JUVENILE FISH PASSAGE PLAN

FOR 1988

FOR CORPS OF ENGINEERS PROJECTS

February 1988
CENPD-EN-WM

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1988 JUVENILE FISH PASSAGE PLAN

1. General. In mid-September 1987 the Corps of Engineers informed the cooperating agencies and the consulting agencies and affected utilities that the Corps was initiating the process for development of the 1988 Juvenile Fish Passage Plan (1988 JFPP). The Corps also informed these parties that the Procedure For Development of a Coordinated Interim Juvenile Fish Plan for Corps of Engineers Projects that was utilized last year had been updated in the interest of expediting the 1988 planning process and that any comments would be considered. Copies of these letters are contained in Appendix 1.

In developing the 1988 JFPP, the Corps has consulted and coordinated with the fishery agencies and tribes. The 1988 JFPP is in accord with the Council's amended Fish and Wildlife Program. If spill is required to achieve the 90 percent smolt survival for either the spring or summer migration 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 August 15, 1988. Spill will be provided regardless of impact on firm energy load carrying capability (FELCC). At Bonneville Dam the spill plan remains basically unchanged from the 1987 JFPP. The second powerhouse will not be operated unless these generating units are needed to limit Bonneville Dam spill to 75,000 cfs during daylight hours (0600 to 2000 hours). Units at the second powerhouse may also be run as necessary for fishery research. In addition, a test plan for 1988 will permit operating the second powerhouse to test the sluiceway effectiveness for passing juvenile fish. See Appendix 6.

Spill requirements to accomplish the 90% survival objective of the Northwest Power Planning Council's Fish and Wildlife Program have been submitted to the Northwest Power Pool Coordinating Group and incorporated into the Pacific Northwest Coordination Agreement planning process. This has the effect of degrading the Federal Power System's Firm Energy Load Carrying Capability (FELCC) in the amount equivalent to the spill requirement under critical water conditions. During years when surplus water exists in the Federal system additional spill may be provided.

The 1988 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.

FISHPASS model studies have been utilized extensively to analyze the benefits of spill to dam and system survival of juvenile salmonids. The information developed by the NPPC Main Stem Advisory Committee has also been utilized.

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 coordinated 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. Where descrepancies occur between Appendix 3 and the JFPP, the JFPP will rule.

3. Fish Transportation Oversight Team's (FTOT) Annual Work Plan For 1988. Appendix 4 contains this draft document which describes the annual work plan for fish collection and transportation operations at Lower Granite, Little Goose, and McNary Dams for the 1988 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 the transportation guidelines, but will not actively oppose in 1988 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 migration of the natural juvenile fish.

5. Project Operation Criteria. The following paragraphs list, by project, the project specific operating criteria of the 1988 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 nightime 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 17, 11, and then 16 will be the first units on and last units off.

(2) Research

- o Research activities at the Bonneville second powerhouse will require daily operation of from two to five units for

nine to nineteen hours (daytime and nighttime) during the April 18 to June 6 time period. Summer research activities will require almost daily operation of from two to four units for six to eight hours (all nighttime) during the June 27 to July 31 time period. See appendix 6 for more detailed outline of planned research.

(3) Operation for Adult Passage.

- o 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. This provides juvenile survival greater than 90%.

(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.

(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.

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

- 0 Spill is not required for spring passage of juvenile fish as the passage facility provides juvenile survival greater than 95%.

- o Spill will be required during the summer passage period because the facility capability provides juvenile survival (less than 90%) for subyearling fall chinook.

- o There will be onsite hydroacoustic monitoring at John Day during the summer migration period, June 1 through

August 15, as described in Appendix 7. The scope of work for the hydroacoustic effort will be coordinated with the fishery agencies and tribes prior to June 1988.

o Spill operation will be as follows:

-- Typical dates of 80% passage are June 7 to August 21 for the summer run.

-- Hours of hydroacoustics monitoring will be initially from 2000 to 0600 hours beginning June 1.

-- When hydroacoustic monitoring indicates 30,000 or more subyearling fish are passing the project spill will be provided.

-- Spill will begin at 2100 hours and continue for at least 3 hours with additional hours of spill dependent on number of juveniles passing the project and through the spillway as indicated by hydroacoustics.

-- Spill amount will be 18% of instantaneous outflow during the defined hours of spill as determined above.

-- In-season modification of spill criteria will be coordinated between the Corps' Reservation Control Center (RCC) and the Fish Passage Center (FPC).

- o Spill will cease when the count is below the hydroacoustic trigger or in the absence of hydroacoustics the airlift trigger or when the fishery agencies and tribes estimate that 90 percent of the summer migration has passed the project. After spill has been discontinued monitoring will continue as scheduled. Spill will be restarted if 90% of migration has not passed and the hydroacoustic monitoring or in the absence of hydroacoustics the airlift index shows the 30,000 trigger has been exceeded for a single day. Spill will not be provided beyond August 15, 1988.

- o When spilling at night (2100 to 0600 hours), spill in south end bays up to 80,000 cfs, then 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 take into account dissolved gas levels as determined by monitoring.

(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.

- 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.

Approximately 2,700 cfs will be routed through the ice and trash sluiceway for 24 hours per day during the juvenile passage season, from April 1 until a week after Little Goose bypass is closed. This provides juvenile survival greater than 92%.

f. Lower Monumental Dam.

Lower Monumental has only a gatewell salvage bypass system. Spill operation will be as follows:

(1) Operation for Juvenile Passage.

- o Typical dates of the middle 80% passage are April 20 to May 31 for the spring run and June 1 to July 15 for the summer run. Substantial fish passage may occur outside these dates depending on hatchery release dates and fish travel times.

- o Hydroacoustic monitoring will be conducted 24 hours a day from April 15 through approximately July 15.

- o When hydroacoustics monitoring indicates 15,000 or more juveniles passing the project, spill will be provided.

- o Spill initially will begin at 2000 hours and continue for at least 3 hours with additional hours of spill dependent on numbers of fish passing the project and through the spillway as indicated by hydroacoustics.

- o Spill amount to achieve 90% survival will be about 55% of instantaneous outflow during the defined hours of spill as determined in dot 4 above.

- o In-season modification of spill criteria will be coordinated between the Corps' RCC and the Fish Passage Center.

- o The project will operate fish passage facilities, including spill, in accordance with juvenile and adult operating criteria shown in Appendix 3. Spill will not be provided beyond July 15.

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 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.

6. Technical Studies.

The Corps' FISHPASS Computer Program was utilized to analyze various spill scenarios with the objective of simulating various spill plans. Input to the FISHPASS program is essentially the input recommended by the Council's Main Stem Passage Advisory Committee in 1986 with some updated information obtained from hydroacoustic monitoring during the 1986 and 1987 outmigrations.

7. Organizations Involved in The Plan.

Consistent with Section 4(h)(11) of the Northwest Power Act and Section 1304(c) of the 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 and coordinate 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 F&W Program will be consulted in formulating interim and permanent juvenile fish passage plans. Refer to Appendix 1.

8. Implementation of The Juvenile Fish Passage Plan.

Implementation of the 1988 JFPP requires the coordinated effort between Bonneville Power Administration, the Corps, Indian Tribes, and the Federal and State Fishery Agencies. The Fish Passage Managers will provide coordination 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 a coordinated operation 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. Requests for significant changes in spill levels may take up to three days to implement to permit thorough coordination with other project functions. However, every effort will be made to respond as quickly as possible to fish passage operational requests.

Written verification of operational changes being requested by the Fish Passage Managers for fish passage will be provided to the RCC as soon as

practicable after each coordination meeting. Unexpected changes in fish passage or operational considerations may be coordinated through discussions between RCC, BPA, and FPC outside the daily afternoon meetings.

Monitoring and surveillance of the fish migration will be provided by the Corps in accordance with Appendix 7. Project monitoring personnel will be present at projects where hydroacoustics is being used to help control voluntary spill for fish. Information related to the migration of fish and passage operations at each dam will be relayed daily to the Reservoir Control Center. Indices of juvenile fish migration will be the basis for initiating spills at a particular project.

a. Responsibilities of Fishery Management Agencies and Tribes.

(1) Specify "spill criteria" in accordance with the 1987 NPPC Fish and Wildlife Program's 90% dam survival objective.

(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. Coordinate 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. Where possible provide 72 hour notice to the RCC on special spill requests.

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

(5) Coordinate 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. Coordinate unforeseen changes in fish passage operation through 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.

(4) Utilize available flexibility of the Federal Columbia River Basin Power 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 as soon as possible, but no later than 72 hours after the request.

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

(7) Coordination and 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 notificaiton to start or stop.

e. Resolution of Differences.

Should any major differences arise during the process of implementing the 1988 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.

9. Comments on the Draft JFPP. A draft JFPP was submitted to interested parties for comment in 1988. No written comments were received on the draft JFPP. However, the draft was discussed at the January 20 coordination meeting and suggested changes were incorporated in the final plan.

LIST OF APPENDICES

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7. Corps of Engineers Spill Monitoring Plan for 1988.

8. Dissolved Gas Monitoring Program.

APPENDIX 1

Correspondence to Cooperating Agencies and the Consulting Agencies and Affected Utilities

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

September 16, 1987

REPLY TO
ATTENTION OF

Water Management Branch

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

Dear Mr. ~~Wapato~~ Tim:

The Corps of Engineers is initiating the process for development of the 1988 Juvenile Fish Passage Plan (JFPP). A Working Committee meeting to discuss the "Procedure for Development of a Coordinated Interim Juvenile Fish Passage Plan for Corps of Engineers Projects" is scheduled for 9:00 a.m. on Tuesday, October 6, 1987, in Room 118 of the Corps of Engineers office in the Custom House, 220 N.W. 8th, Portland.

Contact Russ George of my staff at 221-3745 if additional information would be helpful.

Sincerely,

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

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

September 16, 1987

REPLY TO
ATTENTION OF

Water Management Branch

Ms. Janet McLennan
Assistant Power Manager
Bonneville Power Administration - PG
P.O. Box 3621
Portland, Oregon 97208

Dear Ms. McLennan: Janet

The Corps of Engineers is initiating the process for development of the 1988 Juvenile Fish Passage Plan (JFPP). A Working Committee meeting to discuss the "Procedure for Development of a Coordinated Interim Juvenile Fish Passage Plan for Corps of Engineers Projects" is scheduled for 9:00 a.m. on Tuesday, October 6, 1987, in Room 118 of the Corps of Engineers office in the Custom House, 220 N.W. 8th, Portland.

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Sincerely,

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P O BOX 2870
PORTLAND, OREGON 97208-2870
September 16, 1987

REPLY TO
ATTENTION OF

Water Management Branch

Mr. Rolland Schmitten
National Marine Fisheries Service
7600 Sand Point Way Northeast
Bin C15700
Seattle, Washington 97232

Dear Mr. Rolland Schmitten:

The Corps of Engineers is initiating the process for development of the 1988 Juvenile Fish Passage Plan (JFPP). A Working Committee meeting to discuss the "Procedure for Development of a Coordinated Interim Juvenile Fish Passage Plan for Corps of Engineers Projects" is scheduled for 9:00 a.m. on Tuesday, October 6, 1987, in Room 118 of the Corps of Engineers office in the Custom House, 220 N.W. 8th, Portland.

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Sincerely,

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

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

September 16, 1987

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
Nez Perce 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

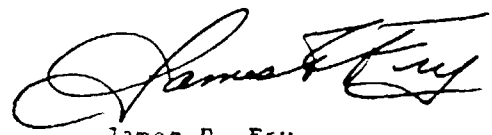
The Northwest Power Planning Council's Fish and Wildlife Program requests that we submit to them and implement a coordinated yearly Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1988 JFPP. Projects included in the 1988 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

We have scheduled a meeting of the Working Committee for 9:00 a.m. on Tuesday, October 6, 1987, in Room 118 of the Corps of Engineers Office in the Custom House, 220 N.W. 8th, Portland, Oregon. We will distribute draft copies of the Procedures for Development of a Coordinated Interim Juvenile Fish Passage Plan for Corps of Engineers Projects at this meeting. We anticipate the institutional procedures for development of the 1988 JFPP will be similar to last year. Written comments on the procedures will be requested by November 6, 1987.

The 1988 JFPP will be developed using these procedures. During the development process your agency will be sent a copy of the JFPP for review and comment.

I request that you inform me of your desire to participate in the development of the 1988 JFPP by indicating in writing the name and address of your representative. Please provide me your response by October 6, 1987.

Sincerely,



James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

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

REPLY TO
ATTENTION OF

September 16, 1987

Water Management 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 that we submit to them and implement a coordinated yearly Juvenile Fish Passage Plan (JFPP) by April 1 of each year. Accordingly, we are initiating the process regarding preparation of the 1988 JFPP. Projects included in the 1988 JFPP are Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

We have scheduled a meeting of the Working Committee for 9:00 a.m. on Tuesday, October 6, 1987, in Room 118 of the Corps of Engineers Office in the Custom House, 220 N.W. 8th, Portland, Oregon. We will distribute draft copies of the Procedures for Development of a Coordinated Interim Juvenile Fish Passage Plan for Corps of Engineers Projects at this meeting. We anticipate the institutional procedures for development of the 1988 JFPP will be similar to last year. Written comments on the procedures will be requested by November 6, 1987.

The 1988 JFPP will be developed using these procedures. During the development process your agency will be sent a copy of the JFPP for review and comment.

I request that you inform me of your desire to participate in the development of the 1988 JFPP by indicating in writing the name and address of your representative. Please provide me your response by October 6, 1987.

Sincerely,

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

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

October 23, 1987

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
Nez Perce 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

Gentlemen:

Enclosed are the meeting notes from the first meeting of the 1988 Juvenile Fish Passage Plan Working Committee.

The next meeting of this Committee is scheduled for 9:00 a.m. on Wednesday, November 25, 1987, in room 118 of the Custom House, 220 N.W. 8th Avenue.

Sincerely,

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

Enclosure

OCT 2 9 1987

Water Management 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 River Basin Fish and Wildlife Council
Northwest Power Planning Council
Upper Columbia United Tribes Fisheries Research Center

Enclosed are the meeting notes from the first meeting of the 1988 Juvenile Fish Passage Plan Working Committee.

The next meeting of this Committee is scheduled for 9:00 a.m. on Wednesday, November 25, 1987, in room 118 of the Custom House, 220 N.W. 8th Avenue.

Sincerely,

SIGNED

James R. Fry
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

REPLY TO
ATTENTION OF

November 6, 1987

Water Management Branch

Robert Saxvik, Northwest Power Planning Council
Kai Lee, Northwest Power Planning Council
Al Wright, Pacific Northwest Utilities Conference Committee
John Donaldson, Columbia Basin Fish and Wildlife Authority
Randy Fisher, Oregon Department of Fish and Wildlife
S. Timothy Wapato, Columbia Basin Fish and Wildlife Authority
Rich Nassief, Northwest Power Pool Coordinating Group
Dan Yribar, U.S. Bureau of Reclamation
Ed Sienkiewicz, Bonneville Power Administration

Enclosed for your information is a copy of the material sent on this date to the agencies and utilities that are involved with the development of the 1988 Juvenile Fish Passage Plan.

Sincerely,

Gary R. Leighton

for James R. Fry
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

REPLY TO
ATTENTION OF

November 6, 1987

Water Management 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 attached technical evaluation report, Juvenile Fish Passage Alternatives '88, was prepared to assist in the development of the Corps' Juvenile Fish Passage Plan for 1988. Concepts and results obtained in this evaluation will be taken into account in formulating the final fish passage plan.

Please review and comment by December 1, 1987.

Sincerely,

for Gary K. Leighton

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

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

REPLY TO
ATTENTION OF

November 6, 1987

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
Nez Perce 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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Please review and comment by December 1, 1987.

Sincerely,

Gary L. Fleighter

for James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

DEC 4 1987

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
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Burns-Paiute Indian Colony
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Nez Perce 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

Gentlemen:

The second meeting of the 1988 Juvenile Fish Passage Plan Working Committee was held on 25 November 1987. Purpose of the meeting was to receive comments on the Corps of Engineers' publication "Juvenile Fish Passage Alternatives '88 - Technical Evaluation" dated October 1987. No adverse comments were received.

You will be notified of the time and location of the next meeting.

Sincerely,

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

DEC 4 1987

Water Management 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

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You will be notified of the time and location of the next meeting.

Sincerely,

James R. Fry
Colonel, Corps of Engineers
Deputy Division Engineer

December 24, 1987

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
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Burns-Paiute Indian Colony
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Nez Perce 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

Gentlemen:

The third meeting of the 1988 Juvenile Fish Passage Plan Working Committee is scheduled for 20 January 1988 at the Corps of Engineers' Office, Room 118 at 9:00 a.m. Purpose of the meeting is two fold: (1) Receive comments on our first draft of the 1988 Juvenile Fish Passage Plan (Enclosure 1) and (2) Have the first coordination meeting on the 1988 Water Budget Plan including review of 1 January forecast of the basin runoff.

Sincerely,

SIGNED

Mark J. Sisinyak
Major General, USA
Commanding

1 Enclosure
Draft Plan

December 22, 1987

Water Management 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
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SIGNED

Mark J.Sisinyak
Major General, USA
Commanding

1 Enclosure
Draft Plan

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

REPLY TO
ATTENTION OF

February 2, 1988

Water Management 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 fourth meeting of the 1988 Juvenile Fish Passage Plan Working Committee is scheduled for February 18, 1988, at the Corps of Engineers' office, Room 118 at 9 a.m. The purpose of the meeting is twofold: (1) review of the February 1 forecast of the basin runoff, and (2) receive comments on "Draft" 1988 Water Budget Plan attached as Enclosure 6 of Enclosure 1 of the January 20 JFPP Working Committee meeting notes.

Sincerely,

Mark J. Sisinyak
Major General, U.S. Army
Division Engineer

Enclosure

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

February 2, 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
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Sincerely,

Mark J. Sisinyak
Major General, U.S. Army
Division Engineer

Enclosure

APPENDIX 2

Correspondence received from Fishery Agencies and Tribes, Northwest Power Planning Council, Pacific Northwest Utilities Conference Committee, and Bonneville Power Administration.

COLUMBIA BASIN FISH AND WILDLIFE AUTHORITY

METRO CENTER • SUITE 170
2000 S.W. FIRST AVENUE
PORTLAND, OREGON 97201

(503) 294-7031
FTS 423-7031

Office Of
Executive Secretary

October 2, 1987

Major General Sisinyak
Division Engineer
North Pacific Division, Corps of Engineers
P.O. Box 2870
Portland, Oregon 97208-2870

ATTN: Colonel James Fry

Dear Major General Sisinyak:

The member fish and wildlife agencies and Indian tribes of the Columbia Basin Fish and Wildlife Authority have received your announcement by letter dated September 16, 1987, of the Corps' initiation of the 1988 juvenile fish passage planning effort. The Northwest Power Planning Council (Council) has contacted us several times in recent months in an attempt to sponsor a meeting to investigate options and processes by which a multi-year spill plan for juvenile fish at Corps' projects could be achieved. We understand that the Corps of Engineers requested delays in that meeting in order to complete internal analyses of the alternative spill plans proposed for the 1987 outmigration. Given the delays experienced with the Council's efforts, we were frankly surprised that the Corps has chosen to proceed on its own initiative.

The procedure that the Corps proposes to follow in development of a fish passage plan for 1988 is identical to the process employed by the Corps for the previous three years. Each year the fisheries agencies and tribes have commented to the Corps that the process would hinder efforts to develop a joint plan, and several alternatives have been proposed. The Corps has persisted with its procedure, however and each year has produced a plan that is unacceptable to the tribes and fisheries agencies. There is little incentive for us to continue to participate in a process that has proven itself to be unworkable.

We believe that a better procedure exists by which the power interests and the fisheries interests can recognize their differences on the spill-for-fish issue and work out a method by which each party will feel that its interests are fairly served. Such a procedure should be developed through the collaborative efforts of policy level representatives of the Council, the power interests, and the fisheries interests. We therefore propose that the Corps delay its proposed October 6 meeting of the "Working Committee" until after the policy level representatives have met to establish an appropriate procedure. We will consult with the Council staff and will encourage them to take the lead in organizing such a meeting.

We look forward to working with you in the upcoming months to begin a new process for juvenile fish passage planning.

Sincerely,

S. Timothy Wapato

S. Timothy Wapato
Chairman

cc: CBFWA Members
Robert Duncan, NPPC
Rick Applegate, NPPC
Al Wright, PNUCC
James Jura, BPA

PNUCC

PACIFIC NORTHWEST UTILITIES CONFERENCE COMMITTEE

October 5, 1987

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

Dear Colonel Fry:

In response to your letter dated September 16, 1987, I appreciate the opportunity to participate in the development of the Juvenile Fish Passage Plan for 1988. As you are aware, PNUCC has always considered this element of the Council's Fish and Wildlife Program to be a top priority. The impacts to the Northwest power system are potentially very great.

In 1987, during both the planning and implementation stages, several controversial issues were raised and, at least for the short term, partially resolved. One such issue was the new concept of a sliding scale for spill. However, I don't believe that these issues have been resolved for the long term to everyone's satisfaction. These major policy issues should be put to rest once and for all so that the annual planning process can better focus on the peculiarities of the specific water condition and not an annual revisitation of each underlying policy issue.

As I have heard you say many times, "what we have here is an opportunity." I agree. By starting the 1988 planning process several months earlier than previous years, I believe these major policy issues can be identified and resolved. I recommend that these policy issues be separated from the other elements of the annual plan.

The first issue that should be resolved is the entire notion of a sliding scale. This issue can be resolved without complicating the discussions with the details of such things as monitoring and hours per day to spill.

As you know, last year as in previous years, I have actively participated in discussions with the policy makers from the Corps, Bonneville, fish agencies and tribes, and the Council. I plan to continue to participate in such discussions. I assume that your JFPP development procedure for this year will have both a working committee and an executive committee as it has in the past. This type of organization lends itself well to the type of problem formulation by the working committee, and policy resolution by the Executive Committee.

I request that PNUCC be included in your Executive Committee. Including my organization will obviate the need for setting up yet another structure to resolve these most important issues. I would be pleased to represent PNUCC. Also in keeping within the framework of the Corps planning process, I have directed Dick Adams of my staff to participate on your working committee. In his absence Ray Kindley will serve as alternate.

Once again, thank you for inviting PNUCC to participate in this planning process. I believe that with good faith effort on the part of all participants these issues can be resolved.

Sincerely,

Dick Adams

FOR Al Wright
Executive Director

RA102

PNUCC

PACIFIC NORTHWEST UTILITIES CONFERENCE COMMITTEE

October 9, 1987

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

Dear Colonel Fry:

At the October 6 meeting of the working committee for the development of the 1988 Juvenile Fish Passage Plan, Nick Dodge asked us to respond to the draft procedure to be used this year in developing the Corps' plan. I would like to reiterate and emphasize the suggestions that I made in my letter to you dated October 5.

First, I thank you for expanding the Corps Executive Committee to include PNUCC as a member. This policy level group will have some very difficult issues to resolve in the near future and I look forward to directly participating in that decision process.

Second, we believe the Corps should modify its schedule so that the issue of the amount of spill to be provided under the criteria in the Council's program is discussed and resolved very early in the plan development process. This issue is one of the key elements of your plan and I expect it is one that has the most controversy. The Executive Committee should deal with this issue at its first few meetings and resolve it. Resolution is basic to continual development of the 1988 plan. Each member of that committee should come prepared to present their concerns in a clear and concise fashion. A clear understanding of the issues is essential to resolving this matter. It is my personal belief that it can be resolved without any future technical analysis. However, if others are interested in pursuing additional study, we are willing to participate. I believe clear direction and study criteria should be developed by the Executive Committee for use in the working committee.

Last, I believe the basic procedure outlined by your staff for developing a common plan for juvenile passage is workable with these suggested adjustments. My staff and I have made this one of our top priorities and are ready to assist in whatever way possible. I look forward to seeing you at the first meeting.

Sincerely,

for Al Wright
Executive Director

AW113

COLUMBIA BASIN FISH AND WILDLIFE AUTHORITY

METRO CENTER • SUITE 170
2000 S.W. FIRST AVENUE
PORTLAND, OREGON 97201

(503) 294-7031
FTS 423-7031

OFFICE OF
EXECUTIVE SECRETARY

October 14, 1987

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

Dear Colonel Fry:

We have received your October 7, 1987 letter in which you offered to host a meeting of the Bypass Forum. The purpose of this meeting is to provide policy guidance to our technical representatives in the development of a passage plan for the 1988 juvenile fish outmigration. As we have discussed with you by telephone, several of us will not be available on October 21; however, October 23 is an acceptable alternative date.

We believe that policy differences have prevented our reaching agreement on a juvenile fish passage plan. Therefore, we propose a series of policy level meetings to be held over the next several months among representatives with direct line responsibility for the operations to be discussed. The procedure paper that the Corps distributed at the October 6 meeting of the Working Committee describes a process and sets general guidelines that have proven to be ineffective over the last three years. These procedures do not provide the direction needed for technical staff on the Working Committee to resolve differences, since these differences are largely of a policy nature. We believe that the policy makers should resolve policy questions that will provide definitive guidance to the technical level before the Working Committee meets again. We suggest that the agenda for the October 23 meeting include the following questions:

1. Can a multi-year agreement be reached?
2. Can the parties commit to a pre-season volume of spill to be determined on a sliding scale?
3. Will the parties allow a volume of water to be managed as spill by the tribes and fisheries agencies?
4. What standard will be used to determine an adequate spill volume?
5. How are the starting and ending points for the sliding scale to be determined?
6. How is the slope of the sliding scale to be determined?

7. What is an acceptable policy regarding impacts to firm and non-firm power?
8. What role should fishery benefits and power system costs determined using FISHPASS or similar models play in the decision-making process?

These questions should serve as a useful starting point for policy-level discussions and should be answered before technical discussions begin. We envision a process in which a series of policy level meetings will be held to reach consensus, if possible, with technical level staff called in to provide available background information as appropriate. If you have additional items that you would like to see on the agenda, feel free to give me a call.

To avoid further delay in setting up policy level meetings, I propose that the second meeting of the Bypass Forum be scheduled for 9:00 A.M., November 6, 1987. Please let me know if this date is acceptable to you. I will be contacting the other participants of the Bypass Forum in the meantime.

I hope that this letter provides you with a better understanding of the Authority's position with respect to the spill planning process and acts to facilitate discussion at our upcoming meeting.

Sincerely,

S. Timothy Wapato

S. Timothy Wapato
Chairman

cc: Robert Duncan, NPPC
Jim Jura, BPA
Al Wright, PNUCC
John Keyes, BOR
CBFWA members
Rick Applegate, NPPC

United States Department of the Interior

FISH AND WILDLIFE SERVICE

500 N.E. Multnomah St., Suite 1692
Portland, OR 97232

December 1, 1987

Col. James R. Fry
Deputy Division Engineer
North Pacific Division, Corps of Engineers
P.O. Box 2870
Portland, OR 97208-2870

Dear Jim:

We have reviewed your technical evaluation report, Juvenile Fish Passage Alternatives '88, and have the following comments. Your report and the conclusions drawn in it have far reaching consequences to the fishery resources of the Columbia River Basin. The current version of the report is not identified as a draft. However, we request that our comments be incorporated into the report for the record.

The analyses in the report rely heavily upon the Corps' FISHPASS model. Prior applications of FISHPASS have been strongly criticized by the fishery agencies and tribes. The FISHPASS model is an overly simplified abstract of a very complex natural system. Because of limitations of the available data, many assumptions are made which underlie the model's calculations. Each assumption adds another level of uncertainty and the cumulative effect of this uncertainty of individual parameters overshadows the differences of survival estimated for the alternative scenarios. Model assumptions that are supported by research and input parameter values that fall within observed ranges can be selected to support any of the alternative passage scenarios.

Lumping together all of the species and stocks of salmon and steelhead in the Columbia River Basin for comparing alternative passage scenarios is another major flaw of your analyses. Conclusions drawn from analyses that combine all stocks may not be applicable to individual stocks. Your preferred alternative of full transportation would result in inadequate protection being provided at mainstem projects for individual stocks of salmon and steelhead that are not collected and transported.

The most serious problem with your analyses is that the alternative passage scenarios evaluated in your report do not achieve the same biological objectives. Comparisons of relative fish numbers produced and relative costs and benefits for alternatives that achieve different objectives are meaningless. For example, the full transportation alternative might produce greater combined numbers of adult steelhead and fall chinook than the other alternatives. However, this would occur at the expense of not restoring individual stocks that are not collected

and transported and stocks that may not benefit from transportation. Other passage scenarios in your report may be more expensive but they are also designed to achieve greater overall biological benefits.

We would be negligent if we evaluated the condition of the fishery resources in the Columbia River Basin solely on the basis of the combined number of fish produced. Restoration of natural stock production throughout the Columbia River Basin and maintenance of their genetic diversity are also important biological objectives. Your evaluation failed to assign any value to these other important objectives.

Finally, substantial risks and uncertainties remain relative to whether transportation benefits yearling chinook and sockeye and these were not adequately addressed in your report. Spring and summer chinook runs are not responding in a manner that is consistent with the positive transport/benefit ratios that some of the research data suggests we should be achieving. In addition, preliminary results of transportation studies on yearling chinook and sockeye at Priest Rapids Dam show a very negative impact of transportation on fish recovered at the dam for the 1984 study. A slightly positive benefit was estimated for fish recovered at Priest Rapids Dam for the 1985 study. Transportation may be impairing the homing ability of the fish which in turn would hinder efforts to restore upriver runs.

Based on the foregoing, we strongly disagree with your analyses and the conclusions reached in your report. We appreciate the opportunity to review and comment on your report.

Sincerely,

Rolf L. Wallenstrom
Regional Director

cc: NPPC
CBFWA

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION
975 S.E. Sandy Boulevard, Suite 202, Portland, Oregon 97214 Telephone (503) 238-0667

December 10, 1987

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

Dear Colonel Fry:

The Commission is pleased to have the opportunity to offer comments on the paper entitled, "Juvenile Fish Passage Alternatives '88." We have carefully reviewed the document and find that, unfortunately, it does not represent an accurate assessment of existing information and, worse, it is likely to mislead uninformed readers on the merits of fish passage alternatives. We find the conclusions reached in the paper particularly troubling. The conclusions are not supported by the best scientific knowledge, nor do they provide a realistic basis upon which to build regional policy commitments.

The Passage Alternatives paper and the related paper, "Full Transportation at Corps' Dams" both serve as good examples of the type of activity which has caused us to call for a new fisheries research process in the Columbia Basin. Both papers are assertions of policy in the guise of scientific information. Such treatment of passage issues, which have proven intractable in the prior years, cannot be considered a departing point for a 1988 or multi-year agreement on passage.

A primary area of disagreement between the Corps and the fisheries interests has been the use of the FISHPASS model to compare alternative passage proposals. We have repeatedly made the case that the model does not produce information, which can be verified by the parties. The Corps' use of the model parameters "adopted by MPAC," in the absence of model verification studies, without adequate model sensitivity analyses, and over the objections of state and federal fishery agencies and Indian tribes, does not speak well for the results contained in the paper.

The values referred to in the Corps paper do not represent the agreement of the MPAC members. The minutes of the MPAC clearly reflect disagreement on values for model parameters. Moreover, we know of no decision by the Council to adopt MPAC parameter values as planning mandates under its Fish and Wildlife Program.

Given the elementary nature of the biological knowledge incorporated into the FISHPASS model, we are not surprised that that differences of such small magnitude occur as model output. For example the difference in system survival between alternatives 5A

and 6 is .001. Without any concept of the uncertainty associated with these estimates, it is not possible to evaluate such small differences. As a consequence, we do not find it possible to make meaningful comparisons between the outcomes from various spill strategies presented in "Juvenile Fish Passage Alternatives '88."

Our understanding of the available information on transportation of juvenile chinook salmon and steelhead in the Snake and Columbia Rivers is that it shows great promise of being part of a successful mortality reduction program for steelhead. In the case of chinook salmon the results are not conclusive. On the basis of the scientific record it is not possible to say that transportation of juvenile chinook improves survival sufficently to justify a program of full transportation. More importantly the scientific record does not permit us to assure the public that transportation of juvenile chinook does not do harm. 1/

We have prepared and transmitted two technical papers to the Corps on the issue of transportation study results and crediting transportation in modeling exercises. 2/ Others have also pointed out problems with providing full credit to transported fish in a modeling exercise. 3/ The '88 Alternatives Paper does not expressly account for the information presented in these papers. However, we know that the relative survival of transported to non-transported fish is a technical issue of great uncertainty and the choice of differential ocean survival rates strongly affects the number of adult returns. The Paper's approach to comparing alternatives based on returning adults obscures these matters in such a way as to preclude critical review.

1/ In the paper dated Nov. 20 which was distributed on Nov. 25 at the Lloyd 700 meeting, the Corps states, "Transportation of juvenile salmon and steelhead from Lower Granite, Little Goose, and McNary Dams has provided consistent benefits to upriver stocks of fish." (p. 1). This statement is not substantiated by the data to which it refers. On the first page, one year of return data, 1983, and one year of preliminary return data, 1984, for spring chinook are cited as proof of consistent success. Failures of the program in 1976, 1977 and 1980, and the marginal performance in 1975 do not combine to characterize the program as a consistent success. Four poor outcomes in eight tries does not equate to consistent success in anybody's understanding.

2/ Filardo, "Transport Benefit Experiments, The Error Associated With Expansion," June 6, 1986; and CRITFC, "Transportation Crediting In Modeling Exercises," January 24, 1986.

3/ McConnaha and Ruff, "Incorporation of Transportation In Analysis Of Fish Passage Alternatives," November 4, 1986.

Fundamentally, however, replacing bypass with transport cannot be substantiated by any amount of scientific research. The ability to transport depends on the ability to collect juvenile fish at the dams, which in turn depends on flow, among other factors over which the dam operators have little control. Full transportation means that all the juveniles which are caught can be transported, but not all the juveniles can be caught. In fact in an involuntary spill event, not even most of the juveniles can be caught. This says nothing about fish entering the mainstem Snake and Columbia Rivers from tributaries above dams without collection facilities. Of particular importance to the Columbia River treaty tribes are such tributaries which pass through or border their reservations, including the Klickitat, Umatilla, and Deschutes. Reliance on transport to the exclusion of bypass and spill could make Columbia Basin salmon and steelhead production more variable than it already is by multiplying the effect of dam mortality.

In the future it may be possible to substantiate transportation of juvenile salmon as a means of lowering mortalities during downstream migration. For the present the confusion of policy with scientific evidence will only serve to make it more difficult for everyone concerned with mainstem passage issues to objectively assess the risks which must be evaluated before the role of transportation in increasing Columbia Basin salmon production can be specified.

In sum, we are not surprised that your analysis provides justification for advocating for full transportation and minimal spill levels. As stated above, FISHPASS is incapable of accurately predicting system and adult survival because 1) data do not presently exist to accurately assess the differential ocean survival of transported and non-transported fish; and 2) data do not presently exist to accurately assign reservoir mortality rates to in-river fish. For example, if some portion of total mortality presently attributed to the reservoir is in the future attributed to turbine passage, then the benefit of those alternatives that call for higher spill would be significantly different. The risk of this and similar scenarios is simply too great for the Commission to agree to spill curtailment.

Sincerely,

S. Timothy Wapato

S. Timothy Wapato
Executive Director

cc: Fish and Wildlife Committees
CBFWA
NPPC
BPA
PNUCC

APPENDIX 3

Operation and Maintenance Criteria for Fish Passage at Corps of Engineers Projects

Not Available
To Be Provided Later

PORTLAND DISTRICT

FISH FACILITIES

OPERATING STANDARDS AND MAINTENANCE PLANS

1988

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) During the period 1 March through 15 August, operation of the second powerhouse will be restricted because of continuing poor guidance of juvenile fish to the structural bypass system. During 0600 to 2000 hours, the second powerhouse may be operated to avoid having to spill more than 75,000 cfs. The second powerhouse will not operate

during 2000 to 0600 hours except as needed for fishery research. Restrictions on second powerhouse operation will be overridden by research requirements as needed and coordinated with fisheries agencies and tribes. These research activities will be 1) continued fish guidance research, 2) survival studies, and 3) evaluation of use of the trash sluice as a fish bypass.

(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. 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.

(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 release of Bonneville pool hatchery fish occurs. 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 foot of additional 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). 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 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. 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 fully 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 monofilament 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)) The day of and four days following juvenile fish releases in the Bonneville pool unscreened units will not operate 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 24 hour passage by Bonneville exceeds 20,000 juvenile salmon 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 August 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 the period September 1 through November 15, operate the same as the March 1-15 through April 15 period. (see (k).

(n) 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 up to one-half of the powerhouse turbine units to reduce wear and facilitate early winter maintenance. These should be removed from lower priority units. 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 are available to meet power demands and 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 release of Bonneville pool hatchery fish occurs. 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 foot of additional 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). 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 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.

(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. If an STS failure occurs follow procedures in Fish Facilities Maintenance Plan.

(e) Inspect all gatewells daily and clean before gatewell water surface becomes fully 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 monofilament lines installed for the purpose of discouraging gull predation on juvenile salmonids.

(j) During the period 1 March through 15 August, operation of the second powerhouse will be restricted because of continuing poor guidance of juvenile fish to the structural bypass system. During 0600 to 2000 hours, the second powerhouse

may be operated to avoid having to spill more than 75,000 cfs. The second powerhouse will not operate during 2000 to 0600 hours except as needed for fishery research. Restrictions on second powerhouse operation will be overridden by research requirements as needed and coordinated with fisheries agencies and tribes. These research activities will be 1) continued fish guidance research, 2) survival studies, and 3) evaluation of use of the trash sluice 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) October 1 through November 15

STSs may be removed from up to one-half of the powerhouse turbine units to reduce wear and facilitate early winter maintenance. These should be removed from lower priority units. Unit operating priority is as follows. 1) screened first powerhouse units, 2) screened second powerhouse units, 3) unscreened second 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. Additionally, all units are available to meet power demands and 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 (receive high priority) 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 August), the day of and four days following a juvenile fish release in the Bonneville pool or when the 24 hour juvenile Salmonid passage by Bonneville 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 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 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 15), the day of and four days following a juvenile fish release in the Bonneville pool, or when the 24 hour juvenile salmonid passage by Bonneville exceeds 20,000, 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.

b. March 1 through November (Fish Passage Period)

(1) All Adult Fish Facilities

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

(b) South Spillway Entrance: Operate both

downstream entrances (S1 and S2).

(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.

(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.

Table II-1

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

Pool Elevation 159.6'

Gate Number																							kcf's
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	3.0
1	(1)																				1	1	6.0
1	1	(1)																		1	1	1	9.0
1	1	1	(1)																1	1	1	1	12.0
1	1	1	1	(1)														1	1	1	1	1	15.0
1	1	1	1	1	(1)												1	1	1	1	1	1	18.0
1	1	1	1	1	1	(1)										1	1	1	1	1	1	1	21.0
1	1	1	1	1	1	1	(1)								1	1	1	1	1	1	1	1	24.0
1	1	1	1	1	1	1	1	(1)						1	1	1	1	1	1	1	1	1	27.0
1	1	1	1	1	1	1	1	1	(1)				1	1	1	1	1	1	1	1	1	1	30.0
1	1	1	1	1	1	1	1	1	1	(1)		1	1	1	1	1	1	1	1	1	1	1	33.0
1	1	1	1	1	1	1	1	1	1	1	1	(2)	1	1	1	1	1	1	1	1	1	1	36.0
1	1	1	1	1	1	1	1	1	1	2	1	2	1	(2)	1	1	1	1	1	1	1	1	39.0
1	1	1	1	1	1	1	1	2	1	2	1	2	1	2	1	(2)	1	1	1	1	1	1	42.0
1	1	1	1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	(2)	1	1	1	1	45.0
1	1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	(2)	1	1	48.0
1	1	1	1	2	1	2	1	2	2	2	(2)	2	1	2	1	2	1	2	1	2	1	1	51.0
1	1	1	1	2	1	2	2	2	2	2	2	2	(2)	2	1	2	1	2	1	2	1	1	54.0
1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	(2)	2	1	2	1	2	1	1	57.0
1	1	1	1	2	2	2	2	2	2	2	2	(3)	2	2	2	2	2	2	1	2	1	1	60.0
1	1	1	1	2	2	2	2	3	2	3	2	3	2	(3)	2	2	2	2	1	2	1	1	63.0
1	1	1	1	2	2	2	2	3	2	3	2	3	2	3	2	2	2	2	(2)	2	1	1	66.0
1	1	1	1	2	2	3	2	3	2	3	2	3	2	3	2	(3)	2	2	2	2	1	1	69.0
1	1	1	1	2	2	3	2	3	2	3	3	3	2	3	2	3	2	(3)	2	2	1	1	72.0
1	1	1	1	2	2	3	2	3	3	3	3	3	(3)	3	2	3	2	3	2	2	1	1	75.0
1	1	1	2	2	2	3	2	3	3	3	3	3	3	3	(3)	3	2	3	2	2	1	1	78.0
1	1	2	2	2	2	3	2	3	3	3	3	3	3	3	3	(3)	3	3	2	2	1	1	81.0
1	1	2	2	2	2	3	2	3	3	3	3	(4)	3	3	3	3	3	3	2	2	1	1	84.0
1	1	2	(3)	2	3	3	2	3	3	3	3	4	3	3	3	3	3	3	2	2	1	1	87.0
1	1	2	3	2	3	3	2	3	3	4	3	3	3	(4)	3	3	3	3	2	2	1	1	90.0
1	1	2	3	2	3	4	3	4	3	4	3	4	3	4	3	3	3	3	2	2	(2)	1	93.0
1	1	2	3	2	3	4	3	4	3	4	(4)	4	3	4	3	3	3	3	2	2	2	1	96.0
1	1	2	3	2	3	4	3	4	4	4	4	4	(4)	4	3	3	3	3	2	2	2	1	99.0
1	2	2	3	2	3	4	3	4	4	4	4	4	4	4	3	3	3	3	2	(3)	2	1	102.0
1	2	2	3	2	3	4	(3)	4	4	4	4	4	4	4	4	3	3	3	2	3	2	1	105.0
1	2	2	3	2	3	4	4	4	4	(5)	4	5	4	4	4	3	3	3	2	3	2	1	108.0
1	2	2	3	2	3	4	4	5	4	5	4	5	4	4	4	(4)	3	3	2	3	2	1	111.0
1	2	2	3	2	3	4	4	5	4	5	5	5	4	(5)	4	4	3	3	2	3	2	1	114.0
1	2	2	3	3	3	4	4	5	4	5	5	5	(5)	5	4	4	3	3	2	3	2	1	117.0
1	2	3	3	3	3	4	4	5	(5)	5	5	5	5	5	4	4	3	3	2	3	2	1	120.0

Table II-1 (Cont.)

Gate Number																							kcf's
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	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	126.0
1	2	3	3	4	4	4	5	5	5	5	5	5	5	5	(5)	4	3	4	3	3	2	1	129.0
1	2	3	3	4	4	5	5	5	5	5	5	5	5	5	5	4	3	4	(4)	3	2	1	132.0
1	2	3	3	5	4	5	5	5	5	5	5	5	5	5	5	4	(4)	4	4	3	2	1	135.0
1	2	3	4	5	4	5	5	5	5	5	5	5	5	5	5	4	(5)	4	4	3	2	1	138.0
1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	(5)	5	4	4	3	2	1	141.0
1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	(4)	2	1	144.0
1	2	3	4	5	5	5	5	5	5	6	5	5	5	5	5	5	5	(5)	5	4	2	1	146.9
1	2	3	4	5	5	5	5	(6)	5	6	5	6	5	5	5	5	5	5	5	4	2	1	149.7
1	2	3	4	5	5	5	5	6	5	6	6	6	6	(6)	5	5	5	5	5	4	2	1	152.5
1	2	3	4	5	5	5	5	6	6	6	6	6	(6)	6	5	5	5	5	5	4	2	1	155.3
1	2	4	4	5	5	5	5	6	6	6	6	6	6	6	5	5	5	5	5	4	(3)	1	158.3
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
1	2	4	4	5	5	6	6	6	6	6	6	6	6	6	(6)	6	5	5	5	4	3	1	163.9
1	2	4	5	2	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	4	3	(2)	166.8
1	2	4	5	2	6	6	6	6	6	6	6	6	6	6	6	6	(6)	5	5	4	4	2	169.7
1	2	4	5	2	6	6	6	6	6	(7)	6	6	6	6	6	6	6	5	5	4	4	2	172.7
1	2	4	5	2	6	6	6	(7)	6	7	6	7	6	6	6	6	6	5	5	4	4	2	175.7
1	2	4	5	2	6	7	6	7	6	7	6	7	6	(7)	6	6	6	5	5	4	4	2	178.7
1	2	4	5	5	6	7	7	7	7	7	(7)	7	7	7	6	6	6	5	5	4	4	2	181.7
1	2	4	5	5	6	7	7	7	7	7	7	7	(7)	7	6	6	6	5	5	4	4	2	184.7
1	2	4	5	(6)	6	7	7	7	7	7	7	7	7	7	6	6	6	6	5	4	4	2	187.5
1	2	(5)	5	6	6	7	7	7	7	7	7	7	7	7	6	6	6	6	5	5	4	2	190.5
1	3	5	5	6	6	7	7	7	7	7	7	7	7	7	7	6	6	6	5	5	4	2	193.5
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.[illegible]
1	3	5	6	6	7	7	7	7	7	8	7	7	7	7	7	(8)	7	6	5	5	4	2	202.3
1	3	5	6	6	7	7	7	8	7	8	7	(8)	7	7	7	8	7	6	5	5	4	2	205.0
1	3	5	6	6	7	8	7	8	7	8	7	8	7	(8)	7	8	7	6	5	5	4	2	207.8
1	3	5	6	6	7	8	7	8	8	8	(8)	8	7	8	7	8	7	6	5	5	4	2	210.6
1	3	5	6	6	7	8	8	8	8	8	8	8	7	8	7	8	7	6	(6)	5	4	2	213.4
1	3	5	6	7	7	8	8	8	8	8	8	8	7	8	7	8	7	(7)	6	5	4	2	216.4
1	3	5	7	7	7	7	8	8	8	8	8	8	(8)	8	7	8	7	7	6	5	4	2	219.3
1	3	5	7	7	8	8	8	8	8	8	8	8	8	8	(8)	8	7	7	6	5	4	2	222.1

Values in parenthesis may be 1 foot less than the values shown.

For example: (1) mean 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.

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 when drawdown in gatewell slots reaches 1 foot over clean rack drawdown at full load on unit 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 chain 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 chain gates completely). During periods of involuntary spill, chain 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. Then reverse the above procedure.

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 (high priority) 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. The Dalles Dam has experienced a problem with the east fish ladder in which a weir tipped over. This created a large head across the next upstream orifice which completely stopped shad passage but did not appear to impede salmonid passage. In this case, after consulting with the fishery agencies, the ladder was dewatered, the weir was tipped upright and bolted into place. The remaining weirs were inspected and the ladder was then watered back up. The following winter all weirs in the east fish ladder were bolted into place.

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. Gate hoists have been added to the system to simplify the adjustment of the gates used to attract fish into the sluiceway. If one of the 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 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 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.

b. March 1 through November (Fish Passage Period)

(1) All Adult Fish Facilities

(a) Water depth over fish ladder weirs: 1.2 (+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) North Fishway

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.

(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 debarked must be closed during the debarking operation. Check gatewell drawdown. 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) Before April 15 turbine units without a full complement of STSs may operate to meet load demands. Exceptions to this are:

(a) Six days following juvenile fish release in the John Day pool unscreened units will not operate 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 biologist one week prior to the release to facilitate necessary coordination to accomplish the unscreened unit shutdown.

(b) Unscreened units will not operate when the 24-hour passage by John Day exceeds 20,000 juvenile salmon unless BPA needs that additional generation 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.

(10) During the period April 16 through August, 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 diminishes.

(11) During the period September 1 through October 31 operate the same as the period before April 15. (#9).

c. **October 1 through October 31**

STSs may be removed from up to one-half of the powerhouse turbine units to reduce wear and facilitate early winter maintenance. These should be removed from lower priority units.

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 KCFS	Spill Bay																			
	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 KCFS	Spill Bay																			
	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	9	9	9	9	9
203.2	3	3	3	3	3	3	3	4	8	8	8	8	8	8	9	9	9	9	9	9
204.8	3	3	3	3	3	3	4	4	8	8	8	8	8	8	9	9	9	9	9	9
206.4	3	3	3	3	3	3	4	4	8	8	8	8	8	9	9	9	9	9	9	9
208.0	3	3	3	3	3	3	4	4	8	8	8	8	9	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.

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 16 - August 31), six days following a juvenile fish release in the John Day pool, or when the 24-hour juvenile salmonid passage by John Day exceeds 20,000, 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.

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.

IV. **FOSTER DAM** (adult fish passage facility).

A. OPERATING STANDARDS

1. Head over submerged weirs: 12-15 inches.

2. Fish ladder flow: 35-39 cfs.

3. Position of entrance gate and gate opening width: use six-foot gate only, operated as a submerged orifice.

4. Elevation of surface of entrance pool above tailwater: 12-18 inches.

5. Number of attraction water pumps used in relation to unit discharge:

   a. Minimum one unit powerhouse discharge (800 cfs) one pump.

   b. Minimum two unit powerhouse discharge (1600 cfs) two pumps.

   c. Powerhouse discharge equal to or in excess of that for two unit rated load at full pool (2200 cfs) - three pumps.

6. Side entrance gate:

   a. Not operated except under the following conditions: 1) during spill and 2) for one day following the end of spill.

   b. Criteria when operated: Operate as a weir 18 inches above tailwater with approximately 40 cfs discharge from entrance pool.

7. Maximum flow through spillgate adjacent to fish facility: 2000 cfs.

8. Criteria shall be checked by operator whenever unit discharge and spill conditions change. In any case, the facility shall be checked to ensure that it is in criteria at least once a day during the peak of the run.

B. MAINTENANCE PLAN

Any reference to annual maintenance work means work is done in January. Time required for annual maintenance is usually two weeks. Date will be coordinated with CENPP-OP biologist at least one month prior to dewatering (see Appendix A).

1. Structure, including holding pool, transportation channel and fish ladder.

a. Clean, inspect, service and repair annually.

2. Transfer equipment (includes hopper, craneway hoists, trolley, sweep and brail).

a. Inspect, service and repair mechanical system quarterly.

b. Inspect, service and repair electrical system semiannually.

3. Side gate and entrance gate.

a. Inspect, service and repair mechanical system quarterly.

b. Inspect, service and repair electrical system semiannually.

4. Inspect, service and repair water supply valves annually.

5. Valves (E), (F) and (G).

a. Inspect, service and repair mechanical annually.

b. Inspect, service and repair electrical system quarterly.

6. Attraction water pumps nos. (1), (2), and (3) inspection, service and repair monthly (while fish facility is in operation).

7. Attraction water pump no. (4) inspection, service and repair annually (Note: attraction water pumps nos. (1), (2), and (3) are used regularly. Pump no. (4) is used only occasionally as required).

C. Schedule of facility operation.

1. Determination of when operation of facility begins and ends requires close coordination (see Appendix A) with the Oregon Department of Fish and Wildlife.

2. Tentative dates of operation (subject to change depending on presence of fish in river).

a. Start of operation - February 1.

b. Shut-down of facility - December 1.

c. Contingency shut-down - upon request by ODFW and coordinated with CENPP-OP biologists, facility may be shut down to permit chinook, excess to hatchery needs, to be available to the fishery and to allow the fish to hold over in cooler river water. In such a case the facility will be restarted August 15.

3. In any case, facility must be ready to operate by above mentioned date.

D. Criteria for determining frequency of inspections for fish and removal of fish.

1. Frequency of inspections - at least once a day.

2. Number of fish present requiring notification of ODFW personnel within 24 hours is an estimated 50-100.

3. ODFW personnel will remove fish during peak of run three times/week.

4. Maximum number of days fish are to be left in facility until ODFW personnel are notified (at beginning and end of run) is four days.

5. The personnel at South Santiam Hatchery are to be notified concerning removal of fish from facility.

E. Contingencies - preparation for and dealing with major and minor problems.

1. A major problem is considered to be any failure or problem which completely prevents fish passage for a period of three days or more during the run. (Since the facility has been in operation there has never been a major problem). The CENPP-OP-PN biologist will be notified as soon as possible when such a problem occurs (see Appendix A).

a. Routine inspection and overhaul are designed to prevent a major failure of the facility during the fish run.

b. Should a failure occur during the runs which may be serious enough to become a major problem, all available resources will be used to repair the facility as quickly as possible. This includes the use of overtime which will be authorized. Highest priority will be given to repairing the facility in such a case.

2. Other problems.

a. Routine preventive maintenance and minor repairs can usually be done during the fish run while the ladder is still in service. Repairs will usually be completed within two days.

F. Coordination with Oregon Department of Fish and Wildlife and CENPP-OP-PN specific to this Facility concerning situations requiring that ODFW and the CENPPOP-PN biologist be informed within 24 hours (see Appendix A).

1. Whenever the salmonid run decreases to a point that fish are no longer entering the facility.

2. Whenever more than 50 fish are estimated to be present in the facility.

3. Whenever fish are seen in the river below the facility prior to start of operation for the season.

A. OPERATING STANDARDS

1. Adult Fish Passage Facility

a. Head over weirs: 12-15 inches.

b. Fish ladder flows: 37-42 cfs (with preference to the lower figure).

c. Position of gate: operated as an orifice with bottom sill at elevation 684.5 feet, mean sea level.

d. Entrance head: 1 foot.

e. Flow into loading pool: 10-15 cfs.

f. Brail pool orifice opening widths: 1.2 to 2.2 feet.

g. Number of attraction water pumps used in relation to unit discharge:

(1) Units not discharging: one pump.

(2) Unit discharging: no pumps, as experience has shown that fish do not enter facility when units are discharging.

h. Criteria shall be checked by operator whenever facility is inspected for numbers of fish present or whenever the project manager considers it necessary due to changing conditions.

2. Juvenile Fish Passage Facility

a. Flow through fish horn: 190-194 cfs.

b. Flow across separator: 6-10 cfs.

c. The transport pipe will be maintained at a water depth sufficient to transport fish.

d. During periods when the reservoir is filling rapidly due to high flood it may be necessary to take the facility out of service. Rapid filling of the reservoir could require the adjustment of the facility every six hours. In any case, when the reservoir is filling for flood control the lack of flow downstream does not provide adequate transportation for the fingerlings.

e. Whenever the reservoir is being drawn down during the run the facility will be kept operating at all times, even if this requires frequent adjustment. It is

essential that the fingerlings be permitted to migrate out of the reservoir during these conditions.

f. Criteria shall be checked by operator whenever reservoir conditions change significantly or whenever sampling of fish by ODFW indicates a problem. An alarm will sound in the powerhouse should the pumps cease operation.

B. SCHEDULE OF MAINTENANCE

1. Adult Fish Passage Facility - Schedule of maintenance (any reference to annual maintenance work means work is performed in January and February. Time required for annual maintenance is usually two weeks). Data will be coordinated with CENPP-OP-PN biologist at least one month prior to dewatering.

a. Structure, including fish ladder.

(1) Clean, inspect, service and repair annually.

b. Craneway machinery, hoist and trolley.

(1) Inspect, service and repair mechanical system quarterly.

(2) Inspect, service and repair electrical motors quarterly.

c. Turntable machinery.

(1) Inspect, service and repair mechanical system annually.

(2) Inspect, service and repair electrical system annually.

d. Brail hoist machinery.

(1) Inspect, service and repair mechanical system quarterly, and more thorough overhaul done annually.

(2) Inspect, service and repair electrical system annually.

e. Brail pool exit gate.

(1) Inspect, service and repair mechanical system annually.

(2) Inspect, service and repair electrical system annually.

f. Fish hopper.

(1) Inspect, service and repair mechanical system quarterly.

g. Thirty-six inch main entrance gate.

(1) Inspect, service and repair mechanical system semi-annually.

(2) Inspect and repair wire rope annually.

(3) Inspect, service and repair electrical system semi-annually.

h. Eighteen inch entrance gate.

(1) Inspect, service and repair mechanical system semi-annually.

(2) Inspect and repair wire rope semi-annually.

(3) Inspect, service and repair electrical system semi-annually.

i. Valves (A) through (H).

(1) Mechanical inspection, service and repair annually.

j. Valves (C), (D) and (E).

(1) Electrical inspection, service and repair annually.

k. Inspect, service and repair attraction water pumps monthly. (Note: because operating criteria has been changed, the pumps are not run as frequently as they had been in the past).

(1) Inspect, service and repair fish turbine annually.

2. Juvenile Fish Passage Facility - Schedule of maintenance (any reference to annual maintenance work refers to work done during time facility is not in operation).

a. Transport pipe valves.

(1) Electrical inspection, service and repair - annual.

b. Internal surface of transport pipe inspection with TV camera - whenever inspection of fingerlings by ODFW personnel indicates injury.

c. Intake gate and hoist.

(1) Inspect, service and repair mechanical system quarterly.

(2) Inspect, service and repair electrical system quarterly.

d. Hose cart and hoist.

(1) Inspect, service and repair mechanical system quarterly.

(2) Inspect, service and repair electrical system quarterly.

e. Main hoist and main hoist brakes.

(1) Inspect, service and repair mechanical system quarterly.

(2) Inspect, service and repair electrical system quarterly, and a more thorough overhaul annually.

f. Air compressor.

(1) Inspect, service and repair electrical system annually.

g. Attraction water pumps.

(1) Mechanical inspection, service and repair monthly, during fish run.

(2) Electrical inspection, service and repair semi-annually, with overhaul as necessary.

C. SCHEDULE OF OPERATION OF FACILITY

1. Adult Fish Passage Facility

a. Determination of when operation of facility begins and ends requires close coordination with the Oregon Department of Fish and Wildlife (see Appendix A).

b. Tentative Dates (subject to change depending on presence of fish in river).

(1) Start operation - February 15.

(2) Shut down of facility - December 15.

c. Facility must be ready to operate by above mentioned date.

2. Juvenile Fish Passage Facility

a. Determination of when operation of facility begins and ends requires close coordination with the Oregon Department of Fish and Wildlife (see Appendix A).

b. Tentative dates (subject to change depending on presence of fish in river).

(1) Start of operation - February 15.

(2) Shut down of facility - June 1.

(3) Start of fall operation - October 25.

(4) Shut down of facility - January 1.

c. Facility must be ready to operate by above mentioned dates.

D. CRITERIA FOR DETERMINING FREQUENCY OF INSPECTIONS FOR FISH AND REMOVAL OF FISH.

1. Adult Fish Passage Facility

a. Frequency of inpsections - at least once a week.

b. If fish are present when facility is inspected, they are to be put over the dam after notifying ODFW.

E. CONTINGENCIES - PREPARATION FOR AND DEALING WITH MAJOR AND MINOR PROBLEMS.

1. Adult Fish Passage Facility

a. A major problem is considered to be any failure or problem which completely prevents fish passage for a period of three days or more during the run. (Since the facility has been in operation there never has been a major problem). The CENPP-OP-PN biologist will be notified as soon as possible when such a problem occurs (see Appendix A).

(1) Routine inspection and overhaul are designed to prevent a major failure of the facility during the fish run.

(2) Should a failure occur during the run which may be serious enough to become a major problem, all available resources will be used to repair the facility as quickly as possible. This includes the use of overtime which will be authorized. Highest priority will be given to repairing the facility in such a case.

b. Other problems.

(1) Routine preventive maintenance and minor repairs can usually be done during the fish run while the ladder is still in service. Repairs will usually be completed within two days.

2. Juvenile Fish Passage Facility

a. A major problem is considered to be any failure or problem which completely prevents fingerling passage for a period of three days or more during the run. (There has not been a major problem with the facility since the facility has been put into operation). The CENPP-OP-PN biologist will be notified as soon as possible after such a problem occurs (see Appendix A). When bypass is operating the facility should be inspected at least twice each week.

(1) Routine inspection and overhaul are designed to prevent a major failure of the facility during the fish run.

(2) Two pumps provide the attraction water. Should one pump fail, the other would be operated to provide some attraction water.

(3) Should a failure occur during the run which may be serious enough to become a major problem, all available resources will be used to repair the facility as quickly as possible. This includes the use of overtime, which will be authorized. Highest priority will be given to repairing the facility in such a case.

b. Other problems.

(1) Routine preventive maintenance and minor repairs can usually be done during the fish run while the facility is still in service.

(2) Vandalism has been a minor problem at the facility. Minor accidents involving debris have occurred.

F. COORDINATION with Oregon Department of Fish and Wildlife and CENPP-OP-PN specific to this facility concerning situations requiring that ODFW and the CENPP-OP-PN biologist (next working day) be notified within 24 hours (see Appendix A).

1. Adult Fish Passage Facility

a. Whenever, after a period of two weeks after the last steelhead had been put over Foster Dam, fish are no longer entering the facility.

b. Whenever fish are seen in the river below the facility prior to the start of operation for the season.

2. Juvenile Fish Passage Facility

a. Whenever high flooding and rapid filling of the reservoir require that the facility be taken out of service.

b. Whenever there is a malfunction severe enough that any of the facilities are shut down or it would disrupt fingerling or adult passages for more than three days.

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.

II. MID-WILLAMETTE VALLEY PROJECT

A. COORDINATION WITH ODFW

1. Project Manager will coordinate on all matters concerning all fish passage facilities. Project Manager may delegate the responsibility.

2. Whenever there is a malfunction severe enough that any of the facilities is shut down, ODFW will be notified within 24 hours.

B. Coordination with the District Office biologist (CENPPOP-PF): The project has the responsibility for operation and maintenance of the facility and coordination with ODFW. It is, however, necessary that the project keep the CENPP-OP biologists informed of all significant circumstances concerning the facility and coordination with ODFW.

1. Whenever the project coordinates with ODFW on significant changes in criteria, the CENPP-OP-PF biologist will be informed of such changes and the reasons for them.

2. The project will directly inform the District Office within 24 hours of any malfunction during the fish run which would prevent fingerling passage or adult passage for more than three days.

3. Whenever operation of the facility begins, the facility is shut down or malfunctions or there are any significant changes in operation the information will be entered on the teletype and recorded in the station log.

4. The project will directly inform the CENPP-OP-PF biologist whenever a significant or unusual maintenance or repair problem occurs. This is particularly important in the event one of the attraction water pumps at the Green Peter fingerling fish passage facility fails or seems likely to fail.

5. Responsibilities of the District Office:

a. The District Office will inform the project of any special needs or requests concerning fingerling passage or any other requests pertaining to fish. Such requests will be made in sufficient time that the project may adequately plan the work schedule or as soon as the District Office has received the request from the fisheries agencies.

b. If needed, the District Office will have the responsibility of obtaining information on work performed on the facility.

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.

APPENDIX 4

Fish Transportation Oversight Team's (FTOT) Overall Work Plan for 1988

THE FISH TRANSPORTATION OVERSIGHT TEAM'S

ANNUAL WORK PLAN FOR TRANSPORT OPERATIONS

AT LOWER GRANITE, LITTLE GOOSE, AND MCNARY DAMS

FOR FIELD YEAR (FY) 1988

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 (April 1, 1988).

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 1988.

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, normal turbine unit loading should be as near to peak efficiency (135 mw at Snake River Projects and 70 mw at McNary) as possible. This will reduce mortality to fish passing through turbines.

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 July, water temperature at McNary increases to a level that causes higher than normal fish mortality. At such time when mortality exceeds 4 percent of fish collected, or there is evidence of a daily peak in juvenile fish mortality due to thermal stress, the following special powerhouse operation should be implemented:

a. Special powerhouse operation

1) Unit 1 (for adult attraction), then
2) Units 14, 13, 12, 11, 10, 9, and 8.

b. Unit loading

Units should be operated near best efficiency but may be operated between 50 and 80 mw to minimize starting and stopping them. If additional generation is needed beyond 80 megawatts per each above unit then additional units may be brought on line beginning with unit 7 and continuing thru unit 5. Unit 4, 3 or 2 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, 1988. 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, 1988, the remainder no later than April 1, 1988. STSs will be cycled except when chinook fork length is less than 112 mm or when a sudden decline in fish condition warrants continuous screen operation. Cycling may resume once chinook fork length exceeds 112 mm and/or fish condition warrants it. FTOT will be responsible for determining when to implement continuous or cyclic operation of screens based on data provided by on-site biologists. Immediately after resumption of screen cycling, fish condition will be monitored to verify that the operational change does not affect fish quality.

b. Maintenance

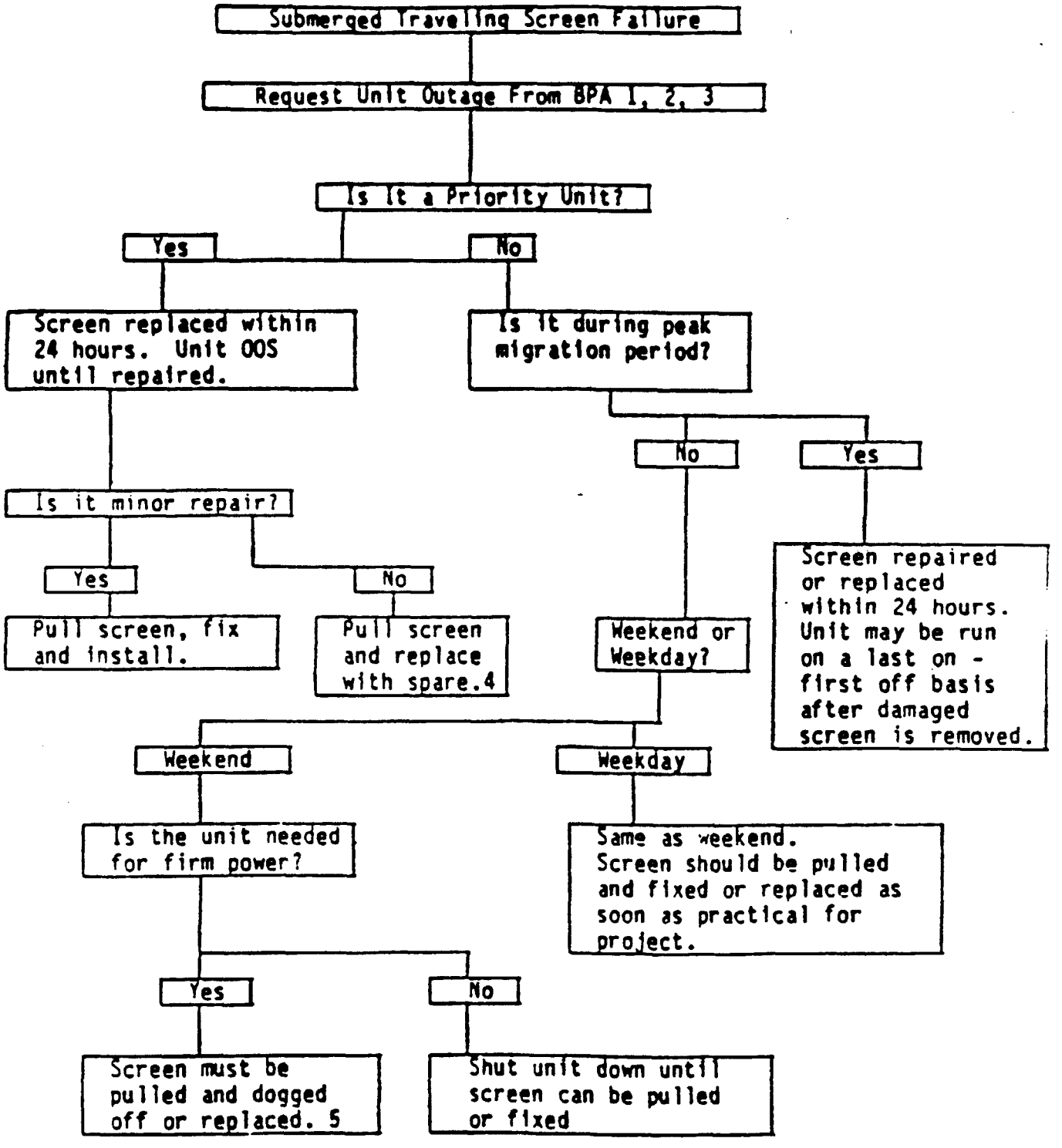
The number and condition of fish collected depend upon well-maintained screens. Continuous monitoring of screen operation is provided by annunciation (automatic warning system) to the powerhouse control room. FTOT and fishery biologists at each dam will be informed of any STS malfunctions. During peak 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



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 on a last on - first off basis in

from which a screen has been removed to replace a damaged screen can be operated without a full complement of screens.

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 peak efficiency ranges 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 be given an opportunity to 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 July, 3 units per week in the following sequence: 2, 14, 3, 11, 12, 13, 4, 5, 6, 7, 8, 9, 10, 1, 2, 14,....
6) August, September, first 2 weeks in October, 2 units per week continuing the sequence in 5) above.

If abnormal STS problems occur, FTOT will be notified and the project will immediately return to 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 upon 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 are raked.

McNary orifices are larger and do not appear to plug as they do at Lower Granite.

Because McNary personnel have raised a concern about potential gatewell orifice plugging during forebay debris dipping, 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.

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 1988 as developed by CBFWA (Appendices 1 and 2).

Fish that are in the sample group will be counted by electronic counting tunnels. All estimated fish counts and raceway loading densities will be based on a sample of the total fish collected. Samples will be taken throughout a 24-hour day i.e. about 3-5 minutes per hour.

Species composition and weight samples are necessary to determine loading densities in individual raceways. This sampling will require that project personnel keep a running hourly total of expanded fish numbers and raceway totals.

8. Facility and Equipment Logs and Records

To monitor 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 should 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. Total facility holding capacity is 500,000 fall chinook.

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:

Barge	Capacity (gal.)	Inflow(gpm)	Fish Holding Capacity (lbs)
2817	85,000	5,200	26,000
2127	85,000	5,200	26,000
4382	100,000	10,000	50,000
4394	100,000	10,000	50,000
Truck	3,500		1,750

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)

Four fish barges are available that will allow a 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 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. Project biologists will be notified of any major problems that occur. They will in turn notify FTOT.

Five tank trailers are available for hauling fish. The spring release of trucked fish in 1988 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 familiar with fish life support systems on their tank trailer and the sensitivity of juvenile salmonids to stress. Drivers will be trained to know where and under what conditions fish must be released in an emergency.

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. State Roles

Fishery agencies and tribes are responsible for biological oversight of fish at transport dams. NPW funds State fish biologists or culturists at each collector facility by cooperative agreement. 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, and
6) participating in gatewell dipping as necessary to monitor quality of fish.

12. 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.

13. NPW Project Requirements for Fishery Agency Activities

To maintain a good working relationship and communication process at NPW projects, fishery agencies and tribes will follow certain courtesy and safety habits. They include:

1) checking into the project properly i.e. notifying project engineers, biologists, or powerhouse operator that you will be arriving or have arrived on site,
2) adherence to local project requirements (hard hats, safety procedures, etc.), and
3) prior arrangements or notification of any unscheduled activities (research, etc).

Appendix 1 - Sampling Guidelines for Collector Dams in 1988
Appendix 2 - Guidelines for Increased Fish Samples at McNary and Lower Granite Dams in 1988

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.
Marking and release of control fish below Little Goose Dam is contingent upon Snake River flows above 100 KCFS OAF. If flows are projected to be below 100 KCF DAF marking control fish will not be done because the chance of survival in large enough numbers to be meaningful is low.

APPENDIX 1

SAMPLING GUIDELINES FOR COLLECTOR DAMS IN 1988

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 1988 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:

---

[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 1988

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.

The following percentage of yearling chinook collected at McNary between April 21, and June 6, 1986 and 1987 were not suitable for marking because they were:

		1986	1987
1.	Adipose clipped	15.8%	12.0%
2.	Branded	5.6%	3.4%
3.	Descaled	8.1%	6.0%
4.	Severely injured	1.5%	2.8%
5.	Dead	1.5%	1.9%
6.	Fall chinook	7.6%	13.6%

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 1988.

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.

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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 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. 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 2, 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 15,000 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.

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 2, 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. At no time shall the total sample exceed 1800 lbs at McNary. 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 chinook (in the "A" tank) 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.

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

Not Available
To Be Provided Later

APPENDIX 6

Test Plans

Bonneville Second Powerhouse Special Evaluation

MEMORANDUM FOR THE RECORD - #1

BONNEVILLE SECOND POWERHOUSE SLUICEWAY EFFECTIVENESS STUDY

December 4, 1987

1. A meeting was called to coordinate the 1988 sluiceway efficiency and the FGE studies at Bonneville Second Powerhouse. In attendance were the following individuals:

John Ferguson	CENPP-PL-F	Rock Peters	CENPP-PL-F
Gary Johnson	CENPP-OP-PN	Bob Magne	CENPP-OP-PN
Jim Kuskie	CENPP-OP-PN	Dan Rawding	CENPP-OP-PN
Bill Maslin	CENPP-OP-PN	Bill Nagy	CENPP-OP-PN
Mike Gessel	NMFS		

2. Daytime FGE in support of the sonar estimates of second powerhouse sluiceway efficiency and survival will be conducted in slot 13B (vertical distribution) and unit 18 (FGE). Unit 12 will not be monitored with hydroacoustics because the internal deflectors being tested in 1988 interfere with the sonar beams. Slot 13B will be outfitted with two transducers; one pointing directly up and one pointing directly down. Daytime FGE will be conducted on the weekends, starting April 23, 1988. Estimating daytime FGE is needed to calculate survival past the second powerhouse. This will require the operation of units 13 and 18 from approximately 1030 and 1530 hours, and units 11 and 17 from 0630 until the conclusion of the test to establish adequate flows. Units 11 and 17 will be used for the entire research season to establish nighttime FGE flows.

3. Transducers will be deployed as follows:

Unit 11	6 Transducers	Unit 12	0 Transducers
Unit 13	6 Transducers	Unit 14	2 Transducers
Unit 15	0 Transducers	Unit 16	2 Transducers
Unit 17	2 Transducers	Unit 18	6 Transducers

4. Test condition for the 5 unit operation and monitoring of sluiceway efficiency will involve units 11, 14, 16, 17, and 18. Test condition for the 2 unit operation and monitoring of sluiceway efficiency will involve units 11 and 18. The sluiceway efficiency tests will start on April 18, 1988, and continue through June 3, 1988. The tests will be conducted Monday through Friday, using a randomized block design. This means that 5 and 2 unit operation will vary almost daily. Test hours will be from 0600 to 2000.

5. The Bonneville Second Powerhouse sluiceway needs to be run 24 hours per day, seven days per week during the fish research season to standardize the nighttime FGE tests. Nighttime FGE crews will be used to conduct the daytime and weekend FGE tests, by setting up the equipment during the evening tests. This will eliminate the need for dedicating two project crane operators and riggers to the second powerhouse fish research program.

John W. Ferguson
Fisheries Biologist

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2946
PORTLAND, OREGON 97208-2946

Reply to
Attention of:

CENPP-PL-F

01 February 1988

MEMORANDUM FOR: Commander, North Pacific Division, ATTN: CENPD-EN-WM, Portland, Oregon 97208-2870

SUBJECT: Bonneville Survival Test Operating Criteria

1. Research to evaluate the survival of juvenile fish through various modes at Bonneville Dam will be repeated in 1988. Groups of test fish will be released into two locations in Unit 17, into the south end of the bypass gallery, and into spillway bay 5 if sufficient flows are available.

2. Request the following conditions be provided to facilitate the survival test:

DATE	TIME	UNITS
27 June - 2 July	2400 - 0800	11, 16, 17, 18
18 July - 23 July	2400 - 0800	11, 16, 17, 18

All units should be run at maximum efficiency. Slot 17A should have an operating STS, and slot 17B should not have an STS but be equipped with the release hose attachment used last year.

3. Request the sluiceway at the second powerhouse not be operated to eliminate biasing the survival test results. To allow a one day predator adjustment period prior to the test, request the sluiceway not be operated during the following periods:

a. 26 June - 2 July

b. 17 July - 23 July

4. Spillway releases will be conducted during the same periods outlined in element two. The spillway pattern will also be requested from midnight to 0800 hours for each day, to allow two hours prior to and six hours following each test release. The final gate patterns to provide approporiate stilling basin flows will be determined from modeling to be conducted at Waterways Experiment Station. We will forward the results as soon as possible.

5. For further information, please contact John Ferguson at (503) 221-6482.

FOR THE COMMANDER

A.J. HEINEMAN, P.E.
Chief, Planning Division

CF: CENPP-OP-PN (Johnson)

CENPP-PL-F 01 February 1988

MEMORANDUM FOR: Commander, North Pacific Division, ATTN: CENPD-EN-WH, Portland, Oregon 97208-2870

SUBJECT: Request for Unit Operations for the Bonneville Second Powerhouse Hydroacoustic Tests

1. Reference, Memorandum For The Record #1, Bonneville Second Powerhouse Sluiceway Effectiveness Study, dated 4 December 1987.

2. To eliminate the effect of dusk hours on the fish guidance efficiency tests to be conducted in conjunction with the sluiceway evaluation, and to facilitate manpower schedules, we request that the hours of operation for the two-unit and five-unit tests be changed from 0600 through 2000 hours to 0600 through 1900 hours. This request supersedes the hours of operation requested in the reference above. All other conditions of operation remain unchanged.

3. For further information, please contact Bob Magne at Bonneville Dam (extension 236) or John Ferguson of my staff (extension 6482).

FOR THE COMMANDER

A.J. HEINEMAN, P.E.
Chief, Planning Division

CF:
CENPP-OP-PN (Johnson)
CENPP-OP-B (Magne)

APPENDIX 7

Corps of Engineers Spill Monitoring Plan for 1988

1988 SPILL MONITORING PROGRAM 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 15 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, level and duration of spill, and the contractors estimate on spill effectiveness from the previous day. 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 - 100 foot armored cables

Costs:

1. Contract costs: $120,000
2. Contract Administration: $10,000
4. Project services costs: $5,000
5. Total estimated project costs: $135,000

JOHN DAY DAM

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.

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 spatial distribution (horizontal and vertical) of juvenile salmonids passing through the powerhouse and spillway so biologists 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).

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 fish guiding efficiency of the submersible traveling screens for subyearling chinook in 1985 and 1986, hydroacoustic monitoring of juvenile salmonid passage at John Day Dam during the summer of 1988 will again be contracted out by the Portland District Army Corps of Engineers.

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 nose. The transducers will be aimed to sample in front of the "B" slot of each monitored turbine. 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 period (2000h.-0600h.) each day. Initially, spill will be provided when fish passage exceeds a predetermined threshhold. Monitoring will be used to manage this spill.

Estimates of the total numbers of juvenile salmonids passing into the monitored turbines and spill bays will be used to generate distributions of fish 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 threshold. Hourly estimates of fish passage will be combined with 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 3 to predict passage for the 24 hour period.

Hydroacoustic monitoring at the turbines and spill bays will continue following initiation of spill for fish passage; if the spill provided is not effective at passing fish , then the Corps biologist will terminate the special spill (e.g. spill for fish passage will continue only as long as fish are present to benefit from it).

The density of fish (fish/acre ft.) passing through 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.

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 multiplexers 1
- Biosonics Model XMPX multiplexer equalizer 1
- Raytheon Model LSR 910M chart recorders 3
- Biosonics 15 degree transducers 12
- Dual Beam transducers 2
- Oscilloscopes 2
- Micro computers 2
- Cables and deployment hardware

Monitoring Schedule

Monitoring will be conducted a minimum of 45 minutes each hour, 10 hours each day, seven days each week from 1 June to 15 August 1988.

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 on-site Corps biologist 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 Corps biologist by approximately 0900h. hours each morning. The Corps biologist will then forward to the NPD Reservoir Control Center (via Telefax) the twenty-four hour estimates of juvenile salmonid passage through the powerhouse and spillway, and the project total.

The contractor will provide a draft report to the Corps for review and comment by 31 October 1988 with the final report due by 31 December 1988.

Coordination

Program Coordinator: is responsible for administration, planning, and overall coordination for the Portland District spill monitoring program.

On-site Biologist: is responsible for coordination between the contractor and the Corps. The on-site biologist will be responsible for providing technical oversight of the contractor, obtaining data from the contractor on an hourly and daily basis and making requests for operation of the spillway for fish passage, 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.

Program Costs

1.	Contract (estimate)	$110,000
2.	Additional equipment	35,000
3.	Personnel (on-site biologist)	12,000
		$157,000

APPENDIX 8

Dissolved Gas Monitoring Program

DISSOLVED GAS MONITORING PROGRAM

CENPD-EN-WM PLAN OF ACTION FOR 1988

1. INTRODUCTION

The Dissolved Gas monitoring program along the Columbia and Snake River mainstem is conducted annually from April through August. Its main objective is to collect the necessary field data needed by the Reservoir Control Center and other project operators to schedule reservoir releases that are not harmful to the migrating fish. Program coordination with project personnel and other participating agencies is assumed by the Water Quality Section (WQ). This document contains WQ's Plan of Action for 1988. Tables and figures mentioned refer to those of the main Report.

2. GENERAL INFORMATION

The 1988 Dissolved Gas monitoring program is scheduled to start in early-April and will continue into August. The monitoring network covers nine Corps projects, four PUD dams, two U.S. Bureau of Reclamation sites and one fish release site below Bonneville Dam (see Figure 1). This is the same number of stations as in 1987. Operational procedures will also generally follow the procedures developed in earlier years.

COMMON SENSING tensionometers will be used exclusively for the collection of total dissolved gas (TDG) and related water quality data. These include TDG, barometric pressure, water temperature and other project operational information. All the instruments used by the Corps and USBR have 3, 4, or 5 parameter channels with direct digital read-outs. Each Tensionometer will be interfaced with a SUTRON Data Collection Platform (DCP) to form a fully automated data collection and transmission system.

Data will be transmitted daily via the GOES Satellite and CBT teletype to the AMDAHL computer for real-time use and permanent storage in the CROHMS data base system (see Figure 2). Figure 3 shows an example of one of the three daily TDG reports produced by WQ from those data. Similar computer outputs will be distributed every morning to the Reservoir Control center and the Fish Passage Center.

3. PLAN OF ACTION

The Plan of Action for the 1988 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 project personnel (see Table 10) will be contacted during December 1987-January 1988 to ensure correct mutual understanding of the objectives of the monitoring program. Details regarding data to be collected, instrument location, procedures to be used, etc. will be finalized by 1 February 1988. Updated information on the recommended procedure for data collection, manual CBT and satellite data transmission protocol will also be provided at that time.

Contractual arrangements for equipment service and maintenance, etc. will be initiated with COMMON SENSING, Inc. and others in December 1987. COMMON SENSING is likely to be retained again as "sole source provider" but this needs to be properly documented as per the latest acquisition procedure. Formal contract will be ready by 1 March 1988. Formal arrangements through MOU's with BPA will also be initiated to secure continuous use of the two BPA instruments on loan to the Corps.

Phase 2: Instrument Installation

The list of the instruments to be installed and their assigned locations is given in Table 1. This is the same instrument deployment as in 1987. Slight changes may, however, occur if warranted by special operational requirements.

The instruments are scheduled for installation and interfacing with a SUTRON DCP's by early to mid-April 1988 at all 11 Corps stations. The WQ staff hydrologist, together with COMMON SENSING and SUTRON's representatives, will coordinate and do the actual installation and instrument calibration and testing. Project personnel will be requested to assist, as needed. Project staff familiarization with the Program details will also be carried out at each project during the installation trips.

Phase 3: In-season Monitoring

Actual data collection and transmission activities will start on or around 1 April depending upon the runoff and fish migration conditions. Specific starting dates will be coordinated with the Reservoir Control Center, project personnel and cooperating agencies. The mid-Columbia PUD's will usually have a shorter monitoring period as most of the juvenile fish will have passed the PUD dams by mid-July.

The following data will be collected approximately every four hours:

- Water Temperature (WC), in Degree C
- Barometric Pressure (BH), in mm of Hg
- Total Dissolved Gas Pressure (NT), in mm of Hg
- Dissolved Oxygen Pressure (OP), in mm of Hg
- Nitrogen + Argon Pressure (NP), in mm of Hg

The exact number of items collected depends on the number of channels used. 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 items.

The PUD's may continue to use 1987 CBT Coding sheets or equivalent. 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 and USBR Tensionometers interfaced with a SUTRON DCP will be powered by a 110-V, 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 (OR). After decoding by a VAX-8250 computer, these data will be automatically forwarded to the AMDAHL computer and stored in the CROHMS data base.

In-season instrumentation 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 each day by 1330 hours by WQ. Reports 101, 102 and 103 will contain the following information (see Figure 3):

- Station Identifier
- Date and Time of the Probe Readings
- Water Temperature, in Degrees C.
- Barometric Pressure, in mm of Hg
- TDG Pressure, in mm of Hg
- Calculated TDG Saturation Percent (%)
- Project Hourly Spill in KCFS (QS)
- Project Total Hourly Outflow in KCFS (QR)
- Project Number of Spillway Gates Open

The same information, except the Calculated TDG Saturation Percent, will also be available for viewing to all those who have access to CROHMS. Reconciliation between data received via the CBT and those recorded on the coding sheets will be made by WQ before these data are permanently stored in the water quality data base.

Phase 4: Instrument Removal and Storage

Shortly after the end of the annual monitoring program, the tensionometers will be removed from the various projects by WQ or contractor personnel. The 110V-AC power lines 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 man-power permitting, statistical analyses will be conducted to develop specific trends and relationships between spill and dissolved gas saturation levels. Efforts will also be expanded to improve the calibration of the GASPILL (dissolved gas) and COLTEMP (water temperature) models.

Phase 6: Program Evaluation and Summary Annual Report

An office report will be prepared to summarize the highlights of the 1988 TDG monitoring program. It will include a general program evaluation of the adequacy and timeliness of the information received, and how that information has helped to control dissolved gas saturation basin-wide.

TABLE 1
1988 DISSOLVED GAS MONITORING NETWORK

Monitoring Station ID	Location	Owner	Model of Tensionometer	No.of Channels
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 Co.PUD	FT	2-ch.
RRH	Forebay	Chelan Co. PUD	FT	2-ch.
RIS	Forebay	Chelan Co. PUD	FT	2-ch.
PRD	Forebay	Grant Co. PUD	TGO-FTR	4-ch.
LWG	Forebay	NPD	TGO-FTR-011	5-auto
LGS	Forebay	NPD	TGT-FR- 003	3-auto
LMN	Forebay	NPW	TG0-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	TBO-FTR-001	5-auto

Notes :
USBR = U.S. Bureau of Reclamation
NPD = North Pacific Division
NPW = Walla Walla District
BPA = Bonneville Power Administration

TABLE 10
List of Contact Persons

Order #	Project/Organization	Contact Name,Position and Phone
a.	Chief Joseph	Joe Munk, Chief of Operations (509) 686-5501
b.	Lower Granite	Jesse Smiley,Chief of Operations (509) 843-1493 Mrs. Sarah Wik,Fishery Biologist (509) 843-3364
c.	Little Goose	Ray Eaking, Chief of Operations (509) 399-2233
d.	Lower Monumental	Frank Lane,Hydrologic Technician
e.	Ice Harbor	(509) 522-6631
f.	McNary	Brad Eby, Res. Mgmt. Section (503) 922-3211, extension 242
g.	John Day	Gary Dunning,Power Project Supt. (503) 739-2227
h.	The Dalles	Larry Kerr,Power Project Supt. (503) 296-1181
i.	Bonneville	Phil Jordan, Chief of Operations (503) 374-8442 (Ext. 249)
j.	Warrendale, Oregon	Ken Avery, Hydrologist,EN-WM (503) 221-3750
k.	Grand Coulee	Dan Lute, USBR, Boise, ID
l.	Boundary, WA	(208) 334-1970
m.	Wells Dam	Mike Erho, Douglas County PUD (509) 884-7191
n.	Rocky Reach	Steve Hays, Chelan County PUD
o.	Rock Island	(509) 663-8121
p.	Priest Rapids	Mike Dell, Grant County PUD (509) 754-3541

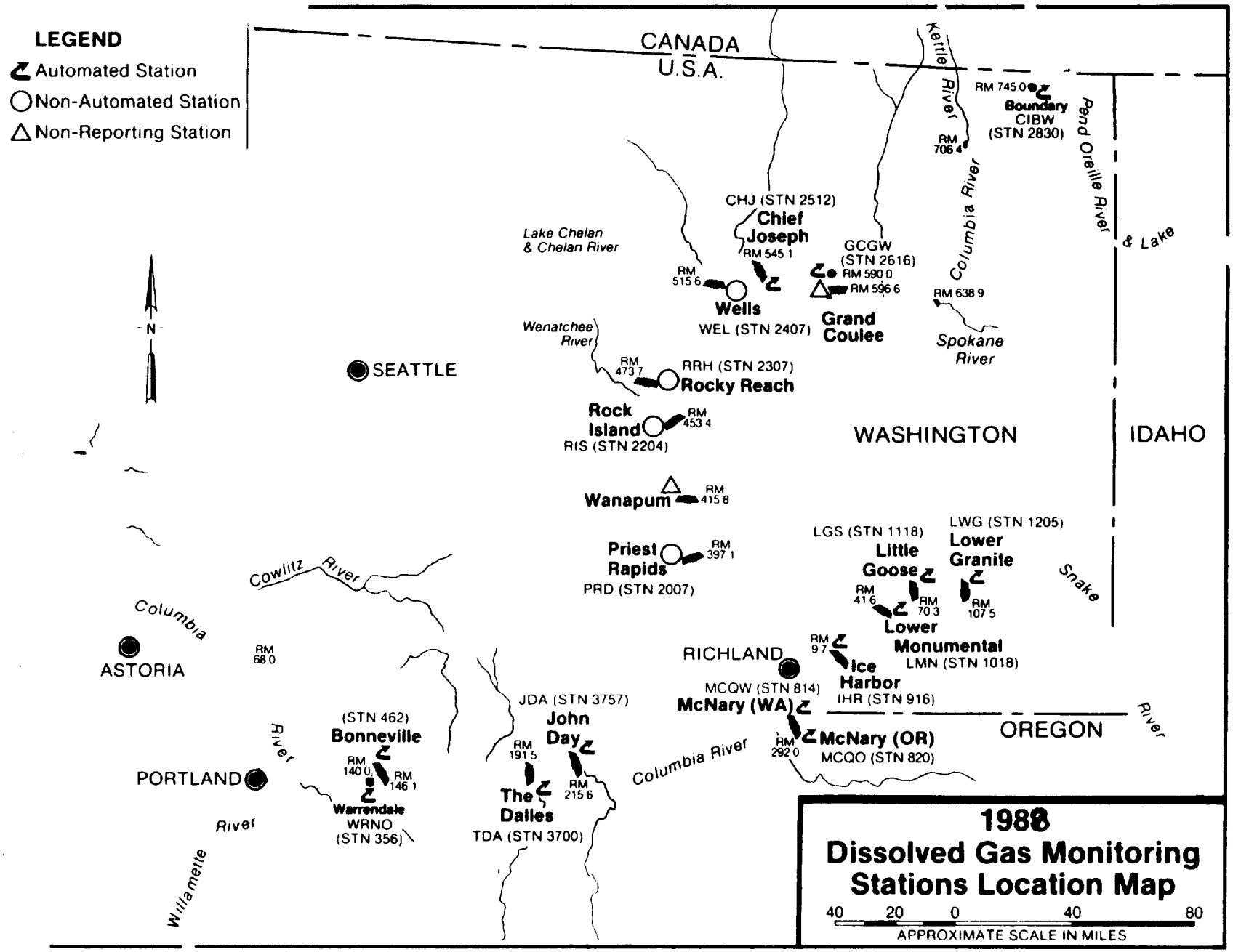
LEGEND
Automated Station
Non-Automated Station
Non-Reporting Station
CANADA
U.S.A.
Kettle River
RM 745.0
Boundary
CIBW
(STN 2830)
RM 706.4
Pend Oreille River
& Lake
Columbia River
RM 638.9
Spokane River
CHJ (STN 2512)
Chief Joseph
RM 545.1
GCGW
(STN 2616)
RM 590.0
RM 596.6
Grand Coulee
Lake Chelan & Chelan River
RM 515.6
Wells
WEL (STN 2407)
Wenatchee River
RM 473.7
RRH (STN 2307)
Rocky Reach
Rock Island
RM 453.4
RIS (STN 2204)
WASHINGTON
IDAHO
SEATTLE
N
Wanapum
RM 415.8
Priest Rapids
RM 397.1
PRD (STN 2007)
LGS (STN 1118)
Little Goose
RM 416
RM 703
LWG (STN 1205)
Lower Granite
RM 107.5
Snake
Lower Monumental
LMN (STN 1018)
RM 9.7
Ice Harbor
IHR (STN 916)
RICHLAND
MCQW (STN 814)
McNary (WA)
McNary (OR)
MCQO (STN 820)
RM 292.0
OREGON
Columbia River
Cowlitz River
Columbia
RM 68.0
ASTORIA
PORTLAND
Willamette River
(STN 462)
Bonneville
RM 140.1
RM 146.1
Warrendale
WRNO
(STN 356)
JDA (STN 3757)
John Day
RM 191.5
RM 215.6
The Dalles
TDA (STN 3700)
1988
Dissolved Gas Monitoring
Stations Location Map
40 20 0 40 80
APPROXIMATE SCALE IN MILES

Figure 1

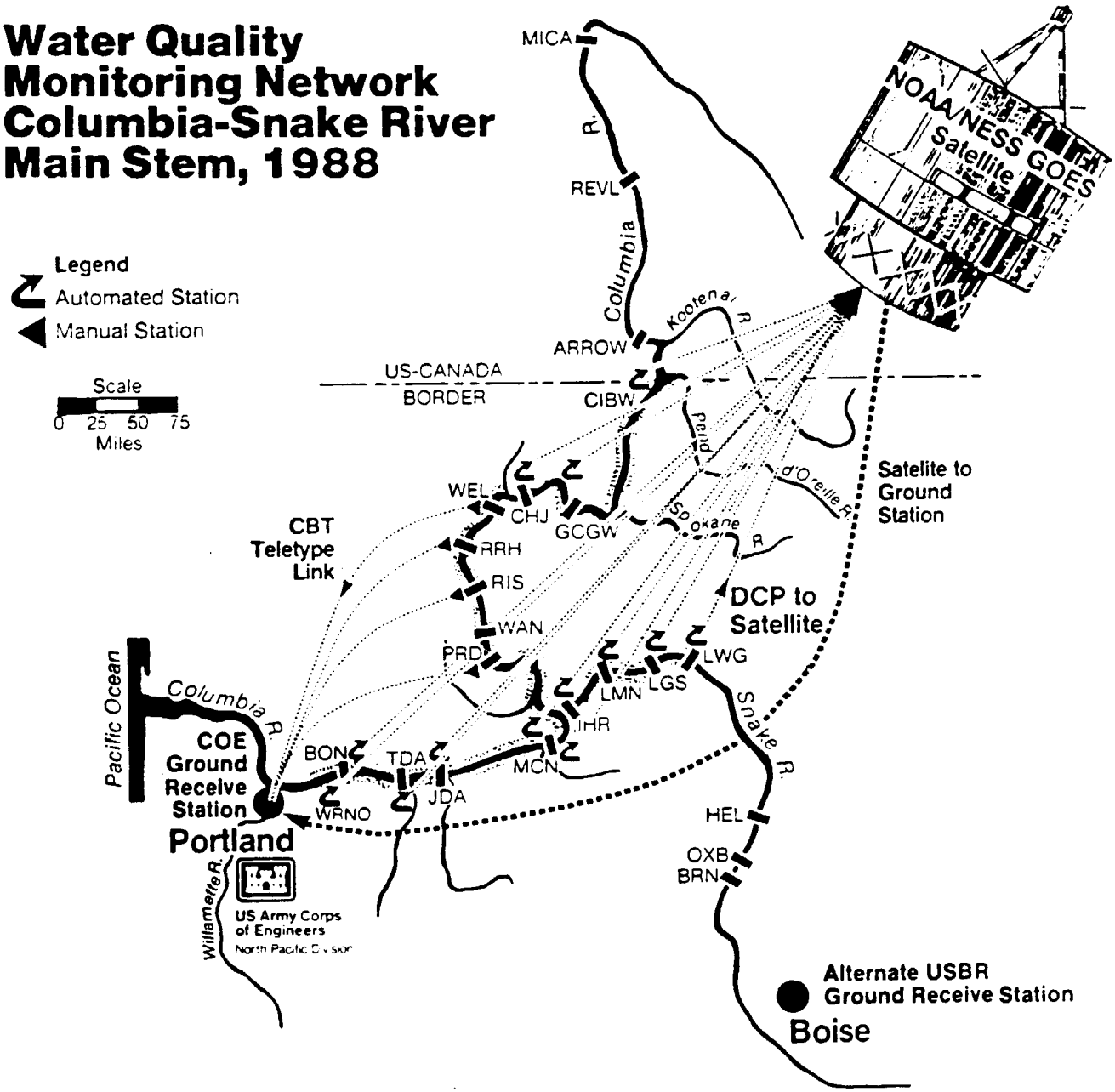
Water Quality Monitoring Network Columbia-Snake River Main Stem, 1988
Legend
Automated Station
Manual Station
Scale
0 25 50 75
Miles
MICA
REVL
Columbia R.
ARROW
Kootenai R.
US-CANADA BORDER
CIBW
Pend d'Oreille R.
NOAA/NESS GOES Satellite
Satelite to Ground Station
WEL
CHJ
GCGW
Spokane R.
CBT Teletype Link
RRH
RIS
WAN
PRD
DCP to Satellite
LWG
LMN
LGS
IHR
MCN
TDA
JDA
BON
WRNO
Pacific Ocean
Columbia R.
COE Ground Receive Station
Portland
Willamette R.
US Army Corps of Engineers
North Pacific Division
Snake R.
HEL
OXB
BRN
Alternate USBR Ground Receive Station
Boise

Figure 2

$RE, 102

REPORT 102
TOTAL DISSOLVED GAS REPORT
FOR 16 JUNE 1987

RUN DATE 17 JUN 1987

CBTT	PROJECT	DATE	TIME	WA TM DEG C	BARO PRES	TD GAS PRES	TD GAS %	SPL QS	TOT QR	NUMB GATES
CIBW	BOUNDARY									
		15JUN87	1000	12.6	724.0	852.0	117.7			
		15JUN87	1300	13.3	724.0	857.0	118.4			
		15JUN87	1700	13.5	724.0	859.0	118.6			
		15JUN87	2100	13.3	724.0	854.0	118.0			
		16JUN87	0100	13.1	724.0	848.0	117.2			
		16JUN87	0500	12.5	724.0	840.0	117.1			
		16JUN87	0900	13.4	724.0	844.0	116.6			
GCGW	GRD COULEE									
		15JUN87	0500	11.7	733.0	800.0	109.1	0.0	42.1	0
		15JUN87	0900	11.8	733.0	829.0	113.1	0.0	131.5	0
		15JUN87	1300	12.9	733.0	834.0	113.8	0.0	139.0	0
		15JUN87	1700	12.9	733.0	824.0	112.4	0.0	107.5	0
		15JUN87	2100	13.1	733.0	824.0	112.4	0.0	94.6	0
		16JUN87	0100	12.7	733.0	811.0	110.6	0.0	40.4	0
		16JUN87	0500	11.7	733.0	802.0	109.4	0.0	67.4	0
		16JUN87	0900	12.5	733.0	823.0	112.3	0.0	117.0	0
CHJ	CHIEF JOSEPH									
		15JUN87	0500	13.7	732.0	825.0	112.7	0.0	41.0	0
		15JUN87	0900	13.8	733.0	825.0	112.6	0.0	130.9	0
		15JUN87	1300	13.7	731.0	825.0	112.9	0.0	125.7	0
		15JUN87	1700	14.4	730.0	822.0	112.9	0.0	111.1	0
		15JUN87	2100	13.9	731.0	809.0	110.4	0.0	95.0	0
		16JUN87	0100	13.6	733.0	825.0	112.6	0.0	42.1	0
		16JUN87	0500	13.6	735.0	813.0	110.6	0.0	55.7	0
		16JUN87	0900	13.3	737.0	820.0	111.3	0.0	138.3	0
WEL	WELLS DAM									
		15JUN87	0500	14.4	733.0	819.0	111.7	0.0	44.5	0
		15JUN87	0900	14.4	734.0	820.0	111.7	0.0	119.6	0
		15JUN87	1300	14.7	734.0	819.0	111.6	0.0	126.6	0
		15JUN87	1700	14.7	735.0	818.0	111.3	0.0	119.0	0
		15JUN87	2100	14.7	735.0	820.0	111.6	0.0	100.0	0
		16JUN87	0100	14.7	736.0	819.0	111.3	0.0	50.6	0
		16JUN87	0400	14.6	741.0	813.0	109.7	0.0	42.8	0
		16JUN87	0900	14.4	742.0	813.0	109.6	0.0	150.3	0
RRH	ROCKY REACH DAM									
		15JUN87	0500	14.9	736.0	814.0	110.6	0.0	49.7	0
		15JUN87	0900	15.0	737.0	814.0	110.4	0.0	95.0	0
		15JUN87	1300	15.0	737.0	813.0	111.0	0.0	135.8	0
		15JUN87	1700	14.9	736.0	818.0	111.1	0.0	101.3	0
		15JUN87	2100	14.6	712.0	814.0	114.3	0.0	121.4	0
		16JUN87	0100	14.6	739.0	809.0	109.5	0.0	72.2	0
		16JUN87	0500	14.7	741.0	809.0	109.2	0.0	49.5	0
		16JUN87	1000	14.7	741.0	806.0	108.8	0.0	147.7	0

Figure 3