project is entitled to four 16-hour permanent millpowers and three 8-hour permanent millpowers for Connecticut River flows in the range of 3,100 cfs to 3,600 cfs. For river flows less than 3,100 cfs, the permanent millpower allocation is reduced linearly depending on flow. For flows between 3,600 cfs and 15,000 cfs, an additional entitlement equal to half the permanent millpower allocation is permitted. For flows greater than 15,000 cfs, the project is entitled to surplus millpowers up to a maximum of 10 millpowers.

The proposed project under the millpower entitlement is authorized two types of water allocations: 16-hour per day and 8-hour per day. For river flows up to 3,100 cfs, the 16-hour allocation is 0 to 107 cfs and the 8-hour allocation 0 to 80.2 cfs; for flows of 3,100 to 3,600 cfs, the 16-hour allocation is 107 cfs and the 8-hour allocation is 80.2 cfs; for flows of 3,600 to 15,000 cfs, the 16-hour allocation is 160.4 cfs and the 8-hour allocation is 120.3 cfs; and for flows of 15,000 to 82,880 cfs both the 16-hour and 8-hour allocations are 267.4 cfs.

We estimate the project would, on the average, operate at its entitled surplus allocation flow of 267.4 cfs for 24 hours per day (close to the plant hydraulic capacity of 299 cfs), about 29 percent of the time; at 160.4 cfs for 16 hours per day and 120.3 cfs for 8 hours per day, about 57 percent of the time; and at 107 cfs for 16 hours per day and 80.2 cfs for 8 hours per day, for about 3 percent of the time. The project would be shut down about 11 percent of the time.

The NYRO Preliminary Inspection Report states that the canal system is dewatered 3 times a year for maintenance: there are two, 1-day canal drawdowns in the spring and fall and a 4-day shutdown period in July. During these periods, the canal system is drained, inspected, and repaired, if needed. Repairs are generally scheduled for the July shutdown.

There are certain periods of the year when the project cannot operate and the applicant would be directed by the HWPC to discontinue drawing flows from the canal system.

Our studies show that Holyoke Corporation would make reasonable use of its allocated flows. Because of the water allocation limits of the HWPC, Holyoke Corporation could not develop additional generating capacity at the site. Hence, we conclude the proposed project would adequately develop the head and hydraulic potential of the site.

The August 1983 Planning Status Report for Connecticut River Basin lists 19 existing hydroelectric projects on HWPC's canal system. The report also lists the Holyoke Project on the canal system as a potential project with an installed capacity of 1,222 kW and an annual generation of 13,165 MWh. However, the report states no basis for the capacity or energy generation estimate. The report did not indicate any proposed project on the canal system that would be in conflict with the proposed project.

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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. We identified 8 comprehensive plans that meet the requirements of section 10(a)(2); however, none address various resources in Massachusetts in relation to the developmental values of hydroelectric development at the site.

The state and federal agencies made no other comments or recommendations addressing flood control, navigation, or irrigation requirements for the second-level canal.

On March 28, 1990, the HWPC filed a petition to intervene in the licensing proceeding to protect its interests. The HWPC submitted technical comments relating to the operation of the proposed project. None of the comments affect this assessment.

Based on the above information, we conclude the proposed Station No. 5 Hydroelectric Project would adequately use the available flow and head at the site and would not conflict with any other planned development.

From a review of agency and public comments filed in this proceeding, and our independent analyses, we conclude that the Station No. 5 Project is best adapted to the comprehensive development of the Connecticut River, from a power development perspective.

#### *Economic Evaluation*

Holyoke Corporation would feed the project power into Holyoke Gas & Electric Light Department's (Holyoke Electric) power grid to help serve its base-load requirements.

The proposed project would be economically beneficial, so long as the projected levelized cost is less than the long-term levelized cost of alternative energy to any utility in the region that can be served by the project. We identified projected, long-term levelized alternative energy costs in the region of 88.2 mills/kWh. Since the levelized cost of energy from the project is estimated to be 61.0 mills/kWh, the project would provide a levelized economic benefit of about 27.2 mills/kWh or \$54,000 annually.

Our analysis shows the 100-percent-equity internal rate of return for the proposed project would be about 13.5 percent, a range considered fairly secure and very attractive to investors. Thus we conclude the proposed project would be economically beneficial and financially feasible.

#### *Conservation and Load Management Programs*

Holyoke Corporation, has no electric-power distribution system and no end-use customers. If the proposed project were licensed and developed, the total net output would be sold, at wholesale prices, to Holyoke Electric for distribution to its customers. Without customers, Holyoke Corporation has no opportunity to establish conservation and load-management programs to reduce demand peaks or reduce the use of electric energy.

#### *Exhibits*

The following portions of exhibit A and the following exhibit F drawings conform to the Commission's rules and regulations and should be included in the license:

*Exhibit A* - The following sections of exhibit A filed June 15, 1989:

The turbine and generator description on page A-2; the transmission line description on page A-7; and the additional mechanical and electrical equipment description on pages A-5 and A-6.

Exhibit FERC No. Showing

F-1 10806-1 Project-Plan and  
Profile

F-2 10806-2 Powerhouse-Plan,  
Section and Elevation

Sections

*Preparers*

Khawaja A. Akhtar, Civil Engineer  
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**-- Footnotes --**

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<b>Footnotes</b>
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- 1 See 33 FPC 593, 594 (1965).
- 2 For a list of the plans, see the attached Environmental Assessment.

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- 1 Due to reproduction requirements, referenced figures have been omitted.

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- 2 The Commonwealth of Massachusetts, Division of Fisheries and Wildlife (MDFW), provided no comments on the application in response to the public notice. There was no need to provide public notice comments since EDIC had adequately addressed all the Commonwealth's concerns by the time the application was filed (personal communication, Mark Tisa, Coordinator, Anadromous Fish Program, Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Field Headquarters, Westborough, Massachusetts June 12, 1990).

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- 3 The Council on Environmental Quality defines cumulative impacts as impacts on the environment that result from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time (40 C.F.R., Part 1508.7).
- 4 Personal communication, Mark Tisa, Coordinator, Anadromous Fish Program, Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Field Headquarters, Westborough, Massachusetts, June 19, 1990; and Order Amending License to Require downstream fish Passage Facilities, *Holyoke Water Power Company*, [Project No. 2004-012](#), issued February 26, 1988, [42 FERC ¶62,166](#).
- 5 Source: Federal Energy Regulatory Commission, Environmental Assessment for *Crocker Mill, A and B Wheels*, Hydroelectric Project, [Project No. 2758-003](#), Washington, D.C., June 16, 1989, [47 FERC ¶62,305](#); and City of Holyoke, Economic Development and Industrial Corporation, application, exhibit E, unless otherwise indicated.

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- 6 Source: Order Amending License to Require Downstream Fish Passage Facilities, *Holyoke Water Power Company*, [Project No. 2004-012](#), issued February 26, 1988, [42 FERC ¶62,166](#); and personal communication, Steve Gephard, Connecticut Department of Environmental Protection -- Marine Fisheries, Waterford, Connecticut, June 21, 1990.
- 7 Information on post-spawning adult Atlantic salmon (kelts) in the Connecticut River is sparse. Therefore, the downstream migration period was estimated, with the assistance of Steve Gephard,

Connecticut Department of Environmental Protection, from information on Atlantic salmon in other northeastern river basins.

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- 8 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 the Interior as appropriate."
- 9 *Lynchburg Hydro Associates*, 39 FERC ¶61,076 (1987).

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- 10 Massachusetts outdoors for our common good: open space and outdoor recreation in Massachusetts, 1988, Massachusetts Department of Environmental Management, Division of Planning and Development; Connecticut River Basin water quality management plan, 1983, Massachusetts Department of Environmental Quality Engineering, Division of Water Pollution Control; A strategic plan for the restoration of Atlantic salmon to the Connecticut River Basin, 1982, Policy Committee for Fisheries Management of the Connecticut River; Connecticut River Basin fish passage, flow, and habitat alteration considerations in relation to anadromous fish restoration, 1981, Technical Committee for Fisheries Management of the Connecticut River.