CORPS OF ENGINEERS NORTH PACIFIC DIVISION

PORTLAND, OREGON

JUVENILE FISH PASSAGE PLAN

FOR 1989

FOR CORPS OF ENGINEERS PROJECTS

CENPD-EN-WM

April 1989

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1989 JUVENILE FISH PASSAGE PLAN

1. General. In developing the 1989 JFPP, the Corps has consulted with the fishery agencies and tribes, and has taken the Council's action to incorporate the spill terms of the Spill Agreement into their Fish and Wildlife Program into consideration to the fullest extent practicable. Spill will be provided at Lower Monumental, Ice Harbor, John Day and The Dalles in accordance with the modified amendment (Appendix 6) for both spring and summer migrations if such spill does not have non-power impacts, and BPA agrees to the power loss. Spill operations will begin when the first 10 percent of that migration have passed the dam and will cease when 90 percent of that migration has passed but no later than July 22, 1989 at Lower Monumental and Ice Harbor or later than August 22, 1989 at John Day and The Dalles. At Bonneville Dam the operation plan remains basically unchanged from the 1988 JFPP and details of the plan and research are shown in Section 5a.

The 1989 JFPP will guide the Corps' actions in regard to providing juvenile fish protection at the Corps' eight mainstem Columbia and Snake River projects. Other Corps documents and agreements related to fish passage at these projects are intended to be in accord with the JFPP.

2. Corps Project Operation and Maintenance. Appendix 3 contains detailed information on the criteria used for the operation and maintenance of fish passage facilities and project operation procedures for fish passage at the Corps projects on the lower Snake and lower Columbia Rivers. These criteria

have been developed through consultation with the fish and wildlife agencies and tribes. The Corps has attempted to resolve concerns expressed by the fishery agencies and tribes but some areas of disagreement still exist. If there are discrepancies in criteria between Appendix 3 and Section 5 of the JFPP, Section 5 of the JFPP will be implemented.

3. Fish Transportation Oversight Team's (FTOT) Annual Work Plan For 1989. Appendix 4 contains this document which describes the annual work plan for fish collection and transportation operations at Lower Granite, Little Goose, and McNary Dams for the 1989 season. The FTOT Plan was developed jointly with the fish and wildlife agencies and tribes. The Corps believes that the best available scientific information supports maximum transportation of all juvenile fish. The Corps cannot agree to be a signatory to anything less, but will not actively oppose in 1989 the transportation of juvenile fish in accordance with the appended FTOT annual work plan.

4. Fish Hatchery Release Schedule. This schedule, provided by the fish and wildlife agencies and tribes, is contained in Appendix 5. Hatchery releases should be coordinated to coincide, insofar as possible, with Water Budget operation and the natural juvenile fish migration.

5. Project Operation Criteria. The following paragraphs list, by project, the project specific operating criteria of the 1989 JFPP.

a. Bonneville Dam.

The first and second powerhouses at Bonneville both have structural powerhouse juvenile bypass systems. Presently juvenile guidance efficiency at the second powerhouse is not satisfactory. Therefore, the units will not be operated at the second powerhouse during the middle 80 percent spring and summer migration period unless units are needed to limit spill to 75,000 cfs during daylight hours (0600 to 2000 hours). Typically, when flows are above the capacity of the first powerhouse units, spill will occur. Units in the second powerhouse may be operated as necessary for fishery research. This restriction on the second powerhouse will not apply after August 15 and during periods when the units are being operated for research.

(1) Operation for Juvenile Passage.

- o Operate juvenile fish passage facilities from March 15 through November 15 in accordance with project operating criteria contained in Appendix 3.

- o No restriction on operation of screened units at the first powerhouse.

- o The second powerhouse will not be operated during the nighttime hours (2000 to 0600 hours) except as necessary for fishery research.

- o The second powerhouse will be operated during the daytime hours (0600 to 2000 hours) if required to limit spill to less than 75,000 cfs. Units 18, 11, and then 17 will be the first

units on and last units off. If additional units are needed the operating priority is 12, 16, 13, 14, 15.

(2) Research

- Research activities at the Bonneville second powerhouse will require daily operation of from two to four units for approximately six hours (1600 to 2200 hrs) during the spring and summer migration period. Summer survival research activities will require operation of four units for six to eight hours (all nighttime) during the four test periods, three nights per test period. See appendix 6 for more detailed outline of planned research.

(3) Operation for Adult Passage.

- Operate the project throughout the year in accordance with project operating criteria as specified in Appendix 3.

b. The Dalles Dam.

Approximately 3,600 to 4,000 cfs flow will be routed through the ice and trash sluiceway for at least 16 hours per day, from sunrise to sunset, during the juvenile passage season, April 1 through November 15.

(1) Operation for Juvenile Passage.

- o Operate juvenile fish passage facilities from April 1 through November 15 in accordance with project operation criteria contained in Appendix 3.
- o Spill may be requested by the Fish Passage Center (FPC) in accordance with spill criteria of Section III B2 through B13 of the spill amendment modified for nonpower use (Appendix 9).

  - o The Corps will implement the Fish Passage Center's spill request if all the following conditions are met:

    - BPA agrees to the power loss
    - the request is consistent with dates, hours, and percentage criteria in MOA
    - spill does not cause adverse non-power or safety impacts

(2) Operation for Adult Passage.

- o Operate the project throughout the year in accordance with project operating criteria as specified in Appendix 3.

c. John Day Dam.

Since April 1987 all 16 units have bypass facilities including screens.

(1) Operation for Juvenile Passage.

7.5

- Operate juvenile fish passage facilities from April 1 through October 31 in accordance with operating criteria in Appendix 3.

- Spill is not required for spring passage of juvenile fish as the passage facility provides juvenile survival greater than 94%.

- Spill may be requested by the Fish Passage Center (FPC) during the summer passage period in accordance with spill criteria of Section III, B2 through B13 of the spill amendment modified for nonpower uses (Appendix 9).

- The Corps will implement the spill request if all the following conditions are met:
  - BPA agrees to the power loss
  - the request is consistent with dates, hours, and percentage criteria in MOA
  - spill does not cause adverse nonpower or safety impacts

- There will be on site hydroacoustic monitoring at John Day during the summer migration period, June 1 through August 15, as described in Appendix 7.

- When spilling at night (2100 to 0600 hours), spill in south end bays up to 80,000 cfs, then the next 20,000 cfs in north end bays. Spill in excess of 100,000 cfs should be split 80 percent in the south bays and 20 percent in the north bays.

- o Spill levels and duration will be adjusted when dissolved gas levels, as determined by monitoring, are too high.

(2) Operation for Adult Passage.

- o Operate the project throughout the year in accordance with operating criteria specified in Appendix 3.

- o From 0400 to 2000 hours, March 1 through November 30, operate unit 1 in the 80 to 100 MW range to provide best ladder entrance condition for adult fish passage, unless additional generation is needed to meet firm load.

d. McNary Dam.

All units at McNary are screened and the project has facilities to separate juveniles by size, and bypass them directly to tailrace or to holding ponds for transport by barge or truck to below Bonneville Dam.

(1) Operation for Juvenile Passage.

- o Operate juvenile fish passage facilities, from April 1 through October 31, in accordance with operating criteria shown in Appendix 3, and FTOT Annual Work Plan shown in Appendix 4.

(2) Operation for Adult Passage.

9+10

- o Operate project facilities throughout the year in accordance with operating criteria shown in Appendix 3.

- o Operate units 1 and 2 during daylight hours from March 1 through November 30 for adult attraction.

e. Ice Harbor Dam.

(1) Operation for Juvenile Passage.

- o Operate juvenile fish passage facilities from April 1 through November 15 in accordance with project operation criteria contained in Appendix 3. Approximately 2,700 cfs will be routed through the ice and trash sluiceway for 24 hours per day during the juvenile passage season, beginning one week after Little Goose collection counts reach 1,000 juveniles per day and continuing until one week after Little Goose bypass is closed.

- o Spill may be requested by the Fish Passage Center (FPC) in accordance with spill criteria of Section III, B2 through B13 of the spill amendment modified for nonpower uses (Appendix 9).

- o The Corps will implement the spill request if all the following conditions are met:

  - BPA agrees to the power loss

- the request is consistent with dates, hours, and percentage criteria in MOA

- spill does not cause adverse nonpower or safety impacts

(2) Operation for Adult Passage.

o Operate project facilities throughout the year in accordance with operating criteria shown in Appendix 3.

f. Lower Monumental Dam.

Lower Monumental has only a gatewell salvage bypass system.

(1) Operation for Juvenile Passage.

o Spill may be requested by the Fish Passage Center (FPC) in accordance with spill criteria of Section III, B2 through B13 of the spill amendment modified for nonpower uses (Appendix 9).

o The Corps will implement the spill request if all the following conditions are met:

- BPA agrees to the power loss

11x12

- the request is consistent with dates, hours, and percentage criteria in MOA

- spill does not cause adverse nonpower or safety impacts

g. Little Goose Dam.

All units at Little Goose are screened and the project has the facilities to separate juveniles by size, and bypass them directly to tailrace or to holding ponds for transport by barge or truck to below Bonneville Dam.

(1) Operation for Juvenile Passage.

o Operate juvenile fish passage facilities from April 1 through end of bypass season in accordance with operating criteria shown in Appendix 3, and FTOT Annual Work Plan shown in Appendix 4.

(2) Operation for Adult Passage.

o Operate project facilities throughout the year in accordance with operating criteria shown in Appendix 3.

o Operate unit 1 during daylight hours from March 1 through November 30 for adult attraction.

h. Lower Granite Dam.

All units at Lower Granite are screened and the project has the facilities to bypass directly to trailrace or to holding ponds for transport by barge or truck to below Bonneville Dam.

(1) Operation for Juvenile Passage.

- o Operate juvenile fish passage facilities from April 1 through end of bypass season in accordance with operating criteria shown in Appendix 3 and FTOT Annual Work Plan shown in Appendix 4.

(2) Operation for Adult Passage

- o Operate project facilities throughout the year in accordance with operating criteria shown in Appendix 3.

- o Operate unit 1 during daylight hours from March 1 through November 30 for adult attraction.

6. Organizations Involved in The Plan.

Consistent with Section 4(h)(11) of the Northwest Power Act and Section 1304(c) of the 1987 Fish and Wildlife Program, the Corps of Engineers is consulting with the following entities at each stage of plan development and will continue to consult with them during implementation:

a. Fish and Wildlife agencies.

b. Indian tribes.

c. The project operators and BPA.

d. Others as required.

The agencies and tribes indicated in Section 108 of the 1987 amended F&W Program will be consulted in formulating interim and permanent juvenile fish passage plans. Refer to Appendix 1.

7. Implementation of The Juvenile Fish Passage Plan.

Implementation of the 1989 JFPP will require that the Corps consult with Bonneville Power Administration, Indian Tribes, and the Federal and State Fishery Agencies. The Fish Passage Managers will be point of contact for the fishery agencies and tribes and the Corps of Engineers' Reservoir Control Center (RCC) will provide the coordination for the project operators as required to determine the operation of the Corps' projects.

RCC daily briefings are held at 1330 hours, Monday through Friday, in the Custom House. Immediately following these briefings, RCC representatives will be available to meet with the Fish Passage Managers to discuss the latest weather and runoff forecasts, as well as fish, hydrologic and power information to assist in the planning of operations for fish passage for the next few days. Fishery operations or requests by the Fish Passage Managers can then be evaluated in the next days forecast runs for overall system operational planning.

a. Responsibilities of Fishery Management Agencies and Tribes.

(1) Request spill in accordance with the NPPC 1989 Fish and Wildlife Program.

(2) Provide RCC with spill priority list and update as needed.

(3) Provide monitoring and surveillance throughout the migration period at predetermined locations such as the fish trap facilities.

(4) Provide status reports on the timing of the downstream migration, including pertinent marked fish release and recovery data, with weekly written reports estimating percentages of run past key projects.

(5) Where biologically feasible, coordinate hatchery releases to ensure they are protected by regulated fishery flows and spills. Release schedules will be provided and updated in a timely manner.

(6) Provide appraisal to the operating agencies of the amount of flexibility in fisheries operations which may affect energy production while maintaining acceptable conditions for migrants.

(7) Provide information on all proposed and scheduled studies or special operations designed to improve fish passage operations which may affect energy production or project operation. Discuss unforeseen changes with the Corps.

(8) Assure that all viable methods and procedures to reduce mortality to migrants are utilized. In addition to spilling this would include such operations as collection and transportation of migrants, use of ice and trash sluiceways, and others.

(9) Coordinate input to water management decisions through the Fish Passage Managers.

b. Responsibilities of the Corps of Engineers.

(1) Provide timely formulation of runoff volume forecasts in January, February, March, April, May, and June to enable the fisheries management agencies and tribes and those in energy production and marketing as much lead time as possible to prepare for operations relative to the impending migration.

(2) Provide the Fish Passage Center with planned reservoir operations to achieve fishery spill requirements during the period of juvenile migration.

(3) In cooperation with the fishery agencies and tribes, provide monitoring, surveillance, and reporting at Corps projects throughout the migration period.

(4) Discuss project operations with regard to releases and/or transport of hatchery stocks with the Fish Passage Center.

(5) Discuss project operations with the power and fishery entities to assure that operating flexibility is made available for both fish passage and energy production.

(6) Provide timely information on all proposed and/or scheduled studies or special operations which may negatively impact or otherwise

constrain fish passage or energy production. Discuss unforeseen changes in fish passage operation with the Fish Passage Center.

(7) In the event that specific spill requests by the Fish Passage Center are not implemented or are modified, a written explanation will be provided.

(8) The Corps is responsible for managing and implementing the annual juvenile fish passage plan, and will make in-season spill decisions or adjustments in consultation with the Fish Passage Managers.

(9) Carry out routine and emergency fish passage operations and maintenance procedures in accordance with criteria in Appendix 3.

(10) Conduct the Dissolved Gas Monitoring Program as described in Appendix 8.

c. Responsibilities of the Bonneville Power Administration.

(1) Report to the RCC and FPC on updated load-resource studies during the April to September period to supplement the NWS River Forecast Center's runoff volume forecast for fish passage planning assistance.

(2) Provide the RCC and FPC their estimate of water available for involuntary spill.

(3) Provide the RCC and FPC their estimate of power market impacts of requested spill operation.

17-18

(4) Utilize available flexibility of the Federal Columbia River Basin System to shape flow requirements, spill priorities, and plant generation to minimize fish passage losses.

(5) Adjust system generation to provide adequate water to meet fishery operations requirements in accordance with spill amendment Section III, Para B2 - B13 as modified to provide nonpower uses (Appendix 9).

(6) Schedule operations to assist in providing spills in support of the juvenile fish passage plan.

(7) Implementation of spill priorities on an hour-by-hour basis.

d. Responsibilities of Mid-Columbia Public Utility Districts.

(1) During the period April 1 through August 15 update status reports on the timing and numbers of the downstream migrants and provide this information daily to the RCC via the CBT System.

(2) Operate projects for spill transfer in accordance with provisions of the Juvenile Fish Passage Plan with one and one-half hours notification to start or stop.

e. Resolution of Differences.

Should any major differences arise during the process of implementing the 1989 JFPP that cannot be resolved between the RCC and the Fish Passage

Managers, these will be referred to the Interagency Executive Committee (Appendix 1). However, the final decision will rest with the Division Engineer.

A P P E N D I C E S

APPENDIX 1

CORRESPONDENCE TO COOPERATING AGENCIES,
CONSULTING AGENCIES AND AFFECTED UTILITIES

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Mangement Branch

COOPERATING AGENCIES

Bonneville Power Administration, U.S. Department of Energy
Bureau of Reclamation, U.S. Department of the Interior
Bureau of Indian Affairs
Federal Energy Regulatory Commission, U.S. Department of Energy
Pacific Northwest Utilities Conference Committee
Columbia River Inter-Tribal Fish Commission
Columbia Basin Fish and Wildlife Authority
Northwest Power Planning Council
Upper Columbia United Tribes Fisheries Research Center

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

We have enclosed a copy of our draft 1989 JFPP for your review. The appendices referenced in the text have not been included with this draft since they are not available at this time, however, we expect them to be similar to the 1988 appendices.

The draft 1989 JFPP is basically the same as the 1988 plan however, the following items are under review by the Corps.

a. The continuation of spill as a bypass means at the dams.

b. The use of a system survival base for the Corps' bypass program. This review will include the role of transport in determining bypass benefits.

c. The scope of the Corps' Columbia-Snake River anadromous fish mitigation effort.

We will fully consult with all parties during this review effort.

Written comments on the draft 1989 JFPP are requested by December 20, 1988. Consultation meetings will be held during January, February, and March as necessary to finalize the 1989 JFPP.

Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

CONSULTING AGENCIES & AFFECTED UTILITIES

Fish and Wildlife Service, U.S. Department of the Interior
Idaho Department of Fish and Wildlife
Montana Department of Fish, Wildlife and Parks
National Marine Fisheries Service, U.S. Department of Commerce
Oregon Department of Fish and Wildlife
Washington Department of Fisheries
Washington Department of Game
Burns-Paiute Indian Colony
Coeur d'Alene Tribes
Confederated Tribes of the Colville Reservation
Confederated Salish and Kootenai Tribes of the Flathead Reservation
Confederated Tribes of the Umatilla Reservation of Oregon
Confederated Tribes and Bands of the Yakima Indian Nation
Kalispell Indian Community
Kootenai Tribe of Idaho
Shoshone-Bannock Tribes of the Fort Hall Reservation
Spokane Tribe of Indians
PUD #1 of Chelan County
PUD #2 of Grant County
PUD #1 of Douglas County
Idaho Power Company

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Colonel, Corps of Engineers
Deputy Division Engineer

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DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. Edward W. Sienkiewicz
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Dear Mr. Sienkiewicz:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

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Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. Dan Yribar
U.S. Bureau of Reclamation
Federal Building & U.S. Courthouse
Box 043 - 550 W. Fort Street
Boise, Idaho 83724-0430

Dear Mr. Yribar:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

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Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

27+23

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870
November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. Rich Nassief
Northwest Power Pool Coordination Group
1115 Public Service Bldg.
Portland, Oregon 97204

Dear Mr. Nassief:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

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Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

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DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. S. Timothy Wapato
Columbia River Inter-Tribal Fish Commission
975 S.E. Sandy Blvd., Suite 202
Portland, Oregon 97214

Dear Mr. Wapato:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

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Deputy Division Engineer

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DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. Randy Fisher
Oregon Department of Fish and Wildlife
P.O. Box 59_, Suite 170
Portland, Oregon 97207

Dear Mr. Fisher:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

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James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Dr. John Donaldson
Columbia Basin Fish & Wildlife Authority
Metro Center, Suite 170
2000 S.W. First Avenue
Portland, Oregon 97201

Dear Dr. Donaldson:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

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Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. Al Wright
Pacific Northwest Utilities Conference Committee
520 S.W. Sixth Avenue
Suite 505
Portland, Oregon 97204

Dear Mr. Wright:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

We have enclosed a copy of our draft 1989 JFPP for your review. The appendices referenced in the text have not been included with this draft since they are not available at this time, however, we expect them to be similar to the 1988 appendices.

The draft 1989 JFPP is basically the same as the 1988 plan however, the following items are under review by the Corps.

a. The continuation of spill as a bypass means at the dams.

b. The use of a system survival base for the Corps' bypass program. This review will include the role of transport in determining bypass benefits.

c. The scope of the Corps' Columbia-Snake River anadromous fish mitigation effort.

We will fully consult with all parties during this review effort.

Written comments on the draft 1989 JFPP are requested by December 20, 1988. Consultation meetings will be held during January, February, and March as necessary to finalize the 1989 JFPP.

Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

November 30, 1988

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. Tom Truelove
Northwest Power Planning Council
851 S.W. Sixth Avenue
Suite 1100
Portland, Oregon 97204-1337

Dear Mr. Truelove:

The Northwest Power Planning Council's Fish and Wildlife Program requests the Corps of Engineers submit and implement a annual Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1989 JFPP. Projects included in the 1989 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

We have enclosed a copy of our draft 1989 JFPP for your review. The appendices referenced in the text have not been included with this draft since they are not available at this time, however, we expect them to be similar to the 1988 appendices.

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c. The scope of the Corps' Columbia-Snake River anadromous fish mitigation effort.

We will fully consult with all parties during this review effort.

Written comments on the draft 1989 JFPP are requested by December 20, 1988. Consultation meetings will be held during January, February, and March as necessary to finalize the 1989 JFPP.

Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

February 14, 1989

REPLY TO
ATTENTION OF:

Water Management Branch

Mr. James J. Jura
Administrator
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Dear Mr. Jura:

The Northwest Power Planning Council voted at its February 8th meeting, to adopt the spill provisions in the proposed long term spill agreement as part of its Fish and Wildlife Program for 1989. Council staff and fish and wildlife agencies biologists indicated that the plan would provide protection for endangered wild and native stocks. It was also indicated that the Corps has grossly overestimated the costs and undervalued the benefits.

The Corps is presently reviewing this amendment to determine if it should be implemented. To make sure that all the available data are considered we request that you provide us the information used to support the proposed spill levels adopted by the Council. This would include the following information:

a. Identify the specific fish stocks that will be protected, their numbers and migrational timing and status.

b. Identify the procedures used to compute the biological benefits of the spill; i.e., survival rate, adult return, economic value and so forth.

c. Identify the procedures used to compute the costs and economic benefits of the proposed spill.

d. Identify the reservoir system impacts of the proposed spill.

e. Identify power system benefits to be derived by implementation.

f. Explain how BPA plans to provide the daily averages and night time load shapes needed for real time implementation of spills.

In order to complete our review by April 1, 1989 we request you provide the above information by February 28, 1989.

Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Copy Furnished:
Mr. Edward Sienkiewicz (BPA)

Letter also sent to the following:
PNUCC
NPPC

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

February 14, 1989

REPLY TO
ATTENTION OF:

Water Management Branch

Burns-Paiute Indian Colony
Tribal Headquarters
Burns, Oregon 97720

Gentlemen:

The Northwest Power Planning Council voted at its February 8th meeting, to adopt the spill provisions in the proposed long term spill agreement as part of its Fish and Wildlife Program for 1989. Council staff and fish and wildlife agencies biologists indicated that the plan would provide protection for endangered wild and native stocks. It was also indicated that the Corps has grossly overestimated the costs and undervalued the benefits.

The Corps is presently studying this amendment to determine if it should be implemented. To make sure that all the available data are considered we have requested information from the participants of the spill agreement to support the proposed spill levels adopted by the Council. This would include the following information:

a. Identify the specific fish stocks that will be protected, their numbers and migrational timing and status.

b. Identify the procedures used to compute the biological benefits of the spill; i.e., survival rate, adult return, economic value and so forth.

c. Identify the procedures used to compute the costs and economic benefits of the proposed spill.

d. Identify the reservoir system impacts of the proposed spill.

e. Identify power system benefits to be derived by implementation.

f. Explain how BPA plans to provide the daily averages and night time load shapes needed for real time implementation of spills.

In order to complete our review by April 1, 1989 we have requested the above information by February 28, 1989.

Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Copy Furnished:
Mr. F.R. Nassief (NPPCG)
Mr. Dan Yribar (USBR)
Mr. Gary Johnson (NPP)
Mr. John McKern (NPW)

Letter also sent to the following:
Bureau of Reclamation
Coeur d'Alene Tribes
Conf Tribes of the Colville Res
Conf Salish and Kootenai Tribes of the Flathead Res
Conf Tribes of the Umatilla Res of Oregon
Kalispell Indian Community
Kootenai Tribe of Idaho
Shoshone-Bannock Tribes of the Ft Hall Res
Spokane Tribe of Indians
PUD #1 Chelan Co
PUD #2 Grant Co
PUD #1 Douglas Co
Idaho Power Company
Bureau of Indian Affairs
Fed Energy Reg Commission
Upper Columbia United Tribes Fisheries Research Center

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

February 14, 1989

REPLY TO
ATTENTION OF:

Water Management Branch

Regional Director
Fish and Wildlife Service
US Department of the Interior
Lloyd 500 Bldg, Suite-1692
500 N.E. Multnomah Street
Portland, Oregon 97232

Dear Sir:

The Northwest Power Planning Council voted at its February 8th meeting, to adopt the spill provisions in the proposed long term spill agreement as part of its Fish and Wildlife Program for 1989. Council staff and fish and wildlife agencies biologists indicated that the plan would provide protection for endangered wild and native stocks. It was also indicated that the Corps has grossly overestimated the costs and undervalued the benefits.

The Corps is presently reviewing this amendment to determine if it should be implemented. To make sure that all the available data are considered we request that you provide us the information you have used to support the proposed spill levels adopted by the Council. This would include the following information:

a. Identify the specific fish stocks that will be protected, their numbers and migrational timing and status.

b. Identify the procedures used to compute the biological benefits of the spill; i.e., survival rate, adult return, economic value and so forth.

In order to complete our review by April 1, 1989 we request you provide the above information by February 28, 1989.

Sincerely,

James B. Royce
Colonel, Corps of Engineers
Deputy Division Engineer

Letter also sent to the following:
Idaho Dept of Fish & Wildlife
Montana Dept of Fish, Wildlife and Parks
Nat Marine Fisheries Service
Oregon Dept of Fish and Wildlife
Washington Dept of Fisheries
Washington Dept of Wildlife
Columbia River Inter-Tribal Fish Commission
Columbia Basin Fish & Wildlife Authority

APPENDIX 2

CORRESPONDENCE RECEIVED

Attachments to correspondence not found in this package are on file with The Reservoir Control Center.

COLUMBIA BASIN FISH & WILDLIFE AUTHORITY

December 20, 1988

Colonel James B. Royce
Deputy Division Engineer
North Pacific Division, Corps of Engineers
P.O. Box 2870
Portland, Oregon 97208-2870

Dear Colonel Royce:

Thank you for sending us a copy of the draft 1989 Juvenile Fish Passage Plan (JFPP). On behalf of the Columbia Basin Fish and Wildlife Authority and its members, I would like to request an extension of time for comments on the draft JFPP until January 13, which follows the January Northwest Power Planning Council meeting in Boise, Idaho. Please let us know if this request cannot be accommodated.

The fish and wildlife agencies and tribes are currently in the process of reviewing and approving a memorandum of agreement that stipulates spill provisions at four hydroelectric projects operated by the Corps of Engineers. The Northwest Power Planning Council is now considering adoption of the agreement as an amendment to the Fish and Wildlife Program. In this light, we have attached a copy of memorandum of agreement that you may wish to examine.

Sincerely

John R. Donaldson, Ph.D
Executive Secretary

cc: Ed Sienkiewicz, BPA
Al Wright, PNUCC

Attachment

Metro Center • Suite 170
2000 SW First
Portland • Oregon 97201

503/ 294-7031 • FTS • 423-7031

March 7, 1989

Colonel James B. Royce
North Pacific Division
Corps of Engineers
P.O. Box 2870
Portland, Oregon 97208-2870

RE: Corps of Engineers Information Request Concerning the Council's Proposed Spill Program for 1989.

Dear Colonel Royce:

The Pacific Northwest Utilities Conference Committee (PNUCC) submits this letter in response to the questions in your letter of February 14, 1989. PNUCC appreciates this opportunity to explain not only our intent in participating in the development of the Long Term Spill Memorandum of Agreement (MOA), but also our position on the fish bypass issues in general.

The paramount foundation of PNUCC's involvement in mainstem Columbia and Snake River fish bypass issues is timely installation of adequately performing mechanical bypass systems. Based on our experience and studies to date, PNUCC has concluded that adequately performing mechanical bypass facilities have substantial biological benefits. The MOA includes a framework for the construction, testing, and operation of the future bypass facilities. In 1987, the Corps of Engineers estimated the total cost of completing the bypass facilities at all lower Columbia and lower Snake River projects to be approximately $160 million. This cost estimated was based on the current state-of-the-art screen design that the fishery agencies and tribes claimed would meet their bypass criteria. Since 1987, additional bypass data have been collected, new screen designs have been contemplated, construction schedules have slipped and the expected bypass protection goals have increased. The evolution of these factors has resulted in increases in expected costs for the installation of the bypass facilities. The MOA establishes the cost and schedule of bypass installation for each project and the means to evaluate the installed bypass systems. The purpose of including these elements in the MOA was to clearly document costs and bypass design agreed to in 1987 by the fishery and power interests and the Corps.

Mechanical bypass systems will not be operational at all mainstem Snake and Columbia River projects for several years. For this reason, we recognize that some interim spill will be necessary to meet the mandate of the Northwest Power Act to "provide for improved survival of [anadromous] fish at hydroelectric facilities located on the Columbia River system." (4(h)(6)(E)(i)). Interim spill is the only immediate means currently available to address fish bypass at each and every project. Attached is our rationale for spill and bypass at each of the Corps projects included in the MOA. It is important to part out that PNUCC's support for the spill levels found in the MOA is based on the understanding that this is only an interim program until bypass is completed.

We understand that the Corps has questioned the biological basis of the MOA's spill provisions adopted by the Power Planning Council in 1989 (e.g., Corps questions A and B). As the Corps is well aware, the incremental benefits of the spill provisions are almost impossible to accurately measure. In addition, most of the current models used to assess fishery benefits cannot determine the cumulative benefits of incremental increases in fishery populations attributed to a single fishery program.

Interim spill provided at levels equivalent to the fish benefits derived from mechanical bypass systems would cause substantial and unacceptable power system impacts. The amounts of spill agreed upon in the MOA were designed to provide water sufficient to achieve acceptable fish benefits while at the same time not cause unreasonable power system impacts. Consistent with the requirements of the Northwest Power Act, the spill program will provide increases in the survival of the smolts at the projects in the Snake and Lower Columbia Rivers. These increases, however small, will incrementally increase the overall survival of upper Snake Basin stocks and these increases are cumulative from year to year. Therefore, the Corps should not casually dismiss the fishery benefits of the recently adopted spill provisions in the Fish and Wildlife Program on the grounds that the benefits are not easily assessed or accurately measured.

PNUCC's secondary objective in participating in the development of the MOA was to resolve potential litigation between the fishery interests and power interests concerning the future development of the regional power system and power marketing agreements. By settling the spill and bypass issues through the MOA rather than through litigation, the regional power interests will realize significant economic benefits. The Corps has not previously included this economic component in its benefit/cost analysis of the spill provisions. Although the economic and political benefits resulting from the MOA might be unconventional relative to the usual standards of economic analysis, these benefits should not be ignored.

PNUCC strongly urges the Corps to consider the following factors when deciding on whether to implement the spill provisions recently adopted into the Council's Fish and Wildlife Program. Recognize that PNUCC is in no way taking issue with the Corps' authority but is merely urging the Corps to consider our rationale for support of the spill provisions of the MOA and installation of mechanical bypass facilities at all mainstem Columbia Corps projects.

1. The context in which the MOA was negotiated. The spill provisions are only one component of a multifaceted agreement, through which the power system derives benefits in exchange for the provision of spill.

2. The spill provisions and the MOA are a means to resolve the continuing and expensive conflicts between the fishery interest; the power. interest; and project operators concerning bypass installation and spill.

3. Spill is an interim bypass measure. Spill will cease when an adequately performing mechanical bypass system is installed and operational.

4. The cost of the spill program (lost revenues) will be borne by the region's ratepayers.

5. Corps funding for design and construction of the mechanical bypass systems will be repaid with interest by the region's ratepayers.

6. In light of the fact that both the cost of the spill program and the repayment of the bypass system is borne by the regional ratepayer, the Corps can consider these as regional economic issues since there is no conflicts in the national economic benefits.

We hope, in light of these factors, that the Corps will not only understand PNUCC's support for the new spill provisions in the Fish and Wildlife Program but also be convinced to implement these provisions.

Sincerely,

Ray Kindley for

Al Wright
Executive Director

AW140

Attachment

NORTHWEST POWER PLANNING COUNCIL

851 S.W. SIXTH AVENUE • SUITE 1100
PORTLAND, OREGON 97204-1348 • (503) 222-5161

Toll free number for Idaho, Montana & Washington: 1-800-222-3355
Toll free number for Oregon: 1-800-452-2324

February 28, 1989

Colonel James B. Royce
Deputy Division Engineer
North Pacific Division
Corps of Engineers
P.O. Box 2870
Portland, OR 97208-2870

Dear Col. Royce:

Thank you for your letter of February 14, 1989, concerning the Council's recent adoption of a 1989 spill measure into the Columbia River Basin Fish and Wildlife Program. As you know, the Northwest Power Planning Council, at its February 8th meeting, voted unanimously to incorporate the spill provisions of section III. of the proposed long-term spill agreement into its program for the 1989 fish migration season.

Representatives of the region's fish and wildlife agencies, Indian tribes, Bonneville Power Administration, utility groups, the Bureau of Reclamation, and the Council have been meeting over the past sixteen months to negotiate a historic agreement to provide spill and/or mainstem passage improvements at four mainstem Columbia and Snake river hydroelectric dams -- Lower Monumental, Ice Harbor, John Day and The Dalles dams. The proposed agreement is intended to cover a 10-year period and would tie spill to a schedule for development of juvenile fish bypass facilities at Lower Monumental, Ice Harbor and The Dalles dams. Spill is to be provided in the interim while fish bypass facilities are being designed, tested and installed at these projects.

The proposed agreement, which would be in effect until the end of 1998, is being distributed among the groups involved for final signatures. Our program amendment process has been left open solely with respect to the post-1989 period, so that the portion of the agreement covering the post-1989 period can be considered for adoption by the Council when the document is signed.

In response to your recent letter concerning our adopted spill provisions for the 1989 migration season, we enclose the comments and information you requested. The Council's spill amendment stemmed from the Northwest Power Act's requirements to protect, mitigate and enhance anadromous fish which have been affected by hydroelectric development while balancing the need to assure the region "an adequate, efficient, economical and reliable power supply." The Council believes the spill amendment meets the Act's requirements. Moreover, the amendment represents an important regional consensus on a difficult issue that has been contentious for many years.

Finally, the amendment provides important economic benefits to the region by allowing the Bonneville Power Administration to develop more efficient power marketing and transmission initiatives.

The Council believes that the new spill provisions will improve mainstem survival for those stocks of juvenile salmon and steelhead originating above The Dalles Dam, and in particular for upriver stocks originating above Lower Granite Dam on the Snake River. We strongly urge you to implement these spill levels throughout the 1989 outmigration, according to the terms of the spill agreement.

If you need additional information concerning these issues, please don't hesitate to contact us. We look forward to hearing from you as to your decision on this matter by April 1, 1989, as indicated in your letter.

Sincerely,

Tom Trulove

Tom Trulove,
Chairman

Enclosures.

cc: Ed Sienkiewicz -- BPA
Randy Fisher -- CBFWA
Al Wright -- PNUCC

A1:JR/JimARG

45446

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

February 28, 1989

In reply refer to: PJI

Colonel James B. Royce
U.S. Army Corps of Engineers
Deputy Division Director
North Pacific Division
P.O. Box 2870
Portland, OR 97208

Dear Colonel Royce:

The Bonneville Power Administration (BPA) has reviewed your letter of February 14, 1989, requesting information pertinent to the U.S. Army Corps of Engineers' (Corps) decision to provide spill at its projects in 1989. BPA requests that the Corps act positively on the Northwest Power Planning Council's (Council) February 8, 1989, amendment to its Fish and Wildlife Program regarding spill. The amendment, incorporating Section III of the Spill Agreement, should be incorporated into the 1989 Juvenile Fish Passage Plan.

The Council's amendment and associated Spill Agreement were achieved through careful analysis and regional consensus on the fishery, power, and legal elements surrounding efficient operations of the Federal Columbia River Power System. This amendment and agreement are broadly supported by Northwest utilities, fishery entities, and BPA. Our testimony to the Council on the amendment is enclosed for your consideration.

BPA requests the Corps consider the Council's amendment within a broad planning and evaluation framework. The amendment stemmed from complex circumstances which required balancing our need to immediately improve passage for depressed anadromous fish stocks against BPA's need to capture immediate and extremely beneficial power marketing and transmission opportunities. The amendment helps resolve fish passage and operations issues that are potentially threatening major power supply initiatives. BPA believes that if the Corps were to consider all of the economic, legal, and biological factors, it would conclude the amendment provides the best net result for fishery and power purposes.

BPA and the Corps share responsibility for the protection, mitigation, and enhancement of Columbia River anadromous fish resources while BPA provides an adequate, efficient, economical, and reliable power supply. BPA weighed the

costs of foregone power for spill against the benefits to fish passage and the benefits for power marketing and transmission initiatives that would have been jeopardized without the amendment. Despite our shared concern that spilling water is an expensive way to protect fish, BPA determined that this near-term loss of power generation was prudent, given the net benefits to power marketing activities and the present limitations in alternative means to achieve immediate fish passage improvements.

Additionally, BPA believes the amendment provides the region with greater certainty in annual spill levels. As a result, the power system can be better attuned to marketing objectives. The amendment also delineates procedures and timelines for the region to pursue the ultimate goal of substituting more effective bypass systems for costly spill.

The Federal Columbia River Power System has grown increasingly complex. Fishery and power management objectives need to be integrated in a positive and dynamic fashion given the changing requirements of both purposes. These conditions require creative means to achieve our agencies' missions. We ask the Corps to implement the spill amendment this year and take the opportunity to evaluate its effectiveness for future years.

Specific information relevant to your questions are included on the enclosed document.

Sincerely,

Edward W. Sienkiewicz
Senior Assistant Administrator for
Power Management

Enclosure

cc:
Mr. T. Trulove, Northwest Power Planning Council
Mr. R. Fisher, Columbia Basin Fish and Wildlife Authority
Mr. A. Wright, Pacific Northwest Utilities Conference Committee

COLUMBIA BASIN FISH & WILDLIFE AUTHORITY

...MATILLA ... RESERVATION ... TRIBE ... COLVILLE INDIANS ... WASHINGTON WILDLIFE ... SALISH ... KOOTENAI TRIBES ... NATIONAL MARINE ... FISHERIES ... YAKIMA NATION ... WARM SPRINGS RESERVATION ... IDAHO FISH & GAME ... SHOSHONE-PAIUTE TRIBES ... BURNS PAIUTE INDIANS ... WASHINGTON FISHERIES ... KOOTENAI TRIBE ... SPOKANE TRIBE ... MONTANA FISH WILDLIFE & PARKS ... COLVILLE RESERVATION ... OREGON FISH & WILDLIFE ... SHOSHONE-BANNOCK TRIBES ... U.S. FISH & WILDLIFE ... COEUR D'ALENE TRIBE

February 28, 1989

Colonel James B. Royce
Deputy Division Commander
Corps of Engineers
P.O. Box 2870
Portland, Oregon 97208-2870

Dear Colonel Royce:

This represents a collective response to your recent letters to the Authority and its individual members requesting information for a proposed review of the spill levels adopted by the Northwest Power Planning Council (Council). The Columbia Basin Fish and Wildlife Authority is pleased that the Corps is actively considering implementation of the spill provisions of the Columbia Basin Fish and Wildlife Program (Program) in 1989. In our view, there is no reason why full implementation should not occur consistent with the Northwest Power Act (the Act).

The benefits associated with the spill amendment are the same as those the Corps is obligated to provide under the Act. The amendment will both improve survival at federal dams, and move us toward equitable treatment of anadromous fish runs. Only the combination of interim spill at meaningful levels and prompt installation of mechanical bypass systems will provide these benefits.

As a general matter, all fish runs above The Dalles Dam will benefit from the amendment, because passage of fish through spill minimizes turbine related mortalities. Implementation of the amendment will contribute to the Council's goal of doubling fish runs, since improvements in mainstem survival significantly accelerate the rebuilding process. The amendment will also protect naturally spawning stocks that are otherwise not benefited by existing mitigation efforts.

The information you have requested regarding the spill amendment has already been provided to the Corps as part of our recommendations for annual fish passage plans, our previous spill amendment application, and the informational papers developed in the course of our 1988 spill implementation discussions last May and June. A recent summary of our position presented to the Council in support of the spill amendment is enclosed for your further

Metro Center • Suite 170
2000 SW First
Portland • Oregon 97201

503/ 294-7031 • FTS • 423-7031

reference. In addition, we will provide you with a copy of the 1989 Detailed Fishery Operating Plan as soon as it is available.

Of course, the Corps must use caution in its consideration of this and other information outside of the Columbia Basin Fish and Wildlife Program. It would not be appropriate for the Corps to apply cost-benefit analyses to the spill amendment, or to question the decision made by the Council.

The Northwest Power Act expressly precludes cost-benefit analyses when determining whether to pursue fish mitigation alternatives in the Columbia Basin. In order to address economic and other issues that might be posed by the Corps and others, the Act establishes a public process for soliciting agency views on proposed Program measures, and provides standards for Council decisions. Once the Council makes a decision based upon the public record, the Corps retains only limited authority to disregard a Program measure such as spill. The Corps must take Program measures into account to the fullest extent practicable in exercising its dam operation responsibilities. This requirement has been defined by the Council and others to direct full implementation except in unusual cases of express statutory conflict. We are not aware of any legal conflict that could justify a Corps decision not to implement spill.

After years of discussion, there is now strong regional consensus among fishery agencies, Indian tribes, the Bonneville Power Administration, BPA customers, and the Northwest Power Planning Council in support of the new spill provisions of the Columbia Basin Fish and Wildlife Program. We urge you to make every effort to build upon this consensus by implementing the spill provisions in 1989 and in future years.

Please include this letter and the enclosure in your official record of decision regarding implementation of Program spill.

Sincerely,

Randy Fisher

Randy Fisher, Chairman by JRD.

cc: Ed Sienkiewicz, BPA
Al Wright, PNUCC
Tom Trulove, NPPC

APPENDIX 3

OPERATION AND MAINTENANCE CRITERIA FOR FISH PASSAGE FACILITIES AT CORPS PROJECTS

PORTLAND DISTRICT

FISH FACILITIES

OPERATING STANDARDS AND MAINTENANCE PLANS

1989

FISH FACILITIES OPERATING STANDARDS AND MAINTENANCE PLAN

TABLE OF CONTENTS

BONNEVILLE DAM

A. OPERATING STANDARDS

1. Bonneville Dam Adult Fish Passage Facilities

a. **Prior to March 1**

(1) Inspect all staff gauges and water level indicators, repair and/or clean where necessary.

(2) Inspect dewatered sections of fish facilities for projections, debris or plugged orifices which could injure fish or slow their progress up the ladder. Repair deficiencies.

(3) Inspect for and, when necessary, clear debris in the ladder exits.

b. **March 1 through November** (Adult Fish Passage Period)

(1) All Adult Fish Facilities

(a) Water depth over fish ladder weirs: 1.3 (±0.1) feet.

(b) Head on all entrances: 1.0 to 2.0 feet (1.5 feet preferred). Refer to maintenance plan when unable to achieve head criterion.

(c) A transportation velocity of 1.5 to 4 feet per second (2.0 fps preferred) shall be maintained in the powerhouse collection channel, the lower ends of the fish ladders which are below the tailwater, and the adult transportation channel (UMT).

(d) Maximum of 6" head on the first powerhouse attraction water intakes and trash racks at all the ladder exits, with a 4" maximum head on all picketed leads. Debris shall be removed when significant amounts accumulate.

(e) Staff gauges and water level indicators will be readable at all water levels encountered during the fish passage period.

(f) The second powerhouse juvenile bypass system continues to have poor guidance efficiency. Because of this, the second powerhouse operation will be restricted during the main part of the juvenile passage period. See second powerhouse juvenile passage standards as it will impact first powerhouse operation.

(g) First powerhouse unit operation priority is 1, 2, 10, 9, (3-8). Second powerhouse priority is 18, 11, 17, 12, 16, 13-14, 15.

(2) Spillway Ladders

(a) Spill bay gates 1 and 18 shall be open 4 inches to attract adult migrating fish to the adjacent fishway entrances.

(b) Side entrances SW-SG-5 and SO-SG-7 and downstream entrances SW-SG-1 and SO-SG-2 shall operate as continuously open free-flowing vertical slots. Downstream entrances SW-SG-3 and SO-SG-4 (adjacent to shore) consist of pairs of sluice gates. When the tailwater is below 9 feet, both gates shall be open. When the tailwater is between 9 and 17 feet, the south sluice gate shall close. When the tailwater exceeds 17 feet, both sluice gates shall close.

(3) First Powerhouse

(a) Entrance gate 65 operates as an adjustable height submerged weir with crest elevation 8 feet below tailwater for tailwater elevations above 17.0. For tailwater elevations below 17.0, the weir is fully lowered with crest at elevation 8.5.

(b) Operate powerhouse entrance gates 9, 21, 34, 58 and 62.

(c) Orifice A (lower sluice gate) operates (opens) from tailwater elevation 7 to 16 on a rising tailwater and elevation 15 to 7 on a falling tailwater.

(d) Orifice B (upper telescoping gate) operates from tailwater elevation 16 to 38 on a rising tailwater and elevation 38 to 15 on a falling tailwater.

(e) Powerhouse entrance gate 1 operates as an adjustable height submerged weir which acts as the primary control to regulate head between the collection channel and tailrace (head on all entrances). Entrance gate 2 is a submerged orifice entrance which operates only when entrance gate 1 is completely lowered to regulate the head between the collection channel and tailrace at lower tailwater elevations. Gate 1 is fully lowered at tailwaters below 22.0; then gate 2 takes over fishway head regulation.

(4) Second Powerhouse

(a) Operate all four north (NUE and NDE) and south (SUE and SDE) entrances. Operate weir crests at elevation 1.0 (fully lowered) for tailwater elevations up to 14.0. For tailwater elevations greater than 14.0, operate weir crest 13.0 feet below tailwater.

(b) Operate all 12 powerhouse floating gate fishway entrances.

(5) Spillway Operations

The following spill schedule (table I-1) shall be followed during the spill period.

c. **December 1 through February (Winter Operating Period)**

(1) Operate the adult fish passage facilities according to the fish passage period standards above, except systems may be dewatered or operated out of criteria for repair and maintenance. Adult facilities to be inspectted once per day to assure that facilities are operating as per standards above. Only one of the ladders servicing the two powerhouses and the associated powerhouse collection system (including the auxiliary water supply system) may be out of service or operating out of standard operating criteria at any one time except under extreme situations. One of the two ladders servicing the spill channel should be in full operation at all times except under extreme conditions. Spillbays 1 and 18 may be on-seal.

(2) Adjust crowders at fish counting stations to full open at the end of the counting season.

Table I-1

Spill Schedule for Flows at Bonneville Dam
(Gate Opening in Dogs)* Revised June 5, 1975 - Reviewed 1985

Gate Number																		Total	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Dogs	KCFS**
4"	1															(1)	4"		
4"	1	1													(1)	1	4"		
4"	1	1	1											(1)	1	1	4"		
4"	1	1	1	1									(1)	1	1	1	4"		
4"	1	2	1	1									1	1	(2)	1	4"	10	35.3
4"	1	2	1	1	1							(1)	1	1	2	1	4"		
4"	1	2	1	1	1	1					(1)	1	1	1	2	1	4"		
4"	1	2	1	1	1	1	1			(1)	1	1	1	1	2	1	4"		
4"	1	2	1	1	1	1	1	1		1	(2)	1	1	1	2	1	4"		
4"	2	2	1	1	1	1	1	1		1	2	1	1	1	2	(2)	4"	20	68.6
4"	2	2	1	1	1	1	(2)	1	1	1	2	1	1	1	2	2	4"		
4"	2	2	1	1	1	1	2	2	(2)	1	2	1	1	1	2	2	4"		
4"	2	2	1	1	1	1	2	3	(3)	1	2	1	1	1	2	2	4"		
4"	2	2	1	1	2	1	2	3	3	1	2	1	1	1	2	(3)	4"		
4"	2	2	1	1	2	1	2	4	(4)	1	2	1	1	1	2	3	4"	30	100.8
4"	2	3	1	1	2	1	2	(5)	4	1	2	1	1	1	2	3	4"		
4"	2	3	1	1	2	1	3	5	(5)	1	2	1	1	1	2	3	4"		
4"	2	3	1	1	2	1	3	(6)	5	1	2	1	1	1	3	3	4"		
4"	2	3	1	1	2	1	3	6	6	1	2	1	1	1	3	(4)	4"		
4"	2	3	1	1	2	1	4	6	(7)	1	2	1	1	1	3	4	4"	40	139.7
4"	2	3	1	2	2	1	4	6	7	(2)	2	1	1	1	3	4	4"		
4"	3	3	1	2	2	1	4	6	7	2	2	1	(2)	1	3	4	4"		
4"	3	3	2	2	2	1	4	(7)	7	2	2	1	2	1	3	4	4"		
4"	3	4	2	2	2	(2)	4	7	7	2	2	1	2	1	3	4	4"		
4"	3	4	2	2	3	2	4	7	7	(3)	2	1	2	1	3	4	4"	50	176.0
4"	3	4	2	2	3	3	4	7	(8)	3	2	1	2	1	3	4	4"		
4"	3	4	3	2	3	3	4	7	8	3	(3)	1	2	1	3	4	4"		
4"	3	4	3	3	3	3	4	7	8	3	3	(2)	2	1	3	4	4"		
4"	3	4	3	4	3	3	4	7	8	3	3	2	2	(2)	3	4	4"		
4"	3	4	3	4	3	4	4	7	(9)	3	3	2	2	2	3	4	4"	60	211.5
4"	3	4	3	4	4	4	4	7	9	(4)	3	2	2	2	3	4	4"		
4"	3	4	4	4	4	4	4	7	(10)	4	3	2	2	2	3	4	4"		
4"	3	4	4	4	4	4	4	8	10	4	(4)	2	2	2	3	4	4"		
4"	3	4	4	4	4	4	4	8	10	5	4	2	(3)	2	3	4	4"		
4"	3	4	4	4	4	4	4	9	10	(6)	4	2	3	2	3	4	4"	70	246.5
4"	3	4	4	4	4	4	5	9	10	6	4	(3)	3	2	3	4	4"		
4"	3	4	4	4	4	4	5	10	10	6	4	3	3	(3)	3	4	4"		
4"	3	4	4	4	4	4	6	10	11	6	4	3	3	3	3	4	4"		
4"	4	4	4	4	4	4	6	10	11	(7)	4	3	3	3	3	4	4"		
4"	4	4	4	4	4	4	6	11	(12)	7	4	3	3	3	3	4	4"	80	281.0

Table I-1 (cont.)

Spill Schedule for Flows at Bonneville Dam
(Gate Opening in Dogs)* Revised June 5, 1975 - Reviewed 1985

Gate Number																		Total	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Dogs	KCFS**
4"	4	4	4	4	4	5	6	11	12	7	(5)	3	3	3	3	4	4"		
4"	4	5	4	4	4	5	6	11	12	(8)	5	3	3	3	3	4	4"		
4"	4	5	4	5	4	5	6	11	12	8	5	(4)	3	3	3	4	4"		
4"	4	5	4	5	4	5	6	12	12	8	5	4	3	3	(4)	4	4"		
4"	4	5	4	5	4	5	7	12	12	8	5	4	3	(4)	4	4	4"	90	316.1
4"	4	5	4	5	5	5	7	12	12	8	5	4	(4)	4	4	4	4"		
4"	4	5	5	5	5	5	7	12	12	8	5	4	4	4	4	(5)	4"		
4"	5	5	5	5	5	5	8	12	12	8	(6)	4	4	4	4	5	4"		
4"	4	5	5	5	5	5	8	12	12	8	6	5	(5)	4	4	5	4"		
4"	4	5	5	5	5	6	8	12	12	8	6	5	5	4	(5)	5	4"	100	351.2

* ( ) values may be one dog less than value shown.
For example: (1) means 0 or 1 dog. (2) means 1 or 2 dogs, etc.

** KCFS approximate values were calculated using a forebay elevation of 76.0 feet.

2. BONNEVILLE DAM JUVENILE FISH PASSAGE FACILITIES

a. First Powerhouse

(1) **Prior to March 15 each year** (or as early as 1 March depending on timing of Bonneville pool hatchery releases.)

(a) Remove debris from forebay, trash racks and gatewell slots.

(b) Inspect vertical barrier screens for damage, holes, debris accumulations and protrusions (video inspection acceptable). Repair when problems are detected.

(c) Inspect each Submersible Traveling Screen (STS) and operate on trial run (dogged off at deck level). Install STS in each intake of operational units by March 15 or earlier if a production release of Spring Creek Hatchery tules is scheduled earlier than March 15. However, installation will not be required before 1 March. The schedule for early hatchery releases will need to be supplied by the fisheries agencies by February 1 in order to coordinate early STS installation.

(d) Operate STSs at angle of 55 degrees from vertical.

(e) Inspect and, where necessary, clean and/or repair all gatewell orifices and orifice lighting systems.

(f) Inspect and, where necessary, clean and/or repair dewatering screens and associated equipment.

(g) Inspect and correct any deficiencies of DSM channel and outfall conduit walls and floor.

(2) March 15 through November 15

(a) Remove debris from forebay and trash racks as required to maintain less than 1.5 feet of drawdown in gatewell or as indicated by fish condition (i.e., higher than expected descaling). STSs in units being raked should be run in continuous mode during raking operation. Gatewell orifices of the unit being raked must be closed during the procedure.

(b) Inspect each STS and each VBS a minimum of once every three months (video acceptable), less frequent inspections may be allowed by the Project Biologist on STSs which have operated very little

since their last inspection. Preferably, inspections will occur immediately prior to peaks in juvenile fish migrations, which begin about May 1, mid-July and September 1. Inspections should be concentrated on the priority units and those others with the longer operating time. More frequent inspections may be required by the Project Biologist or under the following conditions: 1) deterioration of fish condition; 2) increased debris load in bypass system; and 3) other indications of STS or VBS malfunctions or failure. If STS or VBS damage or plugging is detected, follow procedures in Fish Facilities Maintenance Plan. Records of inpections or summary of such records will be made available to the Fish Passage Center by 1 January.

(c) Operate all gatewell orifice systems. Inspect each daily to assure that the orifice valves and lights are operating correctly. Backflush at least every day or more often if indicated by debris accumulations. Replace all burned out orifice lights within 24 hours.

(d) Maintain depth of at least 1 foot over the end of the DSM inclined dewatering screen.

(e) Inspect each STS amp gauge readings at least once each shift and record readings once per day. If an STS failure occurs, then follow procedures in Fish Facilities Maintenance Plan.

(f) Inspect all gatewells daily and clean before gatewell water surface becomes one-half covered to maintain clean orifices and minimize fish injury. The first powerhouse gatewell orifices must be closed during the debarking operation. After debarking a gatewell, backflush the orifice in that gatewell. Check gatewell drawdown.

(g) Coordinate cleaning efforts with personnel operating downstream migrant sampling facilities.

(h) Turbines should be operated at peak efficiency unless the additional generation is needed to avoid operation of a partially or fully unscreened unit or to avoid excess daytime spill (greater than 75 kcfs).

(i) STS cycling operation may begin when the mean length of the majority of the juvenile chinook passing the project reaches or exceeds 112mm. This time will be determined by the Corps biologist using appropriate available data. A cycling time of a maximum 20 minutes off and a minimum of 2

minutes on must be followed. Cycling will be discontinued if warranted by fish condition or debris problems.

(j) Inspect and maintain the lines strung over juvenile release areas for the purpose of discouraging gull predation.

(k) Before April 15, turbine units without a full complement of STSs may operate to meet load demands. Exceptions to this are:

((a)) Unscreened units will not operate for the six days following a tule production release from Spring Creek Hatchery (this operation to start at midnight immediately following the completion of the release) unless BPA needs that additional generation to meet firm energy demands. The release dates will be supplied to CENPP-OP-PF biologists by the Fish Passage Center as soon as these dates are available. The release date must be received by the Corps biologists one week prior to the release, to facilitate necessary coordination to accomplish the unscreened unit shutdown.

((b)) Unscreened units will not operate when the Smolt Monitoring passage index at Bonneville exceeds 3,000 unless BPA needs that additional generation to meet firm energy demands or to avoid excess daytime spill (greater than 75 kcfs).

Units without a full complement of STSs will be the last to be brought on line to meet power demands, and the first off line when the power demand has diminished.

(l) During the period April 16 through September turbine units without a full complement of STSs will not operate except to meet firm energy demands. Units without a full complement of STSs will be the last to be brought on line to meet power demands and the first off line when the power demand has diminished.

(m) During periods of involuntary spill, open sluice gate 7A to a depth of 3.5 feet and 10C to a depth of 2.5 feet below the minimum expected forebay elevation.

(3) October 1 through November 15

STSs may be removed from units as designated by the Project Biologis (at least one-half of the units

must remain screened) to reduce wear and facilitate early winter maintenance. Enough units should remain screened such that the average expected river flow (as estimated by the Reservoir Control Center) for this period would pass through screened units. STS's should be removed as designated by the Project Biologist. All units available to meet load demand. Order of operating priority will be 1) screened first powerhouse units, 2) screened second powerhouse units, 3) unscreened first powerhouse units, and 4) unscreened second powerhouse units.

(4) November 16 through March 14

All STSs removed and DSM channel dewatered (see Dewatering Procedures). DSM channel will be dewatered throughout most of this period as STSs must be stored beneath the intake deck, which places the STSs directly in front of the gatewell orifices. Additionally, all units should be operated at peak efficiency whenever possible.

b. Second Powerhouse

(1) Prior to March 15 each year (or as early as March 1 depending on earliest release of Bonneville pool hatchery fish)

(a) Remove debris from forebay, trash racks and gatewell slots.

(b) Inspect vertical barrier screens for damage, holes, debris accumulations or protrusions. (Video inspection acceptable) and repair when problem detected.

(c) Inspect each Submersible Traveling Screen (STS) and operate on trial run (dogged off at deck level). Install STS in each intake of operational units by March 15 or earlier if a tule production release from Spring Creek Hatchery is scheduled earlier than March 15. However, installation will not be required before 1 March. Fisheries agencies will provide schedule of early hatchery releases by 1 February to allow time to coordinate preparation.

(d) Operate STSs at angle of 60 degrees from vertical.

(e) Inspect and, where necessary, clean and/or repair all gatewell orifices and orifice lighting systems.

(f) Inspect and, where necessary, clean and/or repair dewatering screens and associated equipment.

(g) Inspect and correct any deficiencies of DSM channel and conduit outfall walls and floor.

(2) March 15 through November 15

(a) Remove debris from forebay and trash racks as required to maintain less than 1.5 feet of drawdown in gatewell or as indicated by fish condition (i.e., higher than expected descaling). STSs in units being raked should be run on continuous during raking operation. Gatewell orifices of the unit being raked must be closed during the procedure.

(b) Inspect each STS or VBS a minimum of once every three months (video acceptable), less frequent inspections may be allowed by the Project Biologist on STSs which have operated very little since their last inspection. Preferably, inspections will occur immediately prior to peaks in juvenile fish

migrations, which begin about May 1, mid-July and September 1. Inspections should be concentrated on the priority units and those others with the longer operating time. More frequent inspections may be required by the Project Biologist or under the following conditions: 1) deterioration of fish conditions; 2) increased debris load in bypass system; and 3) other indications of STS or VBS malfunctions or failure. If STS or VBS damage or plugging is detected follow procedures in Fish Facilities Maintenance Plan. Records of inpections or summary of such records will be made available to the Fish Passage Center by 1 January upon request.

(c) Operate all gatewell orifice systems. Inspect each daily to assure that the orifice valves and lights are operating correctly. Orifices with less than clear flow jet should be cleaned at least once per day. Replace all burned out orifice lights within 24 hours.

(d) Inspect each STS amp gauge readings at least once each shift and record reading once per day. If an STS failure occurs follow procedures in Fish Facilities Maintenance Plan.

(e) Inspect all gatewells daily and clean before gatewell water surface becomes one-half covered with debris to maintain clean orifices and minimize fish injury. After debarking a gatewell, inspect and if necessary, clean the orifice in that gatewell. Check gatewell drawdown.

(f) Coordinate cleaning efforts with personnel operating downstream migrant sampling facilities.

(g) Turbines should be operated at peak efficiency unless the additional generation is needed to avoid operation of a partially or fully unscreened unit or to avoid excess daytime spill (greater than 75 kcfs).

(h) STS cycling operation may begin when the mean length of the majority of the juvenile chinook passing the project reaches or exceeds 112mm. This time will be determined by the Corps biologist using appropriate data. A cycling time of a maximum 20 minutes off and a minimum of 2 minutes on must be followed. Cycling will be discontinued if warranted by fish condition or debris problems.

(i) Inspect and maintain the lines installed for the purpose of discouraging gull predation on juvenile salmonids.

(j) The second powerhouse juvenile bypass system continues to have poor fish guidance efficiency. Therefore, prior to the tenth percentile of the spring outmigration the second powerhouse units will not be operated for a minimum of five days following a tule production release from Spring Creek Hatchery. Additional restriction days (up to a grand total of fifteen) will be based upon 8 hour (1600 - 2400) powerhouse 1 bypass passage estimates (summation of each hours sample expanded for each hours sample time to an hourly estimate) of 1000 Spring Creek tules. Eight hour powerhouse 1 bypass passage estimates of Spring Creek tules must remain less than 1000 for two consecutive nights before the restriction will be lifted or once lifted the counts must exceed 1,000 for one day to reinstate the restriction at Bonneville 2. Second powerhouse units will not operate during the middle 80 percent (production releases prior to 1 April from Spring Creek Hatchery will not be considered in the computation of this percent) of the spring and summer outmigrations unless the units are needed to limit daytime (0600-2000 PST) spill to less than 75,000 cfs. This date will be provided by the Fish Passage Center to the Corps' Reservoir Center whom will relay to the project. Typically, when flows are above the capacity of the first powerhouse units, spill will occur. Units in the second powerhouse may be operated as necessary for fishery research. This restriction on the second powerhouse will not apply after August 15, after this date powerhouse 2 is available to meet firm load demands through September. Research activities will include 1) continued fish guidance research, 2) survival studies, and 3) evaluation of the use of the trash chute as a fish bypass.

(k) Maintain DSM water surface at unit #18 orifices between elevations 64.5 - 65.0.

(l) Maintain water surface on dewatering screen between elevations 60.8 - 61.2.

(m) Maintain water surface in downwell between elevations 54.0 - 58.0.

(3) <u>October 1 through November 15</u>

STSs may be removed from units as designated by the Project Biologis (at least one-half of the units must remain screened) to reduce wear and facilitate early winter maintenance. Enough units should remain screened such that the average expected

river flow (as estimated by the Reservoir Control Center) for this period would pass through screened units. STS's should be removed as designated by the Project Biologist. Order of operating priority will be 1) screened first powerhouse units, 2) screened second powerhouse units, 3) unscreened first powerhouse units, and 4) unscreened second powerhouse units.

(4) November 16 through March 14

All STSs removed. DSM channel dewatered (see Dewatering Procedures) only when required for maintenance. The period of maintenance should be minimized to the extent practicable. Facilities to be inspected at least once per day to assure criteria are being met. Additionally, all units should be operated at peak efficiency whenever practicable.

B. MAINTENANCE PLAN

1. Adult Fish Passage Facilities

a. Fish Passage Season - March 1 through November. (See Operating Standards)

b. Winter Maintenance Season - December 1 through February (see Operating Standards)

c. Fishway Auxiliary Water Systems

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - Bonneville Project auxiliary water systems consist of gravity flow and hydroelectric generating systems. Preventive maintenance and normal repair are carried out throughout the year.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - Most fishway auxiliary water systems are operated automatically. If the automatic system fails, then the system can usually be operated manually by project personnel. This will allow the fish facility to operate according to criteria while repair of the automatic system is carried out. When this operation becomes necessary, project personnel will increase the surveillance of the adult system to ensure that criteria are being met.

(a) Bonneville First Powerhouse - If any of the valves or any other part of the system fails, the project is to attempt to maintain criteria by adjusting those valves which continue to function. Conduit pressure must be monitored and not allowed to exceed the established limits. If this maneuver fails to keep the facility operating according to the adult fishway criteria and repairs cannot be made within 24 hours then close powerhouse entrances (9, 21, 34, 58 and 62), one at a time, starting with gate 9 and proceed north.

If closing the orifice gates fails to achieve a minimum fishway head of 1.2 feet when tailwater is greater than 17 feet, then raise gate 65 weir in one-foot increments up to 6 feet of depth below the tailwater surface until a head of 1.2 feet is achieved. If this fails to achieve the proper fishway head, then raise gate 1 weir in one-foot increments to 6 foot depth below the tailwater surface until a head of 1.2 feet is achieved.

When tailwater elevation is less than 17 feet and the gate 65 weir crest is at least 6 feet below

tailwater, close gate 64 in one-foot increments until the proper head is achieved or the gate is fully closed, then raise gate 65 in one-foot increments up to 6 feet below tailwater. If the gate 65 weir crest is less than 6 feet below tailwater, fully open gate 64 and close gate 65. If this fails to achieve the proper fishway head and the gate 1 weir crest is at least 6 feet below tailwater, close gate 2 in one-foot increments until fully closed, then raise gate 1 in one-foot increments up to 6 feet below tailwater. If the gate 1 weir crest is less than 6 feet below tailwater, fully open gate 2 and close gate 1. At this point maintain the gates' positions regardless of whether criteria are met or not, until the auxiliary water system is repaired.

(b) Bonneville Spillway - Two separate fishway auxiliary water valves add water to each spillway ladder (Cascades Island and B-Branch ladders). If one of these valves or any other part of the system malfunctions, the functioning parts of the system are to be adjusted to compensate. If repairs cannot be made in 24 hours, close the sluice gate entrance, if open. This will divert the reduced available water to the entrance slots. If a head of 1.0 foot is still not achieved, stoplogs are to be added to the entrance slots until the desired head or a weir depth of not less than 6 feet below the tailwater surface is reached. At this point maintain the gate positions until the auxiliary water system is repaired.

(c) Bonneville Second Powerhouse - If either of the fishway auxiliary water turbines are unable to provide water sufficient to meet full criteria, raise the North Upstream Entrance (NUE) in one-foot increments until the weir crest is 6 feet below the tailwater or a fishway head of a least 1.2 feet is achieved. If this fails to achieve the above criteria then apply the same procedure, until the criteria are achieved, using in addition the North Downstream Entrance (NDE) then, the South Upstream Entrance (SUE), and finally the South Downstream Entrance (SDE). The weir crests for these three entrances should not be raised above 6 feet below tailwater. If the correct fishway head is still not achieved after this procedure, then fully close NUE and operate in this configuration until repairs can be made to the system.

If both of the fishway auxiliary water turbines fail, the backup fishway auxiliary water system, using gravity flow through the ice and trash sluice way, will be started up. The adult facility will be

operated as follows:

1: Close NDE, SUE and NUE;

2: Operate the SDE weir crest at eight feet below tailwater;

3: Operate the floating orifice gates. However, if the backup fishway auxiliary water system must be used for a period exceeding 30 days, then block off as many of the center floating orifice gates as possible and open NDE with a weir depth of eight feet below the tailwater water surface. While under this configuration power generation at the second powerhouse will be minimized to reduce fish attraction into this area.

If both auxiliary water systems fail or malfunction, close SUE, NDE and NUE and raise SDE weir crest to six feet below tailwater elevation with the floating orifice gates open. Maintain this configuration until the system is repaired. While under this configuration power generation at the second powerhouse will be minimized to reduce fish attraction into this area.

d. Powerhouse and Spillway Adult Fish Collection System

(1) Scheduled Maintenance - (see Appendix A for coordination procedures) - Preventive maintenance and repair occurs throughout the year. During the adult fish passage season this maintenance will not involve any operations which will cause failure to comply with the adult fishway criteria except as specially coordinated or as needed for semi-annual maintenance. Inspection of those parts of the adult collection channel systems which require dewatering, such as diffusion gratings, picketed leads and entrance gates, will be scheduled at least once every ten years with at least one underwater inspection in between unless a channel must be dewatered for fishway modifications or to correct observed problems (See Dewatering Plans). Inspection by a diver or underwater video system may be used for the underwater inspections. This scheduled inspection and any associated maintenance will occur during the winter maintenance period. Any non-routine maintenance and fishway modifications will be handled on a case by case basis. Corps biologists will be on hand during all dewatering activities as well as during inspection operations to provide fishery input (See Dewatering Plans). However, if a biologist cannot be contacted in an emergency, the project will proceed, using all due care to ensure that fish are not stranded or injured. The project

will continue to attempt to contact the biologists.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The Bonneville Project contains several types of fishway entrances. There is little potential for failure in most of the entrance types while a few types do have histories of occasional failure. In most cases when a failure occurs the entrance can and will be operated manually by project personnel until repairs are made. When this operation becomes necessary, project personnel will increase the surveillance of the adult system to insure that criteria are being met. In those cases in which the failure will not allow the entrance to be operated manually, the gate will be maintained, to the extent possible, in an operational position. If this is not possible the entrance will be repaired expediently and the entrance will be brought back into manual or automatic control at the earliest possible date.

e. Adult Fish Ladders and Counting Stations

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The adult fish ladders are usually dewatered (see Dewatering Plan) once each year during the winter maintenance period. During this time the ladders are inspected for blocked orifices, projections into the fishway that may injure fish, stability of the weirs, damaged picketed leads, exit gate problems, loose diffusion gratings, unreadable or damaged staff gauges, defective diffusion valves and malfunctioning operating equipment at the counting stations as well as other potential problems. Problems identified throughout the passage year that do not affect fish passage through the ladder as well as those identified during the dewatered period may then be repaired.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The Bonneville First Powerhouse ladder was completed in 1937 and the Bonneville Second Powerhouse ladder in 1981. Modification of the first powerhouse ladder was completed during the winter of 1981-82. The structures of the ladders include picketed leads, counting stations, fishway exits and overflow weirs with orifices. Picketed leads can cause problems. Pickets with excessive spacing (greater than 1"), erosion of concrete around the picketed leads or missing pickets can allow fish into areas where escape is not possible. In some instances of picketed lead failure, spare picketed leads and spare installation slots are available. In these cases the spare leads are installed and the damaged leads are removed and

repaired. In the remaining instances of picketed lead failure or concrete erosion, the timing and method of repair will depend upon the severity of the problem. The decision of whether or not to dewater the fishway and repair any problems will be made in consultation with the fishery agencies and Indian tribes.

2. Juvenile Fish Passage Facilities

a. Fish Passage Season - March 15 through November 15 (See Operating Standards). Passage season may start as early as March 1 if a Bonneville pool hatchery release occurs.

b. Winter Maintenance Period - November 16 through March 14 (See Operating Standards). Earlier end of this period is subject to early Bonneville pool hatchery release.

c. Submersible Traveling Screens (STSs)

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The STS system will receive preventive maintenance or repair at all times of the year including the winter maintenance period when all STSs may be removed from the intakes. Whenever a generator malfunctions or is scheduled for maintenance, the three STSs in that turbine may be maintained, repaired or exchanged for other STSs needing maintenance or repair. One third of the STSs at Bonneville are scheduled for complete overhaul each year resulting in a three-year maintenance cycle unless future developments indicate that longer life expectancy is possible.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - If an STS is found to be damaged or inoperative in an operating unit, refer to Figure I-1. During the peak juvenile passage periods (April 15 through Sept.), the day of and four days following a juvenile fish release in the Bonneville pool or when the juvenile salmonid index at Bonneville exceeds 3,000, a crane crew will be taken off lower priority work or will work overtime to remove and replace (if spare available) a damaged or malfunctioning STS or VBS from any unit needed or likely to be needed for firm energy within the next 48 hours. Crews will work overtime or as call-outs on weekends as required.

d. Juvenile Bypass Systems

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The Bonneville juvenile bypass facilities will receive preventive maintenance at all times of the year. During the juvenile fish passage season this will normally be above water work such as maintenance of automatic systems, air lines, electrical systems and monitoring equipment. During the winter maintenance period the systems are dewatered downstream of the gatewell orifices. The systems are then visually inspected in all accessible areas for damaged equipment and areas that may cause

problems to the juvenile fish. Any problem areas identified are repaired if the project is able. In extreme cases the work will be contracted as soon as possible or repaired during the next winter maintenance period. Modifications and general maintenance to the channels are also to be completed at this time. The trash racks are to be raked just prior to the juvenile fish passage season and whenever trash accumulations are suspected because of increased head differential across the trash racks or increased juvenile fish descaling is noted at Bonneville. Additional raking of trash racks may be necessary when a storm brings large quantities of debris down river to the project. Gatewell orifices of the unit being raked must be closed during the procedure (applies only to the first powerhouse).

(2) Unscheduled Maintenance (see Appendix A for coordination procedures)

(a) The Bonneville project's juvenile bypass systems are controlled by automatic systems. When an automatic system fails, it usually can be operated manually. This allows either facility to operate according to criteria while repair of the automatic system is completed. Orifices allow fish out of the gatewells into a bypass channel. When the orifices become plugged with debris they are either mechanically (Second Powerhouse) or pneumatically (First Powerhouse) cleaned out.

The gatewells will be inspected daily and debris will be removed (debarked) before the gatewell water surface is fully covered with debris, to maintain clean orifices and minimize fish injury. The gatewell orifices must be closed during the debarking process.

(b) Bonneville First Powerhouse - If any part of the dewatering screen, downwell or juvenile release conduit fails, making this portion of the system unsafe for juvenile fish, the juveniles will be diverted to the ice and trash sluice way. This operating mode will require the gate at the south end of the downstream migrant (DSM) channel to be removed and a stoplog at the north end to be installed so migrants will flow down into the ice and trash sluice way channel. Sluice way gate 7A will be opened to a depth of 3.5 feet and gate 10C to 2.5 feet below the minimum expected forebay to provide safe transportation flows for juveniles. Forebay elevation will be kept above 74.0 msl. to the extent practicable. The bypass will then continue operating while repairs are completed. In either

Figure I-1.
Operating and Maintenance Instructions in the Event of STS or VBS Failure at Bonneville Dam:

1. If the project is operating with all available units to meet firm energy demands during low debris conditions, continue operating until step 3 can be accomplished, otherwise proceed immediately to step 2.

2. Units 10, 9, 18, and 17 will continue operating under any load conditions (except during high debris period) with failed STS or VBS until step 3 can be accomplished. Under high debris conditions any unit with a failed or malfunctioning STS will be shut down. If either unit 1 or 2 is out of service and the other of these two units has a malfunctioning screen, that unit must stay in operation. The failed STS or VBS in any of the above units will be repaired or replaced within 24 hours. Turbine units 1 and 2 will replace turbine units 9 and 10 in the above priority when the First Powerhouse bypass channel flow is to the south. Any other unit with failed STS or VBS will be shut down until step 3 can be accomplished or that unit is required to meet firm energy demand, in which case the unit will be the last to be brought on line and the first off line.

3. During working hours, assuming the BPA dispatcher will unload Bonneville on request, the unit will be taken out of service and the failed STS or VBS examined. If the required repairs can be accomplished that day, they will be done and the unit may then be returned to service. During the peak juvenile passage period (April 15 - September 30), the day of and four days following a juvenile fish release in the Bonneville pool, or when the juvenile salmonid index at Bonneville exceeds 3,000, an STS fails on a unit required for generation, then a crane crew will be taken off all but higher priority work or will work overtime or weekends to remove and replace (if spare available) the damaged or malfunctioning STS or VBS.

4. If repairs require longer than the rest of the day, the STS or VBS will be replaced with a spare or one from a long term out of service unit. If all available turbines are required to meet firm energy demands or to control excess spill during daylight hours, unscreened turbines will be operated. The STS or VBS will be replaced with one from Unit 8 then 7 (PH-1) or Unit 15 (PH-2), and the unit will be returned to service. If the unscreened unit must be operated for longer than one week then remove the damaged STS or VBS according to table I-1. STSs or VBSs should be removed from the A-slot first, B-slot second, C-slot third except at unit 7 where the order of removal should be B, C, A. If the failed STS or VBS is in units 7 or 8 the failed STS or VBS will be removed and repaired.

5. All partially screened or unscreened units will be operated according to Juvenile Operating Standards (I2a(2)(j)) until a spare or repaired STS or VBS is available for installation.

Table I-1

Submersible Traveling Screen Removal Order When It Becomes Necessary to Remove a Malfunctioning Submersible Traveling Screen and Operate the Unscreened Unit at Bonneville Dam.

	1st Powerhouse Turbine Units		2nd Powerhouse Turbine Units	
Order to Pull*	Mar. 15- Jul. 5	Jul. 6 - Sep. 30	Mar. 15- Jul. 5	Jul. 6- Sep. 30
1	8	8	15	15
2	2	7*	14	14
3	1	9	13	13
4	9	10	12	12
5	7*	6	16	16
6	10	2	11	11
7	3	5	17	17
8	4	1	18	18
9	6	3	N/A	N/A
10	5	4	N/A	N/A

* STS should be removed from the A-slot first, B-slot second, C-slot third, except at unit 7 where the STS removal order should be B, C, A.

operating mode, the orifices will be cleaned with the air pressure system at least once per day, when plugged orifices are indicated, or after trash rack raking and gatewell debarking.

(c) Bonneville Second Powerhouse - If the bypass system fails in the dewatering section, downwell or release pipe, fish may be released through the emergency relief conduit. This operation will continue until repairs are accomplished or until the end of the fish passage season. Any decision on whether or not to shut this system down for dewatering and repairs will be made in consultation with the fisheries agencies and Indian tribes. During this emergency operating mode, power generation will be minimized at the second powerhouse to the extent possible. Repairs will receive high priority.

During fishway inspection activities the VBSs may be found to be plugged or damaged. In these cases refer to Figure I-1.

3. Turbines and Spillways

Scheduled Maintenance (see Appendix A for coordination procedures) - The maintenance and routine repair of project turbines and spillways is a regular and reoccurring process which requires that units be shut down for up to two months (see Dewatering Plans). The schedule for this maintenance will be reviewed by CENPP-OP-PF biologists and coordinated within NPP, NPD and BPA. Certain turbine and spillway discharges at the projects are secondarily used to attract adult fish to the area of fishway entrances, to keep predator fish from accumulating in the area of juvenile release sites and to move juveniles downstream away from the project. The maintenance schedules for these turbines and spillways will reflect equal weighting given to fish, power and water management and will be coordinated with the appropriate resource agencies. No other fish related restrictions regarding maintenance will be placed on any units at these projects, except coordinated research activities.

C. Dewatering Plan

1. Adult Fish Ladder

a. Scheduled Maintenance (see Appendix A for coordination procedures)

(1) When possible operate ladder to be dewatered at orifice flow for at least 24 hours but no more than 48 hours prior to dewatering.

(2) Discontinue all fishway auxiliary water supply at least 24 hours but no more than 48 hours prior to dewatering.

(3) Corps biologist will assure that fish rescue equipment is available and will coordinate to ensure adequate numbers of personnel will be available to move fish out of the dewatered ladder.

(4) Project personnel will install head gates to shut down ladder flow. Where possible, a flow of 1-2 inches will be maintained in the ladder until fish are rescued.

(5) At least one Corps biologist will immediately inspect the dewatered ladder and inform the rescue crews of the locations of all stranded fish. A Corps biologist will provide technical guidance in fish safety and assist in the rescue operation. The rescue personnel will then walk the inside of the ladder from the head gates down to tailwater salvaging all fish either by moving fish to tailwater within the ladder flow or capturing and placing the fish in a large water filled tank which is then transported to the forebay or tailwater, whichever is closest, for release.

b. Unscheduled Maintenance (see Appendix A for coordination procedures)

(1) When possible, discontinue fishway auxiliary water and operate ladder at orifice flow as long as possible (prefer 3-24 hours) prior to dewatering.

(2) Follow steps 3-5 above.

2. Powerhouse Fish Collection System

a. Scheduled Maintenance (see Appendix A for coordination procedures)

(1) During the pumping or draining operation to dewater a portion or all of the collection channel, the water level will not be allowed to drop to a level which strands fish.

(2) Corps biologists will assure that rescue equipment is available if needed.

(3) A Corps biologist will provide technical guidance on fish safety and will assist in any necessary rescue operation.

3. Turbines

a. When possible, place head gates and tail logs immediately after turbine unit is shut down if draft tube is to be dewatered.

b. If turbine unit draft tube is to be dewatered and turbine unit has been idle, it will be operated when possible, at "speed/no load" for at least ten minutes and stop logs will then be placed immediately.

c. Water levels in the draft tube will not be allowed to drop to a level which strands fish.

d. Corps biologist will be on site to inspect dewatered turbine draft tubes and intakes as soon as the water levels reach a depth permitting visual inspection and the hatch cover is opened.

e. Corps biologists will assure that rescue equipment is available if needed.

f. A Corps biologist will provide technical guidance on fish safety and assist in any necessary rescue operation.

g. If Unit is planned to be out of service for less than 4 days then it is not required to remove fish from draft tubes as long as a "safety pool" is maintained.

THE DALLES DAM

A. OPERATING STANDARDS

1. Adult Fish Passage Facilities

a. **Prior to March 1 each year**

(1) Inspect all staff gauges and water level indicators, repair and/or clean where necessary.

(2) Inspect dewatered sections of fish facilities for projections, debris or plugged orifices which could injure fish or slow their progress up the ladder. Repair deficiencies.

(3) Inspect for, and when necessary, clear debris in the ladder exits.

(4) Reinstall picketed leads at counting stations prior to watering up the ladders during maintenacne.

b. **March 1 through November (Fish Passage Period)**

(1) All Adult Fish Facilities

(a) Water depth over fish ladder weirs: 1.2 feet ($\pm$0.1).

(b) Head on all entrances: 1.0 to 1.5 feet (prefer 1.3 to 1.5). Refer to maintenance plan when unable to achieve head criteria.

(c) A transportation velocity of 1.5 to 4.0 feet per second (prefer 2.0 fps) shall be maintained in all channels and the lower ends of the fish ladders which are below the tailwater.

(d) Maximum of 6" head on attraction water intakes and trash racks at all the ladder exits, with a 4" maximum head on all picketed leads. Debris shall be removed when significant amounts accumulate.

(e) Staff gauges and water level indicators will be readable at all water levels encountered during the fish passage period.

(f) Main entrance weir depths: 8 feet or greater below tailwater. Weirs will be lowered to bottom when 8 feet depth is not possible.

(2) North Fishway

(a) North Fishway Entrance: Operate entrances N1

and N2 during periods with spill. N2 may be closed during periods with no spill.

(3) Powerhouse

(a) West Powerhouse Entrance: Operate two entrances (W1 and W2).

(b) East Powerhouse Entrance: Operate all three entrances (E1, E2, E3) except as required during low tailwater conditions (below el 78') when E1 entrance may be closed.

(c) Operate 11 submerged orifices along the powerhouse collection system. Orifice numbers are: 3, 12, 24, 39, 57, 78, 102, 117, 129, 135, and 136.

(d) The cul-de-sac entrance will remain closed to avoid fallout of upstream migrants.

(e) South Spillway Entrance: Operate both downstream entrances (S1 and S2).

(4) Spillway Operations

The following spill schedule (Table II-1) shall be followed during the day time (0600 - 2000) for adult migrant attraction.

c. **December 1 through February (Winter Operating Period)**

(1) Operate the powerhouse and south spillway adult fish passage facilities according to the fish passage period standards above except the system may be dewatered or operated out of criteria for repair and maintenance. Adjust the counting station fish crowder to full open and pull picketed leads at counting station at the end of the counting season.

(2) Operate the north spillway adult fish passage facilities according to the following criteria:

(a) No spill period - Operate entrance gate N1, head attainable by ladder flow only. Weir crest 6 feet below tailwater.

(b) Spill period - operate entrance Gate N1 with 1.0 foot head. Weir crest 8 feet below tailwater.

(c) East ladder dewatered or operating out of fish passage period criteria - Operate entrance gate N1 and N2 with 1.0 foot head. Weir crest 8 feet below tailwater.

(3) Only one of the two fish facilities may be out of service at any one time except under extreme situations.

Spilling Schedule at The Dalles Dam Adjusted for Expanded Powerhouse (openings in feet).
Revised January 1985.

Pool Elevation 159.6'

Gate Number																							kcf
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
(1)																						1	
1	(1)																				1	1	
1	1	(1)																		1	1	1	
1	1	1	(1)																1	1	1	1	
1	1	1	1	(1)														1	1	1	1	1	
1	1	1	1	1	(1)												1	1	1	1	1	1	
1	1	1	1	1	1	(1)										1	1	1	1	1	1	1	
1	1	1	1	1	1	1	(1)								1	1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1	(1)						1	1	1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1	1	(1)				1	1	1	1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1	1	1	(1)		1	1	1	1	1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1	1	1	1	1	(2)	1	1	1	1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1	1	1	2	1	2	1	(2)	1	1	1	1	1	1	1	1	
1	1	1	1	1	1	2	1	2	1	2	1	2	1	2	1	(2)	1	1	1	1	1	1	
1	1	1	1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	(2)	1	1	1	1	
1	1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	(2)	1	1	
1	1	1	1	2	1	2	1	2	2	2	(2)	2	1	2	1	2	1	2	1	2	1	1	
1	1	1	1	2	1	2	2	2	2	2	2	2	(2)	2	1	2	1	2	1	2	1	1	
1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	(2)	2	1	2	1	2	1	1	
1	1	1	1	2	2	2	2	2	2	2	2	(3)	2	2	2	2	2	2	1	2	1	1	
1	1	1	1	2	2	2	2	2	2	3	2	3	2	(3)	2	2	2	2	1	2	1	1	
1	1	1	1	2	2	2	2	3	2	3	2	3	2	3	2	2	2	2	(2)	2	1	1	
1	1	1	1	2	2	3	2	3	2	3	2	3	2	3	2	(3)	2	2	2	2	1	1	
1	1	1	1	2	2	3	2	3	2	3	3	3	2	3	2	3	2	(3)	2	2	1	1	
1	1	1	1	2	2	3	2	3	3	3	3	3	(3)	3	2	3	2	3	2	2	1	1	
1	1	1	2	2	2	3	2	3	3	3	3	3	3	3	(3)	3	2	3	2	2	1	1	
1	1	2	2	2	2	3	2	3	3	3	3	3	3	3	3	(3)	3	3	2	2	1	1	
1	1	2	2	2	2	3	3	3	3	3	3	(4)	3	3	3	3	3	3	2	2	1	1	
1	1	2	(3)	2	3	3	3	3	3	3	3	4	3	3	3	3	3	3	2	2	1	1	
1	1	2	3	2	3	3	3	3	3	4	3	3	3	(4)	3	3	3	3	2	2	1	1	
1	1	2	3	2	3	3	3	4	3	4	3	4	3	4	3	3	3	3	2	2	(2)	1	
1	1	2	3	2	3	4	3	4	3	4	(4)	4	3	4	3	3	3	3	2	2	2	1	
1	1	2	3	2	3	4	3	4	4	4	4	4	(4)	4	3	3	3	3	2	2	2	1	
1	2	2	3	2	3	4	3	4	4	4	4	4	4	4	3	3	3	3	2	(3)	2	1	1
1	2	2	3	2	3	4	(4)	4	4	4	4	4	4	4	4	3	3	3	2	3	2	1	1
1	2	2	3	2	3	4	4	4	4	(5)	4	5	4	4	4	3	3	3	2	3	2	1	1
1	2	2	3	2	3	4	4	5	4	5	4	5	4	4	4	(4)	3	3	2	3	2	1	1
1	2	2	3	2	3	4	4	5	4	5	5	5	4	(5)	4	4	3	3	2	3	2	1	1
1	2	2	3	3	3	4	4	5	4	5	5	5	(5)	5	4	4	3	3	2	3	2	1	1
1	2	3	3	3	3	4	4	5	(5)	5	5	5	5	5	4	4	3	3	2	3	2	1	1

Gate Number																						kcfs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	2	3	3	4	3	4	4	5	5	5	5	5	5	5	5	4	4	3	3	(3)	3	2	1	123
1	2	3	3	4	3	4	5	5	5	5	5	5	5	5	4	4	3	(4)	3	3	2	1	126
1	2	3	3	4	4	4	5	5	5	5	5	5	5	5	(5)	4	3	4	3	3	2	1	129
1	2	3	3	4	4	5	5	5	5	5	5	5	5	5	5	4	3	4	(4)	3	2	1	132
1	2	3	3	5	4	5	5	5	5	5	5	5	5	5	5	4	(4)	4	4	3	2	1	135
1	2	3	4	5	4	5	5	5	5	5	5	5	5	5	5	4	(5)	4	4	3	2	1	138
1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	(5)	5	4	4	3	2	1	141
1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	(4)	2	1	144
1	2	3	4	5	5	5	5	5	5	6	5	5	5	5	5	5	5	(5)	5	4	2	1	146.
1	2	3	4	5	5	5	5	(6)	5	6	5	6	5	5	5	5	5	5	5	4	2	1	149.
1	2	3	4	5	5	5	5	6	5	6	6	6	6	(6)	5	5	5	5	5	4	2	1	152.
1	2	3	4	5	5	5	5	6	6	6	6	6	(6)	6	5	5	5	5	5	4	2	1	155.
1	2	4	4	5	5	5	5	6	6	6	6	6	6	6	5	5	5	5	5	4	(3)	1	158.
1	2	4	4	5	5	6	5	6	6	6	6	6	6	6	5	(6)	5	5	5	4	3	1	161.
1	2	4	4	5	5	6	6	6	6	6	6	6	6	6	(6)	6	5	5	5	4	3	1	163.
1	2	4	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	4	3	(2)	166.
1	2	4	4	5	6	6	6	6	6	6	6	6	6	6	6	6	(6)	5	5	4	4	2	169.
1	2	4	5	5	6	6	6	6	6	(7)	6	6	6	6	6	6	6	5	5	4	4	2	172.
1	2	4	5	5	6	6	6	(7)	6	7	6	7	6	6	6	6	6	5	5	4	4	2	175.
1	2	4	5	5	6	7	6	7	6	7	6	7	6	(7)	6	6	6	5	5	4	4	2	178.
1	2	4	5	5	6	7	7	7	7	7	(7)	7	7	7	6	6	6	5	5	4	4	2	181.
1	2	4	5	5	6	7	7	7	7	7	7	7	(7)	7	6	6	6	5	5	4	4	2	184.
1	2	4	5	(6)	6	7	7	7	7	7	7	7	7	7	6	6	6	6	5	4	4	2	187.
1	2	(5)	5	6	6	7	7	7	7	7	7	7	7	7	6	6	6	6	5	5	4	2	190.
1	3	5	5	6	6	7	7	7	7	7	7	7	7	7	7	6	6	6	5	5	4	2	193.
1	3	5	5	6	7	7	7	7	7	7	7	7	7	7	7	(7)	6	6	5	5	4	2	196.
1	3	5	6	6	7	7	7	7	7	7	7	7	7	7	7	7	(7)	6	5	5	4	2	199
1	3	5	6	6	7	7	7	7	7	8	7	7	7	7	7	(8)	7	6	5	5	4	2	202
1	3	5	6	6	7	7	7	8	7	8	7	(8)	7	7	7	8	7	6	5	5	4	2	205
1	3	5	6	6	7	8	7	8	7	8	7	8	7	(8)	7	8	7	6	5	5	4	2	207
1	3	5	6	6	7	8	7	8	8	8	(8)	8	7	8	7	8	7	6	5	5	4	2	210
1	3	5	6	6	7	8	8	8	8	8	8	8	7	8	7	8	7	6	(6)	5	4	2	213
1	3	5	6	7	7	8	8	8	8	8	8	8	7	8	7	8	7	(7)	6	5	4	2	216
1	3	5	7	7	7	7	8	8	8	8	8	8	(8)	8	7	8	7	7	6	5	4	2	219
1	3	5	7	7	8	8	8	8	8	8	8	8	8	8	(8)	8	7	7	6	5	4	2	222

Values in parenthesis may be 1 foot less than the values shown.
For example: (1) means 0 or 1 foot
(2) means 1 or 2 feet
An approved spill schedule which incorporates raising spillbay gates in blocks of four will be implemented when changes in spill discharge are frequent.

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2. Juvenile Fish Passage Facilities

a. **Prior to April 1 each year**

(1) Remove debris from forebay, trash racks and gatewell slots.

(2) Inspect and, where necessary, clean gatewell orifices of debris.

(3) Inspect, test and lubricate chain gates, end gates and hoists for operation as needed.

(4) Inspect and correct any epoxy or concrete deficiencies on walls and floors of ice-trash sluice raceway.

b. **April 1 through November 15 (Passage Period)**

(1) Clean trash racks as flow conditions dictate or when drawdown in gatewell slots exceeds 1.5 feet or as indicated by fish condition at Bonneville (i.e., higher than expected descaling).

(2) Remove debris from forebay when needed, and from gatewell slots when gatewell water surface is over one-half covered.

(3) Operate all gate slot orifices full time.

(4) Either turbine unit 1 or unit 2 or both units should be operating during daylight hours.

(5) Operate sluice way gates 1-1, 1-2 & 1-3 at least 16 hours per day (sunrise to sunset) through August, and at least sunrise to sunset from September 1 on with full surface flow (lower or raise sluice gates completely). During nighttime hours the sluiceway should be operated as a plunge pool for the gate slot orifices unless sluice gates are operating 24 hours per day. During periods of involuntary spill, sluice gates may be operated continuously.

(6) Operate the sluiceway end gate full open from sunrise to sunset.

(7) During period when gates do not operate, set top of bottom end gate at 142 elevation to create orifice plunge pool.

(8) Once each week and more frequently if accumulations of debris are observed, close gates 1-1, 1-2 & 1-3, and open gates 17-3, 18-1 & 18-2 for two hours to flush out debris and fish being held in the

sluiceway channel east of unit 1.

c. **General**

(1) During chain gate operation, maintain forebay level above elevation 158.0 to the extent practicable.

(2) Maintain orifices clear of debris.

(3) Inspect facilities twice each day.

(4) Operate turbine units at peak efficiency whenever practicable. The best fish passage survival is associated with turbine efficiency.

(5) Follow the schedule in Table II-2 for nighttime spill (2000 - 0600). This schedule was developed for juvenile fish passage.

d. **November 15 through March**

(1) Maintain orifices clear of debris.

(2) Set top of bottom end gate at 142 elevation to create orifice plunge pool.

Table II-2

Spilling schedule for The Dalles Dam for Juvenile Fish Passage
2000 - 0600 hours

Total Spill kcfs	Spill Bay 10	11	12	13	14	15	16	17	18	19	20	21	22	23
10.5												7		
12.0												8		
13.5												9		
15.0												10		
16.5										6		5		
18.0										6		6		
19.5										7		6		
21.0										7		7		
22.5										8		7		
24.0										8		8		
25.5										9		8		
27.0										9		9		
28.5										10		9		
30.0										10		10		
31.5										7		7		7
33.0										8		7		7
34.5										8		8		7
36.0										8		8		8
37.5										9		8		8
39.0										9		9		8
40.5										9		9		9
42.0										10		9		9
43.5										10		10		9
45.0										10		10		10
46.5										7	6	6	6	6
48.0										7	7	7	6	6
49.5										7	7	7	7	6
51.0										7	7	7	7	7
52.5									6	6	6	6	6	6
54.0									7	6	6	6	6	6
55.5									7	7	6	6	6	6
57.0									7	7	7	6	6	6
58.5									7	7	7	7	6	6
60.0									7	7	7	7	7	6
61.5									7	7	7	7	7	7
63.0								7	6	6	6	6	6	6

Table II-2 (cont.)

Spilling schedule for The Dalles Dam for Juvenile Fish Passage
2000 - 0600 hours

Total Spill kcfs	Spill Bay 10	11	12	13	14	15	16	17	18	19	20	21	22	23
64.5								7	7	6	6	6	6	6
66.0								7	7	7	6	6	6	6
67.5								7	7	7	7	6	6	6
69.0								7	7	7	7	7	6	6
70.5								7	7	7	7	7	7	6
72.0								7	7	7	7	7	7	6
73.5							7	6	6	6	6	6	6	6
75.0							7	7	6	6	6	6	6	6
76.5							7	7	7	6	6	6	6	6
78.0							7	7	7	7	6	6	6	6
79.5							7	7	7	7	7	6	6	6
81.0							7	7	7	7	7	7	6	6
82.5							7	7	7	7	7	7	7	6
84.0							7	7	7	7	7	7	7	7
85.5							8	7	7	7	7	7	7	7
87.0							8	8	7	7	7	7	7	7
88.5							8	8	8	7	7	7	7	7
90.0							8	8	8	8	7	7	7	7
91.5							8	8	8	8	8	7	7	7
93.0							8	8	8	8	8	8	7	7
94.5							8	8	8	8	8	8	8	7
96.0							8	8	8	8	8	8	8	8
97.5					7	7	7	7	7	6	6	6	6	6
99.0					7	7	7	7	7	7	6	6	6	6
100.5					7	7	7	7	7	7	7	6	6	6
102.0					7	7	7	7	7	7	7	7	6	6
103.5					7	7	7	7	7	7	7	7	7	6
105.0					7	7	7	7	7	7	7	7	7	7
106.5					8	7	7	7	7	7	7	7	7	7
108.0					8	8	7	7	7	7	7	7	7	7
109.5					8	8	8	7	7	7	7	7	7	7
111.0					8	8	8	8	7	7	7	7	7	7
112.5					8	8	8	8	8	7	7	7	7	7
114.0					8	8	8	8	8	8	7	7	7	7
115.5					8	8	8	8	8	8	8	7	7	7
117.0					8	8	8	8	8	8	8	8	7	7

Table II-2 (cont.)

Spilling schedule for The Dalles Dam for Juvenile Fish Passage
2000 - 0600 hours

Total Spill kcfs	Spill Bay													
	10	11	12	13	14	15	16	17	18	19	20	21	22	23
118.5					8	8	8	8	8	8	8	8	8	7
120.0					8	8	8	8	8	8	8	8	8	8
121.5		7	7	7	6	6	6	6	6	6	6	6	6	6
123.0		7	7	7	7	6	6	6	6	6	6	6	6	6
124.5		7	7	7	7	7	6	6	6	6	6	6	6	6
126.0		7	7	7	7	7	7	6	6	6	6	6	6	6
127.5		7	7	7	7	7	7	7	6	6	6	6	6	6
129.0		7	7	7	7	7	7	7	7	6	6	6	6	6
130.5		7	7	7	7	7	7	7	7	7	6	6	6	6
132.0		7	7	7	7	7	7	7	7	7	7	6	6	6
133.5		7	7	7	7	7	7	7	7	7	7	7	6	6
135.0		7	7	7	7	7	7	7	7	7	7	7	7	6
136.5		7	7	7	7	7	7	7	7	7	7	7	7	7
138.0		8	7	7	7	7	7	7	7	7	7	7	7	7
139.5		8	8	7	7	7	7	7	7	7	7	7	7	7
141.0		8	8	8	7	7	7	7	7	7	7	7	7	7
142.5		8	8	8	8	7	7	7	7	7	7	7	7	7
144.0		8	8	8	8	8	7	7	7	7	7	7	7	7
145.5		8	8	8	8	8	8	7	7	7	7	7	7	7
147.0		8	8	8	8	8	8	8	7	7	7	7	7	7
148.5		8	8	8	8	8	8	8	8	7	7	7	7	7
150.0		8	8	8	8	8	8	8	8	8	7	7	7	7
151.5		8	8	8	8	8	8	8	8	8	8	7	7	7
153.0		8	8	8	8	8	8	8	8	8	8	8	7	7
154.5		8	8	8	8	8	8	8	8	8	8	8	8	7
156.0		8	8	8	8	8	8	8	8	8	8	8	8	8
157.5	8	8	8	8	8	8	8	7	7	7	7	7	7	7
159.0	8	8	8	8	8	8	8	8	7	7	7	7	7	7
160.5	8	8	8	8	8	8	8	8	8	7	7	7	7	7
162.0	8	8	8	8	8	8	8	8	8	8	7	7	7	7
163.5	8	8	8	8	8	8	8	8	8	8	8	7	7	7
165.0	8	8	8	8	8	8	8	8	8	8	8	8	7	7
166.5	8	8	8	8	8	8	8	8	8	8	8	8	8	7
168.0	8	8	8	8	8	8	8	8	8	8	8	8	8	8
169.5	9	8	8	8	8	8	8	8	8	8	8	8	8	8
171.0	9	9	8	8	8	8	8	8	8	8	8	8	8	8

Table II-2 (cont.)

Spilling schedule for The Dalles Dam for Juvenile Fish Passage
2000 - 0600 hours

Total Spill kcfs	Spill Bay 10	11	12	13	14	15	16	17	18	19	20	21	22	23
172.5	9	9	9	8	8	8	8	8	8	8	8	8	8	8
174.0	9	9	9	9	8	8	8	8	8	8	8	8	8	8
175.5	9	9	9	9	9	8	8	8	8	8	8	8	8	8
177.0	9	9	9	9	9	9	8	8	8	8	8	8	8	8
178.5	9	9	9	9	9	9	9	8	8	8	8	8	8	8
180.0	9	9	9	9	9	9	9	9	8	8	8	8	8	8
181.5	9	9	9	9	9	9	9	9	9	8	8	8	8	8
183.0	9	9	9	9	9	9	9	9	9	9	8	8	8	8
184.5	9	9	9	9	9	9	9	9	9	9	9	8	8	8
186.0	9	9	9	9	9	9	9	9	9	9	9	9	8	8
187.5	9	9	9	9	9	9	9	9	9	9	9	9	9	8
189.0	9	9	9	9	9	9	9	9	9	9	9	9	9	9
190.5	10	9	9	9	9	9	9	9	9	9	9	9	9	9
192.0	10	10	9	9	9	9	9	9	9	9	9	9	9	9
193.5	10	10	10	9	9	9	9	9	9	9	9	9	9	9
195.0	10	10	10	10	9	9	9	9	9	9	9	9	9	9
196.5	10	10	10	10	10	9	9	9	9	9	9	9	9	9
198.0	10	10	10	10	10	10	9	9	9	9	9	9	9	9
199.5	10	10	10	10	10	10	10	9	9	9	9	9	9	9
201.0	10	10	10	10	10	10	10	10	9	9	9	9	9	9
202.5	10	10	10	10	10	10	10	10	10	9	9	9	9	9
204.0	10	10	10	10	10	10	10	10	10	10	9	9	9	9
205.5	10	10	10	10	10	10	10	10	10	10	10	9	9	9
207.0	10	10	10	10	10	10	10	10	10	10	10	10	9	9
208.5	10	10	10	10	10	10	10	10	10	10	10	10	10	9
210.0	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Use the same pattern trend for spill exceeding 210 kcfs; individual spill bay discharges during nighttime hours should not be less than 7.5 kcfs.

B. THE DALLES DAM FISH FACILITIES MAINTENANCE PLAN

1. Adult Fish Passage Facilities

a. Fish Passage Season - March 1 through November. Operate according to criteria in Operating Standards.

b. Winter Maintenance Season - December 1 through February each year. Operate according to criteria in Operating Standards.

c. Fishway Auxiliary Water Systems

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The Dalles Project auxiliary water fishway water is provided by gravity flow and discharge from hydroelectric turbine systems. Preventive maintenance and normal repair are carried out throughout the year.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - Most fishway auxiliary water systems operate automatically. If the automatic system fails, the system can usually be operated manually by project personnel. This will allow the fish facility to operate according to criteria while the repair of the automatic system is carried out. When this operation becomes necessary project personnel will increase the surveillance of the adult system to ensure that criteria are being met.

(a) The Dalles Powerhouse - If one of the two fishway auxiliary water turbines fails or malfunctions during spring or summer adult migration seasons (March 1 - July 31) use the following sequential procedure until a fishway head of 1.2 feet is achieved:

1: Raise the open West Powerhouse Entrance weirs W1 and W2 (W3 normally closed) in one-foot increments until a proper head is achieved or until the weirs reach 6 feet of depth below the tailwater surface.

2: Raise the East Entrance weirs E2 and E3 (E1 closed at tailwater below 78 feet) in one-foot increments to 6 feet of depth below the tailwater surface.

3: Close West Powerhouse Entrance weir W2.

4: Close one East Entrance weir E1.

5: Raise the South Spillway Entrance weirs S1

and S2 in one-foot increments to 6 feet of depth below the tailwater surface.

6: Close one South Spillway Entrance (S2).

7: Close alternating floating orifices starting from the west end of the powerhouse.

8: If a fishway head of 1.2 feet is still not achieved leave in this configuration until more auxiliary water becomes available. Then reverse the above procedure.

If one of the fishway auxiliary water turbines fails, malfunctions or is out of service for necessary maintenance during the fall adult migration or winter maintenance season (August 1 - February 28) use the following sequential procedure until a fishway head of 1.2 feet is achieved:

1: Raise the open West Powerhouse Entrance weirs in one-foot increments to 6 feet of depth below the tailwater surface.

2: Raise the South Spillway Entrance weirs in one-foot increments to 6 feet of depth below the tailwater surface.

3: If more than one West Entrance weir is operating close all but one (W1).

4: Close one South Spillway Entrance (S2).

5: Raise the East Entrance weirs in one-foot increments to 6 feet of depth below the tailwater surface.

6: Close one East Entrance weir (E1).

7: Close every other floating orifice starting from the west end of the powerhouse.

8: If a fishway head of 1.2 feet is still not achieved, then leave in this configuration until more auxiliary water becomes available.

If both of the fishway auxiliary water turbines fail or malfunction, regardless of fish passage season, the adult fish passage facility will be operated as follows:

1: S1 open with the weir crest 6 feet below the tailwater surface, S2 closed;

2: The junction pool weir supplying the

powerhouse collection system and west powerhouse entrances will be closed;

3: E3 will be open with the weir crest 6 feet below the tailwater surface and E1 and E2 will be closed.

(b) The Dalles North Ladder - If the gravity flow fishway auxiliary water system fails, N1 will remain open with a weir depth of 6 feet below the tailwater surface and N2 will be closed.

d. Powerhouse and Spillway Adult Fish Collection System

(1) Scheduled Maintenance - (see Appendix A for coordination procedures) - Preventive maintenance and repair occurs throughout the year. During the adult fish passage season the maintenance will not involve any operations which will cause a failure to comply with the fishway criteria, unless specially coordinated. Inspection of those parts of the adult collection channel systems, such as diffusion gratings, picketed leads and entrance gates, will be scheduled at least once every five years unless a channel must be dewatered for fishway modifications or to correct observed problems. Inspection by a diver or underwater video system may be used for the underwater inspections. This scheduled inspection and any associated maintenance will occur during the winter maintenance period. Any non-routine maintenance and fishway modification will be handled on a case by case basis. Corps biologists will be on hand during the dewatering activities as well as during inspection operations to provide fishery input (see Dewatering plan). However, if a biologist cannot be contacted in an emergency, the project will proceed using all due care to ensure that fish are not stranded or injured. The project will continue to attempt to contact the biologists.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The Dalles Project contains several types of fishway entrances. There is little potential for failure in most of the entrance types while other types do have histories of occasional failure. In most cases when failures occur the entrance can and will be operated manually by project personnel until repairs are made. When this operation becomes necessary, project personnel will increase the surveillance of the adult system to ensure that criteria are being met. In those cases in which the failure will not allow the entrance to be operated manually, the gate will be maintained, to the extent possible, in an operational position. The entrance will be repaired in an expedient manner and the

entrance will return to manual or automatic control at the earliest possible date.

e. Adult Fish Ladders and Counting Stations

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The adult fish ladders are usually dewatered (see Dewatering plan) once each year during the winter maintenance period. During this time the ladders are inspected for blocked orifices, projections into the fishway that may damage fish, stability of the weirs, damaged picketed leads, exit gate problems, loose diffusion valves, ladder orifice reduction plates and malfunctioning operating equipment at the counting stations as well as other potential problems. Problems identified throughout the passage year that do not affect fish passage, as well as those identified during the dewatered period are then repaired.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The structures of the ladders include picketed leads, counting stations, fishway exits and overflow weirs with orifices.

Picketed leads can cause problems. Pickets with excessive spacing (greater than 1"), erosion of concrete around the picketed leads or missing pickets can allow fish into areas where escape is not possible. Where picketed lead failure or concrete erosion occurs, the timing and method of repair will depend upon the severity of the problem. The decision of whether or not to dewater the fishway and repair any problem will be made in consultation with the fishery agencies and Indian tribes.

2. The Dalles Dam Juvenile Fish Passage Facilities

a. Fish Passage Season. April 1 through November 15 each year operate according to the Operating Standards.

b. Winter Maintenance Period. November 16 through March each year operate according to the Operating Standards.

c. Juvenile Collection and Transportation Systems.

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The Dalles ice and trash sluiceway will receive preventive maintenance at all times of the year. During the juvenile fish passage season this will normally be above water work such as maintenance of automatic systems, air lines, electrical systems and monitoring equipment. During the winter maintenance period the systems are dewatered downstream of the gatewell orifices. The system is then visually inspected in all accessible areas for damaged equipment and areas that may cause problems to the juvenile fish. Any problem areas identified are repaired and modifications to the channel and general maintenance are completed. The trash racks are raked just prior to the juvenile fish passage season (April 1), whenever trash accumulations are suspected because of increased head differential across the trash racks or increased descaling of juvenile fish is noted at The Dalles or Bonneville dams and that Bonneville's trash racks are clean.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The ice and trash sluiceway is now being used as a juvenile bypass system. Historically, there have been few problems associated with this system. The chain gates on The Dalles' juvenile bypass system are fully opened during normal operation. When a chain gate fails, an adjacent gate can be operated until repairs can be made. Orifices allow fish out of the gatewells into the sluiceway. When the orifices become plugged with debris they are manually cleaned. The gatewells will be inspected daily and debris removed (debarked) when floating debris covers more than one-half the water surface. If one of the gate hoists fail, repair promptly. The gate will be removed when there are problems with the seal and the difficulty cannot be repaired promptly. If the epoxy lined section of the sluiceway is found to be damaged, it will be repaired.

3. Turbines and Spillways

Scheduled Maintenance (see Appendix A for coordination procedures) - The maintenance and routine repair of project turbines and spillways is a regular and

reoccurring process which requires that units be shut down for up to two months (see Dewatering Plan). The schedule for this maintenance is reviewed by CENPP-OP-PF biologists and coordinated within NPP, NPD and BPA. Certain turbine and spillway discharges at the projects are secondarily used to attract adult fish to the area of fishway entrances. The maintenance schedules for these turbines and spillways will reflect equal weighting given to fish, power and water management and will be coordinated with the appropriate resource agencies. No other fish related restrictions regarding maintenance will be placed on any units at this project, except to coordinate research activities.

C. Dewatering Plan

1. Adult Fish Ladder

a. Scheduled Maintenance (see Appendix A for coordination procedures)

(1) When possible, operate ladder to be dewatered at a reduced flow for at least 24 hours but no more than 48 hours prior to dewatering.

(2) Discontinue all fishway auxiliary water supply at least 24 hours but no more than 48 hours prior to dewatering.

(3) Corps biologist will assure that fish rescue equipment is available and will coordinate to ensure adequate numbers of personnel will be available to move fish out of the dewatered ladder.

(4) Project personnel will install head gates to shut down ladder flow.

(5) At least one Corps biologist will immediately inspect the dewatered ladder and inform the rescue crews of the locations of all stranded fish. A Corps biologist will provide technical guidance in fish safety and assist in the rescue operation. The rescue personnel will then walk the inside of the ladder from the head gates down to tailwater, salvaging all fish either by moving fish to tailwater within the ladder flow or capturing and placing the fish in a large water filled tank which is then transported to the forebay or tailwater, whichever is closest, for release.

b. Unscheduled Maintenance (see Appendix A for coordination procedures)

(1) When possible, discontinue fishway auxiliary water and operate ladder at orifice flow as long as possible (prefer 3-24 hours) prior to dewatering.

(2) Follow steps 3-5 above.

2. Powerhouse Fish Collection System

a. Scheduled Maintenance (see Appendix A for coordination procedures)

(1) During the pumping or draining operation to dewater a portion or all of the collection channel, the water level will not be allowed to drop to a level which strands fish.

(2) Corps biologists will assure that rescue equipment is available if needed.

(3) A Corps biologist will provide technical guidance on fish safety and assist in any necessary rescue operation.

3. Turbines

a. When possible, place head gates and tail logs immediately after turbine unit is shut down if draft tube is to be dewatered.

b. If turbine unit draft tube is to be dewatered and the unit has been idle for any length of time, it will be operated when possible, at "speed/no load" for at least ten minutes and stop logs will then be placed immediately.

c. Water levels in the draft tube will not be allowed to drop to a level which strands fish.

d. Corps biologist will be on site to inspect dewatered turbine draft tubes and intakes as soon as the water levels reach a depth permitting visual inspection and the hatch cover is opened.

e. Corps biologists will assure that rescue equipment is available if needed.

f. A Corps biologist will provide technical guidance on fish safety and assist in any necessary rescue operation.

g. When a turbine unit is planned to be out of service for less than 5 days, it will not be necessary to dewater the unit and remove fish as long as a "safety pool" is maintained.

III. JOHN DAY DAM

A. OPERATING STANDARDS

1. Adult Fish Passage Facilities

a. **Prior to March 1 each year**

(1) Inspect all staff gauges and water level indicators, repair and/or clean where necessary.

(2) Inspect dewatered sections of fish facilities for projections, debris or plugged orifices which could injure fish or slow their progress up the ladder. Repair deficiencies.

(3) Inspect for and, when necessary, clear debris in ladder exits.

(4) Reinstall picketed leads at counting stations prior to watering up ladders during maintenance.

b. **March 1 through November (Fish Passage Period)**

(1) <u>All Adult Fish Facilities</u>

(a) Water depth over fish ladder weirs: 1.2 ($\pm$0.1) feet.

(b) Head on all entrances: 1.0 to 1.7 feet (prefer 1.5). Refer to maintenance plan when unable to achieve head criteria.

(c) A transportation velocity of 1.5 to 4.0 feet per second (prefer 2.0 fps) shall be maintained in all channels and the lower ends of the fish ladders which are below the tailwater.

(d) Maximum of 6" head on attraction water intakes and trash racks at all the ladder exits, with a 4" maximum head on all picketed leads. Debris shall be removed when significant amounts accumulate.

(e) Staff gauges and water level indicators will be readable at all water levels encountered during the fish passage period.

(f) Main entrance weir depths: 8 feet or greater below tailwater. Weirs fully lowered when 8 feet depth is not possible.

(2) <u>North Fishway</u>

Operate two downstream gates (N1 and N2). Use staff

gauge located around the first ladder bend to calculate entrance head. Doing so helps account for the velocity head associated with these entrances.

(3) Powerhouse

(a) Operate entrances NE-1 and NE-2.

(b) Operate ten powerhouse floating orifices (numbers 1, 2, 3, 6, 9, 12, 15, 17, 18, 19).

(c) Operate SE-1.

(d) From 0400-2000 P.S.T. operate powerhouse turbine unit #1 near 100 megawatts (±10MW) to facilitate best entrance conditions, unless additional load is required to meet firm energy demands and that load cannot be attained with another fully screened unit.

(4) Spillway Operations

The following spill schedule (Table III-1) shall be followed during the spill period. This schedule will be followed during daytime 0600 - 2000 for adult fish attraction. See table III-2 for the nighttime spill schedule.

c. **December 1 through February (Winter Operating Period)**

(1) All Adult Fish Facilities

(a) Water depth over fish ladder weirs: 1.2 feet (±0.1).

(b) Only one of the two fish facilities may be out of service at a time except under extreme situations. The other facility must be operated at passage season criteria unless specially coordinated.

(c) Main entrance weir depths: 6 feet or greater below tailwater. Weirs fully lowered when 6 feet depth is not possible.

(d) Pull picketed leads at counting stations and have crowders adjusted such that the counting slots are fully open at the end of the counting season.

(e) Maximum of 6" head on attraction water intakes and trash racks at all ladder exits. Debris shall be removed when significant amounts accumulate.

(2) North Fishway

(a) Operate gate N1 with N2 closed with a head of:

((1)) No spill - that attainable by ladder flow and one auxiliary water pump.

((2)) With spill - 1.0 foot.

((3)) South ladder dewatered or operating with less than standard auxiliary water flow - 1.0 foot.

(3) Powerhouse

(a) Head on all entrances - 1.0 foot.

(b) Operate NE-2 with NE-1 closed.

(c) Operate all ten floating orifices.

(d) Operate SE-1.

Table III-1

Spill Schedule for John Day Dam in Gate Opening Stops
Daytime pattern for adult fish attraction

Gate Number										
1	2	3	4	5 to 10	11 to 16	17	18	19	20	KCFS
1									(1)	8.2
1	1							(1)	1	6.4
1	1	1					(1)	1	1	9.6
1	1	2					(2)	1	1	12.8
1	1	2	1			(1)	2	1	1	16.0
1	1	2	2			(2)	2	1	1	19.2
1	2	2	2			2	2	(2)	1	22.4
1	2	2	2	0 or 2	0 or 2	2	2	2	1	60.8
1	2	2	2	(3)	(3)	2	2	2	1	80.0
1	2	3	3	3	3	(3)	2	2	1	84.8
1	2	3	3	3	3	3	(3)	2	1	86.4
1	2	3	3	(4)	(4)	3	3	2	1	105.6
2	3	4	4	(4)	(4)	4	4	3	2	118.4
2	3	4	4	(5)	(5)	4	4	3	2	137.6
2	4	4	5	(6)	(6)	4	4	3	2	160.0
2	4	5	5	6	6	(5)	4	3	2	163.2
2	4	5	6	6	6	5	(5)	3	2	166.4
2	4	6	6	6	6	(6)	5	3	2	169.6
2	4	6	6	6	6	6	(6)	4	2	172.8
2	4	5	6	(7)	(7)	6	6	4	2	190.4
2	4	6	7	7	7	(7)	6	4	2	195.2
2	4	6	7	(8)	(8)	7	6	4	2	214.4
2	4	6	8	8	8	(8)	6	4	2	217.6
2	4	6	8	(9)	(9)	8	6	4	2	236.8
2	4	6	9	(10)	(10)	8	6	4	2	257.6
2	5	6	9	10	10	(9)	6	4	2	260.8
2	5	6	9	(11)	(11)	9	6	4	2	280.0

Continue as in rows above, opening from ends toward the center and using 1 stop increments on innermost gate of gates 5 to 16 if necessary.

Gates 1, 2, 18, 19 and 20 limits at 9 stops.
Circled values may be 1 stop less than value shown.
Each stop equals about 1.6 kcfs.
Nighttime spill will follow juvenile spill schedule.

2. Juvenile Fish Passage Facilities

a. **Prior to April 1 each year**

(1) Remove debris from forebay, trash racks and gatewell slots.

(2) Inspect all vertical barrier screens for damage, holes, debris accumulations or protrusions (video inspection acceptable) and repair when problem detected.

(3) Inspect each Submersible Traveling Screen (STS) and operate on trial run (dogged off at deck level). By April 1, STS in each intake of operational units.

(4) Inspect and, where necessary, clean and/or repair all gatewell orifices and orifice lighting systems.

(5) Inspect, maintain and, where necessary, repair the DSM conduit tainter gate.

(6) Inspect and correct any deficiencies of walls and floor DSM conduit, raceway, and outfall.

b. **April 1 through October 31**

(1) Remove debris from forebay and trash racks as required to maintain less than 1 foot of additional drawdown in gatewell or as indicated by fish condition (i.e., higher than expected descaling). The trash racks for at least units 1, 2, and 3 should be raked again before June 15. Raking should proceed to the north as long as substantial debris continues to be collected. STSs in units being raked should run on continuous during raking operation. Gatewell orifices of the unit being raked must be closed during the raking operation.

(2) Inspect each STS and VBS a minimum of once every two months (video acceptable). Preferably, inspections will occur immediately prior to peaks in the juvenile fish migrations (July). Inspections should be concentrated on the priority units and those others with the longer operating time. More frequent inspections may be required under the following conditions: 1) deterioration of fish condition; 2) increased debris load in bypass system; and 3) other indications of STS or VBS malfunction or failure. If STS or VBS damage or plugging is detected, follow procedures in Fish Facilities Maintenance Plan.

(3) Operate all gatewell orifices. Inspect daily to assure that the orifice lights are operating. Replace all burned out orifice lights within 24 hours. Close

and open each orifice every day or as indicated by debris accumulations in the gatewells.

(4) Inspect each STS watt meter readings at least once each shift. If an STS failure occurs follow procedures in Fish Facilities Maintenance Plan.

(5) Inspect all gatewells daily and clean when water surface over one-half covered with debris. Gatewell orifice of the gatewell being cleaned must be closed during the operation. Each VBS should be cleaned within three weeks either side of July 1 unless visually inspected and found free of debris.

(6) Coordinate cleaning efforts with personnel operating downstream migrant sampling facilities.

(7) Turbines should be operated at peak efficiency unless the additional generation is needed to avoid operation of a partially or fully unscreened unit.

(8) STS cycling operation may begin when the mean length of the majority of juvenile chinook passing the project reaches or exceeds 112 mm. This time will be determined by the Corps biologist using available fish monitoring data. A cycling time of a maximum 20 minutes off and a minimum of 2 minutes on must be followed. Cycling will be discontinued if warranted by fish condition or debris problems. STSs in intakes used for juvenile indexing will run continuously.

(9) On April 1 and through September, turbine units without a full complement of STSs may operate only to meet firm energy demands. Units without a full complement of STSs will be the last to be brought on line to meet power demands and the first off line when the power demand diminishes.

c. **October 1 through October 31**

STSs may be removed from the powerhouse turbine units designated by the Project Biologist with no more than eight of the sixteen units unscreened to reduce wear and facilitate early winter maintenance. Enough units should remain screened to allow the average expected river flow, provided by the Reservoir Control Center, for that period to pass through screened units. Units are available to meet load demands and should be operated at peak efficiency whenever possible. Unscreened or partially unscreened units will be on a last on, first off operation.

d. **November 1 through March**

All STSs removed. DSM channel dewatered (see

Dewatering Plans) only when required for maintenance. The period of maintenance should be minimized to the extent practicable. Additionally, all units are available to meet power demands and should be operated at peak efficiency whenever practicable.

e. **General**

The spill schedule shown in Table III-2 will be followed for nighttime spill (2000 - 0600) for juvenile fish passage.

Table III-2

Nighttime Spill Schedule for John Day Dam
for 2000 to 0600 hours

TOTAL SPILL KCFS	Spill Bay																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
9.6																				6
11.2																				7
12.8																				8
14.4																				9
16.0																			5	5
17.6																			5	6
19.2																			6	6
20.8																			6	7
22.4																			7	7
24.0																			7	8
25.6																			8	8
27.2																			8	9
28.8																			9	9
30.4																		6	6	7
32.0																		6	7	7
33.6																		7	7	7
35.2																		7	7	8
36.8																		7	8	8
38.4																		8	8	8
40.0																		8	8	9
41.6																		8	9	9
43.2																		9	9	9
44.8																	7	7	7	7
46.4																	7	7	7	8
48.0																	7	7	8	8
49.6																	7	8	8	8
51.2																	8	8	8	8
52.8																	8	8	8	9
54.4																	8	8	9	9
56.0																	8	9	9	9
57.6																	9	9	9	9
59.2																7	7	7	8	8
60.8																7	7	8	8	8
62.4																7	8	8	8	8
64.0																8	8	8	8	8
65.6																8	8	8	8	9
67.2																8	8	8	9	9
68.8																8	8	9	9	9
70.4																8	9	9	9	9
72.0																9	9	9	9	9
73.6															7	7	8	8	8	8
75.2															7	8	8	8	8	8
76.8															8	8	8	8	8	8

Table III-2 (cont.)

Nighttime Spill Schedule for John Day Dam
for 2000 to 0600 hours

TOTAL SPILL	Spill Bay																		
KCFS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
78.4															8	8	8	8	8	9
80.0															8	8	8	8	9	9
81.6	1														8	8	8	8	9	9
83.2	1	1													8	8	8	8	9	9
84.8	1	1	1												8	8	8	8	9	9
86.4	1	1	1	1											8	8	8	8	9	9
88.0	1	1	1	2											8	8	8	8	9	9
89.6	1	1	2	2											8	8	8	8	9	9
91.2	1	2	2	2											8	8	8	8	9	9
92.8	2	2	2	2											8	8	8	8	9	9
94.4	2	2	2	3											8	8	8	8	9	9
96.0	2	2	3	3											8	8	8	8	9	9
97.6	2	3	3	3											8	8	8	8	9	9
99.2	3	3	3	3											8	8	8	8	9	9
100.8	3	3	3	3	1										8	8	8	8	9	9
102.4	3	3	3	3	1										8	8	8	9	9	9
104.0	3	3	3	3	1										8	8	9	9	9	9
105.6	3	3	3	3	1										8	9	9	9	9	9
107.2	3	3	3	3	1										9	9	9	9	9	9
108.8	3	3	3	3	2										9	9	9	9	9	9
110.4	3	3	3	3	2									7	8	8	8	8	8	8
112.0	3	3	3	3	2									8	8	8	8	8	8	8
113.6	3	3	3	3	2									8	8	8	8	8	8	9
115.2	3	3	3	3	2									8	8	8	8	8	9	9
116.8	3	3	3	3	3									8	8	8	8	8	9	9
118.4	3	3	3	3	3									8	8	8	8	9	9	9
120.0	3	3	3	3	3									8	8	8	9	9	9	9
121.6	3	3	3	3	3									8	8	9	9	9	9	9
123.2	3	3	3	3	3									8	9	9	9	9	9	9
124.8	3	3	3	3	3	1								8	9	9	9	9	9	9
126.4	3	3	3	3	3	1								9	9	9	9	9	9	9
128.0	3	3	3	3	3	1							8	8	8	8	8	8	8	8
129.6	3	3	3	3	3	1							8	8	8	8	8	8	8	9
131.2	3	3	3	3	3	1							8	8	8	8	8	8	9	9
132.8	3	3	3	3	3	2							8	8	8	8	8	8	9	9
134.4	3	3	3	3	3	2							8	8	8	8	8	9	9	9
136.0	3	3	3	3	3	2							8	8	8	8	9	9	9	9
137.6	3	3	3	3	3	2							8	8	8	9	9	9	9	9
139.2	3	3	3	3	3	2							8	8	9	9	9	9	9	9
140.8	3	3	3	3	3	3							8	8	9	9	9	9	9	9
142.4	3	3	3	3	3	3							8	9	9	9	9	9	9	9
144.0	3	3	3	3	3	3							9	9	9	9	9	9	9	9
145.6	3	3	3	3	3	3						8	8	8	8	8	8	8	8	9

Table III-2 (cont.)

Nighttime Spill Schedule for John Day Dam
for 2000 to 0600 hours

TOTAL SPILL	Spill Bay																		
KCFS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
147.2	3	3	3	3	3	3						8	8	8	8	8	8	8	9	9
148.8	3	3	3	3	3	3	1					8	8	8	8	8	8	8	9	9
150.4	3	3	3	3	3	3	1					8	8	8	8	8	8	9	9	9
152.0	3	3	3	3	3	3	1					8	8	8	8	8	9	9	9	9
153.6	3	3	3	3	3	3	1					8	8	8	8	9	9	9	9	9
155.2	3	3	3	3	3	3	1					8	8	8	9	9	9	9	9	9
156.8	3	3	3	3	3	3	2					8	8	8	9	9	9	9	9	9
158.4	3	3	3	3	3	3	2					8	8	9	9	9	9	9	9	9
160.0	3	3	3	3	3	3	2					8	9	9	9	9	9	9	9	9
161.6	3	3	3	3	3	3	2					9	9	9	9	9	9	9	9	9
163.2	3	3	3	3	3	3	2				8	8	8	8	8	8	8	8	9	9
164.8	3	3	3	3	3	3	3				8	8	8	8	8	8	8	8	9	9
166.4	3	3	3	3	3	3	3				8	8	8	8	8	8	8	9	9	9
168.0	3	3	3	3	3	3	3				8	8	8	8	8	8	9	9	9	9
169.6	3	3	3	3	3	3	3				8	8	8	8	8	9	9	9	9	9
171.2	3	3	3	3	3	3	3				8	8	8	8	9	9	9	9	9	9
172.8	3	3	3	3	3	3	3	1			8	8	8	8	9	9	9	9	9	9
174.4	3	3	3	3	3	3	3	1			8	8	8	9	9	9	9	9	9	9
176.0	3	3	3	3	3	3	3	1			8	8	9	9	9	9	9	9	9	9
177.6	3	3	3	3	3	3	3	1			8	9	9	9	9	9	9	9	9	9
179.2	3	3	3	3	3	3	3	1			9	9	9	9	9	9	9	9	9	9
180.8	3	3	3	3	3	3	3	2			9	9	9	9	9	9	9	9	9	9
182.4	3	3	3	3	3	3	3	2		8	8	8	8	8	8	8	8	9	9	9
184.0	3	3	3	3	3	3	3	2		8	8	8	8	8	8	8	9	9	9	9
185.6	3	3	3	3	3	3	3	2		8	8	8	8	8	8	9	9	9	9	9
187.2	3	3	3	3	3	3	3	2		8	8	8	8	8	9	9	9	9	9	9
188.8	3	3	3	3	3	3	3	3		8	8	8	8	8	9	9	9	9	9	9
190.4	3	3	3	3	3	3	3	3		8	8	8	8	9	9	9	9	9	9	9
192.0	3	3	3	3	3	3	3	3		8	8	8	9	9	9	9	9	9	9	9
193.6	3	3	3	3	3	3	3	3		8	8	9	9	9	9	9	9	9	9	9
195.2	3	3	3	3	3	3	3	3		8	9	9	9	9	9	9	9	9	9	9
196.8	3	3	3	3	3	3	3	4		8	9	9	9	9	9	9	9	9	9	9
198.4	3	3	3	3	3	3	3	4		9	9	9	9	9	9	9	9	9	9	9
200.0	3	3	3	3	3	3	3	4	8	8	8	8	8	8	8	8	9	9	9	9
201.6	3	3	3	3	3	3	3	4	8	8	8	8	8	8	8	8	9	9	9	9
203.2	3	3	3	3	3	3	3	4	8	8	8	8	8	8	8	9	9	9	9	9
204.8	3	3	3	3	3	3	4	4	8	8	8	8	8	8	8	9	9	9	9	9
206.4	3	3	3	3	3	3	4	4	8	8	8	8	8	8	9	9	9	9	9	9
208.0	3	3	3	3	3	3	4	4	8	8	8	8	8	9	9	9	9	9	9	9
209.6	3	3	3	3	3	3	4	4	8	8	8	9	9	9	9	9	9	9	9	9

Spill bay openings are expressed in gate stops.

Use the same pattern trend for spill levels exceeding 210 kcfs (i.e. 80% at south bays, 20% at north bays).

B. MAINTENANCE PLAN

1. Adult Fish Passage Facilities

a. Fish Passage Season - March 1 through November (see Operating Standards).

b. Winter Maintenance Season - December 1 through February (see Operating Standards).

c. Fishway Auxiliary Water Systems

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The John Day Project has pump style auxiliary water systems. Preventive maintenance and normal repair are normally carried out during the winter maintenance season.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The fishway auxiliary water systems are operated mostly automatically. If the automatic system fails, the system can usually be operated manually by project personnel. This will allow the fish facility to operate according to criteria while the automatic system is repaired. When this operation becomes necessary project personnel will increase the surveillance of the adult system to ensure that criteria are being met.

(a) John Day South Ladder - If one of the three fishway auxiliary water turbines fails, assuming all three turbines are being used to meet criteria, bulkheads will be installed in the failed turbine discharge conduit and the output of the two remaining turbines will be increased to bring the fishway into agreement with the adult fishway criteria.

If a second turbine unit fails, bulkheads will be installed in the second failed turbine discharge conduit and the adult fish facility will be operated as follows until a fishway head of 1.2 feet is achieved:

1: Raise the south powerhouse entrance weir (SE1) in one-foot increments to 6 feet of depth below the tailwater surface;

2: Raise the north powerhouse entrances (NE1, NE2) in one-foot increments to 6 feet of depth below the tailwater surface.

3: Close NE1.

4: Close the center five floating gate

submerged orifice entrances starting at the north end (17, 15, 12, 9, 6);

5: If the above criteria are still not achieved, then leave in this configuration until more auxiliary water becomes available. Then reverse the above procedure.

If all three turbine units fail, bulkheads will be installed in the failed turbine discharge conduits and the adult fish facility will be operated as follows until repairs can be made:

1: SE1 will be open with the weir crest 6 feet below the tailwater surface;

2: Cross channel bulkheads will be placed in the powerhouse collection channel between units 2 and 3.

3: The floating orifice gate in front of unit 2 will be closed, leaving the floating orifice gate in front of unit 1 open.

(b) John Day North Ladder - This system can operate according to the adult fishway criteria under most conditions by using fewer than the six fishway auxiliary water pumps. If one pump fails, one of the standby pumps will be started up. This routine will be followed until the available pumps can no longer meet the adult fishway criteria. When this occurs, N2 will be raised in one-foot increments until a fishway head of 1.0 feet is met or until the weir crest reaches a depth of 6 feet below the tailwater surface. If this fishway criterion is still not met, N1 will be raised in one-foot increments until that criterion is met or the weir crest reaches a depth of 6 feet below the tailwater surface. If criterion is still not achieved close N2 and the N1 weir will be maintained at the 8 foot level. If head of 1.0 is not met, then raise N1 in one-foot increments until the weir crest reaches a depth of 6 feet below tailwater surface. Maintain in this condition until repairs reach a stage which allows more water to be added to the system. The weirs should then be opened in the reverse order in which they were closed.

d. Powerhouse and Spillway Adult Fish Collection System

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - Preventive maintenance and repair occurs throughout the year. During the adult fish passage season this maintenance will not involve any operations which will cause a failure to comply

with the adult fishway criteria. Inspection of those parts of the adult collection channel systems which require dewatering such as diffusion gratings, picketed leads and entrance gates, will be scheduled at least once every ten years with at least one underwater inspection in between unless a channel must be dewatered for fishway modifications or to correct observed problems (see Dewatering Plan). Inspection by a diver or underwater video system may be used for the underwater inspections. This scheduled inspection and any associated maintenance will occur during the winter maintenance period. Any non-routine maintenance and fishway modifications will be handled on a case by case basis. Corps biologists will be on hand during all dewatering activities as well as during inspection operations to provide fishery input (see Dewatering Plan). However, if a biologist cannot be contacted in an emergency, the project will proceed, using all due care to ensure that fish are not stranded or injured. The project will continue to attempt to contact the biologist.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The John Day Project contains several types of fishway entrances. There is little potential for failure in most of the entrance types while other types do have histories of occasional failure. In most cases when failures occur the entrance can and will be operated manually by project personnel until repairs are made. In those cases in which the failure will not allow the entrance to be operated manually the gate will be maintained, to the extent possible, in an operational position until expedient repairs are affected. If this is not possible, then the entrance will be repaired in an expedient manner (receive high priority) and the entrance will be brought back into manual or automatic control at the earliest possible time.

e. Adult Fish Ladders and Counting Stations

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The adult fish ladders are usually dewatered once each year during the winter maintenance period (see Dewatering Plan). During this time the ladders are inspected for blocked orifices, projections into the fishway that may injure fish, stability of the weirs, damaged picketed leads, exit gate problems, loose diffusion gratings, unreadable or damaged staff gauges, defective diffusion valves and malfunctioning operating equipment at the counting stations as well as other potential problems identified throughout the passage year that do not impact fish passage, as well as those identified during the dewatered period are then repaired.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - The structures of the ladders include picketed leads, counting stations, fishway exits and overflow weirs with orifices. Picketed leads can cause problems. Pickets with excessive spacing (greater than 1"), erosion of concrete around the picketed leads or missing pickets can allow fish into areas where escape is not possible. In some instances of picketed lead failure there are spare picketed leads and spare installation slots. In these cases the spare leads are installed and the damaged leads are removed and repaired. In the remaining instances of picketed lead failure or concrete erosion, the timing and method of repair will depend upon the severity of the problem. The decision of whether or not to dewater the fishway and repair any problem will be made in consultation with the fishery agencies and Indian tribes, according to the described coordination procedures (Appendix A).

2. Juvenile Fish Passage Facilities

a. Fish Passage Season. April 1 through October 31 (see Operating Standards).

b. Winter Maintenance Period. November 1 through March (see Operating Standards).

c. Submersible Traveling Screens (STS).

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The STS system will receive preventive maintenance or repair at all times of the year including the winter maintenance period. Whenever a generator malfunctions or is scheduled for maintenance, the three STSs in that turbine may be maintained, repaired or exchanged for other STSs needing maintenance or repair. About one third of the STSs at John Day are scheduled to get a complete overhaul each year resulting in a three year maintenance cycle unless future developments indicate that a longer life expectancy is possible.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures) - If an STS is found to be damaged or inoperative in an operating unit refer to Figure III-1. During the peak juvenile passage periods (April 16 to August 31), the six days following a juvenile fish release in the John Day pool or when the 24 hour juvenile salmon passage by John Day exceeds 20,000 a crane crew will be taken off lower priority work or will work overtime to remove and replace (if spare available) a damaged or malfunctioning STS or VBS from any unit needed or likely to be needed for power within the next 48 hours. Crews will work overtime or as call-outs on weekends as required.

d. Juvenile Bypass Systems.

(1) Scheduled Maintenance (see Appendix A for coordination procedures) - The John Day juvenile bypass facilities will receive preventive maintenance at all times of the year. During the juvenile fish passage season this will normally be above water work such as maintenance of automatic systems, air lines, electrical systems and monitoring equipment. During the winter maintenance period the system is dewatered downstream of the gatewell orifices. The system is then visually inspected in all accessible areas for damaged equipment and areas that may cause problems to the juvenile fish. Any problems identified are repaired if the project is able. In extreme cases the work will be contracted as soon as possible or repaired during the next winter maintenance period. Modifications and general maintenance to the channel

are also completed at this time.

The trash racks are raked just prior to the juvenile fish passage season (April 1) and whenever trash accumulations are suspected because of increased differential across the trash racks or increased juvenile fish descaling is noted at John Day Dam or increased accumulations of tumbleweeds in the forebay. Additional raking of trash racks may be necessary when a storm brings large quantities of debris down river to the project. The gatewell orifices must be closed during the raking process.

(2) Unscheduled Maintenance (see Appendix A for coordination procedures).

(a) John Day's juvenile bypass system is controlled by automatic systems. When an automatic system fails it can usually be operated manually. This allows the facility to operate according to criteria while repair of the automatic system is completed. Orifices allow fish out of the gatewells into a bypass channel. When the orifices become plugged with debris they are mechanically cleaned out. The gatewells will be inspected daily and debris removed (debarked) when it covers over one-half of the water surface to maintain clean orifices and minimize fish injury. The gatewell orifices must be closed during the debarking process.

(b) If the bypass system fails in the powerhouse conduit, tainter gate, or transportation outfall making the system unsafe for fish, the decision to dewater for repairs will be made in consultation with the fisheries agencies and Indian tribes. During this emergency operating mode, power generation will be minimized. If this operating mode is expected to last longer than four days all units required for generation will be sequentially shut down, fish salvaged from the gatewell, the STS removed and the unit restarted. The orifice gates will be closed then opened once each day to float any debris accumulating around the orifice. During fishway inspection activities VBSs may be found to be plugged with debris or damaged. In these cases refer to Figure III-1.

Figure III-1.

Operating and Maintenance Instructions in the Event of STS or VBS Failure at John Day Dam.

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1. If the project is operating with all available units to meet firm energy demands during low debris conditions continue operating until step 3 can be accomplished, otherwise proceed immediately to step 2.

2. Unit 5 (the station service unit) will continue in operation under any load conditions (except during high debris period) with a failed STS or VBS until step 3 can be accomplished. Under high debris load conditions any unit with a failed or malfunctioning STS or VBS will be shut down. If it is the priority unit, the failed STS or VBS will be repaired or replaced within 24 hours. Any other unit with a failed STS or VBS will be shut down until step 3 can be accomplished or that unit is required to meet firm energy demands, in which case that unit will be the last to be brought on line and the first off line.

3. During working hours, assuming the BPA dispatcher will unload John Day on request, the unit will be taken out of service and the failed STS or VBS will be examined. If the required repairs can be accomplished that day, they will be done and the unit may then be returned to service. During the peak juvenile passage period (April 1 - September 30),, if an STS or VBS fails on a unit required for generation, then a crane crew will be taken off all but higher priority work, will work overtime or weekends to remove and replace (if spare available) the damaged or malfunctioning STS or VBS. During the period of October 1 through October 31, failures will receive a high priority for repair but overtime will not be required unless specified by the Project Biologist.

4. If repairs require longer than the rest of the day, the STS or VBS will be replaced with a spare or one from a long term out of service unit. If this is not the situation begin removing the replacement STS or VBS from the northernmost unit and move sequentially to the south. STSs or VBSs should be removed from the A-slot first, B-slot second, C-slot third.

5. Operation of all partially screened or unscreened units will be restricted according to the Operating Standards until a spare or repaired STS or VBS is available for installation.

3. Turbines and Spillways

Scheduled Maintenance (see Appendix A for coordination procedures) - The maintenance and routine repair of project turbines and spillways is a regular and reoccurring process which requires that units be shut down for up to two months (see Dewatering Plan). The schedule for this maintenance will be reviewed by CENPP-OP-PF biologists and is coordinated within NPP, NPD and BPA. Certain turbine and spillway discharges at the projects are secondarily used to attract adult fish to the area of fishway entrances, to keep predator fish from accumulating in the area of juvenile release sites and to move juveniles downstream away from the project. The maintenance schedules for these turbines (Appendix B) and spillways will reflect equal weighting given to fish, power and water management and will be coordinated with the appropriate resource agencies. No other fish related restrictions regarding maintenance will be placed on any units at these projects, except to coordinate research activities.

C. Dewatering Plan

1. Adult Fish Ladder

a. Scheduled Maintenance (see Appendix A for coordination procedures)

(1) When possible operate ladder to be dewatered at orifice flow for at least 24 hours but no more than 48 hours prior to dewatering.

(2) Discontinue all fishway auxiliary water supply at least 24 hours but no more than 48 hours prior to dewatering.

(3) Corps biologist will assure that fish rescue equipment is available and will coordinate to ensure adequate numbers of personnel will be available to move fish out of the dewatered ladder.

(4) Project personnel will install head gates to shut down ladder flow. Where possible, a flow of 1-2 inches will be maintained in the ladder until fish are rescued.

(5) At least one Corps biologist will immediately inspect the dewatered ladder and inform the rescue crews of the locations of all stranded fish. A Corps biologist will provide technical guidance in fish safety and assist in the rescue operation. The rescue personnel will then walk the inside of the ladder from the head gates down to tailwater salvaging all fish either by moving fish to tailwater within the ladder flow or capturing and placing the fish in a large water filled tank which is then transported to the forebay or tailwater, whichever is closest, for release.

b. Unscheduled Maintenance (see Appendix A for coordination procedures)

(1) When possible, discontinue fishway auxiliary water and operate ladder at orifice flow as long as possible (prefer 3-24 hours) prior to dewatering.

(2) Follow steps 3-5 above.

2. Powerhouse Fish Collection System

a. Scheduled Maintenance (see Appendix A for coordination procedures)

(1) During the pumping or draining operation to dewater a portion or all of the collection channel, the water level will not be allowed to drop to a level

which strands fish.

(2) Corps biologists will assure that rescue equipment is available if needed.

(3) A Corps biologist will provide technical guidance on fish safety and assist in any necessary rescue operation.

3. Turbines

a. When possible, place head gates and tail logs immediately after turbine unit is shut down if draft tube is to be dewatered.

b. If turbine unit draft tube is to be dewatered and turbine unit has been idle for longer than three hours it will be operated when possible, at "speed/no load" for at least ten minutes and stop logs will then be placed immediately.

c. Water levels in the draft tube will not be allowed to drop to a level which strands fish.

d. Corps biologist will be on site to inspect dewatered turbine draft tubes and intakes as soon as the water levels reach a depth permitting visual inspection and the hatch cover is opened. This usually requires the biologist to be lowered into the draft tube for a thorough inspection.

e. Corps biologists will assure that rescue equipment is available if needed.

f. A Corps biologist will provide technical guidance on fish safety and assist in any necessary rescue operation.

g. If the turbine unit is planned to be down for less than 4 days then removal of fish is not necessary as long as a "safety pool" is maintained.

APPENDIX A

INSPECTION PROGRAM AND COORDINATION

COLUMBIA RIVER PROJECTS

A. INSPECTION PROGRAM

1. During the juvenile fish passage season, the juvenile fish passage facilities will be inspected by project personnel, at least once during each working shift, to assure that the systems are operating according to criteria.

2. During the adult fish passage season project personnel will make visual inspections of the adult fish passage facilities each day at daylight and at least once during the day shift (0800-1600 P.S.T.) to assure that the systems are operating according to standard operating criteria.

3. During both the adult and juvenile fish passage seasons, Corps biologists will inspect the adult and juvenile fish passage facilities at least once a week to assure that the systems are operating according to criteria. This inspection will include contacts with the projects' operations superintendants, fish counters and appropriate researchers conducting work on either the adult or juvenile facilities.

4. During the winter maintenance period, Corps biologists will inspect the operating adult and juvenile fish passage facilities at least once every two weeks. All inspectors will ensure with the project that a clearance has been posted on a dewatered facility prior to entering the facility for inspection and will notify the project upon leaving that facility.

5. Just prior to the juvenile fish passage season project personnel will inspect the STS's, VBS's and gatewell orifices and again at least once every three months at Bonneville Dam and every two months at John Day Dam. Preferrably, inspections will occur immediately prior to peaks in juvenile fish migrations. A video monitoring system may be used in these inspections.

6. There will be monthly inspections of project fish facilities by fishery agencies and tribal representatives.

B. COORDINATION PLAN

1. Scheduled Maintenance - Project managers plan in advance for the maintenance activities that are to occur on their respective projects each year. These activities include maintenance of the turbine generators, navigation locks,

adult and juvenile fish facilities and the spillway dam. These activities may also include special tasks conducted by the projects for various research groups. The maintenance for these activities is traditionally set at particular times of the year to coincide with such things as low fish passage, low power demand, low river flows and equal distribution of work load.

The projects' turbine and spillway maintenance schedules will be reviewed annually by CENPP-OP-PF biologists for fishery impacts. The fishway maintenance schedule will be submitted to the CENPP-OP-PF biologist by 15 September each year, for coordination with NPPPL-FW, the fishery agencies and Indian tribes. Other scheduled maintenance needs are to be coordinated with the CENPP-OP-PF biologists when they may inpact the projects' ability to keep the fish facilities operating according to the present fishway operating criteria. The above submittals should take place far enough in advance so that conflicts between fishery needs and required project maintenance can be resolved.

The project fishway maintenance schedules will be considered tentative, but any changes should be coordinated with the CENPP-OP-PF biologists as early as possible. There are many events that could occur during the planned maintenance that should be coordinated with the CENPP-OP-PF biologists. Examples of these are:

a. Dewatering of turbine intakes and draft tubes.

b. Closing of fishway entrances.

c. Interruption of auxiliary fishway water.

d. Ladder dewatering or lowering of the water level.

e. Cycling of STS during fish passage season.

2. Unscheduled Maintenance - Unscheduled maintenance or repair will need to be handled by the project manager on a case by case basis using the available information. Unscheduled maintenance or repair is defined as the correction of any situation that impacts fish passage and survival, or impairs the projects' ability to operate the facilities according to standard operating criteria. The NPPOP-P-NR biologist must be notified as soon as the need for such work becomes apparent. The project manager has the authority to initiate the work prior to this notification when, in his opinion, delay of the work will result in an unsafe situation for people, property or fish. Information needed by the CENPP-OP-PF biologist in the above coordination includes:

a. Description of the problem.

b. Type of repair necessary.

c. Length of time for repair.

d. Expected impacts on fish passage.

e. Description of any priority work or situation that prevents the repair from proceeding immediately.

3. The CENPP-OP-PF biologists will be notified when work requested by any entity may impact fish passage or survival. Also notification of the CENPP-OP-PF biologists is strongly recommended when project personnel observe work being conducted by other groups which may impact fish passage. The CENPP-OP-PF biologists must be notified when a malfunction or accident occurs on or near the project which may impact fish passage or survival. Such malfunctions or accidents would include petroleum spills, chemical spills, vehicle accidents or natural disasters.

APPENDIX B
TURBINES USED AT NPP COLUMBIA RIVER
PROJECTS FOR FISH*

Project	Turbine	Dates Required	Remarks
Bonneville	1,2	1 March - 30 November	Used for adult fish attraction to gate 1 and provide flows for juvenile outfall (ice-trash sluiceway) during the interim bypass operation.
	9,10	1 March - 30 November	Used for adult fish attraction to gate 65 and provides flows for the Bradford Island juvenile transportation release site and juvenile bypass outlet.
	11	1 March - 30 November	Used for adult fish attraction to the second powerhouse upstream and downstream shore fishway entrances.
	17,18	1 March - 30 November	Used for adult fish attraction to the second powerhouse upstream and downstream north shore fishway entrances and provides flow for the juvenile bypass outlet.
The Dalles	1,2	1 March- 30 November	Operated during daylight hours for juvenile fish Ice & Trash sliuceway entrance attraction.
John Day	1	1 March - 30 November	Used for adult fish attraction to SE1 and orifice gate 1.

* Overhauls and other planned outages (longer than 1 day) of these units (a maximum of two units per year) will occur during low juvenile and adult fish passage periods (October 15 to March 1) unless specially coordinated.

WALLA WALLA DISTRICT

FISH FACILITY

OPERATIONS AND MAINTENANCE PLAN

1989

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WALLA WALLA DISTRICT

FISH FACILITY

OPERATIONS AND MAINTENANCE PLAN

I. McNary Dam

A. Adult Fish Passage Facilities

1. Facilities Description: The adult fish passage facilities at McNary are comprised of separate north and south shore facilities. The north shore facilities are made up of a fish ladder with counting station, a small collection system, and a gravity-flow auxiliary water supply system. The collection system has three downstream entrances and a side entrance into the spillway basin. Two of the downstream entrances are used during normal operation. The gravity-flow auxiliary water supply system takes water from the forebay through a series of conduits and distributes it through diffusers at the bottom of the ladder and in the transportation channel. There are four main conduits numbered 1 to 4, with conduits 1 and 4 providing the required flow. Conduits 2 and 3 were sealed off when the fishlock was deactivated and are not available for use. The south shore facilities are comprised of a fish ladder with counting station, two south shore entrances, a powerhouse collection system, and gravity and pumped auxiliary water supply systems. The powerhouse collection system contains three downstream and one side entrance into the spillway basin at the north end of the powerhouse, thirty floating orifices located across the powerhouse, and a common transportation channel for all of the entrances. At the north end of the powerhouse, two of the downstream entrances are used during normal operation with the other downstream and side entrances closed. The gravity-flow auxiliary water is provided by one conduit from the forebay and supplies the diffusers at the bottom of the ladder at tailwater level. The pumped auxiliary water is supplied by three electric pumps with variable-pitched blades. Two pumps are capable of providing the required flow, but all three pumps may operate at reduced output per pump. The electric pumps supply the auxiliary water for the diffusers at the entrances and in the transportation channel.

2. Fish Passage Season: 1 March through 31 December operate according to criteria in Appendix C.

3. Scheduled Maintenance: Scheduled maintenance of a facility which must be unwatered to work on or whose maintenance will have a significant effect on fish passage will be done during the winter maintenance period from 1 January to 1 March. Maintenance of facilities which will not effect fish passage may be conducted during the rest of the year. Maintenance is normally conducted on one fish ladder at a time during the winter to provide some fish passage at the project at all times. Appendix B contains the scheduled maintenance

that is normally conducted each year. When facilities are not being maintained during the winter maintenance period, they will be operated according to the criteria in Appendix C unless otherwise coordinat with the fishery agencies and tribes.

4. Unscheduled Maintenance: Unscheduled maintenance which will significantly effect the operation of a facility will be coordinated with the fishery agencies and tribes (see Appendix A for coordination procedures). If part of a facility malfunctions or is damaged during the fish passage season and the facility can still be operated within criteria without any detrimental effects on fish passage, repairs may not be conducted until the winter maintenance period or until fewer numbers of fish are passing the project so there will be less impact of it being unwatered or taken out of service. If part of a facility is damaged or malfunctions that may significantly impact fish passage, it will be repaired as soon as possible.

(a) Fish Ladders and Counting Stations. The fish ladders contain tilting weirs, fixed weirs, counting stations with picketed leads, and fish exits with trash racks. If any part of the fish ladder fails or is blocked with debris during the fish passage season, efforts will first be made to correct it without unwatering the ladder. Trash racks, picketed leads, tilting weir mechanisms, and counting stations can sometimes be repaired or maintained without unwatering the ladder. The decision on whether to unwater the ladder and make repairs during the fish passage season or wait until the winter maintenance period will be made after consultation with the fishery agencies and tribes.

(b) North Shore Auxiliary Water Supply System: Durin normal operation, conduits 1 and 4 are operated along with entrance weirs WFE2 and WFE3. Conduit #4 feeds diffusers 1 through 4 and conduit #1 feeds diffusers 5 through 12. Each diffuser has two or more rotovalves which control the amount of water going into a diffuser. If a rotovalve fails, the closest rotovalve that is closed will be opened to provide the required flow. If more rotovalves fail than there are closed valves and it is not possible to operate the entrances within criteria, WFE2 weircrest will be raised at one-foot increments to maintain the required 1.0 to 1.5 head differential. If this is not possible by the time the weir reaches 4 feet below tailwater, the entrance will be closed. If one conduit fails, WFE2 will be closed and WFE3 will be operated as deep as possible to maintain the 1.0 to 1.5 feet head differential. If it is not possible to maintain the head differential at a depth of 6 feet or greater, the weir will be maintained at 6 feet regardless of the head. If both conduits fail, WFE 2 will be closed and WFE3 operated at a depth of 6 feet until repairs can be made.

(c) South Shore Auxiliary Water Supply System: The south shore auxiliary water is made up of a combination of gravity flow from the forebay and pumped water from the tailrace. The gravity flow supplies the diffusers above weir 253 (diffusers 7 through 14) and the pumps supply the diffusers below weir 253 (diffusers 1 through 7 and the main unit diffusers). Diffuser 7 is where both systems me and is supplied by either gravity flow or pumped flow. The gravi

flow diffusers are regulated by rotovalves and the pumped flow diffusers by sluicegates. If a rotovalve fails, the nearest closed rotovalve will be opened to supply the flow. If more rotovalves fail than there are closed valves the sluicegates in diffusers 3 through 7 will be opened more to provide the required transportation flows. If any sluicegates fail, the sluicegates nearest it will be opened further to make up the water. If one pump fails, the other two pumps will be operated to maintain the facilities within criteria. If two pumps fail, SFE2 and NFE3 will be closed and SFE1 and NFE2 will be operated as deep as possible to maintain the 1.0 to 1.5-foot head differential. If all three pumps fail, the powerhouse transportation channel will be bulkheaded off at the junction pool and SFE1 and SFE2 operated a deep as possible and to maintain the 1.0 to 1.5 head differential. If a depth of 6 feet on both gates cannot be maintained, SFE2 will be closed. If the gravity flow and pumped auxiliary water supply systems both fail, the powerhouse transportation channel will be bulkheaded off at the junction pool, SFE2 closed, and SFE1 operated at 6 feet below tailwater until repairs can be made.

(d) Fishway Entrances: The fishway entrances are made up of main entrance weirs with hoists and automatic controls, and floating orifices which regulate themselves with tailwater fluctuations. If any of the automatic controls malfunction the weirs can usually be operated manually by project personnel and kept within criteria. If there is a further failure which prevents the entrance from being operated manually, the entrance may be lowered down and left in an operating position or an alternate entrance opened until repairs can be made. If a floating orifice fails, it will be pulled out of the water and replaced with a spare floating orifice.

B. Juvenile Fish Passage Facilities

1. Facilities Description: The juvenile facilities at McNary Dam are made up of traveling screens, gatewell orifices, bypass flume, and transportation facilities. The transportation facilities include an upwell and separator structure, raceways, distribution system for distributing the fish among the raceways, a sampling and marking building, truck and barge loading facilities, and associated water supply lines.

2. Fish Passage Season: 1 April to end of transport and bypass season operate according to criteria in Appendix D and the Fish Transportation Oversight Team's (FTOT) Annual Work Plan (Appendix E).

3. Scheduled Maintenance: Scheduled maintenance of the juvenile facilities is conducted during the entire year as listed in Appendix B, Fish Facility Scheduled Maintenance. Long-term maintenance or modification of facilities which require them to be out of service for extended periods of time are conducted during the winter maintenance period from 1 November to 31 March. During the fish passage season, parts of the facilities are maintained on a daily, weekly, or longer interval to keep them in proper operating condition.

4. Unscheduled Maintenance: Unscheduled maintenance which will have a significant impact on juvenile fish passage should be coordinated with the fishery agencies and tribes. Maintenance facilities such as traveling screens, which sometimes break down during the fish passage season, will be carried out according to the FTOT annual plan (Appendix E). In these cases, repairs will be made as prescribed and the fishery agencies and tribes notified through established channels agreed to in the plan. Other unscheduled maintenance will be coordinated as per Appendix A.

(a) Traveling screens: Traveling screens are inspected periodically throughout the juvenile migration season with a video monitoring system. If a screen is found to be damaged or malfunctions at any time, measures will be taken in accordance with the FTOT Annual Work Plan (Appendix E).

(b) Gatewell orifices and bypass flume: Each gatewell has two orifices with valves to allow fish to exit the gatewell. Under normal operation, one orifice per gatewell is operated in accordance with Appendix D. If an orifice becomes blocked with debris or is damaged, it will be closed and the alternate orifice for that gatewell operated until repairs can be made. The bypass flume is operated to transport juveniles to the collection facility or the overflow screens can be pulled to bypass them into the ice and trash sluiceway which enters the tailrace by turbine unit 14. If there are any problems with the flume, efforts will first be made to repair it without dewatering. If that is not possible, the flume will be dewatered and repaired as soon as possible. Traveling screens will remain in operation and the juveniles allowed to accumulate in the gatewells for up to two days. If repairs are to take longer than two days, a salvage program will be initiated to dipnet the juveniles from the gatewells until repairs are made and the system watered up again.

(c) Transportation Facilities: The transportation facilities can be operated to either collect and hold juveniles for the transportation program or to bypass them back to the river through the ice and trash sluiceway. If part of the facility malfunctions or is damaged, efforts will first be made to bypass the fish around the damaged area. If this is not possible, the overflow screens in the bypass flume will be pulled to bypass fish directly into the ice and trash sluiceway and around the transportation facilities or the entire bypass system may need to be dewatered to allow repairs to be made.

II. Ice Harbor Dam.

A. Adult Fish Passage Facilities.

1. Facilities Description: The adult fish passage facilities at Ice Harbor are made up of separate north and south shore facilities. The north shore facilities include a fish ladder with counting station, a small collection system, and a pumped auxiliary water supply system. The collection system includes two downstream entrances and one side entrance into the spillway basin. In normal operation one downstream entrance is used and the other two entrances are closed. The auxiliary water is supplied by three electric pumps with either two or three pumps operated at any one time, depending on tailwater. The south shore facilities are comprised of a fish ladder with counting station, two south shore entrances, a powerhouse collection system, and a pumped auxiliary water supply system. The powerhouse collection system includes two downstream entrances and one side entrance into the spillway basin at the north end of the powerhouse, twelve floating orifices, and a common transportation channel. One of the downstream north powerhouse entrances and seven of the floating orifices are used during normal operation. At the south shore entrances, one entrance is normally used. The auxiliary water is supplied by eight electric pumps of which from five to seven are normally used to provide the required flows.

2. Fish Passage Season: 1 March to 31 December operate according to criteria in Appendix C.

3. Scheduled Maintenance: Scheduled maintenance of a facility which must be unwatered to work on or whose maintenance will have a significant effect of fish passage will be done during the winter maintenance period from 1 January to 1 March. Maintenance of facilities which will not effect fish passage may be conducted during the rest of the year. Maintenance is normally conducted on one fish ladder at a time during the winter to provide some fish passage past the project at all times. Appendix B contains the scheduled maintenance that is normally conducted each year. When facilities are not being maintained during the winter maintenance period, they will be operated according to the criteria in Appendix C unless coordinated otherwise with the fishery agencies and tribes.

4. Unscheduled Maintenance: Unscheduled maintenance which will significantly effect the operation of a facility will be coordinated with the fishery agencies and tribes (see Appendix A for coordination procedures). If part of a facility malfunctions or is damaged during the fish passage season and the facility can still be operated within criteria without any detrimental effects on fish passage, repairs may not be conducted until the winter maintenance period or until fewer numbers of fish are passing the project. If part of a facility is damaged or malfunctions that may significantly impact fish passage, it will be repaired as soon as possible.

(a) Fish Ladders and Counting Stations: The fish ladders contain fixed weirs, counting stations with picketed leads, and fish exits with trash racks. If any part of the ladder fails or

is blocked with debris during the fish passage season, efforts will first be made to correct it without unwatering the ladder. Trash racks, picketed leads, and counting stations can sometimes be repaire or maintained without unwatering the ladder. The decision on whethe to dewater the ladder and make repairs during the fish passage season or wait until the winter maintenance period will be made after consultation with the fishery agencies and tribes.

(b) North Shore Auxiliary Water Supply System: The north shore facilities contain three electric pumps which provide auxiliary water to the diffusers at the bottom of the ladder and at the entrances. During normal operation two or three pumps are required, depending on the tailwater elevation, to provide the necessary auxiliary water. If a pump fails during a two-pump operation, the pump on standby will be operated to provide the necessary flows. If a pump fails during a three-pump operation, NEW1 will be raised until the required 1.0 to 1.5-foot head differential is achieved. If this cannot be met by the time the weir reaches 6 feet below tailwater, the gate will remain at that level regardless of the head. If two or all three pumps fail, the weir will be maintained at a level of 6 feet below tailwater until repairs are made.

(c) South Shore Auxiliary Water Supply System: The south shore auxiliary water is supplied by eight electric pumps. Fluctuating tailwater levels require from five to seven pumps to be operated to provide the auxiliary water. If one pump fails, a standby pump will be started to keep the fishway within criteria. If more pumps fail, this procedure will continue until all the standby pumps are in operation. If criteria cannot be met, the floating orifice should be closed in the following order: OG-12, OG-10, OG-8, and OG-6 If the required head differential of 1.0 to 1.5 feet cannot be reached when the floating orifices are closed, SSE 1 and NFE 2 will be closed equally at one-foot intervals until it is reached or until the weirs are 5 feet below tailwater. Then the remaining floating orifices should be closed in the following order: OG-4, OG-1, and OG-2. If there is still not enough auxiliary water to maintain the head differential on the two main entrances, NFE 2 will be closed, the transportation channel bulkheaded off at the junction pool, and SSE 1 operated as deep as possible to maintain the head differential. If it cannot be maintained at a depth of 6 feet or greater, the weir will remain at 6 feet regardless of the head.

(d) Fishway Entrances: The fishway entrances are made up of main entrance weirs with hoists and automatic controls, and floating orifices which regulate themselves with tailwater fluctuations. If any of the automatic controls malfunction, the weirs can usually be operated manually by project personnel and kept within criteria. If there is a further failure which prevents the entrance from being operated manually, an alternate entrance will be opened until repairs can be made. If a floating orifice fails, it will be pulled out of the water and the entrance bulkheaded off until the floating orifice is repaired.

B. Juvenile Fish Passage Facilities.

1. Facilities Description: The juvenile passage facilities at Ice Harbor consist of 6-inch orifices drilled through the concrete leading from the gatewells to the ice and trash sluiceway, and electric hoists attached to the A-slot gates of the ice and trash sluiceway to allow operation of the sluiceway as a surface bypass system.

2. Fish Passage Season: 1 April to one week later than Lower Granite transport and bypass season operate according to criteria in Appendix D.

3. Scheduled Maintenance: Scheduled maintenance of the juvenile facilities is conducted during the non-fish passage season from the end of the bypass season (approximately 1 September) to 31 March as listed in Appendix B. Long-term maintenance or modifications to the facilities which require them to be out of service are done during this time period. During the fish passage season, the facilities are inspected on a daily basis to insure that they are operating correctly.

4. Unscheduled maintenance: Unscheduled maintenance which will have a significant effect on fish passage will be coordinated with the fishery agencies and tribes as per Appendix A. If orifices become blocked with debris, they will be cleared by project personnel as soon as possible. If a sluiceway gate hoists fails, the gate will be closed and an alternate gate opened until repairs can be made.

III. Lower Monumental Dam

A. Adult Fish Passage Facilities.

1. Facilities Description: The adult fish passage facilities at Lower Monumental are comprised of north and south shore fish ladders and collection systems with a common auxiliary water supply. The north shore fish ladder connects to two north shore entrances and the powerhouse collection system. The powerhouse collection system has two downstream and one side entrance into the spillway basin at the south end of the powerhouse, ten floating orifices, and a common transportation channel. The two north shore entrances, two downstream south powerhouse entrances, and five of the floating orifices are used during normal operation. The south shore fish ladder has two downstream entrances and a side entrance into the spillway basin. The two downstream entrances are used during normal operation. The auxiliary water is supplied by three turbine-driven pumps located in the powerhouse on the north side of the river. The water is pumped into a supply conduit which travels under the powerhouse collection channel, distributing water to the powerhouse diffusers, and under the spillway to the diffusers in the south shore collection system.

2. Fish Passage Season: 1 March through 31 December operate according to criteria in Appendix C.

3. Scheduled Maintenance: Scheduled maintenance of a facility which must be unwatered to work on or whose maintenance will have significant effect on fish passage will be done during the winter maintenance period from 1 January to 1 March. Maintenance of facilities which will not have a significant effect on fish passage may be conducted during the rest of the year. Fishway auxiliary water supply pumps require monthly, semi-annual, and annual maintenance. Monthly maintenance requires a one-day outage per pump, semi-annual maintenance requires a two-day outage per pump in July, and annual maintenance requires a two-week outage per pump during the winter maintenance period. Maintenance is normally conducted on one fish ladder at a time during the winter to provide some fish passage at the project at all times. Appendix B contains the scheduled maintenance that is normally conducted each year. When facilities are not being maintained during the winter maintenance period, they will be operated according to the criteria in Appendix C unless otherwise coordinated with the fishery agencies and tribes.

4. Unscheduled Maintenance: Unscheduled maintenance which will significantly effect the operation of a facility will be coordinated with the fishery agencies and tribes (see Appendix A for coordination procedures). If part of a facility malfunctions or is damaged during the fish passage season and the facility can still be operated within criteria without any detrimental effects on fish passage, repairs may not be conducted until the winter maintenance period or until fewer numbers of fish are passing the project. If part of a facility is damaged or malfunctions that may significantly impact fish passage, it will be repaired as soon as possible.

(a) Fish Ladders and Counting Stations: The fish ladders contain fixed weirs, counting stations with picketed leads, and fish exits with trash racks. If any part of the ladder fails or is blocked with debris during the fish passage season, efforts will first be made to correct it without unwatering the ladder. Trash racks, picketed leads, and counting stations can sometimes be repaired or maintained without unwatering the ladder. The decision on whether to dewater the ladder and make repairs during the fish passage season or wait until the winter maintenance period will be made after consultation with the fishery agencies and tribes.

(b) Auxiliary Water Supply System: The auxiliary water for the fish ladders and the collection systems is supplied by three turbine-driven pumps on the north shore with all three pumps being required for normal operation. If one, two, or all three pumps fail, the fishway will be adjusted in the following manner until repairs can be made: SPE 2 and SSE 2 will be closed and SPE 1 raised to provide the required 1.0 to 1.5 foot head differential in the system. If the desired head differential cannot be reached by the time SPE 1 reaches 5 feet below tailwater, the floating orifices should be closed starting at OG-9 and working north across the powerhouse. If the head differential still cannot be maintained when all the floating orifices are closed, SPE 1 should be closed, the collection channel bulkheaded off at the junction pool, and NSE 1 and 2 and SSE 1 operated as deep as possible to maintain the head. If it cannot be maintained at a depth greater than 6 feet, the weirs should be maintained at 6 feet regardless of the head differential.

(c) Fishway Entrances: The fishway entrances are made up of main entrance weirs with hoists and automatic controls, and floating orifices which regulate themselves with tailwater fluctuations. If any of the automatic controls malfunction, the weirs can be operated manually by project personnel and kept within criteria. If there is a further failure which prevents an entrance from being operated manually. The weirs can usually be left in a lowered position while repairs are being conducted or the entrance closed and the water redistributed to other entrances while repairs are made. If a floating orifice is damaged, it will be pulled out of the water and the entrance bulkheaded off until it is repaired.

B. Juvenile Fish Passage Facilities.

1. Facilities Description: The juvenile facilities at Lower Monumental consist of an embedded pipe running the length of the powerhouse from turbine unit 1 to unit 6 and then dropping down to the tailrace deck, releasing the fish downstream of turbine unit 6. Each gatewell slot contains one orifice to allow fish to move from the gatewell into the bypass pipe.

2. Fish Passage Season: 1 April to one week later than Lower Granite transport and bypass season operate according to criteria in Appendix D.

3. Scheduled Maintenance: Scheduled maintenance of the juvenile facilities is conducted during the non-fish passage season

from the end of the bypass season (approximately 1 September) to 31 March as listed in Appendix B. Long-term maintenance or modifications to the facilities which require them to be out of service are dc during this time period. During the fish passage season, th facilities are inspected on a daily basis to insure that they are operating correctly.

4. Unscheduled Maintenance: Unscheduled maintenance which will have a significant effect of fish passage will be coordinated with the fishery agencies and tribes as per Appendix A. During daily inspections, gatewell slots are monitored for debris build-up and are cleaned when it accumulates to prevent the orifices from becoming blocked. The bypass pipe should be routinely closed twice per week and blown back with air to clear any blocked orifice. If the orifices or the bypass pipe appear to be blocked with debris they will be cleaned by project personnel as soon as possible.

IV. Little Goose Dam

A. Adult Fish Passage Facilities.

1. Facilities Description: The adult fish passage facilities at Little Goose are made up of one fish ladder on the south shore, two south shore entrances, a powerhouse collection system, north shore entrances with a transportation channel underneath the spillway to the powerhouse collection system, and auxiliary water supply system. The powerhouse collection system is comprised of ten floating orifices, two downstream entrances and one side entrance into the spillway basin on the north end of the powerhouse, and a common transportation channel. Four of the floating orifices and the two downstream entrances at the north end of the collection system are normally used. The north shore entrances are made up of two downstream facing entrances and a side entrance into the spillway basin with the two downstream entrances normally used. The auxiliary water is supplied by three turbine-driven pumps that pump water from the tailrace into the distribution system for the diffusers.

2. Fish Passage Season: 1 March through 31 December operate according to criteria in Appendix C.

3. Scheduled Maintenance: Scheduled annual maintenance of a facility which must be unwatered to work on or whose maintenance will have a significant effect on fish passage will be done during the winter maintenance period from 1 January to 1 March. Maintenance of facilities which will not have a significant effect on fish passage may be conducted during the rest of the year. Fishway auxiliary water supply pumps require monthly, semi-annual, and annual maintenance. Monthly maintenance requires a one-day outage per pump, semi-annual maintenance requires a two-day outage per pump in July, and annual maintenance requires a two-week outage per pump during the winter maintenance period. Appendix B contains the scheduled maintenance that is normally conducted each year. When facilities are not being maintained during the winter maintenance period, they will be operated according to the criteria in Appendix C unless otherwise coordinated with the fishery agencies and tribes.

4. Unscheduled Maintenance: Unscheduled maintenance which will significantly effect the operation of a facility will be coordinated with the fishery agencies and tribes as per Appendix A. If part of a facility malfunctions or is damaged during the fish passage season and the facility can still be operated within criteria without any detrimental effects on fish passage, repairs may not be conducted until the winter maintenance period or until fewer numbers of fish are passing the project. If part of a facility is damaged or malfunctions that may significantly impact fish passage, it will be repaired as soon as possible.

(a) Fishladder and Counting Station: The fishladder contains fixed weirs, a counting station with picketed leads, and a fish exit with trashrack. If any part of the ladder fails or is blocked with debris during the fish passage season, efforts will first

be made to correct it without unwatering the ladder. Trash racks, picketed leads, and counting stations can sometimes be repaired or maintained without unwatering the ladder. The decision to dewater the ladder and make repairs during the fish passage season or wait until the winter maintenance period will be made after consultation with the fishery agencies and tribes.

(b) Auxiliary Water Supply System: The auxiliary water for the fish ladder and the powerhouse collection system is supplied by three turbine-driven pumps on the south shore with all three pumps being required for normal operation. If one, two, or all three pumps fail, the fishway will be adjusted down in the following manner to get the best fish passage conditions possible until repairs can be made: First, NSE 2 and NPE 2 should be closed and NPE 1 operated to provide the required 1.0 to 1.7-foot head differential. If the desired head differential cannot be maintained at a depth of 5 feet or greater, then NSE 1 should be raised until a depth of 5 feet below tailwater is reached. If the head differential cannot be maintained at this point, floating orifices OG-6 and OG-4 should be closed and SSE 1 and 2 should be raised at one-foot increments until 6 feet below tailwater is reached. If the head differential still cannot be maintained, the transportation channel to the north shore should be bulkheaded off at the end of the powerhouse collection channel. Next, OG-10 and OG-1 should be closed followed by NPE 1 and the powerhouse collection channel bulkheaded off at the junction pool. SSE 1 and 2 should then be operated as deep as possible to maintain the head, but not shallower than 6 feet regardless of the head.

(c) Fishway Entrances: The fishway entrances are made up of main entrance weirs with hoists and automatic controls, and floating orifices which regulate themselves with tailwater level. If any of the automatic controls malfunction, the weirs can be operated manually by project personnel and kept within criteria. If there is a further failure which prevents an entrance from being operated manually, the weirs can usually be left in a lowered position while repairs are being conducted or the entrance closed and the water redistributed to other entrances while repairs are made. If a floating orifice is damaged, it will be pulled out of the water and the entrance bulkheaded off until it is repaired.

B. Juvenile Fish Passage Facilities.

1. Facilities Description: Little Goose's juvenile facilities consist of a bypass system and juvenile transportation facilities. The bypass system contains traveling screens, gatewell orifices, a bypass channel running the length of the powerhouse, and a hopper and bypass pipe to transport the fish to the transportation facilities or to the river. The transportation facilities include an upwell and separator structure, raceways for holding fish, a distribution system for distributing the fish among the raceways, a sampling building, truck and barge loading facilities, and associated water supply lines.

2. Fish Passage Season: 1 April to end of transport and bypass season operate according to criteria in Appendix D and the Fi

Transportation Oversight Team's (FTOT) Annual Work Plan (Appendix E).

3. Scheduled Maintenance: Scheduled maintenance of the juvenile facilities is conducted during the entire year as listed in Appendix B, Fish Facility Scheduled Maintenance. Long-term maintenance or modification of facilities which requires them to be out of service for extended periods of time are conducted during the winter maintenance period from the end of the bypass season (approximately 1 September) to 31 March. During the fish passage season parts of the facilities are maintained on a daily, weekly, or longer interval to keep them in proper operating condition.

4. Unscheduled Maintenance: Unscheduled maintenance which will have a significant impact on juvenile fish passage should be coordinated with the fishery agencies and tribes. Maintenance of facilities such as traveling screens, which sometimes break down during the fish passage season, will be carried out according to the FTOT Annual Work Plan (Appendix E). In these cases, repairs will be made as prescribed and the fishery agencies and tribes notified through established channels agreed to in the plan. Other unscheduled maintenance will be coordinated as per Appendix A.

(a) Traveling Screens: Traveling screens are inspected periodically throughout the juvenile migration season with a video monitoring system. If a screen is found to be damaged or malfunctions at any time, measures will be taken in accordance with the FTOT Annual Work Plan (Appendix E).

(b) Gatewell Orifices: Each gatewell has two orifices with valves to allow fish to exit the gatewell. Under normal operation, one orifice per gatewell is operated in accordance with Appendix D. To minimize blockage from debris, orifices should be rotated every other day.

(c) Hopper and Bypass Pipe: The hopper and bypass pipe are attached to the outside of the powerhouse at the end of the powerhouse juvenile bypass channel. All juvenile fish in the bypass system must pass through these to the transportation facilities or to the tailrace. If any part of the hopper or bypass pipe is damaged, the gatewell orifices will be closed and the bypass system unwatered until repairs can be made. Traveling screens will remain in operation and the juveniles allowed to accumulate in the gatewells for up to two days. If repairs are to take longer than two days, a salvage program will be initiated to dipnet the juveniles from the gatewells until repairs are made and the system watered up again.

(d) Transportation Facilities: The transportation facilities can be operated to either collect and hold juveniles for the transportation program or to bypass them back to the river. If part of the facility malfunctions or is damaged, efforts will first be made to bypass the fish around the damaged area. If this is not possible, the fish will be bypassed around the transportation facilities or the entire bypass system unwatered to allow repairs to be made.

V. Lower Granite Dam

A. Adult Fish Passage Facilities.

1. Facilities Description: The adult fish passage facilities at Lower Granite are made up of one fish ladder on the south shore, two south shore entrances, a powerhouse collection system, north shore entrances with a transportation channel underneath the spillway to the powerhouse collection system, and an auxiliary water supply system. The powerhouse collection system is comprised of ten floating orifices, two downstream entrances and one side entrance into the spillway basin on the north end of the powerhouse, and a common transportation channel. Four of the floating orifices and the two downstream entrances at the north end of the collection system are normally used. The north shore entrances are made up of two downstream entrances and a side entrance into the spillway basin with the two downstream entrances normally used. The auxiliary water is supplied by three electric pumps that pump water from the tailrace to the diffusers with two pumps normally used to provide the required flows.

2. Fish Passage Season: 1 March through 31 December operate according to criteria in Appendix C.

3. Scheduled Maintenance: Scheduled maintenance of a facility which must be unwatered to work on or whose maintenance will have a significant effect on fish passage will be done during the winter maintenance period from 1 January to 1 March. Maintenance of facilities which will not effect fish passage may be conducted dur[illegible] the rest of the year. Appendix B contains the scheduled maintenan[illegible] that is normally conducted each year. When facilities are not being maintained during the winter maintenance period, they will be operated according to the criteria in Appendix C unless otherwise coordinated with the fishery agencies and tribes.

4. Unscheduled Maintenance: Unscheduled maintenance which will significantly effect the operation of a facility will be coordinated with the fishery agencies and tribes as per Appendix A. If part of a facility malfunctions or is damaged during the fish passage season and the facility can still be operated within criteria without any detrimental effects on fish passage, repairs may not be conducted until the winter maintenance period or until fewer numbers of fish are passing the project. If part of a facility is damaged or malfunctions that may significantly impact fish passage, it will be repaired as soon as possible.

(a) Fishladder and Counting Station: The fishladder contains fixed weirs, a counting station with picketed leads, an adult fish trap located in an offshoot from the ladder, and a fish exit with trashrack. If any part of the ladder fails or is blocked with debris during the fish passage season, efforts will first be made to correct it without unwatering the ladder. Trash racks, picketed leads, and counting stations can sometimes be repaired or maintained without unwatering the ladder. If the fish trap malfunctions or is damaged, fish may be passed around it until repairs are made. The decision

dewater the ladder and make repairs during the fish passage season or wait until the winter maintenance period will be made after consultation with the fishery agencies and tribes.

(b) Auxiliary Water Supply System: The auxiliary water for the fish ladder and the powerhouse collection system is supplied by three electric pumps. During normal operations and most flow conditions, two pumps are capable of providing the required flows. If a pump fails during the two-pump operation, the pump on standby will be operated to make up the flows. If two pumps fail, NSE 2 and NPE 2 will be closed and NPE 1 raised in one-foot increments to provide the required 1.0 to 1.7-foot head differential. If the head cannot be maintained by the time the top of the weir reaches 5 feet, the floating orifices should be closed in the following order: OG-4, OG-7, OG-10, and OG-1. If the head in the system still cannot be maintained at this point, SSE 1 and SSE 2 should be raised in one-foot increments until 5 feet below tailwater is reached. If all three pumps fail, NSE 1 and NPE 1 should be closed, the powerhouse collection channel bulkheaded off at the junction pool, and SSE 1 and SSE 2 operated at 6 feet below tailwater regardless of the head.

(c) Fishway Entrances: The fishway entrances are made up of main entrance weirs with hoists and automatic controls, and floating orifices which regulate themselves with tailwater level. If any of the automatic controls malfunction, the weirs can be operated manually by project personnel and kept within criteria. If there is a further failure which prevents an entrance from being operated manually. The weirs can usually be left in a lowered position while repairs are being conducted or the entrance closed and the water redistributed to other entrances while repairs are made. If a floating orifice is damaged, it will be pulled out of the water and the entrance bulkheaded off until it is repaired.

B. Juvenile Fish Passage Facilities.

1. Facilities Description: Lower Granite's juvenile facilities consist of a bypass system and juvenile transportation facilities. The bypass system contains traveling screens, gatewell orifices, a bypass channel running the length of the powerhouse, and a bypass pipe to transport the fish to the transportation facilities or to the river. The transportation facilities include an upwell and separator structure to separate the fish from the excess water, raceways for holding fish, a distribution system for distributing the fish among the raceways, a sampling and marking building, truck and barge loading facilities, and associated water supply lines.

2. Fish Passage Season: 1 April to end of transport and bypass season operate according to criteria in Appendix D and the Fish Transportation Oversight Team's (FTOT) Annual Work Plan (Appendix E).

3. Scheduled Maintenance: Scheduled maintenance of the juvenile facilities is conducted during the entire year as listed in Appendix B, Fish Facility Scheduled Maintenance. Long-term maintenance or modification of facilities which require them to be out of service for extended periods of time are conducted during the

winter maintenance period from the end of the bypass season (approximately 1 September) to 31 March. During the fish passage season parts of the facilities are maintained on a daily, weekly, longer interval to keep them in proper operating condition.

4. Unscheduled Maintenance: Unscheduled maintenance which will have a significant impact on juvenile fish passage should be coordinated with the fishery agencies and tribes. Maintenance of facilities such as traveling screens, which sometimes break down during the fish passage season, will be carried out according to the FTOT Annual Work Plan (Appendix E). In these cases, repairs will be made as prescribed and the fishery agencies and tribes notified through established channels agreed to in the plan. Other unscheduled maintenance will be coordinated as per Appendix A.

(a) Traveling Screens: Traveling screens are inspected periodically throughout the juvenile migration season with a video monitoring system. If a screen is found to be damaged or malfunctions at any time, measures will be taken in accordance with the FTOT Annual Work Plan (Appendix E).

(b) Gatewell Orifices: Each turbine intake has 4 orifices, 2 in the bulkhead slot and 2 in the fish screen slot, with 8-inch slide gates for allowing the fish to exit the slots. Under normal operation, a total of 36 orifices are operated with 24 being bulkhead slot orifices and 12 being fish screen slot orifices. At least 1 orifice is open in each bulkhead slot with the fish screen slot orifices rotated open and close on an every other day basis. If an orifice becomes blocked with debris it will be cleaned; however, damaged orifice will be closed and the alternate orifice for that gatewell operated until repairs can be made.

(c) Bypass Pipe: The bypass pipe goes from the end of the powerhouse bypass channel to the transportation facilities downstream of the dam. All juvenile fish in the bypass system must pass through this to the transportation facilities or to the tailrace. If any part of the bypass pipe is damaged, the gatewell orifices will be closed and the bypass system unwatered until repairs can be made. Traveling screens will remain in operation and the juveniles allowed to accumulate in the gatewells for up to two days. If repairs are to take longer than two days, a salvage program will be initiated to dipnet the juveniles from the gatewells until repairs are made and the system watered up again.

(d) Transportation Facilities: The transportation facilities can be operated to either collect and hold juveniles for the transportation program or to bypass them back to the river. If part of the facility malfunctions or is damaged, efforts will first be made to bypass the fish around the damaged area. If this is not possible, the fish will be bypassed around the transportation facilities or the entire bypass system unwatered until repairs are made.

APPENDIX A

COORDINATION PROCEDURES

Appendix A
Coordination Procedures

1. Scheduled maintenance: Scheduled maintenance is the normal preventative maintenance conducted at yearly or other intervals to maintain facilities in proper operating condition.

a. Adult fish passage facilities: Scheduled maintenance of fish ladders, collection systems, and fish pumps which must be unwatered to maintain or whose maintenance will take the facilities out of operating criteria will be conducted during the winter maintenance period. Project Operations Branch (NPWOP-PO) will coordinate the District's winter maintenance outages with the fishery agencies and tribes, usually at the September Fish Passage Development and Evaluation Program Technical Coordinating Committee (FPDEPTCC) Meeting. Project Managers shall inform NPWOP-PO prior to 1 September of their estimated winter maintenance for that year.

Information required should include:

(1) Facilities to be unwatered or taken out of service.

(2) Estimated dates of outages.

(3) Type of maintenance to be performed.

(4) Any special maintenance or modifications to be done.

b. Juvenile fish passage facilities: Most scheduled maintenance of juvenile facilities occurs during the non-fish passage season when facilities are not in service. At projects with collection and transportation facilities, some scheduled maintenance occurs at daily, weekly, or longer intervals to keep the facilities in operating criteria. Scheduled maintenance will be conducted as stated in the Juvenile Facilities Operating Criteria (Appendix D) and FTOT Annual Work Plan (Appendix E) agreed to by the Corps, fishery agencies, and tribes. Major modifications of the juvenile facilities to be conducted during the non-fish passage season will be coordinated with the fishery agencies and tribes by NPWOP-PO prior to any work being done.

c. Turbine unit and spillways: Certain turbine units and spillway gates are operated on a priority basis to provide attraction flows to the ladder entrances. Annual maintenance of turbine units and spillgates or modifications which take them out of service, should be coordinated with NPWOP-PO far enough in advance so that effects on fish passage can be minimized.

2. Unscheduled maintenance: Unscheduled maintenance is the correction of any situation which prevents the facilities from operating according to criteria or which will impact fish passage and

survival. Unscheduled maintenance will be coordinated with the fishery agencies and tribes on a case-by-case basis by NPWOP-PO NPWOP-PO will be notified as soon as possible after it become apparent that maintenance repairs are required. The Project Manage has the authority to initiate work prior to notifying NPWOP-PO when in his opinion delay of the work will result in an unsafe situation for people, property, or fish. Information required by NPWOP-PO includes:

a. Description of the problem.

b. Type of outage required.

c. Impact on facility operation.

d. Length of time for repairs.

e. Expected impacts on fish passage.

APPENDIX B

FISH FACILITY

SCHEDULED MAINTENANCE

PROJECT: McNary

TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Adult Fish Passage Facilities		
North and south shore fish ladders	Annually in January and February	Dewater and clean ladders of all debris. Inspect and perform preventative maintenance and repairs as required.
North and south shore fish counting stations	Annually in January and February	Inspect, clean, and perform preventative maintenance on picketed leads and counting station equipment.
South shore attraction water pumps	Annually in January and February	Inspect and perform required preventative maintenance.
Entrance weir hoists and automatic control systems	Biannually in March and September	Inspect and perform required preventative maintenance.

PROJECT: McNary

TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Juvenile Fish Passage Facilities		
Traveling screens	Annually from November through March	Perform annual maintenance, overhauls, and rehabilitations as required.
	During the juvenile outmigration as per FTOT Annual Work Plan	Inspect with underwater TV camera.
Bypass facilities: orifices and collection and bypass flume	Annually from November through March	Inspect and perform preventative maintenance and repairs as required.
	Daily during the transportation season	Inspect and maintain daily. Repair damaged parts as soon as possible.
Transportation facilities: Upwell and separator, raceways, sample tank, barge and truck loading facilities, and associated water supply lines	Annually from November through March	Inspect and perform preventative maintenance and repairs as required.
	Daily or weekly during the transportation season	Inspect and maintain on a daily or weekly basis depending on the item. Repair damaged parts as soon as possible.
Trash racks	Annually in February and March and throughout the juvenile transport and bypass season per FTOT Annual Work Plan.	Clean trash racks of debris.

PROJECT: Ice Harbor

TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Adult Fish Passage Facilities		
North and south shore fish ladders	Annually in January and February	Dewater and clean ladders of all debris. Inspect and perform preventative maintenance and repairs as required.
North and south shore fish counting stations	Annually in January and February	Inspect, clean, and perform preventative maintenance on picketed leads and counting station equipment.
North and south shore attraction water pumps	Annually in January and February	Inspect and perform required preventative maintenance.
Powerhouse collection system entrance weir hoists	Annually in March	Inspect and perform required preventative maintenance.
Juvenile Fish Passage Facilities		
Sluiceway gate hoists and controls	Annually from September through March	Inspect and perform preventative maintenance and repairs as required.
Gatewell orifices	Annually in March	Inspect and cleanout debris.
Trash racks	Annually in March	Clean trash racks of debris.

PROJECT: Lower Monumental TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Adult Fish Passage Facilities		
North and south shore fish ladders	Annually in January and February	Dewater and clean ladders of all debris. Inspect and perform preventative maintenance and repairs as needed.
North and south shore fish counting stations	Annually in January and February	Inspect, clean, and perform preventative maintenance on picketed leads and counting station equipment.
Attraction water pumps	Annually in January and February; monthly, and semi-annually in July	Inspect and perform required annual, monthly, and semi-annual maintenance.
Powerhouse collections system entrance weir hoists	Biannually in April and October	Inspect and perform required preventative maintenance.
Juvenile Fish Passage Facilities		
Orifices and bypass pipe	Annually in March	Inspect and clean out debris.
Trash racks	Annually in March	Clean trash racks of debris.

PROJECT: Little Goose TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Adult Fish Passage Facilities		
Fish ladder	Annually in January and February	Dewater and clean ladder of all debris. Inspect and peform preventative maintenance and repairs as required.
Fish counting station	Annually in January and February	Inspect, clean, and perform preventative maintenance on picketed leads and counting station equipment.
Attraction water pumps	Annually in January and February, monthly, and semi-annually in July	Inspect and perform required annual, monthly, and semi-annual maintenance.
Powerhouse collection system and transportation channels	Annually in January and February	Inspect and perform preventative maintenance and repairs as required. Replace lights in transportation channel.

PROJECT: Little Goose TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Juvenile Fish Passage Facilities		
Traveling screens	Annually September through March	Perform annual maintenance, overhauls, and rehabilitation as required.
	During the juvenile outmigration as per FTOT Annual Work Plan	Inspect with underwater TV camera.
Bypass facilities: orifices bypass gallery, and bypass pipe	Annually September through March	Inspect and perform preventative maintenance and repairs as required.
	Daily or as required during the transportation season	Inspect and maintain daily or as required. Repair damaged parts as soon as possible.
Transportation facilities; upwell and separator, raceways, sampling facilities, truck and barge loading facilities, and associated water supply lines	Annually September through March	Inspect and perform preventative maintenance and repairs as required.
	Daily or as required during the transportation season	Inspect and maintain daily or as required. Repair damaged parts as soon as possible.
Trash racks	Annually in March and throughout the transport and bypass season per FTOT Annual Work Plan	Clean trash racks of debris.

PROJECT: Lower Granite TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Adult Fish Passage Facilities		
Fish ladder	Annually in January and February	Dewater and clean ladder of all debris. Inspect and perform preventative maintenance and repairs as required.
Fish counting station	Annually in January and February	Inspect, clean, and perform preventative maintenance on picketed leads and counting station equipment.
Powerhouse collection and transportation channels	Annually in January and February	Inspect and perform preventative maintenance and repairs as required. Replace lights in transportation channel.
Fish ladder secondary exit water supply pumps	Quarterly	Inspect and test pumps.
Attraction water pumps	Annually in January and February, and quarterly	Inspect and perform required annual and quarterly preventative maintenance.
Adult fish trap	Annually in March	Inspect and perform required preventative maintenance.

PROJECT: Lower Granite TYPE OF MAINTENANCE: Scheduled

ITEM	TIME OF YEAR	MAINTENANCE OR MEASURE TAKEN
Juvenile Fish Passage Facilities		
Traveling screens	Annually September through March	Perform annual maintenance, overhauls, and rehabilitations as required.
	During the juvenile outmigration as per FTOT Annual Work Plan	Inspect with underwater TV camera.
Bypass facilities: orifices, bypass gallery, and bypass pipe	Annually September through March	Inspect and perform preventative maintenance and repairs as required.
	Daily or as required during the transportation season	Inspect and maintain daily or as required. Repair damaged parts as soon as possible.
Transportation facilities: upwell and separator, raceways, sampling facilities, barge and truck loading facilities, and associated water supply lines	Annually September through March	Inspect and perform preventative maintenance and repairs as required.
	Daily or as required during the transportation season	Inspect and maintain daily or as required. Repair damaged parts as soon as possible.
Trash racks	Annually in March and throughout the transport and bypass season per FTOT Annual Work Plan	Clean trash racks of debris.

APPENDIX C

OPERATING STANDARDS FOR ADULT FISH PASSAGE FACILITIES

McNARY DAM

Operating Standards for Adult Fish Passage Facilities

Fishway Ladders

Water depth over weirs: 1.0 to 1.3 feet

Head on all Entrances

Head range: 1.0 to 1.5 feet

North Shore Entrances (WFE 3 & 3)

Operate 2 downstream gates

Weir depth: 8.0 feet or greater below tailwater.

North Powerhouse Entrances (NFE 2 & 3)

Operate 2 downstream gates.

Weir depth: 9.0 feet or greater below tailwater.

Powerhouse Collection System

Operate 12 floating orifices (O.G. numbers, 1, 3, 4, 8, 14, 21, 26, 32, 37, 41, 43, and 44).

South Shore Entrances (SFE 1 & 2)

Operate 2 entrances.

Weir depth: 9.0 feet or greater below tailwater.

Transportation Velocity

1.5 to 4 feet per second.

Head on Trashracks

Maximum head of 0.5 feet on ladder exit and attraction water intakes. Maximum head on picketed leads shall be 0.3 feet.

Staff Gauges and Water Level Indicators

Shall be readable at all water levels encountered during fish passage period.

Turbine Unit Operating Priority

Unit operation will be 1, 2, 14, 4 through 10, and then 3, 11, 12, 13, consecutively. If warm water temperatures in the summer result in higher than normal mortality in the juvenile fish collection system, refer to the summer unit operation schedule in the FTOT Annual Work Plan.

MCNARY SPILLWAY PATTERN FOR ADULT FISH PASSAGE
DISCHARGES IN KCFS AT FOREBAY ELEVATION 340

KCFS SPILL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TOTAL STOPS
1.5	1																					1
4.5	1	1																			1	3
8.0	1	1	1																	1	1	5
12.0	1	1	1	1															1	1	1	7
14.2	1	2	1	1															1	1	2	9
18.2	1	2	1	1	1													1	1	1	2	11
22.2	1	2	1	1	1	1											1	1	1	1	2	13
26.2	1	2	1	1	1	1	1									1	1	1	1	1	2	15
30.2	1	2	1	1	1	1	1	1							1	1	1	1	1	1	2	17
32.2	1	2	1	1	1	1	1	1	1						1	1	1	1	1	1	2	18
33.3	2	2	1	1	1	1	1	1	1						1	1	1	1	1	1	2	19
37.3	2	2	1	1	1	1	1	1	1	1			1		1	1	1	1	1	1	2	21
41.3	2	2	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	2	23
44.9	2	2	1	1	1	1	1	1	1	1	1	2	2		1	1	1	1	1	1	2	25
48.5	2	2	1	1	1	1	1	2	1	1	1	2	2		2	1	1	1	1	1	2	27
52.1	2	2	1	1	1	2	1	2	1	1	1	2	2		2	1	2	1	1	1	2	29
54.3	2	3	1	1	1	2	1	2	1	1	1	2	2		2	1	2	1	1	1	3	31
57.9	2	3	1	2	1	2	1	2	1	1	1	2	2		2	1	2	1	2	1	3	33
61.5	2	3	1	2	1	2	1	2	1	2	2	2	2		2	1	2	1	2	1	3	35
62.3	2	3	1	2	1	2	1	2	2	2	2	2	2		2	1	2	1	2	1	3	36
64.4	3	3	1	2	1	2	1	2	2	2	2	2	2		2	1	2	1	2	1	3	37
68.0	3	3	1	2	1	2	2	2	2	2	2	2	2		2	2	2	1	2	1	3	39
70.2	3	4	1	2	1	2	2	2	2	2	2	2	2		2	2	2	1	2	1	4	41
73.6	3	4	1	2	1	2	2	2	2	2	2	3	3		2	2	2	1	2	1	4	43
75.4	3	4	2	2	1	2	2	2	2	2	2	3	3		2	2	2	1	2	1	4	44
78.8	3	4	2	2	1	2	2	2	2	3	3	3	3		2	2	2	1	2	1	4	46
82.4	3	4	2	2	2	2	2	2	2	3	3	3	3		2	2	2	2	2	1	4	48
85.8	3	4	2	2	2	2	2	3	2	3	3	3	3		2	2	3	2	2	1	4	50
89.2	3	4	2	2	2	2	2	3	3	3	3	3	3		3	2	3	2	2	1	4	52
92.6	3	4	2	2	2	3	2	3	3	3	3	3	3		3	3	3	2	2	1	4	54
96.1	3	4	2	2	2	3	3	3	3	3	3	3	3		4	3	3	2	2	1	4	56
98.2	3	5	2	2	2	3	3	3	3	3	3	3	3		4	3	3	2	2	2	4	58
101.6	3	5	2	2	3	3	3	3	3	3	4	3	3		4	3	3	2	2	2	4	60
102.8	4	5	2	2	3	3	3	3	3	3	4	3	3		4	3	3	2	2	2	4	61
104.5	4	5	2	2	3	3	3	3	3	3	4	3	3		4	3	3	3	2	2	4	62

MCNARY SPILL PATTERN FOR ADULT FISH PASSAGE

...CONTINUED

KCFS SPILL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TOTAL STOPS
107.3	4	5	2	2	3	3	3	3	3	4	4	3	3		4	3	3	3	2	2	5	64
109.0	4	5	2	2	3	3	3	3	3	4	4	3	3		4	3	3	3	3	2	5	65
112.4	4	5	2	2	3	3	3	3	4	4	4	3	3		4	4	3	3	3	2	5	67
115.8	4	5	2	2	3	3	3	3	4	4	4	3	4		4	4	4	3	3	2	5	69
118.0	4	5	2	2	3	3	3	3	4	4	4	3	4		4	4	4	3	3	3	6	71
121.4	4	5	2	2	3	3	3	3	4	4	4	4	4		4	4	4	3	4	3	6	73
124.2	5	5	2	3	3	3	3	3	4	4	4	4	4		4	4	4	3	4	3	6	75
125.9	5	5	2	3	3	3	3	4	4	4	4	4	4		4	4	4	3	4	3	6	76
128.2	5	6	2	3	3	3	3	4	4	4	4	4	4		4	4	4	3	4	4	6	78
131.6	5	6	3	3	3	4	3	4	4	4	4	4	4		4	4	4	3	4	4	6	80
134.4	6	6	3	4	3	4	3	4	4	4	4	4	4		4	4	4	3	4	4	6	82
137.6	6	6	3	4	3	4	3	4	4	4	5	4	5		4	4	4	3	4	4	6	84
139.8	6	7	3	4	3	4	3	4	4	4	5	4	5		4	4	4	3	4	4	7	86
141.4	6	7	3	4	3	4	4	4	4	4	5	4	5		4	4	4	3	4	4	7	87
142.5	7	7	3	4	3	4	4	4	4	4	5	4	5		4	4	4	3	4	4	7	88
145.7	7	7	3	4	3	4	4	5	4	4	5	4	5		5	4	4	3	4	4	7	
148.9	7	7	3	4	3	4	4	5	4	5	5	5	5		5	4	4	3	4	4	7	[illegible]
152.3	7	7	4	4	3	4	4	5	4	5	5	5	5		5	4	4	4	4	4	7	94
155.0	7	8	4	4	3	4	4	5	4	5	5	5	6		5	4	4	4	4	4	7	96
158.3	7	8	4	4	3	4	4	5	5	5	5	5	6		5	4	5	4	4	4	7	98
161.6	7	8	4	4	4	4	4	5	5	5	6	5	6		5	4	5	4	4	4	7	100
164.9	7	8	4	4	4	5	4	5	5	5	6	6	6		5	4	5	4	4	4	7	103
167.6	8	8	4	4	4	5	4	5	5	6	6	6	6		5	4	5	4	4	4	7	104
169.3	8	8	4	4	4	5	4	5	6	6	6	6	6		5	4	5	4	4	4	7	105
171.9	8	8	4	4	4	5	4	5	6	6	6	7	6		5	4	5	4	4	4	8	107
175.1	8	8	4	4	4	5	4	5	6	6	7	7	7		5	4	5	4	4	4	8	109
178.3	8	8	4	4	4	5	5	5	6	6	7	7	7		5	5	5	4	4	4	8	111
181.6	8	8	4	4	4	5	5	5	6	7	7	7	7		6	5	5	4	4	4	8	113
184.3	8	9	4	4	4	5	5	6	6	7	7	7	7		6	5	5	4	4	4	8	115
187.6	8	9	4	4	4	5	5	6	7	7	7	8	7		6	5	5	4	4	4	8	117
190.8	8	9	4	5	4	5	5	6	7	7	7	8	7		6	5	5	4	5	4	8	119
191.8	9	9	4	5	4	5	5	6	7	7	7	8	7		6	5	5	4	5	4	8	120
210.3	9	10	4	5	5	6	5	6	7	8	8	9	9		7	6	5	5	5	4	9	132
234.0	10	11	5	6	5	6	6	6	7	8	9	10	10		9	8	6	5	6	5	10	148

ICE HARBOR

Operating Standards for Adult Fish Passage Facilities

Fishway Ladders

Water depth over weirs: 1.0 to 1.3 feet

Head on all Entrances

Head range: 1.0 to 1.5 feet

North Shore Entrance (NEW 1)

Operate downstream gate closest to shore.

Weir depth: 8 feet or greater below tailwater when tailwater is high enough to permit it. At low flow and tailwater, maintain a 6-foot or greater depth.

North Powerhouse Entrance (NFE 1 & 2)*

Operate 1 downstream gate.

Weir depth: 8 feet or greater below tailwater.

Powerhouse Collection System

Operate 7 floating orifices (O.G. numbers 1, 2, 4, 6, 8, 10, and 12).

South Shore Entrance (SFE-1) *

Operate entrance closest to powerhouse.

Weir depth: 8 feet or greater below tailwater.

Transportation Velocity

1.5 to 4 feet per second.

Head on Trashracks

Maximum head of 0.5 feet on ladder exits attraction water intakes.

Maximum head on picketed leads shall be 0.3 feet.

* At extremely low tailwater and river flows, entrance weirs may bottom out and not reach 8 feet below tailwater.

Ice Harbor Dam (Continued)

Staff Gauges and Water Level Indicators

Shall be readable at all water levels encountered during fish passage period.

Turbine Unit Operating Priority

Unit operation will be : 1, 2, 3, 4, (5 or 6 in either order).

ICE HARBOR SPILLWAY PATTERN FOR ADULT FISH PASSAGE

GATE NUMBERS										TOTAL
1	2	3	4	5	6	7	8	9	10	STOPS
(1)									1.5	2.5
1	(1)							1	1.5	4.5
1	1	(1)					1	1	1.5	6.5
1	(2)	1					1	2	1.5	8.5
1	2	1	(1)			1	1	2	1.5	10.5
1	2	1	1	(1)	1	1	1	2	1.5	12.5
1	2	(2)	1	1	1	1	2	2	1.5	14.5
1	2	2	(2)	1	1	2	2	2	1.5	16.5
1	2	2	2	(2)	2	2	2	2	1.5	18.5
1	2	2	2	(3)	3	2	2	2	1.5	20.5
1	2	2	(3)	3	3	3	2	2	1.5	22.5
1	2	(3)	3	3	3	3	3	2	1.5	24.5
1	2	3	3	(4)	4	3	3	2	1.5	26.5
1	2	3	3	4	4	4	3	2	1.5	27.5
1	2	3	3	5	(5)	4	3	2	1.5	29.5
1	2	3	(4)	5	5	4	3	3	1.5	31.5
1	(3)	3	5	5	5	4	3	3	1.5	33.5
1	3	(4)	5	6	5	4	3	3	1.5	35.5
(2)	3	4	(6)	6	5	4	4	3	1.5	38.5
2	3	4	6	6	(6)	5	4	3	1.5	40.5
2	3	(5)	6	6	6	5	4	3	1.5	41.5
2	3	5	6	(7)	6	5	5	3	1.5	43.5
2	3	5	(7)	7	6	6	5	3	1.5	45.5
2	3	(6)	7	8	6	6	5	3	1.5	47.5
2	(4)	6	7	8	6	6	5	4	1.5	49.5
2	4	6	7	8	(7)	7	5	4	2	52
2	4	6	(8)	8	7	7	6	4	2	54
2	4	6	8	(9)	8	7	6	4	2	56
2	4	(7)	8	9	9	7	6	4	2	58
2	4	7	(9)	10	9	7	6	4	2	60
2	4	7	(10)	10	9	8	6	4	2	62
2	4	7	10	11	9	8	(7)	4	2	64
2	4	7	(11)	11	10	8	7	4	2	66
2	4	(8)	11	12	10	8	7	4	2	68
2	4	8	11	13	10	(9)	7	4	2	70

1/ Circled value may be 1 foot less than value shown.
For example: (1) means 0 or 1 foot.
(2) means 1 or 2 feet.

LOWER MONUMENTAL

Operating Standards for Adult Fish Passage Facilities

Fishway Ladders

Water depth over weirs: 1.0 to 1.3 feet

Head on all Entrances

Head range: 1.0 to 1.5 feet

North Shore Entrances (NSE 1 & 2)

Operate both gates.

Weir depth: 8 feet or greater below tailwater.

Powerhouse Collection System

Operate 5 floating orifices (O.G numbers 1, 3, 5, 7, 9).

South Powerhouse Entrances (SPE 1 & 2) *

Operate both downstream gates.

Weir depth: 6 feet or greater below tailwater.

South Shore Entrances (SSE 1 & 2)

Operate both downstream gates.

Weir depth: 8 feet or greater below tailwater.

Transportation Velocity

1.5 to 4 feet per second.

Head on Trashracks

Maximum head of 0.5 feet on ladder exits, attraction water intakes. Maximum head on picketed leads, such as around counting station, shall be 0.3 feet.

* The fishery agencies and tribes have requested a weir depth of 8 feet or greater below tailwater. Project personnel should attempt to obtain depths as close to this as possible within existing pump capacities.

Staff Gauges and Water Level Indicators

Gauges shall be readable at all water levels encountered during fish passage period.

Turbine Unit Operating Priority

Unit operation will be: Daytime (0400 to 2000 h) 1, 2, 3, 4, 5, 6
Nighttime (2000 to 0400 h) 6, 5, 4, 3, 2, 1

Spillway Operation

The spillway will be operated according to the following spillgate pattern to minimize impacts on upstream migrating adult salmonids.

Special nighttime spills for bypassing juvenile salmonids may require different spillgate patterns to maximize their efficiency for bypassing juveniles. If these spills occur, special patterns will be provided at that time.

LOWER MONUMENTAL SPILLWAY PATTERN FOR ADULT FISH PASSAGE

GATE NUMBER								TOTAL	TOTAL
1	2	3	4	5	6	7	8	STOPS	KCFS
1								1	1.1
1							1	2	2.2
1	1						1	3	3.3
1	1					1	1	4	4.4
2	1					1	1	5	6.1
2	1					1	2	6	7.8
2	1	1				1	2	7	8.9
2	1	1			1	1	2	8	10.0
2	1	1	1		1	1	2	9	11.1
2	1	1	1	1	1	1	2	10	12.2
2	1	2	1	1	1	1	2	11	13.9
2	1	2	1	1	2	1	2	12	15.6
2	1	2	2	1	2	1	2	13	17.3
2	1	2	2	2	2	1	2	14	19.0
3	1	2	2	2	2	1	2	15	20.8
3	2	2	2	2	2	1	2	16	22.5
3	2	2	2	2	2	1	3	17	24.3
3	2	2	2	2	2	2	3	18	26.0
4	2	2	2	2	2	2	3	19	27.7
4	2	2	2	3	2	2	3	20	29.5
4	2	2	2	3	2	2	4	21	31.2
4	2	2	2	3	2	3	4	22	33.0
4	2	3	2	3	2	3	4	23	34.8
4	3	3	2	3	2	3	4	24	36.6
4	3	3	3	3	2	3	4	25	38.4
4	3	3	3	3	3	3	4	26	40.2
4	3	3	4	3	3	3	4	27	41.9
4	3	3	4	4	3	3	4	28	43.6
5	3	3	4	4	3	3	4	29	45.3
5	4	3	4	4	3	3	4	30	47.0
5	4	3	4	4	3	3	5	31	48.7
5	4	3	4	4	3	4	5	32	50.4
5	4	4	4	4	3	4	5	33	52.1
5	4	4	4	4	4	4	5	34	53.8
5	4	4	5	4	4	4	5	35	55.5
5	4	4	5	4	5	4	5	36	57.2
6	4	4	5	4	5	4	5	37	58.9
6	5	4	5	4	5	4	5	38	60.6
6	5	4	5	4	5	4	6	39	62.3
6	5	4	5	4	5	5	6	40	64.0
6	5	5	5	4	5	5	6	41	65.7
6	5	5	5	5	5	5	6	42	67.4
6	5	5	6	5	5	5	6	43	69.1
6	5	5	6	5	6	5	6	44	70.8
7	5	5	6	5	6	5	6	45	72.5
7	6	5	6	5	6	5	6	46	74.2
7	6	5	6	5	6	5	7	47	75.9
7	6	5	6	5	6	6	7	48	77.6
7	6	6	6	5	6	6	7	49	79.3

LOWER MONUMENTAL SPILLWAY PATTERN FOR ADULT FISH PASSAGE
...CONTINUED

GATE NUMBER								TOTAL	TOTAL
1	2	3	4	5	6	7	8	STOPS	KCFS
7	6	6	6	6	6	6	7	50	81.0
7	6	6	7	6	6	6	7	51	82.7
7	6	6	7	6	7	6	7	52	84.4
8	6	6	7	6	7	6	7	53	86.3
8	7	6	7	6	7	6	7	54	88.0
8	7	6	7	6	7	6	8	55	89.9
8	7	6	7	6	7	7	8	56	91.6
8	7	7	7	6	7	7	8	57	93.3
8	7	7	7	7	7	7	8	58	95.0
8	7	7	8	7	7	7	8	59	96.9
8	7	7	8	7	8	7	8	60	98.8
9	7	7	8	7	8	7	8	61	100.4
9	8	7	8	7	8	7	8	62	102.3
9	8	7	8	7	8	7	9	63	103.9
9	8	7	8	7	8	8	9	64	105.8
9	8	8	8	7	8	8	9	65	107.7
9	8	8	8	8	8	8	9	66	109.6
9	8	8	9	8	8	8	9	67	111.2
9	8	8	9	8	9	8	9	68	112.8
10	8	8	9	8	9	8	9	69	114.6
10	9	8	9	8	9	8	9	70	116.2
10	9	8	9	8	9	8	10	71	118.0
10	9	8	9	8	9	9	10	72	119.6
10	9	9	9	8	9	9	10	73	121.2
10	9	9	9	9	9	9	10	74	122.8
10	9	9	10	9	9	9	10	75	124.6
10	9	9	10	9	10	9	10	76	126.4
11	9	9	10	9	10	9	10	77	128.1
11	10	9	10	9	10	9	10	78	129.9
11	10	9	10	9	10	9	11	79	131.6
11	10	9	10	9	10	10	11	80	133.4
11	10	10	10	9	10	10	11	81	135.2
11	10	10	10	10	10	10	11	82	137.0
11	10	10	11	10	10	10	11	83	138.7
11	10	10	11	10	11	10	11	84	140.4
12	10	10	11	10	11	10	11	85	142.2
12	11	10	11	10	11	10	11	86	143.9
12	11	10	11	10	11	10	12	87	145.7
12	11	10	11	10	11	11	12	88	147.4
12	11	11	11	10	11	11	12	89	149.1
12	11	11	11	11	11	11	12	90	150.8

Operating Standards for Adult Fish Passage Facilities

Fishway Ladder

Water depth over weirs: 1.0 to 1.3 feet

Head on all Entrances

1.4 to 1.7 feet on south shore entrances.

1.0 to 1.5 feet on north powerhouse entrances.

0.8 to 1.5 feet on north shore entrances. (Preferably 1.0 to 1.5 if possible.)

North Shore Entrances (NSE 1 & 2)*

Operate both downstream gates.

Weir depth: 6 feet or greater below tailwater.

North Powerhouse Entrances (NPE 1 & 2) *

Operate both downstream gates.

Weir Depth: 6 feet or greater below tailwater.

Powerhouse Collection System

Operate 4 floating orifices (numbers 1, 4, 6, and 10).

South Shore Entrances (SSE 1 & 2)

Operate both gates.

Weir depth: 8 feet or greater below tailwater.

Transportation Velocity

1.5 to 4 feet per second.

* The fishery agencies and tribes have requested a weir depth of 8 feet or greater below tailwater. Project personnel should attempt to obtain depths as close to this as is possible within existing pump capacities.

Little Goose Dam (Continued)

Tunnel Lights

Lights in the tunnel section, under the spillway, shall be on during fish passage period.

Head on Trashracks

Maximum head of 0.5 feet on ladder exits and attraction water intakes.

Maximum head on picketed leads shall be 0.3 feet.

Staff Gauges and Water Level Indicators

Shall be readable at all water levels encountered during fish passage period.

Turbine Unit Operating Priority

Unit operation will be: Operate unit 1, 2, 3, and then 4 - 6.

LITTLE GOOSE SPILLWAY PATTERN FOR ADULT FISH PASSAGE

GATE NUMBERS								TOTAL	TOTAL
1	2	3	4	5	6	7	8	STOPS	KCFS
(1)							1		
1	(1)					1	1		
1	1	(1)			1	1	1		
1	1	1	(1)	1	1	1	1		
1	1	(2)	1	1	2	1	1	10	19
1	1	2	(2)	2	2	1	1		
(2)	1	2	2	2	2	1	2		
2	2	2	2	2	2	(2)	3		
(3)	2	2	2	2	2	2	3		
3	2	3	(3)	2	2	2	3	20	39
3	3	3	3	2	(3)	2	3		
3	3	3	3	2	3	(3)	4		
3	3	3	(4)	3	3	3	4		
4	3	(4)	4	3	3	3	4		
4	4	4	4	3	3	(4)	4	30	60
5	(5)	4	4	3	3	4	4		
5	5	(5)	4	4	3	4	4		
5	5	5	4	4	(4)	4	5		
5	(6)	5	5	4	4	4	5		
5	6	5	5	4	4	(5)	6	40	80
(6)	6	5	5	4	5	5	6		
6	6	5	5	(5)	5	6	6		
(7)	6	5	5	5	5	6	7		
7	6	5	(6)	6	5	6	7		
7	6	(6)	6	6	6	6	7	50	100
7	6	6	(7)	7	6	6	7		
7	(7)	6	7	7	7	6	7		
7	7	(7)	7	7	7	7	7		
8	7	7	7	7	7	7	(8)		
8	7	8	(7)	8	7	7	8	60	120
8	7	8	(8)	8	8	7	8		
8	(8)	8	8	8	8	8	8		
(9)	8	8	8	8	8	8	9		
9	8	(9)	8	9	8	8	9		
9	8	9	(9)	9	9	8	9	70	140

1/ Circled values may be 1 increment less than indicated.

For examole: (2) means 2 or 1 increments.
(3) means 3 or 2 increments.

LOWER GRANITE

Operating Standards for Adult Fish Passage Facilities

Fishway Ladder

Water depth over weirs: 1.0 to 1.3 feet

Head on all Entrances

Head range: 1.0 to 1.7 feet.

1.5 to 1.7 feet on South Shore entrance is required to maintain the necessary transportation flow at bottom of ladder and first bend in channel.

North Shore Entrances (NSE 1 & 2)

Operate both downstream gates.

Weir depth: 7 feet or greater below tailwater.

North Powerhouse Entrances (NPE 1 & 2)

Operate both downstream gates.

Weir depth: 8 feet or greater below tailwater.

Powerhouse Collection System

Operate 4 floating orifices (numbers 1, 4, 7, and 10).

South Shore Entrances (SSE 1 & 2)

Operate both gates.

Weir depth; 8 feet or greater below tailwater.

Transportation Velocity

1.5 to 4 feet per second.

Tunnel Lights

Lights in the tunnel section, under the spillway, shall be on during fish passage period.

Head on Trashracks

Maximum head of 0.5 feet on ladder exits and attraction water intakes.

Maximum head on picketed leads shall be 0.3 feet.

Staff Gauges and Water Level Indicators

Shall be readable at all water levels encountered during fish passage period.

Turbine Unit Operating Priority

Unit operation will be: 1, 2, 3, and then 4 - 6.

LOWER GRANITE SPILLWAY PATTERN FOR ADULT FISH PASSAGE
DISCHARGES IN KCFS AT FOREBAY ELEVATION 737

GATE NUMBER								TOTAL	TOTAL
1	2	3	4	5	6	7	8	STOPS	FLOW
1								1	1.75
1							1	2	3.50
1						1	1	3	5.25
1	1					1	1	4	7.00
1	1				1	1	1	5	8.75
1	1	1			1	1	1	6	10.50
1	2	1			1	1	1	7	12.37
1	2	1			1	2	1	8	14.25
1	2	1	1		1	2	1	9	15.99
1	2	2	1		1	2	1	10	17.86
1	2	2	1	1	1	2	1	11	19.61
1	2	2	2	1	1	2	1	12	21.48
1	2	2	2	2	1	2	1	13	23.35
1	2	2	3	2	1	2	1	14	25.27
2	2	2	3	2	1	2	1	15	27.14
2	2	2	3	3	1	2	1	16	29.06
2	2	2	3	3	2	2	1	17	30.93
2	2	3	3	3	2	2	1	18	32.85
2	3	3	3	3	2	2	1	19	34.77
2	3	3	4	3	2	2	1	20	36.67
3	3	3	4	3	2	2	1	21	38.61
3	3	4	4	3	2	2	1	22	40.53
3	3	4	4	3	3	2	1	23	42.45
3	4	4	4	3	3	2	1	24	44.37
3	4	4	4	4	3	2	1	25	46.29
3	4	4	5	4	3	2	1	26	48.21
3	4	5	5	4	3	2	1	27	50.13
4	4	5	5	4	3	2	1	28	52.05
4	5	5	5	4	3	2	1	29	53.97
4	5	5	5	4	4	2	1	30	55.89
4	5	5	5	5	4	2	1	31	57.81
4	5	5	6	5	4	2	1	32	59.73
4	5	6	6	5	4	2	1	33	61.65
4	6	6	6	5	4	2	1	34	63.57

APPENDIX D

OPERATING STANDARDS FOR

JUVENILE FISH PASSAGE FACILITIES

OPERATING STANDARDS

FOR JUVENILE FISH PASSAGE FACILITIES

McNARY DAM

Prior to April 1 each year

Powerhouse

Forebay Area and Intakes

1. Remove debris from forebay and trash racks.
2. Rake trash racks
3. Remove debris from gatewell slots.
4. Measure and log drawdown in gatewell slots.

Submersible Traveling Screens

5. Inspect screens and operate on one trial run.
6. Log results of trial run.

Gallery Bypass Flume

7. Orifice lights operational.
8. Orifices clean and operational.
9. Clear plastic spools on orifices clean.
10. Orifice valves operational.
11. Water dissipation screens clean and ready for operation.

Sorter and Raceways

12. No rough edges on perforated plate.
13. Check wet separator and fish distribution system for operation.
14. All raceway retainer screens and crowder brushes in good order with no holes or protruding wires.
15. Raceways clean of debris

McNary Dam (Continued)

16. Sample and holding tanks smooth and clean.

17. All electronic counters checked for operation.

18. Inspect PVC pipes to insure they are clear of debris and cracks. Repair if required.

Fish Trailers

19. All systems operate properly.

20. No leaks around air stone fittings.

    a. Plugs in end of air stones.

    b. Turn stones on lathe if necessary to allow free air passage through stones.

21. Each trailer carries two 5-inch hoses and necessary 5-inch "Kamlock" caps.

22. All valves operating properly.

23. Overall condition of trailer in good shape including hatch covers, release gates, and oxygen manifold system.

Maintenance Records

24. Record all maintenance and inspections.

OPERATING STANDARDS

FOR JUVENILE FISH PASSAGE FACILITIES

McNARY DAM

April 1 - End of Transport and Bypass Season

Powerhouse

Forebay Area and Intakes

1. Remove trash from forebay.

2. Inspect gatewell slots daily and clean as required.

3. Remove debris from forebay and trashracks as required to maintain less than one foot of additional drawdown in gate slots. Additional raking may be required when heavy debris loads are present in the river. Fish quality will also be an indicator of debris buildup on the trash racks.

4. Coordinate cleaning effort with personnel operating downstream migrant facilities.

5. Log drawdown differentials once a week.

Submersible Traveling Screens

6. Inspect, operate, and cycle screens as per FTOT plan.

Gallery Bypass Flume

7. Operate one orifice per gate slot.

8. Orifices clean and operating.

9. Orifice lights operating on open orifices.

10. Orifice valve either full open or closed.

11. Water dissipation screens clean.

12. Maintain pinch valve in good operating condition and operate as open as is possible.

13. Adjust water flow over sorter to maintain a smooth, stable flow condition.

Sorter and Raceways

14. Operate in accordance with FTOT plan.

OPERATING STANDARDS

FOR JUVENILE FISH PASSAGE FACILITIES

ICE HARBOR DAM

Prior to April 1 each year

1. Remove debris from forebay and gatewell slots.
2. Rake trash racks.
3. Inspect and clean orifices of debris. Video inspection permitted.
4. Test that chain gates are operational.
5. Run gates on manual and automatic operation.

April 1 to End of Bypass Season

6. Remove debris from forebay.
7. Remove debris from trashracks as required to maintain less than one foot of additional drawdown in gate slots. Additional raking may be required when heavy debris loads are present in the river.
8. Inspect orifices daily and clean as required.
9. Inspect gatewell slots twice a week and clean as required.
10. Operate chain gates 1A, 2A, 3A, 4A, 5A, and 6A at maximum flows allowed by sluiceway capacity 24 hours a day.

Maintenance Records

11. Record all maintenance and inspections.

OPERATING STANDARDS FOR

JUVENILE FISH PASSAGE FACILITIES

LOWER MONUMENTAL DAM

Prior to April 1 each year

1. Remove debris from forebay and gatewell slots.
2. Rake trash racks.
3. Inspect and clean orifices. Video inspection permitted.
4. Check regulating valve for full open.
5. Check and repair downstream migrant pipe and air valve as required.

April 1 to End of Bypass Season

7. Remove debris from forebay and trashracks as required to maintain less than one foot of additional drawdown in gate slots. Additional raking may be required when heavy debris loads are present in the river.
8. Inspect gatewell slots twice a week and clean when required.
9. Close bypass pipe and blow back with air twice per week to maintain clean orifices. If a heavy debris load is present, blow back more frequently. If outfall flow appears to be less than normal, check orifices for blockage.
10. Inspect facilities daily.

Maintenance Records

11. Record all maintenance and inspections.

OPERATING STANDARDS

FOR JUVENILE FISH PASSAGE FACILITIES

LITTLE GOOSE DAM

Prior to April 1 each year

Powerhouse

Forebay Area and Intakes

1. Remove debris from forebay and gatewell slots.
2. Rake trash racks.
3. Measure drawdown in gatewell slots.

Submersible Traveling Screens (STS)

4. Inspect screens for good running order and operate on one trial run (dogged off on deck).
5. Log trial run.

Collection Gallery

6. Makeup water gate operational.
7. Orifice lights operational.
8. Orifices clean and operational.

Tailrace Area

Sorter and Raceways

9. 42-inch and 48-inch sluice gates operational.
10. Incline screens clean and good shape with no holes.
11. Perforated plate edges smooth with no rough edges.
12. Check wet separator and fish distribution system for operation as designed.
13. Brushes on crowder in good order.
14. Crowder operates properly.

Little Goose Dam (Continued)

15. All slide gates in and around separator and raceways in good operating order.

16. Retainer screens in place with no holes or sharp wires protruding.

17. Barge and truck loading pipes free of debris, cracks, or blockages.

Sampling Facility

18. Building and all equipment operable.

Maintenance Records

19. Record all maintenance and inspections.

OPERATING STANDARDS

FOR JUVENILE FISH PASAGE FACILITIES

LITTLE GOOSE DAM

April 1 to end of transport and bypass season

Powerhouse

Forebay Area

1. Remove debris from forebay.

Intakes

2. Inspect gatewell slots daily (preferably early in day shift) and remove debris when needed.

3. Clean trash racks in front on units as recommended in FTOT work plan.

4. Coordinate cleaning effort with personnel operating downstream migrant facilities.

5. Log drawdown differentials at least once a week.

Submersible Traveling Screens (STS)

6. Inspect screens as recommended in FTOT Plan.

7. Make formal determination at end of season with FTOT transport inspection for adequacy of screen mesh and replacement if necessary.

Collection Gallery Checks

8. Orifice clean and operating.

9. Orifice lights operating.

10. Orifice jets not hitting backwall (bypass gallery full).

11. Makeup water gate and float control equipment operational.

12. Operate at least one 12-inch orifice per slot when possible.

13. Water surface at inlet hopper to transport pipe at proper elevation.

Little Goose Dam (Continued)

Tailrace

Sorter and Raceways

14. 42-inch and 48-inch sluice gate operational.

15. No holes in screens.

16. Crowder brushes in good operating condition.

17. Retainer screens in raceway clean with no holes or protruding wires.

18. Operate wet separator and fish distribution system as designed.

19. Truck hopper and release valve in good operating order, i.e., no sharp edges, smooth paint on inside.

Inspection

20. Inspect fish facilities once each shift.

Maintenance Records

21. Record all maintenance and inspections.

OPERATING STANDARDS

FOR JUVENILE FISH PASSAGE FACILITIES

LOWER GRANITE DAM

Prior to April 1 each year

Powerhouse

Forebay Area and Intakes

1. Remove debris from forebay and gatewell slots.
2. Rake trash racks.
3. Measure drawdown in gatewell slots.

Submersible Traveling Screens (STS)

4. Inspect screens for good running order and operate on one trial run (dogged off on deck).
5. Log trial run.

Collection Gallery

6. Makeup water gates and float control equipment operational.
7. Orifice lights operational.
8. Orifices clean and operational.

Tailrace Area

Sorter and Raceways

9. 42-inch and 48-inch sluice gates operational.
10. Incline screens clean and in good shape with no holes.
11. Perforated plate edges smooth with no rough edges.
12. Check wet separator and fish distribution system for operation as designed.
13. Brushes on crowder in good order.
14. Crowder operates properly.

Lower Granite Dam (Continued)

15. All slide gates in and around separator and raceways in good operating order.

16. Retainer screens in place with no holes or sharp wires protruding.

Sampling/Marking Facility

17. Building and all operational equipment operable.

Barges

18. All pumps (including spare) in good working order.

19. Dump gates operational.

20. No rough edges or support beams protruding into compartments.

21. No brass or galvanized fittings in circulation lines.

22. All loading hoses properly installed so fish will not hit sides of compartments or support beams when loading.

23. Loading hoses in good shape with rubber gaskets in "Kamlock" fittings.

24. Inside edges of Kamlock Lock joints should be beveled to avoid sharp edges.

25. Warning system operational.

26. Provide net and/or deck covers.

Log Maintenance

27. Record all maintenance and inspections.

OPERATING STANDARDS FOR

JUVENILE FISH PASSAGE FACILITIES

LOWER GRANITE DAM

April 1 to End of Transport Season and Bypass Season

Powerhouse

Forebay Area and Intakes

1. Remove debris from forebay.
2. Clean trash racks in front of units as recommended in FTOT work plan.
3. Coordinate cleaning effort with personnel operating downstream migrant facilities.
4. Inspect gatewell slots daily (preferably early in day shift), and remove debris when needed.
5. Log drawdown differentials at least once a week.

Submersible Traveling Screens (STS)

6. Inspect screens as recommended in FTOT plan.
7. Make formal determination at end of season for adequacy of screen mesh and replacement if necessary.

Collection Gallery Checks

8. Orifices clean and operating.
9. Orifice lights operating.
10. Orifice jets not hitting backwall, bypass gallery full.
11. Makeup water gates and associated float controls operational.
12. Alternate orifices in fish screens slots daily (12 open).
13. Bulk head slots orifices opening (24) (6 unit operation).

Tailrace Area

Sorter and Raceways

16. 42-inch and 48-inch sluice gate operational.
17. Maintain stable water conditions in upwell at sorter.

Lower Granite (continued)

18. No holes in screens.

19. Crowder and brushes in good operating order.

20. All slide gates and inflow gates in and around separator and raceways operational.

21. Raceway retainer screens to be clean and have no holes or protruding wire.

Barges and Trucks

22. Barge and truck loading pipes free of debris, cracks, or blockages.

Towboats

23. Capable of making turn-around trip in less than 84 hours.

Inspection

24. Inspect fish facilities once each shift.

Maintenance Records

25. Record all maintenance and inspections.

APPENDIX 4

FISH TRANSPORTATION OVERSIGHT TEAM ANNUAL WORK PLAN
FOR 1989

THE FISH TRANSPORTATION OVERSIGHT TEAM'S

ANNUAL WORK PLAN FOR TRANSPORT OPERATIONS

AT LOWER GRANITE, LITTLE GOOSE, AND MCNARY DAMS

FOR FIELD YEAR 1989

A. Introduction

This work plan is provided to describe operations and establish criteria for the transportation of juvenile migrants at the following collector dams: Lower Granite, Little Goose, and McNary. There are cooperative agreements between State fishery agencies and Walla Walla District, Corps of Engineers (NPW) to provide biologists who represent the States through direct onsite participation. The Fish Transportation Oversight Team (FTOT) will provide oversight of the transport program. Fishery agencies and tribes will provide biological oversight through the Columbia Basin Fish and Wildlife Authority (CBFWA) while NPW will be responsible for facilities management. The FTOT will provide necessary coordination of transport activities among the CBFWA members, NPW, and Fish Passage Center (FPC).

B. Objectives

The purpose of this plan is to establish guidelines to maximize survival of fish collected and transported by:

1. providing efficient collection and safe barge or truck transport of juvenile salmonids from collector dams to their release points below Bonneville Dam.

2. inspecting facilities prior to, during, and after the juvenile migration season. These inspections will be conducted by FTOT, NPW, state, and tribal biologists to ensure facility readiness and operation according to established criteria as well as determining maintenance requirements for the following season.

3. identifying and recommending any changes that would benefit fish collection and transport operations and/or bypass systems related to transportation.

4. assuring that collection, transport, and release site facilities will be ready for operation prior to the spring juvenile outmigration, beginning approximately March 25 at Lower Granite and McNary and April 1 at Little Goose.

5. following operating criteria established for facilities, barges, and trucks. Criteria will be updated to maintain standards for holding fish, i.e., fish densities, sampling, and facility operation and

maintenance. The FTOT will monitor and coordinate changes during the transport season.

6. coordinating evaluation of the transportation program for 1989.

7. training new personnel associated with collection and transport facilities.

8. preparing an annual report detailing the past year's transportation effort.

C. Project Operations for Juvenile Fish Protection

The NPW has responsibility for maintaining all equipment and providing safe passage for juvenile fish. Procedures to meet these requirements are listed below:

1. Turbine Operations/Generation

During the juvenile fish outmigration, turbines will be operated within 1% of peak efficiency to minimize fish mortality (Bell, 1981). Turbine operation data will be available from the powerhouse operator upon request.

2. Unit Priority and Operation

Research has shown that certain units collect more fish than others. Units with higher collections are referred to as "priority units". These priority units are 1 through 4 at Lower Granite and Little Goose Dams and 1, 2, 14 and 4-10 at McNary. McNary unit 14 has priority because it provides current for juveniles at the downstream end of the ice and trash sluiceway. The priority of unit operation at Lower Granite and Little Goose will proceed from unit 1 through 6 and at McNary Dam from unit 1, 2, 14, 4-10, 3, 11, 12, 13 consecutively.

Frequently during mid-summer, water temperatures at McNary contribute to higher than normal fish mortality. At such time when there is evidence of a daily peak in juvenile fish mortality due to thermal stress, the following special powerhouse operation will be implemented:

a. Special powerhouse operation

1) Terminate generation of units 1 thru 7 (if adult fish attraction is impacted, unit 1 may be operated, then
2) Operate units 14, 13, 12, 11, 10, 9, and 8.

b. Unit loading

Units will be operated within 1% of peak efficiency and starting and stopping will be minimized. If additional generation is

needed, then additional units may be brought on line beginning with unit 7 and continuing thru unit 5. Unit 4, 3, 2 or 1 should not be operated when thermal stress related mortality is occurring at the project.

3. Submersible Traveling Screens (STS)

a. Operation

STSs in units 1 and 2 will be installed and in operation at Lower Granite and Little Goose by March 15, 1989. The remainder will be installed immediately after the annual lock outage. At McNary, STSs in units 4 through 10 will be installed by March 15, 1989, the remainder no later than April 1, 1989.

STSs will be cycled except when daily average chinook fork length is less than 112mm or when a sudden decline in fish condition warrants continuous screen operation. Cycling may resume once daily average chinook fork length exceeds 112 mm and/or fish condition warrants it. Immediately after resumption of screen cycling, fish condition will be monitored to verify that the operational change does not adversely affect fish quality. FTOT will be notified when screen operation is changed.

b. Maintenance

The number and condition of fish collected depend upon well-maintained screens. Continuous monitoring of screen operation is provided by annunciation (automatic warning system) to the powerhouse control room. FTOT and fishery biologists at each dam will be informed of any STS malfunctions. During peak migration periods or when a priority screen malfunctions, the malfunctioning screen must be replaced within 24 hours (Figure 1). When a malfunctioning screen is noted, there are two options within flow limits that NPW can take:

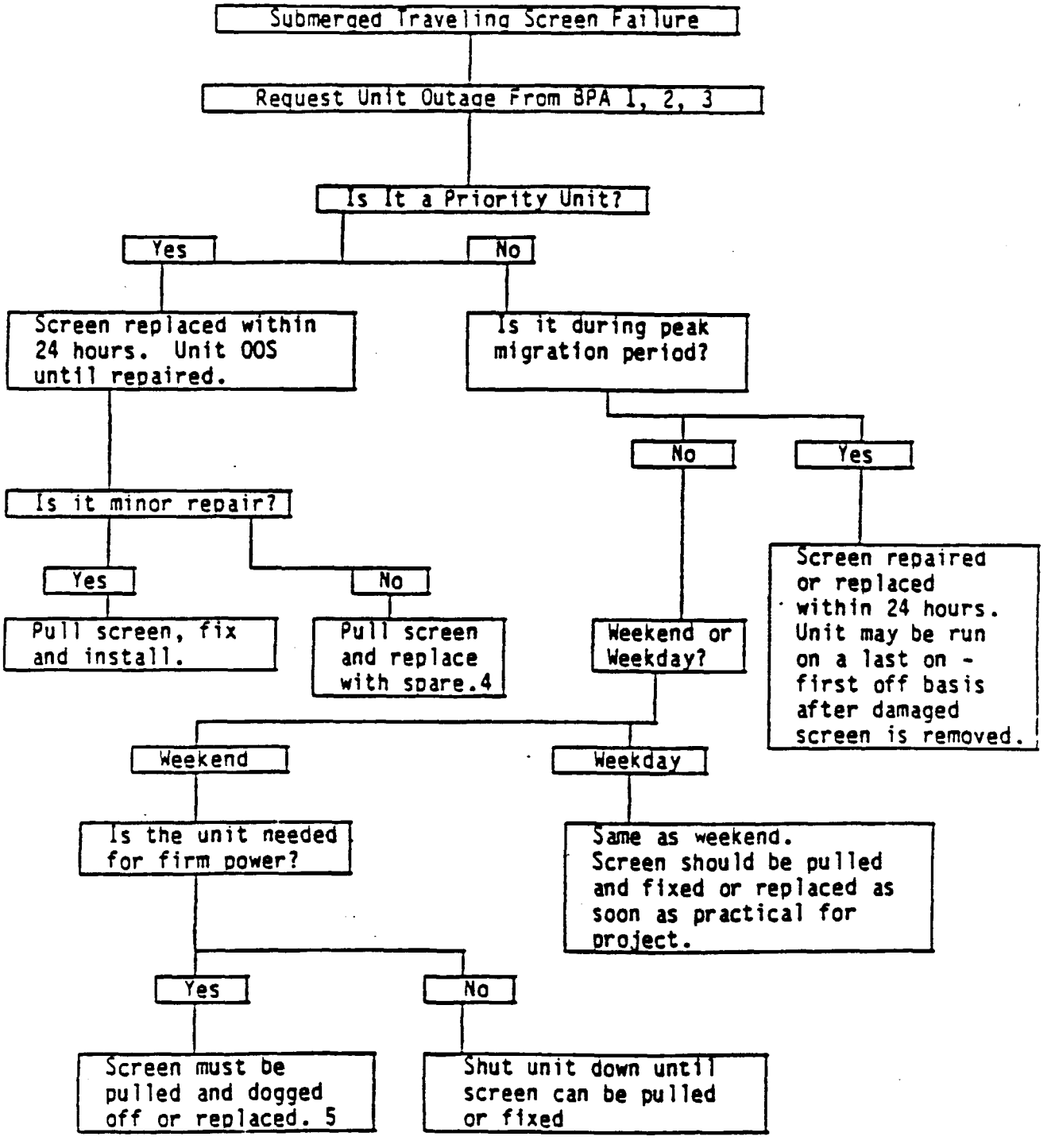
1) cease generation in the affected unit until the screen is pulled and repaired, or:

2) pull the STS and either repair or replace with the spare or a designated replacement screen.

NOTE: A known damaged screen must not be used in a generating unit.

At each collector dam, spare screens are provided, 1 each at Lower Granite and Little Goose and 2 at McNary. If additional screens are needed to replace damaged screens in high priority units, they should be from non-operating units (long term out of service) or taken from C-slots of the lowest priority units on line. A low priority unit from which a screen has been removed to replace a damaged screen can be operated without a full complement of screens.

Figure 1



NOTES:
1. A unit must not be run with a known damaged or malfunctioning screen.
2. Project biologists should be notified as soon as practical of any screen damage or malfunctions. The project biologists will in turn notify FTOT including details of problem and anticipated repair time.
3. If a screen malfunctions and additional generation is needed, the remaining units can be operated above peak loading efficiency. Load should be spread evenly among all available units or all placed on low priority units.
4. If no spare screen is available then C slot screen from lowest priority unit should be used.
5. Any units that must be operated without a full complement of screens should be done so on a last on - first off basis in

During weekends, if project maintenance crews are not available and a screen malfunctions, the affected unit must be shut down and generation switched to a non-operating screened unit. If all screened units are operating, then generation may exceed the 1% peak efficiency criterion in non-affected units if necessary, or water can be spilled as necessary until the STS can be pulled and repaired or replaced with a spare or designated screen. If the affected unit is required for adult passage attraction (unit 1 at Snake River projects, units 1 and 2 at McNary), a decision to shut the unit off over a weekend must not be made without coordinating adult passage concerns through NPW Biologist, FPC Coordinator and FTOT.

c. Inspection

FTOT will perform a visual inspection of STSs at all projects prior to the transport season.

The STS monitoring schedule at Snake River projects should begin with an initial TV video inspection during April, prior to the outmigration peak that normally occurs during the final week of April or early May. Subsequent inspections should be conducted each month that screen operations continue.

At McNary, screen inspections will occur on a continuous basis according to the following schedule:

1) April, week 1, units 4 and 5,
2) April, week 2, units 6 and 7,
3) April, week 3, units 8 and 9,
4) April, week 4, units 10 and 1,
5) May through October, 2 units per week in the following sequence:2, 14, 3, 11, 12, 13, 4, 5, 6, 7, 8, 9, 10, 1, 2, 14,....

If STS problems occur, FTOT will be notified and the project will immediately begin inspecting 3 units per week. FTOT may further recommend changes to the unit inspection schedule if thermal stress problems occur during July or August.

Unscheduled inspections may be required at any of the collector projects under the following conditions:

1) deterioration of fish condition;

2) increased debris load in bypass system; and

3) other indications of STS malfunction.

4. Peak Migration Periods

The peak migration period begins when total collection at an individual project reaches 20,000 fish per day. Migration peaks at Snake River projects generally occur between April 15 and May 31.

McNary peaks vary, but major migrations of spring and summer fish occur between May and mid-August.

5. Debris Problems and Trash Raking

Debris will be removed from trashracks and forebay surface in front of turbine units prior to STS installation and thereafter as it accumulates. Gatewells will be monitored daily for trash buildup and checked at least twice a week for water drawdown (head differential) between the forebay and gatewells. Drawdown may be measured once per week at Little Goose and McNary during periods of low debris accumulation and good fish condition. Head differential measurements at Lower Granite, Little Goose, and McNary Dams will be recorded immediately after initial trash rack raking. Thereafter, when head differential is greater than 1 foot over the initial measurement without debris, or when on-site biologists determine that higher than normal descaling rates indicate that trashracks are likely to be the cause of injury, trashracks will be raked again. Additional raking of trashracks may be necessary as determined by on-site biologists such as when a storm causes massive quantities of debris to be brought down the river system.

When raking is conducted at Snake River collector projects, unit outages are required. When the center trashrack (B) is being raked adjacent units do not have to be shut off. When trashracks A or C are being raked, the adjacent unit must be shut down. Gatewell orifices must be closed in the unit being raked. Project biologists will inform FTOT when trashracks will be raked and the results.

Because of potential gatewell orifice plugging during forebay debris dipping at McNary the orifices should be closed during dipping operations. Also, particular attention should be directed to monitoring adjacent unit orifices to detect plugging problems as early as possible.

6. Facility Operations

The collection facility will be manned 24 hours per day until system operations cease. Fish will be returned to the river if they are not being transported.

Gatewell orifices will be checked daily and cleaned when necessary. Water level in the gallery will be checked daily and flows at the juvenile fish separator will be monitored continuously (at least every 15 minutes).

When screens and bypass systems are not providing safe passage and meeting criteria, FTOT will alert the Fish Passage Managers of problems that may require system operational changes.

a. McNary

If flow exceeds minimum (220 kcfs), fish will be separated by size as long as yearling salmon predominate in the collection. Normally, if flows are projected to drop below 220 Kcfs for approximately 5 days transportation will be maximized to prevent bypassing fish into a deteriorating flow pattern. If existing or projected conditions warrant a change in this criterion, FTOT will coordinate recommended deviations with the fisheries agencies and tribes prior to implementation. Smaller fish (salmon) will be returned to the river and larger fish (steelhead) will be transported. When subyearling summer/fall chinook numbers exceed numbers of yearling salmon, all collected fish will be transported. Subsamples will be examined for marks or used for research purposes and then released to tailwater or transported. Maximum collection and transportation of all species will be implemented when flows are at or below minimum.

Fall chinook fry (alevins) will be bypassed to the ice/trash sluiceway by pulling the flume screen if impingement problems arise.

b. Lower Granite

All fish collected will be transported except those required to be released for approved research or monitoring activities.

c. Little Goose

If flow exceeds minimum (100 Kcfs), fish will be separated by size and smaller fish returned to the river. Normally, if flows are projected to drop below 100 Kcfs for approximately 5 days transportation will be maximized to prevent bypassing fish into a deteriorating flow pattern. Because of the extended period expected for fish to move through the lower Snake River under low-flow conditions, it is desirable to anticipate sub-minimum flows there as far in advance as is practicable (approximately 3-5 days) and initiate transportation of all species at that time. If existing or projected conditions warrant a change in the criteria, FTOT will coordinate recommended deviations with the fisheries agencies and tribes prior to implementation. Larger fish will be transported until approximately 80 percent of the yearling chinook migrants (as determined by the Fish Passage Managers) have passed and steelhead numbers predominate. Then, all fish collected will be transported.

7. Sampling Procedures

a. Sampling will be done in accordance with sampling guidelines for 1989 as developed by CBFWA (Appendices 1 and 2).

b. Fish that are sampled will be counted by electronic counting tunnels verified and adjusted by hand counts. All fish number estimates, raceway, truck, and barge loading densities and rates will be based on the sample of fish collected. Samples will be taken hourly 24-hours per day for a predetermined sample time. Samples may be split into more, shorter sample periods depending on the capability of project equipment.

c. Species composition and weight samples will be taken to determine loading densities in individual raceways, trucks, or barge compartments. This sampling will require that project personnel keep a running hourly total of expanded fish numbers, raceway totals, and direct loading totals in barges.

d. Where smolt monitoring activities are conducted at collector dams, project biologists will utilize daily total information gathered by those forces.

8. Facility and Equipment Logs and Records

To document collection and transport activities the following items will be logged at each dam by either NPW personnel or state fishery biologists.

a. STS Activity - A log of STS operation and inspection will be maintained by the projects. Changes in operational modes or malfunctions and repairs will be noted, including dates of occurrence.

b. Gatewells - Recordings of head differential between the gatewells and forebays will be logged. Trash raking will occur when differentials reach established limits, or as noted in Section 5, Debris Problems and Trash Raking. All debris assessments will be recorded.

c. Fingerling Facilities - Daily logs will be maintained of fish counts/hr/day by species, truck and barge operations, fish sampling, mark recovery, and general observations of fish condition and fingerling passage. Mortalities will be listed by species in all areas of the collection and transport system.

d. Trucks and Barges - Fish transport equipment activities will be logged daily including transport time, problems encountered, estimated fish mortalities, and any equipment malfunctions.

e. At Little Goose, dissolved gas levels in the forebay, upwell, hopper, gallery, and raceways will be measured and recorded at appropriate time intervals. Hopper water surface elevation will be noted coincident with gas measurements.

9. Loading Criteria

Maximum raceway holding capacity is 0.5 lbs. of fish per gallon of water. Inflow to raceways is approximately 1200 gpm at Snake River projects and 1000 gpm at McNary. Individual raceway volume is approximately 12,000 gallons of water at Snake River dams. Individual raceway capacity at McNary Dam is 5,000 gallons plus 2 temporary raceways with 7,400 gallons each. Exceeding holding criteria is not anticipated except during peak outmigration periods. During peak periods, any decision to exceed loading densities at Snake River projects will be coordinated by FTOT. A decision will then be made by the tribes and fisheries agencies to either exceed recommended densities, or bypass fish back to the river. Conditions that must be considered include:

1) species composition;
2) total anticipated collection during the critical holding period;
3) inriver bypass conditions; and
4) fish condition.

At McNary Dam, loading criteria will be adhered to regardless of collection capabilities. When fish poundage in raceways reaches established limits (holding capacity), fish will be bypassed to the river. During periods when large numbers of fall chinook are collected, poundage limits may be inadequate. Total numbers of fall chinook should not exceed 50,000 per concrete raceway or 75,000 per temporary raceway.

At Lower Granite and Little Goose Dams, the raceway capacity may be temporarily exceeded above the established criteria of 0.5 lb/gal. Exceeding recommended loading criteria is dependent on the percentage of steelhead to chinook ratio in the sample. Fish may be held at the higher criteria (up to 1.0 lb/gal) only when steelhead composition in the raceway exceeds 80 percent of the total fish collected. This will minimize the impact of overcrowding spring/summer chinook.

Collected fish should be spread among raceways to prevent crowding and reduce the risk of disease and disaster even when densities are less than holding criteria. Maximum holding time in raceways will not exceed two days except as noted in Section 10a.

The following are criteria established for the fish barges and trucks:

	Capacity (gal.)	Inflow(gpm)	Fish Capacity (lbs)
Truck	3,500		1,750
Barge			
8105	150,000	15,000	75,000
8106	150.000	15,000	75,000
4382	100,000	10,000	50,000
4394	100.000	10,000	50,000
2127	85,000	5,200	26,000
2817	85,000	5,200	26,000

Holding criteria for the barges have been set at 5 lb. of fish/gpm inflow. Truck loading criterion is 0.5 lb. of fish/gallon of water.

10. Transport Operations

a. Truck and Barge Operations (Spring and Summer Migration)

Six fish barges are available that will allow at least one barge load of fish to leave Lower Granite daily. It takes approximately 90 hours to make a trip to the release site below Bonneville Dam and return. The barges are unloaded below Beacon Rock near the Skamania light buoy.

Early migrants will be trucked until barging is implemented approximately April 10. Fish holding criteria during early April at Snake River projects can be increased to 4 days or until daily counts exceed 20,000 fish. Barging should continue through the peak spring migration period or until smolt numbers decline to below 20,000 per day. Direct loading of fish into barges should be done at Lower Granite whenever possible.

Two fish barges will be available to transport fall chinook during the peak summer migration, occurring about June 20 to August 10 at McNary Dam.

Corps personnel will be on barges to supervise all loading and off-loading operations. During the training period, barge personnel will receive instructions on recognizing and dealing with emergencies. If an emergency situation occurs while the barge is underway, the barge rider is responsible for deciding if and where an early release will be made. There will be radio contact between barges and dams on the transportation route. Messages from barge riders will be relayed to project biologists if any major problems occur. They will in turn notify FTOT promptly.

Five tank trailers are available for hauling fish. The spring release of trucked fish in 1989 will be at Bradford Island, adjacent to Bonneville First Powerhouse. The summer release of trucked fish will be at Hamilton Island. Alternate release sites are located at Dalton Point and Bonneville Second Powerhouse.

Truck drivers will be trained to operate fish life support systems on tank trailers and to recognize symptoms of juvenile salmonids' stress. Drivers will be trained to know where and under what conditions fish must be released in an emergency. Emergency releases will be immediately reported to project biologists who in turn will inform FTOT.

b. Summer Transport Program

At McNary Dam, collection and transportation of all species will begin when subyearling chinook exceed yearling salmon counts. Transportation will continue until numbers of fish collected are 1,000 or less for 5 consecutive days (approximately September 30). Other factors that may cause early termination of transport include high fish mortality or injury rates.

Collection and transportation of summer migrants will be maximized at Lower Granite and Little Goose dams. Transport will continue until approximately August 1 or until fish numbers approach 500 per day. Factors that could cause earlier termination of truck transport include high fish mortality or injury rates.

11. Emergency Notification Procedures:

a. A complete listing of persons to be notified in case of emergencies and their business and home telephone numbers will be provided to each person involved in the transport program. Facility operators, truck drivers, and barge riders will be trained on emergency notification procedures by project biologists and FTOT members. In case of emergency, the person involved will immediately notify his supervisor, or the next person up the line until the emergency has been properly reported and corrective action has been initiated. In addition to telephone reporting, barge riders shall report emergencies by the tugboats radio to the nearest Corps dam. The operator on duty will relay the message to the person or persons identified by the barge rider.

b. Emergency procedures will be followed any time an emergency occurs, 24 hours per day, seven days per week during the transport season. Emergencies will be reported to FTOT immediately.

12. State Roles

NPW funds State fish biologists or culturists at each collector facility to sample and monitor fish conditions. Idaho personnel will be stationed at Lower Granite, Oregon's at Little Goose, and Washington's at McNary.

Cooperative agreements between States and NPW specify duties of state personnel in task orders as follows:

1) fish sampling and handling,
2) evaluations of fish condition,
3) double checks on expanded calculations of total facility collection,
4) quality control inspections of collection and transport facilities,
5) monitoring fish research activities at dams,
6) participate in gatewell dipping as necessary to monitor quality of fish,
7) preparing text and tabular information for project and FTOT annual reports,
8) perform other duties as assigned in the task order.

13. Dissemination of Information

Fishery biologists at each dam will be responsible for entering all pertinent information into the computer data base. This will include chinook, steelhead, sockeye, and coho daily collection and transport totals. This information will then be available in Walla Walla and Portland Districts, and North Pacific Division (NPD) office. Information will be provided to user groups through the Smolt Monitoring Program. Fish Passage Center will provide a weekly summary report of transport numbers from collector dams to fishery agencies, tribes, Corps offices, BPA, NPPC, PUDs, etc.

14. Project Requirements for Fishery Agency Activities

a. To maintain good working relationships and safe working conditions, fishery agencies, tribes, and research organizations will be required to follow courtesy and safety protocols as follows:

1. Provide early coordination including work proposals, evidence of approval by CBFWA, and project needs and requirements through written correspondence to the Chief, Operations Division, of CENPW (or CENPP for Portland District projects);

2. Check in with the Project Manager upon first arrival at the project to receive information on who will be the project point of contact, and what courtesy and safety requirements must be followed;

3. Notify the point of contact whenever arriving or departing from the project so they will know where personnel will be working and when they will be on project;

4. Adhere to project clearance, safety, and work procedures, and;

5. Make prior arrangements for notification of unscheduled or non-routine work hours and activities.

Appendix 1 - Sampling Guidelines for Collector Dams in 1989

Appendix 2 - Guidelines for Increased Fish Samples at McNary and Lower Granite Dams in 1989

Reference:

Bell, Milo C. 1981. Recommendations for Turbine Generator Loadings and Blade Gate Relationships of the Best Survival of Juvenile Migrants at the Eight Columbia Basin Dams Operated by contract to the Corps of Engineers. 18pp.

APPENDIX 1

SAMPLING GUIDELINES FOR COLLECTOR DAMS IN 1989

A. INTRODUCTION

Each year the fishery agencies and tribes are faced with the need to sample significant numbers of smolts at the collector dams and other sample points. These samples are used to monitor survival, abundance, and to evaluate bypasses, the transportation program, and other research. Because capability exists to sample an extremely high percentage of the total run at each collector dam, it is necessary to set guidelines for sampling at these projects to prevent the sampling program from overly impacting fish survival.

Currently, there are four collector dams: Lower Granite, Little Goose, McNary, and Bonneville. If each samples only 3 percent of the entire outmigration, the number of sampled Snake River outmigrants would approach 12 percent of the total[1].

In addition to the four collector dams, numerous other sample points exist along the migration path. At several of these up to 1 percent of the run may be sampled. Snake River fish may be intercepted at several of these points and thus could be sampled at a rate exceeding 10 percent.

To minimize impacts of research and evaluation work on these runs, no more than 10 percent of the total run should be sampled during the season. Further, since a mix of transportation and inriver passage is being used to reduce mortality, neither segment (transported or bypassed) should be sampled at a rate exceeding 10 percent. (These guidelines presume that only a small percentage of sampled fish die as a result and that most are returned to the river or transported with a relatively good, though reduced, chance of survival).

Based on the presumption that in 1989 Little Goose and Bonneville dams will sample fish at a combined rate of less than 3 percent of the entire run, and that sampling done at sites other than collector dams will not require handling more than three percent of any one population segment, the following specific sampling guidelines are proposed for use at the collector dams:

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[1]Since fish mortality occurs at and between projects and some fish are transported, the Snake River run is actually sampled at a rate of less than 12 percent. At an inriver survival rate of 85 percent past each project, a 3 percent sample level would sample 8.2 percent of the total outmigration arriving at Lower Granite Dam. If all fish sampled died, it would reduce the number of smolts surviving past Bonneville Dam by about 4 percent.

B. LOWER GRANITE

1. Sampling Objective

Not to exceed the lesser of 3 percent of the estimated weekly outmigration or 10 percent of the weekly total of smolts collected and/or bypassed.

2. Daily Sampling Rate (as obtained hourly by the sampler).

The daily sampling rate should remain constant during any given 24 hour (0700 - 0700) sample period to the extent possible. Changes in sample rate should be made as close to the start of a new daily sample period as feasible.

To allow flexibility in obtaining fish without adding confusion to meeting the sampling objective (above), the daily sampling rate, 0700 to 0700) may not exceed the sampling objective except as follows:

a. For two days during any one week (Sunday to Saturday) the sampling rate may be doubled (the lesser of 6 percent of the outmigration or 20 percent of smolts collected or bypassed), provided that

b. For each day that the sample rate is raised above the sampling objective, there must be a day within the same week in which the sample rate is lowered an equal or greater amount.

c. A minimal number of fish would be sampled each day at collector projects, regardless of a and b above, to obtain information on species composition, weight and descaling. This information is required for safe and efficient operation of the juvenile fish transportion program.

3. Coordination

All researchers must inform FTOT of their previously approved fish needs prior to March 15. FTOT will coordinate the sampling to maximize efficiency of fish use. Researchers must apprise the Corps biologist of their exact fish needs at the earliest possible date. Requests for in-season deviations from these guidelines must be routed through the FTOT.

C. LITTLE GOOSE

1. Sampling Objective

As required to determine pound counts, species composition, enumeration, quality control, etc. for standard bypass and transport operations. Generally not to exceed 1.5 percent of daily collection and/or bypass.

D. MCNARY

Same as for Lower Granite.

APPENDIX 2

GUIDELINES FOR INCREASED FISH SAMPLES AT MCNARY AND LOWER GRANITE DAMS IN 1989

A. INTRODUCTION

In order to evaluate the success of transporting spring chinook smolts to below Bonneville Dam, the fishery agencies and tribes have authorized the Corps to conduct a marking program.[1] However, workers are having difficulty collecting and marking the number of spring chinook required in approved study plans. This is because increasing numbers of marked fish are being released from upriver sites.

It is questionable whether the required numbers of markable fish for the transport evaluation program and PIT tag study can be obtained using the established sampling guidelines (APPENDIX 1). The fishery agencies and tribes have agreed to waive portions of these guidelines for the purpose of these studies in 1989.

Allowable exceptions to the established guidelines are as follows:

B. LOWER GRANITE

1. Sampling Objectives

   a. To safely handle the required numbers of fish to operate the transport program and monitor the smolt migration.

   b. To provide previously-approved numbers of markable fish to conduct the transport evaluation and PIT tag study.

2. Daily Sampling Rate

   If sampling under established guidelines (APPENDIX 1) is insufficient to meet objective 1b, then the sampling rate may be increased to a level that will provide previously-approved numbers of markable fish as per the study plan. However, this rate may not be increased if it would result in more than 25,000 fish being in the sample tank. At no time shall the total sample held in the tank exceed 2600 pounds at Lower Granite. The above criteria are to be implemented during a 24 hours sample period in which double shifting is occurring for marking transport evaluation fish.

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[1]Marking and release of control fish below Little Goose Dam is contingent upon Snake River flows above 100 KCFS Daily Average Flow (DAF). If flows are

(Footnote Continued)

APPENDIX 2

GUIDELINES FOR INCREASED FISH SAMPLES AT MCNARY AND LOWER GRANITE DAMS IN 1989

A. INTRODUCTION

In order to evaluate the success of transporting spring chinook smolts to below Bonneville Dam, the fishery agencies and tribes have authorized the Corps to conduct a marking program.[1] However, workers are having difficulty collecting and marking the number of spring chinook required in approved study plans. This is because increasing numbers of marked fish are being released from upriver sites.

It is questionable whether the required numbers of markable fish for the transport evaluation program and PIT tag study can be obtained using the established sampling guidelines (APPENDIX 1). The fishery agencies and tribes have agreed to waive portions of these guidelines for the purpose of these studies in 1989.

Allowable exceptions to the established guidelines are as follows:

B. LOWER GRANITE

1. Sampling Objectives

   a. To safely handle the required numbers of fish to operate the transport program and monitor the smolt migration.

   b. To provide previously-approved numbers of markable fish to conduct the transport evaluation and PIT tag study.

2. Daily Sampling Rate

   If sampling under established guidelines (APPENDIX 1) is insufficient to meet objective 1b, then the sampling rate may be increased to a level that will provide previously-approved numbers of markable fish as per the study plan. However, this rate may not be increased if it would result in more than 25,000 fish being in the sample tank. At no time shall the total sample held in the tank exceed 2600 pounds at Lower Granite. The above criteria are to be implemented during a 24 hours sample period in which double shifting is occurring for marking transport evaluation fish.

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[1] Marking and release of control fish below Little Goose Dam is contingent upon Snake River flows above 100 KCFS Daily Average Flow (DAF). If flows are

(Footnote Continued)

a. If the average daily mortality for yearling chinook in the sample exceeds 2 percent for three consecutive days then the sampling rate will be returned to the previously-established rate (APPENDIX 1). If the mortality is not reduced to 2 percent or less after two consecutive days at the reduced rate, it will be assumed the problem is not with the sample density and the rate can be increased as necessary.

C. LITTLE GOOSE

Follow established guidelines (APPENDIX 1)

D. MCNARY

1. Sampling Objective

Same as Lower Granite

Except that during years that high numbers of fish are required for experimental purposes, the sample time will be from noon to noon. This reduces the sample tank holding time by allowing workers to move fish from the sample tank before the next days sample begins.

2. Daily Sampling Rate

If the sample collected under established guidelines (APPENDIX 1) is insufficient to meet objective 1b, then the sampling rate may be increased to a level that will provide previously-approved numbers of markable fish as per the study plan. However the rate may not be increased if it would result in more than 15,000 fish being collected in the sample during the 24 hour sampling period. Changes in the sample rate should be made as close to the start of a new 24 hour sample period as possible. Multiple sample rate changes within a sample period should be avoided.

The following constraints to holding fish in the sample tank apply:

a. If the average daily mortality for yearling chinookin the sample exceeds 2 percent for three consecutive days then the sampling rate will be returned to the previously-established rate (APPENDIX 1). If the mortality is not reduced to 2 percent or less after two consecutive days at the reduced rate, it will be assumed the problem is not with the sample density and the rate can be increased as necessary.

(Footnote Continued)
projected to be below 100 KCFS DAF, marking control fish will not be done because the chance of survival in large enough numbers to be meaningful is low.

b. If the average daily mortality for juvenile sockeye (in the "A" or "B" tanks) exceeds 3 percent for three consecutive days, the sampling rate will be returned to the previously-established rate (APPENDIX 1). If the mortality is not reduced to 3 percent or less after two consecutive days at the reduced rate, it will be assumed the problem is not with sample density and the rate can be increased as necessary.

APPENDIX 5

HATCHERY RELEASE SCHEDULE

FISH PASSAGE CENTER
825 N.E. 20TH AVENUE • SUITE 336 • PORTLAND, OR 97232-2295
PHONE (503) 230-4099

MEMORANDUM

DATE: March 2, 1989

TO: Interested Parties

FROM: Michele DeHart and Malcolm Karr

RE: Hatchery Release Information

Enclosed is a schedule of the proposed hatchery releases above Bonneville for 1989. Please note that the information is preliminary and subject to change. The FPC will be contacting the hatchery managers or coordinators on a weekly basis during the spring and summer to ensure that the information is maintained as accurate and complete as possible. Current information will be printed in Section II of each Weekly Report.

During your review of this schedule, if you should find any inaccurate information, please contact Larry Basham at (503) 230-4287.

80-89-JJ

Hatchery Releases

3/01/89

1. Report Date..... 3/01/89
2. Include from Starting date 9/01/88
   to Ending date 12/31/89
3. Include Migration Year 00 - 00
4. Specific Agency - Hatchery
5. Specific Race and Species
6. Specific River/Rive Zone
7. Specific Release Site
8. Include Non-Hatchery N
9. Include Below Bonneville N

Cmd-5 Job Jobqueued

FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES / AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOI ID	COMMENTS
IDFG	MAGIC VALLEY	SU STEELHEAD A	88	5	89	4/10/89 4/20/89	150,000	HAMMER CRK	SALMON R	SNAK	89207	
		SU STEELHEAD B	88	5	89	4/10/89 4/20/89	850,000	SAWTOOTH RIVER	SALMON R	SNAK	89266	
		SU STEELHEAD B	88	5	89	4/10/89 4/21/89	300,000	E F SALMON R	E F SALMON R	SNAK	89267	PROGENY FROM ADULT RUTURN TO E.F. TRAP.
		SU STEELHEAD A	88	5	89	4/21/89 4/28/89	450,000	LITTLE SALMON R	SALMON R	SNAK	89264	3K PIT, 45K CWT 10-41-41,42,43 REL INTO HAZARD CREEK
		SU STEELHEAD A	88	5	89	4/25/89 4/30/89	100,000	YANKEE FORK	SALMON R	SNAK	89265	
		SU STEELHEAD A	88	5	89	4/28/89 5/05/89	300,000	SLATE CRK	SALMON R	SNAK	89206	
	*				HATCHERY TOTAL.		2,150,000	FROM 6 RELEASES				*
	MCCALL	SU CHINOOK 1 SOUTH FORK	87	20	89	3/24/89 3/31/89	1,000,000	S F SALMON R	S F SALMON R	SNAK	89257	240K CWT 10-31-41,42,43,44,45; US/CANADA 60K FB & CWT 10-31-46
	*				HATCHERY TOTAL.		1,000,000	FROM 1 RELEASES				*
	NIAGARA SPRINGS	SU STEELHEAD A	88	5	89	4/07/89 4/18/89	500,000	PAHSIMEROI R	PAHSIMEROI R	SNAK	89260	
		SU STEELHEAD A	88	5	89	4/19/89 4/25/89	200,000	SALMON R	SALMON R	SNAK	89261	REL NEAR SHOUP BRIDGE.
		SU STEELHEAD A	88	5	89	4/19/89 4/25/89	200,000	N F SALMON R	N F SALMON R	SNAK	89262	
		SU STEELHEAD A	88	5	89	4/24/89 5/01/89	800,000	HELLS CANYON	SNAKE R	SNAK	89259	3K PIT
	*				HATCHERY TOTAL.		1,700,000	FROM 4 RELEASES				*
	PAHSIMEROI	SU CHINOOK 1 PAHSIMEROI	87	20	89	3/31/89 3/31/89	1,000,000	PAHSIMEROI R	PAHSIMEROI R	SNAK	89258	50% SF STOCK
	*				HATCHERY TOTAL.		1,000,000	FROM 1 RELEASES				*
	RAPID RIVER	SP CHINOOK 1 RAPID RIVER	87	20	89	3/20/89 3/31/89	2,500,000	RAPID RIVER	RAPID R	SNAK	89254	US/CANADA 100K CWT 10-40-45,51; 60K FB & CWT 10-31-40

These data are preliminary and have been derived from various sources. For verification and/or origin of data, contact the Systems at (503) 230-4290

FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOT ID	COMMENTS
IDFG	RAPID RIVER	SP CHINOOK 1 RAPID RIVER	87	20	89	3/21/89 3/22/89	400,000	HELLS CANYON	SNAKE R	SNAK	89255	3K PIT
	#			HATCHERY TOTAL.			2,900,000	FROM 2 RELEASES				
	RED RIVER	SP CHINOOK 1 CLEARWATER	87	23	89	10/17/88 10/17/88	291,000	RED R	S F CLEARWATER	SNAK	89256	56K FB & CWT 10-40-02
	#			HATCHERY TOTAL.			291,000	FROM 1 RELEASES				
	SAWTOOTH	SP CHINOOK 1 SALMON	87	21	89	10/12/88 10/13/88	990,500	SAWTOOTH	SALMON R	SNAK	89250	US/CANADA, 6K PIT, 150K CWT 10-29-35; 10-31-38,39 200K RV CLIPPED.
		SP CHINOOK 1 SALMON	87	20	89	3/15/89 3/20/89	1,100,000	SAWTOOTH	SALMON R	SNAK	89252	300K CWT US/CANADA; 60K FB 10K PIT
		SP CHINOOK 1 SALMON	87	20	89	3/20/89 3/25/89	311,000	E F SALMON R	E F SALMON R	SNAK	89251	63K CWT 10-30-35
		SP CHINOOK 1 SALMON	87	20	89	3/20/89 3/31/89	200,000	YANKEE FORK	SALMON R	SNAK	89253	
	#			HATCHERY TOTAL.			2,601,500	FROM 4 RELEASES				
##				AGENCY TOTAL...			11,692,500	FROM 19 RELEASES				##

FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES / AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOT ID	COMMENTS
ODFW	BONNEVILLE	SP CHINOOK 1 CARSON	87	10	89	10/15/88 10/15/88	76,000	BONIFER POND	UMATILLA R	LCOL	89127	100% CWT 07-44-27,28,29,30; 50% ACCLIMATION POND
		FA CHINOOK 1 URB	87	7	89	3/06/89 3/06/89	200,000	UMATILLA R	UMATILLA R	LCOL	89100	REL AT MINTHORN.
		SP CHINOOK 1 CARSON	87	9	89	3/15/89 3/15/89	150,000	HOOD R	HOOD R	LCOL	89106	150K CWT
		SP CHINOOK 1 CARSON	87	9	89	3/27/89 3/27/89	100,000	BONIFER POND	UMATILLA R	LCOL	89101	75K CWT
		SP CHINOOK 1 CARSON	87	9	89	3/27/89 3/27/89	100,000	UMATILLA R	UMATILLA R	LCOL	89102	REL AT OR NEAR BONIFER PONDS. 75K CWT
		FA CHINOOK 0 URB	88	60	89	6/01/89 6/01/89	2,000,000	BONNEVILLE	LOWER COLUMBIA	LCOL	89105	2M CWT
		SP CHINOOK 1 CARSON	88	11	89	10/15/89 10/15/89	75,000	MINTHORN POND	UMATILLA R	LCOL	89103	75K CWT
		SP CHINOOK 1 CARSON	88	11	89	10/15/89 10/15/89	75,000	UMATILLA R	UMATILLA R	LCOL	89104	75K CWT NR MINTHORN
#						HATCHERY TOTAL.	2,776,000	FROM 8 RELEASES				#
	CASCADE	COHO TOUTLE	87	15	89	3/15/89 3/15/89	700,000	YAKIMA R	YAKIMA R	MCOL	89107	80K CWT
		COHO TOUTLE	87	15	89	3/15/89 3/15/89	80,000	MINTHORN POND	UMATILLA R	LCOL	89109	80K CWT
		COHO TOUTLE	87	15	89	3/27/89 3/27/89	900,000	UMATILLA R	UMATILLA R	LCOL	89108	
#						HATCHERY TOTAL.	1,680,000	FROM 3 RELEASES				#
	IRRIGON	FA CHINOOK 1 BONNEVILLE	87	9	89	11/03/88 11/04/88	89,500	MINTHORN POND	UMATILLA R	LCOL	89128	100% CWT 07-45-36,37,38; 50% ACCLIMATION POND
		SU STEELHEAD WALLOWA	88	49	89	11/22/88 11/22/88	94,500	HELLS CANYON	SNAKE R	SNAK	89129	45% IMNAHA STOCK, 55% WALLOWA STOCK FRESHOLTS
		SU STEELHEAD IMNAHA	88	5	89	4/24/89 4/24/89	330,000	LI SHEEP CRK	IMNAHA R	SNAK	89115	100% AD

FROM 9/01/88 TO 12/31/89

AGCY HATCHERY	SPECIES AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOI ID	COMMENTS
ODFW IRRIGON	SU STEELHEAD WALLOWA	88	5	89	4/24/89 4/24/89	225,000	BIG CANYON CRK	WALLOWA R	SNAK	89116	100% AD
	SU STEELHEAD WALLOWA	88	5	89	4/24/89 4/24/89	500,000	WALLOWA	WALLOWA R	SNAK	89117	100% AD
	SU STEELHEAD WALLOWA	88	5	89	4/24/89 4/24/89	625,000	WALLOWA R	WALLOWA R	SNAK	89118	100% AD
	FA CHINOOK 0 URB	88	80	89	5/10/89 5/10/89	3,000,000	UMATILLA R	UMATILLA R	LCOL	89114	200K CWT
	SP CHINOOK 1 RAPID RIVER	88	12	89	5/10/89 5/10/89	125,000	LOOKINGGLASS CR	GRANDE RONDE R	SNAK	89119	120K CWT
*					HATCHERY TOTAL.	4,989,000	FROM 8 RELEASES				
LOOKINGGLASS	SP CHINOOK 1 RAPID RIVER	87	22	89	9/23/88 9/23/88	85,500	LOOKINGGLASS CR	GRANDE RONDE R	SNAK	89132	100% CWT 07-46-30,31; 40K FB
	SP CHINOOK 1 RAPID RIVER	87	21	89	11/01/88 11/01/88	86,500	LOOKINGGLASS CR	GRANDE RONDE R	SNAK	89130	100% CWT 07-46-32,33
	SP CHINOOK 1 IMNAHA	87	11	89	4/15/89 4/15/89	150,000	IMNAHA R	IMNAHA R	SNAK	89120	80K CWT
	SP CHINOOK 1 LOOKINGGLASS	87	11	89	4/24/89 4/24/89	170,000	BIG CANYON CRK	WALLOWA R	SNAK	89121	80K CWT
	SP CHINOOK 1 RAPID RIVER	87	12	89	4/24/89 4/24/89	420,000	LOOKINGGLASS CR	GRANDE RONDE R	SNAK	89122	80K CWT
	SP CHINOOK 0 RAPID RIVER	88	60	89	7/25/89 7/25/89	100,000	LOOKINGGLASS CR	GRANDE RONDE R	SNAK	89123	80K CWT
*					HATCHERY TOTAL.	1,012,000	FROM 6 RELEASES				
OAK SPRINGS	SU STEELHEAD UMATILLA	88	80	80	4/10/89 4/10/89	30,000	HINTHORN POND	UMATILLA R	LCOL	89110	30K LV AD & CWT
	SU STEELHEAD UMATILLA	88	9	89	4/10/89 4/10/89	30,000	BONIFER POND	UMATILLA R	LCOL	89112	
	SU STEELHEAD UMATILLA	88	7	89	4/24/89 4/24/89	30,000	UMATILLA R	UMATILLA R	LCOL	89111	30K CWT & LV AD

These data are preliminary and have been ved from various sources. For verification and/or origin of data, contac. the operators of the Fish Passage Data System at (503) 230-4290

FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOT ID	COMMENTS
ODFW	OAK SPRINGS	SU STEELHEAD SANTIAM	88	6	89	4/24/89 4/24/89	80,000	HOOD R	HOOD R	LCOL	89113	80K AD
		SU STEELHEAD UMATILLA	88	58	89	12/21/89 12/21/89	10,000	UMATILLA R	UMATILLA R	LCOL	89131	REL AT CORPORATION
	*					HATCHERY TOTAL.	180,000	FROM 5 RELEASES				
	ROUND BUTTE	SP CHINOOK 1 DESCHUTES	87	8	89	3/10/89 3/10/89	210,000	DESCHUTES R	DESCHUTES R	LCOL	89125	60K CWT
		SP CHINOOK 1 DESCHUTES	87	6	89	4/15/89 4/15/89	60,000	DESCHUTES R	DESCHUTES R	LCOL	89124	60K CWT
		SU STEELHEAD DESCHUTES	88	4	89	4/20/89 4/20/89	162,000	DESCHUTES R	DESCHUTES R	LCOL	89126	100X AD
	*					HATCHERY TOTAL.	432,000	FROM 3 RELEASES				
**						AGENCY TOTAL...	11,069,000	FROM 33 RELEASES				**

These data are preliminary and have been derive[illegible]o various sources. For verification and/or origin of data, contact the [illegible]rators of the Fish Passage Data System at (503) 230-4290

FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOT ID	COMMENTS
USFW	CARSON	SP CHINOOK 1 CARSON	87	21	89	4/10/89 4/10/89	100,000	UMATILLA R	UMATILLA R	LCOL	89224	
		SP CHINOOK 1 CARSON	87	18	89	4/13/89 4/14/89	2,000,000	WIND R	WIND R	LCOL	89225	35K FB FPC
*						HATCHERY TOTAL.	2,100,000	FROM 2 RELEASES				*
	DWORSHAK	SP CHINOOK 1 CLEARWATER	87	33	89	9/28/88 9/28/88	193,000	DWORSHAK DAM	N F CLEARWATER	SNAK	89247	100% CWT 05-40-10,11,12
		SP CHINOOK 1 CLEARWATER	87	20	89	3/27/89 4/01/89	300,000	WHITE SANDS CR-	LOCHSA R	SNAK	89201	60K CWT 05-19-42,43,44
		SP CHINOOK 1 CLEARWATER	87	20	89	4/03/89 4/07/89	1,200,000	DWORSHAK DAM	N F CLEARWATER	SNAK	89200	60K FB & CWT 05-40-13,14,15
		SU STEELHEAD B	88	8	89	4/17/89 4/24/89	200,000	CLEAR CRK	CLEARWATER R	SNAK	89211	
		SU STEELHEAD B	88	8	89	4/17/89 4/24/89	100,000	S F CLEARWATER	S F CLEARWATER	SNAK	89212	
		SU STEELHEAD B	88	8	89	4/17/89 4/24/89	100,000	CROOKED R	S F CLEARWATER	SNAK	89213	
		SU STEELHEAD B	88	8	89	4/17/89 4/24/89	125,000	NEWSOME CK	S F CLEARWATER	SNAK	89214	
		SU STEELHEAD B	88	8	89	5/01/89 5/10/89	1,300,000	DWORSHAK DAM	N F CLEARWATER	SNAK	89210	3K PIT, 160K CWT 05-18-36,37, 05-19-45,46,47 05-20-41,42,43.
*						HATCHERY TOTAL.	3,518,000	FROM 8 RELEASES				*
	ENTIAT	SP CHINOOK 0 ENTIAT	87	27	89	11/14/88 11/14/88	56,500	ENTIAT R	ENTIAT R	MCOL	89248	
		SP CHINOOK 1 ENTIAT	87	18	89	4/20/89 4/20/89	800,000	ENTIAT R	ENTIAT R	MCOL	89226	
*						HATCHERY TOTAL.	856,500	FROM 2 RELEASES				*
	HAGERMAN	SU STEELHEAD A	88	5	89	4/10/89 4/30/89	500,000	E F SALMON R	E F SALMON R	SNAK	89209	45K CWT 10-41-32,33,34

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FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES / AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOT ID	COMMENTS
USFW	HAGERMAN	SU STEELHEAD B	88	5	89	4/20/89 4/30/89	500,000	S F CLEARWATER	S F CLEARWATER	SNAK	89208	
	*				HATCHERY TOTAL.		1,000,000	FROM 2 RELEASES				
	KOOSKIA	SP CHINOOK 1 CLEARWATER	87	20	89	3/27/89 4/01/89	200,000	CROOKED R	S F CLEARWATER	SNAK	89204	
		SP CHINOOK 1 CLEARWATER	87	20	89	3/31/89 3/31/89	200,000	LOLO CRK	CLEARWATER R	SNAK	89205	
		SP CHINOOK 1 CLEARWATER	87	20	89	4/01/89 4/30/89	100,000	ELDORADO CRK	CLEARWATER R	SNAK	89203	
		SP CHINOOK 1 CLEARWATER	87	20	89	4/03/89 4/04/89	400,000	KOOSKIA	M F CLEARWATER	SNAK	89202	
	*				HATCHERY TOTAL.		900,000	FROM 4 RELEASES				
	LEAVENWORTH	SP CHINOOK 0 LEAVENWORTH	88	1169	90	12/09/88 12/09/88	1,044,000	LEAVENWORTH	WENATCHEE R	MCOL	89249	FRY RELEASE
		SP CHINOOK 1 LEAVENWORTH	87	18	89	4/19/89 4/19/89	2,200,000	WENATCHEE R	WENATCHEE R	MCOL	89227	200K US/CAN 50K FB
		SU STEELHEAD LEAVENWORTH	87	6	89	4/19/89 4/19/89	95,000	WENATCHEE R	WENATCHEE R	MCOL	89228	
		SP CHINOOK 1 LEAVENWORTH	87	35	89	4/21/89 4/21/89	100,000	WENATCHEE R	WENATCHEE R	MCOL	89229	FB & CWT PARAMETRIX STUDY
		SP CHINOOK 1 LEAVENWORTH	87	55	89	4/21/89 4/21/89	100,000	WENATCHEE R	WENATCHEE R	MCOL	89230	FB & CWT PARAMETRIX STUDY
		SP CHINOOK 1 LEAVENWORTH	87	16	89	4/21/89 4/21/89	100,000	WENATCHEE R	WENATCHEE R	MCOL	89231	FB & CWT PARAMETRIX STUDY
		SP CHINOOK 1 LEAVENWORTH	87	30	89	4/21/89 4/21/89	100,000	WENATCHEE R	WENATCHEE R	MCOL	89232	FB & CWT PARAMETRIX STUDY
	*				HATCHERY TOTAL.		3,739,000	FROM 7 RELEASES				
	LWHITE SALMON	SP CHINOOK 0 L WHITE SALMON	88	1394	90	11/10/88 12/16/88	2,403,500	LWHITE SALMON R	LWHITE SALMON R	LCOL	89700	UNFED FRY

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FROM 9/01/88 TO 12/31/89

AGCY HATCHERY	SPECIES..... AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOT ID	COMMENTS
USFW LWHITE SALMON	SP CHINOOK 1 L WHITE SALMON	87	15	89	4/17/89 4/17/89	509,000	LWHITE SALMON R	LWHITE SALMON R	LCOL	89234	
	FA CHINOOK 0 BONN. URB	88	180	89	5/11/89 5/12/89	2,000,000	YAKIMA R	YAKIMA R	MCOL	89235	400K CWT REPROGRAMMING (YAKIMA TRIBE) 300K PEN REARING
	FA CHINOOK 0 BONN. URB	88	120	89	6/26/89 6/26/89	1,500,000	LWHITE SALMON R	LWHITE SALMON R	LCOL	89236	
	SP CHINOOK 0 L WHITE SALMON	88	33	89	6/26/89 6/26/89	500,000	LWHITE SALMON R	LWHITE SALMON R	LCOL	89237	
	SP CHINOOK 0 L WHITE SALMON	89	1400	91	12/16/89 12/16/89	1,600,000	LWHITE SALMON R	LWHITE SALMON R	LCOL	89233	
#					HATCHERY TOTAL.	8,512,500	FROM 6 RELEASES				
SPRING CRK	FA CHINOOK 0 SPRING CREEK	88	90	89	3/09/89 3/09/89	7,400,000	SPRING CRK	LOWER COLUMBIA	LCOL	89238	200K US/CANADA
	FA CHINOOK 0 SPRING CREEK	88	65	89	4/13/89 4/13/89	3,600,000	SPRING CRK	LOWER COLUMBIA	LCOL	89239	200K US/CANADA
	FA CHINOOK 0 SPRING CREEK	88	35	89	5/18/89 5/18/89	4,600,000	SPRING CRK	LOWER COLUMBIA	LCOL	89240	200K US/CANADA; 1.2M NET PEN REARED
#					HATCHERY TOTAL.	15,600,000	FROM 3 RELEASES				
WILLARD	COHO WILLARD	88	1200	90	2/28/89 2/28/89	1,000,000	LWHITE SALMON R	LWHITE SALMON R	LCOL	89242	FRY RELEASE
	COHO WILLARD	87	16	89	5/29/89 5/29/89	1,750,000	LWHITE SALMON R	LWHITE SALMON R	LCOL	89243	
#					HATCHERY TOTAL.	2,750,000	FROM 2 RELEASES				
WINTHROP	SP CHINOOK 1 WINTHROP	87	15	89	4/18/89 4/18/89	900,000	METHOW R	METHOW R	MCOL	89244	50K FB FPC
#					HATCHERY TOTAL.	900,000	FROM 1 RELEASES				
WARM SPRINGS	SP CHINOOK 1 WARM SPRINGS	87	12	89	4/17/89 4/17/89	405,000	WARM SPRINGS R	WARM SPRINGS R	LCOL	89245	100% CWT
	SP CHINOOK 0 WARM SPRINGS	88	13	89	9/29/89 9/29/89	250,000	WARM SPRINGS R	WARM SPRINGS R	LCOL	89246	100% CWT
#					HATCHERY TOTAL.	655,000	FROM 2 RELEASES				
##					AGENCY TOTAL....	40,531,000	FROM 39 RELEASES				

FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES / AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOI ID	COMMENTS
WDF	KLICKITAT	SP CHINOOK 1 KLICKITAT	87	10	89	3/01/89 5/01/89	600,000	KLICKITAT R	KLICKITAT R	LCOL	89006	
		COHO TYPE-N	87	20	89	5/01/89 6/01/89	1,350,000	KLICKITAT R	KLICKITAT R	LCOL	89009	
		SP CHINOOK 1 KLICKITAT	88	50	89	6/01/89 6/01/89	1,200,000	UPPER KLICKITAT	KLICKITAT R	LCOL	89007	
		FA CHINOOK 0 PRIEST RAPIDS	88	80	89	6/01/89 6/01/89	4,000,000	KLICKITAT R	KLICKITAT R	LCOL	89008	
	*				HATCHERY TOTAL.		7,150,000	FROM 4 RELEASES				*
	LYONS FERRY	FA CHINOOK 1 SNAKE RIVER	87	8	89	4/15/89 4/15/89	400,000	LYONS FERRY	SNAKE R	SNAK	89010	
		FA CHINOOK 0 SNAKE RIVER	88	100	89	6/01/89 6/01/89	1,400,000	LYONS FERRY	SNAKE R	SNAK	89011	
	*				HATCHERY TOTAL.		1,800,000	FROM 2 RELEASES				*
	PRIEST RAPIDS	FA CHINOOK 1 PRIEST RAPIDS	88	40	89	6/01/89 6/20/89	5,000,000	BELOW PRD DAM	MID COLUMBIA R	MCOL	89013	
	*				HATCHERY TOTAL.		5,000,000	FROM 1 RELEASES				*
	ROCKY REACH	FA CHINOOK 1 PRIEST RAPIDS	87	8	89	4/01/89 4/01/89	180,000	ABOVE RRH DAM	MID COLUMBIA R	MCOL	89014	
		COHO TYPE-S	87	20	89	5/01/89 6/01/89	392,000	ABOVE RRH DAM	MID COLUMBIA R	MCOL	89015	
	*				HATCHERY TOTAL.		572,000	FROM 2 RELEASES				*
	TUCANNON	SP CHINOOK 1 SNAKE RIVER	87	15	89	3/01/89 4/01/89	132,000	TUCANNON R	TUCANNON R	SNAK	89012	
	*				HATCHERY TOTAL.		132,000	FROM 1 RELEASES				*
	WASHOUGAL	COHO TYPE-N	87	20	89	4/01/89 4/01/89	2,500,000	KLICKITAT R	KLICKITAT R	LCOL	89003	
	*				HATCHERY TOTAL.		2,500,000	FROM 1 RELEASES				*

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FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOI ID	COMMENTS
WDF	WELLS	SU CHINOOK 1 WELLS	87	8	89	4/01/89 4/01/89	250,000	WELLS DAM	MID COLUMBIA R	MCOL	89016	
		SU CHINOOK 0 WELLS	88	90	90	4/01/89 4/01/89	400,000	METHOW R	METHOW R	MCOL	89017	
		SU CHINOOK 0 WELLS	88	60	89	6/01/89 6/01/89	1,240,000	WELLS DAM	MID COLUMBIA R	MCOL	89018	
		SU CHINOOK 0 WELLS	88	20	89	7/01/89 7/01/89	200,000	WELLS DAM	MID COLUMBIA R	MCOL	89019	
	*					HATCHERY TOTAL.	2,090,000	FROM 4 RELEASES				
	YAKIMA	COHO TYPE-B	87	15	89	4/01/89 4/01/89	100,000	YAKIMA R	YAKIMA R	MCOL	89020	RELEASED INTO MILE SPRINGS.
	*					HATCHERY TOTAL.	100,000	FROM 1 RELEASES				
**						AGENCY TOTAL...	19,344,000	FROM 16 RELEASES				**

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FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOI ID	COMMENTS
WDW	CHELAN	SU STEELHEAD WELLS	88	5	89	4/18/89 4/24/89	45,000	ENTIAT R	ENTIAT R	MCOL	89363	
		SU STEELHEAD WELLS/RING	88	5	89	4/18/89 4/29/89	345,000	WENATCHEE R	WENATCHEE R	MCOL	89364	
	#			HATCHERY TOTAL.			390,000	FROM 2 RELEASES				#
	LYONS FERRY	SU STEELHEAD LYONS FERRY	88	5	89	4/17/89 4/21/89	30,000	ASOTIN CREEK	SNAKE R	SNAK	89352	
		SU STEELHEAD LYONS FERRY	88	5	89	4/17/89 4/30/89	200,000	WALLA WALLA R	WALLA WALLA R	MCOL	89354	
		SU STEELHEAD LYONS FERRY	88	5	89	4/17/89 4/21/89	160,000	TOUCHET R	TOUCHET R	MCOL	89355	80K FB & CWT, REL FROM ACCLIMATION POND AT DAYTON, WA.
		SU STEELHEAD WALLOWA	88	5	89	4/24/89 4/30/89	225,000	GRANDE RONDE R	GRANDE RONDE R	SNAK	89350	REL FROM COTTONWOOD ACCLIMATION PONDS.
		SU STEELHEAD LYONS FERRY	88	5	89	4/24/89 4/30/89	160,000	TUCANNON R	TUCANNON R	SNAK	89351	REL FROM TUCANNON ACCLIMATION PONDS 60K FB & CWT
		SU STEELHEAD LYONS FERRY	88	5	89	4/24/89 4/30/89	100,000	LYONS FERRY	SNAKE R	SNAK	89353	100K FB & CWT
	#			HATCHERY TOTAL.			875,000	FROM 6 RELEASES				#
	NACHES	SU STEELHEAD YAKIMA	88	9	89	4/17/89 4/21/89	52,000	NACHES R	NACHES R	MCOL	89366	PLANTED IN L. NACHES R 50% VOLITIONAL REL.
	#			HATCHERY TOTAL.			52,000	FROM 1 RELEASES				#
	RINGOLD	SU STEELHEAD RINGOLD	88	5	89	4/24/89 4/28/89	200,000	RINGOLD	MID COLUMBIA R	MCOL	89367	
	#			HATCHERY TOTAL.			200,000	FROM 1 RELEASES				#
	SKAMANIA	WI STEELHEAD SKAMANIA	88	6	89	4/03/89 4/21/89	15,000	WHITE SALMON R	WHITE SALMON R	LCOL	89359	
		SU STEELHEAD SKAMANIA	88	6	89	4/17/89 4/21/89	100,000	KLICKITAT R	KLICKITAT R	LCOL	89356	
		SU STEELHEAD SKAMINIA	88	6	89	4/24/89 4/30/89	10,000	WHITE SALMON R	WHITE SALMON R	LCOL	89357	5K REL FROM NET PEN REARING IN NW LAKE
	#			HATCHERY TOTAL.			125,000	FROM 3 RELEASES				#

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FROM 9/01/88 TO 12/31/89

AGCY	HATCHERY	SPECIES / AGE & STOCK	BRD YR	SIZE #/lb	MGR YR	RELEASE DATES	NUMBER RELEASED	RELEASE SITE	RIVER NAME	ZONE	FPC LOI ID	COMMENTS
WDW	VANCOUVER	SU STEELHEAD SKAMANIA	88	6	89	4/17/89 4/21/89	40,000	WIND R	WIND R	LCOL	89350	
	*			HATCHERY TOTAL.			40,000	FROM 1 RELEASES				
	WELLS	SU STEELHEAD WELLS	88	5	89	4/21/89 5/09/89	90,000	OKANOGAN R	OKANOGAN R	MCOL	89360	
		SU STEELHEAD WELLS	88	5	89	4/21/89 5/11/89	85,000	SIMILKAMEEN R	OKANOGAN R	MCOL	89361	40K FB & CWT
		SU STEELHEAD WELLS	88	5	89	4/21/89 5/11/89	655,000	METHOW R	METHOW R	MCOL	89362	30 K FB & CWT
	*			HATCHERY TOTAL.			830,000	FROM 3 RELEASES				
	YAKIMA	SU STEELHEAD YAKIMA	88	43	89	10/20/88 10/20/88	59,000	NACHES R	NACHES R	MCOL	89390	100% CWT 62-19-07,10; REL IN TRIBS OF NACHES; FRESHOLTS
		SU STEELHEAD YAKIMA	88	9	89	4/17/89 4/21/89	48,000	YAKIMA R	YAKIMA R	MCOL	89365	PLANTED IN TOPPENISH CR. 50% VOLITIONAL.
	*			HATCHERY TOTAL.			107,000	FROM 2 RELEASES				
**				AGENCY TOTAL...			2,619,000	FROM 19 RELEASES				**
****				TOTAL RELEASE..			85,205,500	FROM 126 RELEASES				****

L A S T P A G E

APPENDIX 6

SLUICEWAY EFFECTIVENESS TEST PLAN
OPERATION OF BONNEVILLE SECOND POWERHOUSE
SPECIAL OPERATION

BONNEVILLE SECOND POWERHOUSE FGE RESEARCH

Studies conducted in 1988 indicated that stationary bar screens were more effective at guiding juvenile migrants into the bypass system than the submerged traveling screens. This confirmed the hypothesis that submerged traveling screens present some areas of hydraulic rejection, which in turn lowers the effectiveness of the traveling screens. However, as has been observed at other dams where stationary bar screens have been tested, descaling rates and losses through the gap net increased. Lights on the intake ceiling were tested with positive or neutral results.

The 1989 research will be directed toward decreasing the bar screen descaling rates and gap net losses, while maintaining high rates of screen effectiveness. Preliminary model studies of various test configurations have been completed at the COE Waterways Experiment Station. These studies indicate that guidance of dye up the gatewell slot can be improved by placing perforated plate behind the bar screen, adding a 26" solid plate to the top of the bar screen (which simulates the traveling screen), raising the emergency gate, raising the bar screen from a 30" lowered position to a 18" lowered position, and flattening the screen angle from 55 degrees to 65 degrees. Based on these studies we will be add perforated and solid plates to the bar screens and test the benefits of raising the emergency gates and bar screen, and angle changes. These tests will be conducted in slot 12B. The benefits from lights mounted on the screen frame "I" beam will be tested concurrently in slot 12A.

In addition to these bar screen tests we will continue with research to develop the maximum guidance from the traveling screen. This is to simultaneously gain as much information as possible on the traveling screen in the event the bar screen does not meet fish guidance and/or debris handling criteria. The benefits of raising the emergency gate on traveling screen FGE and effectiveness will be tested.

All tests will be conducted under standard FGE test conditions, which is four units operating. Full powerhouse loading may be requested when the best test scenario is determined. Testing will be conducted from April 24 through June 2, and July 5 through August 1.

BONNEVILLE FIRST POWERHOUSE FGE

The FGE of the first powerhouse was documented in 1988 to formulate baseline FGE conditions prior to the installation of

the Bonneville Navigation Lock floating guidewall. The spring migration was monitoring during late May and early June, however, insufficient numbers of subyearling chinook were present. Monitoring of the summer outmigration indicated that subyearling guidance was extremely poor, averaging less than 15%. This was the first data gathered at the first powerhouse for the summer outmigration. We plan to repeat this monitoring of both the spring and summer outmigrations in 1989, from approximately May 8 through 14, and July 5 through August 1.

BONNEVILLE SECOND POWERHOUSE HYDROACOUSTIC EVALUATIONS

Since 1985, the COE hydroacoustic evaluations have shown the sluice chute to be a highly effective passage conduit for juvenile migrants under low powerhouse load conditions. In an attempt to determine to effectiveness of using the sluice chute as a juvenile migrant passage conduit, and to determine the accuracy of the hydroacoustic techniques, hydroacoustic estimates were made in 1988 of turbine passage and compared to the NMFS estimates of FGE. These tests indicated a lot of daily variation between the hydroacoustic and net catches, which is hypothesized to be a-result of short sample durations. The comparison of total passage estimates across the entire monitoring period indicated that the hydroacoustic estimates were 85% of the NMFS estimates at turbine 13A and 52% at turbine 17B.

The 1989 studies will examine whether the variability between hydroacoustic estimates and gatewell samples can be reduced by increasing sample times. This work will be conducted as part of the spill monitoring contract at John Day Dam. At Bonneville second powerhouse, transducers will be installed in turbine units 11 and 18 to estimate turbine passage and target strength, and upstream of the sluice chute entrance gate. The data from these will be used to document turbine and sluice passage. Verification of hydroacoustic estimates of sluice passage will be tested with a video camera during the summer months. The second powerhouse hydroacoustic research will not require any special unit operation, other than what is planned for the FGE experiments described above.

BONNEVILLE SURVIVAL

The Bonneville survival study was initiated in 1987 to assess the comparative survival of subyearling fall chinook through various passage modes at Bonneville Dam. The study was designed to determine the consequences of turbine passage from poor fish guidance efficiencies on subyearling chinook, and to look at both juvenile and adult recoveries. Preliminary analyses of the first two years of this study suggest that unexpected problems may be

associated with passage through the second powerhouse bypass system. Sampling at Jones Beach (RM 46) indicated 10% - 13% fewer fish were being recaptured for bypass released fish than turbine released fish. In both 1987 and 1988 insufficient river flows were available to conduct the spillway portions of this study.

In 1989 we plan to repeat the 1988 bypass, upper turbine, lower turbine, control, and front roll releases, and we anticipate flows will be adequate enough to implement the spillway release. Releases are scheduled for June 26 through 28, July 10 through 12, July 19 through 21, and July 28 through 30. Four units will be needed for the turbine and bypass releases, and spill volumes of approximately 53,000 cfs will be requested for eight hours for the spillway releases.

National Marine Fisheries Service will also be assessing the incidence of descaling and injury, and if possible percent mortality, among groups of subyearling fall chinook released through various segments of the first and second powerhouse bypass systems. This evaluation will attempt to isolate possible sources of the suspected mortality with the second powerhouse bypass system, evaluate the first powerhouse bypass system, and provide needed recapture experience and gear development. These evaluations will be based on sampling with nets immediately downstream of the outfall structures at both powerhouses.

APPENDIX 7

CORPS OF ENGINEERS SPILL MONITORING PLAN
FOR 1989

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2946
PORTLAND, OREGON 97208-2946

Reply to
Attention of:

CENPP-OP-PN

28 December 1988

MEMORANDUM FOR: Commander, North Pacific Division
ATTN: CENPD-EN-WM

SUBJECT: 1989 Spill Monitoring Plan for John Day Dam

The requested hydroacoustics spill monitoring program plan for the juvenile salmonid outmigration at John Day Dam in 1989 is inclosed The plan is designed to conform to standards outlined in the 1988 Juvenile Fish Passage Plan. Some minor modifications to the program are outlined in the scope of work.

FOR THE COMMANDER:

Encl

PATRICK J. KEOUGH, P.E.
Chief, Operations Division

JOHN DAY DAM SPILL MONITORING PROGRAM
SCOPE of WORK

Objectives

Determine, in real-time, using single and dual-beam hydroacoustic techniques, hourly and daily estimates of total numbers of juvenile salmonids passing through the turbines and spillway during the prime passage period to enable decisions to be made concerning spill operations for juvenile passage.

Determine, in real-time, hourly projections of 24-hour total juvenile salmonid passage by John Day Dam.

Determine how effective spills are in bypassing juvenile salmonids during the prime passage period by analysis of passage through the powerhouse and spillway.

Determine the horizontal distribution of juvenile salmonids passing through the powerhouse and spillway so Corps Personnel can maximize the effectiveness of spills.

Determine how the distribution of discharge among the operating turbines and spillbays is related to juvenile salmonid passage (e.g. spillway efficiency).

Determine the accuracy of estimates of passage into individual turbines, using in-turbine monitoring techniques, by comparative analysis of hydroacoustic estimates with existing NMFS airlift data at turbine three.

Site Description

John Day Lock and Dam is located at Columbia River mile 216 near Rufus, Oregon. The project is oriented perpendicular to the flow and has a 16-turbine powerhouse and a 20 bay spillway. A juvenile fish bypass system is incorporated into the powerhouse structure and is comprised of submersible traveling screens, gatewell orifices, bypass channel, and outfall chute.

Approach

As a result of poor guidance of subyearling chinook into the juvenile bypass system at John Day Dam, hydroacoustic monitoring will again be implemented by the Portland District Army Corps of during the summer of 1989.

Hydroacoustic transducers will be deployed at six, main turbine intakes to provide an even distribution of monitored sites across the powerhouse. Six transducers will be placed at spillbays at the south end of the spillway where most spill for fish passage will occur.

Transducers at the powerhouse will be located at the floor of the turbine intakes on sleds that slide down the pier noses. The transducers will be aimed to sample in front of the "b" slot of each monitored turbine. At turbine three, slots "a" and "b", transducers will be placed above the STSs, inside the turbine intake to enable comparison of hydroacoustics estimates and airlift estimates. The spillway transducers will be deployed just below the waters surface on pole mounts that will be attached to the upstream face of the roadway deck. These transducers will be oriented to sample a nearly vertical, conical volume of water immediately upstream of the spill gate.

Monitoring will be conducted during the 10 hours of prime passage (2000h.-0600h.) each day. Initially, spill will be provided when greater than 50 percent of the daily passage is composed of subyearling chinook as evidenced by airlift data collected by the National Marine Fisheries Service at turbine three.

Estimates of the total numbers of juvenile salmonids passing into the monitored turbines and spill bays will be used to generate the distributions of fish passage across the powerhouse and spillway. Hourly discharge at each site will then be used to determine the density of fish passing at individual turbines and spill bays. Through interpolation and extrapolation, estimates of the total number of fish passing through the unmonitored sites will be made. In this way, total numbers of fish passing the project will be estimated.

Projections of 24-hour passage will be accomplished early each evening so that spill can be requested when passage is expected to exceed a predetermined 24-hour minimum threshold. Hourly estimates of fish passage will be computed using the hourly temporal distributions of passage averaged across the previous 7 days and the day/night distributions of passage based on the airlift sampling system at turbine three. These data will be used to predict passage estimates for the 24-hour period.

Hydroacoustic monitoring at the turbines and spill bays will continue after initiation of spill for fish passage. If the spill provided is not effective at passing fish, then the Corps will terminate the special spill (e.g. spill for fish passage will continue only as long as fish are present in sufficient numbers to benefit from it).

Estimates of the density of fish passage (fish/acre ft.) at the spillway will be analyzed to determine the efficiency of spill in bypassing fish. This information will be helpful in determining patterns and rates of spill which are most effective in passing juvenile salmonids, increasing survival of fish, and providing for more efficient use of the water.

Transducers deployed inside of turbine three will be used to assess the effectiveness of this type of deployment at John Day and to also verify accuracy of hydroacoustic estimates. Verification of hydroacoustic estimates of passage, by comparison with another acceptable technique, is considered important, needed information.

Equipment

Most of the equipment that will be used is Corps-owned or will be borrowed from BPA.

-	Biosonics Model 101 420 kHz transceivers	2
-	Biosonics Model 151 fast multiplexer	1
-	Biosonics Model XMPX multiplexer equalizer	1
-	Thermal Chart Recorder	1 *
-	Raytheon Model LSR 910M chart recorders	4
-	Biosonics 15 degree transducers	14
-	Dual Beam transducers	3
-	Oscilloscopes	3
-	Micro computers	2
-	Cables and deployment hardware	

* (to be purchased)

Monitoring Schedule

Monitoring will be conducted a minimum of 45 minutes each hour, 10 hours each day, seven days each week from 1 May to 15 August 1989.

Data Analysis and Dissemination

Echogram information will be entered into on-site computers each hour by the contractor. Hourly estimates of fish passage through the powerhouse and spillway as well as a projection of 24 hour passage will be provided to the Control Room Operator within one-half hour of the hour in which the data were collected. Daily passage information, for the period of 0600h.-0600h., will be provided to the Reservoir Control Center by approximately 0900h. each morning.

The contractor will provide a draft report to the Corps for review and comment by 31 October 1989 with the final report due by 31 December 1989.

Coordination

Program Coordinator: is responsible for administration, planning, and overall coordination for the Portland District spill monitoring program.

Biologist: is responsible for coordination between the contractor and the Corps. This biologist will be responsible for providing technical oversight of the contractor, conducting weekly meetings, obtaining data from the contractor on a daily basis, and the timely dissemination of results so that effective daily decisions can be made by the Reservoir Control Center and other agencies.

Project Assistance

Hourly discharge information for the powerhouse and spillway will need to be made available to the contractor. Access to the project, siting for the monitoring trailers, parking space, and keys will all be required by the contractor. The contractor will be required to provide his own support for most activities.

As initiated in 1988, the control room operator will be requested to make the hourly real-time spill decisions based on criteria provided by the Corps Fishery Field Unit biologist and the hourly hydroacoustics data provided by the contractor.

Program Costs $148,272

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
WALLA WALLA, WASHINGTON 99362-9265

REPLY TO
ATTENTION OF:

CENPW-OP-PO (1130) 22 December 1988

MEMORANDUM FOR: Commander, North Pacific Division,
ATTN: CENPD-EN-WM

SUBJECT: 1989 Spill Monitoring Plan for Lower Monumental

1. Reference CENPD-EN-WM memorandum dated 13 Dec 1988, subject as above.

2. Enclosed is the requested plan describing our program for monitoring spill at Lower Monumental during the 1989 juvenile salmonid outmigration. Our 1989 O&M budget contains funds to cover the program, so additional funds from HQUSACE are not required. If the spill agreement is signed and implemented in 1989, our advertisement for hydroacoustic monitoring at Lower Monumental can be canceled.

3. If there are any questions on our 1989 monitoring program, please contact Mr. David Hurson at (509) 522-6710.

FOR THE COMMANDER:

For Robert Tolan CPT, CE
PAUL F. WINBORG
Chief, Operations Division

Encl

1989 SPILL MONITORING PLAN
WALLA WALLA DISTRICT

Lower Monumental Dam:

Site Description: Lower Monumental is the second dam on the lower Snake River, and is located at approximately River Mile 42. The project contains a 6 turbine unit powerhouse, an 8 bay spillway, and a navigation lock. The powerhouse contains a gatewell salvage system which allows the small percentage of juveniles that deflect from the turbine intakes up into the gatewells, to exit the gatewells and be bypassed to the tailrace. In addition to the gatewell salvage system, nighttime spill may be used for bypassing juveniles around the powerhouse. The spill monitoring at Lower Monumental will be conducted by contract with a Corps representative onsite for determining when and how long to spill.

Objectives:

1. Determine when sufficient numbers of juvenile salmonids are present at the project to warrant spill to bypass them.

2. Estimate hourly, daily, weekly, and seasonal numbers of juvenile salmonids passing through the turbine units, spillbays, and the entire project.

3. Determine the effectiveness of the special spills in bypassing juveniles on a daily, weekly, and seasonal basis.

4. Determine diel passage through the turbine units and spillbays on a daily, weekly, and seasonal basis.

5. Determine vertical and horizontal distribution through the turbine units and spillbays on a weekly and seasonal basis.

Monitoring Period: Lower Monumental will be monitored 24 hours per day, 7 days a week from 15 April through 31 July for determining spill effectiveness in bypassing juveniles.

Monitoring Procedures: Monitoring will be conducted using a 420 kHz hydroacoustic system provided by the Government. The system will be comprised of an echo sounder, multiplexer, chart recorders, 15 degree transducers, and miscellaneous cables and accessories.

1. Turbine units: The B-slot on 3 of the 6 turbine units will be monitored for fish passage. Transducers will be attached to frames that slide down the trashrack guides on the pier noses to the bottom of the intakes, and aimed toward the surface.

2. Spillbays: Five of the 8 spillbays will be monitored for

fish passage. Transducers will be attached to mounts that are suspended from the spillway bridge, lowered below the water surface, and aimed downwards.

Data Analysis: Monitoring the project for determining when to spill for bypassing migrating juvenile salmonids requires the data to be analyzed in "real time". This will require the contractor to rely heavily on computers for analyzing the data. Information on juvenile fish passage will be entered into the computers as juveniles are detected with the hydroacoustic equipment. Computer programs will then analyze the data and provide timely information. The information required to meet our objectives is as follows:

1. Objective 1: The Corps will be responsible for developing guidelines that the onsite Corps representative will follow for determining when sufficient numbers of juvenile salmonids are present to warrant spill for bypass.

2. Objective 2: The contractor will be responsible for either developing computer programs or modifying Government-furnished software for expanding the sampling data to entire powerhouse, spillway, and project passage on an hourly basis. The contractor will be required to provide, by 15 minutes past every hour that the project is monitored, information on total number and percentage of juveniles that passed through the turbine units and spillway. This information will be used by the Corps representative for making the decisions regarding spill as stated in objective 1.

3. Objective 3: The contractor will be required to provide the Corps information on spill effectiveness (estimated number and percent of juveniles that pass through the spillway versus the rest of the project). The contractor will provide a daily and weekly summary of spill effectiveness to the Program Coordinator every Thursday morning, by 1000 hours, and will include daily, weekly, and seasonal spill effectiveness in the final report. Spill effectiveness will include the estimated number and percent of juveniles that use the spillway during special nighttime spills and of total daily project passage. The basic collection and analysis of this information will be accomplished under objective 2.

4. Objective 4: The contractor will utilize information collected and analyzed under objective 2 to determine daily, weekly, and seasonal diel passage of juvenile salmonids through the turbine units and spillway. The daily and weekly diel passage information will be provided to the Program Coordinator every Thursday morning, by 1000 hours. The final report will include daily, weekly, and seasonal diel passage information.

5. Objective 5: The contractor will provide the Program Coordinator information on the horizontal and vertical distribution of juvenile salmonids migrating through the turbine units and spillway on a weekly and seasonal basis. The weekly distribution information will be provided every Thursday morning, by 1000 hours, and the seasonal distribution information will be included in the final report.

6. The contractor shall prepare a final report that will include all the information required for objectives 2 through 5, plus additional information on daily average project discharge, and average powerhouse and spillway discharges during the special fish passage spills.

Coordination:

1. Program Coordinator: Will be responsible for overall coordination of the spill monitoring program, and the development of spill monitoring guidelines for use by the onsite Corps representative for making spill determinations. The Program Coordinator will be responsible for overseeing the activities of the contractor and determining if they are adequately monitoring the spill program.

2. Onsite Corps Representative: Will be responsible for determining whether to spill or not spill for juvenile fish passage based on guidelines provided by the Program Coordinator. The onsite representative will be responsible for preparing a daily report detailing the number of juveniles estimated to pass the project for that day, and the level and duration of spill. This report will be disseminated on a daily basis to all parties involved in the spill monitoring program.

3. Designated Project Point of Contact: Will be responsible for contract administration, informing contractor of all project safety regulations, issuing required project keys, and for coordinating requested project support with other project personnel.

Project Impacts: Project personnel will be required to provide crane service for the following: installing transducers at the beginning of the monitoring program, for reaiming or replacing transducers during the program, and for removing transducers at the end of the program. Powerhouse operators will have to provide information on project operations to the contractor on an hourly basis for estimating hourly fish passage.

Equipment Required: Most hydroacoustic equipment will be Government furnished property. Extraneous equipment such an oscilloscopes will be provided by the contractor. Government furnished property for monitoring Lower Monumental Dam includes the following:

1 - Echo sounder
1 - Multiplexer
2 - Chart recorders
10 - 15 degree transducers
3 - turbine transducer mounts
5 - spillway transducer mounts
2 - 1000 foot cables
7 - 500 foot cables
4 - 150 foot armored cables

Costs:

1. Contract costs: $85,000
2. Contract Administration: $10,000
4. Project services costs: $5,000
5. Total estimated project costs: $100,000

APPENDIX 8

DISSOLVED GAS MONITORING PROGRAM
PLAN OF ACTION

1989 Dissolved Gas Monitoring Program

PLAN OF ACTION FOR 1989

The Plan of Action for the 1989 operations consists of six phases:

(1) Program start-up;
(2) Instrument Installation;
(3) In-season Monitoring;
(4) Instrument Removal and Storage;
(5) Data Compilation, Analysis and Storage; and
(6) Program Evaluation and Report.

Phase 1: Program Start-Up

Responsible parties (See Table 1) will be contacted during the December 1988-January 1989 to ensure a good and mutual understanding of the objectives of the monitoring program, including data to be collected, instrument location, procedures to be used, etc.

Negotiations for equipment service and maintenance contracts for Corps instruments will be finalized by 1 February 1989. COMMON SENSING is likely to be retained as "sole source provider" in the absence of other alternate sources. Formal contracts will be ready by 1 March 1989.

Current MOU's with BPA regarding the continued use of the two BPA tensionometers on loan to the Corps will be updated as needed.

Phase 2: Instrument Installation

The list of the instruments to be installed and their assigned locations is given in Table 2. This calls for the same instrument deployment as in 1988.

The instruments are scheduled for installation and interface with SUTRON DCP's by 15 April 1989 at the latest at all Corps stations. The WQ staff hydrologist, together with COMMON SENSING and SUTRON representatives will jointly perform the installation, calibration and testing of all equipment at those stations. Selected project personnel may be requested to assist as needed. Project staff familiarization with the Program details will be carried out at each project during the instrument installation trips.

Phase 3: In-season Monitoring

Actual data collection and transmission activities will start on or around 1 April. Exact starting dates will be coordinated with the Reservoir Control Center, project biologists and cooperating agencies. The mid-Columbia PUD's will usually have a comparatively shorter monitoring season. Unless water temperature proves to be a serious potential problem, the PUD's efforts will cease by mid-July.

The following data will be collected approximately every four hours :

- Water Temperature (WC), ^{o}C
- Barometric Pressure (BH), mm of Hg
- TDG Pressure (NT), mm of Hg
- Dissolved Oxygen Pressure (OP), mm of Hg
- Nitrogen + Argon Pressure (NP), mm of Hg.

A 2-channel station will monitor WC and NT; a 3-channel: WC, BH and NT; a 4-channel: WC, NT, OP, and NP; and a 5-channel: all five parameters. The minimum required are WC, BH and NT.

The PUD's may continue to use 1988 CBT Coding sheets (or equivalents). Data transmission via CBT teletype will be done twice a day between 0915 to 1100 hours and 2115 to 2300 hours. The WQ Section will provide all necessary assistance, if needed. The same CBT coding sheets, once filled out, will be sent to WQ every three weeks for data reconciliation.

All Corps, USBR and PUD tensionometers interfaced with a SUTRON DCP will be powered by a 110V, AC line with internal battery back-up. Data collected by these instruments will be transmitted automatically every four hours, via the GOES Satellite, to the Corps' ground-receive station in Portland. After decoding, these data will be automatically transmitted to the AMDAHL computer for storage in the CROHMS data base.

In-season instrument and operational problems should be reported to WQ, who will then arrange for the necessary repairs to be made as expeditiously as possible.

Daily reports summarizing TDG saturation levels at all monitoring stations will be prepared and disseminated by WQ each day by 1330 hours. Reports 101, 102 and 103 will contain the following information (See Figure 1):

- Station Identifier
- Date and Time of the Tensionometer Probe Readings
- Water Temperature, ^{o}C
- Barometric Pressure, mm of Hg
- TDG Pressure, mm of Hg
- Calculated TDG Saturation Percent (%)
- Project Hourly Spill, KCFS (QS)
- Project Total Hourly Outflow, KCFS (QR)
- Number of Spillway Gates Open

The same information, except the calculated TDG saturation, will also be available for viewing by those who have access to CROHMS. Reconciliation between data received via the CBT and those manually recorded on the coding sheets will be made by WQ before the data are permanently stored in the WQ Data Base.

Phase 4: Instrument Removal and Storage

Shortly after the end of the monitoring season the tensionometers will be removed from the various projects by WQ or contractor personnel. The 110-AC power line will be disconnected; the DCP interface cable wrapped with a plastic cover to protect against moisture; and the instruments packed and returned for

regular maintenance and service by COMMON SENSING. These instruments will be ultimately stored at the Division office until the beginning of the next monitoring season.

Phase 5: Data Compilation, Analysis and Storage

Time and manpower permitting, statistical analyses will be conducted to develop trends and relationships between spill and TDG saturation. Efforts will continue in the model calibration and application of GASSPIL (dissolved Gas) and COLTEMP (Water temperature) models.

Phase 6: Program Evaluation and Summary Report

An office report will be prepared to summarize the highlights of the 1989 TDG monitoring program. It will include a general program evaluation of the adequacy and timeliness of the information received from the field, and how that information is used to help control TDG supersaturation and high water temperature throughout the Basin.

TABLE 1
List of Contact Persons

Projects	Names	Position	Phone Numbers
Int'l Boundary	Dan Lute	Hydrologist (USBR)	(208) 334-1970
Grand Coulee	Dan Lute	Hydrologist (USBR)	(208) 334-1970
Chief Joseph	Joe Munk	Ch. of Operations	(509) 686-5501
Wells	Mike Erho	Biologist (Douglas)	(509) 884-7191
Rocky Reach	Steve Hays	Biologist (Chelan)	(509) 663-8121
Priest Rapids	Mike Dell	Biologist (Grant)	(509) 754-3541
Lower Granite	Jesse Smiley	Ch. of Operations	(509) 843-1493
Little Goose	Ray Eaking	Ch. Of Operations	(509) 399-2233
Lo.Monumental	Frank Lane	Hydr.Tech.	(509) 522-6631
Ice Harbor	Frank Lane	Hydr.Tech.	(509) 522-6631
McNary	Brad Eby	Reservoir Mgmt	(503) 922-3211
John Day	Gary Dunning	Power Proj.Supt.	(503) 739-2227
The Dalles	Larry Kerr	Power Proj.Supt.	(503) 296-1181
Bonneville	Phil Jordan	Ch. of Operations	(503) 374-8442

TABLE 2
1988 Dissolved Gas Monitoring Network

Sta.ID	Location	Owner	Model of Tensionometer	Channels No.
CIBW	Boundary	USBR	TGO-FT	4-auto
GCGW	D/s GCL	USBR	TGO-FT	4-auto
CHJ	Forebay	NPD/BPA	TBO-FTR-002	5-auto
WEL	Forebay	Douglas PUD	FT	2-ch.
RRH	Forebay	Chelan PUD	FT	2-ch.
RIS	Forebay	Chelan PUD	FT	2-ch.
PRD	Forebay	Grant PUD	TBO-FTR	4-auto
LWG	Forebay	NPD	TGO-FTR-011	5-auto
LGS	Forebay	NPD	TGT-FR- 003	3-auto
LMN	Forebay	NPW	TGO-FTR-007	5-auto
IHR	Forebay	NPW	TGO-FTR-008	5-auto
MCQW	Forebay-WA	NPD/BPA	TBO-FTR-006	5-auto
MCQO	Forebay-OR	NPD/BPA	TBO-FTR-004	5-auto
JDA	Forebay	NPD	TGO-FTR-009	5-auto
TDA	Forebay	NPD	TB-F- 001	3-auto
BON	Forebay	NPD	TB-F- 002	3-auto
WRNO	Warrendale	NPD	FTR-001	5-auto

Notes :
USBR - U.S. Bureau of Reclamation
NPD - North Pacific Division
NPW - Walla Walla District
BPA - Bonneville Power Administration

X = the instantaneous spill percentage required during the requested hours of spill which shall in no event exceed 50%

For example, with a constant flow of 220 kcfs the 10 percent spill rate listed in the Spill Table could provide an instantaneous spill level of 10% for 24 hours, or, on request of the fishery agencies and tribes, 20 percent for 12 hours.

If, however, the daily average flow is 220 kcfs and the average river flow during the spill period is 165 kcfs, then the instantaneous spill percentage could be 27 percent for 12 hours or 32 percent for 10 hours at the discretion of the agencies and tribes:

(220 kcfs * 10% / 165 kcfs) * (24 Hrs / 12 Hrs) = 27%, or

(220 kcfs * 10% / 165 kcfs) * (24 Hrs / 10 Hrs) = 32%

9. Seasonal Spill Shaping - The daily spill percentage may be adjusted at the request of the agencies and tribes within the ranges specified in the parentheses and footnote in the Spill Table. The purpose of this operational flexibility is to provide an increased level of spillway bypass for a greater number of smolt migrants. The agencies and tribes shall be allowed this operational flexibility, provided that each day of increased spill is balanced by a day of decreased spill. For example, if agencies and tribes initial spill requests at LMN are for 65 percent, then each day of spill at that reduced percentage would entitle the agencies and tribes to request a day at 75 percent.

The determination of when to request more or less spill shall be made by the agencies and tribes. For example, earned days of a higher percentage spill would not be considered used unless requested by the agencies and tribes, regardless of whether the project actually provides higher spill than requested.

The agencies and tribes shall use this flexibility to shape spill to the fish migration and shall provide information and rationale in support of their requests. The rationale for their requests shall be based on available data and sound scientific methods. For the purposes of the above discussion, no spill shall be shifted from one season to the other.

a. In the Snake River in spring and summer, the agencies and tribes may request low spill days at the beginning of the season. Each such low day requested shall entitle them to request two high spill days during the peak of the migration, and shall obligate them to request (i.e. repay) one low spill day after the peak of the migration. The low and high day figures are contained in the parentheses and footnote in the Spill Table. The number of low days that may be requested to earn high days is limited to 10 days, or 25 percent of the number of days between the estimated 10 percent passage date and the ending date in the Spill Table, whichever is less.

b. At TDA in spring, the formula described above in subsection a. applies, except the limitation on the number of low days that may be requested is eight.

c. At JDA and TDA in summer, the agencies and tribes may earn 1 high spill day for each low spill day requested and there is no limit on the number of low spill days that may be requested. The agencies and tribes may also request up to 14 unearned high days before requesting any low days provided that all unearned high days must be repaid with low days by July 15.

10. Spill Hours - Daily spill levels, determined by the agencies and tribes pursuant to this agreement, shall be spilled during hours requested by the agencies and tribes. No spill shall be requested to occur between 0600 and 1800 hours at LMN, IHR or JDA. During the migration periods specified in this agreement, BPA shall not make operational requests that result in nighttime spills less than 8.675 kcfs at LMN and 3.325 kcfs at IHR. Spill at TDA shall be provided during any hours requested by the agencies and tribes, subject to infrequent system reliability limitations imposed by BPA during the peak generating hours 0600-1000 and 1800-2000. Placement of limitations on spill at TDA during these peak generating periods shall be dealt with on a case-by-case basis. Notwithstanding these limitations, spill at all projects may be requested for all hours from 1800 hours on Fridays through 0600 hours on Mondays ("weekends"). Holidays shall be treated the same as weekends.

11. Hourly Spill Shaping - The agencies and tribes may request daily shaping of spill for fish passage. The decision to provide a higher percentage for fewer hours or a lower percentage for more hours rests with the agencies and tribes. If spill is higher than requested due to project operations, no reduction in hours or accounting against future requests shall occur.

The agencies and tribes may request a pre-scheduled constant level of spill during the allowable spill hours. At TDA, however, spill requests may specify two different spill rates, one for daytime and one for nighttime. The two spill rates may not be used to obtain a greater volume of water than would be available with one spill rate. Spill shall be provided at the hourly rates requested by the agencies and tribes. This subsection shall apply whether spill percentages are determined using the Instantaneous or Daily Average methods.

12. Maximum Instantaneous Spill Levels - Spill requested by the agencies and tribes at LMN and IHR may equal up to 100 percent of the instantaneous flow at each project. Summer spill requested at JDA shall be limited to 50 percent of the instantaneous flow at JDA, and spring and summer spill requested at TDA shall be limited to 50 percent of the instantaneous flow at TDA.

If BPA decides that any request consistent with this agreement for shaping prescheduled spill on any day cannot be implemented due to system reliability problems, then modifications to the shaping shall be made in consultation with the agencies and tribes. Such modifications shall affect only the shape of spill and shall not reduce the spill for that day.

Following such consultations, a complete description of the reasons that the request cannot be implemented shall be provided to the fishery agencies and tribes. This communication shall be followed by a written explanation within one week. The parties anticipate that the occurrence of such modifications shall be very infrequent. If such modifications occur more frequently and at a frequency unacceptable to the agencies and tribes, they may pursue such remedies available to them including withdrawal from this agreement.

APPENDIX 9

SECTION III, PARA. B2-B13
OF THE SPILL AMENDMENT
FOR SPILL AT CORPS PROJECTS
MODIFIED TO PROVIDE NONPOWER USES

SPILL FOR JUVENILE FISH PASSAGE - The following spill plan contains the portion of the MOA pertaining to a one-year spill agreement.

a. The operation of turbines at Federal hydroelectric projects causes mortality to juvenile migrating anadromous fish. Passage of water over spillways rather than through turbines during periods of juvenile anadromous fish migration can reduce turbine-related mortality of juvenile anadromous fish. This Agreement is intended to provide improved fish passage conditions through the commitment of spill for juvenile anadromous fish and avoidance of turbine impacts.

b. Specific Principles for Implementation

1. Spill for juvenile fish passage at the Federal Columbia River Hydroelectric Projects shall be provided in accordance with the terms of this agreement insofar as the spill does not impact nonpower uses. The following table sets forth fundamental principles of this agreement.

2. Spill Table

	Spill Season	Spill Percentages (a)	
(Columns)	(1)	(2) --average	(3) (range)--
L.Monumental			
Spring	4/15-5/31	70%	(65-75)
Summer	6/1 -7/22	70%	(65-75)
Ice Harbor			
Spring	4/15-5/31	25%	(15-35)
Summer	6/1 -7/22	25%	(15-35)
John Day			
Spring	N/A	N/A	
Summer	6/7 -8/22	20%	(15-25)
The Dalles(b)			
Spring	5/1 -6/6	10%	(5-15)
Summer	6/7 -8/22	5%	(0-10)

(a) Spill for 12 hours/day at LMN and IHR, 10 hours/day at JDA, and 24 hours/day at TDA.

(b) During both the spring and summer the daily spill level at The Dalles Dam can be shaped on a seasonal basis by plus or minus 5% of the daily spill percentage indicated in the spill table.

3. Spill Requests - The agencies and tribes shall request that spill be provided in accordance with the Spill Table and other provisions of this agreement. Such requests shall be transmitted by the Fish Passage Center (FPC) to the Corps of Engineers' Reservoir Control Center (RCC) and BPA. The parties shall honor all requests by the Agencies and Tribes that are necessary for the implementation of this agreement and consistent with this agreement as long as the request does not impact nonpower uses. The agencies and tribes may request adjustments or modifications to the dates, hours, and percentages of spill to be provided, in accordance with this agreement.

4. Spill Seasons - Dates for the initiation and cessation of spill of fish passage under this agreement shall be determined in the following manner. The agencies and tribes, using the best available data and sound scientific methods, shall estimate the 10 and 90 percent passage dates ("estimated dates") for the spring and summer migrations. Information and analyses employed by the fishery agency and tribes in developing the estimates of the 10 and 90 percent passage dates shall be provided to the parties.

a. Spring spill may be requested at LMN, IHR and TDA on the respective estimated dates of 10 percent passage at each dam, but not before the respective spring starting dates in the Spill Table.

b. The spring spill period shall end on the respective estimated dates of 90 percent passage but, except as provided in subsection d below, no later than the spring ending dates in the table.

c. The parties recognize that there may be considerable overlap between the spring 90% and summer 10% passage dates. In the event these dates do not overlap, no spill shall be requested between the estimated date of 90 percent spring passage and the estimated date of 10 percent summer passage.

d. The parties also recognize that the estimated 90% spring passage date may extend beyond the spring season ending dates in the Spill Table. If neither 90 percent of spring migrants nor 10 percent of summer migrants have passed LMN or IHR by May 31 or TDA by June 6, then summer spill levels may be requested until 90 percent of spring migrants have passed.

e. Except as provided in subsection d above, summer spill may be requested at LMN, IHR, JDA and TDA on the estimated date of 10 percent passage, but not before the summer starting dates in the Spill Table.

f. The summer spill period shall end at LMN, IHR, JDA and tDA on the estimated date of 90 percent passage, but not later than the summer ending dates in the Spill Table.

5. Pre-Season Adjustments to Spill Percentages at LMN and IHR - The allocation of available spill between LMN and IHR may be adjusted in pre-season planning by mutual consent of the parties. No in-season spill transfers shall be allowed. This provision is intended to allow flexibility to improve overall fish passage, based on new information, without increasing power system impacts. Factors that must be considered in determining the power impacts of such reallocations include differences in head between the projects and changes in the frequency of powerhouse shutdowns due to nonspilled flows inadequate to maintain turbine loading.

6. In-Season Adjustments to Spill Percentages at LMN and IHR - The method for determining the instantaneous spill percentages shall vary depending on the month and the April 1, Jan-Jul volume runoff forecast at Lower Granite (LGR).

a. When that forecast is less than 23 million acre feet (MAF), spill requests by the agencies and tribes during all months shall be based on the percentages and hours in the Spill Table and daily average flows and shall be calculated by the agencies and tribes in accordance with the following formula, hereinafter referred to as the Daily Average Method:

(Daily Avg Q * % Spill / Period Q) * (12 hours/N hours) = X

Where:

Daily Avg Q = projected daily average flow at the project

% Spill = the percent spill required by the Spill Table

Period Q = total average river flow during the requested spill period

12 hours = the number of hours of spill prescribed by the Spill Table

N hours = the number of hours of spill requested by the agencies and tribes

X = the instantaneous spill percentage required during the requested hours of spill which shall in no event exceed 100%

For example, with a daily average flow of 85 kcfs, and a 12 hour spill period average flow of 70 kcfs, the 70 percent spill from the table would equate to 85 percent instantaneous spill for 12 hours or 100 percent instantaneous spill for 10 hours.

(85 kcfs * 70% / 70) * (12 Hrs/12) = 85%, or

(85 kcfs * 70% / 70 kcfs) * (12 Hrs/10 Hrs) = 102%

b. When that forecast is greater than 30 MAF, spill requests by the agencies and tribes during all months shall be based on the percentages and hours in the Spill Table and shall be calculated by the agencies and tribes in accordance with the following formula, hereinafter referred to as the Instantaneous Method:

(12 Hrs * % Spill) / N Hrs = X

Where:

12 Hrs = the number of hours of spill prescribed by the Spill Table

% Spill = the percent of spill required by the Spill Table

N Hrs = the number of hours of spill requested by the fishery agencies and tribes

X = the instantaneous spill percentage required during the requested hours of spill which shall in no event exceed 100%

For example, 70 percent spill for 12 hours could be concentrated by request of the agencies and tribes into 84 percent for 10 hours or 100 percent for 8 hours.

c. When that forecast is between 23 and 30 MAF (inclusive), instantaneous spill levels requested by the agencies and tribes during April, May and June shall be calculated using the Instantaneous Method and spill during July shall be calculated by the agencies and tribes using the Daily Average Method.

7. In-Season Adjustment to Spill Percentages at JDA - At JDA the instantaneous spill percentage requests by the agencies and tribes shall be based on the percentage and hours in the Spill Table and shall be calculated by the agencies and tribes in accordance with the following formula:

(10 Hrs * % Spill) / N Hrs = X

Where:

10 Hrs = the number of hours of spill prescribed by the Spill Table

% Spill = the percent of spill required by the Spill Table

N Hrs = the number of hours of spill requested by the agencies and tribes

X = the instantaneous spill percentage required during the requested hours of spill which shall in no event exceed 50%

For example, 20 percent spill for 10 hours could by request of the agencies and tribes be adjusted to 17 percent for 12 hours or 25 percent for 8 hours.

8. In-Season Adjustments to Spill Percentages at TDA - At TDA the instantaneous spill percentage requested by the agencies and tribes will be based on the percentages and hours in the spill table and the daily average flow, and will be calculated by the agencies and tribes in accordance with the following formula:

(Avg Q * % Spill / Period Q) * (24 Hrs / N Hrs) = X

Where:

Avg Q = projected daily average flow at the project

% Spill = the percent spill required by the Spill Table

Period Q = total average river flow during the requested spill period

24 hours = the number of hours of spill prescribed by Spill Table

N hours = the requested number of hours of spill

X = the instantaneous spill percentage required during the requested hours of spill which shall in no event exceed 50%

For example, with a constant flow of 220 kcfs the 10 percent spill rate listed in the Spill Table could provide an instantaneous spill level of 10% for 24 hours, or, on request of the fishery agencies and tribes, 20 percent for 12 hours.

If, however, the daily average flow is 220 kcfs and the average river flow during the spill period is 165 kcfs, then the instantaneous spill percentage could be 27 percent for 12 hours or 32 percent for 10 hours at the discretion of the agencies and tribes:

(220 kcfs * 10% / 165 kcfs) * (24 Hrs / 12 Hrs) = 27%, or

(220 kcfs * 10% / 165 kcfs) * (24 Hrs / 10 Hrs) = 32%

9. Seasonal Spill Shaping - The daily spill percentage may be adjusted at the request of the agencies and tribes within the ranges specified in the parentheses and footnote in the Spill Table. The purpose of this operational flexibility is to provide an increased level of spillway bypass for a greater number of smolt migrants. The agencies and tribes shall be allowed this operational flexibility, provided that each day of increased spill is balanced by a day of decreased spill. For example, if agencies and tribes initial spill requests at LMN are for 65 percent, then each day of spill at that reduced percentage would entitle the agencies and tribes to request a day at 75 percent.

The determination of when to request more or less spill shall be made by the agencies and tribes. For example, earned days of a higher percentage spill would not be considered used unless requested by the agencies and tribes, regardless of whether the project actually provides higher spill than requested.

The agencies and tribes shall use this flexibility to shape spill to the fish migration and shall provide information and rationale in support of their requests. The rationale for their requests shall be based on available data and sound scientific methods. For the purposes of the above discussion, no spill shall be shifted from one season to the other.

a. In the Snake River in spring and summer, the agencies and tribes may request low spill days at the beginning of the season. Each such low day requested shall entitle them to request two high spill days during the peak of the migration, and shall obligate them to request (i.e. repay) one low spill day after the peak of the migration. The low and high day figures are contained in the parentheses and footnote in the Spill Table. The number of low days that may be requested to earn high days is limited to 10 days, or 25 percent of the number of days between the estimated 10 percent passage date and the ending date in the Spill Table, whichever is less.

b. At TDA in spring, the formula described above in subsection a. applies, except the limitation on the number of low days that may be requested is eight.

c. At JDA and TDA in summer, the agencies and tribes may earn 1 high spill day for each low spill day requested and there is no limit on the number of low spill days that may be requested. The agencies and tribes may also request up to 14 unearned high days before requesting any low days provided that all unearned high days must be repaid with low days by July 15.

10. Spill Hours - Daily spill levels, determined by the agencies and tribes pursuant to this agreement, shall be spilled during hours requested by the agencies and tribes. No spill shall be requested to occur between 0600 and 1800 hours at LMN, IHR or JDA. During the migration periods specified in this agreement, BPA shall not make operational requests that result in nighttime spills less than 8.675 kcfs at LMN and 3.325 kcfs at IHR. Spill at TDA shall be provided during any hours requested by the agencies and tribes, subject to infrequent system reliability limitations imposed by BPA during the peak generating hours 0600-1000 and 1800-2000. Placement of limitations on spill at TDA during these peak generating periods shall be dealt with on a case-by-case basis. Notwithstanding these limitations, spill at all projects may be requested for all hours from 1800 hours on Fridays through 0600 hours on Mondays ("weekends"). Holidays shall be treated the same as weekends.

11. Hourly Spill Shaping - The agencies and tribes may request daily shaping of spill for fish passage. The decision to provide a higher percentage for fewer hours or a lower percentage for more hours rests with the agencies and tribes. If spill is higher than requested due to project operations, no reduction in hours or accounting against future requests shall occur.

The agencies and tribes may request a pre-scheduled constant level of spill during the allowable spill hours. At TDA, however, spill requests may specify two different spill rates, one for daytime and one for nighttime. The two spill rates may not be used to obtain a greater volume of water than would be available with one spill rate. Spill shall be provided at the hourly rates requested by the agencies and tribes. This subsection shall apply whether spill percentages are determined using the Instantaneous or Daily Average methods.

12. Maximum Instantaneous Spill Levels - Spill requested by the agencies and tribes at LMN and IHR may equal up to 100 percent of the instantaneous flow at each project. Summer spill requested at JDA shall be limited to 50 percent of the instantaneous flow at TDA.

If BPA decides that any request consistent with this agreement for shaping prescheduled spill on any day cannot be implemented due to system reliability problems, then modifications to the shaping shall be made in consultation with the agencies and tribes. Such modifications shall affect only the shape of spill and shall not reduce the spill for that day.

Following such consultations, a complete description of the reasons that the request cannot be implemented shall be provided to the fishery agencies and tribes. This communication shall be followed by a written explanation within one week. The parties anticipate that the occurrence of such modifications shall be very infrequent. If such modifications occur more frequently and at a frequency unacceptable to the agencies and tribes, they may pursue such remedies available to them including withdrawal from this agreement.

13. Prescheduling - Spill requests shall be pre-scheduled by the agencies and tribes through the FPC. Spill requests shall be provided to the RCC by 1500 each Monday through Thursday. Spill requests for weekends, Mondays, and holidays shall be pre-scheduled on Thursday. Spill requests for Tuesday after 1800 through 1800 on Wednesday shall be pre-scheduled no later than 1500 hours on Monday. The same prescheduling procedure shall be followed on Tuesday and Wednesday of each week. Spill requests for all projects for Friday after 1800 through 0600 hours on Tuesday shall be prescheduled no later than 1500 on Thursday. Spill requests at TDA for the 0600 through 1800 on Tuesday shall be prescheduled on Monday by 0900 through the RCC. See Appendix C. Allowance of prescheduling outside these specified times shall be at BPA's discretion.

BPA shall provide the Summary of Planned Daily Operation, 30-day version, to the FPC on a weekly basis. Upon request and as needed, BPA shall provide technical assistance to the agencies and tribes so that the FPC can estimate daily average flows and average flows for the daily spill period, in order to determine the instantaneous spill percentages in subsections 6, 7 and 8.

Modifications by the agencies and tribes to pre-scheduled spill requests are discouraged but may be allowed. Requests by the agencies and tribes for such modifications shall be dealt with by BPA on a case-by-case basis. The parties anticipate that the occurrence of such modifications shall be very infrequent.

14. Use of Surplus (Overgeneration) Spill - Any remaining spill available after meeting the requirements of this agreement will be allocated among Federal and non-Federal hydroelectric projects according to a spill priority list established by the FPC.

15. Special Operations - Special operations outside of this agreement may be sought by the agencies and tribes to protect fish. For example, if guidance for all species does not meet the FPE standard, special operations may be requested to provide protection to fish not meeting the standard. Such operations shall be considered by BPA on a case by case basis.

16. Continued Operation of Ice and Trash Sluiceways - The parties shall request operation of the ice and trash sluiceways at IHR and TDA as in recent years during the implementation of this agreement. Juvenile fish protection provided through spill shall be in addition to not in lieu of protection provided through such sluiceway operation.

Spill Request Deadlines

Day and Hours That Spill Request is Imolemented	Deadline for Providing Spill Request	Applicable Hydroelectric Projects
Friday (after 1800 hrs)	Thursday by 1500 hrs	All
Saturday (all hours)	Thursday by 1500 hrs	All
Sunday (all hours)	Thursday by 1500 hrs	All
Monday - Tuesday (0000 hrs) (1800 hrs)	Thursday by 1500 hrs	All
Tuesday - Wednesday (1800 hrs (1800 hrs)	Monday by 1500 hrs	All
Wednesday - Thursday (1800 hrs (1800 hrs)	Tuesday by 1500 hrs	All
Thursday - Friday (1800 hrs (1800 hrs)	Wednesday by 1500 hrs	All
Tuesday (0600 - 1800 hrs)	Monday by 0900	TDA
Holidays	Thursday by 1500 hrs	All

APPENDIX C

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