APPENDIX G

Response to Comments

SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

August 24, 1989
PUD 18626

Mr. Gary Engman
Washington State Dept. of Wildlife
Region 4
16018 Mill Creek Boulevard
Mill Creek, WA 98012

Mr. Jon Linvog
National Marine Fisheries Service
7600 Sand Point Way NE
Bin C 15700
Seattle, WA 98115

Mr. David Somers
Tulalip Tribes, Inc.
6700 Totem Beach Road
Marysville, WA 98270

Mr. Gwill Ging
U.S. Fish & Wildlife Service
2625 Parkmont Lane SW
Olympia, WA 98502

Mr. Robert Gerke
Department of Fisheries
3939 Cleveland Avenue
Tumwater, WA 98504

Gentlemen:

RE: Jackson Project - FERC #2157
Adult Fish Passage (Powerhouse Berm) Study
1989 Winter-run Steelhead Trout Spawning Ground Survey

On March 27, 1989, we advised you that with consultant assistance the District was conducting another survey on winter-run steelhead trout spawning (PUD-18260). The report on the results of the 1989 steelhead spawning survey on the Sultan River is transmitted herewith for your review.

The average daily river flow was moderate to low during the 1989 steelhead spawning season, but powerhouse flows generally were greater than 50% of total flows during April, May and June. Power generation during the migrating season/survey period (March-June) was slightly above average (152,888 MWh vs 138,000 MWh), based on the project's operating simulation model. April was a "wet month" with generation more than twice the average while the other months were below average. April also had the highest flows during the survey period as well as the highest proportion of powerhouse flows. Therefore, the high powerhouse flows observed in April provided a good test of fish berm effectiveness at attracting fish and aiding their upstream migration.

Your review attention is directed to the following items in the 1989 steelhead spawning survey report attached:

1) Acceptability of the 1989 survey and report; and
2) The need to conduct the third survey in the current series of three.

(1745U)

Please submit your review comments, if any, to the District no later than thirty (30) days after receipt of this letter and attached report. Bear in mind that this study report, as part of the adult fish passage study, is needed by the District to send to the Federal Energy Regulatory Commission for its evaluation of the proposed revised reservoir operating plan under License Article 57. Your cooperation in assisting us by completing a timely review would be appreciated.

Very truly yours,

for J. D. Maner, Director
Engineering and Power Supply

Attachment
JDM:vr
cc: Bell & Ingram
Dr. Weitkamp, Parametrix, Inc.
Cashell, FERC (w/o attachment)
Martin, FERC (w/o attachment)

(1745U)

Appendix G

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
847 NE 19th AVENUE, SUITE 350
PORTLAND, OREGON 97232-2274
(503) 230-5400

April 4, 1986 F/NWR5

Mr. J. D. Maner, Executive Director
Utility Operations
Snohomish County Public Utility
District No. 1
P.O. Box 1107
Everett, Washington 98206

Dear Mr. Maner:

Re: Jackson (Sultan) Project - FERC No. 2157, Draft Report on the Adult Fish Passage Study

National Marine Fisheries Service (NMFS) reviewed the referenced report and has the following comments for your consideration.

In general, an uncommonly low runoff year and the resulting narrow range of discharge scenarios that the study was based on provide unconvincing results that do not totally alleviate our concern with fish migration past the powerhouse. The following specific comments should serve to clarify this position.

Specific Comments

Page 5, Flow Regime, paragraph 2. For more clarity, the reference to minimum flows required in the FERC operating license should also specify the minimum flows required for release at the diversion dam which vary during the year from 95 cfs to 175 cfs. (1)

Page 11, paragraph 2. It's stated that "Steelhead trout were reported swimming over the berm in that flow regime during testing of the Pelton turbines in the Spring, 1984." This is too vague and unless there is supporting documentation indicating the exact time and date of the observation and the person observing it, the statement should be deleted. (2)

Page 17, Spawning Ground Surveys. For comparative purposes, data from chinook spawner surveys conducted prior to project construction and also in 1985 should be included in the report in tabular form. (3)

Page 26, Summer-Run Steelhead. It's indicated that temperature monitoring above and below the fish berm was initiated during the summer-run steelhead migration. However, there is no reason given as to why similar temperature monitoring did not occur for the chinook or winter steelhead observations. (4)

Response by Public Utility District No. 1 of Snohomish County
to Review Comments by NMFS
(As of January 22, 1987)

1. The discussion about minimum instream flows on page 5 in paragraph 2 under Flow Regime has been revised by adding the flow schedule from the Settlement Agreement which is approved by Order of the FERC issued February 9, 1983 (22 FERC ¶ 61,140).

2. The observation was reported verbally by Jim Daley, Project Construction Engineer (Bechtel) to R. Metzgar. However, a diary review did not produce the date/time of the reported observation. Mr. Daley should be considered as a reliable witness. However, without further substantiating information, the statement will be deleted. Deletion, however, does not mean that the incident did not occur.

3. Agreed. Additional pre-construction chinook spawner survey data will be added. Revisions will be made at appropriate places in the text, such as at page 12 (first paragraph) and page 17, reflecting this revision. Also, the 1985 and 1986 survey results will be added to the report.

4. Monitoring water temperature with respect to the summer-run steelhead was suggested to the study consultant by the Washington Department of Game. The adult summer-run steelhead upstream migration season (summer) is the most likely one to have widely fluctuating temperature changes, rather than fall (constantly declining) or winter (nearly constant). Also, there was no reason to specifically monitor water temperature since project operation, direct discharge to the river at the powerplant was limited due to low water storage in the reservoir. Consequently, the possibility of a thermal "barrier" existing at the berm was deemed unlikely. Also, see comment #8 below.

(2199U)

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Page 44, Spawning Ground Surveys, paragraph 2. The second sentence in this paragraph is missing a word after "distinctly." We assume that the word should be "different." (5)

Page 55, Discussion

Chinook Passage

As indicated in Figure 10, page 35, the chinook observations occurred during a period of very low powerhouse dischages (30-70 cfs +). These discharges represented only 15 to 40 percent of total flow. What will normal powerhouse discharge be during a normal or wet water year during this period? This evaluation may need repeating with more normal powerhouse (i.e. higher) discharges since migration delays would not normally be expected at the flow splits observed. (6)

Page 56, paragraph 1. It's indicated that "Powerhouse discharge represented only 15 to 50 percent of the total flow, . . . " However, the maximum percentage of powerhousn discharge that we can calculate from Figure 10, page 35 is approximately 40 percent. This occurred during the first part of September when powerhouse discharge was about 70 cfs and total flow about 180 cfs. (7)

Page 57, paragraph 2. It's puzzling why "temperature differences at the berm slot" are indicated as a possible cause of a chinook spawning distribution shift when apparently no temperature data was obtained in this regard. If it is available, it should certainly be presented and discussed in the report. (8)

In addition, another possible factor discussed as causing a spawning distribution shift is the amount of available spawning habitat upstream and downstream from the powerhouse. On page 59, the statement is made that "Re-regulation of Sultan River flows due to project operations has increased the spawning area available, especially downstream from the powerhouse." However, no data or analysis are presented which shows how re-regulated flows are better for the lower river spawning habitat compared to the natural, pre-project flow regime. (9)

Page 61, paragraph 2. We agree with the statement that ". . . it is not possible at this time to determine if mitigative action is warrented" (sic). (10)

Page 63, Winter-Run Steelhead. The fact that only two radio tagged steelhead passed the powerhouse provides inconclusive data that the fish berm effectively passed steelhead. Since most of the tagged fish were of hatchery origin, few of these fish, if any, would be expected to migrate past the powerhouse since they were planted as juveniles in the lower river. (11)

5. The comment refers to page 44, but the sentence mentioned is on page 48. The missing word is "different" as suggested, and is in the revised text.

6. Although project operating experience and data are limited, the District believes that the instream flow condition at the powerhouse will be quite similar in most years to that recorded thus far. That is, the stream flow range and direct releases from the power plant, if any, will be small (100 cfs to 450 cfs) during the months of August-September through mid-October. The project will always be operated in a water-conserving mode during late summer and early fall, the historic period of usual low rainfall and runoff. The only two exceptions to this "rule" would be a loss of generation capacity at the Centralia Steam Plant or from other sources which are providing firm power to the regional system for the District's share of the electric power demand. Then, if water storage in Spada Lake permitted, the District would produce to the extent feasible the equivalent amount of power by the Jackson Project.

   The second exception would occur if the reservoir was filled (elevation 1,450') and spilling either was likely or occurring. Then the power plant would be operated so as to regain control of the reservoir. In this event, stream flow would be unusually high anyway due to the precipitation/runoff creating a spill condition. Also, the power plant would be operated so as to lower reservoir water surface elevation before late fall/early winter with expected usually heavier rainfall/runoff periods. This condition is one that needs to be analyzed (and will be) by pending operational studies to be conducted as part of the flood control operation plan required by FERC Project License Article 57.

7. The 50 percent of powerhouse discharge to total stream flow occurs during the last part of October with a discharge of 350 cfs in a total flow of 600 cfs (both approximate numbers). Thus, the powerhouse discharge contribution at that time is 58 percent as shown as Figure 10, page 35.

8. The matter of differential water temperatures at the berm was postulated as a possible factor affecting the upstream migration of chinook past the powerhouse. The comments on page 57 were speculative in both intent and content and since specific water temperature documentation is lacking, they will be treated similarly as the statement about the observation of steelhead swimming over the berm (see #2 above). They will be deleted. Furthermore, the most accurate statement assessing the 1985 season is: "Since the powerhouse was shutdown completely during the 1985 fall chinook spawning season, there could be no operationally related upstream passage problem at the berm".

   Speculation on water temperature arose due to the fact that instream flows in the Sultan River were maintained during the operational shutdown by releases at Culmback Dam. Since the Howell-Bunger valve is at the base of the dam, colder water than normal was released. This water was a few degrees colder than the historical minimum water temperature range. Thus, the upstream reaches of the river closer to Culmback Dam, such as those above the powerhouse, experienced colder water temperatures than reaches further downstream, which benefited from travel time and thus gradual warming of the water by warmer air temperatures and direct sunlight.

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9. Regarding the spawning habitat improvement to areas downstream of the powerhouse in the lower Sultan River (page 59), the statement is based on the establishment of an "optimum" minimum instream flow schedule by the Joint Agencies during the planning and licensing phase of Stage II of the project. Perhaps it is merely intuitive and, indeed, unsupported by data and analysis which show irrefutably how re-regulated flows are better for lower river spawning habitat compared to the natural pre-project flow regime. However, Project history shows that the Joint Agencies insisted on increasing minimum instream flows in the Lower river from 50 cfs from June 1 to September 30 and 125 cfs from October 1 to May 31 to 165 cfs (June 16 to September 14) and 200 cfs for the remainder of the year, respectively.

   In the past two spawning years (1985 and 1986), storage at Spada Lake has provided the ability to augment the natural seasonal low flows which would have occurred in the lower river without the Project. For example, over two weeks in September 1986 had flows below 100 cfs into Spada Lake (based on Project operational records). The lowest flow was 47 cfs. Similarly, such low flows were recorded for October, 1986. These low flows would have received some augmentation from tributary drainage below Culmback Dam. Nevertheless, the total flow would have been substantially below the present required minimum of 200 cfs for September 15 to June 15.

   A similar low flow situation occurred during the 1985 fall spawning season. At that time due to the large pink salmon spawner run, the Washington Department of Fisheries requested flow augmentation to provide more spawning areas and thus reduce redd supraimposition in some overcrowded river channel reaches. The spawner response was favorable in that adults moved into areas formerly inaccessible due to inadequate water depths and velocities. Thus, the District and its consultant speculated/concluded that more consistent and stable flows may have (emphasized) improved the desirability of existing spawning areas in the lower river.

10. Comment noted. The typographical error will be corrected in the word "warranted"..

11. The NMFS comments raise the point about passage effectiveness of the berm for winter-run steelhead. We believe the comment misses the point about the basic reason for radio-tagging, which was to monitor behavior in the tailrace area of the power plant, as one indicator of berm effectiveness. When high instream turbid river flows are combined with large discharges from the power plant, it is difficult to observe fish behavior in the tailrace, especially delay or entry, if any, into the discharge canals of turbine units nos. 1 and 2.

    It is an interesting artifact of the radio-tagging effort that apparently the fish trap and/or site chosen selectively fished mostly hatchery origin fish or that most wild fish successfully avoided the tagging fish trap, because post-project (Stage II) steelhead spawning ("wild" fish) above the berm was consistent with pre-project spawning records. Tagging only "natural" or "wild" fish rather than hatchery origin winter-run steelhead trout was intended, using the dorsal fin as the criteria. Discovery that most tagged fish were of hatchery origin instead of "wild/natural" was made through later laboratory analysis of scale samples collected at the trapping site while tagging fish.

Appendix G

Page 64, Summer-Run Steelhead. The summer steelhead study occurred during a period when the powerhouse was shut down most of the time, and therefore can't really be considered a valid test. The test should have occurred during more normal powerhouse operations. (12)

In addition, the flow split was about 109 cfs/327 cfs (above powerhouse/powerhouse discharge) during the time when the powerhouse discharge was 3° C. cooler than the water coming through the berm slot. Is this a normally expected flow split for this time of year? If the powerhouse discharge will normally be even greater, the temperature differential could have a more significant impact. Even 3° C. may be a problem, especially if the powerhouse discharge is large in relation to total flow.

The report should provide specific information on the ranges of streamflows and powerhouse discharges normally expected during the various seasons. Providing such information would allow a reviewer to better evaluate if the conditions studies were representative of conditions which will normally occur. (13)

We appreciate the opportunity to comment on the draft report and, pending receipt of comments from other fishery interests, believe that it may be appropriate to meet with Snohomish PUD and the study consultant to constructively discuss everyone's comments and concerns. (14) (15)

Sincerely,

Dale R. Evans

Dale R. Evans
Division Chief

cc: WDG (Engman)
WDF (Bruya)
USFW (Ging)
Tulalip Tribes (Somers)
Parametric, Inc. (Weitkamp)

12. Concerning the validity of the study on summer-run steelhead due to project shutdown, it appears that the months of July, August, September and mid-October will "normally" be low power generation periods for the Jackson Project. The three years of operating experience may not be definitive as each year was "unusually" dry. Nevertheless, when wetter summer seasons occur, the project will be operated to minimize spill yet conserve water. The exception has been discussed in #6 above. Consequently, the year of the study on summer-run steelhead (1985) appears to be "normal", except for water temperature, in terms of project operation (even through the project was shutdown completely), and thus the summer-run steelhead trout results are, indeed, valid and reflect expected future conditions and results for that species.

13. Project power operation is determined by several factors such as City of Everett water demand and consequent requirements to maintain certain elevations in Lake Chaplain; providing minimum instream flows; amount of water stored in Spada Lake; runoff into the reservoir; the snowpack; the time of year; terms of power supply contracts in force and Exhibit H (Figure H-3) in the License Amendment Application to the FERC. Some of these factors are dependent (interactive), and some are independent variables. Consequently, there are innumerable possible combinations which make it difficult to provide a reliable or reasonable range and schedule for powerhouse discharges which might be expected during various seasons. Generally, the following schedule may be expected, but the extent or duration of the discharge range will be determined by whether runoff conditions are "wet", "dry" or "average".

The discharge, except for minimum flows, may be highly variable and the duration irregular during most seasons. The mid/late summer to fall season has been, thus far, and would seem to be the most likely to be consistent. The most extreme range with greatest frequency of extremes will occur during the winter. As a year advances from winter into spring, the likelihood of extremes, their frequency and duration decrease, reflecting the climate with a decrease in weather extremes (heavy rainfall). However, then the snowpack and snowmelt must be anticipated. The combination of air temperature, cloud cover and rainfall will determine the runoff produced from the snowpack. During the reservoir filling period, power operation is set to prevent spilling and to avoid (if possible) wide fluctuations in discharge. Project operation relies upon effective anticipation and interpretation of given conditions, meteorological and hydrological forecasts and projections of power supply/demand. Accuracy in setting power generation will improve with the experience gained from more years of project operation by the scheduler. Since the project has been operated for commercial power generation for only 2.5 years, the following generalized information is the best "guesstimate" that can be presented in response to the comment.

Page 64, Summer-Run Steelhead. The summer steelhead study occurred during a period when the powerhouse was shut down most of the time, and therefore can't really be considered a valid test. The test should have occurred during more normal powerhouse operations. (12)

In addition, the flow split was about 109 cfs/327 cfs (above powerhouse/powerhouse discharge) during the time when the powerhouse discharge was 3° C. cooler than the water coming through the berm slot. Is this a normally expected flow split for this time of year? If the powerhouse discharge will normally be even greater, the temperature differential could have a more significant impact. Even 3° C. may be a problem, especially if the powerhouse discharge is large in relation to total flow.

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We appreciate the opportunity to comment on the draft report and, pending receipt of comments from other fishery interests, believe that it may be appropriate to meet with Snohomish PUD and the study consultant to constructively discuss everyone's comments and concerns. (14) (15)

Sincerely,

Dale R. Evans

Dale R. Evans
Division Chief

cc: WDG (Engman)
WDF (Bruya)
USFW (Ging)
Tulalip Tribes (Somers)
Parametric, Inc. (Weitkamp)

Discharge	Season	Comments
1,300 to 750 cfs	10/15 to 5/30	Used during winter to optimize stored water. In Spring, extent depends on snowmelt.
750 - 450 cfs	4/1 to 7/15	Depends on snowpack; used to maintain or gain reservoir elevation during filling.
450 - 200 cfs	5/15 to 7/15	Depends on rainfall; used to maintain or gain reservoir elevation during filling.
200 - 100 cfs	7/15 to 10/15	Used to provide instream flows during "dry" season.

In summary, the scheduler, with very few exceptions, maintains maximum water releases (approximately 1300 cfs) to the river for power when the reservoir is in State 1 and 2 as defined in Exhibit H, Figure H-3. When the reservoir is in State 3 water releases for power vary according to power demands with consideration given to present and forecasted conditions. When the reservoir is in State 4, only minimum water requirements are satisfied in terms of direct discharge from the powerhouse to the river.

14. The District agrees with the suggestion for further consultations and proposes that this set of responses to NMFS comments be the basis for revising the draft study report and for review/comment by other members of the Joint Agencies. These responses may be revised later also before submittal to the FERC along with other comments/responses produced by future consultations. The District desires to produce an accurate record of consultations for the benefit of the FERC in that agency's review of the adult fish passage anadromous fish mitigation issue.

15. Revised study report pages have been prepared reflecting review comments by the NMFS and the results of spawning surveys conducted in the fall 1985 and 1986.