

Crystal Falls - License 10-18-1995

UNITED STATES OF AMERICA 73 FERC ¶ 62, 036  
FEDERAL ENERGY REGULATORY COMMISSION

City of Crystal Falls

Project No. 11402-000  
Michigan

ORDER ISSUING LICENSE  
(MINOR PROJECT)  
OCTOBER 18, 1995

INTRODUCTION

On April 2, 1993, the city of Crystal Falls (City) filed an application under Part I of the Federal Power Act (FPA) for an original license to continue to operate and maintain the unlicensed 1,000-kilowatt (kW) Crystal Falls Hydroelectric Project No. 11402, located on the Paint River in Iron County, Michigan. 1/

The City proposes no changes to increase the project's capacity and would continue to operate the project to provide power for the City.

BACKGROUND

Notice of the application was published on February 2, 1994. Two agencies filed timely motions to intervene in this proceeding: the U.S. Department of the Interior (Interior) dated March 21, 1994, and the Michigan Department of Natural Resources (MDNR) dated March 29, 1994. No agency filed a motion to intervene in opposition to the project.

The motions to intervene were unopposed and therefore granted automatically under Rule 214(c)(1) of the Commission's Rules of Practice and Procedure. 2/

On April 15, 1994, the Commission issued a Public Notice indicating that the license application was ready for environmental analysis. Comment letters during the notice period were filed by Interior dated June 9, 1994, and by MDNR dated June 13, 1994.

1/ The existing project has been owned and operated by the City of Crystal Falls since 1914. On April 13, 1989, the Director, Office of Hydropower Licensing (OHL) issued an Order Finding Hydroelectric Project Jurisdiction for the Crystal Falls Project under Section 23(b) of the FPA. See 47 FERC Para. 62,029 (1989). The Commission determined that because construction to increase the project's capacity occurred after 1935, the project requires a license to continue to operate.

2/ 18 C. F. R. § 385.214(c)(1)

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The Commission's staff issued the Crystal Falls Project Draft Environmental Assessment (DEA) for public comment on March 31, 1995. In response, comment letters were received from the City, the U.S. Department of Interior, Fish and Wildlife Service (FWS), and MDNR. Commission staff considered these comments in preparing the final Environmental Assessment (EA) which is attached to and made a part of this license.

The Commission's staff also prepared a safety and design assessment (S&DA), which is available in the Commission's public file associated with this project.

### PROJECT DESCRIPTION

The existing constructed project consists of a 270-foot-long, 16-foot-high concrete gravity dam with a 92-foot-long ungated overflow spillway and a 101-foot-long gated spillway topped with four radial steel gates. The project impoundment has a surface area of about 100 acres and a storage capacity of 590 acre-feet at water surface elevation 1,333.69 feet National Geodetic Vertical Datum (NGVD). The powerhouse contains three turbine generators with a combined installed capacity of about 1,000 kW. A more detailed project description is contained in the ordering paragraph (B)(2).

Before 1992, the City operated the project in a peaking mode. The reservoir was drawn down during the day and refilled by the next morning. The power plant was historically operated with a headwater band of 12 inches, ranging from a maximum elevation of 1,333.69 feet to a minimum elevation of 1,332.69 feet.

Since 1992, the City has operated the project in run-of-the-river (ROR) mode. The City proposes to continue to operate the project in ROR. During the ice-free period, the City would continue to add 12-inch-high flashboards in the beginning of the summer over the ungated spillway and operate the project at a target headwater elevation of 1,333.69 (± 0.25) feet. All turbine/generator units would be operated as required to maintain the target headwater elevation. During winter months the reservoir would be drawn down to elevation 1,332.44 feet by removing the flashboards, and the units would be operated to maintain the target headwater elevation of 1,332.44 (± 0.25) feet.

### WATER QUALITY CERTIFICATION

Section 401(a)(1) of the Clean Water Act (CWA)<sup>3/</sup> requires an applicant for a federal license or permit for any activity that may result in a discharge into navigable waters of the United States to provide to the licensing or permitting agency a

<sup>3/</sup> 33 U.S.C. §1341. (1988)

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certification from the state in which the discharge originates that such discharge will comply with certain sections of the CWA. If a state fails to act on a request for certification within 1 year, the certification requirement is waived. 4/

The City applied for Water Quality Certification (WQC) on January 28, 1992, pursuant to Section 401 of the CWA. The City subsequently withdrew its request for 401 certification and reapplied on January 28, 1993.

MDNR did not act on the City's request within 1 year after January 28, 1993; therefore, certification is deemed waived. We have, however, analyzed water quality issues associated with the Crystal Falls Hydroelectric Project and have included conditions recommended by MDNR to help preserve water quality.

### COASTAL ZONE MANAGEMENT ACT

Section 307 (c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456 (3)(A), states that the Commission cannot issue a license for a project within or affecting the state's coastal zone, unless the state CZMA agency concurs with the license applicant's certification of consistency with the state CZMA program. The Crystal Falls Project is not located within a state-designated coastal zone management area.

### SECTION 18 FISHWAY PRESCRIPTION

Section 18 of the FPA provides the Secretary of the Interior the authority to prescribe fishways at Commission-licensed projects. 5/ Interior, by letter dated June 9, 1994, requested the Commission to reserve its authority to require construction and operation and maintenance of such fishways as may be prescribed pursuant to Section 18 of the FPA. Article 407 reserves that authority.

### ECONOMIC ANALYSIS

Under the Commission's new approach to evaluating the economics of a project, as recently articulated in Mead, 6/ supra, a proposed project is economically beneficial so long as its projected cost is less than the current cost of alternative energy. To determine whether the project proposed is

4/ 33 U.S.C. §1341(a)(1). (1988)

5/ Section 18 of the FPA provides: "The Commission shall require the 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."

6/ See 72 FERC para. 61,027 (1995).

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economically beneficial, the staff compared the cost of energy from the proposal to the City's alternative source, purchase from Wisconsin Electric Power Company (WEPCo). The cost of alternative capacity plus fixed operation and maintenance would be \$117 per kW-year. The cost of alternative on-peak and off-peak energy would be 27.3 mills/kWh and 18.7 mills/kWh, respectively.

The staff applied this new analysis to the Crystal Falls Project. Based on current economic conditions, without future escalation or inflation, the project if licensed as the City proposes, would produce about 5.726 gigawatt hours (GWh) of energy, at an annual cost of about \$122,100 (21.3 mills/kWh) less than currently available alternative equivalent power. When licensed in accordance with the conditions adopted herein, the project would still produce about 5.726 GWh of energy annually, at an annual cost of about \$96,400 (16.8 mills/kWh) less than currently available alternative power.

The staff's evaluation of the economics of the proposal shows that it appears to cost less than currently available alternative power (or avoided costs). However, as explained in Mead, the economic analysis is perforce inexact, and project economics is moreover only one of the many public interest factors considered in determining whether or not, and under what conditions, to issue a license. Although the continued operation of the project would be more economical under the City's proposal than under the conditions adopted herein, the City is ultimately responsible and best able to determine whether continued operation of the existing project including the conditions adopted herein is a reasonable decision in these circumstances. The Commission concludes that it is in the public interest to issue the license, as conditioned herein, and leaves to the City the decision of whether or not to continue to operate the project as so conditioned.

### RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES

Section 10(j) of the FPA 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 of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. Conditions based on such fish and wildlife recommendations must be included in the license unless the Commission determines that the recommendations are inconsistent with the purposes and requirements of the FPA or other applicable law.

Interior, in its June 9, 1994, letter, and MDNR in its June 13, 1994, letter, provide recommendations under Section 10(j) of the FPA.

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By letters dated April 10, 1995, the staff made preliminary determinations that certain Interior and MDNR recommendations may be inconsistent with the purpose and requirements of Part I of

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the FPA or other applicable law. The staff also made preliminary determinations that certain fish and wildlife recommendations were outside the scope of Section 10(j) and that they should be considered under Section 10(a) of the FPA.<sup>7/</sup>

By letters dated April 10, 1995, the staff made a preliminary determination that the following recommendations of MDNR and Interior were inconsistent with the purposes of Part I of the FPA: 1) maintaining state temperature and DO standards, 2) developing and implementing a plan for water quality monitoring, 3) developing a bald eagle protection plan, 4) limiting refilling during flashboard replacement to 0.25 foot/day from April 24 through May 6, 5) establishing a 200-foot project boundary on lands adjacent to the reservoir, and 6) maintaining records of tailrace elevations.

In response to the determinations, the staff received comment letters from Interior dated May 22, 1995, and from MDNR dated May 30, 1995. A number of the staff's recommendations for the project have been modified as reflected in the EA.

As noted above, conditions based on fish and wildlife recommendations submitted pursuant to Section 10(j) must be included in the license unless the Commission determines that the recommendations are inconsistent with the purposes and requirements of the FPA or other applicable law. If the Commission does not adopt a recommendation submitted pursuant to Section 10(j), it must explain, pursuant to Section 10(j)(2), how the recommendation is inconsistent with applicable law and how the conditions selected by the Commission adequately and equitably protect, mitigate damages to, and enhance fish and wildlife. In doing so, we first determine whether the recommendation is supported by substantial evidence in the record, that is, whether there is evidence in the record adequate to support a conclusion. If not, the recommendation is inconsistent with the requirement of Section 313(b) of the FPA that Commission orders be supported by substantial evidence.<sup>8/</sup> Next, we determine whether a substantiated recommendation is inconsistent with the FPA or other applicable determinations under the equal consideration/comprehensive development standards of FPA Sections 4(e) and 10(a)(1), in that the recommendation conflicts unduly with another project purpose or value (including

<sup>7/</sup> See Section VIII of the EA.

<sup>8/</sup> See IV FERC Statutes and Regulations, *supra*, ¶ 30,921 at p. 30,157.

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the project's economic benefits).<sup>9/</sup> In short, we determine whether the recommendation would have a significant, negative impact on a valuable project purpose or beneficial use.

In this instance, MDNR and Interior recommend that the City  
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meet state water quality standards for temperature and DO and that the City develop and implement a water quality monitoring plan. Although the EA expressed the view that the Crystal Falls Project is not contributing to or causing violations of the state water quality standards for the Paint River, the recommendations to meet state standards and implement a water quality monitoring plan is a low-cost measure.

Further, MDNR recommends that the City develop a bald eagle protection plan. The EA concluded that it is highly unlikely that eagles would nest on City owned project lands given the small amount of area owned by the City, the proximity to human activities and developments, and the lack of suitable habitat. However, in the EA the Commission's staff determined that this recommendation is a low-cost measure.

I do not believe that the recommendations to meet state water quality standards for temperature and DO, implement a water quality monitoring plan, and develop a bald eagle protection plan are inconsistent with the purposes and requirements of the FPA under the criteria discussed above. The recommendations would not have a significant negative effect on the project purposes, nor would the expense of implementing them have any significant economic effect on the feasibility of the project. Therefore, I adopt the recommendations to meet state water quality standards for temperature and DO, implement a water quality monitoring plan, and develop a bald eagle protection plan in Article 404 and 410, respectively.

MDNR recommends that flashboard replacement occur from April 24 through May 6, and that the impoundment be raised from 1,332.44 to 1,333.69 feet with an elevation change of no more than 0.25 foot/day. The staff recommends that flashboards be replaced by May 1 or within 10 days of ice-out. MDNR agrees with our analysis that installing the flashboards in the spring within a time period relative to ice-out is preferable to a specific two-week period. MDNR provides no evidence to support the recommendation to limit changes in elevation to 0.25 foot/day when refilling the impoundment. The staff recommends that, when refilling the impoundment, tailrace flows should not deviate more than 10 percent from inflow under all conditions. These measures are reflected in Article 402.

9/ See Mead Corporation, Publishing Paper Division, 72 ¶ 61,027 (1995). We also consider whether the application should in fact be denied, on the basis that the resources the project would adversely affect are more valuable than the benefits it would confer.

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MDNR recommends that a 200-foot boundary be established on all non-applicant lands adjacent to the reservoir and that lands within this zone be managed in accordance with a comprehensive land management plan. The staff recommends the development of a land management plan to protect shoreland resources in lieu of the establishment of a 200-foot project boundary around the reservoir. MDNR agrees with the recommendation for the

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development of a plan to protect shoreland resources. Article 414 requires the development of a land management plan for the protection of shoreland resources.

Interior recommends that the City maintain records of tailrace elevations. Interior commented on our findings in the DEA indicating that it no longer has a serious concern about the Commission not requiring the City to record tailwater elevations because of the very restrictive headwater band of 0.1 foot recommended by the Commission for this project.

The Commission staff also determined that a number of agency recommendations for license conditions were outside the scope of Section 10(j) and did not warrant adoption.<sup>10/</sup> I examined these recommendations and the staff comments on them in the EA. I concur with the EA's findings that under Section 10(a) these recommendations are unwarranted and would not be in the public interest for reasons given in Section VIII of the EA.

#### COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed a total of 55 plans of which we identified as applicable six Michigan and four United States comprehensive plans. No conflicts were found.

Section IX of the EA lists the comprehensive plans relevant to this project.

#### COMPREHENSIVE DEVELOPMENT

Sections 4(e) and 10(a)(1) of the FPA, 16 U.S.C. §§ 797(e) and 803(a)(1), require the Commission, in acting on applications for license, to give equal consideration to the power and development purposes and to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or

<sup>10/</sup> See Table 10 of the EA for a complete list of these recommendations.

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developing a waterway or waterways for all beneficial public uses. The decision to license this project, and the terms and conditions included herein, reflect such consideration.

The DEA analyzed the effects associated with the issuance of an original license for the Crystal Falls Project. The EA recommends a variety of measures to protect and enhance environmental resources, which I have adopted. In conclusion, the issuance of an original license for the Crystal Falls Project

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will not constitute a major federal action significantly  
affecting the quality of the human environment.

#### Recommended Alternative

I have considered the City's proposed project, agency recommendations, the staff's recommended protection, mitigation, and enhancement measures, and the no-action alternative under Sections 4(e) and 10(a) of the FPA.

Based on the staff's independent analysis of the environmental and economic effects of the alternatives, I have selected the City's proposed project with additional enhancement measures as the preferred alternative. I recommend this option because (1) with mitigation, the environmental effects of operating the project would be relatively minor; (2) the proposed mitigation measures would benefit water quality, fisheries, and recreational resources; and (3) the electricity that would be generated from a renewable resource would be beneficial, since it would reduce the use of fossil-fueled, steam-electric generating plants, thereby conserving nonrenewable energy resources and reducing atmospheric pollution.

This alternative consists of:

- ù operating the project in instantaneous run-of-the-river mode;
- ù managing impoundment levels within the following limits:

May 1 or within 10 days of ice-out through October 24 within 0.1 foot of the top of the flashboards at elevation 1,333.98 (NGVD);

November 7 through May 1 or within 10 days of ice-out within 0.1 foot of the crest of the dam at elevation 1,332.98 (NGVD);

From October 25 through November 6, the impoundment elevation would be lowered from 1,333.98 to 1,332.44 feet with a draw-down of no more than 0.25 foot per day;

In the spring, ice sluicing and flashboard installation should be performed as early as practicable and the impoundment should be stabilized no later than May 1 or within 10 days of ice-out;

When drawing down or refilling the impoundment, tailrace flows should not deviate more than 10 percent from inflow under all conditions;

- ù monitoring compliance with instantaneous run-of-the-river by installing a continuous impoundment level recording device and a continuously recording flow

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monitor in the tailrace;

- ù preparing a report after each year of operation to document the City's compliance with run-of-the-river conditions;
- ù developing and implementing a plan to monitor water quality for compliance with state standards for temperature and dissolved oxygen (DO);
- ù installing and monitoring a barrier net for downstream fish protection;
- ù developing and implementing a plan to evaluate barrier-net effectiveness;
- ù reserving Section 18 authority to Interior to prescribe fishways;
- ù developing and implementing a plan for management of large woody debris to improve fish habitat downstream of the project;
- ù developing and implementing a wildlife management plan that includes provisions for the protection of bald eagles;
- ù developing and implementing a plan to identify and protect super-canopy trees on City-owned land in the project area;
- ù cooperating with agencies to develop and implement a plan to control the spread of exotic wetlands plants such as purple loosestrife and Eurasian water milfoil in the project area;
- ù developing and implementing a recreation plan;
- ù constructing, operating, and maintaining additional recreation facilities as follows:

- (1) improve the canoe portage by securing an iron hand rail to the existing retaining wall;
- (2) remove brush and small trees at the downstream end of the canoe portage on the north bank of the tailrace to create a downstream shoreline fishing area;
- (3) provide a gravel drive and parking area to accommodate use of the boat ramp;
- (4) design and organize the parking lot for the boat launch;
- (5) redevelop the existing boat launch facility to provide adequate grade and end-of-ramp water depth

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for launching trailerable boats;

- (6) provide additional directional signage to the canoe portage and boat launch from major highways;
  - (7) maintain public access to recreation facilities on the Paint River for the term of the license;
  - (8) develop a plan to design and install steps at the north side canoe portage/tailrace access trail location;
  - (9) develop a plan to design and construct a gravel parking lot for a minimum of seven vehicles, directional signage, and a vault toilet for better access and use of the northside tailrace fishing access location;
  - (10) develop a plan to improve the existing stone stairway to Power Plant Park at the tailrace fishing access area on the south side of the river;
  - (11) provide handicapped access and parking at the boat launch and north side tailrace access area;
  - (12) design and construct a handicapped-accessible fishing/wildlife viewing pier on the impoundment;
- ù developing and implementing a land management plan to protect shoreland resources in the project area; and
  - ù implementing the Cultural Resources Management Plan and Programmatic Agreement.

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#### LICENSE TERM

Because the City does not propose new hydropower development at the existing project, the license for the Crystal Falls Hydroelectric Project will be for a term of 30 years.

#### SUMMARY OF FINDINGS

The final EA issued for this project includes background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment. 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 operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the Safety and Design Assessment (S&DA).

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

THE DIRECTOR ORDERS:

(A) This license is issued to the City of Crystal Falls (Licensee), for a period of 30 years, effective the first day of the month in which this order is issued, to operate and maintain the Crystal Falls Hydroelectric Project. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the Licensee's interests in those lands, shown in the following exhibits:

Exhibit G-	FERC Drawing	Showing
	No. 11402-MI	
1	3	Map of Project Area

(2) The Crystal Falls Hydroelectric Project consists of: (1) a 270-foot-long concrete gravity dam consisting of (a) a 16-foot-high, 92-foot-long ungated spillway section with 12-inch-high flashboards (November 1 through April 30), and a 101-foot-long gated spillway with four gates; (2) a reservoir having a surface area of 100 acres and a gross storage capacity of 590 acre-feet; (3) a 77.1-foot-wide by 40.75-foot-long integral

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concrete and brick powerhouse containing three generating units with a total rated capacity of 1,000 kilowatts (kW); (4) four radial steel gates consisting of (a) one gate 14-feet-wide by 20-feet-high, and (b) three gates 24-feet-wide by 12-feet-high each; (5) a 41-foot-wide intake structure integral to the powerhouse with three bays; (6) water conduits from the intake structures to the turbines consisting of (a) steel tubes 8-feet in diameter for Units 1 and 2 and (b) a steel tube 11-feet in diameter for Unit 3; and (7) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of Exhibit A and F below recommended for approval.

Exhibit A: The following sections of Exhibit A filed April 1993: the generator description on page A-1; the turbine description on pages A-1, A-2, and A-6; and additional mechanical and electrical equipment described elsewhere on page A-10.

Exhibit F-	FERC Drawing	Showing
	Page 11	

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1	1	Dam Plan and Elevation
2	2	Plan, Elevation and Section

- (3) All of the structures, fixtures, equipment, or facilities used to operate or maintain the project and located at the project; all portable property that may be employed in connection with the project and located near 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, G, and F described above are approved and made part of the license.

(D) The following sections of the FPA 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.

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(E) This license is subject to the articles set forth in Form L-12 (October 1975), entitled, "Terms and Conditions of License for Constructed Minor Project Affecting the Interests of Interstate or Foreign Commerce," and the following additional articles.

Article 201. The Licensee shall pay the United States the following annual charges, effective as of the first day of the month in which this license is issued:

For the purpose of reimbursing the United States for the Commission's administrative costs, pursuant to Part I of the FPA, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 1,000 kilowatts (kW). Under regulations currently in effect, projects with authorized capacity of less than or equal to 1,500 kW are not assessed an annual charge.

Article 301. Within 3 months of the license issuance, the Licensee shall file with the Commission, for approval, revised exhibits F showing project facilities "as-built." Specifically, the revised exhibits F shall show: (1) the retaining wall at the left abutment extending further downstream; (2) the crest of the dam extending beyond the left abutment in line with and parallel to the axis of the dam; and (3) complete details of the building facilities along the bulkhead wall between the powerhouse and the

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tailrace gate spillway.

Article 401. The Licensee shall operate the project in an instantaneous run-of-the-river mode for the protection and enhancement of water quality and aquatic resources in the Paint River. Run-of-the-river operation is required within 60 days of installation of streamflow and water level monitoring devices required by Article 403. The Licensee shall at all times act to minimize fluctuations in the surface elevation of the Crystal Falls impoundment by maintaining a discharge from the project such 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-the-river operation may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee, the Michigan Department of Natural Resources, and the U.S. Department of the Interior. If the flow is so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 402. The Licensee shall manage impoundment fluctuation levels for the protection and enhancement of water quality and aquatic resources in the Paint River. The Licensee shall maintain the level of the Crystal Falls impoundment elevation within 0.1 foot of the top of the flashboards at 1,333.98 feet (NGVD) during the period of about May 1 through

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October 24 and within 0.1 foot of the crest of the dam at 1,332.98 feet (NGVD) during the period of November 7 through spring. From October 25 through November 6, the impoundment elevation shall be lowered from 1,333.98 to 1,332.44 with a draw-down of no more than 0.25 foot per day. In the spring, ice sluicing and flashboard installation shall be performed as early as practicable, and the impoundment shall be stabilized at elevation 1,333.98 +0.1 foot (NGVD) no later than May 1 or within 10 days of ice-out. When drawing down or refilling the impoundment, the Licensee shall manage outflow such that tailrace flows shall not deviate more than 10 percent from inflow under all conditions. Management of impoundment fluctuation and tailrace flows is required within 60 days of installation of streamflow and water level monitoring devices required by Article 403.

Article 403. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a plan to monitor inflow to the project and outflow from the project to the tailrace to document compliance with run-of-the-river operation required by Article 401 and management of impoundment water level elevations required by Article 402.

The plan shall include, at a minimum;

- (1) a schedule for installing a continuous water level recording device and visible staff gage in the impoundment, and a continuous flow monitoring device in the tailrace;

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- (2) the planned location of the flow and water level measuring device and the staff gage;
- (3) the design of the devices, including any pertinent hydraulic calculations;
- (4) operating measures that will minimize the effects of lag time and deviations from true run-of-the-river conditions below the project;
- (5) the method of flow data collection, and provisions for providing data to the regulatory agencies in a timely manner; and
- (6) preparation of a report after each year of operation providing flow and impoundment level records, which shall be provided, upon request, to the U.S. Fish and Wildlife Service (FWS) and Michigan Department of Natural Resources (MDNR).

The Licensee shall prepare the plan after consultation with the FWS, the U.S. Geological Survey, and the MDNR.

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

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

Article 404. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a plan to monitor dissolved oxygen (DO) and temperature levels in the Paint River downstream of the project.

The purpose of this monitoring plan is to ensure that streamflows below the project, as measured immediately downstream of the project tailrace, maintain the Michigan standards for DO concentration and temperature.

The monitoring plan shall include provisions for (1) monitoring of DO concentrations and temperature levels in the impoundment and downstream, with sensor locations and sampling frequently determined in consultation with the Michigan Department of Natural Resources (MDNR) and the U.S. Fish and Wildlife Service (FWS); and (2) the preparation of operating procedures developed in consultation with MDNR and FWS to address water quality conditions which deviate from the above limits.

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The Licensee shall prepare the plan after consultation with MDNR and FWS. The water quality monitoring plan shall include a schedule for:

- (a) implementation of the program within 24 months from the date of issuance of this license;
- (b) consultation with MDNR and FWS concerning the results of the monitoring; and
- (c) filing the requests, agency comments, and Licensee's response to agency comments with the Commission.

The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and make recommendations before filing the plan with the Commission. If the Licensee does

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not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the DO concentration and temperature monitoring plan, including any changes required by the Commission.

Article 405. Within 4 months of the license issuance, the Licensee shall file with the Commission, for approval, a plan for the installation and monitoring of a barrier net to reduce the entrainment of resident fish.

The plan shall include, at a minimum, the following items:

- (1) data on water velocities in the proposed location of barrier net;
- (2) functional design drawings of the barrier net;
- (3) a schedule for deployment and removal of the barrier net in the spring and fall to coincide with deployment and removal of the flashboards; and
- (4) methods and schedule of net maintenance including periodic brushing and backflushing using the spill gates.

The Licensee shall prepare the aforementioned plan and schedule after consultation with the U.S. Fish and Wildlife Service and the Michigan Department of Natural Resources.

The Licensee shall include with the plan documentation of agency consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the

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agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on site-specific information.

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

Article 406. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a plan for post-construction studies to monitor the effectiveness of the barrier net to reduce entrainment of fish in the turbine intakes.

The monitoring plan shall include, at minimum, a schedule for:

- (1) implementation of the plan;
- (2) consultation with the appropriate federal and state agencies concerning the results of the monitoring; and
- (3) filing the results, agency comments, and Licensee's response to agency comments with the Commission.

The Licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service and the Michigan Department of Natural Resources.

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

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

Article 407. Authority is reserved by the Commission to require the Licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of, such fishways as may be prescribed by the Secretary of the Interior under Section 18 of the Federal Power Act.

Article 408. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a plan for the passage of large woody debris that collects near the project

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intake into the project tailrace to improve fish habitat downstream of the project.

The Licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service and the Michigan Department of Natural Resources.

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

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

Article 409. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a plan to identify and protect super-canopy trees on City-owned lands in the project area.

The Licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service and the Michigan Department of Natural Resources.

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

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

Article 410. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a wildlife management plan. At a minimum, the plan shall include the following measures:

- (1) provide waterfowl enhancement by addition of 10 wood duck boxes and creation of additional mallard nesting habitat using either nesting structures or a waterfowl nesting island on the impoundment;
- (2) provide for 1 osprey nesting platform on the

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impoundment;

- (3) provide for 1 purple martin nesting colony at the dam;
- (4) provide for 2 bat nesting houses at the dam;
- (5) provide for additional eastern bluebird nesting locations on project lands and rights of way at 100 yard intervals until the occupancy rate of the nest boxes falls below 30%;
- (6) provide for additional kestrel and owl nesting locations on project lands and rights of way;
  
- (7) provide for wildlife plantings in the project rights of way;
- (8) provide for the protection and enhancement of habitat for any Federal or state-listed threatened, endangered or sensitive species on project lands; and
- (9) provide for the protection of bald eagles on project lands.

The Licensee shall prepare the plan after consultation with the U. S. Fish and Wildlife Service and the Michigan Department of Natural Resources.

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

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

Article 411. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a plan for the control of exotic wetland species to protect wetlands from invasive species including purple loosestrife and Eurasian water milfoil. The plan shall include, at a minimum, measures to inform and educate the public about the spread of invasive species through the placement of signage/bulletin boards in strategic locations within the project area. If at any time during the period of the license, the Michigan Department of Natural Resources (MDNR) deems it necessary to control or eliminate purple loosestrife and/or Eurasian water milfoil, the Licensee shall cooperate in this measure.

The Licensee shall prepare the plan after consultation with

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the U. S. Fish and Wildlife Service and MDNR.

The Licensee shall include with the plan documentation of agency consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall

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include the Licensee's reasons, based on site-specific information.

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

Article 412. The Licensee shall implement the "Programmatic Agreement Among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and the Michigan State Historic Preservation Officer for Managing Historic Properties That May Be Affected By A License Issuing to the City of Crystal Falls For the Continued Operation of the Crystal Falls Hydroelectric Project, Project No. 11402," executed on August 24, 1995, including but not limited to the Cultural Resources Management Plan (CRMP) for the project. In the event that the Programmatic Agreement is terminated, the Licensee shall implement the provisions of its approved CRMP. The Commission reserves the authority to require changes to the CRMP at any time during the term of the license. If the Programmatic Agreement is terminated prior to Commission approval of the CRMP, the Licensee shall obtain approval before engaging in any ground disturbing activities or taking any other action that may affect any historic properties within the project's area of potential effect.

Article 413. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a final recreation plan. The plan shall be based on the facilities described in: pages E-23 to E-25 of the application for license and Appendices 8 and 10, filed on April 2, 1993; and responses to Additional Information Requests filed on October 25, 1993.

The final plan shall provide for the following recreational enhancements at the project: (1) a hand rail secured to the existing retaining wall; (2) removal of brush and small trees at the downstream end of the canoe portage on the north bank of the tailrace to create a downstream shoreline fishing area; (3) a gravel drive and parking area at the boat ramp; (4) redesign of the parking lot for the boat launch; (5) adequate grade and end of ramp water depth at the existing boat launch facility; (6) directional signage to canoe portage and boat launch from major highways; (7) public access points to the Paint River for the term of the license; (8) steps at the northside canoe portage/tailrace access trail location; (9) a gravel parking lot for a minimum of seven vehicles, directional signage, and a vault

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toilet at the northside tailrace fishing access location; (10) improvements to existing stone stairway to Power Plant Park; (11) handicapped access and parking at the boat launch and northside tailrace access area; and (12) a handicapped accessible fishing/wildlife viewing pier on the impoundment.

The final plan shall include, at a minimum, the following:  
(1) final site plans for the recreation facilities cited above;

(2) design drawings of the directional signs and a description of where they will be located; (3) a discussion of how the facilities will conform to the guidelines established by the Architectural and Transportation Barriers Compliance Board (Federal Register, Vol. 56, No. 144); (4) erosion and sediment control measures, designed in consultation with the Soil Conservation Service, which shall be implemented during construction and which shall minimize destruction of the area's natural vegetation, and provide for revegetation, stabilization, and landscaping of new construction areas and slopes damaged by erosion; and (5) the implementation schedule not to exceed 6 months from the date of the plan's approval.

The Licensee shall prepare the plan after consultation with the Michigan Department of Natural Resources and the Soil Conservation Service.

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

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

Within 90 days of completion of construction, the Licensee shall file as-built drawings of the recreational facilities with the Commission.

Article 414. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a land management plan to protect shoreland resources in the project area. The plan shall include, at a minimum, (1) maps delineating the shoreland protection zones; (2) the method of protection such as purchase, easement, or other; and (3) the criteria for selecting each area.

The plan shall include provisions for notifying the

Crystal Falls - License 10-18-1995

Commission of any plans to modify the status of any City-owned riparian lands adjacent to the project reservoir.

The Licensee shall prepare the plan in consultation with the Michigan Department of Natural Resources.

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

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

Article 415. (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 water for which the Licensee may grant permission without prior Commission approval are:

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

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- (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and
- (4) food plots and other wildlife enhancement.

To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall:

- (1) inspect the site of the proposed construction;
- (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site; and
- (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline.

To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for:

- (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained;
- (2) storm drains and water mains;
- (3) sewers that do not discharge into project waters;
- (4) minor access roads;

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- (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 (measured over project waters) from any other private or public marina;
- (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and

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- (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year.

At least 60 days before conveying any interest in project lands under this paragraph (d), the Licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

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

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

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

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the

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protection and enhancement of the project's scenic, recreational, and other environmental values.

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(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. Section 385.713. The filing of a request to rehearing does not operate as a stay of the effective date of this order or of any other data specified in this order, except as specifically ordered by the Commission. The Licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Fred E. Springer  
Director, Office  
of Hydropower Licensing

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ENVIRONMENTAL ASSESSMENT  
FOR HYDROPOWER LICENSE

Crystal Falls - License 10-18-1995

Crystal Falls Hydroelectric Project  
FERC Project No. 11402  
Michigan

Federal Energy Regulatory Commission  
Office of Hydropower Licensing  
Division of Project Review  
825 North Capitol Street, N. E.  
Washington, DC 20426

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
cfs	cubic feet per second
City	the city of Crystal Falls
CLMP	Comprehensive Land Management Plan
COE	U. S. Army Corps of Engineers
Commission	Federal Energy Regulatory Commission
CRMP	Cultural Resources Management Plan
DEA	Draft Environmental Assessment
DO	dissolved oxygen
EA	environmental assessment
EPRI	Electric Power Research Institute
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U. S. Fish and Wildlife Service
GWh	gigawatt hour
Interior	U. S. Department of the Interior
kW	kilowatt
MCLAC	Michigan Compiled Laws and Administrative Code
MDNR	Michigan Department of Natural Resources
mg/l	milligrams per liter
MIRIS	Michigan Resource Inventory System
MW	megawatt
MWh	megawatt hour
NGVD	National Geodetic Vertical Datum
NWI	National Wetlands Inventory
PA	Programmatic Agreement
ROR	run-of-the-river
SHPO	State Historic Preservation Officer
USGS	U. S. Geological Survey

WEPCo  
WQC  
WUM

Crystal Falls - License 10-18-1995  
Wisconsin Electric Power Company  
Water Quality Certificate  
Wisconsin-Upper Michigan

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#### SUMMARY

On April 2, 1993, the City of Crystal Falls (City) filed an application for an original license to continue to operate the 1,000 kilowatt Crystal Falls Hydroelectric Project FERC No. 11402. The project is on the Paint River in Iron County, Michigan. The City proposes no new capacity.

In this Environmental Assessment, we analyze and evaluate the effects of issuing an original license for the existing hydropower development and recommend terms and conditions to become part of any license issued. In addition to the City's proposal, we considered two alternatives: (1) the staff's alternative, and (2) the no-action alternative. We also evaluate agency recommendations under the provisions of Sections 10(j) and 4(e) of the Federal Power Act (FPA).

Based on our consideration of all developmental and nondevelopmental resource interests related to the project, we recommend that the following measures be included in any license issued for the project to protect, mitigate, or enhance environmental resources. The applicant should:

- ù operate the project in instantaneous run-of-the-river mode; manage the project impoundment with a maximum daily water level fluctuation of no lower than 0.1 foot from the dam crest in the winter and the top of the flashboards in the summer;
- ù install a continuous recording water level device in the reservoir and a continuously recording flow monitor in the tailrace to monitor compliance with run-of-the-river operation;
- ù prepare a report after each year of operation to

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document ability to comply with run-of-the-river conditions;

- ù limit draw-down to no more than 0.25 foot/day during flashboard removal and replacement;
- ù when drawing down or refilling the impoundment, tailrace flows should not deviate more than 10 percent from inflow under all conditions;
- ù perform ice sluicing and flashboard installation as early as practicable in the spring and stabilize impoundment levels no later than May 1, or within 10 days of ice-out;
- ù develop and implement a plan to monitor water quality for compliance with state standards for temperature and dissolved oxygen;
- ù install and monitor a barrier net to reduce fish entrainment;
- ù conduct barrier net effectiveness studies;
- ù develop and implement a plan for management of large woody debris to improve fish habitat downstream of the project;

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- ù consult with agencies to develop and implement a plan to monitor and control the spread of exotic wetlands plants in the project area;
- ù develop and implement a recreation plan;
- ù construct, operate, and maintain additional recreation facilities;
- ù develop and implement a bald eagle protection plan;
- ù develop and implement a wildlife management plan;
- ù develop and implement a plan to identify and protect super canopy trees on City-owned lands within the project area;
- ù develop and implement a plan to protect shoreland resources in the project area;
- ù manage cultural resources through the provisions of a Cultural Resources Management Plan; and
- ù reserve authority to Interior to prescribe fishways.

If the license is denied, about 5,726,000 kilowatt-hours of electric energy generation per year at the Crystal Falls Hydroelectric Project would be lost. No measures would be implemented to protect, mitigate, or enhance existing environmental resources.

The City applied to the Michigan Department of Natural Resources (MDNR) for Water Quality Certification on January 28, 1992, pursuant to Section 401 of the Clean Water Act. The City subsequently withdrew its request for 401 certification and reapplied on January 28, 1993. MDNR did not act on the City's request within one year after January 28, 1993. Therefore, in accordance with the provisions of the Clean Water Act, we deem the certification waived.

Under Section 10(j) of the FPA we made a preliminary determination that some of the recommendations of the federal and

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state fish and wildlife agencies are not consistent with the purposes and requirements of Part I. Section 10(j) of the FPA requires the Commission to include conditions, based on recommendations of federal and state fish and wildlife agencies, for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. We have addressed the concerns of the federal and state fish and wildlife agencies and made recommendations. All agency recommendations identified in Section VIII of the DEA that were determined to be within the scope of Section 10(j) were either partially or fully adopted.

Based on our independent analysis of the Crystal Falls Hydroelectric Project, we conclude that issuing a license for the project, with our recommended environmental measures and other special license conditions, would not constitute a major federal action significantly affecting the quality of the human environment.

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ENVIRONMENTAL ASSESSMENT

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

Crystal Falls Hydroelectric Project  
FERC Project No. 11402 Michigan

INTRODUCTION

The Federal Energy Regulatory Commission (Commission or FERC) issued the Crystal Falls Hydroelectric Project Draft Environmental Assessment (DEA) for comment on March 31, 1995. In response, we received three comment letters (see list in Section IV.C). The staff reviewed all timely filed comment letters. We identify the sections of the DEA that have been modified as a result of comments received in the staff's response to the letters contained in Appendix A.

I. APPLICATION

The city of Crystal Falls (City) has owned and operated the Crystal Falls Hydroelectric Project since 1914. On April 13, 1989, the Director, Office of Hydropower Licensing issued an Order Finding Hydroelectric Project Jurisdiction for the Crystal Falls Hydroelectric Project under Section 23(b) of the Federal Power Act (FPA). The Commission determined that, because construction to increase the project's capacity occurred after 1935 and operation of the project affects interstate commerce, the project requires a license to continue to operate.

On April 2, 1993, the City filed an application for an original license to continue to operate the Crystal Falls Hydroelectric Project FERC No. 11402. The 1,000 kilowatt (kW)

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project is on the Paint River in Iron County, Michigan (Figure 1). The project does not occupy any United States Lands.

## II. PURPOSE AND NEED FOR ACTION

### A. Purpose of Action

In this Environmental Assessment (EA), we analyze the impacts of continued operation of the constructed project, evaluate alternatives to the proposed project, and make recommendations to the Commission on whether to issue a license, and if so, recommend terms and conditions to become part of any license issued. The FPA provides the Commission with the exclusive authority to license nonfederal hydropower projects on navigable waterways and federal lands.

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In deciding whether to issue any license the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation; the protection of, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreation opportunities; and the preservation of other aspects of environmental quality.

### B. Need for Power

The Crystal Falls Project was constructed in 1903. The three generating units were installed in 1914, 1924, and 1954. The City uses all the power produced by the project to meet its energy needs.

The public has benefitted from the unique merits of the hydropower generation from Crystal Falls for about 81 years. Hydropower generation is a low-cost form of electric power generation; it produces no atmospheric pollution; and it derives its primary energy from a renewable source.

The project is in the Wisconsin-Upper Michigan (WUM) subregion of the Mid-America Interconnected Network Main Regional Electric Reliability Council region. As reported in the Electricity Supply and Demand Report issued in June 1995, by the North American Electric Reliability Council, WUM forecasts an average annual increase in peak energy demand of 1.9 percent during the summer months and 1.4 percent during the winter months for the 1995 to 2004 planning period.

Considering the extended period of time during which the City has benefitted from the hydropower output of the Crystal Falls Project and WUM's growth rate projections, the Commission's staff concludes that the short-term and long-term needs of the applicant for the electricity generated by the projects have been

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adequately established.

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Figure 1. Project Location Map

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### III. PROPOSED ACTION AND ALTERNATIVES

#### A. Proposed Action

##### 1. Project Description

The project was constructed by the City in 1902-1903. In 1907 the City expanded the powerhouse to its present size with the addition of a second room to the southwest side of the original structure. The original dam was removed and replaced with the present dam in 1931. The constructed project (Figure 2) consists of a 270-foot-long, 16-foot-high concrete gravity dam with a 92-foot-long ungated overflow spillway, a 101-foot-long gated spillway with four radial steel gates, and integral 77-foot-wide powerhouse. The project impoundment has a surface area of about 100 acres and a storage capacity of 590 acre-feet at water surface elevation 1,333.69 feet National Geodetic Vertical Datum (NGVD). During the ice-free period from about May 1 through October 31, 12-inch-high wooden flashboards are added to the top of the ungated spillway section, and the reservoir is filled to a target elevation of 1,333.69 feet.

The 41-foot-wide intake structure consists of three bays integral to the powerhouse. The tailrace is 75 feet long and 77 feet wide.

The powerhouse contains three S. Morgan Smith vertical Francis turbines with a combined installed capacity of about 1,000 kW. The first generator was installed in 1914 (300 kW); the second in 1924 (300 kW); and the third in 1954 (400 kW). The average annual generation from the three General Electric generators is 5,726 megawatt hours (MWh) based on 10 years (1980 to 1989) of record.

All operations at the plant are performed manually by an operator who is on duty 24 hours a day, 7 days a week. Before 1992 the City operated the project in a peaking mode. The reservoir was drawn down during the day and refilled by the next morning. The power plant was historically operated with a headwater band of 12 inches, ranging from a maximum elevation of 1,333.69 feet to a minimum elevation of 1,332.69 feet.

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Since 1992, the City has operated the project in run-of-the-river mode. The City proposes to continue to operate the project run-of-the-river. During the ice-free period, the City would continue to add 12-inch-high flashboards in the beginning of the summer over the ungated spillway and operate the project at a

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Figure 2. Dam Facilities Layout

target headwater elevation of 1,333.69 (±0.25) feet. All turbine/generator units would be operated as required to maintain the target headwater elevation. During winter months the reservoir would be drawn down to elevation 1,332.44 feet by removing the flashboards, and the units would be operated to maintain the target headwater elevation of 1,332.44 (±0.25) feet.

During high flow conditions the City would continue its current operations. When inflow exceeds the total hydraulic capacity of the turbines and the reservoir continues to rise, Gate 4, which is farthest from the powerhouse, is opened first and the excess flow is passed through. If the water level continues to rise, Gate 3 is opened, followed by Gates 2 and 1.

## 2. Proposed Environmental Measures

The City proposes the following environmental measures:

- ù continue to operate the project as run-of-the-river;
- ù manage the project impoundment with a maximum daily water level fluctuation of ±0.25 foot;
- ù install and monitor a barrier net to reduce fish entrapment;
- ù improve recreation facilities by:
  - (1) placing canoe portage and boat access signs in strategic locations to better inform the public;
  - (2) improving the canoe portage by securing an iron hand rail to the existing retaining wall;
  - (3) modifying the existing granite substrate of the canoe portage by creating a limited number of steps;
  - (4) removing brush and small trees at the downstream end of the canoe portage on the northeast bank of the tailrace to create a downstream shoreline fishing area;
  - (5) constructing a boat ramp at the boat landing;

- Crystal Falls - License 10-18-1995  
(6) providing a gravel drive and parking area to accommodate use of the boat ramp; and

- ù manage cultural resources through the provisions of a Cultural Resources Management Plan.

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## B. Alternatives to the Proposed Project

### 1. Staff's Alternative

An alternative to licensing the project as proposed by the City is to license the project with modifications or other resource protection, mitigation, or enhancement measures. In addition to the City's environmental measures, the staff recommends the following measures:

- ù operate the project in instantaneous run-of-the-river mode; 11/
- ù maintain the project impoundment within 0.1 foot of the crest of the dam (1,332.98 feet) in the winter and the top of the flashboards (1,333.98 feet) in the summer;
- ù limit draw-down to no more than 0.25 foot/day during flashboard removal and replacement;
- ù replace flashboards by May 1 or within 10 days of ice-out;
- ù monitor compliance with instantaneous run-of-the-river and impoundment elevations by installing a continuous recording water level monitoring device in the reservoir and a continuously recording flow monitor in the tailrace;
- ù prepare a report after each year of operation to document the City's ability to comply with instantaneous run-of-the-river conditions;
- ù develop and implement a plan to monitor water quality for compliance with state standards for temperature and dissolved oxygen (DO);
- ù develop and implement a plan to evaluate barrier net effectiveness;

11/ Operating the project in the instantaneous run-of-the-river mode means that the amount of water flowing into the project's reservoir equals the amount of water released from the project to

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the river downstream. In theory, this operating mode would minimize changes in reservoir water surface elevations and tailrace flows. In practice, due to operation constraints and flash flow events, there may be some minor fluctuations in reservoir elevations.

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- ù develop and implement a plan to manage large woody debris to improve fish habitat downstream of the project;
- ù develop and implement a bald eagle protection plan;
- ù develop and implement a wildlife management plan;
- ù develop and implement a plan to identify and protect super canopy trees on City-owned lands within the project area;
- ù consult with agencies to develop and implement a plan to control the spread of exotic wetlands species such as purple loosestrife and Eurasian water milfoil;
- ù design and implement a recreation plan;
- ù construct, operate, and maintain recreation facilities, as follows:
  - (1) design or organize the parking lot for the boat ramp;
  - (2) redevelop the existing boat launch facility to provide adequate grade and end-of-ramp water depth for launching trailerable boats;
  - (3) provide additional directional signage to canoe portage and boat launch from major roadways;
  - (4) maintain recreation facilities as public-no-fee access points to the Paint River for the term of the license;
  - (5) develop a plan to design and install steps at the northside canoe portage and tailrace trail access location;
  - (6) develop a plan to design and construct a gravel parking lot for a minimum of seven vehicles, directional signage, and a vault toilet to improve access and use of the tailrace fishing access location;
  - (7) develop a plan to improve the existing stone stairway to Power Plant Park at the tailrace fishing access area on the south side of the river;

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- (8) provide handicapped access and parking at the boat launch and the northside tailrace access areas;

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- (9) develop and implement a handicapped-accessible fishing pier on the impoundment; and

- ù develop and implement a land management plan to protect shoreland resources within the project area.

2. No-action Alternative

Under the no-action alternative the project would continue to operate under the current mode of operation, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives.

3. Alternatives Considered but Eliminated From Detailed Study

In a letter dated December 1, 1994, in response to scoping, the Michigan Department of Natural Resources (MDNR) requested consideration of alternatives for federal takeover and project removal if it is determined that the project cannot meet the costs of the necessary environmental mitigation. We do not consider federal takeover pursuant to Section 14 of the FPA to be an alternative. Federal takeover and operation of a project is applicable to a licensed project. Since the Crystal Falls Project is not yet licensed, federal takeover is not applicable.

However, we did consider two retirement alternatives to the City's proposal but eliminated them from detailed study because they are not reasonable in the circumstances of this case. The project could be retired with or without dam removal, but either alternative would involve denial of the license application. No participant has suggested that dam removal would be appropriate, and we have found no adequate basis for recommending it at this time. The current project and impoundment provide recreation opportunities and fish and wildlife habitat. Thus, dam removal is not a reasonable alternative to licensing the project with appropriate protection, mitigation, or enhancement measures.

The second retirement alternative would involve retaining the dam and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency willing and able to assume regulatory control and supervision of the remaining facilities.

As with any retirement alternative, project capacity and energy would have to be replaced, most likely with fossil-fueled

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has stepped forward and no participant has advocated project retirement, nor have we found any basis for recommending it. In these circumstances we do not consider removal of the electric generating equipment to be a reasonable alternative.

MDNR recommends that the City develop a plan for project removal in anticipation of the end of the license term or project retirement. Interior has also recommended that the City establish a trust fund for project retirement. Neither agency, however, advocates dam removal/retirement at this time.

As discussed in Section VIII of this EA, the Commission, in its December 14, 1994, Policy Statement on project retirement (RM93-23-000), declined to impose a generic retirement requirement and instead decided to address the issue on a case-by-case basis. We conclude that, under the circumstances of this case, development of a plan for dam removal and establishment of a pre-retirement trust fund for the project is not warranted.

#### IV. CONSULTATION AND COMPLIANCE

##### A. Agency Consultation

The Commission's regulations require the prospective applicant to consult with the appropriate resource agencies before filing a license application. After an application is accepted the Commission issues a public notice and seeks formal comments in accordance with federal statutes. Comments become part of the record and are considered during analysis of the project.

The Commission issued a Public Notice on April 15, 1994, stating that the license application was ready for environmental analysis. The following entities commented on the application:

Commenting Agency	Date of Letter
Department of Interior	June 9, 1994
MDNR	June 13, 1994

##### B. Intervention

Besides providing comments, organizations and individuals may petition to intervene and become a party to subsequent proceedings. In response to the Public Notice issued by the Commission on February 2, 1994, motions to intervene were received from:

Intervenor	Date of Motion
Department of Interior	March 21, 1994
MDNR	March 29, 1994

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

C. Comments on the Draft Environmental Assessment

The respondents commenting on the DEA are as follows:

Commenting Entities	Date of Letter
City of Crystal Falls	May 9, 1995
U. S. Department of the Interior, Fish and Wildlife Service	May 22, 1995
Michigan Department of Natural Resources	May 30, 1995

D. Water Quality Certification

Pursuant to Section 401 of the Clean Water Act, license applicants must obtain either (1) state certification that any discharge from the project would comply with applicable provisions of the Clean Water Act, or (2) a waiver of certification by the appropriate state agency. The Commission requires that applicants apply for such certification or waiver before they file their application with the Commission.

The City applied to MDNR for a Water Quality Certificate (WQC) on January 28, 1992, pursuant to Section 401 of the Clean Water Act. The City subsequently withdrew its request for 401 certification and reapplied on January 28, 1993.

Section 401 (a)(1) permits the Commission to deem certification waived if the certifying agency fails to act on a WQC request within a reasonable period of time, not to exceed one year. MDNR did not act on the City's request within one year after January 28, 1993; therefore, the certification is waived.

E. Section 18 Fishway Prescription

Section 18 of the FPA gives the Secretary of the U.S. Department of the Interior (Interior) authority to prescribe fishways at Commission-licensed projects.<sup>12/</sup> Although Interior does not recommend fish passage facilities as a condition for licensing the Crystal Falls Hydroelectric Project,

<sup>12/</sup> Section 18 of the FPA provides: "The Commission shall require construction, maintenance and operation by a licensee at its own expense ... such fishways as may be prescribed by the Secretary of Commerce or the Secretary of Interior, as appropriate."

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it requested, by letter dated June 9, 1994, the Commission to reserve its authority to require construction and operation and maintenance of such fishways as may be prescribed pursuant to Section 18 of the FPA.

F. Dredge and Fill Permit Conditions

Pursuant to Section 404 of the Clean Water Act, dredge and fill permits are required for specified types of construction in wetlands and waterways of the United States. These permits generally include conditions applicable to project construction activities. Because licensing of the Crystal Falls Hydroelectric Project would not involve any appreciable construction activities that would affect wetlands, a Section 404 Permit would not be required for construction of proposed recreation facilities.

If construction activities including new recreation facilities, fishways, or other improvements are deemed necessary in the future, the City would be required to obtain a Section 404 Permit. MDNR has delegated authority from the U.S. Army Corps of Engineers (COE) to issue Section 404 Dredge and Fill Permits under PD-346, Michigan Inland Lakes and Stream Act of 1972.

G. Coastal Zone Management Program

The Crystal Falls Hydroelectric Project is not in a state-designated coastal zone management area (personal communication between P. Weslowski, Stone & Webster, and C. Cunningham, MDNR, December 27, 1994).

H. Scoping

On October 3, 1994, we issued a Scoping Document that identified the pertinent issues to be analyzed in the EA. Comments on the Scoping Document were received following the scoping meetings held on November 1 and 2, 1994, as follows:

Commenting Entities	Date of Letter
City of Crystal Falls	November 23, 1994
MDNR	December 1, 1994 and December 5, 1994

All references in the EA to agency comments, recommendations, or statements refer to the above-noted communications unless otherwise noted.

V. ENVIRONMENTAL ANALYSIS<sup>13</sup>

We examined all resource areas including geology, fish and wildlife, water quality, recreation, and cultural resources in the context of how the Crystal Falls Hydroelectric Project would affect them for the term of the license. In this EA, we include the details of only affected resources. Continued operation of the Crystal Falls Hydroelectric Project would not affect aesthetic resources or socioeconomics. The Scoping Document identified that the project would have only minor impacts on aesthetics and socioeconomics. We received no comments to the contrary at the public scoping meeting. We exclude these resources from our detailed analysis for the following reasons:

a. The aesthetic resources at the Crystal Falls Hydroelectric Project include the rural setting. During the scoping process and in comment letters filed during the licensing process, no resource agency or Tribe recommended any measures to improve the aesthetic resources at the project. Based on our preliminary analysis, we conclude that construction activity associated with improvements of recreation facilities is minor and would not have a long-term impact on aesthetic resources.

b. We also conclude that the project would not affect the socioeconomics of the region because no major construction activities are proposed that would affect employment, business, infrastructure, or tax revenues.

A. General Description of the Local e

1. Menominee River Basin

The project is in the Menominee River Basin on the Paint River at river mile 14.5 in Iron County, Michigan. Figure 3 shows the Menominee River drainage basin and location of the Paint River and the Crystal Falls Hydroelectric Project.<sup>14</sup>

<sup>13</sup> Unless otherwise indicated, our information is taken from the City's application, filed on April 2, 1993, and its response to additional information requests, filed on October 25, 1993.

<sup>14</sup> The Crystal Falls Project is not one of the hydropower projects evaluated as part of the Menominee River Basin Draft Environmental Impact Statement because the project is small, located high in the watershed, and not directly connected to issues of the lower and middle Menominee River.

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Figure 3. Menominee River Basin

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There are three principal rivers in the Menominee River Basin, the watershed of which comprises 4,070 square miles. The Brule River, which forms a substantial part of the Wisconsin/Michigan boundary, flows easterly from the Northern Highland plateau. The Michigamme River originates near Lake Superior and flows south. The Paint River flows in a southeasterly direction and joins the Brule River at a point almost due north of the village of Florence (Figure 3). Three miles further downstream at the confluence of the Brule and Michigamme Rivers, the Menominee River takes its source and flows southeasterly for 118 miles to its discharge in Green Bay, an arm of Lake Michigan.

Average rainfall in the river basin is about 30 inches, and average runoff is about 20 inches. The river is not subject to destructive floods (FERC, 1994).

The principal industries in the Menominee River Basin are timber related and include harvesting (both pulp and saw logs), paper making, and other wood processing activities (letter from MDNR, May 30, 1995).

The Menominee River and its tributaries have a total of 20 hydropower developments with an installed capacity of 107,177 kW (see Table 1)(FERC, 1994). There is only one other hydropower dam on the Paint River. Lower Paint dam is located downstream of the Crystal Falls Hydroelectric Project about 6 miles above the confluence of the Brule River at Little Bull Rapids. It is owned and operated by Wisconsin Electric Power Company (WEPCo). The Paint River Pond, an impoundment associated with the Brule River Project (also owned by WEPCo), is also located downstream of the Crystal Falls Hydroelectric Project at the confluence of the Paint and Brule Rivers.

No other power generation or developments upstream of Crystal Falls currently affect inflow to the project.

#### 2. Paint River Sub Basin

The headwaters of the Paint River are in a lake- and swamp-dominated area of the Ottawa National Forest in north-central Iron County. The river has a drainage area of 597 square miles and flows approximately 70 miles through heavily forested terrain to its confluence with the Brule River.

#### B. Cumulative Impact Summary

An action may cause cumulative impacts on the environment if it overlaps in space and/or time with the impacts of other past, present, and reasonably foreseeable future actions. The individually minor impacts of multiple actions, when added together, may amount to collectively significant cumulative impacts. The existing environment shows the effects of past and

Project No.	Project Name	Water Body
2486	Pine	Pine
2536 2744A	Little Qui nesec Menomi nee	Menomi nee Menomi nee
2744B 2433	Park Hill Grand Rapi ds	Menomi nee Menomi nee
2357	Whi te Rapi ds	Menomi nee
2394 2720	Chal k Hill Sturgeon Fal ls	Menomi nee Menomi nee
2471 1980	Sturgeon Ri ver Qui nesec Fal ls	Sturgeon Menomi nee
1980	Bi g Qui nesec	Menomi nee
2131 1759	Ki ngsford Twi n Fal ls	Menomi nee Menomi nee
1759 1759	Peavy Fal ls Way	Mi chi gamme Mi chi gamme
2431	Brul e	Brul e
2072 11402	Lower Pai nt Crystal Fal ls	Pai nt Pai nt
2073 2074	Mi chi gamme Fal ls Heml ock Fal ls	Mi chi gamme Mi chi gamme

present actions and provides the context for determining the cumulative impacts of future actions.

We reviewed the project's potential to cause adverse cumulative impacts. MDNR expressed concern about freshwater fish with strong migratory habits in the basin. Given the project's location and the nature of the area's resources, we conclude that the Crystal Falls Hydroelectric Project has the potential to cumulatively affect fisheries in the river basin. In Section V.C.3.c, we present our evaluation of the project's potential cumulative impacts on this resource.

### C. Proposed Action and Action Alternatives

In each of the following resource sections, we describe the environmental setting; the City's proposed operating procedures

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and environmental protection, mitigation, or enhancement measures; and the recommendations of resource agencies and other entities. We then provide our independent analysis and conclusions of the effects the project may have on environmental resources, and make recommendations to protect, mitigate, or enhance the affected environmental resources.

Lastly, we discuss any unavoidable adverse impacts on each environmental resource as a consequence of our recommended protection, mitigation, or enhancement measures.

### 1. Geology Resources

a. Affected environment: The Crystal Falls Hydroelectric Project is in the Superior Uplands region of the Canadian Shield, a broad region that includes the western half of Michigan's Upper Peninsula. The Superior Uplands are composed of igneous and metamorphic rocks of Precambrian age that are up to 2.5 billion years old and show signs of a long history of folding, uplift, and periods of erosion. Iron-rich ore deposits, which are in the nearby Menominee Iron Range, were the source of historic economic prosperity.

Surficial geology consists of glacial deposits varying in depth from 6 feet in the uplands to 200 feet in the lowlands and valleys. These deposits are predominantly a stratified drift composed of sorted outwash and ice contact deposits interspersed with smaller areas of unsorted ground moraine.

Soils in the project area consist of sands, loams, and mucks that are usually wet or saturated (Salkin, 1992). These soils, which were originally developed under white and Norway pine forests, are generally not used as farmland.

Some erosion was noted by surveying archaeologists, but it was considered minor and the result of natural processes. During the Commission's site visit to the project in November 1994, there was no observed shoreline erosion.

b. Environmental impacts: In a letter dated June 13, 1994, MDNR expressed generic concern about shoreline and bank erosion in impoundments and tailwater areas of hydropower projects in Michigan and the subsequent negative effects on aquatic systems. MDNR states that past operations have resulted in erosion in project areas and recommends that the City develop and implement a plan in consultation with MDNR to address both present and future erosion problems.

### Our Analysis

The removal of vegetation, earth disturbances, and construction activities associated with installation of recreation or fish protection facilities may cause some short-term, minor erosion and sedimentation. However, construction of

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the City's proposed measures is not expected to appreciably affect water quality in the impoundment or tailrace. We recommend that the City implement standard erosion controls during construction of recreation, fish protection facilities, or other improvements.

We do not agree with MDNR that a site-specific erosion and sediment control plan should be developed by the City to repair present and future erosional sites. As noted, during the Commission's site visit in November 1994, no evidence of shoreline erosion was observed to support MDNR's general statement about project operations' influence on erosion in the impoundment and tailrace.

Managing impoundment-level fluctuations, draw-downs, and refills should minimize to a great extent the potential for future bank erosion from project operations in both the impoundment and tailwater areas. We conclude, therefore, that a site-specific erosion and sediment control plan is not warranted.

c. Unavoidable adverse impacts: There may be some minor, short-term increases in erosion and sedimentation associated with the construction of recreation and fish protection facilities. Other minor, natural erosion would continue along both banks of the Paint River in the project area.

2. Water Resources

a. Affected environment:

Water Quantity

The Paint River is a major tributary of the Menominee River. Crystal Falls Hydroelectric Project dam is located at river mile 14.5 and impounds a reservoir of approximately 100 acres. Except for the Lower Paint Project, which is located downstream about 6 miles above the confluence with the Brule River, the river is free-flowing and unregulated. Table 2 lists the mean and median flows for each month of the year. The flows are based on the 1950 through 1989 data collected from the U.S. Geological Survey (USGS) station approximately 150 feet downstream of the project powerhouse. Table 2 shows high spring flow rates in April and May and lower than average flows in January and February. The annual mean flow is 614 cubic feet per second (cfs) but flows as low as 82 cfs (1988) and as great as 10,500 cfs (1960), have been recorded in the period of record for the gaging station.

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Table 2. Mean and median flows by month, 1950-1989 (USGS)  
(Source: Application)

Month	Mean Flow (cfs)	Median Flow (cfs)
January	327	328
February	314	300
March	444	338

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April	1,649	1,300
May	1,067	812
June	709	536
July	475	373
August	394	337
September	478	377
October	552	426
November	559	487
December	398	383
Annual	614	405

The 100-acre project impoundment contains about 590 acre-feet of storage at elevation 1,333.69 NGVD. The impounded river reach is long and narrow. The deepest portions of the impoundment are near the powerhouse and gated spillway section of the dam. Most of the impounded water is less than 10 feet deep, but there are some 12-foot holes and one 20-foot-deep hole in the upper half of the reservoir.

Before 1992, the project operated in a peaking mode and the reservoir was typically drawn down during the day. Since 1992, the project has operated in a modified run-of-the-river conditions; the project impoundment has been routinely fluctuated as much as 1 foot.

Water Quality

The Paint River near the Crystal Falls Hydroelectric Project does not have any known water users or industry that discharges to the river upstream of the project. There are some stormwater discharges from adjacent roads and bridges that enter the river. One stormwater discharge enters the river immediately below and on the northeast side of the dam.

Water quality standards for Michigan (R323.1041 - Rules of the Water Resources Commission under Section 323 of the Michigan Compiled Laws and Administrative Code [MCLAC]) cover a variety of

physical and chemical characteristics of water quality. The two characteristics that may be influenced by operation of a hydroelectric project are DO and temperature. Section R323.1064(1) of the MCLAC requires waters such as the Paint River to continuously maintain a DO of at least 5 milligrams/liter (mg/l). Section R323.1075(2) requires that water bodies similar to the Paint River shall not receive a heat load that would warm the receiving water at the edge of the mixing zone by more than 5 F above natural water temperatures. Section R323.1075(3)(b) requires that water bodies similar to the Paint River shall not

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receive a heat load that would warm the receiving water at the edge of the mixing zone to temperatures greater than monthly maximums (Table 3).

Table 3. Monthly maximum temperatures at the edge of the mixing zone (Source: Application)

Month	Temperature ( F)
January	38
February	38
March	41
April	56
May	70
June	80
July	83
August	81
September	74
October	64
November	49
December	39

The City conducted a one year water quality sampling program beginning in September 1991. Results of the study showed that the impoundment does not stratify and that state water quality standards were met for temperature and DO. Some inflows to the project impoundment from Briar Creek Tributary recorded DO levels close to and occasionally below the 5 mg/l standard. Footnotes in the water quality data report imply that some extreme low DO observations were caused by debris clogging the continuous DO monitors.

Although water temperatures on some days approached the monthly maximums (see Table 3), generally they were similar to inflow temperatures. When inflow temperatures changed rapidly,

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the impoundment outlet temperatures lagged the change and reduced the variability in water temperatures.

b. Environmental impacts: In this section, we present our analysis of the effects of run-of-the-river operation on the environment and the need for monitoring run-of-the-river conditions and water quality.

Run-of-the-river Operation

The City proposes to operate the project in run-of-the-river mode. It proposes to use 1-foot flashboards during the ice-free

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season and to maintain the impoundment at elevation 1,333.69 (±0.25) feet. During the winter, it proposes to operate without the flashboards at elevation 1,332.44 (±0.25) feet.

The City proposes a ±0.25 foot impoundment fluctuation that would allow the impoundment to be drawn down as much as 0.79 foot below the dam crest (elevation 1,332.98 feet) in the winter and as much as 0.54 foot below the flashboard crest in the summer. In the event of an emergency plant outage, the City claims that the plant can be restarted in 2 to 3 minutes or that one of the spill gates can be opened if the plant cannot be immediately restarted. If the gates cannot be operated, the City says the inflow would pass over the ungated spillway. MDNR's letter dated June 13, 1994, recommends that the City pass river inflow instantaneously in the event of a total plant blackout.

Interior in its letter dated June 9, 1994, and MDNR in its letter dated June 13, 1994, both recommend an instantaneous run-of-the-river operating mode and agree that the City's proposed operation with impoundment fluctuations meets their flow requirements. MDNR also defines instantaneous run-of-the-river as inflow to the reservoir equaling outflow and states that impoundment fluctuations should be minimized. MDNR's acceptance of the City's flow as run-of-the-river, however, is not completely consistent with its definition of instantaneous run-of-the-river.

Both agencies make additional recommendations relative to run-of-the-river operation. Both agencies recommend that the City notify them of any emergencies and scheduled maintenance affecting flows or water level changes of more than 1 foot elevation. MDNR also states that draw-downs of greater than 1 foot would require a permit. MDNR recommends that during any draw-down or refill, the discharge should not deviate more than 10 percent from the instantaneous run-of-the-river condition.

In its June 13, 1994, letter, MDNR also recommends installing flashboards during the April 24 through May 6 period and withdrawing them during the October 25 through November 6

period each year. During this period, it recommends that the impoundment elevation should change no more than 0.25 foot/day.

MDNR also recommends that, in the event of an emergency draw-down, the City should identify resource damage and mitigation and report actions taken to avoid recurrence of emergency draw-downs. MDNR also recommends that the City could, for short periods of time, modify its flow and impoundment levels upon mutual agreement with MDNR and Interior.

Our Analysis

We evaluate the need for run-of-the-river conditions; the reasonable levels of impoundment fluctuation needed for such

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operation; appropriate impoundment levels during transition between summer and winter operation; duration of the transition season; and jurisdiction for, effects of, and mitigation related to emergency draw-downs.

To provide run-of-the-river conditions during plant outages as proposed by the City, the crest gates would need to open to the position where gate flow equals inflow to the impoundment. The spill gates cannot be accurately set to match and reliably follow inflow, especially when inflows are low and continuous minimum flows are even more important for maintaining downstream water quality and aquatic habitat. These gates are not easily calibrated to provide specific flows. Without accurate matching of release flows to inflow, repeated, discrete gate operations would lead to surging flows downstream of the project. The gate sills are 13 to 20 feet below the normal impoundment elevation where the depth of the impoundment is typically 16 to 18 feet (City of Crystal Falls, 1993, application, Appendix 10). Opening these gates to pass inflow, especially after a long period of nonuse, may lead to release of impoundment sediments. Normally these gates are used to pass flood flows during spring runoff.

During a high flow period, releasing some sediment would have a much smaller effect on water quality than it would if it were released during a low-flow period. We also doubt that the spill gates can reliably be used to pass inflow during the winter season. The City currently skims ice over the ungated spillway section each spring, in part, to reduce potential for damage to the gates. The gates probably would require freeze protection if expected to reliably operate and provide flow during the winter season.

The City proposes to pass inflow over the ungated spillway if either the plant cannot be restarted or the gates cannot be used during a plant outage. We considered the lag time that would be required to provide inflows using the spillway. As stated previously, under the City's proposed operations, the impoundment may be drawn down as much as 0.79 foot when a plant

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outage occurs. With annual median inflow (405 cfs), the 100-acre impoundment would fill for approximately 141 minutes before flows over the ungated spillway started.

The 141-minute lag time is the maximum period of no flow that may be observed in the project tailrace during a median inflow period. This duration of no flow would have adverse effects on downstream river flows. Longer durations may also occur if flows are less than 405 cfs. Because the river downstream has a consistent (but gentle) gradient, downstream areas would be dewatered during an extended no flow condition. A 141-minute no flow period probably would lead to dewatering of riverine reaches below the project.

We compared this no flow dewatering to an alternative run-of-the-river operation that would require the impoundment to be

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maintained within 0.1 foot of either the dam crest during winter operation or the flashboard crest during summer operation. In the event of a plant outage, the time lag to begin spilling water would be about 18 minutes with the 405 cfs inflow condition. In 18 minutes there would still be some potential for downstream dewatering, but the extent and duration would be much more limited. With round-the-clock attended operation as proposed by the City, maintaining an impoundment elevation no lower than 0.1 foot below the dam or flashboard crest should be easily facilitated with only the addition of a continuous operating impoundment level sensor. We, therefore, recommend the City maintain impoundment level no lower than 0.1 foot below the dam crest or top of the flashboards and install a continuous operating impoundment level sensor.

#### Run-of-the-river During Flashboard Operations

During the transition periods between winter without flashboards and summer with 1-foot flashboards, there must be some flexibility in project flow and elevation standards. In the City's letter dated July 25, 1994, it cites a need to raise the impoundment elevation 1 foot higher than the dam crest (1,333.98 feet) to pass sheets of accumulated ice. The reservoir level is then dropped to an elevation about 0.5 foot below the dam crest (1,332.44 feet) to allow installation of the flashboards. MDNR's letter dated June 13, 1994, recommends that this activity be confined to the period of April 24 through May 6.

The City states that under current procedures the flashboard installation normally would require 5 to 10 days to complete. In our analysis, we recognize that the period when the City can transition to use of flashboards depends on seasonal weather conditions. We also recognize that it is in the City's best interest to get the boards up as soon as possible to achieve the energy benefits of the extra 1 foot of head. It is also beneficial to fisheries, wildlife, and riparian vegetation (see

Sections V.C. 3 and V.C. 4) that the stable summer elevation be established early in the growing season.

We conclude that there is no need to limit the transition period to MDNR's recommended 2 weeks. During extremely cold, dry spring seasons, the City may not be able to complete flashboard installation by May 6, and during warm, wet seasons there may be opportunity to install the boards earlier than April 24. To prevent the City from installing the boards during fish spawning (see Section V.C. 3) and the vegetative growing season (see Section V.C. 4) we conclude that the boards should be in place each year no later than May 1 or within 10 days of ice-out. During the removal of sheet ice and installation of flashboards, the time period when the impoundment elevation is below the level of the dam and flashboard crest should be minimized to ensure run-of-the-river flows can be passed through the ungated spillway in the event of a plant outage. MDNR agrees with our analysis (personal communication between P. Weslowski, Stone & Webster,

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and G. Whelan, MDNR, August 17, 1995).

MDNR also recommends that flashboards be removed during the October 25 through November 6 period. From a water quality/quantity perspective, there is no reason why the City could not remove the boards in this season. For both removal and installation of the flashboards, some deviation from strict run-of-the-river conditions is needed to fill or spill approximately 100 acre-feet of water. MDNR recommended, in its June 13, 1994, letter, that such draw-downs should be subject to changes in flow of no more than 10 percent. Changes of flow in this range should have no effect on downstream water quality because changes of this minor magnitude would commonly be expected from typical rainfall and snowmelt events.

MDNR's letter dated June 13, 1994, also recommended that changes in impoundment elevation in the transition season should not exceed 0.25 foot/day. We find no water quality related reasons to support this recommendation.

The City does not identify the need for maintenance draw-downs of the reservoir beyond those described for modifications of the flashboards. Both Interior and MDNR recommend that the City notify them of scheduled draw-downs greater than 1 foot. In any case, we recommend that the City be required to seek approval from FERC's Division of Project Compliance and Administration for any scheduled draw-down. MDNR recommends that the Commission require a license condition that the City apply for an MDNR permit for draw-downs greater than 1 foot. The Commission does not make a practice of imposing license articles to cover state permits. If the City needs to schedule a draw-down, it would be expected to meet the conditions imposed by the license and any pertinent state, county, and local regulations. We do not

recommend the inclusion of a license article requiring the City to apply for a state permit for a draw-down.

For emergency deviations of flow or impoundment level, we recommend that the City notify the Commission within 10 days of the emergency event. Because emergency deviations may affect water quantity and fish and wildlife resources, we also recommend that MDNR and Interior be notified as soon as possible. Early notification of FERC, MDNR, and Interior would aid in identifying resources (including water quality) affected and measures needed to limit future impacts on the resource. MDNR also recommends that the City assist in identifying the need for mitigation for emergency flow and impoundment deviations. We recommend that the City prepare a report of any emergency draw-down. The report should define any impacts on local fish and wildlife resources.

MDNR recommends that the City be allowed to temporarily modify impoundment elevations and flow rates based on mutual agreement with Interior and MDNR. The Commission must be notified of any mutual agreements between the City and MDNR and

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Interior regarding temporary project modifications to the impoundment elevation, flow rates, or project operations.

We conclude that run-of-the-river operation should provide continuous flow releases below the project. The flows should be ensured by maintaining the impoundment within 0.1 foot of the crest of the dam or flashboards. The spill gates are not an appropriate means of ensuring flow releases when a unit cannot be immediately restarted. The City should remove flashboards in the October 24 through November 6 period and replace the flashboards no later than May 1 or within 10 days of ice-out. When drawing down or refilling the impoundment, tailrace flows should not deviate more than 10 percent from inflow. The impoundment should be refilled as soon as possible after flashboard installation and removal in accordance with the 10 percent flow deviation. Project operation may be modified in the event of an emergency, but the City must inform the Commission.

Monitoring for Run-of-the-river Conditions

The City did not propose monitoring of run-of-the-river operation. In a July 25, 1994, letter, in response to MDNR and Interior's recommended terms and conditions, the City agreed to install upstream and downstream staff gages visible to the public. The City plans to use its existing upstream water level gage to manually record hourly impoundment levels. In the letter, the City rejects MDNR's request to provide telemetry from the USGS gaging station citing costs. The City says that the USGS station information is also available from WEPCo, the local utility company. The City agreed to a three-year test period proposed by MDNR to determine the effectiveness of compliance monitoring using the upstream and downstream staff gages.

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Interior in its letter dated June 9, 1994, and MDNR in its letter dated June 13, 1994, both recommend that the City:

- ù develop a monitoring plan for run-of-the-river conditions;
- ù make an agreement to cost share operation of the existing USGS gaging station;
- ù equip all flow gaging stations with telemetry systems for agency access;
- ù install a color coded staff gage visible to the public;
- ù maintain continuous records of headwater and tailwater elevations; and
- ù maintain and provide, on agency request, information on turbine, spillway, and impoundment operations.

MDNR further recommends that the City:

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- ù contract with USGS to install and operate another gage upstream to monitor inflow into the impoundment;
- ù install a continuously recording water level gage; and
- ù prepare a report documenting its ability to comply with run-of-the-river operation over a three-year period.

Our Analysis

Tailrace flows are occasionally interrupted by unexpected plant outages caused by a variety of factors. Because downstream water quantity and quality could be diminished by inconsistent flow releases, there is a need to monitor compliance with run-of-the-river flow conditions. Because the ability to provide downstream releases in case of a plant shut-down depends on maintaining impoundment elevation within 0.1 foot from the crest of the dam or flashboards, impoundment level monitoring is also needed.

The upstream and downstream staff gages and operator's log do not provide the type of data needed to ensure that run-of-the-river flows are provided continuously. The hourly log recordings would not identify the extent of a flow interruption in the time range (in minutes) where downstream river resources could be adversely affected by discontinuities in flow. We recommend that recording be done at least at 15 minute intervals. We also recommend that the impoundment level sensor be recorded at least at 15 minute intervals. We also recommend that the City continue to record the time of any plant outage and restarts.

There is no justification to require the City to fund the existing USGS station to monitor tailrace flow. The existing USGS station is one method that the City may choose to monitor downstream flows. The City should develop a plan to identify the most appropriate method to monitor tailrace flows and impoundment elevation. There is no need to monitor inflow to the reservoir. Inflows are naturally regulated and can be estimated, to the degree of accuracy necessary for determining compliance with run-of-the-river conditions, by monitoring tailrace flows and headpond elevation. In addition, monitoring upstream flows would require both large tributaries and the main channel to be monitored and would require precise calibration of the equipment to avoid apparent discrepancies between flow monitoring locations.

The City should file flow and headpond elevation data with the Commission so that retrospective audits of compliance with flow conditions can be conducted. MDNR's and Interior's request for telemetry access is not supported by any evidence nor is it demonstrated why telemetry is a reliable method for monitoring run-of-the-river operation. However, if the agencies want this information via telemetry, continuous records of flow can be obtained from USGS or from WEPCo's telemetry operation. Regular operation would not lead to prolonged interruptions in tailrace

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flow. Any monitoring of the data by the agencies is not likely to uncover unidentified deviations from the licensed flow and impoundment elevations. We, therefore, do not recommend that the City install telemetry for agency access to the gages used to monitor run-of-the-river conditions.

The City has agreed to install a staff gage visible to the public, as recommended by Interior and MDNR, and we agree that it is helpful for the operation that we are recommending. We recommend that the impoundment be maintained within 0.1 foot of the top of the crest of the dam or flashboards depending on the season. Deviations from this level are easily observable with the use of staff gages. Therefore, we recommend that the City install a staff gage in the impoundment visible to the public.

A tailrace staff gage does not have a "proper" observable range because the level of the tailrace will fluctuate with inflow. Historically, inflow has been as low as 82 cfs; tailwater levels at this flow would be atypically low but not indicative of a violation of run-of-the-river operation. We conclude that a tailrace staff gage is not necessary to monitor compliance of the operation of the project or protection of river resources.

Although Interior and MDNR recommend that the City provide information on daily operation of the turbines and spillway, we do not recommend this as necessary for monitoring project operations or for protecting fish and wildlife resources. The

Commission maintains responsibility to ensure that the City operates the plant in accordance with the license. We recommend that the City monitor, document compliance, and report incidents of noncompliance. The Commission should audit compliance periodically from information filed with the Commission and in response to complaints about noncompliance. The agencies and public can collect data through their own sources or with voluntary sharing of information from the City's project.

We considered the need for the City to provide a post-licensing report documenting its compliance with license articles concerning tailwater flows and headpond elevation. Although the City maintains round-the-clock operator surveillance of the project, human error and aging equipment create a potential to lead to dewatering of the tailrace or impoundment draw-downs. We, therefore, recommend that the City prepare a report documenting results of compliance with minimum flow and headpond elevation each year.

In summary, based on our run-of-the-river monitoring analysis, we recommend that the project operate in a run-of-the-river mode with the following specific limits on project operation:

- ù outflows should be maintained within 10 percent of actual inflows under all conditions;

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- ù impoundment elevation should be maintained no more than 0.1 foot below the dam (winter) or flashboard (summer) crest;
- ù the City should maintain a continuously recording impoundment level monitor;
- ù the City should maintain a continuously recording flow monitor downstream of the project;
- ù the City should install a staff gage visible to the public;
- ù the City should file with the Commission flow and impoundment level records;
- ù the City should submit a report each year documenting its compliance with run-of-the-river conditions; and
- ù the City should, upon request from Interior and MDNR, supply the agencies with copies of the monitoring reports filed with the Commission.

### Water Quality Monitoring

Both MDNR and Interior recommend that the City conduct a water quality monitoring study. MDNR recommends as a condition of license that the City meet state water quality standards for DO and temperature. Interior recommends a condition that the City agree to additional mitigation based on the results of water quality monitoring.

We reviewed the water quality data collected by the City. We compared the water quality data to state standards and reviewed MDNR's specific comments on the results of the water quality monitoring.

Our review of the water quality data shows nothing that would indicate that the project is contributing to or causing violations of the state water quality standards for the Paint River. Temperatures of water entering the impoundment sometimes meet or may occasionally be expected to exceed the monthly maximums for state rivers at this latitude. However, these temperatures are likely to occur within the definition of the state water quality standards under Michigan Water Resources Rules at Section 323. In addition, the higher temperatures are most likely the result of river conditions that exist upstream of the project. The dark-stained waters are likely to absorb more light and heat due to natural tannins in wetlands that feed the river. Also, land use patterns such as agriculture, mining, forestry, or residential shoreline development may eliminate

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shoreline vegetation that provides shading to river waters.

We investigated the MDNR comment concerning an observed deviation of water quality standards on August 26, 1992. MDNR noted that, on this date, water temperatures downstream of the impoundment were more than 5 degrees greater than the temperature of waters flowing into the reservoir. This "temperature rise" exceeds allowed limits for Michigan standards at the edge of the mixing zone. We observed the deviation. We also observed that upstream river temperatures were dropping rapidly over the course of a couple of days by more than 5 degrees. This cooling was undoubtedly a natural or seasonal cooling event.

The mass of impoundment waters acts to dampen rapid changes in downstream temperatures. In fall, colder inflow mixes with the reservoir waters and slowly reduces downstream temperatures. In spring, the impoundment waters absorb heat from rapidly rising inflow waters to reduce the rate of water temperature change downstream of the project. The specific instance of a "violation" of water quality standards at the project was the result of the rapid rate of cooling of waters that flow into the project impoundment.

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Further review of hourly temperature data for the few days before and after the "violation" shows that the impoundment outlet temperatures lagged inflow temperatures by about 24 hours. The project impoundment slowed the rate of change. More importantly, the "violation" cited by MDNR shows no evidence of the project adding heat to the river.

Our review of the temperature and DO data indicates no need for the City to collect additional water quality data. The existing data demonstrate that the project tailwaters are expected to meet state standards. We do not agree with MDNR and Interior recommendations for a license article for water quality monitoring. See Section VIII for our recommendation for water quality monitoring.

c. Unavoidable adverse impacts: None.

3. Fisheries Resources

a. Affected environment: The existing environment and established fisheries near Crystal Falls dam are typical of riverine fisheries in the upper midwest of the United States. The project impoundment has riverine habitat characteristics because of its long narrow shape. MDNR's letter dated June 13, 1994, identifies the downstream 5.1 miles of river to the Little Bull impoundment as pool-riffle habitat with an average gradient of 4.5 feet per mile.

The license application provides information on species composition from three different data sources: a 1926-1927

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University of Michigan Museum Record; a 1984-1987 MDNR fyke and trapnet study; and a 1992 City-sponsored fyke net and electrofishing survey. The University of Michigan data were collected from the general Paint River watershed by unknown sampling methods. The location of the MDNR sampling was not specified, and the sampling did not identify minnow species. The City-sponsored sampling was conducted in the project impoundment but also did not identify most minnow species.

Table 4 presents a summary of the species composition data for the three studies. Although the City-sponsored study provides information on relative abundance and size distribution of fish collected, each sampling gear type has some species and size bias. Generally, muskellunge in the 23- to 31-inch size range dominated the electrofishing samples, while northern pike in the 11- to 26-inch size range, pumpkinseed sunfish in the 2- to 6-inch range, rock bass in the 3- to 8-inch range, and white sucker in the 5- to 21-inch range were the most abundant species collected in the fyke net samples.

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Table 4. Fish species composition by study and period of occurrence (Source: Staff)

Species	Uni v. Mi chi gan Museum 1926-1927	MDNR Fyke & Trap Netting (no mi nnows i denti fi ed) 1984-1987	City Fyke Netting & El ectrofi shi ng April 1992
Rainbow trout	X		
Brook trout	X		
Brown trout		X	X
Muskellunge		X	X
Northern pike		X	X
Smallmouth bass		X	X
Largemouth bass		X	X
Pumpkinseed		X	X
Bluegill		X	X
Black crappie		X	X
Rock bass		X	
Logperch	X		X
Walleye		X	X
Yellow perch		X	
Blacknose dace	X		
Longnose dace	X		
Hornyhead chub	X		X
Creek chub			X
White sucker	X	X	
Mottled sculpin	X		
Black bullhead		X	
Tadpole madtom		X	X

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project area as good habitat for cool and warmwater fish. Interior identifies walleye and smallmouth bass as primary management species.

MDNR in comments at the November 2, 1994, scoping meeting noted that the City-sponsored studies identified a mediocre fish population in the reservoir. It stated that muskellunge are doing well and have migrated to the site from upstream lakes that are stocked, and smallmouth bass use the deeper impoundment waters for overwintering. MDNR also noted that northern pike use the impoundment's marshy habitat for spawning.

Also at the November 2, 1994, scoping meeting, MDNR stated that past management practice included stocking of walleye fingerlings. Stocking was not successful, however, and walleye populations in the reservoir are low. MDNR also has a trout stocking program for waters 10 to 15 miles upstream of the project. Records for the period from 1979 to 1994 show brook, brown, and rainbow trout have been stocked. Water temperatures

near a point about 8 miles upstream of the project are too high to sustain trout on a year-round basis.

b. Environmental impacts: Fish populations in the Paint River near the project may be affected by project operation and by many of the City's proposals, agency recommendations, and Commission-adopted mitigation or enhancement measures. In the following section we discuss potential fisheries-related issues, including: run-of-the-river operation, fish entrainment barrier nets, fish passage, woody debris transport, and cumulative impacts of the project.

#### Run-of-the-river Operation

The City proposes run-of-the-river operation with use of 1 foot flashboards in the ice-free season. The City proposes to maintain the impoundment in each season in a 0.5-foot operating band.

Both MDNR and Interior recommended an instantaneous run-of-the-river operation. We describe details of their recommendations in our discussion of water quality/quantity (see Section V.C.2).

As part of MDNR and Interior recommendations to operate the project in run-of-the-river mode, they cite the adverse effects on downstream riverine habitat of deviations from strict run-of-the-river conditions. They also cite potential for recruitment failure due to deviations from strict run-of-the-river conditions leading to dewatering at critical times of the year. MDNR states that shallow water habitat areas downstream of the project are valued as spawning and nursery habitat. Stable impoundment elevations are needed to maintain these habitat values.

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MDNR also recommends that, during the transitional water level period when flashboards are installed or removed, the changes in impoundment level should be limited to no more than 0.25 foot/day.

Our Analysis

We considered the habitat needs for all life stages of fish in the impoundment and downstream of the project, the effect of deviations from the proposed run-of-the-river conditions, and the operating limits proposed by the City.

Impoundment fluctuations of less than 0.5 feet would have limited effects on spawning fish in the project impoundment. However, nesting species such as largemouth bass and other species of the sunfish family that construct nests in shallow waters could be susceptible to spawning failure if water level fluctuations during the spawning season were greater than 1 foot.

The City's proposed operation should not have an impact on spawning fish.

Juvenile fish of many species use shallow vegetated areas as nursery refuge from large predatory species. Fluctuations of the impoundment during the vegetative growth season could restrict growth of shallow water vegetation. Fluctuations could also drive small fish from vegetated shallows into open water where they could be susceptible to predation. Limiting fluctuations to less than 0.5 foot, as proposed, should prevent these potential impacts. At the site visit, the Commission staff observed vegetated shallows that have been established under existing operations. The City's proposed operations should preserve the existing vegetation. The 0.5-foot operating band should not drive juvenile fish from nursery areas; this range of fluctuation is commonly observed in many lakes and riverine reaches where the same fish species have successfully established populations.

We recommend limiting impoundment operating level to no less than 0.1 foot below the seasonal crest of the dam or flashboards (see Section V.C.2). This smaller fluctuation zone is not necessarily more beneficial for impoundment fish than the City-proposed 0.5-foot operating regime, but the more stringent limitation ensures that run-of-the-river flows are provided downstream of the dam.

We considered MDNR recommendations to reduce daily changes in the impoundment to no more than 0.25 foot/day. Rising water levels of the impoundment would have no adverse effect unless levels rose so high that riverine fish were displaced to upland habitats with unsuitable fish habitat characteristics. The City proposes to raise the impoundment by 1.5 feet in spring to skim off ice before setting the flashboards. The site visit showed that the areas that would be inundated by a 1.5 foot rise would probably not displace riverine fish to unsuitable areas. We conclude that limiting the rate of impoundment rise is not

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necessary for fishery resources protection.

A rapid decline in impoundment elevation due to project operation could lead to fish stranding. Juvenile fish that frequent shallow refuge areas are most likely to be stranded in the shallow wetlands, especially on the north-northwest side of the impoundment. We do not have specific topographic data that would identify areas where fish may be susceptible to stranding or that would support a rate of change in impoundment elevation. MDNR's proposed rate of 0.25 foot/day should be less than or comparable to the natural rate of change in an impoundment or river due to natural variation in flow events. Because rapid changes could lead to stranding, MDNR's proposed 0.25 foot/day rate is reasonable based on expected natural conditions, and the rate should not have a meaningful impact on the schedule, cost, or timing of flashboard replacement. We recommend that

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impoundment draw-downs be limited to a rate of no more than 0.25 foot/day.

If a scheduled draw-down of more than 1.5 feet is required for a short period, the Commission would consider a proposal for more rapid draw-down and refill. A more rapid period of draw-down may eliminate impacts of desiccation and erosion of impoundment sediments associated with a long exposure period. We recommend that if the City needs to schedule a draw-down, it seek Commission approval and notify MDNR and Interior at least 60 days in advance of the scheduled draw-down.

Written notification submitted to the Commission is required for any modification of project operation including emergency and planned impoundment draw-downs. We recommend that a copy of the written notification also be provided to Interior and MDNR at the time that it is filed with the Commission. We also recommend that the City consult with MDNR and Interior and develop, for Commission approval, an impoundment draw-down plan.

#### Fish Entrainment Barrier Net

The City proposes to install a seasonal use fish barrier net to block passage of fish into the project intake structure. A net, if effective, would limit the potential for fish mortality due to passage through the turbine.

Interior's letter dated June 9, 1994, and MDNR's letter dated June 13, 1994, agreed on the need for the following barrier net recommendations. They agreed that the City should:

- ù develop a barrier net plan and schedule;
- ù develop a plan for net maintenance;
- ù develop and implement a plan to evaluate the effectiveness of the barrier net; and

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- ù develop a plan to compensate for unavoidable loss of fish due to any net ineffectiveness or turbine passage outside the barrier net season.

Interior also recommends that the City use a consultant experienced in the design and installation of fish protection measures.

Our Analysis

We considered the potential for fish entrainment based on upstream fish species composition and the physical features of the project. Then we considered the biological and engineering feasibility of using a barrier net at the site. Based on the

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feasibility we considered the potential effectiveness of the barrier and whether or not there would be any unavoidable fish losses.

The project impoundment and upstream aquatic habitat are suitable for supporting fish species with seasonal migratory habitats such as walleye, smallmouth bass, pike, and muskellunge. These migratory species may move downstream seasonally to seek alternative feeding or overwintering habitat. These fish may be susceptible to entrainment in the turbines at the Crystal Falls Hydroelectric Project. Other young-of-the-year species such as bass and sunfish also may relocate downstream.

EPRI (1992) characterizes entrainment data mostly from upper midwest locations similar to the Crystal Falls Hydroelectric Project. The report concludes that species such as rock bass, smallmouth bass, bluegills, and perch often dominate the entrainment samples (especially in the Michigan and Wisconsin area) and commonly in the spring and summer seasons of the year. EPRI (1992) also concluded that most entrained fish were less than about 8 inches in length.

The existing project has trashracks with 1 to 2 inch clear spacing and average approach velocities of less than 2 feet per second. It is unlikely that the muskellunge and northern pike of the size that dominated the onsite electrofishing and gill net sampling could be entrained through the project. Small bass and sunfish would be more susceptible to entrainment.

The existing project turbines are a vertical Francis design. EPRI (1992) shows entrainment mortality for larger introduced fish is about 10 to 30 percent. The close spaced trashracks are more likely to entrain small fish, however, and entrainment mortality would likely be more similar to the 6 percent value reported in EPRI (1992).

We also considered the physical feasibility of using a barrier net. The Commission staff's site visit and the City's preliminary design considerations show that the upstream end of the barrier net would be anchored on the west-southwest bank of

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the river while the downstream end would be attached to the concrete bulkhead spanning the intake of Unit 3 and gated spillway No. 1. The Commission's staff expect some difficulty with this design due to the proximity of the Unit 3 intake. This may lead to approach velocities commonly greater than 0.2 feet per second.

The proposed barrier net would be closer to the intake and have higher expected approach velocities than other sites where barrier nets have been successfully used. At the nearby Pine Project, similar intake flows were set much further back from the barrier net. The City's proposed design, however, may be

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effective with modifications. By making the net larger, anchoring further upstream, and tying the downstream end to the gate pier between gates 1 and 2 or 2 and 3, or putting a jog in the net to put the net further from Intake No. 3, an effective barrier net is feasible.

If an effective barrier net is installed, about 75 to 90 percent of the entrained fish would be retained in the reservoir (based on the effectiveness of the Pine barrier net) during the ice-free season when the net would be installed. EPRI (1992) indicates that the ice-free season is expected to be the period of greatest entrainment. A 75 to 90 percent reduction in mortality would reduce the effective turbine mortality from 6 to 30 percent to 1 to 8 percent.

Although we have no specific data on numbers, species, and life stages of fish that could be subject to entrainment and turbine mortality, a barrier net would be consistent with MDNR's fishery management plans. The barrier net may retain many juvenile walleye, bass, pike, muskies, and bait fish species in the project impoundment. Impoundment populations of walleye, which have not responded to stocking, could be enhanced through retention of both juvenile walleye and prey species such as sunfish and minnows.

We recommend that the City develop a plan and schedule for using a barrier net. We recommend that, before developing a design, the City collect information on water velocities in the proposed location of the intake barrier net. The City should also develop a plan for spring deployment and fall removal of the net. We recommend that the net be installed at the time flashboards are set in the spring and be removed with the flashboards in the fall. This would ensure that the net is in place when migrating fish are most likely to pass through the project turbines. The plan for deployment and removal should be part of an overall net maintenance plan including periodic brushing and backflushing using the spill gates.

Although Interior recommends that the City select a consultant experienced in the design of a barrier net, we do not agree. A recent report by EPRI (1994) describes the designs of seven different barrier nets including the Pine Project barrier

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net. Additional details of the Pine barrier net are described in another recent EPRI report (EPRI, 1994a). Given the history of use of this fish protection device, the availability of published design information, and the generic ability of engineers to apply available design information to a specific site, a consultant experienced in barrier design would not be necessary.

Interior and MDNR ask for a plan to compensate for unavoidable fish losses. Interior is not recommending a study of biological significance of any loss, but rather seeks

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compensation, including cash, after all attempts to minimize entrainment impacts have been identified. MDNR seeks to have the City complete or fund an MDNR study of a damage assessment for fisheries resources lost to entrainment after a barrier net effectiveness study is completed. MDNR also seeks annual payments to conduct a fishery damage assessment for the restitution value of fish. But MDNR says that the City-funded fishery damage assessment should also include option and existence values as part of the assessment. The nonuse valuation puts relatively high value on the resource based on people's values for the knowledge that fish exist in the Paint River. The City would be required to make annual payments based on these nonuse values and the restitution value.

We considered the need for the City to evaluate the effectiveness of the barrier net and the need to provide mitigation for residual entrainment. An effectiveness evaluation would determine the rate and numbers of fish that are passing through the barrier net, which would help determine if mitigation is effective and continued net maintenance is justified. A two-season evaluation would be necessary: in the first year, site-specific maintenance issues may be identified but may bias effectiveness until maintenance is updated to include these unforeseen events for the second year of study. The City should develop a plan for an effectiveness study in consultation with MDNR and Interior and subject to Commission approval.

It is premature to include a license article for mitigation of residual entrainment impacts. The barrier net is expected to be effective, and no data indicate that entrainment and turbine mortality would have a major impact on Paint River fishery resources. Residual numbers and value of fish lost to entrainment and turbine mortality are not expected to equal the cost of conducting a turbine entrainment study to assess the value of the lost fish. We do not agree with MDNR and Interior on the need for a study of value of residual fish loss and for a license condition to make fish damage assessment payments to MDNR. If the barrier net effectiveness study demonstrates that a high number of fish are passing through the barrier net, an alternative or supplemental fish protection system may be needed or other mitigation may be suitable. We cannot prejudge the effectiveness of the City's proposed and MDNR and Interior endorsed fish protection methods. We do not recommend that a residual fisheries damage assessment be funded by the City. We

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also do not recommend that the City provide cash to MDNR for residual fish entrainment losses.

Fish Passage

The City does not propose fish passage. In its July 25, 1994, letter responding to agency-recommended terms and conditions, the City states that installation of fish passage

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would jeopardize the economics of the project. It also points out that the project dam is founded on a natural 11-foot waterfall that was historically a barrier to upstream and downstream passage.

Interior in its letter dated June 9, 1994, requests reservation of authority to prescribe fishways pursuant to Section 18 of the FPA. Interior cites a potential future need to supply fish passage for resident species such as walleye, northern pike, smallmouth bass, and muskellunge. Interior states that passage would provide opportunity for fish to travel long distances between preferred summer and winter habitats.

MDNR requests that FERC include a standard license reopener article for fish passage, but does not seek up- or downstream fish passage facilities at this time. MDNR goals for the river include both coldwater and coolwater species such as brook trout, brown trout, and walleye. It states that upstream and downstream fish passage facilities could be required to establish self-sustaining or near self-sustaining populations of these fish species.

Our Analysis

We considered the management plans and existing fisheries on the Paint River. A management plan that includes fish passage at Crystal Falls for trout, as discussed in MDNR's June 13, 1994, letter, is not consistent with the information provided at the scoping meeting. At the November 2, 1994, scoping meeting MDNR stated that water temperatures within 8 miles upstream of Crystal Falls dam are too high in summer to support year-round populations of trout. Walleye have been shown to migrate, but literature demonstrating migratory habits does not show that migration is a requisite life history requirement.<sup>15</sup> If suitable upstream and downstream walleye passage is available, fish would have a greater choice of spawning habitats. Populations and abundance, however, would not necessarily be enhanced.

For the fisheries resources in the project vicinity we conclude that there is no obvious need for fish passage now or in the immediate future. Although fish downstream of the project may migrate to the project tailrace, downstream habitat and water quality is similar to upstream habitat, and there are no fish population benefits associated with installation of fish passage facilities.

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15 Although migration into tributary streams is a common trait for spawning walleye, walleye will spawn on rocky shorelines of lakes (Becker, 1983).

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Upstream passage may be useful to pass trout that are washed or pass over the project dam. The trout need to move further upstream where summer temperatures are in the range of their thermal tolerance. Few trout are expected to pass upstream, however, because large numbers are not likely to pass downstream over the dam. Also upstream conditions provide suitable habitat for these species. Interior has requested reserved authority to prescribe fishway construction under Section 18 of the FPA. We recommend that Interior have reserved authority to prescribe fish passage at a later date. We recommend that MDNR rely on the standard reopener article for requesting future fish passage facilities. See also our discussion on cumulative impacts on this issue in Section V. C. 3. c.

### Management of Large Woody Debris

The City does not propose to enhance downstream fish habitat by passing large logs over the dam. Currently the City collects large debris and disposes of it in an offsite terrestrial environment.

MDNR requests that the City sluice these large logs over the dam into the project tailrace. MDNR recommends this measure to help restore habitat and provide velocity refuge structures downstream of the project.

### Our Analysis

We considered the feasibility of passing large logs downstream and whether or not this would create useful habitat. We asked the City at the scoping meeting if it could pass the large logs into the project tailrace. The City agreed that this could be easily accomplished. Woody debris would collect in natural snags downstream, and the downstream face of the logs would provide low velocity areas for juvenile fish or suitable cover habitat for adult bass. We recommend that the City develop a plan to pass woody debris that collects near the project intake into the project tailrace.

c. Cumulative impacts: MDNR and Interior identified the effects of multiple dams interfering with passage of migratory fish species as a cumulative impact worthy of more detailed analysis. Interior recommends a cumulative impact assessment covering the Upper Menominee River including the Crystal Falls, Brule, Lower Paint, Michigamme Falls, Hemlock Falls, Peavy Falls, and Way projects. MDNR's letter dated December 1, 1994, also recommended that this DEA address the cumulative impacts of multiple dams on the Upper Menominee River

### Our Analysis

The area of study identified by Interior and MDNR is in the range that walleye, smallmouth bass, pike, and trout may move or interact with other subpopulations if allowed free range of movement. The project dam may limit the movement, subdivide populations, and limit gene pool mixing. Various parts of the study area are dealt with in other environmental assessments, e.g., for the Menominee and Brule projects. These assessments deal with site-specific or cumulative impacts.

During the site visit, the Commission's staff viewed the Lower Paint Project, reaches of the Paint between Crystal Falls and the Lower Paint, reaches of the Paint upstream of the project, and the bypass of the Lower Paint hydroelectric facility. Some of the Commission's staff have also visited the Brule Project impoundment and tailrace on a previous occasion. Although we observed specific differences in river gradient, there were no obvious habitat differences among projects in the region.

One obvious cumulative impact of dam construction is the creation of impounded waters where riverine conditions previously existed. This has facilitated introduction and population growth of species such as largemouth bass and walleye that typically require impoundments or lakes for successful early life-stage development (Becker, 1983). The impounded waters also provide feeding and cover habitat for northern pike and muskellunge. The impoundments also provide deepwater overwintering habitat for walleye, bass, northern pike, and muskellunge. MDNR identified these species as part of its management plan for the Upper Menominee River. The management plan may have been developed, in part, to favor these species because of the hydro impoundments.

We conclude that there are no obvious population-limiting factors associated with the Crystal Falls Hydroelectric Project that add to cumulative impacts in the Upper Menominee and Paint River systems. Fish passage among the segmented sections of the rivers may be necessary if additional populations or habitat data identify population enhancing habitats. Because new information on habitat, new management goals, or other changed circumstances could lead to a need for fish passage during the term of the license, we recommend that the MDNR rely on the standard reopener article for requesting future fish passage facilities.

### Generic Fish and Wildlife Reopener License Request

MDNR recommends in a letter dated June 13, 1994, a license article for the City to provide for resolution of fish and wildlife resource problems that cannot be identified at this

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time. MDNR requests that this article authorize the Commission to order the City to construct and operate and maintain such

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reasonable facilities as may be ordered by the Commission or requested by Interior or MDNR for unexpected fish and wildlife resource issues.

We agree that in the 30-year life of the license for this project, unforeseen events may dictate a need for changes in equipment or operation of the project to prevent major impacts on fish and wildlife resources in the project area. The Commission has recommended use of a standard fisheries and wildlife reopener license article in the Brule DEA (FERC No. 2431-008) for this same issue. That license reopener can be used to require changes to projects upon Commission motion or as recommended by Interior or MDNR after notice and opportunity for hearing. Any entity may petition the Commission at any time during the license for relief if it determines that additional environmental protection measures are necessary for the project. We recommend the use of the standard fish and wildlife license reopener article for the Crystal Falls Hydroelectric Project.

d. Unavoidable adverse impacts: None.

4. Terrestrial Resources

a. Affected environment: The Crystal Falls Hydroelectric Project is in an area of gently rolling topography underlain by glacial till deposits with several large rock outcrops. Vegetation and wildlife habitat in the project vicinity are indicative of the rural character of the county outside of towns and villages. The area is heavily forested with a variety of deciduous (aspen and birch) and coniferous (white pine, red pine, white spruce, and balsam fir) tree species except for small clearings associated with residential dwellings and a few sand and gravel operations.

The shoreline of the impoundment is predominantly undeveloped and largely forested except for about a dozen palustrine shrub wetlands and several emergent marsh wetlands. Most wetland acreage is forested, and much of the upland areas consist of aspen and other hardwoods. The only properties with houses or buildings abutting the impoundment are found immediately upstream of the dam on both shores, about 1/2 mile upstream of the dam and at U.S. Route 141. About 2 miles upstream of the dam on the west shore is an area with additional dwellings, but they are several hundred feet from the impoundment shoreline.

Forested areas provide habitat for a variety of wildlife species including sport species such as black bear, white-tailed deer, red fox, raccoon, gray squirrel, snowshoe hare, ruffed grouse, and American woodcock. Interior in its letter dated June 9, 1994, identified fisher, shorttail weasel, pine marten, mink, muskrat, otter, and beaver as furbearer resources.

#### Wetlands

Based on National Wetlands Inventory (NWI) maps and field surveys of the area, the City identified 43 wetlands greater than 2 acres in size within the study area, defined as the land within 1/4 mile of the river between the U.S. Route 141 and state highway M-69 bridges. Two of the wetlands are riverine and include the impoundment and tailwater while the remaining 41 wetlands are palustrine. Based on Michigan Resource Inventory System (MiRIS) maps, the City identified 37 wetland areas within the study area, comprising 216 acres of forested wetlands, 76 acres of scrub/shrub wetlands, and 8 acres of emergent marsh. Additionally, there are two river areas (upstream and downstream of Crystal Falls dam) totalling 51 acres shown on the MiRIS maps. The City states that 12 of the 43 wetlands depend on high water levels on the Paint River for their existence. Most of the remaining wetlands along the northern and western portions of the study area are the result of springs and seepages as water travels laterally down the drainage towards the Paint River.

#### Threatened and Endangered Species

The City identified 28 federal - and state-listed endangered, threatened, and special concern species of plants and wildlife that may occur in the project area.

Field surveys performed by the City confirmed that there are six state-listed plant species and four faunal species (including one federal species) in the project study area. The plants include green spleenwort (threatened), northern oak fern (endangered), walking fern (threatened), the sedge, *Carex arcta* (special concern), purple clematis (special concern), and willow-herb (special concern). The faunal species included cormorant (special concern), loon (threatened), northern harrier (special concern), and bald eagle (federal and state threatened). In addition, although individuals were not observed during the studies, there is usable and likely habitat for wood turtle (special concern) and osprey (threatened).

Interior in its letter dated June 9, 1994, stated that the project lands provide suitable habitat for the federally listed bald eagle (*Haliaeetus leucocephalus*) and gray wolf (*Canis lupis*). Based on known geographic ranges, peregrine falcon (*Falco peregrinus*) and mountain lion (*Felis concolor*) are the only other federally listed species that might, but are not likely to, occur in the project area.

Interior stated that, because there were no other federally listed threatened or endangered species of plants or wildlife in the project area, further consultation with the U.S. Fish and Wildlife Service (FWS) was unnecessary.

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b. Environmental impacts:

Federally Listed Threatened and Endangered Species

Interior in its letter dated June 9, 1994, states that bald eagles use the project waters for feeding and white and red pine trees as perch sites. Interior also states that there are several white pine trees in the project vicinity that provide suitable nest trees; however, there are no known nests of bald eagles in the project area. FWS recommends that all super canopy trees (e.g., very tall trees used as nest/perch sites by raptors) on City-owned project land be preserved as potential nest sites for bald eagles.

Interior states that, although some grey wolf activity has been reported in Iron County, it is unlikely that grey wolves would use the project area due to its proximity to the City. Interior also said that there is no need for further action on this project as required by the Endangered Species Act.

MDNR in its letter dated June 13, 1994, recommended protection and enhancement of habitat for osprey and bald eagle. MDNR recommends the development of a Bald Eagle Protection Plan that incorporates 16 conditions intended to protect and enhance bald eagles and their habitat. 16

Our Analysis

Based on our analysis of available information, including consideration of the small acreage of land within the project boundaries, we conclude that licensing, operating, and maintaining the project with our recommended measures would not adversely affect bald eagles and that development of a bald eagle protection plan is not warranted. It is highly unlikely that

16 A part of MDNR's Bald Eagle Protection Plan includes the following measures: (1) the licensee shall schedule and implement closure or restriction of road access to licensee-owned or leased project lands within the bald eagle management zones; (2) camping in primitive areas with potential bald eagle habitat on licensee-owned or leased project lands will be prohibited or limited to designated areas in consultation with MDNR and FWS; (3) each nest within a breeding area shall be protected on licensee-owned or leased project lands by three zones that become less restrictive to human activity as the distance from the nest increases. During the nesting season or critical periods, the licensee will restrict certain activities on licensee-owned project lands as follows: (a) Primary Zone - 330 feet from nest site; (b) Secondary Zone - 660 feet from nest site; and (c) Tertiary Zone - extends 0.25 mile from the nest unless other information is available to indicate a greater or lesser distance.

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eagles would nest on City-owned project lands given the small amount of area owned by the City, the proximity to human activities and developments, and the lack of suitable habitat. Closure and restriction of land use and the protection of the three zones on private property, as outlined by MDNR in its letter dated June 13, 1994, may require the City to obtain easements on private property, which could be unduly burdensome. The proximity of the project lands to the populated areas of Crystal Falls makes compliance to the three zone restrictions nearly impossible to enforce.

Protecting super canopy (potential nesting) trees would contribute to the protection of bald eagles. In addition, instantaneous run-of-the-river operation would result in improved wetlands and riparian habitats along the impoundment and in the tailrace for potential use by threatened and endangered species. Areas outside of the influence of the impoundment and project operations are minimally affected by the project so enhancement measures for these resources are not warranted.

In light of the logging history of the area and the relative scarcity of super canopy trees along the river, we concur with Interior and MDNR that all super canopy trees on City-owned project lands should be preserved. We recommend that the City develop and implement, in consultation with MDNR and Interior, a plan to identify and protect super canopy trees on City-owned lands within the project area, within one year of project licensing. See Section VIII for our recommendation for a bald eagle protection plan.

#### State-listed Threatened and Endangered Species

All of the state-listed plant species are located in habitats that are not directly affected by the hydrology of the Paint River and project impoundment operations. Therefore, no mitigation or enhancement measures are required. *Carex arcta* and willow-herb are both located in small isolated wetlands more than 200 feet from the river shoreline. The remaining plants are found in upland areas on or near cliffs and escarpments. Observations of these plant populations indicate that several species are stressed, perhaps due to the recent timber harvest.

With respect to the listed faunal species, the City's consultant did not observe any nests or evidence of breeding. The change in project operations from historical peaking (prior to 1992) to run-of-the-river has most likely improved the foraging habitat for these species in the project area. Continued run-of-the-river operation would provide consistent flows in the riverine reach below the powerhouse and stable impoundment elevations that would result in better wildlife habitat above and below the dam.

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There is potential for future shoreline development and a subsequent change from rural undeveloped land to rural residential land. A land management plan, therefore, should be developed that incorporates concern for and informal protection of threatened and endangered species habitats (see Section V. C. 6).

MDNR in its letter dated June 13, 1994, recommends the development of a wildlife management plan by the City to protect and enhance wildlife habitat on project lands. The wildlife management plan includes waterfowl enhancement measures such as wood duck boxes and mallard nesting structures; an osprey nesting platform on the impoundment; a purple martin nesting colony at the dam; two bat nesting houses at the dam; eastern bluebird nesting locations; additional kestrel and owl nesting locations; and wildlife plantings. MDNR recommends that the plan also provide for annual consultation with resource agencies on the status of wildlife populations and measures to be performed to protect and enhance wildlife populations in the project area.

MDNR also recommends that the City maintain ownership and manage all City-owned lands adjacent to the impoundment and tailwater as part of the project. In addition, MDNR recommends that a Comprehensive Land Management Plan (CLMP) be developed by the City in consultation with MDNR and Interior to manage lands adjacent to the reservoir within a 200-foot-wide buffer zone. MDNR states that changes in the project boundary would jeopardize bald eagle nesting and compromise the intent of recommended wildlife enhancements.

Interior in its letter dated June 9, 1994, states that, because most of the land within the project area is not owned by the City, it does not recommend development of a wildlife management plan for the project.

### Our Analysis

Because of the minimal amount of land within the project area that is owned by the City, we feel the City does not need to develop a CLMP but rather should develop a limited land management plan for the project. Given the relatively natural state of the existing shoreline habitats and the potential future development of private lots abutting the river, a land management plan such as that described in Section V. C. 6 should be developed. MDNR agrees with our analysis (personal communication between P. Weslowski, Stone & Webster, and G. Whelan, MDNR, August 17, 1995).

We concur with MDNR about development of a wildlife management plan to enhance and protect wildlife resources in the project area. We recommend that the City develop and implement a wildlife management plan that includes MDNR's provisions as

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recommended in its letter dated June 13, 1994, except for the requirement for annual consultation with MDNR and Interior. Continued run-of-the-river operation would be advantageous to wildlife populations and would not result in any appreciable ecological issues that would require annual consultation.

### Wetlands

Both Interior and MDNR recommend run-of-the-river operation with a target headwater elevation of 1,333.69 (±0.25) feet during the ice-free months and 1,332.44 (±0.25) feet during the winter months. Interior states that reducing riverine and reservoir water level fluctuations minimizes impacts on wetlands and shoreline habitats important to waterfowl and water birds. In addition, MDNR specifies restrictions and dates during the spring and fall transition periods between the higher and lower water levels. The elevation of the impoundment should be maintained at 1,333.69 (±0.25) feet from May 7 through October 24. From November 7 through April 23, the impoundment should be maintained at 1,332.44 (±0.25) feet. During the periods from April 24 through May 6 and October 26 through November 6 the impoundment should be raised and lowered no more than 0.25 foot/day. MDNR recommends these limits to protect wetlands and aquatic resources.

### Our Analysis

Although the City states that only 12 of 43 wetlands depend on the Paint River for their existence, our review of the available information indicates that approximately 28 of 43 wetlands abut the river and, therefore, could be affected by changes in water levels in the river. In addition, the decision to map wetlands only greater than 2 acres may have resulted in an underestimation of the actual wetland acreage in the study area and in particular the long, narrow band of riparian vegetation along the shores of the river.

We concur in part with Interior and MDNR that the City should continue run-of-the-river operation. However, we recommend that impoundment elevations be maintained no lower than 0.1 foot below the crest of the dam in the winter, and 0.1 foot below the top of the flashboards in the summer to reduce impacts on wetlands within the reservoir resulting from dewatering episodes.

We agree with MDNR's recommended impoundment water level fluctuation restriction dates because they include and improve upon Interior's recommendation by providing the same winter and summer water levels plus a more specific and gradual lowering of the impoundment water surface in the fall. However, the sluicing of ice and the installation of flashboards makes the springtime gradual raising of the impoundment level impractical. Instead,

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occur as early as practical but that the flashboards must be installed and the water elevation stabilized no later than May 1 or within 10 days of ice-out.

Exotic Wetland Plants

To protect wetlands from exotic invasive species, Interior recommends that the City be required to cooperate with MDNR and Interior in implementing a plan to control the spread of purple loosestrife when deemed appropriate by these agencies.

MDNR in its letter dated June 13, 1994, recommends that the City develop and implement a plan to monitor and control/eliminate purple loosestrife and Eurasian water milfoil, when deemed appropriate by MDNR and Interior.

Our Analysis

Based on our review and analysis of available information, the purple loosestrife and Eurasian water milfoil control plan requirement is acceptable as stated by Interior. However, MDNR's requirement for the City to monitor for and potentially eliminate these invasive species is excessively burdensome, particularly because the introduction of these species at any point into the Paint River watershed upstream of the project is beyond the control of the City. Eradicating an established stand of purple loosestrife is difficult because each plant produces many seeds. For small stands of purple loosestrife, uprooting the plant or using an herbicide is possible. If an introduction occurs, it would ultimately result in colonization of the impoundment as a result of activities for which the City cannot be held responsible. We, therefore, recommend that the City consult with MDNR and Interior and develop and implement a plan for the control of exotic wetland species. As a minimum, the plan should include measures to inform and educate the public about the spread of invasive species through the placement of signage/bulletin boards in strategic locations of the project area from the dam upstream to the U.S. Route 141 bridge. We recommend that, if invasive species become established in the project area, the City cooperate with MDNR and Interior to develop control strategies.

c. Unavoidable adverse impacts: None.

5. Cultural Resources

a. Affected environment: The Crystal Falls hydroelectric plant was constructed by the City in 1902-1903. The plant provided electricity to the community. In 1907 the City expanded the powerhouse to its present size with the addition of a second room to the southwest side of the original

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structure. The generating units dated from 1914, 1924, and 1953. The original dam was replaced with the present dam in 1931.

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The present Crystal Falls powerhouse and dam were listed in the National Register of Historic Places in 1983, as part of an Iron County Multiple Resources Nomination. The property maintains integrity of design, location, and use. The powerhouse possesses integrity of design, workmanship, materials, and use, with limited alteration since the major addition in 1907. At the request of the City, the Michigan Bureau of History reviewed the National Register eligibility of the powerhouse and dam and concluded that the Crystal Falls powerhouse and dam maintain eligibility as one of the few surviving examples of small-scale, early, municipal electric power facilities (letter from Kathleen B. Eckert, State Historic Preservation Officer, dated September 1, 1992).

The City conducted a Phase I historic and archeological survey of the project area along the Paint River. The survey identified three historic sites consisting of an earth berm associated with an early lumber camp, and two pilings and an abutment in the vicinity of early lumber camps. None of these historic sites were considered eligible for listing in the National Register of Historic Places (letter from Kathleen B. Eckert, State Historic Preservation Officer, dated April 20, 1992).

There are no archeological sites affected by the project that are either listed or eligible for listing in the National Register of Historic Places (Salikin, 1992).

b. Environmental impacts:

Historic Architectural/Engineering Record

As defined within the "Historic Resources of Iron County, Michigan: Partial Inventory - Historic and Architectural Resources" the Crystal Falls powerhouse and dam are significant under Criterion A and Criterion C of the National Register of Historic Places. They are significant because they possess distinctive features of hydroelectric engineering during the formative, turn-of-the-century decades of the industry's development in Michigan and contributed to the development of Crystal Falls. The component most clearly representative of this period is the powerhouse, a rectangular brick structure above a foundation penetrated by arches and below a sweeping hipped roof.

The continued operation of the Crystal Falls Hydroelectric Project in the present or proposed mode of operation would have no effect on the characteristics that qualify the property for listing in the National Register of Historic Places because there would be no changes to these characteristics.

Archeological Resources

No prehistoric or historic archeological sites listed or eligible for listing on the National Register of Historic Places have been recorded in the project area.

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### Cultural Resources Management Plan

The City developed a draft Cultural Resources Management Plan (CRMP) to avoid or minimize disturbances to: properties at the Crystal Falls hydroelectric plant that are listed or eligible for listing in the National Register of Historic Places and any other historic property that may be identified in the course of operating the project or engaging in presently unscheduled ground-disturbing activities. The objective of the management plan is efficient, cost-effective maintenance of historic features in relation to the facility as a whole. Implementation of this plan by the City would allow operation of the National Register-listed project features and development of the proposed recreation enhancements without adversely affecting any Register-eligible properties.

The objective of the CRMP is to conserve the existing historic fabric and features of the Register-listed Crystal Falls powerhouse and dam to the greatest extent practicable with the framework of continuity of use. This concept derives from the fact that without continued use or operation, both during the facility's period of significance and since that time, the facility would not exist. Thus, continued operation is critical to the preservation of the facility as a National Register-eligible property and conservation and care of its historic features. The City's draft CRMP identifies the following steps for future activities at the project:

- ù normal day-to-day maintenance operations on the plant, including the powerhouse, dam, and equipment, that do not permanently alter the existing visual or functional character of the fabric or features shall be considered to have no effect, and therefore, may be carried out without consultation with the State Historic Preservation Officer (SHPO);
- ù repair or replacement of historic fabric with in-kind replacement of historic fabric or features (those that duplicate the old in terms of materials, design, size, color, texture, and functional characteristics), shall be considered to have no effect;
- ù modifications to the plant, including the powerhouse, dam, and equipment, other than in-kind replacement shall be considered to have a potential adverse effect and will require consultation with the SHPO who may

require recordation of the plant to Historic American Engineering Record standards if the modifications are substantial;

- ù emergency repairs resulting from a flood or other disaster may be completed without consultation provided that the SHPO is furnished a report on the nature of

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the damage and the repairs made so that information on the plant can be kept current;

- ù any undiscovered archeological sites identified during operations or ground-disturbing activities shall be reported to the SHPO who will determine the need for additional archeological investigation and mitigation;
- ù any change in operation that results in accelerated erosion or inundation of significant areas will require consultation with the SHPO to determine potential impacts on cultural resources; and
- ù after every 50-year flood event, an additional pedestrian survey will be conducted to determine if any archeological resources have been exposed.

We recommend that the City develop and file for Commission approval a final version of the CRMP in consultation with the SHPO.

#### Programmatic Agreement

To ensure that the provisions of the CRMP are reviewed, refined, and implemented, a Programmatic Agreement should be executed among the Commission, Advisory Council on Historic Preservation (ACHP), and the Michigan Bureau of History. The Programmatic Agreement should stipulate that the CRMP must be refined and filed for Commission approval within one year of any license issued for the Crystal Falls Hydroelectric Project. The City developed a draft Programmatic Agreement that we revised to conform with the format and provisions approved by the Commission and the ACHP. The revised draft Programmatic Agreement (PA) was provided to the ACHP, SHPO, and the City for review and approval with the DEA. A final PA has been executed by the ACHP, the SHPO, and the City. We recommend that the Programmatic Agreement be adopted as a license article.

c. Unavoidable adverse impacts: None.

#### 6. Recreation Resources

a. Affected environment: The project is in a relatively undeveloped and scenic area within the City's limits. Above the dam the river is smooth and slow flowing, with

undeveloped forest land, private residential lots, and sand and gravel operations on both banks.

#### Recreation

Major recreation activities in the project area include fishing, canoeing, hunting, skiing, and snowmobiling. Although the reservoir is too narrow and shallow to accommodate large powerboats and water skiers, smaller trailered and car-top boats

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can be accommodated for fishing and canoeing. Local residents and tourists enjoy wildlife viewing in the project area. Commercial fishing guides also use the reservoir. Snowmobiling and cross-country skiing are the major wintertime activities in the region. There are several groomed snowmobile trails within the project area. Deer and small game are hunted in and around the Crystal Falls area (White Water Associates, 1992).

Existing recreation facilities near the project include several improvements already developed as part of the City's licensing proceedings. As a result of consultations with MDNR and Interior, the City has developed a gravel parking area and boat ramp just north of the dam on the north side of the river, a canoe portage trail, and a cleared access point below the dam on the north side of the river for tailwater fishing. A former, unmaintained park area (Power Plant Park) is on the south side of the river below the powerhouse. Stone stairs lead down from the roadway to a clearing near a former fire pit, where a trail runs down to the river (Figure 4).

Recreation user information for the project area is limited and anecdotal. The City states that recreation facilities on project lands and waters have limited use and access. The City also indicates, however, that the access point above the dam on the north side of the river is commonly used by local individuals. The City states that the access point below the powerhouse on the south side of the river lacks signage and has limited use. MDNR, however, characterized this tailwater access point as heavily used (MDNR, 1994). There is no other available user information on project recreation facilities.

The City has a total of 160 acres available for outdoor recreation, including Runkle Lake Park, the public golf course, several neighborhood parks, and the school athletic fields. The City maintains 137 acres, and the Forest Park School District, the City's only school system, maintains the remainder.

Several private entities also provide indoor and outdoor recreation opportunities in the area (White Water Associates, 1992). Table 5 lists recreation facilities in the City.

Figure 4. Recreation Facilities

A canoe access point to the Paint River, maintained by MDNR, is approximately 1 mile below the project at the intersection of state highway M-69 and the river. This facility offers 15 parking spaces, carry-in boat access, and vault toilets. Public access to the Paint River is also available at Ericson's Landing, which is approximately 5 miles upstream of the project. This facility is maintained by MDNR and offers 10 parking spaces, a gravel-surface boat ramp, and vault toilets.

There are no areas within or near the project that are included in, or have been designated for study for inclusion in, the National Wild and Scenic Rivers System. There are also no areas within or near the project that have been designated as

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 wilderness areas, recommended for such designation, or designated  
 as wilderness study areas under the Wilderness Act.

A section of the Paint River, from the backwaters of the  
 project reservoir upstream to Mallard Lake, is listed on the  
 Nationwide Rivers Inventory for its recreation and fishery  
 values. This 32-mile stretch of river is listed for outstanding  
 fishing and canoeing opportunities and has been proposed by the  
 state for study for inclusion in the State Natural Rivers System  
 (Interior, 1993).

Table 5. City of Crystal Falls Recreation facilities (Source:  
 Staff)

Facility	Type	Ownership	Activities
Runkle Lake	Area wide/ outdoor	City	Camping, swimming beach, baseball, tennis, shuffl eboard, pl ayground.
Crystal Falls Municipal Golf Course	Area wide/ outdoor	City	Gol fi ng - 9 hol es.
Crystella Ski Hill	Area wide/ outdoor	Ki awani s and Ci ty	Downhi ll and cross- country ski ing, ice skati ng.
Li ncol n Park	Nei ghbor- hood/ outdoor	Ci ty	Pl ayground apparatus.
M-69 Canoe Access	Area wide/ outdoor	MDNR	Carry-in boat access to Pai nt Ri ver.
Forest Park School Athleti c Fi el d	Communi ty - I ndoor/ outdoor	Forest Park School Di stri ct	Baseball, tennis, track, pl ayground apparatus.

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Facility	Type	Ownership	Activities
Crystal Bowl	Pri vate/ i ndoor	Pri vate	Bowl i ng.
Pai nt Ri ver Canoe Trail	Publ i c/ outdoor	Wi sconsi n El ectri c Power Corporati on	Canoei ng, fi shi ng, campi ng.
Snowmobi le trai ls	Publ i c/ outdoor	I ron County, I ron Range Snowmobi le Associ ati on	Snowmobi l i ng.

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### Land Use

White Water Associates completed environmental surveys of land use patterns in the project area (White Water Associates, 1992). The findings show that most land in the study area, which encompasses the area beginning at the intersection of the Paint River and U.S. Route 141 to state highway M-69 and all lands within 1/4 mile of the river, is privately owned.

Until recently, there was little residential development along the river within the project area. Land ownership is a mixture of land companies, private individuals, and the state of Michigan. Land owners in the study area have begun to subdivide and sell properties along the river, where individuals are constructing new homes.

The City has not established project boundaries. However, in the area immediately surrounding the project, the City owns approximately 1.8 acres of land. Within the City limits, which extend some 800 feet above the dam, the City owns a strip of land from the shoreline back 100 feet. The City's water supply facility, which treats water for use within the City, is immediately adjacent to the north side of the dam. Power from the project is used to pump treated water to the distribution system.

b. Environmental impacts: The City acknowledges the need to provide recreation facilities at the project (City of Crystal Falls, 1993, application). To best determine what types of facilities should be provided, the City, Interior, and MDNR visited the site on June 10, 1993.

During the visit, access to the river at locations upstream and downstream of the project were identified and discussed. As a result of this consultation, the City agreed to make

improvements to some existing facilities and to add others, including:

- (1) placement of canoe portage and boat access signs in strategic locations to better inform the public of these facilities;
- (2) provision of a boat ramp at the boat landing. The boat ramp is to be made of concrete pads, approximately 8 feet wide and extend from the shore to a water depth of approximately 24 inches;
- (3) provision of a gravel driveway and parking area (approximately 150 feet by 75 feet) to accommodate use of the boat ramp;
- (4) improvement of the canoe portage by securing an iron

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hand rail to the existing retaining wall;

- (5) modification of the existing granite substrate of the canoe portage by creating a limited number of steps; and
- (6) removal of brush and small trees at the end of the canoe portage route to create downstream shoreline fishing access (approximately 5 feet by 50 feet).

Interior in its letter dated June 9, 1994, and MDNR in its letter dated June 13, 1994, commented on the City's proposed recreation improvements and addressed the following recreation issues.

#### Impoundment Access and Facilities

The City has already made several of the improvements to the impoundment boat launch location agreed to during the June 10, 1993, site visit. These improvements include installation of several signs to better inform the public of the canoe portage and boat access locations, development of the gravel driveway and parking area approximately 150 feet by 75 feet, and installation of a concrete-pad boat ramp.

Interior recommended that the City improve the access area to the reservoir on the shoreline above the dam. Recommended improvements include providing a gravel driveway and parking area, deepening the shoreline at the boat launch and installing concrete pads in the water, providing signs at each access area so that it is evident that the facilities are open to the public, providing signage from the main highways to direct the public to the recreation access area, and developing suitable facilities to provide handicapped access.

MDNR recommended improvements similar to Interior's recommendations, and added these recommendations for the City: organize the parking lot; install a barrier-free skid pier and a barrier-free vault toilet; create a hardened path; designate two barrier-free parking spaces; charge no fees for the facility; and provide maintenance.

#### Our Analysis

During our site visit conducted on November 1, 1994, we viewed the existing recreation facilities at the Crystal Falls Hydroelectric Project. The current gravel parking area appears adequate to handle approximately 10 vehicles with trailers and several other nontrailed vehicles. MDNR development criteria for boating facilities on inland lakes call for one car/trailer space per 15 acres of water surface. Based on these guidelines, the Crystal Falls impoundment, which is approximately 100 acres, would require about seven traileered parking spots. The size of the existing gravel parking area is adequate to provide for the

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estimated level of use at this location. To maximize the available parking area and provide for smooth working circulation of vehicles using this site, however, we recommend that the parking lot be designed and organized in consultation with MDNR.

The concrete boat launch installed by the City consists of concrete pads approximately 8 feet wide and extends into the water approximately 30 feet. During our site visit, the water level at the end of the boat launch was approximately 12 inches deep. Additionally, the slope of the ramp did not appear appropriate for the easy launching of trailered boats, especially during periods of low water. Because this facility is the only one on the impoundment, we recommend that the City develop a plan to reconstruct the existing facility to provide adequate grade length and end-of-ramp water depth for launching of trailerable boats. This plan should be developed in consultation with MDNR, and include provisions for a handicapped-accessible skid pier and vault toilet with approach path. Upon Commission approval, the City should implement this plan.

MDNR and Interior recommend that directional signs be installed from all major roadways to ensure the public's ability to find and use the recreation facilities. The City has installed several signs designating the canoe take-out and boat launch locations and the canoe portage route. We did not observe any directional signs from the major roadways in the project area directing users to the project during our site visit. The public should be aware of recreation facilities associated with this hydroelectric project, and there should be signage to direct individuals to these facilities. Therefore, we recommend that the City consult with MDNR to develop appropriate signage and placement to assist area recreationists in locating and using project recreation facilities.

MDNR also recommends that this area be a no-fee access point and that the City be responsible for its continued operation and maintenance. While we agree that public access to this hydroelectric project's lands and waters should be provided by the City, it is the Commission's policy to allow licensees to charge reasonable recreational user fees to help offset the costs of these facilities and improvements, and we will afford the City the same opportunity to do so.

Tailrace Fishing Access (Northside)

The City proposes to improve downstream access by securing an iron hand rail to the existing retaining wall, modifying the existing granite substrate to create a limited number of steps, and removing brush and small trees at the end of the canoe portage to create a shoreline fishing access area approximately 5 feet by 50 feet downstream of the project. The City has completed these improvements, except for creating the steps to the tailrace area. It was explained during the site visit that while the City expected to use a jackhammer to level certain areas, its initial attempts were unsuccessful in removing the

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material required to create any steps.

Both Interior and MDNR recommended that the City improve the area below the dam on the north side of the river to allow access for tailrace fishing. These improvements were to include installing an iron hand rail to the existing concrete retaining wall that runs parallel to the river on the north bank, modifying the existing granite substrate next to the wall to create steps down to the shoreline, and removing brush and small trees from the bank area to enhance fishing opportunities. MDNR further recommended that this area include a parking lot for a minimum of seven vehicles, directional signage, barrier-free access to the tailwater, vault toilet, two designated barrier-free parking spaces, and a fishing/birdwatching platform. MDNR also recommended that this location include a car-top boat launch with a parking lot for a minimum of five vehicles, directional signage, vault toilet, hardened paths, and signed designated barrier-free parking spaces.

#### Our Analysis

We agree with the agencies' assessment that the canoe portage/tailwater access trail needs improvement. While the installation of the iron hand rail improves this access point, the granite substrate of this portion of the path is both steep and slippery, creating dangerous conditions for individuals using the canoe portage trail and anglers accessing the tailrace area. Therefore, we recommend that the City develop a plan, in consultation with MDNR, to construct a limited number of steps in this location to aid individuals accessing the tailrace area. Upon Commission approval, the City should implement this plan.

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The area at the corner of Rock Crusher Road and the north abutment of the dam is currently disturbed and appears to be used as an informal parking area for individuals accessing the tailrace. This site should be improved to provide better access for boaters, anglers, and other individuals using the tailwaters of the project. Therefore, we recommend that a plan be developed for this location, in consultation with MDNR, to provide a gravel parking lot for a minimum of seven vehicles, directional signage, and a vault toilet. Upon Commission approval, the City should implement this plan.

We do not agree with MDNR's recommendation that an additional car-top boat launch facility is needed on the north side of the project. This area would already be developed to include parking for a minimum of seven vehicles, signage, and a toilet in connection with improved tailrace fishing access. The facilities planned for this location would adequately provide for a tailrace fishing access point and car-top boat launch.

#### Tailrace Fishing Access (Southside)

The City does not propose any improvements to the south side tailrace fishing access.

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MDNR recommends that the City fund the improvement, maintenance, and operation of the existing no-fee Crystal Falls dam tailwater access located on the south side of the project. It recommends that the improvements include a parking lot for a minimum of five vehicles, directional signage, barrier-free access to the tailwater, vault toilet, signage, work on the existing powerhouse stairway, a log stairway to the tailwater, and fishing area platform.

MDNR states that this additional tailwater access adjacent to the powerhouse is needed to accommodate the existing fishing use of this site and to make this site safe to use. During the November 1994 site visit, an existing access point on the south side of the river below the powerhouse was noted. This former park site known as Power Plant Park consists of stone stairs leading from the Fairbanks Road Bridge to a clearing containing an old fire pit. A trail from the clearing leads to the riverbank and continues along the river to the USGS gaging station below the powerhouse.

### Our Analysis

Because we recommend the development of the northside access area to the tailwater, we do not recommend the development of the southside access area as described by MDNR. Individuals wishing to access the tailwaters to fish would be provided adequate access from the northside area. Additionally, individuals interested in fishing areas close to the south bank of the river

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can use the small peninsula between the project tailrace and the dam section by traversing the ledge area below the spillway. Access to the south side can also be gained through the Power Plant Park site. To provide a safe access point to the south side of the river, we recommend that the City develop a plan, in consultation with MDNR, to improve the existing stone stairway to Power Plant Park. Upon Commission approval, the City should implement this plan.

### MDNR M-69 Canoe Access Location

MDNR recommended that the City provide funding for the maintenance and operation of the existing MDNR canoe access point located about one mile downstream of the Crystal Falls Hydroelectric Project.

### Our Analysis

The M-69 access area is outside of the project area and would be unaffected by the proposed operation of the Crystal Falls Hydroelectric Project. The recreation measures we recommend for the immediate project area are adequate. Therefore, we do not recommend that the City provide funding for the maintenance and operation of MDNR's M-69 Paint River canoe access point.

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### Access for the Disabled

Currently, there are no developed recreation facilities at the project that are accessible to the disabled. The City does not propose to develop any handicapped-accessible facilities as part of its license.

Both Interior and MDNR recommend that the recreation facilities at the Crystal Falls Hydroelectric Project be designed so as to be accessible to all.

At the impoundment boat launch, MDNR recommends that a barrier-free skid pier, barrier-free vault toilet, hardened paths, signage, and two designated barrier-free parking spaces be provided. In an area adjacent to the parking area and the impoundment MDNR recommends that the City provide no-fee handicapped-accessible shoreline fishing, birdwatching, and an aesthetics viewing pier.

At the northside tailwater access area, MDNR recommends that the following improvements be made to provide handicapped access to the tailwater: barrier-free access to the tailwater, a vault toilet, signage, two designated barrier-free parking spaces, and a fishing/birdwatching platform. MDNR also recommends that the southside access area should be designed to provide access for the disabled.

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### Our Analysis

We agree that access to project recreation facilities should be provided for persons with disabilities. There are no handicapped-accessible access points at the project, and accessible areas are extremely limited in Iron County. Presently there are no completely barrier-free shoreline fishing areas on inland lakes or rivers within Iron County. Additionally, the 1993 Michigan boat launch directory lists 38 inland lake or river public boat launches in Iron County of which only 5 are listed as fully accessible (MDNR, 1994).

Therefore, we recommend that the impoundment boat launch and parking area, and the northside tailwater access and parking area be designed in consultation with MDNR to provide adequate access to these facilities for all. These facilities would provide persons with disabilities barrier-free access to the project impoundment and tailwaters. Because we have not recommended the redevelopment of the southside tailwater access site, however, no barrier-free access would be required there.

We also agree that because there are no other barrier-free fishing areas within Iron County, the development of a handicapped-accessible pier on this impoundment would provide disabled individuals an opportunity to fish, view wildlife, and enjoy the natural areas surrounding the project. Therefore, we recommend that, as part of its recreation plan, the City design

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and construct, in consultation with MDNR, a handi capped-  
accessible fishing pier on the impoundment.

#### Recreation Plan and Schedules

MDNR recommends that the City consult with MDNR to develop and implement a recreation plan for the Crystal Falls Hydroelectric Project within one year of any license issued for this project.

#### Our Analysis

We recommend that the City submit, for Commission approval, and upon approval implement, a final recreation plan including the City's proposals and staff-recommended recreation facilities. The plan should include: (1) final design drawings of all facilities; (2) a discussion of how the needs of the disabled were considered in designing each access area or facility; (3) a description of signs to be used to identify public access areas and the portage route; (4) drawings and specifications for each recreation facility; (5) costs of the improvements; (6) construction schedule; and (7) soil erosion and sedimentation protection measures.

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We recommend that the City complete the recreation facilities for the project within one year of license issuance. Monitoring should be consistent with FERC Form 80 filings.

#### Buffer Zone

MDNR recommends that the City develop a CLMP to manage resources on lands adjacent to the project reservoir. MDNR recommends that the City maintain ownership and manage all presently owned City property adjacent to the impoundment and tailwater as part of the project. On all nonproject lands adjacent to the reservoir a 200-foot project boundary should be established, and lands within this zone should be managed in accordance with the land management plan. MDNR states that this buffer zone is critical for attaining maximum benefit from agency recommendations.

MDNR also recommends that any proposal to withdraw project lands from the project boundary be reviewed by resource agencies.

#### Our Analysis

Establishment of MDNR's recommended buffer zone at this project would help ensure that areas around the project would remain undeveloped over the life of the project. Not developing these lands would protect shoreland aesthetics, productive wetland areas, and critical wildlife habitat and would preserve public access to the Paint River in this area.

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To protect these resources, however, the City should be required to purchase all property within 200 feet of the shoreline within the project area. The City currently owns a buffer of 100 feet from the water's edge from the project north to the City limits. For the rest of the project area, the most practical and cost-effective way to establish buffer zone protection is to develop criteria for selecting shoreland that is needed for protection, not to indiscriminately purchase large parcels of land adjacent to the river. Much of the shoreland in the project area contains significant wetland systems already protected under state and federal laws. The amount and location of land for a protective buffer zone should be determined on a site-specific basis using criteria and objectives developed for this purpose.

Further, MDNR has not presented any information that indicates project shorelines are currently targets for significant development activities. We recognize that this could change over the life of the project because shorelands are typically attractive home sites. Therefore, we recommend that the City consult with MDNR and file a plan for Commission approval to protect shoreland resources in the project area. The plan should include maps delineating the shoreland protection

zones; the method of protection such as purchase, easement, or other; and the criteria for selecting each area. MDNR agrees with our recommendation (personal communication between P. Weslowski, Stone & Webster, and G. Whelan, MDNR, August 17, 1995).

MDNR recommended that any proposal by the City to withdraw lands from the project boundary be reviewed by resource agencies. We concur with the basic philosophy of this recommendation to ensure that such plans would not compromise environmental measures that have been implemented and would be consistent with the objectives of the land management plan. We recommend, therefore, that the City notify the Commission of any plans to modify the status of any City-owned riparian lands adjacent to the project reservoir. The City should develop a plan in consultation with the agencies and file it with the Commission for review and approval prior to altering riparian lands.

D. No-action Alternative

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

VI. DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the Paint River's water resources to generate hydropower by estimating the economic benefits of the proposed project. We also address the economic effects of various measures considered in the EA for the

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protection, mitigation, or enhancement of area resources.

We base our independent economic studies on current electric power conditions. We do not consider future inflation or escalation of prices.<sup>17</sup>

We base our estimate of the cost of alternative capacity and energy on the City's avoided cost. We used a capacity value of \$117/kW-year and a composite energy value of 21.8 mills/kWh.<sup>18</sup>

17 See Mead Corporation, Publishing Paper Division, 72 FERC Para. 61,027 (July 13, 1995).

18 In its response to our Additional Information Request, item 4, the City stated that the capacity and energy provided by the Crystal Falls Projects displaces purchases from WEPCo. WEPCo's average 1993 energy rates were 27.3 mills/kWh for on-peak energy and 18.7 mills/kWh for off-peak energy. WEPCo also assesses a monthly demand charge of \$9.79/kW.

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We base our economic analysis of the alternatives on the data shown in Table 6.

Table 6. Staff's assumptions for economic analyses of the Crystal Falls Hydroelectric Project (Source: Staff)

Assumption	Value	Source
O&M costs (1995 dollars)	\$28,800	Staff
Discount rate	8.0%	Staff
Book value	\$281,000	City a
Application preparation cost	\$250,000	City b

a The City's response to AIR item 4, dated October 1993.

b Provided by the City during scoping.

Based on these assumptions, we estimate that the annual cost of the existing project to produce about 5.726 GWh of energy annually would be about \$133,500 (23.3 mills/kWh) less than the currently available alternative.

A. Proposed Project

In this section, we present the City's proposal which consists of continued operation of the Crystal Falls Hydroelectric Project with its proposed environmental measures. Table 7 summarizes the costs and current net annual benefits of the City's proposal.

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Table 7. Summary of costs and current net annual benefits of the City's proposed project (Source: Staff)

Protection, Mitigation, or Enhancement Measures	Capital Cost (1995 \$)	Operation & Maintenance (1995 \$)	Current Net Annual Benefit (1995 \$)
Existing project	-	-	\$133,500
Install fish barrier net	\$26,900	\$7,900	-\$10,300
Max daily water level fluctuation of 0.25 ft	NC	-	NC
Improve recreation facilities a	\$8,100	-	-\$700
Walking survey after a 50-year flood per Programmatic Agreement	\$4,400	-	-\$400
Total:	\$39,400	\$7,900	\$122,100

- a Recreational measures include: adding a canoe portage and boat access signs, adding an iron hand rail at the canoe portage, modifying the existing granite substrate of canoe portage to create steps, removing brush and small trees at end of the canoe portage to create downstream shoreline fishing area, constructing a boat ramp at the boat landing, and providing a gravel drive and parking area to accommodate use of boat ramp.

B. Staff's Alternative 19

In this section, we present the costs and current net annual

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benefits of the staff's recommended alternative, which consists of the City's proposed project with staff modifications. Table 8 presents the summary of these costs and the current net annual benefits.

The current net annual benefit for the staff's alternative would be about \$96,300 or about 16.8 mills/kWh.

19 This alternative reflects the staff's final proposed alternative after reviewing 10(j) recommendations as discussed in Section VIII.

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Table 8. Summary of costs and current net annual benefits of the staff's alternative (Source: Staff)

Protection, Mitigation, or Enhancement Measures	Capital Cost (1995 \$)	Operation & Maintenance (1995 \$)	Current Net Annual Benefit (1995 \$)
City's proposed project	\$39,400	\$7,900	\$122,100
Barrier net effectiveness evaluation a	\$70,000	-	-\$6,400
Instantaneous run-of-the-river operation	NC	-	NC
Max daily water level fluctuation of 0.1 ft.	NC	-	NC
Report to document run-of-the-river operation	\$5,000	-	-\$500
Water level staff gage	\$1,000	-	\$100
Water level recording at impoundment	\$5,000	\$1,000	-\$1,500
Water flow recording at tailrace (staff)	\$5,000	\$2,000	-\$2,500
Temperature and DO monitoring	\$15,000	\$1,000	\$2,400
North side tailwater fishing area b	\$16,300	\$1,200	-\$2,700
South side tailwater access area	\$5,700	-	-\$500
c			
Impoundment boat access	\$19,400	\$3,100	-\$4,800

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area d Handicapped-accessible fishing pier	\$13,100	\$1,000	-\$2,200
Signage from highway Maintain recreational facilities as public- no-fee	\$500 NC	- -	-\$50 NC
Recreation plan	\$5,000	-	-\$500
Land management plan Protection of super canopy trees	\$2,500 \$500	- -	-\$200 -\$50

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Protection, Mitigation, or Enhancement Measures	Capital Cost (1995 \$)	Operation & Maintenance (1995 \$)	Current Net Annual Benefit (1995 \$)
Wildlife management plan e	\$5,000	\$2,000	-\$900
Invasive species control	\$5,000	-	-\$500
Removal of large woody debris to improve fish habitat downstream	NC	-	NC
Total:	\$213,400	\$17,600	\$96,300

- a This is a 2-year study at a cost of \$35,000 per year.
- b This measure includes designing and installing a limited number of steps at the north side canoe portage/tailrace access trail location, designing and constructing a gravel parking lot for a minimum of seven vehicles, directional signage, vault toilet, and provision for handicapped access and parking.
- c This measure includes improving the existing stone stairway to the Power Plant Park at the tailrace fishing access area.
- d This measure includes designing and organizing a parking lot for the boat launch, redeveloping the existing boat launch facility to provide adequate grade and end-of-ramp water depth for launching trailerable boats, and provision for handicapped access and parking.
- e \$2,000 in O&M every 5 years.

C. No-action Alternative

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

The annual cost of the existing project, including carrying charges on net investment and application preparation costs is about \$76,000 (13.4 mills/kWh), for the existing generation of about 5.726 GWh of energy annually. We estimate that the cost of alternative power is about 36.7 mills/kWh. Therefore, the existing project would produce power at an annual cost of about \$133,500 (23.3 mills/kWh) less than the currently available alternative.

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D. Economic Comparison of the Alternatives

Table 9 presents a summary of the current net annual benefits for the various alternatives.

Table 9. Comparison of economic analyses for Crystal Falls Hydroelectric Project alternatives (Source: Staff)

	Proposed Project	Staff's Alternative	No-Action Alternative
Installed capacity (MW)	0.97	0.97	0.97
Annual generation (GWh)	5.726	5.726	5.726
Current net annual cost of alternative power (thousand \$)	\$210.4	\$210.4	\$210.4
(mills/kWh) <sup>a</sup>	36.7	36.7	36.7
Current net annual project cost (thousand \$)	\$88.3	\$114.10	\$76.9
(mills/kWh) <sup>a</sup>	15.4	19.9	13.4
Current net annual economic benefits (thousand \$)	\$122.1	\$96.3	\$133.5
(mills/kWh) <sup>a</sup>	21.3	16.8	23.3

<sup>a</sup> Based on average annual generation of 5,726 MWh.

Under the Commission's current approach to evaluating the economics of a project, as recently articulated in Mead, supra, a proposed project is economically beneficial so long as its projected cost is less than the current cost of alternative energy to any utility in the region that can be served by the project. To determine whether the project proposed is economically beneficial, we compared the cost of energy from the proposal to the City's alternative source, purchase from WEPCo.

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Our evaluation of the economics of the proposal and staff's alternative shows that they appear to cost less than currently available alternative power. As we explained in Mead, our economic analysis is by necessity inexact, and project economics is moreover only one of the many public interest factors we consider in determining whether or not, and under what conditions, to issue a license. Based on the record in this proceeding, we conclude that it is in the public interest to license the project, conditioned as appropriate under Section 10(a)(1) of the FPA, and leave to the City the decision of

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whether or not to continue operating the existing project in light of the economic analysis set forth herein.

E. Pollution Abatement

The Crystal Falls Hydroelectric Project annually generates about 5.726 GWh of electricity on average. This amount of hydropower generation, when contrasted with the generation of an equal amount of energy by fossil-fueled facilities, avoids the unnecessary emission of a moderate quantity of atmospheric pollutants. Assuming that the 5.726 GWh of hydropower generation would be replaced by an equal amount of coal-fired generation, generating electric power equivalent to that produced by the Crystal Falls Hydroelectric Project would require combustion of about 2,400 tons of pulverized bituminous coal annually.

Without pollution control and assuming the sulfur content of the coal to be about 1.0 percent the following approximate quantities of atmospheric pollutants would be produced annually:

Oxides of sulfur	50 tons
Oxides of nitrogen	20 tons
Carbon monoxide	1 ton
Carbon dioxide	5,500 tons

Removing the oxides of sulfur and nitrogen from the flue gas produced by the combustion of fossil fuels increases the cost of generating electricity. State-of-the-art pollution technology is capable of removing about 95 percent of the oxides of sulfur and 60 percent of the oxides of nitrogen from the uncontrolled flue gases. Estimates of these control costs are about \$500 per ton for oxides of sulfur and \$385 per ton for oxides of nitrogen removed. The cost of removing 95 percent of the 50 tons of oxides of sulfur would be about \$25,000. The cost of removing 60 percent of the 20 tons of oxides of nitrogen would be about \$8,000.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a hydropower

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project, the recreation, fish and wildlife, and other nondevelopmental values of the waterway are considered equally with its electric energy and other developmental values. In deciding whether or not and under what conditions to issue a hydropower license, the Commission must weigh various economic and environmental tradeoffs.

We considered the City's proposed project, agency recommendations, our recommended protection, mitigation, or enhancement measures, and the no-action alternative under

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Sections 4(e) and 10(a) of the FPA. From our independent analysis of the environmental and economic effects of the alternatives, we selected the City's proposed project with our additional recommended measures (staff's alternative) as the preferred alternative.

This alternative consists of:

- ù operating the project in instantaneous run-of-the-river mode;
- ù managing impoundment levels within the following limits:
  - About May 1 through October 24 within 0.1 foot of the top of the flashboards at elevation 1,333.98 feet (NGVD);
  - November 7 to spring within 0.1 foot of the crest of the dam at elevation 1,332.98 feet (NGVD);
  - From October 25 through November 6, the impoundment elevation would be lowered from 1,333.98 to 1,332.44 feet with a draw-down of no more than 0.25 foot/day;
  - Ice sluicing and flashboard installation should be performed as early as practicable in the spring, and the impoundment should be stabilized no later than May 1 or within 10 days of ice-out;
  - When drawing down or refilling the impoundment, tailrace flows should not deviate more than 10 percent from inflow under all conditions;
- ù monitoring compliance with instantaneous run-of-the-river by installing a continuous impoundment level recording device and a continuously recording flow monitor in the tailrace;
- ù preparing a report after each year of operation to document the City's compliance with run-of-the-river conditions;

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- ù monitoring compliance with water quality standards for temperature and DO;
- ù installing and monitoring a barrier net for downstream fish protection;
- ù developing and implementing a plan to evaluate barrier net effectiveness;

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- ù developing and implementing a plan for management of large woody debris to improve fish habitat downstream of the project;
- ù developing and implementing a bald eagle protection plan;
- ù developing and implementing a wildlife management plan;
- ù developing and implementing a plan to identify and protect super canopy trees on City-owned land in the project area;
- ù cooperating with agencies to develop and implement a plan to control the spread of exotic wetlands plants such as purple loosestrife and Eurasian water milfoil in the project area;
- ù constructing, operating, and maintaining additional recreation facilities as follows:
  - (1) improve the canoe portage by securing an iron hand rail to the existing retaining wall;
  - (2) remove brush and small trees at the downstream end of the canoe portage on the north bank of the tailrace to create a downstream shoreline fishing area;
  - (3) provide a gravel drive and parking area to accommodate use of the boat ramp;
  - (4) design and organize the parking lot for the boat launch;
  - (5) redevelop the existing boat launch facility to provide adequate grade and end of ramp water depth for launching trailerable boats;
  - (6) provide additional directional signage to canoe portage and boat launch from major highways;
  - (7) maintain recreation facilities as public access points to the Paint River for the term of the license;

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- (8) develop a plan to construct a limited number of steps at the northside canoe portage/tailrace access trail location;
  - (9) develop a plan to design and construct a gravel parking lot for a minimum of seven vehicles,

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directional signage, and a vault toilet for better access and use of the northside tailrace fishing access location;

- (10) develop a plan to improve the existing stone stairway to Power Plant Park at the tailrace fishing access area on the south side of the river;
- (11) provide handicapped access and parking at the boat launch and northside tailrace access area;
- (12) design and construct a handicapped-accessible fishing/wildlife viewing pier on the impoundment;
- ù developing and implementing a recreation plan;
- ù developing and implementing a land management plan to protect shoreland resources in the project area; and
- ù implementing the CRMP and Programmatic Agreement.

Implementation of these measures would improve water quality, fisheries, wildlife, and recreation resources; increase access to the river in the project area; and provide for the best use of the waterway.

The costs of some of these measures would reduce the net benefits of the project. The project would still, however, have net economic benefits over the license term compared with other energy alternatives.

Specifically, six of the recommended measures would reduce economic benefits of the project. These include: (1) compliance monitoring and documentation of run-of-the-river conditions; (2) evaluation of barrier net effectiveness; (3) wildlife management enhancements; (4) control of exotic wetland species; (5) additional recreation enhancements; and (6) development of a land management plan. We summarize these recommendations briefly in the following section.

#### A. Compliance Monitoring with Run-of-the-river Conditions

The City has not proposed any compliance monitoring. Interior in its letter dated June 9, 1994, and MDNR in its letter dated June 13, 1994, both recommend that the City develop a monitoring plan for run-of-the-river conditions. Because downstream water quantity and quality could be greatly modified

by inconsistent flow releases, we feel that there is a need to monitor compliance with run-of-the-river flow conditions.

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While there is no justification to require the City to fund the existing USGS station to monitor tailrace flow, the City should develop a plan to identify the most appropriate method to monitor tailrace flows and impoundment elevation. We recommend that the City install a continuous impoundment level recording device to monitor compliance with run-of-the-river. We also adopt MDNR's and Interior's recommendation that the City install a visible staff gage with color-coded operating bands. We calculate that the current net annual cost of this monitoring and documentation of the City's compliance with run-of-the-river conditions would be \$5,400.

#### B. Fish Barrier Net Effectiveness Evaluation

During preapplication consultation, the City agreed to install a barrier net system to exclude fish from the intake area. The City agreed to a 2-year trial period to determine the most effective net operating procedures to reduce entrainment and turbine mortality.

Both MDNR and Interior concur with the plan to design, install, and monitor a barrier net at the Crystal Falls site, in consultation with the agencies. MDNR further recommends that, upon completion of the barrier net study, a residual damage assessment be performed to determine if additional protective measures are warranted.

We concur with the installation and evaluation of a barrier net at the Crystal Falls development to reduce entrainment and turbine mortality of migratory fish. We do not, however, concur with the need to perform a Fishery Damage Assessment because there are presently no data on entrainment losses that indicate that entrainment is significant at this time. Until the effectiveness of the barrier net has been demonstrated we do not feel a damage assessment is warranted. We calculate that the current net annual cost of the 2-year barrier net effectiveness study would be \$6,500.

#### C. Wildlife Management Plan

The City has not proposed any wildlife measures. Interior indicated that, because most of the land in the project area is not owned by the City, it is not recommending that the City develop a wildlife management plan. Interior also does not recommend a Bald Eagle Protection Plan. However, Interior recommends that super canopy trees on City-owned land be preserved as potential nest trees for bald eagles.

MDNR, on the other hand, recommends that the City develop a comprehensive Bald Eagle Protection Plan. A Bald Eagle

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Protection Plan is not warranted. The three protection zones defined by MDNR would be unduly restrictive, given the small

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amount of land owned by the City in the project area. In addition, the proximity of the City to the project area suggests that bald eagles would be unlikely to nest so close to the dam. However, we have adopted this recommendation (see Section VIII).

We agree with Interior's and MDNR's recommendation to preserve super canopy trees on City-owned land. We calculate that this measure would have a current net annual cost of \$50. The cost of the bald eagle protection plan has been included in the wildlife management plan cost.

MDNR recommends the development of a wildlife management plan for the Crystal Falls Hydroelectric Project in its letter dated June 13, 1994. These measures would increase faunal diversity in the project area and offset losses of habitat from past timber and agricultural practices within the Paint River sub basin. We calculate that wildlife management measures would have a current net annual cost of \$1,000.

D. Exotic Wetland Plant Monitoring

The City has not proposed any plans for monitoring or controlling the spread of invasive aquatic plants such as purple loosestrife or Eurasian water milfoil. Interior recommends that the City cooperate with the agencies in controlling the spread of purple loosestrife. MDNR recommends that the City develop a plan to monitor, control/eliminate purple loosestrife and Eurasian water milfoil.

We agree with MDNR and Interior that the spread of invasive exotic plants threatens the integrity of existing wetland systems. We, therefore, concur that the City should consult with MDNR and Interior and develop a plan to control the spread of these species in the project area. However, because the introduction of these species into the Paint River is beyond the control of the City, we disagree with MDNR's requirement that the City should assume the burden of eliminating these species from the area. We recommend that the City develop a plan to address invasive species with specific measures to inform and educate the public using the project impoundment and tailrace areas for recreation purposes. We also recommend that, if invasive species become established in the project area, the City cooperate with MDNR and Interior to develop control strategies. We calculate that preparation of the plan would have a current net annual cost of \$500.

E. Recreation Resources

The City acknowledged the need to provide recreation facilities at the project in its application. As a result of a June 10, 1993, site visit with Interior and MDNR, the City agreed

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to a number of recreation improvements, some of which have already been made.

Interior and MDNR recommend additional recreation enhancements. Based on our independent analysis, we concluded that some of the recommendations were warranted to: (1) improve access and usage for the disabled; (2) increase public awareness of available recreation facilities in the area; and (3) improve usage and safety of parking lots, boat launch facilities, and access areas. We calculate that the current net annual cost of these enhancements would be \$11,550.

#### F. Land Management Plan

MDNR recommends that the City develop a CLMP to manage resources on lands adjacent to the project reservoir. MDNR recommends that the City maintain ownership and manage all presently owned City property adjacent to the impoundment and tailwater as part of the project. On all nonproject lands adjacent to the reservoir MDNR recommends that a 200-foot buffer zone should be established and that the lands within this zone should be managed in accordance with the CLMP.

We agree that establishment of a buffer zone would ensure protection for shoreland, productive wetland areas, and critical wildlife habitat. However, the City should not be required to purchase all property within 200 feet of the shoreline, but rather, the amount and location of land for protection should be determined on a site-specific basis using criteria and objectives developed for this purpose. MDNR agrees with our analysis (personal communication between P. Weslowski, Stone & Webster, and G. Whelan, MDNR, August 17, 1995). We, therefore, recommend development, in consultation with MDNR, of a land management plan to protect shoreland resources in the project area. We calculate that the current net annual cost of this plan would be \$200.

#### G. Conclusions

Based on our independent review and evaluation of the proposed Crystal Falls Hydroelectric Project, agency recommendations, the proposed project with our protection, mitigation, or enhancement measures, and the no-action alternative as documented in this EA, we have selected as the preferred alternative the City's proposed project with our additional recommended measures (staff's alternative). The current net annual benefit for the staff's alternative would be \$96,300 or about 16.8 mills/kWh. We recommend this option because: (1) our required measures would protect, mitigate, or enhance environmental resources in the Paint River sub basin; and (2) the electricity generated would continue to conserve nonrenewable resources and reduce atmospheric pollution and the

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associated environmental impacts from acid precipitation, fossil-fuel extraction, and transportation.

#### VIII. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

Under the provisions of the FPA, as amended by the Electric Consumers Protection Act of 1986, each hydroelectric license issued by the Commission must include conditions based on recommendations of federal and state fish and wildlife agencies for the protection and enhancement of fish and wildlife and their habitat affected by the project.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of the agency.

Pursuant to Section 10(j) of the FPA, we make a preliminary determination that some of the recommendations of the federal and state wildlife agencies may be inconsistent with the purposes and requirements of Part I of the FPA or other applicable laws. Recommendations or parts of recommendations that were considered inconsistent with Section 10(j) conflict with the comprehensive planning and public interest standards of Section 4(e) and 10(a) of the FPA. This is because these recommendations, or parts of these recommendations, would cost more to implement than the value of their potential benefits. We identified seven resource agency recommendations that we have determined may be inconsistent with Section 10(j):

- ù MDNR's recommendation that, from April 24 through May 6, the impoundment shall be raised from 1,332.44 to 1,333.69 feet with an elevation change of no more than 0.25 foot/day;
- ù MDNR's recommendation that the City shall meet water quality standards for temperature and DO;
- ù MDNR's recommendation that the City shall develop and implement a water quality monitoring plan;
- ù MDNR's recommendation that the City develop a Bald Eagle Protection Plan;
- ù MDNR's recommendation that on all non-applicant lands adjacent to the reservoir a 200-foot project boundary shall be established, and lands within this zone shall be managed in accordance with a comprehensive land management plan;

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- ù Interior's recommendation that the City develop a plan to monitor water quality variables to meet state water quality standards; and
- ù Interior's recommendation that the City maintain records of tailrace elevations.

For the Crystal Falls Project, MDNR and Interior have had the opportunity to make comments and recommendations. Both agencies have provided recommendations, and all recommendations are evaluated and discussed in the water, fisheries, terrestrial, and recreation resources sections of this EA. We present our conclusions concerning the merits of these recommendations there. In Table 10, we summarize MDNR's and Interior's recommendations, show the annual cost of environmental measures, and show if they are within the scope of 10(j) and whether they are adopted under the staff's alternative.

Table 10. Summary of fish and wildlife agency recommendations (Source: Staff)

Adopted?	Agency	Recommendations	Within	Annual	
			Scope of 10(j)	Cost of Environmental Measures	
	Interior/ MDNR	Operate in instantaneous run-of-the-river mode.	Yes	Indeterminate	Yes
	MDNR	During draw-downs, discharge should be continuous and not more than 10% different than expected discharge at the time.	Yes	Indeterminate	Yes
	MDNR	Temporary flow and impoundment fluctuation can be modified with mutual agreement of FWS and MDNR.	No, not specific measure to protect fish and wildlife	Indeterminate	Yes

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
Partially adopted, recommend impoundment fluctuations of 0.1 of elevations	Interior/ MDNR	Maintain impoundment elevation of 1,333.69 (±0.25) feet during ice-free months and 1,332.44 (±0.25) feet during the winter months.	Yes	Indeterminate	Limit to within foot target
Partially adopted reservoir tail race not deviate than from draw-downs refilling	MDNR	Between the ice-free and winter periods, change impoundment elevation no more than 0.25 ft/day.	Yes	Indeterminate	for draw-downs; flows shall more 10% inflow during and
	Interior/ MDNR	Notify agencies of emergencies and scheduled maintenance that	No, not specific measure to protect	Indeterminate	Yes

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 affect water levels fish and  
 and flow releases wildlife  
 greater than 1  
 foot.

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
City	MDNR	The City shall identify mitigation for emergency violations of impoundment fluctuations.	No, not specific measure to protect fish and wildlife	Indeterminate	No, must report of t n and notify MDNR as after event
City	MDNR	Maintenance draw-downs greater than 1 foot require an	No, not specific measure to	Indeterminate	No, must

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approval the Commission maintenance draw-	Interior/ MDNR	Develop a monitoring plan for run-of-the-river and minimization of reservoir fluctuation.	Yes	\$500	from fish and wildlife for e downs Yes
recommend develop a for appropriate method monitor	Interior/ MDNR	Make agreement with USGS to cost share the existing flow monitoring station.	No, not specific measure to protect fish and wildlife	Indeterminate	No, City plan most e to flows

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
there need monitor to reservoir	MDNR	Contract with USGS to install, operate, and maintain additional flow monitoring gage upstream of project.	No, not specific measure to protect fish and wildlife	\$13,000	No, is no to inflow the

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continuous records available USGS WEPCo telemetry operations	Interior	Equip flow gaging stations with telemetry for agency access.	No, not specific measure to protect fish and wildlife	\$1,800	No, are from or
	Interior/ MDNR	Install a staff gage visible to public with color-coded operating bands.	Yes	\$100	Yes
	MDNR	Install continuous water level recording gage.	Yes	MDNR	Yes
Partially adopted headpond; continuous recording tailwater elevation justified part of compliance monitoring	Interior	Maintain records of headwater and tailwater elevations on continuous basis as part of compliance monitoring.	Yes	Indeterminate	for of not as

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
Commission retains authority to ensure operates in accordance with license	Interior/MDNR	Maintain and provide on agency request information on daily operation of turbines, spillway, and impoundment.	No, not specific measure to protect fish and wildlife	Indeterminate	No, to City in with
	MDNR	After three years of water level and flow data collection, the City shall prepare a report documenting compliance with run-of-the-river conditions.	Yes	Indeterminate	Yes
	MDNR	The City shall meet water quality standards for temperature and DO.	Yes	Indeterminate	Yes
	MDNR	The City shall develop and implement water quality monitoring plan.	Yes	\$2,400	Yes
	Interior	Develop a plan to monitor water quality variables to meet state water quality standards.	Yes	\$2,400	Yes
the Commission determine	Interior	The City and MDNR shall agree on mitigation based on results of water quality monitoring.	No, not specific measure to protect fish and	Indeterminate	No, will need

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for  
mitigation

wildlife

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
	Interior/ MDNR	Develop fish protection plan and schedule for installation of a barrier net.	Yes	\$10,300	Yes
published information of barrier nets available	Interior/ MDNR	The fish protection plan shall include a consultant selection process.	No, not specific measure to protect fish and wildlife	Indeterminate	No, n on design nets
	Interior/ MDNR	Develop a plan for maintenance of the barrier net.	Yes	Indeterminate	Yes
Commission determine for	Interior/ MDNR Interior/ MDNR	Develop barrier net effectiveness plan. Develop a plan to compensate for unavoidable fish losses.	Yes No, not specific measure to protect fish and wildlife	\$6,400 Indeterminate	Yes No, will need such a plan
	MDNR	Develop and implement a plan to improve fish habitat in the Paint River below	Yes	Indeterminate	Yes

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the project with  
large woody debris.

MDNR	Provide for fish passage in standard license order reopener.	No, not specific measure to protect fish and wildlife	Indeterminate	Yes
MDNR	Develop and implement a wildlife management plan.	Yes	\$900	Yes

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
	MDNR	Provide 10 wood duck boxes and 10 mallard nesting structures.	Yes	Indeterminate	Yes
	MDNR	Provide an osprey nesting platform.	Yes	Indeterminate	Yes
	MDNR	Provide for purple martin nesting colony.	Yes		Yes
	MDNR	Provide bluebird nesting boxes.	Yes	Indeterminate	Yes
	MDNR	Provide two bat houses.	Yes	Indeterminate	Yes
	MDNR	Provide owl and kestrel nesting locations.	Yes	Indeterminate	Yes
	MDNR	Provide wildlife plantings.	Yes	Indeterminate	Yes
annual consultati not as run-of- the-river	MDNR	Consult annually with wildlife agencies.	No, not specific measure to protect fish and wildlife	Indeterminate	No, on is needed

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MDNR	Finalize a Bald Eagle Protection Plan including identification of nesting, roosting, and perching locations.	Yes	Indeterminate	Yes
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Adopted?	Agency	Recommendati ons	Wi thi n Scope of 10(j)	Annual Cost of Envi ronmental Measures	
	Interior/ MDNR	Preserve all super canopy trees for bald eagle nest si tes.	Yes	\$50	Yes
	Interior/ MDNR	Devel op a plan and cooperate wi th resource agenci es in implementing a plan to control the spread of purple loosestri fe.	Yes	\$500	Yes
Parti ally adopted to moni tor control ,	MDNR	Devel op a plan to moni tor and control /el i mi nate Eurasian mi l foi l .	Yes	\$500	pl an and

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cooperate					and
eliminate					to
Commission	Interior/ MDNR	Any proposal to withdraw project lands from project boundary shall be reviewed by the agencies.	No, not specific measure to protect fish and wildlife	Indeterminate	Yes
	Interior/ MDNR	The City shall provide facilities for fish and wildlife as ordered by FERC, FWS, or MDNR.	No, not specific measure to protect fish and wildlife	Indeterminate	No,
retains authority require and wildlife facilities					to fish
	Interior	Allow public access to the river subject to reasonable safety and environmental limitations.	No, not specific measure to protect fish and wildlife	Indeterminate	Yes

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
	Interior/ MDNR	Improve canoe portage with hand rail and steps.	No, not specific measure to protect fish and wildlife	\$100	Yes
	Interior	Remove tailrace brush for fishing access.	No, not specific measure to	Indeterminate	Yes

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	Interior	Improve signage and boat launch on north side of impoundment.	protect fish and wildlife No, not specific measure to protect fish and wildlife	\$50	Yes
	Interior/ MDNR	Provide reservoir access for mobility-impaired.	No, not specific measure to protect fish and wildlife	\$2,200	Yes
Commission	Interior	Recreation facilities shall be approved by MDNR.	No, not specific measure to protect fish and wildlife	Indeterminate	No,
ultimately					must
approve					
facilities					
Commission	Interior	Implement recreation improvements on MDNR schedule.	No, not specific measure to protect fish and wildlife	Indeterminate	No,
approve					will
schedule					
recreation					for
improvement					al
					ts

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Adopted?	Agency	Recommendations	Within Scope of 10(j)	Annual Cost of Environmental Measures	
	Interior	Review recreation plan with agencies	No, not specific	Indeterminate	No,

Commi ssi on revi ews recreati on Form every 6		Crystal Falls - License 10-18-1995 each 10 years.	measure to protect fi sh and wi ldl i fe		wi th 80 years
Parti al ly adopted, Commi ssi on retai ns authori ty requi re recreati on i mprovemen	MDNR	Devel op a recreati on pl an i ncl udi ng tai lwater access, parki ng, car-top boat l aunch, concrete boat l aunch, stai rway, fi shi ng pl atform, vault	No, not speci fi c measure to protect fi sh and wi ldl i fe	\$500	to al
M-69 take-out outsi de proj ect boundari es	MDNR	toi l ets, and ski d pi er. Fund mai ntenance and operati on of MDNR canoe take-out at M-69.	No, not speci fi c measure to protect fi sh and wi ldl i fe	\$1,000	No, canoe i s of
Parti al ly adopted, Commi ssi on recommends devel op a to protect shorel and resources	MDNR	Devel op a comprehensi ve l and management pl an for l ands wi thi n a 200- foot proj ect boundary.	Yes	\$200	Ci ty pl an



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As shown in Table 10, we determined that 29 of the 57 recommendations made by fish and wildlife agencies are within the scope of Section 10(j) of the FPA. Of the 29 recommendations, we adopted all 29, fully or in part.

As noted above, conditions based on fish and wildlife recommendations submitted pursuant to Section 10(j) must be included in the license unless the Commission determines that the recommendations are inconsistent with the purposes and requirements of the FPA or other applicable law. If the Commission does not adopt a recommendation submitted pursuant to Section 10(j), it must explain, pursuant to Section 10(j)(2), how the recommendation is inconsistent with applicable law and how the conditions selected by the Commission adequately and equitably protect, mitigate damages to, and enhance fish and wildlife. In doing so, we first determine whether the

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recommendation is supported by substantial evidence in the record, that is, whether there is evidence in the record adequate to support a conclusion. If not, the recommendation is inconsistent with the requirement of Section 313(b) of the FPA that Commission orders be supported by substantial evidence.<sup>20</sup> Next, we determine whether a substantiated recommendation is inconsistent with the FPA or other applicable determinations under the equal consideration/comprehensive development standards of FPA Sections 4(e) and 10(a)(1), in that the recommendation conflicts unduly with another project purpose or value (including the project's economic benefits).<sup>21</sup> In short, we determine whether the recommendation would have a significant, negative impact on a valuable project purpose or beneficial use.

In this instance, MDNR and Interior recommend that the City meet state water quality standards for temperature and DO and that the City develop and implement a water quality monitoring plan. The Crystal Falls Project is not contributing to or causing violations of the state water quality standards for the Paint River. However, because the cost of these measures does not have a substantial negative impact on the value of the project, we adopt the agencies' recommendations pursuant to Section 10(j) of the FPA.

Further, MDNR recommends that the City develop a bald eagle protection plan. It is highly unlikely that eagles would nest on City owned project lands given the small amount of area owned by

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the City, the proximity to human activities and developments, and the lack of suitable habitat. Since the cost of the bald eagle protection plan would not have a substantial negative impact on the value of the project, we adopt the agencies' recommendation pursuant to Section 10(j) of the FPA.

We partially adopted MDNR's recommendation that from April 24 through May 6, the impoundment shall be raised from 1,332.44 to 1,333.69 feet with an elevation change of no more than 0.25 foot/day. Based on our analysis, impoundment level rising rates during flashboard installation should have no effect on water quality or fish and wildlife resources. MDNR's recommended restriction would result in impoundment elevations being below the flashboard crest for at least 5 days. This is 3 or 4 days longer than necessary and, in the event of a plant outage, may

20 See IV FERC Statutes and Regulations, *supra*, ¶ 30,921 at p. 30,157.

21 See Mead Corporation, Publishing Paper Division, 72 ¶ 61,027 (1995). We also consider whether the application should in fact be denied, on the basis that the resources the project would adversely affect are more valuable than the benefits it would confer.

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adversely affect downstream run-of-the-river flows (see Section V.C.2.b). MDNR agrees with our conclusions.

We partially adopted Interior's recommendation to maintain tailwater elevations. Historically, inflow has been as low as 82 cfs; tailwater levels at this flow would be atypically low but not indicative of a violation of run-of-the-river operation. We conclude that recording tailrace elevations is not necessary to monitor compliance of project operation or protect river resources (see Section V.C.2.b). Interior in comments dated May 22, 1995, indicates that it did not have serious concerns with our recommendation that the City not be required to record tailwater elevation because headpond levels would be closely regulated.

We partially adopted MDNR's recommendation that the City establish on all non-applicant lands adjacent to the reservoir, a 200-foot project boundary and that lands within this zone be managed in accordance with a comprehensive land management plan. The City already owns a 100-foot buffer from the water's edge from the dam northward to the City limits. Much of the shoreland is currently protected from development by existing state and federal wetland regulations. The most practical and cost-effective method to establish buffer zone protection is to develop criteria for selecting shoreland that is needed for protection, not to indiscriminately purchase large parcels of land adjacent to the river (see Section V.C.6.b). MDNR agrees with our conclusions.

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Recommendations Outside the Scope of Section 10(j)

We determined that 28 of the 57 recommendations of the federal and state fish and wildlife agencies are outside the scope of Section 10(j) because they are not specific measures to protect fish and wildlife. These recommendations are therefore considered under the public interest standards of Section 10(a) of the FPA. We determined that 12 of these recommendations have merit and, therefore, we have adopted or partially adopted them. The remaining 16 recommendations are not in the public interest, and we did not adopt them for the following reasons:

- ù MDNR's recommendations that the City identify mitigation for emergency violations of impoundment fluctuations and that maintenance draw-downs greater than 1 foot require an MDNR permit because these recommendations preempt the Commission's authority with respect to nonfederal water power projects under the FPA. In the event of an emergency violation, the City would be required to report to FERC's Division of Project Compliance (see Section V.C.2.b).

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- ù Interior's and MDNR's recommendation that the City should agree to cost share with USGS the existing flow monitoring station because there is no justification to require the City to fund the existing USGS station to monitor tailrace flows when other methods of monitoring tailrace flows are available (see Section V.C.2.b).
- ù MDNR's recommendation that the City contract with USGS to install and operate another gage upstream to monitor inflow to the impoundment because there is no need to monitor inflow to the reservoir. Inflows are naturally regulated and can be estimated to the degree of accuracy necessary for determining compliance with run-of-the-river conditions (see Section V.C.2.b).
- ù Interior's recommendation that the City should equip flow gaging stations with telemetry for agency use because continuous records are available from USGS or WEPCo telemetry operations (see Section V.C.2.b).
- ù Interior's and MDNR's recommendation that the City maintain and provide, on agency request, data on daily operation of turbines, spillway, and impoundment because the Commission maintains responsibility to ensure that the City operates the project in accordance with the license (see Section V.C.2.b).
- ù Interior's recommendation that the City and MDNR should agree on mitigation based on results of water quality monitoring because the project is currently meeting water quality standards, and strict run-of-the-river

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operation is unlikely to engender violations of state water quality standards (see Section V. C. 2. b).

- ù Interior's recommendation that the fish protection plan include a consultant selection process because the barrier net technology is well established, and given the availability of published design information, and the generic ability of engineers to apply available design information to an individual site, there is no need for a consultant in the selection process (see Section V. C. 3. b).
- ù Interior's and MDNR's recommendation to develop a plan to compensate for unavoidable fish losses because the barrier net is expected to be effective. At this time, no data indicate that entrainment and turbine mortality would have a major impact on fishery resources (see Section V. C. 3. b).
- ù Interior's and MDNR's recommendation that the City provide facilities for fish and wildlife as ordered by

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FERC, FWS, or MDNR because this preempts the Commission's approval authority over a licensed hydropower project (see Section V. C. 3. b).

- ù MDNR's recommendation for annual consultation with wildlife agencies because run-of-the-river operation would be advantageous to fish and wildlife resources and would not result in an appreciable ecological issues that would require consultation on an annual basis (see Section V. C. 4. b).
- ù Interior's recommendation that the City implement recreation improvements on a schedule approved by MDNR because this preempts the Commission's approval authority over a licensed hydropower project (see Section V. C. 6. b).
- ù Interior's recommendation that the City review recreation plans with the agencies every 10 years because the Commission reviews recreation with Form 80 (see Section V. C. 6. b).
- ù MDNR's recommendation that the City fund maintenance and operation of the MDNR canoe take-out at M-69 because this canoe take-out is outside the project area influence (see Section V. C. 6. b).
- ù MDNR's recommendation to develop and implement a plan to inventory, control, and repair erosion sites on project lands and below the project in the project influence zone. There is no evidence that shoreline erosion is occurring as a result of present operations and run-of-the-river operations should minimize to a

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great extent the potential for future bank erosion (see  
Section V. C. 1. b).

- ù MDNR's recommendation to develop a plan for project removal.
- ù Interior's and MDNR's recommendation to establish a trust fund for project retirement.

With respect to the last two recommendations concerning development of a plan for dam removal and the establishment of a trust fund for project retirement, we consider the issues separately from other nondevelopmental issues.

As stated in Section III, we considered project retirement and dam removal as alternatives to the City's proposed project. No participant has suggested that dam removal would be appropriate, and we have found no adequate basis for recommending it at this time. Therefore, we eliminated these alternatives

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from detailed study because they are not reasonable in the circumstances of this case at this time.

MDNR recommended that the City develop a plan to study the costs for (1) permanent nonpower operation, (2) partial project removal, or (3) complete project removal. The purpose of this recommendation is to address future project retirement and the consequences to fisheries habitat of these facilities when they have exceeded their economic life and are sold, transferred to other owners, or otherwise fall into disrepair.

Interior recommends that the City establish a trust fund to cover the cost of retiring the Crystal Falls Hydroelectric Project when necessary. It further recommends that the City estimate the costs of: (1) modifications required for maintaining permanent natural run-of-the-river flows with no power generation, (2) partial project removal, and (3) complete project removal.

The Commission's position is set forth in the December 14, 1994, Policy Statement.<sup>22</sup> With respect to retirement with or without dam removal, it retains jurisdiction of hydropower projects until a comprehensive resolution with respect to retirement of the project at the end of the license term or, in the event of a license denial, resolution is arranged with the licensee, the state, and other pertinent parties. The Commission recognizes the need for responsible state agencies to be partners in any arrangement that is worked out at the time when federal licensing ends.

The Commission also notes that once the Commission's jurisdiction has concluded, the preemption that earlier displaced any state laws would be at an end. The state would then be at liberty to impose its own licensing or other regulatory regime free from any restrictions imposed earlier by the FPA.

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Through the retirement process the Commission's objective is to resolve, on a case-by-case basis, and to the satisfaction of the successor agency, matters pertaining to retirement at the end of the license term and to accomplish a mutually acceptable resolution of the issues. Therefore, we have not adopted MDNR's recommendation at this time, because it will be addressed at the end of the term of license.

With respect to establishing a trust fund for project retirement, the Commission stated that it will not generically impose retirement funding requirements on licensees. However, the licensee is ultimately responsible for meeting a reasonable level of retirement costs when the project is retired. The

22 FERC Statutes and Regulations ¶ 31,011 (1994).

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Licensee should plan accordingly and the Commission will not accept the lack of adequate preparation as justification for not retiring a project. Provision for mid-course funding may become appropriate. The Commission encourages affected parties to develop creative solutions to pre-retirement funding in such situations.

In certain situations, where supported by the record, the Commission may impose license conditions to ensure that funds are available to do the job when the time for retirement arrives. The Commission reserves the authority to determine on a case-by-case basis whether or not to impose funding requirements at the time of licensing. The Commission needs reasons to require a retirement trust fund beyond a general belief in having such a fund. The policy statement says:

There may be particular facts on the record in individual cases, however, that will justify license conditions requiring the establishment of retirement cost trust funds in order to assure the availability of funding when decommissioning occurs. The Commission would consider, for example, whether there are factors suggesting that the life of the project may end within the next 30 years, and would also look at the financial viability of the licensee for indications that it would be unable to meet likely levels of expenditures without some form of advance planning.

Because there are no data to suggest that the Crystal Falls Hydroelectric Project is in poor physical condition or has marginal economics such that the project would not remain viable throughout the term of the license, there is no reason to require the establishment of a trust fund. Therefore, we have not adopted Interior's recommendation for the City to establish a trust fund at this time.

IX. CONSISTENCY WITH COMPREHENSIVE PLANS

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Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2) federal and state agencies filed a total of 55 qualifying comprehensive plans of which we identified 6 Michigan and 4 United States comprehensive plans to be applicable. We did not find any conflicts. We list comprehensive plans relevant to this project in Section XI.

X. FINDING OF NO SIGNIFICANT IMPACT

None of the resources that we analyzed which include geologic resources, water quantity and quality, fisheries, terrestrial, cultural, and recreation resources would

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experience significant adverse effects under the proposed action or any of the alternatives considered in this EA.

On the basis of our independent analysis, issuing a license for the project as proposed by the City with our additional recommended measures would not constitute a major federal action significantly affecting the quality of the human environment.

XI. LITERATURE CITED

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## XII. LIST OF PREPARERS

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APPENDIX A

AGENCY COMMENT LETTERS ON  
THE DEA FOR THE CRYSTAL FALLS PROJECT

- 1) City of Crystal Falls                      May 9, 1995
- 2) U. S. Department of Interior              May 22, 1995  
Fish and Wildlife Service
- 3) Michigan Department of                      May 30, 1995  
Natural Resources

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