UNITED STATES OF AMERICA 108 FERC ¶ 62, 075
FEDERAL ENERGY REGULATORY COMMISSION

Public Utility District No. 2 of Grant County Project No. 2114-117

ORDER MODIFYING AND APPROVING AMENDMENT OF LICENSE APPLICATION AND REVISING ANNUAL CHARGES

(Issued July 23, 2004)

On October 2, 2003, and supplemented on April 5 and May 28, 2004, Public Utility District No. 2 of Grant County (Grant or licensee), filed an application to amend its license for the Priest Rapids Project, FERC No. 2114,[1] seeking authorization to replace the10 turbines at the Wanapum development with 10 new, upgraded turbines. The Priest Rapids Project consists of two developments: the Wanapum development and the Priest Rapids development. The Wanapum development is about 18 miles upstream of the Priest Rapids development. The project is located on the Columbia River in Grant, Yakima, Kittitas, Douglas, Benton, and Chelan counties, Washington, and occupies federal lands.

BACKGROUND AND AMENDMENT APPLICATION

In its October 2, 2003 filing, Grant stated that the turbines of the Wanapum development have reached the end of their useful life and need replacement. Grant indicated that it has investigated turbine runners designed to improve juvenile salmon survival for several years in cooperation with the U.S. Department of Energy's Advanced Hydro Turbine Program. Grant intends to install this new technology, Minimum Gap Runner turbines, at the Wanapum development. In its October 2003 filing, Grant proposes to install one advanced turbine and test its effects in passing migrating juvenile salmon before proceeding with installation of the remaining 9 turbine units at the rate of one unit every 9 months.

The licensee stated that the proposed turbine replacement would provide increased power and hydraulic capacity, equal or improve the survival of juvenile salmon passage through the units, and improve water quality by reducing the amount of spill at the Wanapum dam during periods of high flow. Under the proposal, the total rated capacity at the Wanapum development would increase from 1,200,000 hp (900 MW) to 1,500,000 hp (1,125 MW), and the total hydraulic capacity would increase from 178,000 cubic feet

[1] 14 FPC 1067 (1955).

per second (cfs) to 188,000 cfs. The generators' total name plate capacity would remain unchanged at 1,038 MW.

In its April 5, 2004 supplemental filing, Grant stated that due to delays in the issuance of the biological opinion (BO) under the Endangered Species Act, it was requesting an interim order that authorized the installation only of one advanced turbine at the Wanapum development. Grant proposed not to test or operate the new unit until issuance of the BO by the National Oceanic Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), and a final amendment order by the Commission that addressed the replacement of all 10 units.

In an interim order issued April 30, 2004, the Commission authorized Grant to install one new advanced turbine in Unit No. 8 of the Wanapum development.[2] The order stipulated that Grant could not test or operate the new unit until the issuance of the BO by NOAA Fisheries and an order amending the license by the Commission.

On May 6, 2004, NOAA fisheries filed with the Commission, a BO regarding implementation of an Interim Protection Plan (IPP) at the Priest Rapids Project for listed anadromous salmonids. The BO identified a Reasonable and Prudent Alternative (RPA) defining a set of short-term actions that would begin to immediately improve the survival of listed Upper Columbia River (UCR) steelhead and UCR spring-run chinook salmon.

On May 28, 2004, Grant filed, with the Commission, a request to operate the new ATU in Unit 8 after completing installation and to conduct a study to determine if it meets the specified performance criteria for juvenile salmon passage survival. If the study results indicate that survival of juvenile salmonids passing through Unit No. 8 are equal or better than an existing unit, the licensee proposes to subsequently replace the remaining 9 units over the next eight years.

CONSULTATION

In the development of the amendment application, the licensee consulted with NOAA Fisheries, the U.S. Fish and Wildlife Service (FWS), the Washington Department of Fish and Wildlife (WDFW), the Washington Department of Ecology (WDOE), the Oregon Department of Fisheries, the Mid-Columbia Coordinating Committee, the Columbia River Inter-Tribal Fish Commission, the Yakima Nation, the Wanapum Indians, American Rivers and the licensee's power purchasers. Comments on the licensee's amendment application were received from NOAA Fisheries, Public Utility District No. 1 of Douglas County, and Public Utility District No. 1 of Chelan County, the FWS, the WDOE, the WDFW, the Wanapum Indians, American Rivers, and Puget Sound Energy.

[2] 107 FERC ¶ 62,088 Interim Order Authorizing Installation of Advanced Turbine Unit.

The commenting parties generally agreed with the licensee's proposed amendment application to install 10 new advanced turbines. Additionally, several commentators emphasized that replacement of the remaining 9 turbines should not proceed until a thorough biological study of the first turbine is completed and shows favorable results with respect to passing juvenile salmonids.

By a letter dated November 3, 2003, the Commission inquired from Grant if they consulted with the State Historical Preservation Office (SHPO) to determine if the proposed amendment is likely to have any direct or indirect impacts on sites or properties either listed in or recommended as eligible for the National Register of Historic Places. By letter dated December 3, 2003, the SHPO, responding to the licensee, concurred that the proposed amendment would not affect any historic properties.

On November 6, 2003, the Commission issued a public notice of Grant's amendment application to replace and test turbine Unit No. 8 of the Wanapum development, and subsequently replace the 9 remaining units if the new unit meets specified performance criteria for juvenile salmon passage survival. The U.S. Department of Interior (Interior) and Mr. Pat Kelleher filed comments. Mr. Kelleher's comments were unrelated to the proposed amendment, and Interior stated that it had no comments on the proposed amendment.

The Columbia River Inter-Tribal Fish Commission, WDFW, WDOE, and NOAA Fisheries filed motions to intervene in the proceeding. WDOE and WDFW did not express a position on the proposed amendment, while the National Marine Fisheries expressed general support for the amendment. The Columbia River Inter-Tribal Fish Commission also expressed general support for the proposed amendment, but also noted concerns about the potential effects on anadromous species, indicating that they may not support full replacement of all the turbines if the follow-up studies indicate that the new ATU adversely affects anadromous species.

A. Water Quality Certification

On October 1, 2003, the licensee filed an application with the WDOE requesting certification for their amendment proposal under Section 401 of the Clean Water Act. By letter dated March 12, 2004, the WDOE concluded, with reasonable assurance, that the proposed license amendment would comply with state and federal water quality standards if a number of conditions are met. The WDOE's letter described: 11 General Conditions; four, Total Dissolved Gas Pressure Monitoring Conditions; six, Construction Activities Conditions; and six, Spill Prevention Conditions. The WDOE's Certification Order is attached as Appendix A of this order.

B. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species. The Wanapum development is located within the geographical ranges of both the Upper Columbia River steelhead evolutionarily significant unit (ESU) and spring-run chinook salmon ESU. Both species are listed as endangered. Critical habitat for steelhead was designated as all river reaches accessible to listed steelhead in the Columbia River tributaries upstream of the Yakima River and downstream of Chief Joseph dam, which places the Wanapum development within the Columbia River reach that includes the critical habitat tributaries.

On May 6, 2004, NOAA Fisheries filed, with the Commission, their final BO regarding the implementation of an Interim Protection Plan at the Priest Rapids Project. NOAA Fisheries determined that the IPP would likely jeopardize the continued existence of Upper Columbia River spring-run chinook salmon and Upper Columbia River steelhead. As one component of the Interim Protection Plan, the BO discusses the replacement of 10 turbines at the Wanapum development with 10 new advanced turbines. The BO included a reasonable and prudent alternative that contained a number of actions of which two actions pertained to the licensee's proposed 10 turbine replacement (Appendix B). In addition to the two actions, NOAA Fisheries identified three reasonable and prudent measures and three terms and conditions that, if implemented, the 10 turbine replacement proposal would not jeopardize the continued existence of the listed anadromous species.

Bull trout have also been listed as threatened for the Columbia River population segment. Because limited detailed information on the distribution of bull trout in the mid-Columbia River was available, Grant and the other mid-Columbia licensees conducted studies from 1999 to 2003 to determine the potential distribution and movement patterns of the species in this reach of the river. Only 1 bull trout was collected in Wanapum reservoir, and of the 79 bull trout radio-tagged upstream of Wanapum dam (at Rock Island dam and points upstream), only 9 were detected in Wanapum reservoir and 1 passed Wanapum dam. By letter dated July 9, 2004, FWS recommends that Grant and the Commission continue informal consultation with them regarding bull trout as well as other threatened and endangered species in the project area, until a formal consultation on the proposed relicensing application is completed.

DISCUSSION

A. Design Plan, and Schedule

Grant proposes to test Unit No. 8 after the issuance of an amendment order and file the test results with the Commission, NOAA Fisheries, and the Mid-Columbia Coordinating Committee. If the operating criteria and biological testing indicate that the ATU provides equal or better survival for migrating smolts over the existing turbines, then Grant proposes to proceed with replacing the remaining 9 turbines.

Grant proposes to replace all ten turbines at Wanapum development with ATUs, over about an 8-year period, and the new units would have the following design features:

- Larger runner diameter (305 inches versus 285 inches for the existing units);
- Higher output rating (150,000 hp vs. 120,000 hp) and more wicket gates (32 vs. 20);
- "Fish-friendly" features, including reshaped stay vanes, new smaller wicket gates that are in line with the stay vanes (to eliminate discharge ring overhang), a spherical runner and discharge ring to eliminate gaps at the hub and discharge ring, and reshaped draft tube to improve hydraulics and reduce re-circulation and turbulence.

According to the Commission's regulations at 18 C.F.R. 11.1(i) which state in part "authorized installed capacity means the lesser of the ratings of the generator or turbine units.....The rating of a turbine is the product of the turbine capacity in horsepower (hp) at best gate (maximum efficiency point) opening under the manufacturer's rated head times a conversion factor of 0.75kW/hp.....". As such, in this order we will revise (a) the project description to reflect the installation of ATUs at the Wanapum development, and (b) the authorized installed capacity of the project. The authorized installed capacity of the Priest Rapids Project, after the replacement of the units at Wanapum development, would increase from 1,755,000 kW to 1,893,000 kW as shown in the following table; each unit of the Wanapum development will increase by 13,800 kW.

Priest Rapids Development

Unit	1	2	3	4	5	6	7	8	9	10	Total
Turbine, MW	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5	855.0
Generator, MW	95.0	97.8	95.0	95.0	95.0	95.0	95.0	95.0	97.8	95.0	955.6
Authorized, MW	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5	85.5	**855.0**

Wanapum Development

Unit	1	2	3	4	5	6	7	8	9	10	Total
Before Replacement of Turbines											
Turbine, MW	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	900.0
Generator, MW	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	1,038.0
Authorized, MW	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	900.0
After Replacement of Turbines											
Turbine, MW	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	112.5	1,125.0
Generator, MW	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	1,038.0
Authorized, MW	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	103.8	**1,038.0**
Project's Total Authorized capacity = 1,893 MW											

The authorized capacity of the Wanapum development after the replacement of ten units is 1,038 MW. The total authorized capacity of the Priest Rapids Project is 1,893 MW.

This order also revises Article 47 of the license, regarding annual charges for the purpose of reimbursement to the United States Government for the cost of administration of Part I of the Federal Power Act (Act). In accordance with the Commission's policy, the effective date of revised annual charges will be the date of commencement of construction of revised capacity.[3] In its May 28, 2004 letter, Grant stated that work on the construction and installation of Unit No. 8 commenced on May 11, 2004. As such Article 47 is revised in ordering paragraph (G) of this order to reflect an increase in authorized capacity of 13, 800 kW for Unit No. 8. For the remaining 9 units, we are requiring in ordering paragraph (H) of this order, Grant to file with the Commission, within 30 days of the start construction of each additional unit, construction start date and a description of the modifications, which we would use to further revise Article 47.

Along with the amendment application, Grant filed revised exhibit drawings L-12a, L-13, and L-14a, and exhibit M revising the general description of Mechanical, Electrical, and Transmission Equipment. We reviewed the exhibit drawings, and the revised exhibit M filed on October 2, 2003, and found them in conformance with the Commission's rules and regulations. This order approves revised exhibit M, and the exhibit drawings as described in ordering paragraph (I) of this order.

B. Environmental Review

We prepared an Environmental Assessment (EA) for the proposed amendment, which is attached as Appendix C of this order. The EA evaluates the effects of the proposed amendment, two action alternatives for replacing the existing units, and a no action alternative. The EA concludes that the replacement of existing units at Wanapum

[3] 66 FERC ¶ 61,086 Order on Rehearing, issued January 18, 1994.

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

1. Water Quality

Potential effects on water quality, associated with the replacement of the turbines, could occur during the construction phase of the project, and post construction due to the small increase in project hydraulic capacity. Once in operation, the ATUs would have a greater hydraulic capacity, which would reduce the amount of water spilled during flood flows, potentially reducing the total dissolved gas levels associated with spillage.

Because of the existing hydraulic capacity of the Wanapum station, most of the river flow passes through the powerhouse turbines, except during high-flow periods and during voluntary spillage for downstream fish passage. Studies by the licensee indicate that turbine operation does not contribute significantly to total dissolved gas (TDG) supersaturation. Because the new ATUs would have a higher hydraulic capacity, the upgrade would reduce the proportion of total flow subject to spill-related supersaturation at flows above the hydraulic capacity of the turbines.

Spring flows typically exceed the hydraulic capacity of the Wanapum turbines, and uncontrolled spills produce elevated TDG levels. Under the proposed amendment, the hydraulic capacity of the Wanapum development would increase from the current normal utilization of 165,000 cfs (maximum capacity of 178,000 cfs) to a new maximum capacity of 188,000 cfs. Thus, the ATUs would reduce the spill volume by a maximum of 23,000 cfs and potentially lower the TDG levels.

Grant proposes to perform all construction work, associated with turbine replacement, in the dry and does not anticipate that spills associated with equipment oil, fuel and other debris, and waste material would enter the river. The licensee also proposes to follow the existing Spill Prevention Control and Counter Measure Plan to further protect against spills from oils, waste, and debris during the construction process thus minimizing the potential for any adverse effects on water quality from the proposed construction activities.

In order to ensure that the proposed amendment would comply with state and federal water quality laws, the WDOE provided Section 401 Certification that contained a number of conditions to be implemented that would provide reasonable assurances that the water quality standards would be met. The conditions imposed in the water quality certification are by law also conditions of the license and should be incorporated in this order as part of the requirements for implementing the licensee’s amendment proposal.

2. Fisheries and Aquatic Resources

There are three federally listed species which occur in the project area: steelhead salmon, spring-run chinook salmon, and bull trout. Because replacement of the turbines would not result in any change in project operations, the only effect on fishery resources would be associated with any changes in survival of fish passing downstream through the units. With installation of the ATUs, some mortality of smolt would continue, although the "fish-friendly" design of the ATUs should reduce mortality and improve the survival of listed species. This would assist in the recovery efforts for the listed species and provide a beneficial effect on the listed spring-run chinook and steelhead salmon.

NOAA Fisheries' BO contains alternative actions and an Incidental Take Statement that sets forth Reasonable and Prudent Measures (RPM) and associated Terms and Conditions. The BO indicates that if these measures are implemented, the 10 turbine replacement proposal would not jeopardize the continued existence of the listed anadromous species. Therefore, alternative Action Nos. 4 and 9, and all applicable RPMs and Terms and Conditions associated with Action Nos. 4 and 9 should be implemented as described in the BO and are also adopted as Essential Fish Habitat conservation measures. The remaining provisions of the BO, that pertain to the licensee's proposed IPP, will be addressed in a subsequent Commission proceeding.

3. Testing

The installation of the ATU represents the first commercial application of the latest advancements in fish friendly turbine design. The Kaplan type turbine incorporates a number of features intended to improve survival of juvenile salmonids passing through the units along with improved turbine efficiency. In order to determine the extent of any improved passage through the units, the licensee has designed a study to compare fish survival through an ATU versus an existing unit.

The licensee proposed to conduct a biological study in cooperation with the fishery resource agencies and tribes. The licensee also proposed to file the results with the Commission, NOAA Fisheries and the Mid Columbia Coordinating Committee before continuing with the installation of the remaining 9 units.

In addition to filing the results of the study with the Commission, the licensee should also file any comments provided by the resource agencies and tribes concerning the study results. Further, the licensee should not begin installation of the remaining units until the Commission has reviewed and approved the study results.

CONCLUSION

Based upon review of the information provided by the licensee, agency comments, and our independent analysis, we conclude that approving this amendment of license is not a major federal action significantly affecting the quality of the human environment.

Therefore, this order approves (a) operation and testing of the previously authorized new advanced turbine in Unit No. 8, and (b) replacement of the 9 remaining units provided the operating criteria and biological testing results indicate at least equal or better survival for migrating smolts over the existing turbines and after Commission approval of the study results.

The Director orders:

(A) The licensee's (Public Utility District No. 2 of Grant County) October 2, 2003 filing, as supplemented on April 5, 2004 and May 28, 2004, requesting authorization to replace 10 turbines at the Wanapum development of the Priest Rapids Project, FERC No.2114, as modified in paragraphs (B) through (L) is approved.

(B) The licensee is authorized to operate and test the new Unit No. 8 of the Wanapum development that was approved by the Commission's April 30, 2004 order.

(C) The licensee shall implement the conditions stipulated in the water quality certification issued by the Washington Department of Ecology on March 12, 2004. The conditions of the water quality certification are incorporated in this order as part of the requirements for implementing the licensee's amendment application.

(D) For the purpose of replacing the turbines at the Wanapum development, the licensee shall implement the Reasonable and Prudent Alternative Action Nos. 4 and 9, stipulated in the Biological Opinion by the National Oceanic Atmospheric Administration's National Marine Fisheries Service on May 3, 2004, and all applicable Reasonable and Prudent Measures, and Terms and Conditions associated with Action Nos. 4 and 9.

(E) The licensee shall file, with the Commission for approval, a report on the results including comments from the resource agencies and tribes, concerning the advance turbine fish passage survival study. The licensee shall proceed with the replacement of the remaining 9 units at the Wanapum development after the Commission informs the licensee that test results are satisfactory.

(F) Paragraph (b) of the license is revised in part to read as follows:

……; each development has a powerhouse, integral with dam. The Priest Rapids development contains ten vertical shaft turbines, with a total capacity of 855 MW (85.5 MW each) and connecting to ten generators having a total rated capacity of 955.6 MW. The Wanapum development consisting of ten Advanced Turbine Units with a total rated capacity of 1,125 MW (112.5 MW each) and connecting to ten generators with a total rated capacity of 1,038 MW (103.8 MW each); a substation……..……

(G) Article 47 item (i), of the license, is revised to read:

> For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. Effective May 11, 2004, the authorized installed capacity for that purpose is 1,768, 800 kilowatts.[4]

(H) Within 30 days of the start construction of each additional unit, Grant shall file with the Commission, construction start date, and description of the modifications and exact installed capacities of the units.

(I) The following exhibit L drawings, filed on October 2, 2003, are approved and made part of the license.

Exhibit	Title	FERC Drawing No.	Superseded Drawing No.
L-12 A	Wanapum Development Powerhouse Plan – Elev. 466.0	2114-339	2114-330
L-13	Wanapum Development Transverse Sections	2114-340	2114-331
L-14 A	Wanapum Development Longitudinal Sections, Sheet 2	2114-341	2114-208

Superseded drawing numbers 2114-330, 2114-331, and 2114-208 are eliminated from the license.

[4] This is based on the current authorized capacities of 855,000 kW for Priest Rapids and 900,000 kW for Wanapum development plus the increased capacity of 13,800 kW for Unit No. 8 currently under construction. (855,000+900,000+13,800 = 1,768,800 kW).

(J) Within 90 days of the date of issuance of this order, the licensee shall file the approved exhibit drawings in aperture card and electronic file formats:

(a) Four sets of the approved exhibit drawings shall be reproduced on silver or gelatin 35mm microfilm. All microfilm shall be mounted on type D (3-1/4" X 7-3/8") aperture cards. Prior to microfilming, the FERC Drawing Number (e.g., P-2114-339 through P-2114-341) shall be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number shall be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (e.g., L-12 A etc.), Drawing Title, and date of this license shall be typed on the upper left corner of each aperture card. See Figure 1.

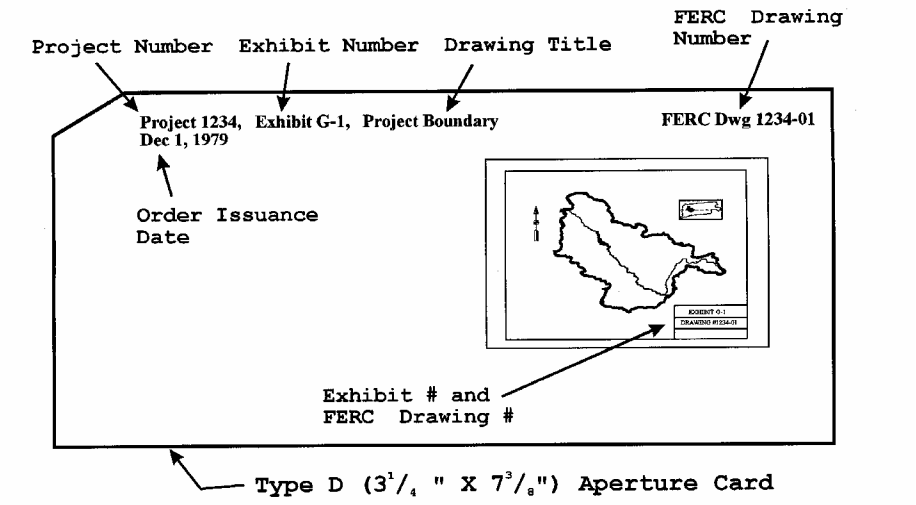

Figure 1.

(b) The licensee shall file two separate sets of exhibit drawings in electronic format with the Secretary of the Commission, ATTN: OEP/DHAC. A third set shall be filed with the Commission's Division of Dam Safety and Inspections Chicago Regional Office. Each drawing must be a separate electronic file, and the file name shall include: FERC Drawing Number, FERC Exhibit, Drawing Title, date of this license, and file extension [e.g., P-10395-14, G-1, Project Boundary, 11-04-2003.TIF]. Electronic drawings shall meet the following format specification:

IMAGERY - black & white raster file
FILE TYPE – Tagged Image File Format, (TIFF) CCITT Group 4
RESOLUTION – 300 dpi
DRAWING SIZE FORMAT – 24” X 36” (min), 28” X 40” (max)
FILE SIZE – less than 1 MB

(K) The revised exhibit M filed on October 2, 2003, is approved and made part of the license, superseding the exhibit M approved in order issued July 28, 1993.[5]

(L) Grant shall coordinate with and get prior authorization from our Portland Regional Office for the on-site construction of each turbine unit.

(M) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

J. Mark Robinson
Director
Office of Energy Projects

[5] 64 FERC ¶ 62,056 Order Approving Revised Exhibit M and Revising Annual Charges.

APPENDIX A

Section 401 Water Quality Certification

State of Washington
Department of Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF GRANTING A WATER QUALITY CERTIFICATION TO Public Utility District No. 2 of Grant County, Washington in accordance with 33 USC 1341 FWPCA Section 401, RCW 90.48.260 and WAC 173-201A	) ORDER NO. 1026) Amending the current license) for the Priest Rapids) Hydroelectric Project (FERC) No. 2114) to install new) turbines at Wanapum dam

TO: Mr. Cliff Sears
Regulatory Compliance Coordinator
Grant County Public Utility District
P.O. Box 878
Ephrata, WA 98823

On October 1, 2003, Grant County Public Utility District (Grant PUD) filed an application with the Washington State Department of Ecology requesting certification under Section 401 of the Clean Water Act (33 USC 1341). This certification needs to be submitted to the Federal Energy Regulatory Commission (FERC) as part of Grant PUD's application for an amendment to the current license for the Priest Rapids Hydroelectric Project, FERC No. 2114.

NATURE OF PROJECT:

Wanapum Dam is one of two dams that make up the Priest Rapids Hydroelectric Project. The dam spans the Columbia River at river mile 415.8 near Vantage, Washington. At this point, the Columbia River forms the border between Grant and Kittitas Counties.

Grant PUD proposes to replace up to ten of the ten existing Kaplan turbines at Wanapum dam with new turbines designed by the Department of Energy Advanced Hydroturbine Program.

Specifically, Grant PUD proposes to install one Advanced Turbine at the dam, and then evaluate both power output and the survival of juvenile salmonids passing through the new turbine as compared to an existing turbine. The remaining nine turbines at Wanapum would also be replaced with Advanced Turbines if tests show that the new turbine meets power production and fish survival criteria. These criteria are detailed in Grant PUD's application to FERC for a noncapacity amendment of their present license for the Priest Rapids Hydroelectric Project.

FINDINGS:

1. Replacing all ten existing turbines at Wanapum dam with Advanced Turbines would increase the power plant's hydraulic capacity from 160,000 cubic feet per second to

approximately 188,000 cfs. Increased hydraulic capacity would likely decrease total dissolved gas (TDG) produced by the dam by decreasing the time during which river flows exceed powerhouse capacity, thereby reducing overall spill volumes. The new turbines are not expected to either increase or decrease TDG in the flows passing through the powerhouse.
2. The wicket gates in the Advanced Turbines are equipped with grease-less bearings which will reduce the overall risk of leaking machine oils into the river at the dam.
3. Construction work necessary to remove the existing turbine(s) at Wanapum dam and install the new Advanced Turbine(s) will be done in the dry inside the existing structure of the dam. Discharge to the Columbia River of any construction debris or slurry water can either be avoided or treated so that it meets state water quality standards at the discharge point.

AUTHORITIES:

In exercising authority under Section 401 of the Clean Water Act (33 USC 1341) and RCW 90.48.260, Ecology has investigated this proposal for the following:

1. Conformance with all applicable water quality-based, technology-based, and toxic or pretreatment effluent limitations as provided under Sections 301,302, 303,306, and 307 of the Clean Water Act (33 USC 1311, 1312, 1313, 1316, and 1317);
2. Conformance with the state water quality standards as provided for in Chapter 173-201AWAC and by Chapter 90.48 RCW, and with other appropriate requirements of state law; and,
3. Conformance with all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.

WATER QUALITY CERTIFICATION:

In view of the foregoing and in accordance with Section 401 of the Clean Water Act (33 USC 1341), RCW 90.48.260 and Chapter 173-201A, Ecology finds reasonable assurance that the proposed license amendment will comply with state and federal water quality standards and other appropriate requirements of state law if the following conditions are met.

I. GENERAL CONDITIONS

A. This approval is for the replacement of the turbine(s) at Wanapum dam and any water quality effects resulting from that action. It does not cover discharges from Wanapum dam in general, any other construction or operational measures associated with the dam, or any other water quality impacts being addressed as part of the relicensing of the Priest Rapids Hydroelectric Project.

B. All water quality criteria as specified in WAC 173-201A-030 for Class A waters plus specific conditions for the Columbia River [WAC 173-201 A-130 (21) apply to this proposal and the applicant must comply with those criteria.
C. In the event of changes in or amendments to the state water quality standards (WAC 173-201A), or changes in or amendments to the state Water Pollution Control Act (RCW 90.48), or changes in or amendments to the Federal Clean Water Act, such provisions, standards, criteria or requirements shall also apply to this proposal and any attendant agreements, orders, or permits.
D. This certification does not exempt compliance with other statutes and codes administered by federal, state and local agencies.
E. Discharge of any solid or liquid waste to the waters of the state of Washington without prior approval from Ecology is prohibited.
F. If five or more years elapse between the date this certification is issued and commencement of work to install the new turbine(s), Grant PUD shall send Ecology an updated 401 application that reflects the current conditions, regulations and technologies. Work may not proceed unless and until Ecology approves the updated application.
O. Grant PUD shall obtain Ecology review and approval before undertaking any change to the license amendment as proposed that might affect water quality or compliance with this certification.
H. Copies of this Order and associated permits, licenses, approvals and other documents shall be kept on site and made readily available for reference by Grant PUD, its contractors, consultants, and by Ecology.
I. Grant PUD shall allow Ecology access to inspect the project and project records required by this certification for the purpose of monitoring compliance with the conditions of this Order.
J. Ecology reserves the fight to issue orders or to initiate other legal actions, such as civil and criminal penalties, to enforce the requirements of this Order.
K. Ecology reserves the right to amend this Section 401 water quality certification if the agency determines that the provisions hereof no longer provide reasonable assurance that the proposed license amendment will comply with water quality standards or other appropriate requirements of state law. Any such amended certification shall take effect immediately upon issuance, unless otherwise provided in the amended certification, and may be appealed to the Pollution Control Hearings Board under RCW 43;221B. Ecology shall transmit any amended certification to FERC to update the Commission's records as to the current certification conditions.

II. TOTAL DISSOLVED GAS PRESSURE ('I"13)(3) MONITORING CONDITIONS

A. Grant PUD shall monitor for TDG in order to check the effects of the new turbine(s) on total dissolved gas levels at Wanapum Dam. Two different kinds of monitoring shall be conducted in 2005 following completion of the installation of the first of the new turbines:

1. An analysis of TDG levels shall be conducted during the spill season using the data collected from the existing fixed monitoring stations in the forebay and tailrace at the Wanapum dam and in the forebay of Priest Rapids dam. This analysis should provide a comparison with the analyses already conducted prior to the application to install new turbines.

2. A transect study to evaluate TDG laterally across the powerhouse channel shall be set up approximately 2000 feet downstream of the powerhouse during periods when the dam is not spilling and all of the river's flow is going through the powerhouse. During the study the new turbine shall be operated between minimum and maximum capacity within the cavitation limits and normal operating elevations. This test will be designed to verify that the new turbine will not materially increase TDG during normal operations.

B. If monitoring indicates that the new turbine does not increase TDG as compared to an existing turbine, then Grant PUD may install the remaining nine new turbines without further approval from Ecology. If monitoring indicates that the new turbine increases TDG as compared to an existing turbine, and the TDG standard is exceeded, then Grant PUD shall file a Total Dissolved Gas Abatement plan for Wanapum dam, subject to Ecology's approval, prior to installing the remaining nine new turbines.

C. The spill season analysis and transect study as described in AI. and A2. above shall be performed again after installation of all ten new turbines is completed.

D. Monitoring shall comply with all state and federal data quality requirements. Prior to beginning TDG monitoring studies, Grant PUD shall prepare and submit to Ecology a monitoring and data quality plan for review and approval. Results from both the spill season analysis and the transect study, including monitoring data and a summary report, shall he submitted to Ecology within three months of completing both studies. Study reports shall be filed with Ecology after the first new turbine is installed and again after all ten new turbines have been installed.

III. CONSTRUCTION ACTIVITIES

A. All construction work associated with removing the old turbine(s) and installing the new one(s) shall be done in the dry. Upstream and downstream bulkhead gates shall be used to isolate the construction site from the Columbia River. The construction site, which is wholly located within the existing structure of the dam, shall also be de-watered.

B. Rubble and other debris created by construction or deconstruction shall be removed from the site and disposed of in a fashion that prevents it from entering state waters.

C. All slurry resulting from the construction work shall be collected in settling ponds. Silt and other debris settled, filtered, etc. from the ponds shall be disposed of off-site in a manner that prevents this material from entering state waters. Any water from the settling ponds that is ultimately returned to the river must meet water quality standards for the Columbia River at the discharge point.

D. At a minimum, the settled water needs to be monitored for pH and turbidity before being discharged to the river. Water from the settling ponds may need to be neutralized in order to meet the standard for pH. Carbon dioxide is commonly used for this purpose; all other methods require prior approval from Ecology.
E. Monitoring shall comply with all state and federal data quality requirements. A monitoring plan shall be prepared by Grant PUD and submitted to Ecology for approval. Any water quality monitoring results shall be submitted annually to Ecology's Eastern Regional Office until the construction work is completed.
F. Wash water containing oils, grease or other hazardous materials resulting from wash down of equipment shall not he discharged into state waters.

IV. SPILL PREVENT/ON AND CONTROL

A. RCW 90.56 prohibits any discharge of oil, fuel or chemicals into state waters or onto land where such contaminants could potentially drain into state waters.
B. Grant PUD shall keep records of the amounts of oil used on-site for any oil-using components of the new Advanced Turbine(s). These records shall be made available to Ecology upon request.
C. Grant PUD shall provide Ecology with the latest version of the Spill Prevention Control and Counter Measure Plan for Wanapum dam prior to starting work.
D. Activities causing distressed or dying fish, fish kills, or any discharge of oil, fuel, or chemicals into state waters, or onto land where such contaminants could potentially drain into state waters, are prohibited.
E. In the event of a discharge of oil, fuel or chemicals into state waters, or onto land where such contaminants could potentially drain into state waters, containment and clean-up efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Clean-up shall include proper disposal of any spilled material and used clean-up materials.
F. Spills into state waters, spills onto land where contaminants could potentially drain into state waters, fish kills, and any other significant water quality problems, shall be reported immediately to the Department of Ecology Eastern Regional Office at (509) 329-3400. Notification shall include a description of the nature and extent of the problem, any actions taken to correct the problem, plus any proposed changes in operations to prevent further problems.

Any person who fails to comply with any provision of this Order shall be liable for a penalty of up to ten thousand dollars for each day of continuing noncompliance.

This Order may be appealed. Your appeal must be filed with the Pollution Control Hearings Board, P.O. Box 40903, Olympia, Washington 98504-0903, within thirty (30) days of the postmarked date of this Order. At the same time, your appeal must also be sent to the Department of Ecology, Eastern Regional Office, 4601 N. Monroe Street, Spokane, WA 99205. Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21 B.320. These procedures are consistent with Chapter 43.21B RCW.

DATED this 12th day of March 2004 at Spokane, Washington.

SIGNED BY:

James M. Bellatty
Section Manager
Water Quality Program
Eastern Regional Office

APPENDIX B

Reasonable and Prudent Alternative Actions, Reasonable and Prudent Measures, and Terms and Conditions

National Oceanic and Atmospheric Administration, National Marine Fisheries Service

Regarding 10 Turbine Replacement Amendment

REASONABLE AND PRUDENT ALTERNATIVE

The regulations implementing Section 7 of the ESA (50 CFR 402.2) define reasonable and prudent alternatives as alternative actions, identified during formal consultation, that 1) can be implemented in a manner consistent with the intended purpose of the action, 2) can be implemented consistent with the scope of the action agency s legal authority, 3) are economically and technically feasible, and 4) would not jeopardize the continued existence of the listed species.

This RPA defines a set of short-term actions that would begin to improve the survival of listed UCR steelhead and UCR spring-run chinook salmon immediately. It also requires the early implementation of longer-term elements that may extend beyond the time period of this Opinion. Some of these relate to continued improvements in juvenile and adult passage survival at the Project. Others are off-site measures that will be the responsibility of Grant PUD, such as the design, construction, and operation of substantially expanded hatchery programs over the next several decades, and the rehabilitation of tributary habitat.

This RPA is based upon the best scientific information available. Scientific knowledge is continually evolving, and NOAA Fisheries acknowledges the importance of adaptive management guided by reliable science. Each of the RPA actions described below, particularly those related to juvenile passage, anticipate monitoring and evaluation to compare the success of the actions to performance standards. Quantifiable biological performance standards (in this case, project survival performance standards) are the appropriate measure for evaluating the adequacy of fishery conservation measures for hydropower projects over time. NOAA Fisheries expects that the following RPA actions will result in operations that meet or exceed the project survival standards by 2010 (and will be reported per the requirement in Section 9.6.1 of this RPA by 2013). NOAA Fisheries employed identical performance standards in evaluating the adequacy of the anadromous fish conservation programs for Columbia River dams upstream of the Priest Rapids Project that are operated by Chelan and Douglas County PUDs, as described in the HCPs for Rock Island, Rocky Reach, and Wells Dams, and in the August 2003 biological opinions for the HCPs, and determined that they would not appreciably reduce the likelihood of both survival and recovery. These survival standards are 93% juvenile project survival and 91% combined adult and juvenile survival at the Priest Rapids and Wanapum Developments (i.e., at each dam) by 2010, per Action 1, below.

NOAA Fisheries has consulted with other Federal and State resource agencies, affected Tribes, and Grant PUD in the development of this RPA. The actions under this RPA are largely an outcome of those consultations.

Juvenile Passage, Wanapum Development

***Action 4*:** Advanced Turbines. As a second component of its DPAAP described above, Grant PUD shall, within 90 days of the issuance of this Opinion, file an application with FERC for an amendment to its license to replace the 10 turbines at its Wanapum Development with 10 new advanced turbines, as developed by the Department of Energy s Advanced Hydro Turbine Program. Subject to the approval of the application by FERC, Grant PUD shall first install a

single advanced turbine unit beginning in 2004 and evaluate its ability to meet criteria developed in consultation by the PRCC and approved by NOAA Fisheries. Grant PUD shall, prior to installation, develop an appropriate scientific protocol for evaluating the physical and biological performance of this advanced turbine in consultation with the PRCC and approved by NOAA Fisheries. Grant PUD shall implement such protocols in 2005 and coordinate the evaluation of the performance of the test unit with the PRCC. If the results demonstrate that the advanced turbine unit will achieve juvenile passage survivals that are equivalent to or better than the survivals through the existing turbine units, and is otherwise achieving applicable operating criteria, Grant PUD shall develop a schedule for implementation of the remaining 9 units and, subject to the approval of NOAA Fisheries and in consultation with the PRCC, shall proceed to install the remaining units accordingly.

The Wanapum turbines have reached the end of their useful life and need replacement. Grant PUD has been investigating turbine runners that are designed to improve juvenile salmon survival through turbine routes and to improve water quality by reducing the amount of water that must be spilled. Grant PUD is proposing to install one new runner beginning in 2004 for testing (S. Brown, Grant PUD, pers. comm. to S. Carlon, NOAA Fisheries, Sept. 13, 2002). Biological testing of the new runner will determine if all Wanapum turbines should be replaced with the new runner design. If testing of the new unit reveals that juvenile survivals will be equivalent to or better than survivals associated with the existing units, and the unit is otherwise meeting applicable operating criteria, NOAA Fisheries expects that Grant PUD will proceed to install the remaining units according to an approved schedule. This schedule of installation may extend beyond the period of the existing license and into annual licenses, or into a new license that may be issued for the Project. NOAA Fisheries expects that the annual licenses or a new license shall, in this circumstance, authorize the continued installations consistent with the approved schedule so as to capture the biological and hydro generation benefits as promptly as possible.

An in water construction plan shall be developed by Grant PUD and shall be subject to approval by NOAA Fisheries. NOAA Fisheries expects that some take may occur during the turbine shutdown and dewatering phase of the installation process (Section 12). Once the unit is dewatered, all construction activities of the new turbine unit will be isolated from waters containing listed species. Operation of the new turbine runners is expected to benefit listed species by reducing the potential for strike injury and mortality and by improving water quality (e.g., reduce TDG).

***Action 9*:** Turbine Operations. While construction takes place on the downstream passage alternatives, FERC shall require Grant PUD to promptly reassess operation of the existing turbines at Wanapum Dam to optimize juvenile survival through the turbines. Grant PUD shall coordinate study proposals with NOAA Fisheries and the PRCC. Any subsequent changes to turbine operations to improve survival will require approval from NOAA Fisheries and consultation with the PRCC.

Average juvenile survival through the Wanapum turbines is comparable to survival through FCRPS turbines. Even so, the combined project survival is less than what is needed to achieve applicable performance standards for the Project. Further refinement of turbine operations should optimize turbine passage survival and contribute to increases in overall project survival. Increases in overall project survival could be realized in the short term with potential operational changes implemented beginning in 2004.

REASONABLE AND PRUDENT MEASURES

Reasonable and prudent measures (RPM) and implementing terms and conditions are non-discretionary measures to minimize take, that are not already part of the description of the proposed action. They must be implemented as binding conditions for the exemption in Section 7(a)(2) to apply. FERC has the continuing duty to regulate the activities covered in this incidental take statement. If FERC fails to require Grant PUD to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(a)(2) may lapse. Similarly, if Grant PUD fails to implement the actions set forth in this statement, protective coverage may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these RPMs, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with all relevant RPMs will require further consultation.

NOAA Fisheries believes that the following RPMs are necessary and appropriate to minimize take of listed fish resulting from implementation of the action.

1. Measures described in Section 9, the RPA actions numbered 1 through 25, are hereby incorporated by reference as RPMs imposed on the license for the Priest Rapids Project within this incidental take statement.

2. To minimize the amount and extent of incidental take during the shutdown phase of turbine unit 8, FERC shall ensure that measures are implemented to salvage any listed species that are entrained in the gatewells and draft tube of unit 8.

3. To minimize the amount and extent of incidental take from construction activities associated with the turbine replacement (RPA Action 4), measures shall be taken to isolate all toxic materials from the river.

TERMS AND CONDITIONS

To be exempt from the prohibitions of Section 9 of the ESA, FERC must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

1. RPA Actions 1 through 25

    a. NOAA Fisheries has no further terms and conditions with respect to implementation of these RPA actions, except for action 4, which is addressed below.

2. Shutdown of Turbine Unit 8

    a. Prior to dewatering the unit, FERC shall require that the emergency wheel gate gatewells be dipnetted twice per slot using best management practices for gatewell dipping and transportation to avoid or minimize stress on listed fish.

    b. FERC shall require that Grant PUD install the downstream bulkhead as soon as reasonably practicable after installation of the upstream bulkhead to reduce the likelihood that listed species in the tailrace enter the draft tube and become entrapped after the installation of the downstream bulkhead.

    c. If the downstream bulkhead cannot be installed within 24 hours of the upstream bulkhead, FERC shall require Grant PUD to inspect the draft tube for the presence of listed fish and without delay remove and transport them for prompt reentry into the river using best management practices for dipnetting and transportation to minimize stress on listed species.

    d. FERC shall require that Grant PUD record and report the number and species, if any, of fish entrained during the shutdown phase.

3. Toxic Materials

    a. FERC shall require that Grant PUD implement best management practices to isolate and remove any toxic materials (oil, grease, concrete, waste water, etc.) occurring within the construction area (between the upstream and downstream gates) and ensure that these materials do not enter the river.

APPENDIX C

Environmental Assessment

Priest Rapids Hydroelectric Project
Project No. 2114-117

ENVIRONMENTAL ASSESSMENT

PRIEST RAPIDS HYDROELECTRIC PROJECT

(Project No. 2114-117)

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Administration and Compliance
888 First Street, N.E.
Washington, D.C. 20426

July 2004

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ACRONYMS

Advisory Council	Advisory Council on Historic Preservation
ATU	advanced turbine unit
BO	biological opinion
Commission	Federal Energy Regulatory Commission
cfs	cubic feet per second
CZMA	Coastal Zone Management Act
EA	environmental assessment
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FPA	Federal Power Act
kcfs	thousand cubic feet per second
MW	megawatts
MWh	megawatt hour
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act of 1969
NERC	North American Electric Reliability Council
NHPA	National Historic Preservation Act of 1966
NOAA Fisheries	National Marine Fisheries Service
NWPP	Northwest Power Pool
OAHP	Washington State Office of Archaeology and Historic Preservation
SHPO	State Historic Preservation Officer
TDG	total dissolved gas
WDOE	Washington Department of Ecology
WECC	Western Electric Coordinating Council
WQC	water quality certification

EXECUTIVE SUMMARY

On October 2, 2003, and supplemented on April 5 and May 28, 2004, Grant County Public Utility District (Grant, or licensee) filed an application for a non-capacity-related amendment of license to replace the existing 10 turbines at the Wanapum development of the Priest Rapids Project (FERC No. 2114) with new advanced turbine units (ATUs) designed under the U.S. Department of Energy's Advanced Hydroturbine Program. The ATUs would replace existing aging equipment, increase efficiency, improve power output, and include design features that should improve survival of fish passing through the units. The installed capacity of the Wanapum development would increase from 900 MW to 1,125 MW. The licensee proposes to install one ATU in 2004, followed by a biological study to determine the new turbine's effectiveness in reducing chinook salmon smolt mortality during downstream passage. Upon favorable results from the study (equal or greater survival than with the existing turbines), the licensee would proceed with the replacement of the remaining 9 turbines over an 8-year period.

All proposed replacement work would be conducted "in the dry" within the existing structure of the powerhouse, with the upstream and downstream bulkhead gates installed to isolate the construction area from the river. Any rubble resulting from construction would be placed in containers and disposed of off-site. Slurry would be diverted to settling ponds, where solids would be allowed to settle out and then be removed and disposed of off-site. After further filtering and settling, the remaining water would be diverted to the station sumps for discharge to the river. Grant would also follow an existing Spill Prevention Control and Counter Measure Plan to address any potential spills associated with oils, waste, and other debris resulting from construction. The proposed chinook salmon smolt survival testing between the new ATU and an existing unit, to be conducted in 2005, would use balloon-tag mark-recapture techniques.

In this environmental assessment (EA), we assess the effects of the proposed action, two action alternatives for replacing the existing units, and no action. One replacement alternative is in-kind replacement of the existing turbines with 1950's technology equipment, similar to the existing turbines. This would repair the existing worn units, but there still could be operational problems and inefficiencies associated with a 50-year-old design, and there would be no improvements associated with the ATU. A second replacement alternative would be a conventional turbine upgrade, to improve efficiency and hydraulics, but with no specific "fish-friendly" features. This would "fix" most of the structural and hydraulic problems with the existing units, but might not provide any benefits associated with improved fish passage survival. Under no action, Grant would continue to operate the existing units and be required to continually repair and maintain these units as best as possible, but might be required to shut down some units if they cannot be repaired. This could result in the loss of generating capacity, and none of the benefits of replacing the existing units with ATUs would occur. Grant, however, states that this alternative is not feasible. Most of the agency and public

comments filed in response to the public notice of the amendment application support the proposed action.

The proposed action would result in the greatest power benefits to the project by replacing the existing aging and inefficient generating units, and increasing annual power generation by 132,143 MWh. This alternative would have potential benefits to water quality by increasing the hydraulic capacity of the powerhouse by about 5.6 percent and reducing uncontrolled spillage, and in turn total dissolved gas (TDG) levels downstream of the dam. Survival of fish passing through the units would likely be improved, which would benefit the anadromous fish populations of the mid-Columbia River.

In-kind replacement of the existing units would replace the existing aging and inefficient units and would increase annual generation at the project by 11,515 MWh. This alternative would also forego further efficiency improvements offered by newer turbine designs, would not result in any increase in hydraulic capacity and decrease in TDG levels, and would not improve fish passage survival at the project.

Conventional turbine upgrade would replace the existing aging and inefficient units, would improve unit efficiency, and would increase annual generation at the project by 87,170 MWh. This alternative would not result in any increase in hydraulic capacity and decrease in TDG levels, and would not improve fish passage survival at the project.

No action would result in the continued operation and high maintenance requirements of the existing units, no improvement in unit efficiency or increase in annual generation, and no improvements in TDG levels or fish survival at the project.

Staff recommends approval of the proposed action to replace the existing units at Wanapum dam with ATUs that would increase unit efficiency and annual generation, and likely result in improvements to water quality (TDG levels) below the project and fish passage survival through the units. The proposed action would be the highest cost alternative, based on our stand-alone economic analysis of the proposed amendment, but would also have the greatest tangible benefits of replacing aging, inefficient, and unreliable equipment, along with potential long-term environmental benefits associated with improved water quality and higher fish survival through the project.

On the basis of the record and this draft EA, staff concludes that replacement of the existing units at Wanapum dam with ATUs would not constitute a major federal action significantly affecting the quality of the human environment. For this reason, and pursuant to Commission regulations, no EIS is required for the proposed action.

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Administration and Compliance
Washington, D.C.

PRIEST RAPIDS HYDROELECTRIC PROJECT
FERC NO. 2114 -117 — WASHINGTON

I. APPLICATION

On October 2, 2003, Grant County Public Utility District (Grant, or licensee) filed an application for a non-capacity-related amendment of license[6] to replace the existing 10 turbines at the Wanapum development of the Priest Rapids Project (FERC No. 2114), with new advanced turbine units (ATUs). The Priest Rapids Project is located on the Columbia River in Chelan, Douglas, Kittitas, Grant, Yakima and Benton Counties, Washington (Figure 1).

Initially, the licensee proposed to install one ATU followed by a biological study to determine the new turbine's effectiveness in reducing juvenile salmonid mortality during downstream passage. Upon favorable results from the study (equal or greater survival than with the existing turbines), the licensee would proceed with the replacement of the remaining nine turbines.

On April 5, 2004, the licensee modified their original amendment application by requesting that only one turbine be installed while the development of a final Biological Opinion (BO), concerning (in part) the installation, testing and operation of all ten units, proceeded. On April 30, 2004, the Commission issued an Interim Order Authorizing Installation of Advanced Turbine.[7] That order authorized the installation of one unit, but stated that the unit could not be tested or operated until the biological opinion and the final order amending the license were issued.

On May 6, 2004 the final BO for the Priest Rapids Project was filed with the Commission and on May 28, 2004, the licensee requested that the Commission proceed with its review of their initial amendment application and issue a final order consistent with ordering paragraph (A) of the April 30, 2004 order. For the purposes of this Environmental Assessment, we will be referring to the licensee's original October 2, 2003 filing as it relates to the replacement, testing, and operation of 10 turbines at the Wanapum development.

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[6] Pursuant to 18 CFR 4.201(b), this proposed action would qualify as a non-capacity-related amendment, because the total hydraulic capacity of the project would increase less than 15 percent.

[7] 107 FERC ¶ 62,088 (2004).

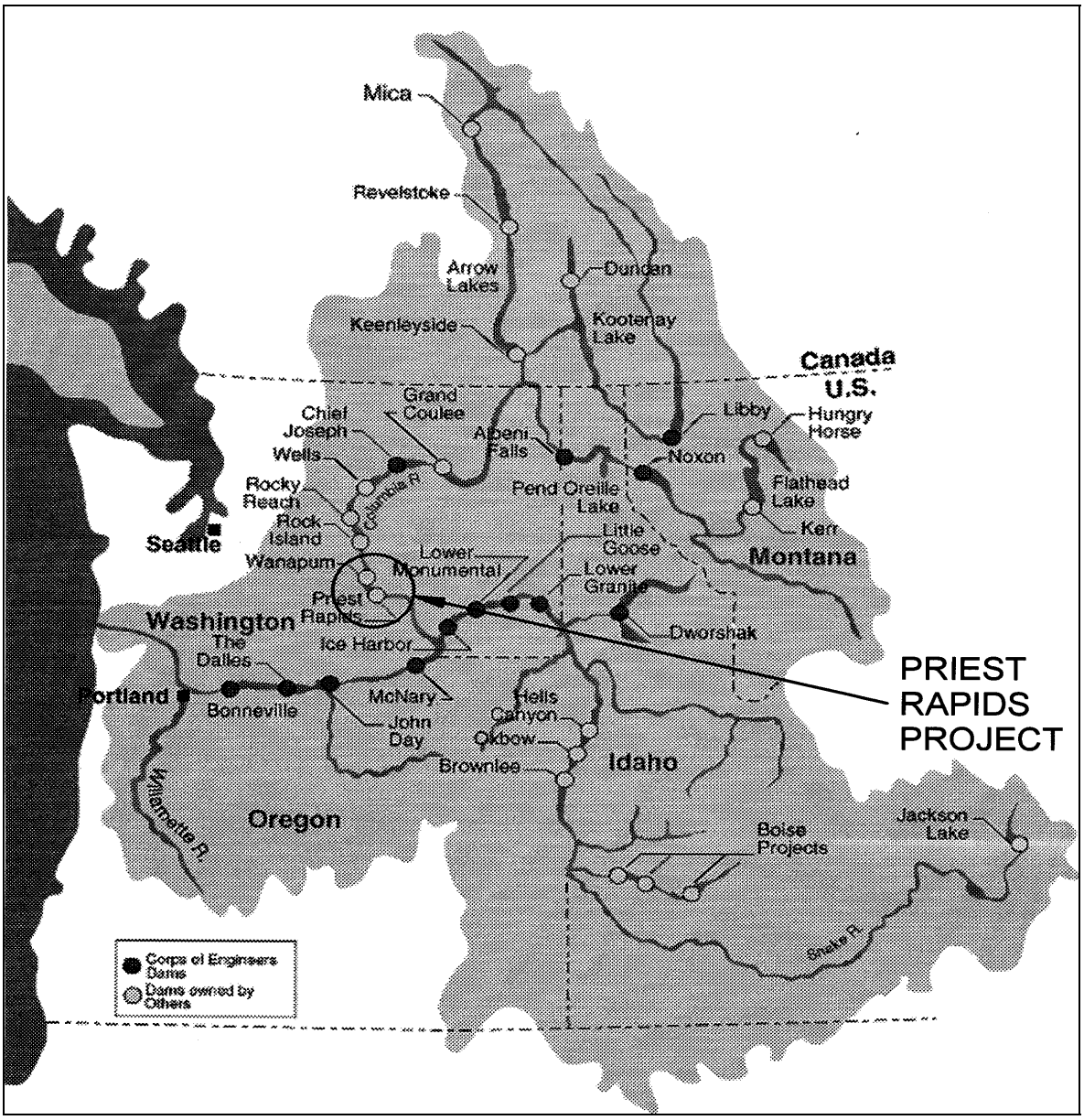

Figure 1. Location of the Priest Rapids Project within the Columbia River Basin. (Source: U.S. Army Corps of Engineers website; Priest Rapids labeling added by FERC Staff)

II. BACKGROUND

A. PURPOSE OF ACTION

The Priest Rapids Project consists of the 955-megawatt (MW) Priest Rapids development and the 1,038-MW Wanapum development. The developments began

commercial operations in 1961 (Priest Rapids) and 1964 (Wanapum). The Wanapum turbines, which are now more than 40 years old, have experienced continued structural and hydraulic problems, indicating that the units are reaching the end of their useful machine life, and must be replaced. Grant is proposing to replace these turbines with new ATUs designed under the U.S. Department of Energy's Advanced Hydroturbine Program. The ATUs would increase efficiency, improve power output, and include design features that should improve survival of fish passing through the units. Successful fish passage through the project is an important consideration on this reach of the Columbia River because of the presence of endangered species of Pacific salmon and steelhead trout. These anadromous species must successfully pass downstream through this and other projects to maintain their significant populations.

Grant has concurrently filed an application for a new 50-year license for the project; the existing license expires on October 31, 2005. However, Grant is proposing the unit replacement as an amendment of license separate from the relicensing so that the needed unit replacement, and associated benefits, can begin in 2004, rather than waiting until potential issuance of a new license at some time after 2005.

B. NEED FOR POWER

The Priest Rapids and Wanapum developments of the Priest Rapids Project are the only generating resources that are owned and operated by Grant. The project currently produces a total of approximately 8,609,000 megawatt hours (MWh) of firm and non-firm power to the region. Under current power purchase agreements, Grant is entitled to 36.5 percent (approximately 3,142,000 MWh) of the output of the project. The current contract for the Priest Rapids development's output is due to expire in 2005, and the contract for the Wanapum development's power will expire in 2009. At times, Grant's entitlement is less than its load requirements, and it is forced to purchase the necessary power to make up the shortfall. Grant projects that its total load requirements will be approximately 3,300,000 MWh by 2005, which is a 6 percent increase from 2001. Grant is currently negotiating new power purchase agreements, which, coupled with the proposed turbine upgrades at the Wanapum development, should ensure that Grant will be able to meet its load obligations and still be able to provide low-cost surplus power to other utilities in the region.

The new power purchase agreements will increase Grant's entitlements to the output of the project from 36.5 percent to a maximum of 70 percent. Also, Grant's proposed turbine upgrades at Wanapum are expected to increase the output of the project to approximately 9,040,000 MWh, representing a 5 percent increase in average annual output.

From a regional perspective, we looked at the regional need for power as reported by the North American Electric Reliability Council (NERC) for its Western Electric Coordinating Council (WECC) Region. The project is located in the Northwest Power

Pool (NWPP) area of the WECC region. The NWPP area includes all or major portions of the states of Washington, Oregon, Idaho, Wyoming, Montana, Nevada and Utah, as well as a small portion of northern California and the Canadian provinces of British Columbia and Alberta. The NWPP area has a significant winter peak demand and depends heavily on hydroelectric generation (62 percent of installed capacity). For the period from 2003 through 2012, WECC expects winter peak demand and annual energy requirements in the NWPP area to grow at annual compound rates of 1.6 and 1.7 percent, respectively. With a significant percentage of hydroelectric generation in the region, it is expected that the ability to meet winter peak demand is adequate for the next ten years.

The ability to meet sustained seasonal requirements over the 10-year period depends on planned new generation additions (NERC, 2003). NERC's estimate of planned additions over the next ten years is significantly lower than estimated in 2002, down from an estimate of 81,055 MW to 32,323 MW, although approximately 8,000 MW of the 81,055 MW planned went into operation in 2002. The reduction in planned additions was primarily due to the deteriorated financial condition of several major merchant plant developers, and that more capacity was planned than was needed. Assuming the new capacity is constructed as planned, resource capacity margins for the winter-peaking area range between 23.4 and 29.6 percent of firm peak demand for the next ten years. We conclude that the region has a need for power over the near term and that the Priest Rapids Project, which supplies a part of the current regional electricity demand, could continue to help meet part of the regional need for power.

If approved, the power from the proposed increase in turbine capacity at the Wanapum development of the Priest Rapids Project would help to meet Grant's needs, as well as meeting part of the local and regional need for power. The project provides low-cost energy that displaces non-renewable, fossil-fired generation and contributes to a diversified generation mix. Displacing the operation of fossil-fueled facilities avoids some power plant emissions and creates an environmental benefit. The additional output resulting from the upgraded Wanapum turbines, if produced by fossil-fueled generation, would result in an increase in greenhouse gases of about 66,780 metric tons of carbon per year.

III. PROPOSED ACTION AND ALTERNATIVES

A. PROJECT LOCATION AND DESCRIPTION

The Wanapum development is located at river mile 415, about 18 miles upstream of the Priest Rapids development, and 38 miles downstream of the Rock Island Project (FERC No. 943). Wanapum dam has a total length of 8,637 feet, consisting of earth fill embankments, a concrete powerhouse containing 10 units with a generating capacity of 1,038 MW and hydraulic capacity of 178,000 cubic feet per second (cfs) at a head of 80 feet, and a spillway section containing 12 Tainter gates. There is also a "Future Units" section between the powerhouse and spillway, which has space for six additional

generating units. The 10 existing units are vertical-shaft, adjustable, five-blade, Kaplan turbines.

B. PROPOSED ACTION

Grant proposes to replace all 10 turbines at Wanapum with ATUs, over about an 8-year period, as follows:

- Install one ATU (Unit 8) between May 2004 and January 2005;
- Perform salmon smolt survival evaluation on the ATU and an existing turbine in spring 2005;
- Review data and prepare a report for filing with the Federal Energy Regulatory Commission (Commission), with results of survival testing by July 2005;
- Make decision on proceeding with replacement of additional units by December 2005; and
- If survival testing meets the desired criteria, proceed with replacement of the remaining nine units beginning in December 2005, with completion by August 2012.

The new Kaplan ATUs would have the following design features:

- Larger runner diameter (305 inches versus 285 inches for the existing units);
- Higher output rating (112.5 MW vs. 90.0 MW) and more wicket gates (32 vs. 20);
- "Fish-friendly" features, including reshaped stay vanes, new smaller wicket gates that are in line with the stay vanes (to eliminate discharge ring overhang), a spherical runner and discharge ring to eliminate gaps at the hub and discharge ring, and reshaped draft tube to improve hydraulics and reduce re-circulation and turbulence.

All proposed replacement work would be conducted "in the dry" within the existing structure of the powerhouse, with the upstream and downstream bulkhead gates installed to isolate the construction area from the river. Any rubble resulting from construction would be placed in containers and disposed off-site. Slurry would be diverted to settling ponds, where solids would be allowed to settle out and then be removed and disposed of off-site. After further filtering and settling, the remaining water would be diverted to the station sumps for discharge to the river. Grant would also follow an existing Spill Prevention Control and Counter Measure Plan, to address any potential spills associated with oils, waste, and other debris resulting from construction.

The proposed chinook salmon smolt survival testing between the new ATU and an existing unit would be conducted using balloon-tag mark-recapture techniques. This

would involve release of balloon-tagged and sensor fish (radio-tagged only) into three gate slots, at two depths, and at four flow levels, upstream of the turbine. Control fish would be released downstream of the unit at the same four flow levels. A total of 4,480 balloon-tagged and 500 sensor fish would be released into both the ATU and existing unit. This design would provide 24 individual survival estimates by depth and flow for each turbine. For comparisons between the two units, though, Grant is proposing to use pooled, average smolt survival for each unit, or if that is not possible, a summary of survival by each tested flow. Additional survival evaluations would be made using other river reach-wide techniques still to be developed in consultation with the fishery agencies. These other techniques could include PIT-tagging, radiotelemetry, and acoustic tagging.

The decision criteria for proceeding with the replacement of the remaining nine units would be based on whether the ATU has equal or better survival than the existing unit, using a statistical analysis of the data collected by the balloon-tagging study. If so, then Grant would proceed with replacement of the remaining 9 units over the next 8 years. If survival in the ATU is less than the existing unit, then Grant would consult with the Joint Fishery Parties to determine the likely source of the lower survival, and whether any additional studies or turbine modifications are possible before proceeding with installation of additional ATUs.

C. ACTION ALTERNATIVES

Grant indicates that because of the deteriorating condition of the existing units, replacement is the only feasible alternative. Two options for replacement (in addition to the proposed action), however, are available. One is in-kind replacement of the existing turbines with 1950's technology equipment, similar to the existing turbines. This would repair the existing worn units, but there still could be operational problems and inefficiencies associated with a 50-year-old design, and there would be no improvements associated with the ATU.

A second replacement alternative would be a conventional turbine upgrade, to improve efficiency and hydraulics, but with no specific "fish-friendly" features. This would "fix" most of the structural and hydraulic problems with the existing units, but may not provide any benefits associated with improved fish passage survival.

D. NO-ACTION ALTERNATIVE

If no action is taken to replace the existing units, Grant would be required to continually repair and maintain the existing units as best as possible, but may be required to shut down some units if they cannot be repaired. This could result in the loss of generating capacity, and none of the benefits of replacing the existing units with ATUs would occur. Grant, however, states that this alternative is not feasible.

IV. CONSULTATION AND COMPLIANCE

A. CONSULTATION

1. Comments filed

On November 6, 2003, a Public Notice of the license amendment application was issued. The period for comments, protests, and motions to intervene closed on December 5, 2003. The following entities filed comments in response to the notice:

Commenting Entities	Date of Letter
Pat Kelleher	December 3, 2003
U.S. Department of the Interior	December 5, 2003

Pat Kelleher requested improvements to two reservoir boat ramps and construction of a new boat ramp to access the Priest Rapids development tailrace, and funding for a Kittitas County Sheriff Officer, a rescue boat, and boat storage on Wanapum Reservoir. This comment, although filed in response to the notice of the amendment, appears to be more associated with the ongoing relicensing proceeding. The U.S. Department of the Interior stated that they had no comments on the proposed amendment.

2. Interventions

The following entities filed motions to intervene in response to the public notice:

Intervenor	Date of Filing
Washington Department of Ecology	December 4, 2003
Washington Department of Fish & Wildlife	December 4, 2003
National Marine Fisheries Service	December 5, 2003
Columbia River Inter-Tribal Fish Commission	December 5, 2003

The Washington Department of Ecology (WDOE) and Washington Department of Fish & Wildlife did not express a position on the proposed amendment. The National Marine Fisheries Service (NOAA Fisheries) expressed general support for the amendment. The Columbia River Inter-Tribal Fish Commission also expressed general support for the proposed amendment, but also noted concerns about the potential effects on anadromous species, indicating that they may not support full replacement of all the turbines if the follow-up studies indicate that the new ATU adversely affects anadromous species.

3. Scoping

Because of the general support of the proposed license amendment by parties consulted by Grant prior to filing, and the limited comments filed in response to the public notice, no additional scoping, specifically for this proposed amendment, has been conducted by Commission staff.

B. COMPLIANCE

1. Section 18 Fishway Prescriptions

Section 18 of the Federal Power Act (FPA) states that the Commission will require the construction, maintenance, and operation by a licensee of such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate. Neither the Secretary of the Interior nor the Secretary of Commerce prescribed such fishways. The Wanapum development, however, already has extensive fish passage facilities, and installation of the ATUs should improve fish passage at the site by improving the survival of fish passing downstream through the turbines.

2. Water Quality Certification

Under Section 401(a)(1) of the Clean Water Act, an applicant for a federal license or permit to conduct an activity that may result in a discharge into the navigable waters must provide the licensing or permitting agency with water quality certification (WQC) from the applicable state. The federal agency may not authorize the activity unless certification has been obtained, or the state has waived certification through failure to act on the request for certification within 1 year after receipt of that request.

Grant applied for WQC by letter to the WDOE dated October 1, 2003. By letter dated March 12, 2004, the WDOE stated that, subject to the conditions provided in their letter, there is reasonable assurance that the licensee's proposed amendment will comply with state and federal water quality laws. The WDOE letter included 11 general conditions plus four conditions related to total dissolved gas, six conditions regarding construction activities, and six conditions concerning spill prevention and control.

3. Coastal Zone Management Act

Section 307(c)(3) of the Coastal Zone Management Act (CZMA) requires that all federally licensed and permitted activities be consistent with approved state coastal zone management programs. If a project is located within a coastal zone boundary, or if a project affects a resource located in the boundaries of the designated coastal zone, the applicant must certify that the project is consistent with the state's coastal zone management program.

The State of Washington's coastal zone under the CZMA includes the 15 counties that border salt water, either the Pacific Ocean or Puget Sound, and includes the lower Columbia River as far upstream as Pillar Rock in Wahkiakum County, which is in the lower 20 to 25 miles of the Columbia River (WDOE, 2001). Because the Priest Rapids Project area is located more than 400 miles upstream, on a section of the river that is entirely freshwater, the CZMA does not apply to the project area.

4. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species.

The Wanapum development is located within the geographical ranges of both the Upper Columbia River steelhead evolutionarily significant unit (ESU) and spring-run chinook salmon ESU. Both species are listed as endangered. Critical habitat for steelhead was designated as all river reaches accessible to listed steelhead in the Columbia River tributaries upstream of the Yakima River and downstream of Chief Joseph dam, which places the Wanapum development within the Columbia River reach that includes the critical habitat tributaries. Listed steelhead must pass upstream and downstream through the project. Spring-run chinook critical habitat was designated as all river reaches accessible to listed chinook in Columbia River tributaries between Rock Island dam and Chief Joseph dam. This reach is upstream of the Wanapum development, but listed spring-run chinook must pass upstream and downstream through the project. With the installation of ATUs at Wanapum, the passage survival of listed steelhead and spring-run chinook should improve, and any adverse effect on the species should be reduced. Additional discussion of potential effects on these and other anadromous species is included in section V.C.2, *Fisheries and Aquatic Resources*.

On May 6, 2004, NOAA Fisheries filed with the Commision their final BO regarding the implementation of an Interim Protection Plan at the Priest Rapids Project. NOAA Fisheries determined that the proposed action would likely jeopardize the continued existence of Upper Columbia River spring-run chinook salmon and Upper Columbia River steelhead. As one component of the Interim Protection Plan, the BO discusses the replacement of 10 turbines at the Wanapum development with 10 new advanced turbines. NOAA Fisheries enclosed a reasonable and prudent alternative that contained a number of actions of which two actions pertained to the licensee's proposed 10 turbine replacement. In addition to the two actions, NOAA Fisheries identified three reasonable and prudent measures and three terms and conditions that, if implemented, the 10 turbine replacement proposal would not jeopardize the continued existence of the listed anadromous species.

Bull trout have also been listed as threatened for the Columbia River population segment. Because limited detailed information on the distribution of bull trout in the mid-Columbia River was available, Grant and the other mid-Columbia licensees conducted studies from 1999 to 2003 to determine the potential distribution and movement patterns of the species in this reach of the river. Only 1 bull trout was collected in Wanapum reservoir, and of the 79 bull trout radio-tagged upstream of Wanapum dam (at Rock Island dam and points upstream), only 9 were detected in Wanapum reservoir and 1 passed Wanapum dam (see section V.C.2, *Fisheries and*

Aquatic Resources). By letter dated March 18, 2004, the U.S. Department of the Interior, Fish and Wildlife Service stated that consultation under section 7 of the ESA is continuing while additional research and monitoring is conducted during 2004.

Because of the limited distribution of bull trout in the project area, the proposed amendment would likely have no effect on bull trout.

5. National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA) (16 U.S.C. 470 et seq.) (as amended) requires federal agencies to manage cultural resources under their jurisdiction and authorizes the Secretary of the Interior to maintain the National Register of Historic Places (National Register). Section 106 of the NHPA and its implementing regulation (36 CFR Part 800) require federal agencies to take into account the effect of any proposed undertaking on properties listed or eligible for listing in the National Register. If an agency official determines that an undertaking may have adverse effects on properties listed or eligible for listing in the National Register, the agency official must afford an opportunity for the Advisory Council on Historic Preservation (Advisory Council) to comment on the undertaking.

The law also provides for the appointment of State Historic Preservation Officers (SHPOs) to facilitate the implementation of federal cultural resource policy at the state level, and for the responsible federal agency (i.e., agency official) to consult with Native American tribes who attach religious or cultural importance to cultural resources under their jurisdiction.

By letter dated December 3, 2003, the SHPO concurred that the proposed amendment would not affect any historic properties, because the Wanapum development does not meet the 50-year age threshold for listing in the National Register. The SHPO, however, recommended that in 10 years the project should be evaluated for listing, and that any photographic documentation of the old turbines be forwarded to the Washington State Office of Archaeology and Historic Preservation (OAHP) for retention. The SHPO further stated that no further consultations with OAHP are required unless Native American tribal representatives express concerns about potential effects of this action on cultural resources.

V. ENVIRONMENTAL ANALYSIS

A. GENERAL DESCRIPTION OF THE LOCALE

The Wanapum development is located at river mile 415 of the mainstem Columbia River, on a section of the river in Washington commonly referred to as the "mid-Columbia." The mid-Columbia contains four mainstem hydroelectric projects licensed by the Commission, including: the Priest Rapids Project (which consists of the Wanapum and Priest Rapids dams), Rock Island Project (river mile 453), Rocky Reach

Project (river mile 474), and Wells Project (river mile 516). Immediately downstream of the Priest Rapids dam is the Hanford Reach, the last non-tidal, major free-flowing reach of the Columbia River in the United States. Upstream of the Wells Project is the U.S. Army Corps of Engineers' Chief Joseph dam, and above that is the U.S. Bureau of Reclamation's Grand Coulee dam.

The area surrounding the Wanapum development is semi-arid, being in the "rain shadow" of the Cascade Mountains to the west. The area generally receives less than 7 inches of rain per year, mostly occurring between November and April. The Wanapum reservoir is 38 miles long and has an area of 14,680 acres and useful storage capacity of 160,400 acre-feet. The character of the reservoir ranges from somewhat riverine in the upper reaches to more lacustrine closer to the dam. The reservoir shoreline is mostly undeveloped, but the reservoir does serve as a water supply for irrigation and other agricultural users, and for some residences. The Columbia River in the project reach supports both resident and anadromous species, with more than 40 species found in the reach. This reach of river supports anadromous runs of spring, summer, and fall chinook salmon, sockeye, coho salmon, steelhead trout, American shad, and Pacific lamprey. Most of the efforts to protect and enhance anadromous fish runs at the Wanapum development, however, have been directed at the salmon and steelhead.

Botanical and wildlife resources in the project area are typical of the "shrub-steppe" cover type of central Washington. Upland vegetation is dominated by arid-land shrubs and perennial bunchgrasses, although some riparian vegetation (trees and shrubs) and wetland areas are scattered throughout the area. Some agricultural fields and orchards also occur in the area. Many of the undeveloped areas are classified as priority wildlife habitats by the state of Washington. Sixty-one species of mammals, including 6 big-game species, 5 amphibian species, 52 species of waterbirds, 27 species of birds-of-prey, and more than 100 species of passerine and non-passerine birds have been documented in the area. The area is also important for waterfowl that nest in the area or pass through as migrants.

The project area contains significant cultural resources, primarily related to the past and present use of the area by Native Americans. The Priest Rapids development is located near the ancestral village of the Wanapum Tribe, and the applicant has provided a new village for the Wanapum at the base of Priest Rapids dam. The applicant has also cooperated with the Wanapum and other tribes in establishing the Heritage Center Museum at Wanapum dam, and has drafted a Historic Properties Management Plan in cooperation with the tribes and other state and federal stakeholders.

Recreational usage of the project area is significant, with the area offering a wide range of recreational opportunities, including boating, fishing, hiking, hunting, camping, picnicking, swimming, golfing, bicycling, observing wildlife, and sightseeing. The area commonly attracts visitors from Seattle and elsewhere in the state. As part of the project relicensing effort, the applicant has developed a Draft Recreation Resource Management

Plan in consultation with state and federal agencies and other stakeholders. The applicant has also developed a Draft Shoreline Management Plan to protect and manage existing and future land usage within the project area and protect the visual resources of the area.

B. SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act of 1969 (NEPA), a cumulative effect is the effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time to include hydropower and other land and water development activities.

We have determined that the proposed action could cumulatively affect the anadromous salmonid species that migrate through the project area. This could affect the three races of chinook salmon, sockeye, coho salmon, steelhead, American shad, and Pacific lamprey that spawn upstream of the Wanapum dam and must pass downstream to the Pacific Ocean to complete their life cycle. It is likely that this would be a positive cumulative effect on these species by improving the survival of outmigrants that pass through the turbines at Wanapum dam.

1. Geographic Scope

The geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of: (1) the proposed action's effect on the resources, and (2) the contributing effects from other hydropower and non-hydropower activities within the Columbia River Basin. For the anadromous species, this would be the mid-Columbia River and its tributaries from Wanapum dam to the upstream limit of anadromous fish migrations in the mainstem river and tributaries. Ultimately, however, any improvements in survival of these species would also affect the lower-Columbia River and Pacific Ocean fisheries.

2. Temporal Scope

The temporal scope of the analysis would be from 30 to 50 years into the future, or the expected machine life of the new turbines that would be installed.

C. PROPOSED ACTION AND ACTION ALTERNATIVES

All construction activities associated with the proposed action and any of the action alternatives would occur inside the existing powerhouse, isolated from the river. There would also be no changes in project operations after installation of the new units, other than a small increase in the volume of river flow passing through the powerhouse during periods of maximum generation. Thus, there would be no effects on geology and soils, terrestrial resources, cultural resources, recreational resources, and land

use/aesthetics. The only resources that could be affected by the proposed amendment would be water resources and fisheries/aquatic resources. The effects of the proposed action and the action alternatives on these resources are described below.

1. Water Resources

a. Affected Environment:

The 1,210-mile-long Columbia River originates in British Columbia, Canada, where it flows northward and then southward into the United States, accumulating flow from parts of Canada, Washington, Oregon, Idaho, and Wyoming. After its confluence with the Snake River, the Columbia turns westward, flowing along the Washington-Oregon border to its outlet at the Pacific Ocean. The annual average flow of the Columbia River downstream of the Priest Rapids Project is approximately 88,000 cfs (USGS, 2001). Flows at this location range from a minimum of 28,200 cfs to a maximum of over 400,000 cfs.

The flow regime of the Columbia River in the Priest Rapids Project area is controlled primarily by releases from upstream storage reservoirs. This regime limits peak seasonal flows, thereby reducing the potential for flood damage and providing a relatively stable seasonal hydrograph, enabling hydroelectric projects along the river to maximize generation. Average monthly and other flow statistics since construction of Priest Rapids dam (1960–2001) are presented in table 1.

Table 1. Summary statistics for monthly Columbia River flows (kcfs) measured at USGS Gage No. 12472800 from 1960 to 2001. (Source: USGS, 2001)

	January	**February**	**March**	**April**	**May**	**June**
Min.	55.1	72.7	58.2	57.9	61.8	78.8
Max.	168.4	195.0	201.8	189.1	271.7	461.4
Median	109.8	104.4	104.7	103.1	156.7	176.9
Average	107.7	111.5	109.6	117.0	163.3	206.5
	July	**August**	**September**	**October**	**November**	**December**
Min.	56.7	66.7	60.1	61.6	56.1	52.6
Max.	294.3	191.0	126.7	118.3	121.2	163.8
Median	146.3	107.4	75.6	79.9	88.1	98.6
Average	157.3	111.4	80.9	80.3	88.3	101.1

Water quality standards for the mid-Columbia River, including the Wanapum development, are set by the WDOE. These standards provide a special condition for total dissolved gas (TDG) (the only parameter potentially affected by the proposed action) in the Columbia River to protect fish migrations through the hydroelectric dams. The standards allow up to 115 percent saturation as measured at the forebay of the next downstream dam and 120 percent saturation as measured in the tailrace of each dam,

when spilling is necessary to aid fish passage. These standards are based on the average of the 12 highest consecutive hourly readings in one day. In addition, the maximum allowable one-hour average TDG level is 125 percent [WAC 173-201A-060(4)(b)].

b. Environmental Effects:

Water Quantity

Proposed Action

Under the proposed action, Grant PUD would replace the 10 Kaplan turbines at Wanapum dam with ATUs designed under the Department of Energy's Advanced Hydroturbine Program. The proposed replacement would increase the Wanapum development hydraulic capacity from a maximum of 178,000 cfs (the typical operating flow is 165,000 cfs) to approximately 188,000 cfs at 75 feet of net head, at the cavitation limit and at a river flow of approximately 264,000 cfs. The proposed new turbines could accommodate an additional 10,000 cfs, thereby raising the threshold at which spilling would occur. This amounts to a 5.6 percent increase in the flow that could pass through the turbines at maximum capacity.

In-kind Replacement

Under the in-kind replacement alternative, the hydraulic capacity of the turbines at Wanapum dam would not change. Water would continue to pass through the turbines at the normal utilization of about 165,000 cfs and, if necessary, up to the rated maximum capacity of 178,000 cfs. Flows higher than this would be discharged through the spillway gates.

Conventional Turbine Upgrade

Installation of conventional turbines would improve the electrical efficiency but not the hydraulic capacity of the turbines. This alternative would not have any effect on the hydraulic capacity of the project or alter the existing flow regime.

Water Quality

Potential effects on water quality, associated with the replacement of the turbines, could occur during the construction phase of the project, and post construction due to the small increase in project hydraulic capacity. Because construction activities would be restricted to the inside the powerhouse, the work would not affect the physical properties of the river water (e.g., temperature, pH, hardness, nutrient concentrations, metals, suspended solids, turbidity, or conductivity) any differently than under current operations. Once in operation, the ATUs would have a greater hydraulic capacity, which would reduce the amount of water spilled during flood flows, potentially reducing the TDG levels associated with spillage.

Construction Related Effects

Grant proposes to perform all work associated with turbine replacement in the dry, and does not anticipate that spills associated with equipment oil, fuel and other debris, and waste material would enter the river. To further minimize the potential effects to the environment, Grant proposes to use vegetable-based lubricants for any equipment having a high probability of contact with water. Grant also proposes to follow the existing Spill Prevention Control and Counter Measure Plan to further protect against spills from oils, waste, and debris during the construction process. Additionally, Grant would collect any water accumulating in the construction area and pump it to settling ponds, where it would have to meet pH and turbidity standards before being returned to the river. In addition to the preventative steps, Grant staff and its contractors have experience in handling non-embedded turbine and generator parts from past work, such as rewinding of the generators and refurbishment of the turbine runners, without incident. All of the above measures would occur in each of the action alternatives regardless of the turbine technology chosen to replace the existing units.

Although best management practices will be incorporated to protect water quality, any inadvertent or accidental discharge of oil, fuel or other solid or liquid wastes during the construction activities that enter the river could have a short term, minor adverse affect on water quality.

Total Dissolved Gas

Proposed Action

Because of the existing hydraulic capacity of the Wanapum station, most of the river flow passes through the powerhouse turbines, except during high-flow periods and during voluntary spillage for downstream fish passage (see section V.C.2, *Fisheries and Aquatic Resources*). Grant cites studies that indicate turbine operation does not contribute significantly to TDG supersaturation, based on unchanged TDG pressure in the forebay and powerhouse tailrace measurements. Because the new ATUs would have a higher hydraulic capacity, the upgrade would reduce the proportion of total flow subject to spill-related supersaturation at flows above the hydraulic capacity of the turbines.

Spring flows typically exceed the hydraulic capacity of the Wanapum turbines, and uncontrolled spills would produce elevated TDG levels. Grant developed regression equations to explain the relationship between TDG levels and spill volumes in an effort to analyze spill data after the installation of flow deflectors in 2000. Grant voluntarily spills up to about 50 percent of the river flow during parts of the spring/summer outmigration period for salmon and steelhead smolts, and the flow deflectors were installed to reduce TDG levels during this spillage. Under the proposed action, the hydraulic capacity of Wanapum powerhouse would increase from the current normal utilization of 165,000 cfs (maximum capacity of 178,000 cfs) to a new maximum capacity of 188,000 cfs. Thus, the ATUs would reduce the spill volume by a maximum of 23,000 cfs. Using the

regression equation developed by Grant, we estimate that the ATUs would reduce TDG levels from spills at the 7Q10 flood flow[8] by a maximum of 2.7 percent (table 2). This analysis, however, also indicates that the state TDG criteria of 120 percent maximum saturation during the fish passage season can be met under current normal project operations. Based on the summary flow statistics in table 1, and the timing of the outmigrations (see section V.C.2, *Fisheries and Aquatic Resources*), river flows of the 7Q10 magnitude would occur at the same time as the outmigration period, when voluntary spills also occur. So, the precise effects on TDG levels of any reductions in spill associated with the higher hydraulic capacity of the ATUs may be masked by the voluntary spills for fish passage.

Table 2. Estimated tailrace TDG levels for Wanapum spills at the 7Q10 flood flow with existing turbines and ATUs. (Source: Staff, based on Juul, 2002)

Turbine	Regression Equation	R^2	7Q10 Flood Flow (kcfs)	Powerhouse Flow Utilization (kcfs)	Spill Volume (kcfs)	Estimated TDG %
10 Existing Units	% TDG = 0. 00007 (spill in kcfs)^2 + 0.106(spill in kcfs) + 108.39	0.73	264	165	99	119.6
10 Advanced Turbines	% TDG = 0.00007 (spill in kcfs)^2 + 0.106(spill in kcfs) + 108.39	0.73	264	188	76	116.9

In-kind Replacement

Replacement of the 10 Kaplan turbines at Wanapum dam with 1950's technology equipment would not alter the hydraulic capacity of the powerhouse, thus TDG levels would be unchanged from existing levels.

Turbine Upgrade

Replacement of the Wanapum turbines with conventional technology would not affect the flow regime and in turn would not have any effect on existing TDG levels.

[8] The flood flow that would occur for seven consecutive days, every 10 years.

c. Unavoidable Adverse Effects: None.

2. Fisheries and Aquatic Resources

a. Affected Environment:

The Columbia River in the project vicinity supports several runs of anadromous fish species, some of which contribute to important fisheries within the Columbia River and in the Pacific Ocean. Eight species/races migrate through the project area or use the project area during one or more of their life stages (table 3). The adult returns shown in table 3 are from the fish counts at the Priest Rapids development fish ladders. No counts are currently made at the Wanapum development fish ladders, because past counts indicated that the Wanapum and Priest Rapids counts were nearly identical. Recent adult returns (2003) for the salmonid species have generally been higher than the average long-term returns, except for sockeye. American shad returns were lower in 2003, but the shad is a non-native species that is not a target species of interest in the mid-Columbia. The higher returns in 2003 for most of the species are a continuation of the trend observed since the year 2000, with record or near-record counts for many of the species (chinook, coho, sockeye, and steelhead).

Table 3. Anadromous species that occur in the Priest Rapids Project reach of the Columbia River, with adult returns as recorded at the Priest Rapids development fish ladders. (Sources: GCPUD, 2003a; FPC, 2004)

Species/Run	Average Adult Return 1960–2002	Adult Return in 2003	Upstream Migration Timing	Downstream Migration Timing
Spring chinook[a]	12,923	18,136	mid-April to mid-June	April through June
Summer chinook	21,010	82,904	mid-June to mid-August	June through August
Fall chinook	15,255	48,546	mid-August through November	June through August
Steelhead[a]	11,053	17,652	July through November	April through June
Sockeye	60,785	36,551	mid-May to mid-August	April through June
Coho	1,878	4,803	September through November	April through June
American shad	17,704	7,067	June through August	No significant spawning above Priest Rapids
Pacific	1,195	4,339	May through October	April through August

Species/Run	Average Adult Return 1960–2002	Adult Return in 2003	Upstream Migration Timing	Downstream Migration Timing
lamprey				

[a] Upper Columbia River naturally spawned populations are federally listed as endangered.

Because of the significant anadromous fish runs that pass through the project, Grant has conducted many studies on fish passage through both project developments and has implemented measures to sustain and improve fish passage past the site. For example, as a result of a 2001 Memorandum of Agreement with state, federal, and tribal fishery agencies, Grant provides spillage during the spring/summer outmigration period for the juvenile salmonids. Under the Memorandum of Agreement, at Wanapum, Grant provides 43 percent spill during the spring outmigration period and 49 percent spill during the summer outmigration period (ending in August), although they may not always achieve those levels of spill because of water quality standards related to maximum TDG in the river. Voluntary spillage, however, is now the primary measure for providing downstream fish passage at the Wanapum development, aside from turbine passage.

Resident species that occur in the Priest Rapids Project reservoirs and tailraces were investigated in a 1999 fisheries survey, which documented the presence of 38 species of fish (GCPUD, 2001). The catch of resident species in Wanapum reservoir was dominated by peamouth chub, redside shiner, northern pikeminnow, and three-spine stickleback. Juvenile chinook salmon were also collected in larger numbers during the spring outmigration period. Game species such as resident trout, smallmouth and largemouth bass, and walleye were collected in relatively small numbers. Resident species of particular interest include the bull trout, which is federally listed as a threatened species, and the white sturgeon. Only one bull trout was collected at the upper end of the Wanapum reservoir, and the white sturgeon was collected in small numbers throughout the project area. Wanapum reservoir yielded the highest catches of white sturgeon, with 19 collected at 9 sites within the reservoir. Other species of concern collected in Wanapum reservoir included one westslope cutthroat trout (Washington State Priority Species and federal Species of Concern), and two leopard dace (Washington State Priority Species and Candidate Species for state listing) (GCPUD, 2001).

b. Environmental Effects:

Because replacement of the turbines would not result in any change in project operations, the only effects on fishery resources would be associated with any changes in survival of fish passing downstream through the units. The small increase in hydraulic capacity of the proposed ATUs, however, would potentially increase the entrainment of fish at some flow levels. Because federally listed species occur in the project area, and

could be affected by the proposed action, potential effects on these species will also be discussed.

Downstream Fish Passage

Proposed Action

The several anadromous species/races that occur in the project area (table 3) must migrate downstream through the Wanapum development (and other Columbia River hydro projects) as juveniles to reach the Pacific Ocean where they grow and mature, later returning to the Columbia River to complete their spawning and life cycles. All of the salmon species die after spawning, but the steelhead trout may survive spawning, and post-spawning adult steelhead will also attempt to pass downstream to return to the ocean. Most of the efforts to provide safe downstream passage, however, have been directed at the juvenile life stages of salmon and steelhead that are migrating to the ocean for the first time (as smolt).

Grant has conducted studies on the survival of smolt through the existing Wanapum units and has estimated overall dam passage survival. Turbine survival tests indicated a range in survival of 88.5 to 100 percent, depending on the depth and flow at which test fish were released. The average survival for all depths and flows was 94.2 percent (GCPUD, 2003a). Studies at Wanapum dam indicate that nearly 70 percent of the juvenile salmon pass the dam via the turbines, even with the voluntary spillage for fish passage described above. Overall dam passage survival at Wanapum has been estimated between a low of about 88 percent in 2001 to a high of 97 percent in 2003 (based on 2003 preliminary results) (GCPUD, 2003b). The target dam passage survival is 95 percent.

As described above in section III.B, the proposed ATUs to be installed at Wanapum would incorporate "fish-friendly" design features, which should improve the survival of fish passing through the turbines. The extent that the survival rate may improve cannot be predicted, which is the primary reason that Grant is proposing to test the survival of salmon smolt through the first ATU proposed for installation in 2004. Any improvement in turbine passage survival, however, would result in a beneficial effect on the anadromous fish runs, by improving the dam passage survival at a project that already meets (in some years) its dam passage survival goals. Improving the passage survival at Wanapum would in turn have a positive (but difficult to quantify) effect on future adult returns and any associated fisheries in the lower Columbia River or in the Pacific Ocean.

In-kind Replacement

In-kind replacement of the turbines would likely result in the same level of fish survival as currently occurs with the existing units. As noted above, the fish survival through the existing units already is relatively high, so in-kind replacement would likely

have no adverse effects on the existing anadromous fish runs, but would not result in any enhancement.

Turbine Upgrade

Turbine upgrade to a more modern design would improve the hydraulics and efficiency of the units, but not necessarily fish survival. There could be some increase in fish survival associated with improved hydraulics, although the design features of upgraded turbines typically do not target improved fish survival as an upgrade objective.

Increased Hydraulic Capacity

Proposed Action

As described above, the hydraulic capacity of the ATUs would be higher than the existing units, with the maximum hydraulic capacity (for all 10 units) increasing from 178,000 to 188,000 cfs (5.6 percent). With a higher hydraulic capacity, there is a possibility that more fish would pass through the turbines, instead of over the spillway, if the amount of spillage is reduced. Any increase in the percentage of fish that pass through the turbines, however, would likely be minor. Studies have indicated that even with voluntary spillage of up to 50 percent for fish passage, about 70 percent of the downstream-migrating smolt still pass through the powerhouse. If the hydraulic capacity of the powerhouse was to increase by only 5.6 percent, it seems unlikely that the percentage of smolt passing through the powerhouse would be significantly greater than what occurs under existing operations. Even if some increase in smolt passage occurred through the new turbines, this would likely be offset by the expected increase in fish survival through the units. The potential increase in fish survival is not known, but even a 1 percent increase, applied to all fish passing through the units, would likely exceed any potential increase in mortality associated with more fish passing through the units as a result of the higher hydraulic capacity.

In-kind Replacement

In-kind replacement of the existing turbines would not result in any measurable increase in hydraulic capacity or potential for increasing fish passage through the units.

Turbine Upgrade

Upgrade of the existing turbines would not result in any measurable increase in hydraulic capacity or potential for increasing fish passage through the units.

Federally Listed Species

Proposed Action

As described above, three federally listed species occur in the project: the endangered Upper Columbia River spring chinook and steelhead, and the threatened bull

trout. Both the spring chinook and steelhead pass upstream (as adults) and downstream (as smolt) through the Wanapum development, while the bull trout is a resident species occasionally found in the project reservoir. The upstream passage of both spring chinook and steelhead adults would not be affected by the installation of the new turbines and the small increase in hydraulic capacity of the powerhouse. If upstream migrating fish are able to detect the small increase in flow from the powerhouse, this would only act to attract more fish to the vicinity of the powerhouse, where they could more readily be attracted into the powerhouse upstream migrant facilities.

Downstream migrating smolt, however, could be affected by the installation of the new turbines, although this would likely be a beneficial effect related to increased survival. To assess the proportion of the smolt that passes through the project and that are listed species, we reviewed gatewell sampling data from Wanapum dam (Lukas, 1999). Gatewell sampling occurred from 1982 through 1996, initially as a monitoring tool, but later as a means to bypass at least some of the smolt around the turbines. Some smolt accumulate in the gatewell slots during their downstream migration, and sampling or "dipping" the gatewells removes these smolt before they "sound" and enter the turbines. Identification and counting of smolt occurred in most years, and provides an indication of the species composition and relative abundance of smolt passing downstream through the project.

Table 4 summarizes the gatewell sampling data, and indicates that listed species may comprise at least a portion of the smolt migration passing Wanapum dam. Age 1 chinook dominate the catch, comprising about 48 percent of the total average annual passage. Age 1 chinook are juvenile spring chinook salmon, which spend one year rearing in the river before migrating to the ocean. Age 0 chinook, which comprise about 22 percent of the catch, are juvenile summer and fall-run chinook. Sockeye are the next most common species (14 percent of the catch), followed by steelhead (8.4 percent) and coho (7.8 percent). The listed Upper Columbia River spring chinook migrate as age 1 smolt, so are included in the largest cohort of smolt that outmigrate through the project. This cohort, however, also includes spring chinook released from upstream hatcheries and other spring chinook that are not part of the Upper Columbia River ESU. The listed spring chinook only include naturally spawned, non-introduced chinook that spawn in the Columbia River tributaries upstream of Rock Island dam and downstream of Chief Joseph dam, excluding the Okanogan River (63 FR 11482). So, although the listed population is included within the largest segment of the smolt run at Wanapum, the precise proportion of the run that includes the listed population is not known.

Table 4. Average counts of downstream migrating smolts collected from gatewell dipping at Wanapum dam, 1982 to 1996. (Source: Lukas, 1999)

Season	Age 0 Chinook	Age 1 Chinook	Sockeye	Coho	Steelhead	Total
Spring	136	56,101	16,994	9,586	10,274	93,091

Summer	27,290	3,077	357	22	93	30,839
Total	27,426 (22.1%)	59,178 (47.8%)	17,351 (14.0%)	9,608 (7.8%)	10,367 (8.4%)	123,930

The steelhead smolt that pass Wanapum dam also include the listed population, other wild fish, and hatchery releases. As with chinook salmon, the listed population includes only naturally spawned steelhead that spawn in the Columbia River tributaries upstream of the Yakima River and downstream of Chief Joseph dam. The Wells Hatchery stock is also considered essential to the recovery of the Upper Columbia River steelhead (62 FR 43937). The proportion of the smolt run passing Wanapum that includes the listed steelhead population is not known, although the wild segment of the adult steelhead run is estimated at the upstream Rock Island dam. At Rock Island in 2003, a total adult steelhead run of 17,509 was counted at Rock Island (compared to 17,652 at Priest Rapids), and the wild segment was estimated to be 11,456 fish (65 percent) (FPC, 2004). Although the outmigrating steelhead smolt may not reflect the same percentage of wild versus hatchery fish as upstream migrating adults, nor is it likely that the listed population comprises the entire wild segment of the run, these data indicate that the listed population may be a substantial portion of the smolt run.

Although Grant would continue to provide spillage for downstream passage of smolt at Wanapum, a large portion of the smolt run would continue to pass downstream through the turbines, and a sizable segment of the fish passing through the turbines would likely be the listed spring chinook and steelhead. With installation of the ATUs, some mortality of smolt would continue, although the "fish-friendly" design of the ATUs should reduce mortality and improve the survival of the listed species. This would assist in the recovery efforts for the listed species, and we conclude that installation of the ATUs at the Wanapum development would not likely have an adverse effect on the listed Upper Columbia River spring chinook and steelhead.

Bull trout have a limited distribution within the Wanapum development area. The 1999 resident fisheries survey collected only one bull trout in the reservoir (GCPUD, 2001). From 2001 to 2003, GCPUD funded a radiotelemetry study of bull trout, where adult bull trout were collected at the Rock Island and Rocky Reach projects, fitted with radio transmitters, and released throughout the reach from below Rock Island dam to the Rocky Reach Project. Of the 79 fish radio tagged, only 9 were detected within Wanapum reservoir, and most stayed within about 6 miles of the Rock Island dam at the upper end of the Wanapum reservoir. Only one fish passed downstream through the Wanapum development, and also passed through the Priest Rapids development, indicating that few bull trout move through the projects (Stevenson et al., 2003). Since few bull trout occur within Wanapum reservoir, or migrate past the dam, installation of the ATUs would not likely have an adverse effect on the bull trout.

Other Project Alternatives

The other project alternatives of in-kind turbine replacement, turbine upgrade, or no action would all essentially result in no changes from existing conditions at the Wanapum development that could affect listed species. Existing passage conditions through the units would remain the same, although turbine upgrade would have the potential for some improvements in hydraulics in the units, which could benefit fish passage. Adoption of any of these alternatives, although they would not likely adversely affect any of the listed species, would forego the potential improvements in fish passage that would occur with the ATUs, and that could benefit the listed species.

c. Unavoidable Adverse Effects:

Installation of ATUs at Wanapum dam would improve the survival of fish passing downstream through the units, but some mortality, although likely low, would still occur.

d. Cumulative Effects:

Anadromous species that occur in the mid-Columbia River must pass several dams, both as juveniles and adults, to complete their life history requirements. The number of dams that must be passed depends on which section of the river or tributary in which the fish occur. Fish spawning and rearing upstream of the Wells Project must pass a total of nine mainstem dams as adults and juveniles. Any fish spawning and rearing in the reach between Wanapum and Rock Island dams would need to pass six dams.

GCPUD, 2003b states that passage survival at the Wanapum development has been estimated to be from 88 to 97 percent in recent years. NOAA Fisheries (2000) reported a wide range in Snake River project survivals, depending on river flow, percentage of spill at each dam, water temperature, and several other factors that may vary from year to year. Thus, it would be difficult to precisely predict the effects on overall survival of fish migrating from the Columbia River because of the improvement in survival through the proposed Wanapum ATUs. However, a potential range of effects on overall river survival can be estimated using a range of assumptions regarding fish survival at each of the dams on the Columbia River, and the potential improvement in survival through the ATUs. These estimates are presented in table 5.

Table 5. Estimated improvement in overall river survival for outmigrating smolts, associated with assumed improvements in passage survival at Wanapum dam due to installation of ATUs. (Source: Staff)

No. of dams	Per dam survival[a]	ATU survival improvement[b] (%)	Overall river survival
6	0.85	0	0.377
6	0.85	1	0.382
6	0.85	2	0.386
6	0.95	0	0.735

No. of dams	Per dam survival[a]	ATU survival improvement[b] (%)	Overall river survival
6	0.95	1	0.743
6	0.95	2	0.751
9	0.85	0	0.232
9	0.85	1	0.234
9	0.85	2	0.237
9	0.95	0	0.630
9	0.95	1	0.639
9	0.95	2	0.644

[a] Assumes equal survival at all dams, with the ATU survival improvement applied to only one dam. Range of dam survivals is based on survival objective for each dam (0.95), and a lower survival less than the objective (0.85).

[b] Assumes improvements of 1 and 2 percent, based on relatively high survival already observed with existing units (about 0.94), and the possibility that additional improvements would be small.

Data in table 5, with the assumptions noted, indicate that smolt passage survival improvements of 1 to 2 percent, associated with the ATUs, would improve overall river survival a maximum of 1.6 percent with the six-dam scenario and 1.4 percent with the nine-dam scenario (with 0.95 survival at each dam). At the lower per dam survival assumption (0.85), the maximum improvement would be from 0.5 to 0.9 percent. This potential range of improved river survival, although appearing to be small, would nonetheless be a positive cumulative effect for the anadromous salmonid populations of the mid-Columbia River, and could benefit lower Columbia River and ocean fisheries.

D. NO-ACTION ALTERNATIVE

Under the no-action alternative, the existing units would continue to be operated and maintained, and the hydraulic capacity of the Wanapum development would remain the same. The same level of spillage would occur and TDG levels in the tailwaters would be unchanged. Fish passage survival through the generating units would also remain the same, and although relatively high, there would be no potential for improvement in fish survival through the units and enhancement of the anadromous fish populations.

VI. CONCLUSIONS

A. PROPOSED ACTION AND ALTERNATIVES

1. Proposed Action

The proposed action would result in the greatest power benefits to the project by replacing the existing aging and inefficient generating units, and increasing annual power generation by 132,143 MWh. This alternative would also have potential benefits to water quality by reducing uncontrolled spillage and in turn TDG levels downstream of the dam.

Survival of fish passing through the units would likely be improved, which would benefit the anadromous fish populations of the mid-Columbia River.

2. In-kind Replacement of Existing Turbines

In-kind replacement of the existing units would replace the existing aging and inefficient units, and would increase annual generation at the project by 11,515 MWh. This alternative, however, would forego further efficiency improvements offered by newer turbine designs, would not result in any increase in hydraulic capacity and decrease in TDG levels, and would not improve fish passage survival at the project.

3. Conventional Turbine Upgrade

Conventional turbine upgrade would replace the existing aging and inefficient units, would improve unit efficiency, and would increase annual generation at the project by 87,170 MWh. This alternative, however, would not result in any increase in hydraulic capacity and decrease in TDG levels, and would not improve fish passage survival at the project.

4. No Action

No action would result in the continued operation and high maintenance requirements of the existing units, no improvement in unit efficiency or increase in annual generation, and no improvements in TDG levels or fish survival at the project.

B. COMPARATIVE ECONOMIC BENEFITS OF ALTERNATIVES

In this section, we analyze the project's use of the water resources of the Columbia River to generate power and estimate the economic benefits of the proposed turbine upgrades at the Wanapum development. Our economic analysis, however, only considers the cost of the turbine replacement alternatives by themselves; we do not evaluate the economics of the entire Wanapum development nor the Priest Rapids development. The overall economics of the Wanapum development will be evaluated in another NEPA document, as part of the ongoing relicensing of the Priest Rapids Project, which includes both the Wanapum and Priest Rapids developments.

Under its approach to evaluating the economics of hydroelectric projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶ 61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power, with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. This economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision on what is in the public interest with respect to the proposed license amendment.

Description of Alternatives

Grant has proposed to replace the 10 generating units at the Wanapum development with ATUs, thereby increasing the annual generation and horsepower rating of the Priest Rapids Project. Grant evaluated several alternatives before selecting the ATU scenario, including: 1) a no-action scenario; 2) rehabilitation and repair of existing turbines (in-kind replacement); 3) replacement with conventional turbines that would improve efficiency, increase capacity, and correct structural and hydraulic problems associated with the existing turbines; and 4) replacement with ATUs. The ATU alternative was contemplated to improve unit operations and output as well as to improve the probability of survival of fish that pass through the turbines.

Grant believes that the structural and hydraulic problems associated with the existing turbines would continue and the risk of a catastrophic failure is unacceptably high, thereby causing them to reject a no-action scenario. The no-action alternative would not increase annual generation or generating capacity, but would still have an associated cost due to the expectation of periodic non-routine maintenance and more frequent outages. Grant estimated the initial capital cost to be about $25,950,000.

The alternative to replace the existing turbines in-kind would involve the rehabilitation and repair of the existing turbines. This alternative is not really a replacement alternative, as the existing turbines would be retained, but represents a lower-cost alternative to a more costly turbine replacement. Grant rejected this alternative because it relied on the use of 1950's-era turbine design technologies with associated problems with cavitation and lower overall efficiencies. The alternative would provide minimal increases in annual generation but would not resolve other concerns, including fish survival during passage through the turbines. Grant estimates the in-kind replacement alternative would have an initial capital cost of $73,947,000 and would increase annual generation by about 11,515 MWh, but would not increase the horsepower rating of the turbines.[9]

The conventional turbine replacement alternative would involve replacement with conventional turbine technology and would improve operational efficiency, increase the horsepower rating of the turbines and correct structural and hydraulic problems associated with the existing turbines. Grant estimates the conventional replacement alternative would have an initial capital cost of $112,110,000 while increasing annual generation by about 87,170 MWh, and increasing the horsepower rating of the turbines by 30,000 horsepower.[10] This alternative would not be expected to increase fish survival rates.

[9] The increase in generation would result from more efficient use of the water, due to higher equipment reliability.

[10] Both horsepower and generation would increase because of higher-efficiency runners.

The proposed alternative would involve replacement of the existing turbines with new turbines of an advanced design, which would not only increase operational efficiencies and generating output, but should also increase the survival of fish that may pass through the turbines during normal operations. Grant estimates the ATU replacement alternative would have an initial capital cost of $143,800,000 while increasing annual generation by about 132,143 MWh, and increasing the horsepower rating of the turbines by 30,000 horsepower.

None of the alternatives would require modifications to the existing generators, nor would the units be generator-limited. However, if the ATUs are installed, Grant plans to evaluate the potential benefits of upgrading the generators following performance testing and biological evaluation of the new turbines.

Economic analysis

The No-Action alternative would produce no additional power beyond existing generation, but would have annual costs of approximately $1,800,000.[11] The net effect on the project would be a reduction in annual benefits of $1,800,000.

The In-kind Replacement alternative would result in an additional 11,515 MWh of annual generation with a value of approximately $391,510 at $34/MWh (GCPUD, 2003b). This alternative would have annual costs of $5,129,280. The net effect on the project would be a reduction in annual benefits of $4,737,770.

The Conventional Turbine Replacement alternative would result in an additional 87,170 MWh of annual generation with a value of approximately $2,963,780. This alternative would have annual costs of $7,776,440. The net effect on the project would be a reduction in annual benefits of $4,812,660.

The ATU Replacement alternative would result in an additional 132,143 MWh of annual generation with a value of approximately $4,492,860. This alternative would have annual costs of $9,974,590. The net effect on the project would be a reduction in annual benefits of $5,481,730.

C. STAFF RECOMMENDATIONS

Staff recommends approval of the proposed action to replace the existing units at Wanapum dam with ATUs, along with implementation of NOAA Fisheries' reasonable and prudent actions and WDOE's section 401 certification conditions. Approval of the proposed action would increase unit efficiency and annual generation, likely result in improvements to water quality (TDG levels) below the project, and improve fish passage survival through the units. Although the proposed action would be the highest cost

[11] Although Grant analyzed their estimated costs over a potential 50-year license period, we typically only evaluate costs over a period of 30 years. We also assume that the initial capital investment would be financed over 20 years. The annual costs include interest fees, depreciation, taxes, etc. based on the initial capital investment.

alternative, based on our stand-alone economic analysis of the proposed amendment,[12] it would also have the greatest tangible benefits of replacing aging, inefficient, and unreliable equipment, along with potential long-term environmental benefits associated with improved water quality and higher fish survival through the project.

VII. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with comprehensive plans for improving, developing, or conserving a waterway or waterways affected by a project. A total of 73 comprehensive plans that address various resources of the state are currently on the Commission's list for the state of Washington. We did not find any inconsistencies with plans applicable to the mid-Columbia River and the proposed action.

VIII. FINDING OF NO SIGNIFICANT IMPACT

On the basis of the record and this EA, staff concludes that replacement of the existing units at Wanapum dam with ATUs, along with implementation of the licensee's proposed environmental protection measures, would not constitute a major federal action significantly affecting the quality of the human environment. For this reason, and pursuant to Commission regulations, no Environmental Impact Statement is required for the proposed action.

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