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ALASKA POWER AUTHORITY

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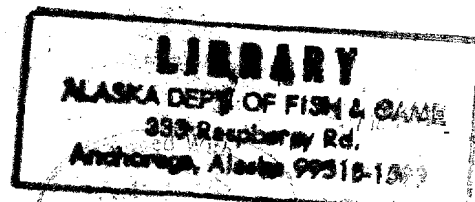
F471

no. 2902

SUSITNA HYDROELECTRIC PROJECT

FERC No. 7114

ALASKA



Comments Submitted by Resource Agencies,
Intervenors and the General Public
on the

Draft Environmental Impact Statement
prepared by

Office of Electric Power Regulation
Federal Energy Regulatory Commission

May 1984

ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska

I. Introduction:

The Susitna Hydroelectric Project License Application was originally filed by the Alaska Power Authority (Power Authority) in February 1983. After the Federal Energy Regulatory Commission (FERC) issued a "non conforming" letter, a revised license application was submitted to the FERC on July 11, 1983. This was accepted by FERC on July 29, 1983. Subsequent to the FERC acceptance, comments on the application were filed by federal and state agencies with resource management responsibilities. The Power Authority responded to these comments in filings made January 19, 1984, and February 15, 1984. The FERC issued its Draft Environmental Impact Statement (DEIS) on May 17, 1984, which recommended a mixed hydro/thermal generation scenario in lieu of the Susitna Project. The Power Authority responded to the DEIS in comments filed on August 23, 1984.

Federal and state resource agencies, intervenors and the general public also submitted comments to FERC on their DEIS. Contained herein are copies of the comments submitted to the FERC as of September 4, 1984. The following comments were received:

Federal Agencies

1. Bruce Blanchard, Director
Environmental Project Review
U.S. Department of Interior

September 4, 1984
2. Robert W. McVey, Director
Alaska Region
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

July 3, 1984
3. Richard D. Hull, Director of Lands
U.S. Department of Agriculture

June 20, 1984
4. D.E. Olson, Chief
Planning Division
North Pacific Division
Corps of Engineers
Department of the Army

July 25, 1984

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5. Robert J. Cross, Administrator
Alaska Power Administration
Department of Energy

July 6, 1984
6. Ernesta B. Barnes, Regional Administrator
Region X
U.S. Environmental Protection Agency

July 31, 1984
7. Thomas F. King, Director
Office of Cultural Resource Reservation
Advisory Council on Historic Preservation

August 29, 1984

State Agencies

8. Robert L. Grogan, Assistant Director
Division of Governmental Coordination
Office of Management and Budget
Office of the Governor
State of Alaska

September 4, 1984
- The OMB letter represented a synthesis of two letters submitted to OMB.
- 8A. Carl M. Yanagawa, Regional Supervisor
Habitat Division
Department of Fish and Game

August 13, 1984
 - 8B. Esther C. Wunnicke, Commissioner
Department of Natural Resources

August 8, 1984

The ADF&G and DNR letters were not submitted to FERC.

9. David W. Hangen, Deputy Commissioner
Central Region
Department of Transportation
and Public Facilities

July 23, 1984

The DOTPF letter was not submitted to FERC.

Local Government

10. Gary C. Tucker, Attorney for
Anchorage Municipal Light and Power
Municipality of Anchorage

August 15, 1984

Individuals and Organizations

11. Paul Bratton, for
Alaska Survival
Box 343, Talkeetna

August 14, 1984

12. Matthey Zencey, Energy Director
Rural Alaska Community Action Program, Inc.
and Jeff Weltzin, Chair
Alaska Regional Energy Association

August 22, 1984

13. Ann M. Sugrue
Alaska Consumer Advocacy Program

August 22, 1984

14. Roberta Sheldon,
Talkeetna, Alaska

August 20, 1984

15. Becky Long
Talkeetna, Alaska

August 6, 1984

16. Denis Ransur (?)
Talkeetna, Alaska

August 13, 1984

17. Jeff Weltzin
Fairbanks, Alaska

August 24, 1984 (?)

Containing several ADF&G memoranda.

18. R.B. Stiles
Coal Operators and Alaska Leaseholders

July 5, 1984

II. Synopsis of Comments on FERC's
Draft Environmental Impact Statement (DEIS)

FEDERAL AGENCIES

Department of the Army, Corps of Engineers (07-25-84)

Their review indicated that the treatment of the impacts of the proposed action on wetlands in the project area was too broad and general for an adequate impact assessment. They had no comments on other areas of responsibility, including flood control, navigation and hydropower.

Department of Energy, Alaska Power Administration (07-06-84)

Their comments focussed on three areas: load forecasts, fuel price assumptions, and other hydroelectric alternatives. They stated that forecast models have consistently underestimated short-term growth and suggested that FERC accept the Authority's submitted forecasts and examine the risk that the forecasts may be too low. They also suggested that FERC accept the Authority's economic assumptions, which are consistent with the National Energy Policy Plan, rather than their current assumptions which fall well below the low range assumptions of the plan. In terms of other hydroelectric alternatives, the Department of Energy (DOE) recommended that four of the five sites suggested by FERC, Johnson, Browne, Keetna, and Snow not receive further consideration in light of underestimation of total costs by at least \$1.0 billion, technical difficulties, and serious environmental problems which substantially exceed those associated with full development of the Susitna hydro resources. Available data regarding the fifth site, Chakachamna, supported the finding that Chakachamna is not more attractive than Susitna.

The DOE concluded that over the long run, the Susitna project has acceptable environmental costs and will be of great and lasting benefit to the people of Alaska.

Department of the Interior (08-29-84)

The DOI's assessment concluded that the impact analysis as presented in the DEIS in support of FERC staff's recommended hydrothermal alternative was inadequate for an overall comparison of environmental impacts or mitigation plans to the proposed project; however, they further stated that FERC staff's recommended alternative would be significantly more damaging to fish and wildlife resources than the proposed project. In addition, they stated that information regarding eagle nests subject to disturbance from the proposed project should be clarified and that the taking of bald eagles or their nests may be permitted under eagle permit regulations (reference Bald Eagle Protection Act including recent amendment).

They recommend development and incorporation of a specific and acceptable mitigation plan prior to license issuance, and that if hydroelectric development is authorized in the Susitna Basin, that it be licensed and constructed in stages. In an effort to provide a clear understanding on which to base decisions regarding the project, the DOI recommended that the EIS be augmented to adequately and quantitatively address the impacts of both the proposed project and FERC staff's recommended hydro-thermal alternative.

National Marine Fisheries Service, Alaska Region (07-03-84)

Concern was expressed that the DEIS is deficient in that sufficient information was not provided to allow project-related fishery impacts to be identified and mitigated and that it failed to satisfy NEPA guidelines. Further, they suggested that the FERC prepare either a second DEIS or a supplement.

United States Environmental Protection Agency (07-23-84)

Their assessment concluded that the DEIS provides a very unbalanced, superficial analysis of alternative systems, while providing a relatively thorough evaluation of the impacts of the Susitna project. They delineated impacts related to the Susitna project as well as to the alternatives, which were not adequately addressed, and stated that the economic analysis requires substantial reworking in order to provide an objective comparison of the alternatives. They determined that the DEIS was inadequate due to data gaps and lack of detail, and that the recommendation as set forth in the DEIS was essentially unsupported in light of the absence of appropriate data and analysis. This led them to recommend that FERC prepare a revised DEIS.

United States Department of Agriculture (06-26-84)

This agency felt that the DEIS presented a comprehensive analysis of the effects of the construction and operation of the proposed Susitna Hydroelectric Project. The Director, Basin and Area Planning Division, had no objection to the plan, stating that it would have little impact on agricultural activity; however, the National Environmental Coordinator cautioned that any significant environmental effects be mitigated to the extent possible if the decision was made to proceed.

STATE AGENCIES

Department of Fish and Game (received 08-13-84)

Based on their review, it was concluded that the DEIS does not contain sufficient fish and wildlife data on which to base project decisions. Major areas were identified as requiring more thorough consideration on which to base an adequate assessment of the

project's environmental impacts. The issue identified by ADF&G as being the most significant for inclusion in the EIS was an analysis of impact issues, subsequent identification of significant impacts, and a recommended plan to mitigate these impacts.

They concluded that the information contained in the DEIS did not reflect the level of information available regarding the project, nor clearly identify mechanisms which would serve to incorporate information arising from ongoing studies and other sources into the impact assessment to mitigation planning process. They strongly recommended that the EIS be modified to accommodate identified concerns, such that it might serve as a useful document in making decisions on project feasibility.

Department of Natural Resources (08-08-84)

This agency concluded that, in general, the DEIS did not provide sufficient information on which to allow them to properly assess the project's potential impacts upon area resources. The request was made for additional information on which to base a meaningful project analysis. Issues which were not adequately addressed in the DEIS dealt with processing of DNR project applications, including the application to construct or modify a dam. It was further stated that these areas must be adequately answered in the FEIS in order for DNR to perform its adjudicative functions without disruptive delays.

Department of Transportation and Public Facilities (07-23-84)

Their preliminary assessment concluded that impacts stemming from the potential development of the Browne and Johnson sites would have to be addressed by their agency; however, the Keetna, Snow, Chakachamna, and Susitna sites did not appear to directly impact any of their facilities significantly.

OTHER PARTIES

Coal Operators and Alaska Leaseholders (C.O.A.L.) (07-05-84)

This organization felt that the analysis was thorough and objective. They stated that their analysis supported the conclusion as presented in the DEIS, that a mixed thermal-based generation scenario, supplemented with selected non-Susitna Basin hydropower facilities, would be the most effective approach to meeting the projected generation requirement of the Railbelt area.

SUSITNA



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

AUG 29 1984

ER 84/710

Honorable Kenneth F. Plumb, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

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ALASKA POWER AUTHORITY

Dear Mr. Plumb:

The Department of the Interior has completed its review of the draft environmental statement for the Susitna Project (FERC No. 7114), Matanuska-Susitna Division, Alaska. We have the following comments and recommendations. Page specific detailed comments are included as an enclosure to this letter.

The FERC Staff's recommended alternative for energy development differs considerably from the applicant's proposed project. Although the FERC's recommended alternative of fossil fuel generation and selected hydropower development may be supportable, the impacts analysis in the DEIS is inadequate for comparison to the applicant's proposal. From the document it appears that FERC Staff's recommended alternative would be significantly more damaging to fish and wildlife resources than the applicant's proposed project. It has been acknowledged that fairly detailed site information is available for only one of the five hydroelectric sites favored by the Staff and that information on the other four sites is "limited primarily to non-specific inventory data and resource maps" (p. 2-41, par. 1). Such data do not appear adequate as a basis for an overall evaluation of the environmental impacts of the two alternative projects.

The greatest need for additional information appears to be for the four hydroelectric projects requiring dam construction under the "hydro-thermal" alternative. Foundation conditions have not been adequately described for any of those four sites. Geologic conditions of the reservoir areas have not been described in sufficient detail to permit even a rough estimate of the potential environmental impacts. Permafrost conditions and related impacts are mentioned in a highly generalized way for two of the four hydroelectric projects that would require new dams and reservoirs, but for all three sites that probably contain permafrost (Browne, Johnson, and Keetna sites) there is a need for further information on any potential impacts resulting from degradation of permafrost.

The large extent of land area required by the "hydro-thermal" alternative is of concern, since it would result in inundation of 102,000 acres (p. 4-86, sec. 4.5.1.2) and would require the dedication of over 115,000 acres for project purposes (p. 4-100, sec. 4.92). By comparison, the proposed Susitna Project would inundate about 46,000 acres and require either inundation or clearing of about 56,000 acres.

We find the DEIS inadequate in other impact analyses also. It does not contain a specific mitigation plan for either the FERC Staff's or the applicant's alternative. These deficiencies preclude identification or development of "all practicable means to avoid or

minimize environmental harm from the alternative selected..." [40 CFR, 1505.2(c)]. As a consequence, we believe the EIS should be augmented, with opportunity for public review, so that all relevant and reasonable mitigation measures are identified (even if they are outside the jurisdiction of the lead agency or cooperating agencies). This is essential if the FERC is to have the best possible information on which to base its decisions regarding the project.

Inasmuch as the applicant is continuing to pursue the project as proposed, we are continuing to work with it. Parallel deficiencies in the license application, in consideration of the magnitude of the proposed project, were the basis upon which we obtained intervenor status in this proceeding. In the absence of a specific and acceptable mitigation plan, we would not support licensing of the project until such a plan has been developed and incorporated as part of the project. Should the project be licensed without a satisfactory mitigation plan, we would recommend appropriate stipulations for incorporation into any Section 10 and Section 404 permits that may be issued by the U.S. Army Corps of Engineers.

The DEIS does not address the impacts of the project on the Denali National Scenic Highway designation as proposed in ANILCA, Section 131L. Although a negative recommendation for designation has been forwarded to Congress, the study corridor remains under a valid withdrawal pending Congressional action and the project's effects upon that withdrawal should be discussed in the final EIS. In addition, any crossings of other public lands or native allotments would have to be approved by the State Director, Bureau of Land Management and the Area Director, Bureau of Indian Affairs, respectively.

The DEIS, in our opinion, does not fully comply with the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act, and, unless it is significantly strengthened to discuss adequately the impacts of both the proposed action and FERC Staff's recommended alternative, including available data on fish and wildlife resources and a properly considered mitigation plan, we will consider referring it to the Council on Environmental Quality under 40 CFR 1504. As always, we would prefer to continue working with the FERC to resolve the issues we have raised here. For continuing coordination on this project, please contact the Field Supervisor, Western Alaska Ecological Services Field Office, U.S. Fish and Wildlife Service, 605 West 4th Avenue, Anchorage, Alaska 99501 (907 271-4575) and the State Director, Bureau of Land Management, 701 C Street, Box 13, Anchorage, Alaska 99513.

Sincerely,


Bruce Blanchard, Director
Environmental Project Review

Enclosure

cc: Mr. Fred E. Springer
Alaska Power Authority

Comments of the Department of the Interior on the
Draft Environmental Impact Statement for the Susitna Project, FERC #7114,
Matanuska-Susitna Division, Alaska
(ER 84/710)

GENERAL COMMENTS

The draft statement lacks needed information and is deficient on many points essential to a clear understanding of the environmental impacts that would result from the project. More specifically, the statement lacks a quantitative basis for many of its conclusions. Descriptions of existing resources, potential impacts, and mitigation opportunities are frequently only qualitative.

It is difficult to compare alternatives on the basis of the information provided. Although quantified information may not be readily available, we believe the discussions of alternatives could be better supported. Quantified information in the license application provided by commenters could be used to substantially improve discussions on baseline resources, impacts, and mitigation.

Another major deficiency is the lack of a coherent, specific mitigation plan. The statement should contain a mitigation plan endorsed by the Federal Energy Regulatory Commission (FERC) Staff which is specific and contains assurances that it would be implemented. The mitigation plan should be composed of those elements proposed by the applicant, by agencies and by other commenters on the license application and the draft statement, as well as those measures that the FERC Staff has independently formulated. The Department of the Interior (DOI), through its comments on the application, proposed a number of specific mitigation measures that should be incorporated into the mitigation plan. The statement should include recommended mitigation measures, or state why specific measures recommended by others are not considered appropriate.

We believe that if hydroelectric development is authorized in the Susitna Basin, it should be licensed and constructed in stages.

SPECIFIC COMMENTS

Main Text

Page 1-33, paragraph 6: Attention should be given to the Mt. Spurr geothermal site. This site was the first geothermal lease sale made by the Alaska Department of Natural Resources (ADNR). Although the interest level (as reflected by the bids offered) was low, the ADNR considered this the best potential geothermal development site within their jurisdiction.

Emphasis should be placed on utilizing geothermal energy for electrical generation rather than as a direct heat source.

Page 1-37, Table 1-20: The construction schedule should reflect the FERC Staff's analysis of when power upgrades would be needed and a realistic appraisal of when the alternative units could be brought on line.

Page 2-20, last paragraph: The major deficiency of the proposed recreation plan is that it was developed without an appropriate level of input from the resource management agencies, such as the U.S. Fish and Wildlife Service (FWS), Bureau of Land Management (BLM), and the National Park Service. For example, development of access and facilities on the south side of the Susitna River, particularly in the Fog Lakes and Stephan Lake/Prairie Creek areas, would result in conflicts with existing use of these areas by guides, lodges, and high seasonal brown bear concentrations. The FERC Staff should encourage the applicant to initiate discussions with resource management agencies so that a recreation plan can be developed free of conflicts with other components of the proposal. (See also our comments regarding Page 5-8, paragraphs 3 through 5.)

Page 2-22, paragraphs 5 and 6: To prevent significant habitat losses and disturbance, we have recommended to the applicant that no borrow activities occur in the portion of borrow site E at the confluence of Tsusena Creek with the Susitna River. If use of floodplain gravel from any of the proposed borrow pits would cause ice buildup as a result of groundwater overflow, the statement should discuss mitigation.

Page 2-24, paragraph 4: Since the design criteria manual and the construction practices manual are integral to the proposed mitigation plan, it is highly desirable that these manuals be subject to public review and comment. When found acceptable, these manuals should be incorporated into the license.

Page 2-25, paragraphs 7 and 8: We recommend that the FERC Staff comment on the adequacy of the applicant's efforts "to minimize impacts to vegetation... so as to reduce clearing requirements or effects on sensitive areas such as wetlands" in proposed facilities sitings and designs. We concur with the FERC Staff's comments on problems with the "liberal" correlations used to determine wetland areas from Viereck and Dyrness vegetation types and the need for more detailed studies (see page J-79, paragraph 3; page J-86, paragraph 1).

Page 2-25, paragraph 9: Until we are informed of the locations and proposed maintenance and public access of transmission corridor access trails, we cannot be sure how well potential impacts may be mitigated. Resource management agencies should also be involved when contractors prepare detailed access plans. A plan for minimizing public-use impacts, such as off-road vehicle use of project access routes, should be provided in the statement.

Page 2-27, paragraph 8: Please refer to our comments on requirements of the Bald Eagle Protection Act (page 4-45, paragraph 2). The FWS, which has statutory authority under this Act, has not agreed to the applicant's proposal of constructing artificial bald eagle nests (See DOI comments on page E-3-443 of the license application).

Page 2-27, paragraph 9: The first sentence should be changed to read "Compensation through habitat manipulation...." Enhancement can only occur after full mitigation has been achieved. We would caution that the feasibility of using controlled burning for habitat improvement is probably low.

Page 2-27, paragraph 10: Please reference the FWS letter dated October 12, 1983, to Lawrence Anderson (FERC) in which the FWS expresses concern over the

siting of the transmission lines near Nenana. The transmission lines pass within five miles of four, or possibly five, historic peregrine falcon eyries between Nenana and Fairbanks. Although these sites have not been recently used by peregrines, the FWS believes this nesting habitat may be reoccupied as peregrine populations increase to the levels preceding their decline. Considerable discussion has taken place between the FWS and the applicant, the Alaska Power Authority (APA). During an April 25, 1984, meeting, the APA representatives indicated their intention to consider rerouting the lines at least one mile from any historic eyries. Subsequent to that meeting, D. Roseneau of LGL Consultants reviewed all historical information on peregrine nesting and surveyed the peregrine habitat along this reach of the Tanana River. Roseneau presented his findings in a June 26, 1984, meeting at which representatives from FWS and APA were present. Roseneau reported that at the one location where the proposed transmission line closely approached historic peregrine nesting habitat (about 4 miles east of Nenana), the line would be approximately 1 3/8 mile from the cliff. Another cliff, located within 0.5 miles of the transmission line, which FWS considered possible historic nesting habitat, proved to lack suitable nesting sites. This finding lessens our concern over the present transmission line alignment, but does not remove the potential for disturbance to any peregrine attempting to reoccupy this habitat (i.e., the cliff located 1 3/8 miles away) while construction or maintenance activities were taking place.

Section 7(c) of the Endangered Species Act of 1973, as amended, requires Federal agencies to prepare a Biological Assessment (BA) when threatened or endangered species have been identified in the vicinity of a proposed construction project that is a major Federal action significantly affecting the quality of the human environment. Since the DEIS acknowledges (page 2-27) that the endangered American peregrine falcon (Falco peregrinus anatum) could be impacted by construction of the Healy to Fairbanks transmission line, a BA is required. The assessment should be completed in conjunction with the National Environmental Policy Act (NEPA) process and can be a section within the EIS that closely examines the potential effects of all components of the action on the peregrine. In general, a biological assessment should include the following:

- A. An onsite inspection of the area affected by the proposed project.
- B. Interviews with recognized experts on the species at issue.
- C. A literature review to determine the species distribution, habitat needs, and other biological requirements.
- D. An analysis of possible impacts to the species, including cumulative effects.
- E. An analysis of measures to avoid or minimize impacts.

Biological assessments may be prepared by a designated non-Federal entity. If, as a result of the assessment, it is concluded that the proposed activity may

affect the peregrine falcon, then a request for formal consultation should be submitted with a copy of the assessment to the Fish and Wildlife Service.

Page 2-28, paragraph 4: Different scheduling, worker transportation, and camp feature scenarios should be compared in regard to project socioeconomic impacts, and in later sections, mitigation.

Page 2-29, paragraph 3: In the discussion of cultural resources mitigation measures, there appears to be no provision for consultation with the Advisory Council on Historic Preservation as required by section 106 of the National Historic Preservation Act of 1966. The applicant has consistently been advised of this requirement by the National Park Service.

Page 2-41, paragraph 4: It should be clarified where the Johnson hydroelectric project would be located. Several references (including this paragraph) indicate it would be located on the Tanana River while other references state it would be located on the Johnson River e.g., page 3-65, paragraph 1). In addition, we recommend that a figure be provided illustrating a probable design configuration for this alternative.

Page 3-17, paragraph 6: The most valuable aquatic habitats are the lower reaches of these tributaries, and their confluence areas with the Susitna River. These are the habitats that would be inundated by the applicant's proposal. Quantification of the resident fisheries should be provided, given that they are available from the applicant.

The resident species should be individually described. Habitat usage and population levels should be provided in the statement.

Page 3-31, paragraph 2: Results of the FWS's ongoing wetlands mapping, under contract to the APA, need to be incorporated into project analyses. These maps will allow a more adequate assessment of wetland impacts and siting of project features to minimize those impacts.

Page 3-31, paragraph 3: For each of the wildlife species in the project area, population levels and seasonal habitat usage should be provided.

Page 3-41, paragraph 1: We concur with use of both low and high population growth scenarios in evaluating the project area.

Page 3-44, paragraph 7 and Page 3-49, paragraphs 1 through 5: Quantification of wildlife harvest (including that portion of the harvests that can be classified as subsistence, non-consumptive wildlife use, and commercial benefits of these uses should be provided in the statement. Subsistence use patterns should be established by surveys. This information should be contained in the statement.

Page 3-55, paragraphs 1 through 4: Quantification by vegetation type of the areas to be impacted should be provided to allow comparison of the alternatives.

Page 3-59, paragraphs 3 through 5; Page 3-63, paragraphs 6 and 7; and Page 3-69, paragraphs 3 through 8: Lack of quantification precludes meaningful comparison among wildlife resources that would be affected by alternative power generation scenarios.

Page 3-64, last paragraph: None of the alternatives described are sufficiently developed quantitatively to allow an adequate comparison of potential impacts. The statement should provide this basis of comparison, particularly in regard to the aquatic and terrestrial resources.

Page 4-5, paragraph 1: Delay in ice formation in the reservoirs and downstream would lead to ice fog formation during severe cold periods. The surrounding vegetation would become coated with ice, reducing its value as moose browse.

Page 4-6, paragraph 8: The location and purpose of the 138-kV transmission lines should be indicated in the statement.

Page 4-9, paragraph 3: The conclusions on how side sloughs downstream of Talkeetna would be affected by project-modified flows apparently is based upon a preliminary investigation of only Rabideaux slough. Investigations of additional lower river sloughs should be included to support the instream flow analysis.

Page 4-23, paragraph 7: Pre-project, high spring flows often overtop the upstream berms of the side sloughs, flushing out the ice and also juvenile salmon. The implications of the ice slowly decaying in place post-project should be discussed.

Page 4-25, paragraph 2: Post-project, light penetration would still be extremely limited. We would not anticipate significant increases in benthic aquatic plants and invertebrate productivity.

Page 4-26, paragraph 2: The two most valuable salmon streams in the upper Susitna River, Portage Creek and Indian River, are relatively close to the proposed Devil Canyon dam site. The potential for disorientation of spawners migrating to these two streams in the years immediately following closure should be addressed in the statement.

Page 4-26, paragraph 5: Given the paucity of data for downstream of Talkeetna, we find there is very little basis for reaching the conclusion that spawning in sloughs downstream of Talkeetna would not be significantly affected during filling of the Watana reservoir.

Page 4-32, paragraph 5: The suggestion that Kokanee salmon be introduced into the reservoirs may warrant further investigation. However, we believe the potential of the reservoirs for establishment of viable fisheries to be low. Our primary fishery concern in the reservoir area is the unavoidable inundation of Arctic grayling habitat. The FWS mitigation goal for this species is no net loss of habitat value while minimizing loss of in-kind

habitat value. The introduction of Kokanee salmon could lead to further reductions in Arctic grayling due to competition, in which case we would be opposed to such a program. Efforts by the State of Alaska to artificially propagate grayling have been largely unsuccessful to date. If in-kind mitigation should be determined to be infeasible, then out-of-kind mitigation should be instituted.

Page 4-35, paragraph 3: The sentence should be qualified to state that early seral stages will be beneficial for some wildlife species such as moose. Some other species require habitats of climax vegetation; it would be some time after construction is completed before suitable habitats are again available to such animals.

Page 4-36, paragraph 5 through Page 4-37, paragraph 4: The statement should include an analysis of flows which would maintain existing patterns of downstream vegetation. The applicant's proposed flow regime, Case C, should then be compared to these alternative flows in regard to post-project vegetative patterns.

Page 4-38, paragraphs 4 and 5: Please provide the methodology and analysis which lead to the prediction of a doubling in consumptive, and quadrupling in nonconsumptive, use pressures.

Page 4-38, paragraph 4; Page 4-41, paragraphs 2 and 3; Page 4-43, paragraphs 2 and 5; and Page 4-4b, paragraph 1: Harvest restrictions are established by the Alaska Board of Game. As discussed here, the project will likely result in impacts to game populations that the Board can minimize through changes in seasons or bag limits. However, it should be acknowledged in the statement that those changes represent further project impacts by foreclosing management options otherwise available to the Board.

Page 4-43, paragraph 6, last sentence: At least 35 wolverine would be impacted to some degree by the impoundment alone; home ranges of 45 percent of all instrumented wolverine overlap the impoundment zone (reference our comments on page K-46, paragraph 10 and page K-48, paragraph 3). This information should be included in this section.

Page 4-45, paragraph 2: Bald and golden eagles are protected under the Bald Eagle Protection Act (16 USC 668-668c). That protection makes it generally illegal to take bald or golden eagles, including any part, nest, or egg of either species. Under a recent amendment, the Secretary of the Interior may permit the taking of golden eagle nests which interfere with resource development or recovery operations (16 USC 688a). The Act provides for the taking of bald eagles or their nests only for certain specific exhibition or scientific purposes when compatible with the preservation of this species. Such taking may be permitted by the appropriate FWS Regional Director under eagle permit regulations (50 CFR 22). "Take" is defined to include molest or disturb. For additional information, please consult our comments on page E-3-451, paragraph 2 through page E-3-454, paragraph 1 of the license application. Discussions in the statement should recognize the legal protection provided for these two species. The proposal, if authorized, should be consistent with the Act. The

statement should clarify the number of bald and golden eagle nests, in addition to those which would be inundated, that are subject to disturbance from the proposed project. Conflicting information is found in Appendix K (Tables K-18, K-19 and K-21) and the license application (Exhibit E, Volume 6B, Chapter 3, Tables E-3-160 and E-3-161).

Page 4-49, paragraph 6: The statement should include an analysis of the different population growth and impact scenarios possible under alternative worker transportation plans. That analysis would be a reasonable basis for planning project transportation features to best mitigate potential project impacts.

Page 4-55, paragraph 5: The analysis of subsistence use could be more in detail in line with the recent Federal Court decision on subsistence. The analysis relative to the threshold of significant restriction to subsistence uses, as defined in this decision, should be included. The analysis should include more than the brief discussion presently given to impacts associated with the work camp. Subsistence use should also be expanded to include vegetal and cultural materials. Quantification should be provided for the numbers of Alaskan residents, both Native and non-Native, who depend on project area resources for at least some part of their food and other resource supplies. Use by non-Native Alaskans is not addressed despite the fact that the railbelt has a relatively high population ratio of non-Natives to Natives. This is particularly important where the Bureau of Land Management will be expected to issue subsequent land use authorizations in support of FERC's proposed decisions as outlined in the DEIS. The State has collected significant data in portions of the area, and we suggest FERC contact the Alaska Department of Fish and Game if they have not already done so.

Page 4-56, paragraph 1: The positive economic project effects described here may be negative to that portion of the area population dependent on subsistence opportunities for their food and other resources. Furthermore, the likelihood that guides "displaced" by project construction can reestablish their businesses in other areas should be discussed here.

Page 4-74, paragraph 6: Although the proposed action (page 2-12, paragraph 3, and Figure 2-11) addresses only proposed transmission line routes downstream from the Watana and Devil Canyon sites, alternative routes are inferred in Figure 2-14, "Alternative Transmission Line Corridors" and here. If there are additional alternative routes or additional data, they should be added to the final document. The transmission line alternatives are inadequately evaluated for wildlife impacts. The final EIS should point out that the potential for indirect impacts, if access is improved during the construction of powerlines, is great.

Page 4-79, paragraph 4; Page 4-84, paragraph 2; and Page 4-88, paragraph 6: Given the vague descriptions of the locations of primary and appurtenant facilities associated with this and other out-of-basin alternatives, it is premature to assume that no Federally listed or proposed threatened or endangered species would be impacted. If any of the alternatives were to be pursued, they would have to be assessed for potential conflicts.

Page 4-86, paragraphs 8 and 10: The statement should be corrected to indicate that the applicant's design for the Chakachamna site includes a 50-foot dam and minor water level changes.

Page 4-88, paragraph 3: Quantification should be provided concerning the fisheries to be affected by the hydroelectric projects, both directly through migration blockage and indirectly through modification of downstream conditions. Discussion should also be presented in the statement on the potential for mitigation at the proposed alternative sites. For example, whether passage facilities are viable at the Keetna site should be discussed. Also, the Chakachamna project could be limited to one basin, the Chakachamna River, thus reducing potential adverse impacts to the McArthur system.

Page 4-88, paragraph 5: Comparative quantitative information should be provided actions and habitats to be directly impacted by habitat loss, alteration, and migration blockages, as well as by potential indirect impacts of increased and disturbance.

Page 4-89, paragraph 2 through Page 4-90 paragraph 3: Comparative information should be provided on the magnitude of subsistence, recreational, and commercial uses of fish and wildlife resources and potential impacts to those resource uses from non-Susitna generation alternatives.

Page 4-96, Table 4-13: The statement should provide the criteria used to determine relative impact potentials of alternative generation scenarios. Differences among habitat losses quantified here, as compared to those given in Table J-45, page J-87, should be clarified for all Susitna alternatives.

Page 4-100, paragraph 1: The ADNR's Susitna Area Plan, recently circulated for agency review, and the completed Willow Subbasin Plan interagency project area planning efforts should be discussed here.

Page 4-101, paragraph 4: Fish and wildlife resource impacts would also result in irreversible subsistence-related, as well as recreation-related, impacts in the project area.

Page 5-7, paragraphs 1 through 3: Selection of individual components within a thermal-based with hydropower generation scenario would necessitate careful evaluation. The hydropower sites examined in this statement do not, as a group, appear to be environmentally appealing. For example, we would be very concerned about the blockage of upstream salmon migration with the Keetna site, and the large inundation area with the Johnson site.

Page 5-7, paragraphs 4 through 6: We concur with the FERC Staff conclusion that if hydroelectric development is authorized in the Susitna Basin, it should be licensed and constructed in stages. We concur that, based upon the information and analyses presented in the statement, Watana I with a downstream re-regulation dam would be the most environmentally sound Susitna Basin development.

Page 5-8, paragraphs 1 and 2: Numerous ideas concerning instream flow releases are raised in this section and in Section 5.3.3. The statement should contain a coherent instream flow regime that would adequately protect the fisheries and other resources, and their use, of the Susitna River. We intend to work directly with the applicant to formulate this instream flow regime.

Page 5-8, paragraphs 3 through 5: From a fish and wildlife resource perspective, we agree that the Denali Highway access proposal should be abandoned, and that the preferred access alternative would consist of rail access to Devil Canyon from Gold Creek along the southern side, with road access from Devil Canyon to Watana along the northern side of the Susitna River. Should there be continued interest in the originally proposed route, there should be further consideration of additional mitigation, including alternative alignments, habitat improvements, and construction stipulations, as well as further coordination with FWS and BLM.

If the FERC Staff's recommendation is adopted, there are several recreation resources identified in the recreation plan (pages 2-14 through 2-20) that may no longer be considered reasonably accessible, and other potential resources that may now be considered appropriate. We suggest that if the transportation plan is changed, the recreation plan be reconsidered and revised accordingly. The proposal and the analysis fail to address the impacts on existing users of these campgrounds in the event that extensive development takes place. Generally, the loss of remote wilderness type recreation opportunities cannot be mitigated through developing more or larger campgrounds.

Page 5-8, paragraph 8 through page 5-9, paragraph 1: We concur with the proposal and objectives for the applicant's continuing coordination with governing agencies and landowners throughout project planning, construction, and operation. DOI and its bureaus will continue to participate actively in such efforts.

Page 5-11, paragraph 1: Arctic grayling would sustain significant adverse impacts due to the inundation of habitat by the reservoirs. Our preference would be to mitigate in-kind, that is Arctic grayling for Arctic grayling. As mentioned previously, efforts by the State of Alaska to artificially propagate grayling have not been successful to date. If in-kind mitigation of unavoidable grayling loss is determined to be infeasible, a plan for out-of-kind mitigation should be discussed in the EIS.

Page 5-11 paragraph 4 through page 5-12, paragraph 4: We concur with the FERC Staff's analysis of the problems with the applicant's mitigation plan for terrestrial communities and with the Staff's recommendations for continued coordination with resource agencies by the applicant, further studies, and continued monitoring. The statement should quantify areas and locations of potential mitigation lands as well as cite research documenting the success of recommended vegetation manipulations. We have recommended that an inter-agency team be an integral part of monitoring and refining mitigation during and post-project. Results of ongoing vegetation and wetlands mapping should

be used to refine mitigative siting of project features and modeling of moose, bear, and beaver habitats to determine mitigation needs and potential values of proposed habitat manipulations.

The Bureau of Land Management is concerned with the proposed mitigation of habitat loss through designation of "replacement" lands because the proposal fails to identify those replacement lands, and, specifically, whether Federal lands administered by BLM are suggested.

Page 5-12, paragraph 4: The statement should clarify exactly which agency mitigation recommendations, including alterations in proposed project plans, have been incorporated in the Staff's recommendations. For those recommendations not so adopted, an explanation should be included in the statement.

Page 5-12, paragraphs 5 and 6: Given the FERC Staff recommendation that construction access only be provided to Watana from Gold Creek (see page 5-8, paragraph 5) it is inconsistent for the FERC Staff also to endorse a recreation plan is strongly dependent upon public access being available from the Denali Highway to the Watana dam. The recreation mitigation plan should be consistent with the FERC Staff recommendation of no Denali Highway access to the Watana dam site.

Page 5-12, paragraph 7, subparagraphs 1, 2, 4, and 5 and page 5-13, subparagraphs 2, 3, 4, 5, 6, 9, 13, and 14: DOI also concurs with the need for these mitigation strategies that will help minimize impacts to fish and wildlife resources and the subsistence use of those resources.

Page 5-13, subparagraph 3: We strongly concur with the mitigation proposal to establish a project-funded interagency monitoring board. The board should serve to monitor all mitigation during construction and operation of the project, not just socioeconomic impacts. On-site representation from the FERC would be highly desirable to maximize the responsiveness of this board.

Page 5-13, subparagraph 9: We recommend that Federal agencies be included in this listing of agencies to which the applicant should communicate project information.

Appendix E. Geology and Soils

We have two main concerns with the information provided here. First, while possible impact issues are generally described, they are not quantified, thus precluding a full assessment of impacts (see page E-39, paragraph 3; page E-40, paragraphs 2 through 6). For example, slope failures and erosion would result in vegetation losses. These sites should be evaluated for their value as wildlife habitat. Our second concern is that recommended mitigation measures are not quantified.

Identified information needs should be pursued, and then presented in the statement (e.g., page E-11, paragraph 7; page E-41, paragraph 6; and page E-48, paragraph 3). The U.S. Geological Survey and the Soil Conservation Service should also be consulted during the analysis of all site-specific construction plans (page E-59, paragraph 5).

Appendix H. Water Resources

Page H-7, paragraph 4: Seven distinct habitat types are cited, yet the ensuing descriptions cover only three habitat types. The four other habitat types should be described, and distinguished in regard to their physical and biological characteristics.

Page H-12, paragraph 1: The side slough habitat is biologically significant and is highly responsive to changes in mainstem discharge. However, tributaries support greater numbers of spawners and thus could be considered of greater biological significance. Tributary mouths are also highly responsive to mainstem discharge changes.

Page H-21, paragraph 5: The acceptability of the applicant's upward revision of the record drought year 1969 should be assessed. We believe the implications of water year 1969 alone, and in conjunction with low water year 1970, should be examined in regard to meeting biological versus power demands.

Page H-40: Given that the applicant proposes flow no greater than 12,000 cubic feet per second (cfs), comparisons should be provided for flows less than 12,000 cfs versus wetted surface area. Discharge flows at Gold Creek of 6,000 cfs, 8,000 cfs, 10,000 cfs, and 12,000 cfs versus wetted surface area would be illustrative of various post-project conditions.

Page H-44, paragraph 1: Discussion should be provided on why the applicant's computer models, in this case SNTMP, were not used. A comparison of the strengths and weaknesses of the applicant's models versus those relied upon by the FERC Staff should be included in the statement. This is particularly important since emphasis in Appendix I on downstream adverse fishery impacts is placed on model-predicted temperature changes.

Page H-45: Two additional water quality parameters that need to be examined are heavy metals, particularly mercury, and pH. Pre-project, several trace elements, including mercury, exceed water quality guidelines (see page E-2-36 in the license application). Given the high level of background mercury and the noted increases in mercury concentrations in fish in other northern impoundments (see Appendix I, page I-64), attention should be focused on this element. Also, pH levels up to 8.1 (see page E-2-34 in the license application) have been observed. Discussion should be provided on the post-project implications of these high pH levels, particularly in association with the other water quality parameters that exceed recommended standards (see Table E.2.17 in the license application).

Page H-48, paragraph 2: We have on several occasions requested that the potential for shoreline erosion and bank slumping be assessed, most recently by letter dated April 23, 1984 from the FWS to the applicant. Soil sampling should be conducted to examine the amount of fine-grained materials and the heavy metal and pH levels. We do not believe these studies are presently planned. Based upon information provided by this type of study, the statement should quantitatively discuss the potential for impacts, both within the reservoirs and downstream.

Page H-49, paragraph 2: In addition to discussing the potential for nitrogen supersaturation during an average year, the statement should also address startup and testing of the turbines and the greater-than-50-year flood event. Adequacy of the applicant's proposed mitigation, as well as the practicality of additional mitigation should be discussed (e.g., requiring control of nitrogen supersaturation up to the 100-year event).

Appendix I. Fisheries and Aquatic Resources

Page I-26, paragraph 2: The applicant categorized the aquatic habitats into seven distinct types: mainstem, side channel, side slough, upland slough, tributary, tributary mouth, and lake. These seven habitat types are acknowledged on page H-7 of this statement. The ensuing discussions should focus on these distinct physical and biological habitats.

Page I-26, paragraph 7: Reference is made to an Appendix A in this and several following sections. The indicated discussions are not contained in Appendix A of the statement, Load Growth Forecasts. Please clarify where the discussions can be found.

Page I-35, paragraph 6: Current harvest levels and project impacts on subsistence activities need to be evaluated. The referenced ongoing assessment should be incorporated into the statement.

Page I-43, paragraph 4: The ensuing impact discussions are essentially limited to the five salmon species. Although not all the fishery species occurring in the Susitna River need to be discussed to evaluate the project's potential impacts, we believe several additional species warrant discussion. We recommend that the FWS evaluation species, which include the five salmon species, Arctic grayling, rainbow trout, burbot, and Dolly Varden, be discussed in the statement.

Page I-50, paragraph 3: Although the application proposes limiting operations to baseload, the applicant anticipates examining during the next year: constant discharge, baseload variable discharge, load following, and peaking operations (see applicant's Task 5B in the Draft Aquatic Plan of Study, Fiscal Year 1985). The statement should compare these different modes of operation in regard to the biological resources of the Susitna River.

Page I-57, paragraph 4: Although summer turbidity would, post-project, be greatly reduced, the levels would probably still be high enough to inhibit significant increases in benthic productivity. Also, the elimination of the natural high flows could result in long term siltation of spawning gravels.

We consider to be speculative and premature the conclusion that, "Undoubtedly, reduction in turbidity and flow stabilization offer important management opportunities for Susitna River salmon."

Page I-62, paragraph 4: The conclusion that adverse temperature impacts in the mainstem would be ameliorated by fish congregation in the sloughs should be tempered through a discussion of the anticipated reduction in wetted usable area and the potential for increased losses due to predation. Increased

concentrations of juvenile salmon and low turbidity would increase vulnerability to predation.

Page I-62, paragraph 5: The turbidity levels would probably still be too high to anticipate markedly increased productivity of benthic organisms. Coupled with the expected decrease in summer temperatures, benthic productivity may not increase over pre-project levels.

Page I-63, paragraph 1: We anticipate that the Devil Canyon reservoir would provide marginal fishery habitat. Turbidity levels probably would not be sufficiently reduced to be of benefit to the aquatic resources.

Page I-64, paragraph 3: To state that diverting salmon up the Talkeetna River would result in increased productivity assumes that the Talkeetna River is presently underutilized by salmon. The statement should provide quantitative support for this contention. The other assumption that would need to be supported is that warmer temperatures from the Talkeetna River would provide a stronger attractant than the chemical trail of the natal stream.

Page I-64, paragraph 6: The sport fishery is strongly associated with the natural salmon holding areas. Fishing pressure primarily occurs at the tributary confluences where the fish concentrate. How severely the project would impact the sport fishery is therefore directly related to how the project would influence these tributary mouth areas. The statement should relate project impacts to the tributary mouths to impacts to the sport fishery.

Page I-64, paragraph 8: The references noted do not examine the potential for mercury accumulation in fish downstream from impoundments. Discussion of this potential problem should be provided. Post-project impacts due to the high background pH (see page E-2-34 in the license application) and several other water quality parameters (see Table E.2.17 in the license application) should be discussed.

Page I-66, paragraphs 2-4: Individually, the access road stream crossings a not constitute a serious adverse impact. However, the potential effects of turbidity, siltation, improper placement of culverts, inadequate culverts, erosion, etc., resulting from crossing over 100 streams, many of which contain excellent Arctic grayling habitat (e.g., Brushkana, Seattle, and Deadman Creeks), should be classified as a potentially significant adverse cumulative impact.

Page I-67, paragraphs 2-4: Unless adequate mitigation measures are incorporated into the designs and construction, the cumulative adverse impacts, primarily to wetlands and streams, resulting from the construction of the transmission lines, would be significant. Potential impacts would include turbidity, siltation, erosion, inadequate culverts, and improper placement of culverts.

Appendix J. Terrestrial Botanical Resources

Page J-3, paragraph 3: Further vegetation and wetlands mapping is currently being undertaken to refine and improve the mapping described here. The state-ment should incorporate preliminary results of those efforts. This mapping

would allow more accurate and detailed impact assessments, facility siting which better avoids wetlands and other sensitive areas, and improved evaluation of wildlife habitat.

Page J-12, paragraph 2: We question the usefulness of correlating Viereck and Dyrness vegetation types to the more general types and resolution mapped by Commonwealth Associates for the Healy-to-Willow transmission corridor segment. Although this correlation was made "to provide some basis for comparison between the two systems...", there is no corresponding correlation or interpretive analysis quantifying vegetation types within that corridor (Table J-14). Until the Healy-to-Willow transmission line segment is typed at the 1:63,360 scale according to Viereck and Dyrness, a cumulative assessment of all transmission corridor segments, as well as of all project features, cannot be made.

Page J-25, paragraph 1: To evaluate borrow site impacts and mitigation needs, material needs and the probable sequence in which identified borrow areas would be used should be described.

Page J-37, paragraph 4 and Tables J-13, J-14, and J-15: Use of Commonwealth Associates' classification system precludes an analysis of cumulative impacts from all transmission line segments. Please refer to our earlier comments on the need to consistently classify the entire transmission corridor (page J-12, paragraph 2 and DOI comments on page E-3-217:(e) of the license application).

Pages J-44 through J-46: Wetlands have been mapped as part of the FWS's National Wetlands Inventory for several of the areas affected by the non-Susitna generation alternatives. Those maps should be used in any further analyses of these alternatives.

Page J-46, paragraph 5 and Table J-18: The 1100 acres of vegetated area to be cleared for permanent access (Table J-26) should be included in the discussion of total permanent vegetation losses.

Page J-48, Table J-19 and Page J-49, paragraph 1: Further information is needed to assess fully the impacts and mitigative uses planned for proposed borrow areas. Those portions of proposed borrow areas partially or completely located within the eventual inundation areas should be quantified, and use schedules outlined as recommended previously (page 25, paragraph 1).

We concur with the recommendation that power development in the Railbelt region be phased with actual area growth and power demands. Thus, if a Watana dam is developed and the Devil Canyon dam is not, then removing borrow from portions of the Susitna River downstream from the Watana dam site may unnecessarily impact existing and potential fisheries. Consequently we recommend that proposed borrow areas E and I not be used in construction of the proposed Watana dam and associated facilities.

Alteration of forest habitats to tall shrub or lower vegetation types in the transmission corridor should be tabulated here to allow an assessment of overall project impacts.

Page J-49, paragraph 3: The potential for overbrowsing would be greatest in areas closest to the impoundment and other impact areas where available habitats will be reduced.

Page J-49, paragraph 4; Page J-50, Table J-20; and Page J-51, Table J-21: Accurately identifying wetlands is a prerequisite to required permitting under Section 404 of the Clean Water Act. It should be determined, based upon accurate wetlands maps, whether each proposed project facility, borrow area, access road, etc., could be sited to avoid wetlands areas. We note that while 53.2% of the entire upper and middle Susitna River Basin is classified as potential wetlands (Table J-12), 75.5% of areas to be permanently lost (Table J-20) and 80.8% of areas to be temporarily lost (Table J-21) are classified as potential wetlands.

Page J-53, paragraph 3: Whether increased nutrients and productivity on disturbed soils would be beneficial or detrimental to wildlife species of concern would depend upon the resultant plant species composition. Generally shrubs, which are here described to decrease, while graminoids increase after disturbance, are of greater value to wildlife on a year round basis.

Page J-54, paragraph 1 through Page 55, paragraph 2: The statement should reflect results of the latest modeling projections of icing, water tables, and other hydrologic changes. These probable changes should then be related to potential vegetation changes.

Page J-57, Table J-22: Permanent access roads should be included here to allow a complete assessment of cumulative project impacts.

Page J-62, paragraph 6: We recommend that FERC Staff assess the adequacy of access routing "to avoid important wetland areas near Deadman and Tsusena creeks and to minimize crossage of other wetlands areas," given the liberal correlation of wetland types to the Viereck and Dyrness vegetation classification system (also see page 4-34, Table 4-3).

Page J-62, paragraph 7: We recommend that the statement include maps and verbal descriptions of the nine potential borrow areas for the proposed Denali Highway access route.

Page J-64, paragraph 3: We recommend that the statement include maps and verbal descriptions of the five potential borrow areas along the Watana to Devil Canyon access road segment.

Page J-65, paragraph 6: We concur with use of a worst-case estimate in assessing vegetation impacts. The statement should reflect the status of and problems encountered during construction of the Healy-to-Willow Intertie. That transmission facility, to be completed by fall, 1984, is proposed for upgrading to serve as a Susitna hydroelectric transmission corridor.

Page J-65, paragraph 7: While we concur with use of a worst-case methodology in assessing impacts, we again recommend that the statement include an accurate

identification of wetlands so that the mitigative siting of transmission line corridors and associated access trails can be fully evaluated.

Page J-66, Table J-28; Page J-70, Table J-30; J-72, Table J-32; and Page J-74, Table J-34: Discussion of transmission corridor impacts should include a quantitative analysis of probable pre- versus post-construction changes in vegetation types. Wildlife values of those types and how they would be impacted under the proposed maintenance schedule should be displayed.

Page J-67, paragraph 1: We recommend that transmission line access corridors be clearly defined so that they can be considered in assessing total project impacts; access trails for maintenance should be minimized to occur only between major river crossings or topographical barriers such as deep ravines (DOI comments on page E-3-245 of the license application). We are concerned that Appendix F refers to creation of a minimum standard access road along the entire length of the transmission line (page F-39, paragraph 6). Resource agencies such as the FWS, BLM, the CE, and the ADF&G should be consulted in all access sitings to ensure that potential adverse impacts to wetlands, fish streams, and vegetation from off-road vehicles are avoided or minimized.

Page J-75, paragraphs 1 through 4: Specific losses or changes in area vegetation types will determine the magnitude of alternative project impacts to area wildlife as compared to the proposed Susitna project. We recommend that such impacts be quantified to support the alternatives comparison. Quantification should also be provided for Susitna development comparisons of construction camp and scheduling alternatives.

Page J-79, paragraph 3, last sentence: Potential borrow needs, an analysis of alternative as compared to proposed borrow sites, and the proposed order for using those sites should be better described here.

Page J-84, paragraph 2: Terrestrial areas to be inundated by the 50-foot dam associated with the proposed Chakachamna project should be quantified here.

Page J-85, paragraph 2: This comparative analysis should include the FERC Staff recommended access alternative which eliminates the Denali Highway road connection.

Page J-86, paragraph 1, last sentence: We concur, and recommend that these information gaps be filled in the statement.

Page J-86, paragraph 3: We recommend that the FERC Staff provide their comparative rationale for recommending the Johnson hydropower alternative, which would inundate over twice the area of the proposed alternative.

Page J-87, Table J-45: To compare adequately the alternative energy proposals, some quantitative assessment of potential access areas should be made here.

The figure of 36,900 acres to be permanently removed with construction of both Watana and Devil Canyon dams, impoundments, and other permanent facilities does

not agree with previous data that 37,000 acres will be permanently lost with construction of the Watana dam and facilities (Table J-18) and an additional 7,900 acres will be permanently lost with construction of the Devil Canyon dam and facilities (Table J-22).

Page J-88, paragraph 1: Potential increases in human access and resultant impacts should be discussed here.

Page J-88, paragraph 7 through Page J-89 paragraph 4: We recommend that FERC comment on the adequacy of the applicant's efforts "to minimize impacts to vegetation...so as to reduce clearing requirements or effects on sensitive areas such as wetlands," in proposed facilities sitings and designs.

Page J-89, paragraph 5 through Page J-90, paragraph 3: We concur with the general mitigation scheme for transmission corridor clearing and maintenance with the exception of referenced longitudinal and other access trails. Until locations, maintenance, and public access proposals for those trails are provided, we cannot assess how well potential impacts may be mitigated. Resource and permitting agencies such as the FWS, the ADF&G, and the CE should be involved when contractors are required to prepare construction and maintenance access plans. Rather than including only potential options, the statement should clarify what plan for managing human access impacts of project routes is recommended.

Page J-90, paragraph 4 through Page J-91, paragraph 6: We recommend including rectification for the up to 17,000 acres of reservoir slopes that may be affected by beaching, flow or block slides, erosion, slumpage, and other subsequent vegetation losses.

Page J-92, paragraph 8 through Page J-93, paragraph 1: The mitigation plan should include a process for implementing additional mitigation measures, with resource agency concurrence, should initial measures prove ineffective.

Page J-93, paragraphs 5 and 6: We concur with the FERC Staff's recommendations on further and ongoing studies.

Appendix K. Terrestrial Wildlife Resource

Page K-3, paragraph 2: The following reference was omitted from the References list:

U.S. Fish and Wildlife Service. 1983d. Letter from Melvin A. Monson, Acting Assistant Regional Director, to Eric P. Yould, Executive Director, Alaska Power Authority (24 January).

Page K-3, paragraph 5: The ADF&G continues to be the principal organization conducting wildlife studies in the Susitna River Basin. Work on furbearers and birds has been, and is being, conducted by University of Alaska researchers and consultants under contract to the applicant. We are concerned that results of all those studies as presented here are 1 to 2 years old. The statement should be updated to reflect findings of the 1983 studies.

Page K-8, Figure K-2: The quantitative basis for classifying the delineated areas as having high, medium, and low densities of moose should be included here.

Page ~~K-12~~^{K-1}, paragraph 4: The Nelchina herd was estimated at 24,825 caribou in 1983.

Page K-17, paragraph 2: The most sheep observed at the Jay Creek mineral lick at one time, 31 individuals, ^{K-2} (approximately 21 percent of the population) was during 1983 project studies.

Page K-26, paragraph 7: GMU 13 accounts for 5 to 14.5 percent of statewide big game harvests. The importance of this unit is apparent given that GMU 13 constitutes barely more than 1 percent of the state's total area.

Pages K-26 through K-29: This discussion on "Human Use and Management of Wildlife" includes several descriptions of data gaps. Information should be provided on ongoing efforts and the timetable for filling those gaps. Surveys allowing analysis of the subsistence portion of wildlife and fish harvests should be included in further project studies. Please reference our comments on page N-75, paragraphs 3 and 4.

Page K-30, paragraph 1: Presence of several historic peregrine falcon eyries within a few miles of the transmission line north of Nenana should be described here.

Page K-34, paragraph 6: Both consumptive and non-consumptive human uses of wildlife are intensive in the lower Susitna River Basin because of adequate access and proximity to the major population centers of Southcentral Alaska. Discussion of area harvests and non-consumptive wildlife uses, as was done for the upper and middle Susitna River Basin (pages K-26 through K-29), should be provided.

Page K-35, paragraph 2 through Page K-37: Lack of quantification precludes any meaningful comparison among wildlife resources that would be affected by alternative scenarios for Susitna River Basin development, natural gas or coal-fired energy generation, and the various components and component combinations of a combined hydro-thermal energy generation source. No data sources, other than a general resource review, are provided to substantiate qualitative assessments that an alternative site provides "limited" or "high quality" wildlife habitat, or that moose "concentrate" in various areas and seasons.

^{K-3}Page K-35, paragraphs 5 through 9: More recent detailed data on Chuitna and Beluga river area wildlife resources are available in reports preparatory to Diamond Shamrock's plans to develop coal resources there. ^{K-4} Area studies include ongoing moose radio-tracking by ADF&G.

Page K-38, paragraph 1: We recommend that the statement include a general discussion of overall impacts on the ecosystem's wildlife from the Watana impoundment, as is later provided for the Devil Canyon development (page K-60, paragraph 4).

Page K-38, paragraph 2: The statement should clarify how the vegetation types and project impacts defined in Appendix J relate to the "high quality habitat" to which moose use is here attributed. Habitats and their relative quality will not be geographically defined until ongoing vegetation mapping, browse analyses and food habits studies, and the moose carrying capacity modeling are completed over the next couple of years.

Page K-38, paragraph 4: The statement should be updated to include 1983 survey estimates that the Watana impoundment area was inhabited by 580 moose in spring 1983.^{K-5}

Page K-39, Table K-6: Indirect impacts of altered moose use patterns, resulting from habitat losses and alterations as well as from changes in harvests, should also be quantified here (e.g., page K-41, paragraphs 3 and 6 and page K-43, paragraphs 2 and 3).

Page K-41, paragraph 3: Figures provided here should be updated. The 1983 fall census shows the primary impact zone was used by 2836 +/- 301 moose.^{K-6}

Pages K-41, paragraph 4 through Page K-43, paragraph 2: Vegetation type losses and changes over time should be quantified in the statement according to expected worst and best case expectations for vegetation succession. Those losses/changes should then be related to potential wildlife uses throughout the project life, including project construction.

Page K-43, paragraph 2, Page K-48, paragraph 3, and Page K-64, paragraph 4: The temporary displacement periods described here should likely be expanded to include a recovery period before wildlife species will return to fully or partially utilize those areas out of production or subject to intense disturbance during project construction.

Page K-45, Table K-11, and Page K-46, paragraph 2: According to the latest ADF&G reports, 15 of 26 black bear den sites (58 percent) would be inundated by the Watana impoundment.^{K-7}

Page K-46, paragraph 10 through Page K-48, paragraph 3: Impacts to wolverine are apparently underestimated. Inundation of low-level areas will result in permanent loss of winter habitat. Since 45 percent (9 of 20) of all instrumented wolverine have home ranges overlapping the impoundment zone, at least 35 wolverine would be impacted to some degree by the impoundment alone.^{K-8} Access roads, transmission corridors, and other project facilities will likely further decrease wolverine habitats.

Page K-54, paragraph 3: A general discussion of operational impacts on area wildlife should be provided here.

Page K-54, paragraph 1 through Page K-56, paragraph 2: Quantification should be provided for vegetation types to be impacted and moose populations likely to be affected by vegetation changes over time. An evaluation of downstream

succession patterns and associated values for moose should be based upon detailed vegetation mapping and modeling.

Page K-59, paragraph 6: As later described, beaver may be excluded from sloughs which are to be managed for salmon spawning (page K-82, paragraph 6). No quantification is provided for sloughs which may be managed for beaver and expected positive population impacts, as compared to the negative population impacts likely near upstream project facilities. Thus it is impossible to ascertain whether the net result will be enhancement of beaver habitat or partial compensation for overall habitat losses.

Page K-64, paragraph 4: For the Terror Lake hydroelectric project at Kodiak Island, Alaska, it was estimated that the full recovery period for brown bear habitat utilization would be 20 years. The 10-year loss of habitat described here is probably optimistic and should be reassessed.

Page K-65, paragraph 4: The statement should provide quantification for the impacts listed here.

Pages K-66 through K-69, paragraph 3: The section provides numerous examples of significant negative impacts that could occur to wildlife with the proposed Denali Highway to Watana access segment. We concur with the FERC Staff recommendation that this segment be dropped from project plans.

Page K-70, paragraph 2: The statement should clarify the methodology used to calculate the percent of impoundment-caused winter carrying capacity losses that will be compensated for by enhanced forage availability along the transmission line right-of-way.

Page K-70, paragraph 7: Collisions of birds with towers or conductors and electrocution, are not covered in Appendix D as stated here.

Page K-74, paragraphs 3 through 7: We concur that project impacts to wildlife would be reduced with construction of the smaller Watana I alternative.

Page K-75, paragraphs 2 through 5: We concur with the FERC Staff recommendation that the Denali Highway to Watana access segment not be constructed (page 5-8, paragraph 5). However, this analysis of alternative access routes does not clearly identify which specific alternative or combination of alternatives constitutes the FERC Staff's recommended access alternative. Page K-76, paragraph 1: We support the concept of only using borrow areas that would be inundated or otherwise lost due to project construction. The statement should clarify potential borrow areas and a timetable for using each proposed borrow site (page J-48, Table J-19 and page J-49, paragraph 1).

Page K-76, paragraph 2: Comparative information on the locations and habitats to be impacted by the construction camp, permanent workers, access roads and other infrastructure features essential to natural gas plant development should be provided here.

Page K-77, paragraph 7: Alternative scenarios for different hydro-thermal development combinations should be described. Those scenarios should include comparable quantitative information on wildlife habitats to be impacted, as well as on associated infrastructure needs.

Page K-77, paragraph 8: We support rail access from Gold Creek to Devil Canyon south of the Susitna River, and road access from there to Watana north of the Susitna River, as the best access alternative for minimizing impacts to fish and wildlife.

Page K-79, paragraphs 1 through 3: Unless the statement includes comparative information on the relative values of different wildlife habitats, as well as acreages to be potentially impacted, it will not be possible to realistically compare and choose among the energy development alternatives.

Page K-79, paragraph 6 through Page K-82, paragraph 8: We provided numerous mitigation recommendations in our comments on the license application. These included a set of "Biological Stipulations" and "Recommended Construction Methods for Mitigating Impacts to Wetlands Which Cannot be Avoided by Project Development" (Attachments A and C). The statement should fully incorporate those recommendations here or include reasons why they have been omitted.

Page K-79, paragraph 9 through Page K-80, paragraph 1: We concur with the transmission corridor clearing and maintenance proposal to optimize browse enhancement for moose and other wildlife that prefer vegetation types in early successional stages. However, the statement should quantify the actual compensation that may be gained for other project-caused habitat losses. On a strict acreage basis, the project will result in permanent loss of 38,000 acres and an additional loss of 6,400 acres for 10 years during project construction and beyond during habitat recovery (according to Table J-45, please see our comments on Table 4-13, page 4-96, which list total project habitat losses at 64,000 acres). Comparative values of all these areas as wildlife habitat have not been determined. Their location relative to moose use patterns has not been assessed. The statement (page K-79, paragraph 8) questions the likelihood that moose will take advantage of forage available after transmission corridor clearing. The mitigation potential of this project feature would equal the incremental improvement of browse along the approximately 6,200 acres of forest habitat within the transmission corridor from Tables J-30, J-32, and J-34). Thus the possibility of obtaining up to 40 percent compensation from both permanent and temporary project losses as postulated earlier (page K-70, paragraph 2) would seem greatly exaggerated.

Page K-80, paragraphs 3 and 4: We concur with these analyses.

Page K-80, paragraph 5: Project impacts that may cause the Alaska Board of Game to conduct a controlled moose hunt or otherwise restrict harvest seasons and bag limits may foreclose or otherwise limit Board management options available without project construction (see DOI comments on page E-3-510 of the license application).

Page K-80, paragraph 7, subparagraph 2 and Page K-81, paragraph 1, subparagraph 2: Additional restrictions recommended by ADF&G, with which we concur, should be incorporated here: restrict timber harvest within 2 air miles of the Jay Creek lick area to late August through April; prohibit clearing activities within 0.5 miles of the lick area, including roads, logging equipment, and debris, except for those portions below the minimum operating water level; prohibit air traffic below 1,000 feet above ground level and discourage it between 1,000-1,500 feet above ground level within 1.0 mile of mineral licks, 1 May-15 July; prohibit helicopter landings within 1.0 mile of mineral licks during 1 May-15 July; prohibit boat and ground access within 1.0 mile of the Jay Creek lick area and other mineral licks from 1 May-15 July. ^{K-9} These restrictions would also be necessary during project operation and in managing area recreational activities post-construction.

Page K-80, paragraph 6 through Page K-81, paragraph 1: The mitigation plan should allow for changing designated sensitive areas and restricted activities based upon interagency monitoring. Changes in wildlife use patterns, unusual weather conditions, and other factors could warrant temporary or permanent changes in the plan.

Timing and activity restrictions should be established, in consultation with ADF&G, on aircraft and major ground activity near active fox dens.

Page K-81, paragraph 3 and Page K-83, paragraph 3: The statement should evaluate out-of-kind mitigation, and its acceptability to the resource agencies.

Page K-81, paragraph 4: We support severely restricting recreational access and activities in the vicinity of the Jay Creek mineral lick to further minimize project impacts to sheep (page K-57, paragraphs 5 and 8).

Page K-82, paragraphs 3 and 6: Quantification of downstream increases in beaver is necessary to support the contention that there will be enhancement, beyond all other impacts to aquatic furbearers.

Page K-83, paragraph 6: The statement should provide the analysis leading to postulated two-fold increases in hunting pressures and four-fold increases in non-consumptive wildlife users with project development. How those postulated increases would be affected by eliminating the proposed Denali Highway to Watana access route should then be analyzed in the following section, K.5.2.

Appendix L. Recreation Resources

Page L-4: The table should be corrected to indicate the acreage of the Kodiak National Wildlife Refuge as 1,817,600 acres. Distinctive wildlife of the refuge include brown bear and introduced Sitka blacktail deer.

Page L-22, paragraph 4: Figures displaying the additional alternatives discussed should be provided in the statement.

Page L-27, paragraph 4: The discussion should recognize that the type and quality of habitat is usually a more important consideration than the actual

acreage. Habitat is not an amorphous commodity, but quite variable in type and usage made of it by the species with which we are concerned. If, for example, an area being inundated is highly important for black bear denning, then the carrying capacity of a large surrounding area could be severely affected.

Loss of the habitat would mean loss of the wildlife supported by the habitat. One should not assume adjacent habitat is capable of supporting "displaced" wildlife. The statement should also address the loss of preferred hunting opportunity.

Page L-27, paragraph 8: Filling of the Watana reservoir would inundate portions of Deadman, Watana, Kosina, Jay, and Goose Creeks and the Oshetna River (page E-3-86 of the license application). These streams provide high quality Arctic grayling habitat supporting thousands of fish. Loss of this aquatic habitat would adversely impact sport fishing.

Page L-28, paragraph 2: The proposed access route could create severe adverse impacts to numerous Arctic grayling streams, beaver, caribou, and indirectly to wolves, brown bear, and fur bearers. By opening the route to the public, increased hunting and fishing pressure would be exerted upon diminished resources. This would lessen the quality of the experience, and could be considered a net recreational loss. It could also require the Alaska Boards of Game and Fish to limit seasons or bag limits, thereby decreasing their existing management options.

The effect of the proposed access route on the guides dependent upon the upper Susitna River basin should be examined in the statement.

Page L-29, paragraph 2: Given the implications to fish and wildlife resource impacts, the decision on public access should be made prior to license issuance, and stipulated within the license. The statement should examine alternatives of no public access, controlled public access, and full public access for both the FERC Staff's recommendation for construction access (see page 5-8, paragraph 5) and the applicant's proposed access route.

Page L-36, paragraphs 2 and 3: Fulfillment of the public desire to see more hiking trails could be accomplished adjacent to existing roads such as the Denali, Richardson, Seward, Glenn, and Parks Highways. Construction of trails and facilities where public pressure exists would be desirable and would allow the development of a recreation plan compatible with the FERC Staff recommendation on access (see page 5-8, paragraph 5). This alternative would avoid adverse impacts to fish and wildlife resources due to the proposed recreation plan. The statement should examine a recreation plan that incorporates the above concepts.

Page L-36, paragraph 4: Comparisons between alternatives should be based upon the types, quantities, and relative qualities of habitats to be affected and how evaluation species would be impacted. Total acreage comparisons are virtually meaningless. Impacts to the fish and wildlife resources should also be related to sport hunting and fishing.

Page L-38, paragraph 1: Elimination of high flows through Devil Canyon would probably lead to salmon expanding their range into the tributaries of this river reach. This potential added production should be assessed in regard to potential benefits to sport, commercial, and subsistence fisheries.

Page L-40, paragraph 6: The description of the potential adverse impacts to recreation with the development of the Chakachamna site is inconsistent with the more accurate synopsis of the recreational resources of this area provided on page L-25, paragraphs 4 and 5. This discrepancy should be corrected in the statement.

L-42, paragraph 8: Here, and in other references to the Susitna project, the inundation area is estimated to be about 37,000 acres. This should be corrected to indicate that the inundation area would be approximately 45,800 acres (see page 2-1, paragraph 3, and page 2-2, paragraph 4).

Page L-42, paragraph 3: The agency recommendations considered reasonable should be incorporated into a mitigation plan endorsed by the FERC Staff. An explanation should be provided for those agency recommendations not included here.

Appendix N. Socioeconomics

Page N-11, paragraph 7 through page N-12, paragraph 1: As recommended in the final section of this appendix, continuing and new studies are necessary to respond to the data gaps identified here (page N-75, Section N.4).

Project impacts may necessitate changes in fish and wildlife harvest restrictions in response to legislative protection of subsistence uses. Such changes may foreclose future management options of the Alaska Boards of Game and Fish and should be considered in mitigating project impacts.

Community sharing has been documented in Tyonek area subsistence studies and should be considered in analyzing subsistence harvests. ^{N-1a, b}

Page N-12, paragraph 5 through page N-15, paragraph 5: The attraction of the project area to tourists and resultant importance of tourism in the area economy is largely due to area fish and wildlife resources. Thus, project impacts to those resources should also be addressed as project impacts on the tourism industry.

Page N-12, paragraph 9 through page N-13, paragraph 2: Given the importance of hunting and fishing to the project area economy and the potential for the project to adversely impact the fish and wildlife resources supporting that hunting and fishing, the statement should include an analysis of trends in both consumptive and non-consumptive fish and wildlife uses relative to historical population growth and settlement areas.

Page N-30, paragraph 4 through page N-37, paragraph 8: We appreciate the provision of quantitative socioeconomic information in discussing project

alternatives. Such information allows a more informed basis for choosing among alternatives; similar data should be provided in other appendices.

Page N-35, paragraph 1: The development of a year-round road connecting the Belusa area, Tyonek, and Anchorage would appear probable with the alternative energy development scenarios described here. Impacts of that road to fish and wildlife, and to subsistence uses of those resources should be discussed in the statement.

Page N-38, paragraph 6: Projects that should be examined in making projections about construction worker settlements and other socioeconomic concerns are the nearly complete Terror Lake hydroelectric project on Kodiak Island and the Healy-to-Willow Intertie transmission corridor, which parallels transmission lines proposed for the Susitna project.

Page N-38, paragraph 7 through page N-40, paragraph 6: We concur with use of both highland low growth scenarios in analyzing expected changes in area population expected with the project. This range of growth projections is necessary to plan reasonably for possible impacts and mitigation needs such as designing worker access, camps, and work schedules to best minimize impacts to area resources. A comparison of the high and low alternatives with air transportation provided, allowing greater worker settlement in Anchorage and Fairbanks, versus allowing workers to settle closer to the project, would help show which alternative is preferable for minimizing impacts to area socio-economics, fish, wildlife, or other resources.

Decisions on transportation plans, onsite camp features, work schedules, etc. should be made in the statement in order to determine project impacts and how transportation, camp, and other project features a need to be modified to better mitigate those impacts.

Page N-47, paragraph 1: Estimates should be provided for the numbers of Alaska residents, both native and non-native, who depend on project area resources for at least some part of their food and other resource supplies.

Page N-50: This page was not included in our copy.

Page N-62, paragraph 7: We disagree with the conclusion that construction and use of project access routes would have only a few minor socioeconomic impacts. Please refer to our previous comments on the potential for project impacts to negatively affect area residents' ability to obtain subsistence resources for cultural, nutritional, religious, and other socioeconomic factors, or to depend on guiding for their livelihood (page 4-56, paragraph 1). Presence of project access roads, particularly the proposed Denali Highway segment, would be the primary cause of those impacts. Management options for construction access and public access through project operation are potential mitigation means that should be fully analyzed in the statement.

Page N-63, paragraph 3: Surveys of Healy-to-Willow Intertie workers would provide pertinent, current data applicable in determining worker settlement

patterns, projecting socioeconomic impacts, and establishing necessary mitigation.

Page N-64, paragraphs 4 through 6: The statement should include an analysis of FERC Staff and resource agency recommendations to eliminate access from the Denali Highway. That alternative would significantly reduce impacts to existing subsistence and guiding activities, as well as better protect current patterns of other consumptive and non-consumptive fish and wildlife uses.

Page N-64, paragraph 9 through Page N-72, paragraph 6: We have previously described how the statement inadequately quantifies fish and wildlife resources to be impacted by the non-Susitna generation alternatives (Appendices J and K). Information on subsistence, recreational, and commercial uses of those resources and potential impacts from non-Susitna generation alternatives is also lacking, and should also be incorporated into the statement.

Page N-65, paragraphs 2 through 7, Page N-69, paragraph 5, and Page N-70, paragraph 7 through Page N-71, paragraph 2: The ADF&G has undertaken numerous studies of subsistence harvests and resource uses by the village of Tyonek which document the importance of area fish and wildlife resources to Tyonek.^{N-2} Ongoing plans for Beluga coal development favor construction of an on-site construction camp/permanent village to minimize potential impacts to area lifestyles. Tyonek residents favor projects that would provide employment opportunities but not interfere with their ability to pursue subsistence resource uses.^{N-3} These subsistence concerns, alternatives for not providing worker housing in Tyonek, and alternatives for providing or not providing road access to Anchorage should be considered in discussing the range of development scenarios and level of impacts possible with non-Susitna generation alternatives near Tyonek.

Page N-66, paragraph 3: The possibility of obtaining coal from Beluga area coal development should be discussed. The Diamond Shamrock corporation is pursuing coal development for export to Pacific Rim countries by 1990.

Page N-73, paragraph 4: Impacts to the subsistence, recreational, and commercial fishery with development of the Chakachamna site should be considered here.

Page N-79, subparagraphs 1, 2, 4, 6, 7, 8, 9, 10 and 13, and Page N-75, paragraph 1, subparagraphs 17 and 18: We particularly support these mitigation recommendations, which will minimize impacts to fish and wildlife resources and subsistence use of those resources. Coordination among mitigation measures for these different resources should be clarified.

Page N-75, paragraphs 3 and 4: We support speedy completion of all the applicant and Staff recommended studies suggested here. Results of these studies should be coordinated with mitigation planning for other area resources, e.g., fish and wildlife resources, and their use.

FOOTNOTES

- K-1 Pitcher, Kenneth W. 1984. Susitna Hydroelectric Project, Phase II, 1983 Annual Report, Big Game Studies, Volume IV -- Caribou. Alaska Department of Fish and Game. Submitted to the Alaska Power Authority.
- K-2 Tankersley, Nancy G. 1984. Susitna Hydroelectric Project, Phase II, Final Report, Big Game Studies, Volume VIII -- Dall Sheep. Alaska Department of Fish and Game. Submitted to the Alaska Power Authority.
- K-3 Selkregg, L.L. (ed.) 1974. Alaska Regional Profiles -- Southcentral Region. Arctic Environmental Information and Data Center, Anchorage. 255 pp.
- K-4 Environmental Research and Technology, Inc. 1984. Diamond Chuitna Project, Terrestrial Wildlife, Baseline Studies Report. Volume I -- Text; Volume II -- Figures. Prepared for Diamond Shamrock -- Chuitna Coal Joint Venture, Anchorage, Alaska.
- K-5 Ballard, Warren B., Jackson S. Whitman, Nancy G. Tankersley, Lawrence D. Aumiller, and Pauline Hessing. 1984. Susitna Hydroelectric Project, 1983 Annual Report, Big Game Studies, Volume III. Moose -- Upstream. Alaska Department of Fish and Game. Submitted to the Alaska Power Authority.
- K-6 *ibid.*
- K-7 Miller, Sterling D. 1984. Susitna Hydroelectric Project, Phase II. Second Annual Progress Report. Big Game Studies, Volume VI -- Black Bear and Brown Bear. Alaska Department of Fish and Game. Submitted to the Alaska Power Authority.
- K-8 Whitman, Jackson S. and Warren B. Ballard. 1984. Susitna Hydroelectric Project, Final Report, Big Game Studies, Volume VII -- Wolverine. Alaska Department of Fish and Game. Submitted to the Alaska Power Authority.
- K-9 Tankersley, Nancy G. 1984. Susitna Hydroelectric Project, Phase II, Final Report, Big Game Studies, Volume VIII -- Dall Sheep. Alaska Department of Fish and Game. Submitted to the Alaska Power Authority.
- N-1a Fall, James A., Dan Foster, and Ronald T. Stanek. 1983. The use of moose and other wild resources in the Tyonek and upper Yentna areas, a background report. Alaska Department of Fish and Game, Division of Subsistence. Anchorage. 44 pp.
- N-1b Foster, Dan. 1982. The utilization of king salmon and the annual round of resource uses in Tyonek, Alaska. Alaska Department of Fish and Game, Division of Subsistence. Anchorage. 62 pp.
- N-2 *ibid.*
- N-3 Darbyshire and Associates. 1981. Socioeconomics impact study of resource development in the Tyonek/Beluga coal area. Anchorage, Alaska.



P. 7114
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 1668
Juneau, Alaska 99802

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JUL 13 1984

July 3, 1984

Honorable Kenneth Plumb
Secretary
Federal Energy Regulatory Commission
825 N. Capital Street, N.W.
Washington, D.C. 20426

RE: FERC No. 7114

Dear Mr. Plumb:

The National Marine Fisheries Service (NMFS) has reviewed the DEIS 8405.22 - Susitna Hydroelectric Project (FERC No. 7114) Alaska (Federal Energy Regulatory Commission - Office of Power Regulation).

In order to provide as timely response as possible, we are submitting the enclosed comments to you directly in parallel with their transmittal to Department of Commerce for incorporation in the Department response. These comments represent the views of the Alaska Region of the NMFS. The final comments of the Department should reach you shortly.

Sincerely,

James H. Brooks
for Robert W. McVey
Director, Alaska Region

6.4.2



in sufficient detail to understand the effects of proposed alternatives, and discussion of the environmental consequences must include direct and indirect effects of the proposal and alternatives to that proposal (See 40 CFR 1502.15; §1502.16). The subject DEIS generally suffers from inadequate or incomplete descriptions of the physical processes and biological resources of the project area. Similarly, post project conditions are rarely quantified. Efforts to predict the project's effects on such important issues as downstream temperatures, turbidity, ice conditions, fish populations, and groundwater have been inconclusive. Many of these issues are the subject of on-going study by the applicant, the Alaska Power Authority (APA). The Draft Statement accurately identifies these data gaps and informational needs, often stating that certain impacts cannot be quantified at this time. Clearly, these deficiencies prevent the requisite thorough analysis of the full scope of environmental impacts associated with the Susitna Project. As will later be discussed, until an adequate EIS is developed addressing the needs identified in these comments, no project approval can occur. NEPA clearly requires that an agency consider the environmental impacts of a proposal before project authorization not afterwards (See Cady v. Morton, 527 F2d. 786, 794 (9 Cir. 1975); Environmental Defense Fund v. Andrus, 596 F2d. 848, 853 (9 Cir. 1979)).

Mitigative measures to avoid or minimize adverse impact were presented in the applicant's license application. The DEIS concludes that "the long-term effectiveness of mitigation measures remain unclear." We must concur with this assessment. Although we are aware of the applicant's continuing efforts to refine these conceptual mitigative measures, they remain unproven, untested, and often based on inadequate data from physical models. Selection of a project release schedule which will minimize impact to fish species is a basic component of the mitigation plan, yet the DEIS does not present a specific flow schedule which can be demonstrated effective. The DEIS must present an effective, implementable mitigation plan which could be incorporated into the license as specific conditions or stipulations (40 CFR 1502.16(h)). The mitigative measures identified in this document do not constitute such a plan and we find the DEIS deficient in this respect.

Regarding the Statement's analysis of alternatives, we believe additional data must be presented to allow for an informed selection to be made. Many of the alternative hydroelectric sites would be, in themselves, major projects involving significant resources and associated impacts. The information presented in the DEIS does not permit the selection of one project over another based on biological considerations. The DEIS should present each alternative's impact in comparative form so that a clear basis for choice is presented to the decision maker and the public (40 CFR §1502.14). Substantial treatment must be given to each alternative discussing their potential impacts (40 CFR 1502.14(b)). We are, therefore, reluctant to concur with the recommended alternative until additional data are presented in comparative form to allow a clear basis for choice. Given the need for power projections and oil price scenario presented in Chapter 1, we concur with the staff conclusion that, should any hydroelectric development occur in the Susitna Basin, it should entail staged licensing and construction, beginning with the Watana I dam, to be followed by a modified High Devil Canyon, Devil Canyon, or a re-regulation dam/tunnel.

Specific Comments

XXV para. 3, Water Quality and Quantity The statement that nitrogen supersaturation would occur at times for almost every year of operation seems to conflict with the discussion on gas supersaturation presented on page 4-18. We assume that the proposed mitigative feature (cone valves) would reduce the annual occurrence of supersaturation.

2-21., Mitigation Measures Proposed by the Applicant The discussion of mitigation does not present an implementable plan to avoid or minimize resource loss (see General Comments). Where available, detailed diagrams and plans for the various mitigative features should be given. The DEIS indicates that much of these features are unlikely to achieve the desired effect or are subject to the results of on-going study. We do not believe this provides for full consideration of the fishery resources within the Susitna River System, nor does it present an acceptable approach towards the goal of mitigating project impacts.

2-23, para. 6 Although the Watana filling flow for the October to April period would be approximately 5,000 cfs, the potential exists for significantly higher flows. On page 4-7 the maximum winter flow for Watana operation is given as 14,700, five times the maximum historical monthly flow for December, January, or February. Should ice develop, the resultant staging at these flows would create water elevations sufficient to inundate the sloughs. We question whether this impact could realistically be controlled by heightening berms. Before this can be determined, additional information must be presented on post-project ice formation, maximum winter powerhouse releases, and elevation (survey) data for the slough berms and the barrier islands separating slough and mainstem waters.

should read "operating" RSF checked with Bruce Smith. 19 July

The eight sloughs whose streambeds are to be structurally modified should be identified, and working drawings presented for each. A generic or conceptual diagram is not sufficient for analysis, as the sloughs often vary in certain respects such as upwelling, substrate, length, gradient, water quality, etc.

page 3-17, Fish Communities This discussion should incorporate the most recent data available from the Alaska Department of Fish and Game study efforts. Much of the discussion presented in this section is too general to provide insight into the habitat relationships associated with the important fish species of the system. For instance, recent work indicates that overwintering habitat is probably a major limiting factor for fish and that resident and juvenile species select ground water or other thermally affected areas to overwinter. Chum salmon have been shown to remain within the system for a period of time (up to three months) after emergence. Such life history detail is necessary for a thorough understanding of the potential project impacts on the fishery resource.

page 3-17, para. 9 The statement that tributaries and sloughs have the clearest water and thus the largest numbers of rearing juveniles should be qualified by identifying which species are being discussed and during which season. Very little data are available concerning overwintering within the mainstem, yet considerable use could be inferred from information on the fall outmigrations from tributaries.

page 3-24, para. 2 Recent studies have not shown a well defined correlation between temperature and distribution of juvenile salmonids. The mainstem and mainstem-influenced areas appear to be particularly significant to rearing chinook salmon. Thus, although principally a tributary spawner, this species may be subject to impacts of altered mainstem conditions.

3-25, para. 3 While the numbers of salmon migrating past Talkeetna Station are generally less than 25 percent of those passing Sunshine, we suspect that a high percentage of the sport catch above Sunshine occurs within the upper Susitna. Sport fishing sites along the Lower Susitna are heavily utilized; pressure along the upper river is currently low but can be expected to increase. The statement should discuss the importance and potential of the Talkeetna to Devil Canyon reach to the sport fishery.

page 4-7, para. 3 The issue of in-stream flow releases has been a major concern to our agency in addressing the impact and mitigative measures of the Susitna Project. As noted in the DEIS, the APA's proposed release schedule (Case C) would result in reduced access to sloughs by adult salmon. We have advocated a quantitative approach to the flow issue in which habitat vs. flow relationships are derived. This information is needed before an informed decision could be made on project flows.

Selection of a project flow regime will require a better assessment of power needs and costs. The DEIS suggests that present demand projections prepared by the applicant may be overestimated (Section 1) and that the reservoir operations model used by the applicant does not allow for the most efficient allocation of flows for both power generation and fishery needs (p. 5-10). Accordingly, we believe the presented release schedule is neither economically or biologically supportable. While the DEIS attempts to accommodate fishery needs by providing for a high flow release for adult access to sloughs, this recommendation alone will not mitigate flow related impacts. Maximum winter flows may be necessary to avoid slough overtopping and resultant impacts to developing eggs/fry and overwintering fish. Such limitations are not presented. The DEIS notes that no evidence has yet been provided to support the assumption that the 6,000 cfs minimum flows for May, June, or July have been shown to protect salmon. Clearly, adoption of Case C flow is not supported, nor does the DEIS present a flow regime which fully provides for the fishery resources of the Susitna System.

page 4-13, para. 4 Extrapolation of the information gained on Rabideaux Slough to all sloughs below Talkeetna may not be appropriate. The biological values associated with this slough should be presented. What additional sloughs below Talkeetna have been studied?

page 4-13, para. 6 The DEIS should present the species and numbers of fish utilizing tributaries where fish passage problems are expected. For those tributaries whose entrances are expected to cut down to the new water levels, how long will this process take? What mitigative measures are proposed?

page 4-13, para. 3 The existing modeling efforts which predict post-project icing are being revised. At this time there is no confident prediction on the existence or location of a post-project ice front.

page 4-17, para. 4 The statement that a four-fold increase in winter suspended solids levels falls within the range of natural variation at Gold Creek during winter should be referenced. This would seem to conflict with the statement that wintertime turbidity levels are at or near zero (page 3-10, para. 8). The model used by the applicant did not consider many important factors such as reservoir ice formation, effect of suspended sediments on density layering, or reservoir mixing. Therefore, the suspended sediment values presented may not be overestimates, as suggested on page 4-16, para. 5.

This section should discuss the relationship between suspended sediments and turbidity within the Susitna, and their biological significance.

page 4-21, Temperature The temperature analysis indicates that only the most preliminary estimates of downstream temperatures can be made at this time (e.g., winter temperatures near 4°C or less, summer temperatures ranging from 5°C to 10°C). In view of the importance of temperatures to the fishery resources within the Susitna River System, this analysis is not acceptable for purposes of impact identification or mitigation planning.

page 4-23, Sloughs This section should discuss existing and post-project ice staging and the resultant inundation of the sloughs with cooler mainstem waters.

page 4-23, Ice Processes Ice formation and break-up represent important physical factors affecting the fish species within the Susitna and their habitat. It is apparent that this important process is not yet sufficiently understood to allow for full project impact to be assessed. The reservoir model, which drives the downstream temperature and ice models, has been questioned. Projections for the location of a post project ice front have ranged from just below Devil Canyon to Cook Inlet. The applicant has stated that ice is not expected to form on Devil Canyon Reservoir, in contrast with the DEIS projection that both reservoirs would have similar ice formation and decay. Again, no assessment of project related impact, or recommendations for mitigation, can be made from the information presented.

page 4-25, Groundwater The paragraph seems to recognize a distinction between groundwater and mainstem infiltration. The sources of groundwater are likely to include the mainstem, deep and shallow aquifers, and lateral runoff from snow melt and precipitation. A reduction in mainstem infiltration may reduce the amount of upwelling within sloughs. Slough groundwater temperatures, however, may be relatively independent of the mainstem. The importance of groundwater to salmon spawning habitat has been discussed, and we believe this subject deserves further attention. How would flow reduction in the mainstem affect upwelling areas in sloughs? Which systems drive the groundwater within the major spawning sloughs 8A, 9, 11, and 21?

page 4-25, para. 2 The anticipated reductions in summertime turbidity should be quantified in this section. A large decrease in turbidity may still result in turbidity levels too high to allow sufficient light penetration for growth and development of aquatic plants. What would be the post-project turbidity during the ice-free season?

page 4-27, para. 2 The additional spawning and rearing habitat made available with a Watana alone, Watana I-High Devil Canyon, and Watana I re-regulation dam should be quantified. Would these alternatives present a significant enhancement opportunity within the basin?

page 4-32, para. 9 The assessment is made that salmon migrating toward the upper Susitna may avoid this reach and migrate into the warmer Talkeetna River. Provided that filling temperatures are within the range of tolerance for these species, it is unlikely that these temperature differences would offset the chemical attraction of their natal waters. Additional displacement into the Talkeetna may result in overcrowding on spawning grounds, superimposition of redds, and increased competition among rearing juveniles. Therefore, any production lost on the upper Susitna may not be offset by increased use of the Talkeetna.

page 5-8, para. 5 We concur with staff's recommendation of an access route from Gold Creek only. The DEIS should make clear that this would be a rail only access, and may consider further advantages to an all-rail access system (e.g., reduced staging areas, increased access control).

page 5-9, para. 8 Two flows are presented for the 3 day access release; 20,000 and 23,000 cfs. Which is correct?

page 5-12, para. 5 The staffs' concurrence with the proposed recreation plan seems inconsistent with the recommendation against access from the Denali Highway. The bulk of this plan is associated with this northerly route and, without its adoption, would provide relatively few recreational opportunities.

page 5-13, para. 3 We support an inter-agency monitoring effort for all mitigative features. We are continuing to discuss this possibility with the applicant.

page 5-15, para. 2 We concur with the staff recommendations for further aquatic study. The applicant's FY85 study efforts, if funded, should effectively meet these recommendations and will significantly advance our understanding of the fishery.

page H-7, para. 4 The discussion of Habitat Types should characterize each of the seven identified in this paragraph.

page H-34, Table H. 3-1 The overtopping flows presented are higher than recent projections from the applicant. These are: slough 8A-28,000; slough 9-22,000; slough 21-24,700.

page H-37, para. 2 This analysis uses a figure of 12,500 cfs as the cut-off for unrestricted access for 50 percent of the sloughs. Post project flows (minimum flow, Case C) will be 12,000 cfs. What is the significance of this difference? Slough 8A, for example, has unrestricted access at 12,500 cfs. What would be the magnitude of impact resulting from 12,000 cfs flows?

Summary

In our November 7, 1983, comments to the FERC regarding the Susitna License Application, the NMFS identified several data gaps, including accurate description of various post-project physical conditions (e.g., river and reservoir thermal structure, ice conditions, and turbidity) and a failure to provide an adequate fisheries mitigation plan. In that correspondence, we requested that these concerns and deficiencies be specifically addressed in the DEIS, and noted "At this time it does not appear that information presented within the license application would support preparation of a DEIS fully in compliance with the National Environmental Policy Act." Our review of the DEIS found no significant improvement beyond the license application. Many important impacts cannot be quantified at this time in light of existing data. Questions remain concerning the accuracy of many of the applicant's modeling efforts, including such critical areas as oil price projections, suspended sediment levels, thermal structure within the reservoirs, downstream temperatures, and ice formation.

The CEQ Rules and Regulations require an agency to identify where data gaps exist (40CFR 1502.22). A worst case analysis is to be presented wherever A) the information relevant to adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining the information are exorbitant, or B) the information relevant to adverse impact is important to the decision and the means to obtain it are not known. id. Neither A nor B above apply to the Susitna project. Many of these informational needs are not only affordable and obtainable but have in fact been undertaken or completed by the APA. The DEIS clearly suffers from omission of this necessary data and must be revised to cure this deficiency.

As FERC is aware, in general, prior to the issuance of a license authorizing a projects' construction, fish and wildlife impacts must be addressed and minimized. Specifically, an EIS must be prepared which provides full consideration of the fishery resources which would be affected by the project (See Confederated Tribes and Bands v. FERC, No. 82-7561 (9 Cir. June 7, 1984); Environmental Defense Fund v. Andrus, 596 F2d 848, 853 (9 Cir. 1979); Cady v. Morton, 527 F2d 786, 794 (9 Cir. 1975)). Apart from the requirements of NEPA, this stricture briefly stems from several statutory precepts. The FPA, 16 USC §802(a) requires FERC to assess whether the proposed project will adequately preserve anadromous fish prior to the issuance of a license (See Udall v. FPC, 387 US 428, 450 (1967)). Moreover Section 1 of FWCA, 16 USC §661(a) requires that the FERC, before authorizing the damming of any stream to first consult with the NMFS with a view toward conservation of the resource (See Udall v. FPC, 387 US at 444; Zabel v. Tabb, 430 F2d 199, 209 (5 Cir. 1970), Cert den., 401 US 910).

Recognizing the importance of quantifiable descriptions of the project's physical and biological impacts, we believe that the DEIS should be re-written or supplemented with the requested information. Without such an action the public process would suffer, as the DEIS would not allow for an informed decision(s) to be made regarding biological effects, selection of preferred alternatives, or mitigative measures. As stated, these actions must be taken in order to provide full consideration of fishery resources as required under the above mentioned statutes. Until the DEIS is revised to cure the deficiencies noted in these comments, we must caution FERC that project authorization should not continue.



P. 7114
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 1668
Juneau, Alaska 99802

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OFFICE OF THE SECRETARY

1984 JUL -9 PM 1:48

FEDERAL ENERGY
REGULATORY COMMISSION

RECEIVED
JUL 17 1984

RECEIVED AUTHORITY

JUL 13 1984

Pillsbury, Madison & Sutro

RECEIVED
JUL 10 1984

July 3, 1984

Honorable Kenneth Plumb
Secretary
Federal Energy Regulatory Commission
825 N. Capital Street, N.W.
Washington, D.C. 20426

RE: FERC No. 7114

Dear Mr. Plumb:

The National Marine Fisheries Service (NMFS) has reviewed the DEIS 8405.22 - Susitna Hydroelectric Project (FERC No. 7114) Alaska (Federal Energy Regulatory Commission - Office of Power Regulation).

In order to provide as timely response as possible, we are submitting the enclosed comments to you directly in parallel with their transmittal to Department of Commerce for incorporation in the Department response. These comments represent the views of the Alaska Region of the NMFS. The final comments of the Department should reach you shortly.

Sincerely,

James H. Brooks
for Robert W. McVey
Director, Alaska Region

6.4.2





United States
Department of
Agriculture

Forest
Service

Washington
Office

FILED
OFFICE OF THE SECRETARY

12th & Independence, SW
P.O. Box 2417
Washington, DC 20013

P-7114

1984 JUN 28 AM 9:33

Reply to 2770

FEDERAL ENERGY
REGULATORY COMMISSION

Date JUN 26 1984

Mr. Kenneth F. Plumb
Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, NE
Washington, DC 20426

RECEIVED

JUL 13 1984


Pillsbury, Madison & Sutro

Dear Mr. Plumb:

Thank you for providing us the opportunity to review and comment on the
Susitna Hydropower Project No. 7114, Draft Environmental Impact Statement
(DEIS).

The DEIS is very well written and presents a very comprehensive analysis of
the potential impacts. Enclosed are some additional comments for your
consideration.

Sincerely,


RICHARD D. HULL
Director of Lands

Enclosure

ENVIRONMENTAL
LICENSING

1984 JUL -2 PM 3:04

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United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 2890
Washington, D.C.
20013

Subject: BAP - Review of Draft Environmental Impact
Statement (EIS) for Susitna Hydroelectric
Project, Alaska

Date: June 7, 1984

To: Ed Nelson, Director of Basin and Area
Planning, SCS

File Code:

The subject document has been reviewed in response to your May 29, 1984, request. The document presents a very comprehensive analysis of the effects of the construction and operation of the proposed Susitna Hydroelectric Project. Significant environmental consequences would occur as a result of the proposed action and include:

- (1) large population increases in the project area
- (2) loss of fish and wildlife habitat
- (3) nitrogen supersaturation of stream water
- (4) selective clearing of 56,000 acres of vegetation
- (5) construction of 2 dams with a combined storage of over 10 million acres-feet.

We can only caution that these and other significant environmental effects be mitigated to the extent possible if the decision is made to proceed with the project.

447-4912

GARY A. MARGHEIM
National Environmental Coordinator



**Soil
Conservation
Service**

**BASIN AREA PLNG - OAR - Application for
Susitna Hydropower Project, Alaska**

Date: JUN 15 1984

File Code: 150-7-6-5

Richard D. Hull, Director of Lands, Forest Service,
Washington, D.C.

7119

We have reviewed the Susitna Hydropower Project Draft Environmental Impact Statement (DEIS). The Alaska Power Authority proposes to construct a 1.6 gigawatt capacity hydroelectric project on the Susitna River about 140 miles north-northeast of Anchorage. The proposed action would include an 885-foot-high earth-fill dam (Watana) that would create a 38,000-acre reservoir with 9 million acre-feet of storage; and a thin arch, 646-foot-high concrete dam (Devil Canyon) that would create a reservoir of 7,800 acres and with 1 million acre-feet storage capacity.

The proposed project would require 64,100 acres of land (table F-12). Most of the land is owned by the U.S. Government and managed by the Bureau of Land Management (page F-6). There is no large-scale farming activity and no prime or unique farmlands within the project boundary.

The DEIS is very well written and presents a very comprehensive analysis of the effects of the proposed construction and operation of the project. Dr. Gary Margheim, our Environmental Coordinator, has provided us with a memorandum of comments on the DEIS. His memorandum is enclosed.

The proposed project would have little impact on agricultural activity. We have no objection to the plan.

Edward S. Pickett

EDGAR H. NELSON
Director, Basin and
Area Planning Division

Enclosure

LAND

JUN 19 1984

Director _____
Assistant _____
_____ ✓

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2570
PORTLAND, OREGON 97208

July 25, 1984

REPLY TO
ATTENTION OF:

Environmental Resources

RECEIVED

AUG 2 1984

Pillsbury, Madison & Sultz

Director
Division of Environmental Analysis
Federal Energy Regulatory Commission
Room 308-RB
825 North Capitol Street NE
Washington, D. C. 20426

Dear Sir:

We have reviewed the Draft Environmental Impact Statement for the Susitna Hydroelectric Project, FERC No. 7114, Alaska. In regard to the U. S. Army Corps of Engineers areas of responsibilities for flood control, navigation, and hydropower, we have no comments.

The draft document indicates that the Corps of Engineers is a cooperating agency under National Environmental Policy Act criteria. We wish to advise that we are not a cooperating agency.

Our review of the draft statement, taking into consideration our Sec. 404, Clean Water Act regulatory responsibilities, indicates that the statement does not adequately address the impacts of the proposed action on wetlands in the project area. The treatment of baseline wetlands data and project impacts is too broad and general for an adequate Sec. 404 impact assessment.

Sincerely,



D. E. Olson
Chief, Planning Division



Department of Energy

Alaska Power Administration
P.O. Box 50
Juneau, Alaska 99802

RECEIVED

JUL 9 1984

ALASKA POWER AUTHORITY

July 6, 1984

RECEIVED

JUL 10 1984

ALASKA POWER AUTHORITY

Mr. J. Mark Robinson
Federal Energy Regulatory Commission
825 No. Capitol St., NE
Washington, D.C. 20426

Dear Mr. Robinson:

Thank you for the opportunity to comment on the draft EIS for the Susitna Hydroelectric Project, Alaska (FERC No. 7114).

Our comments are on three areas of the report - Load Forecasts; Fuel Price Assumptions; and Other Hydroelectric Alternatives.

Load Forecasts

FERC's load forecasts use the same computer models as those of the applicant. FERC's answers are lower because of the lower oil price assumptions. The differences are small -- for example FERC's estimates of energy requirements in the year 2000 range from 92 to 98 percent of the APA reference case. That is not a significant difference in terms of forecast accuracy.

We have noted that the forecast models developed for Susitna over the past four years or so have consistently underestimated short-term growth. For example, the DEIS contains three computer-generated numbers for energy requirements in the 1983 "base year". These are 2803 Gwh (APA reference case), 2802 (FERC medium oil price scenario), and 2814 (FERC high oil price scenario). Actual net generation for 1983 for the Susitna market area was 3025 GWh, or eight percent above the DEIS numbers. Unusually mild weather in the latter part of 1983 helped hold down the size of the difference. Based on 1983 actual use, the APA reference case allows for a 3% compound growth of energy requirements for the balance of the 1980's; the FERC numbers allow for from 2 to 2.4%. The National Energy Policy Plan suggests 3.7% as a national figure for the period. Actual increase for the Susitna market area has been 3.8 percent per year over the last three years.

The Susitna market area--particularly the southern portion--has a strong and growing economy. Applicant has submitted forecasts containing very modest growth assumptions. We suggest FERC accept these forecasts and examine the risk that the forecasts may be too low.

Fuel Price Assumptions

Alaska Power Administration does not claim expertise in this area. However, it is obvious that FERC's assumptions of future fuel prices are much lower than those from other sources. The oil price assumption receives the most attention in this DEIS because of the relationship in the load forecast models.

It is noted that the applicant's oil price assumptions are compatible with the Scenario B projections of DOE's National Energy Policy Plan, while FERC's assumptions fall well below the low range assumptions of the plan.

We suggest that FERC should be in a position of accepting economic assumptions by applicants which are consistent with the National Energy Policy Plan.

Other Hydroelectric Alternatives

FERC suggests a series of smaller hydroelectric alternatives -- namely Johnson, Browne, Keetna, Snow, and Chakachamna -- may be more attractive and more economical than development of the Susitna Project. These five projects have a total estimated firm energy capability approximately equal to the Watana Project.

In our opinion, four of the five FERC sites -- Johnson, Browne, Keetna, and Snow -- should not receive further consideration as possible alternatives to Susitna by reason of higher costs and serious environmental problems.

By way of background, our office has been involved in investigations of Alaskan hydroelectric resources since 1948, first as the Alaskan program of the Bureau of Reclamation and since 1967 as the Alaska Power Administration.

The Browne, Keetna, Johnson, and Snow sites were identified in USBR inventories completed by the mid-1960's. The inventory work consisted of rough hydrology, geology, engineering, and cost studies to determine which of the potential projects were sufficiently attractive to warrant more detailed study.

Subsequent work on the four sites, also of inventory grade, appears in the Susitna Feasibility studies by ACRES, as reported in a somewhat modified form, in the FERC DEIS.

The available data show the Johnson site to be a particularly poor choice. The site is located on the Tanana River, the largest tributary of the Yukon River. Development would require a massive dam with structural height of over 200 feet and crest length of about 6400 feet. The USBR studies raises significant questions about foundation suitability -- surface geology suggests a deep valley fill of permeable, unconsolidated sediments.

The Johnson Reservoir would be huge -- about 2½ times as large as Watana -- and would impact areas with much greater fish and wildlife values than the Watana site. The Johnson site would require relocation of about 50 miles of the Alaska Highway, and at least one small community.

We note that FERC shows a development cost of \$1500/kw for Johnson, and suggest that figure is seriously underestimated. Indexing of USBR data gives a 1982 construction cost in excess of \$5000 per kilowatt.

The Browne site would require a large, main-stream dam on the Nenana River and relocation of significant portions of the Alaska Railroad and Parkes Highway. Keetna would require a large dam in the heart of Talkeetna Mountains. The dam, its transmission lines, and access roads would involve major intrusion into areas which are now essentially undisturbed. As indicated in the DEIS, Browne, Keetna, and Snow are all very high cost projects.

Chakachamna has received more attention than the other four sites recommended by FERC, including recent studies by the Alaska Power Authority. The available data supports a finding that Chakachamna is a potentially excellent project, but does not support a finding that it is more attractive than Susitna.

It is questionable whether any of the projects suggested by FERC could be bought on-line by 1993, since virtually no detailed data is available for them. It is certain that Johnson could not be developed that quickly as assumed by FERC.

The transmission system required for development of the five hydro sites appears underestimated. FERC staff assumed that the new projects would be tied into the new Anchorage/Fairbanks intertie or tied into the nearest transmission line. Apparently, there were no rough systems studies made. In most cases, the projects would be tied into fully loaded or "shakey" systems, therefore, major new transmission systems would be required to distribute the power to load centers.

In our opinion, the total costs for the five hydro projects are underestimated by at least \$1.0 billion. This is based on significant underestimate of the Johnson Project (and possibly the Snow Project) and the need for major new transmission facilities. When these costs are added to the FERC thermal/hydro scenario, it becomes questionable whether this alternative is a true alternative to Susitna. The many unknowns about the five hydro projects increase the probability of further cost increase.

We believe the environmental costs associated with the FERC hydro alternatives substantially exceed those associated with full development of the Susitna hydro resources, and that no additional study is necessary to establish that fact.

Conclusion

The applicant proposes to finance and develop the upper Susitna hydroelectric project, having made intensive investigations of Susitna as proposed and of many alternatives, and having noted clearly that, at least for the short run, alternative costs for thermal power would be less expensive. The State position generally reflects the findings that, over the long run, this excellent hydroelectric project will be of great and lasting benefit to the people of Alaska, and that the environmental costs are acceptable.

FERC staff finds that thermal alternatives and five smaller hydroelectric projects—with firm energy capability roughly equal to the Watana dam as proposed by the State — should result in lower power costs than would Susitna. That finding is translated into a recommendation that the State pursue a hydro-thermal program involving those five projects, coal, and natural gas, instead of Susitna.

Alaska Power Administration believes FERC staff has underestimated the technical difficulties of developing the five smaller hydro sites and underestimated their economic and environmental costs. This is particularly true for the Johnson site which would require a large, mainstream dam on the Tanana River (largest tributary of the Yukon) and reservoir area 2 1/2 times that for Watana.

We suspect that, by the time FERC finalizes the environmental statement, four of the five non-Susitna hydro alternatives will be scrapped (Johnson, Browne, Keetna, and Snow).

There have been extensive studies on environmental implications of the Susitna development. Adverse impacts are remarkably minor for such an important new energy source. Environmental costs are not of a magnitude to warrant denial of license.

The State wishes to make a major investment in its renewable energy resources for power production instead of pursuing natural gas and coal alternatives. The State should be permitted to do so.

Again, we appreciate the opportunity to comment.

Sincerely,

Robert J. Cross
Administrator

cc: Alaska Power Authority

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101



REPLY TO M/S 443
ATTN OF:

July 23, 1984

Mr. Kenneth F. Plumb, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street N.W.
Washington, D.C. 20426

RE: Susitna Hydroelectric Project Draft EIS
FERC No. 7114

Dear Mr. Plumb:

The Environmental Protection Agency (EPA) has completed its review of the Draft Environmental Impact Statement (Draft EIS) for the Susitna Hydroelectric Project. This Draft EIS was prepared in connection with an application for license from the Alaska Power Authority (APA) to construct and operate the proposed project. The project is located on the Susitna River about 140 miles north-northeast of Anchorage. The APA proposes to construct two dams (Watana and Devil Canyon) with reservoirs inundating 38,000 and 7,800 acres, respectively, and powerhouses with an installed capacity of 1,620 megawatts to provide electric power to most of the State of Alaska (Railbelt area).

The Draft EIS evaluated several alternatives to the APA proposed project. Among them were hydroelectric development in several sites including the Susitna River Basin, coal and natural gas generation, combinations of thermal and hydroelectric generation, and no-action. The Draft EIS recommendation (FERC staff recommendation) is three-tiered and ranked in order of preference. First, the Draft EIS concludes that a mixed thermal-based generation scenario, with selected non-Susitna hydropower projects added as needed, is the most effective approach to meeting the projected generation requirements. The next preference is hydroelectric development on the Susitna River and licensed construction in stages with the first stage being Watana I. This is a smaller version of the Watana Dam proposed by APA. It has an installed capacity of 900 megawatts and inundates 28,000 acres. The last preference is the Susitna Hydroelectric Project as proposed by APA, but with an increase in minimum flow releases during the salmon spawning season.

The DEIS takes a commendable approach to structuring the decisions before the Commission. The decision is, in one sense, a system level choice; that is, what type of electrical power supply system would best meet the affected region's needs over the long term. It is also an individual

project licensing choice in that FERC must decide what hydroelectric projects, if any, it should license as a part of the regional power supply system. With respect the coal-fired power plants which would be part of mixed hydro-thermal systems, the analysis must also determine, at a screening level, whether the suggested plants would be licensable under applicable statutes such as the Clean Water Act and the Clean Air Act.

Adequacy of the EIS:

The Draft EIS provides a very unbalanced analysis of the alternative systems and the individual power plants included in them. Although it provides a relatively thorough evaluation of the impacts of the Susitna project, it gives only superficial treatment to other potential hydroelectric projects. Similarly, it ignores several potentially significant impacts related to the use of coal-fired power plants. The impacts requiring further analysis include, inter alia:

1. Fugitive dust emissions from increased coal mining at the Usibelli Mine and new mining at the Beluga coal fields and the effects of these emissions on the Denali National Park [A Class I area under the Clean Air Act's Prevention of Significant Deterioration (PSD) program].
2. Water quality impacts of coal mining at the sites noted above.
3. Noise impacts from expansion of the Usibelli Mine on Denali National Park.
4. The impacts of bottom ash, fly ash, and scrubber sludge disposal from coal-fired power plants.

The evaluation of the Susitna project also needs to be expanded to fully address some of the issues which it raises. For example, the analysis of water quality impacts indicates that the State water quality standard for temperature would be violated and that the standard for turbidity may be violated by the project. Further analysis is necessary to:

1. Confirm the severity and duration of the potential standards violations.
2. Develop mitigation measures to reduce the magnitude and duration of the expected water quality changes.

Finally, the economic analysis requires substantial reworking in order to provide an objective comparison of the alternatives.

Environmental Impacts of the Alternatives:

The DEIS indicates that each of the alternatives could result in significant environmental degradation. In addition to the water quality problems, noted above, the Susitna project could have serious adverse

impacts on fisheries and recreation which are not yet adequately addressed in the Draft EIS. The other hydroelectric alternatives might present similar water quality problems (the analysis is not detailed enough to address this question) and some of them would result in major impacts to habitat. For example one of the alternative hydroelectric projects would significantly alter or inundate over 100,000 acres of terrestrial habitat.

Conclusions:

The absence of appropriate data and analyses leaves the FERC staff recommendations to the Commission essentially unsupported. We consider the flaws in the Draft EIS to be serious enough to merit the development of a Revised Draft EIS. A Revised Draft EIS would provide more detailed environmental setting data and increase the depth of the impact analysis for the alternatives so that all alternatives can be compared on an equitable basis. The impact analysis simply has not been developed to the point that a regional energy planning decision can be made which gives adequate consideration and weight to the environmental differences among the alternatives.

This, when combined with the potential adverse environmental consequences noted above and in the enclosed Draft EIS Review Report, has led us to rate the Draft EIS ER-3 [ER: Environmental Reservations; 3: Inadequate] in accordance with our responsibility under Section 309 of the Clean Air Act to determine whether the environmental impacts of proposed Federal actions are acceptable in terms of public health, welfare, and environmental quality.

The enclosed report is based on our review of both the Draft EIS and APA's responses to our license application scoping recommendations.

We appreciate the opportunity to review this report. Should you want to discuss EPA's comments please contact Richard R. Thiel, Environmental Evaluation Branch Chief, at FTS 399-1728.

Sincerely,

151

Ernesta B. Barnes
Regional Administrator

Enclosure

cc: Mark Robinson, FERC
Ron Kreizenbeck, AOO
Lenny Corin, F&WS-Anchorage

U. S. ENVIRONMENTAL PROTECTION AGENCY

SUSITNA HYDROELECTRIC PROJECT—FERC No. 7114
APA SCOPING RESPONSE EVALUATION

U. S. ENVIRONMENTAL PROTECTION AGENCY
1200 Sixth Avenue, M/S 443
Seattle, Washington 98101
July 30, 1984

APA SCOPING RESPONSE EVALUATION

U. S. EPA

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INTRODUCTION

This report discusses the Alaska Power Authority's (APA) responses to EPA's scoping comments on the Draft Environmental Impact Statement for the Susitna Hydroelectric Project. The scoping recommendations were based on EPA's review of APA's Application for License. The APA responses were contained in Section C of the APA report titled "Susitna Hydroelectric Project, Project No. 7114, Response of the Alaska Power Authority to Comments on the Alaska Power Authority's License Application," dated January 19, 1984. They were reviewed for their technical accuracy and responsiveness to EPA's recommendations.

The APA report numbered each of the original EPA scoping comments, and responded to them in numerical sequence (C.1 through C.94). This numbering format has been retained for this report. In order to keep this report as brief as possible, responses which EPA deemed to be adequate, or which addressed an issue which we determined did not merit further attention, are ignored. Finally, we note that we did not expect any response from APA to our scoping recommendations. The burden for complying with the National Environmental Policy Act (NEPA) falls on Federal agencies such as the Commission. Thus, the objective of our scoping effort was to help insure that the FERC EIS would be a fully adequate decision making document.

1 PURPOSE AND NEED

Comment C.4: The response states that an analysis of the cumulative effect of reasonable values for key variables other than the price of oil is not justified due to the "dominant role played by world oil prices." Although the importance of world oil prices as a determinant of likely economic conditions is recognized (based on the discussion in the referenced Section 5.3), the dominant role of world oil prices relative to other factors is not evident from the analysis. Moreover, from the information provided in Tables B.118-B.126, it appears that the percentage effect (20 percent) from assumed high and low world oil price scenarios on projected households in the year 2000, (a key variable for estimating energy demands) is not dramatically different from the percentage effect (14.6 percent) from high and low estimates of State mining employment. If the effects of other variables are included, the relative importance of world oil prices in determining future economic conditions and energy demands is questionable. Our comments on the Draft EIS reflect this concern.

Comments C.8-C.9: The response restates that future energy savings from conservation will occur primarily as a result of market forces (i.e., is priced-induced). Although this statement may be true, no additional data in terms of estimates of future energy savings from conservation (either program-induced or price-induced) are provided, as requested. Because of the importance of potential energy savings to development and analysis of feasible energy supply alternatives, reasonable estimates of energy savings from program-induced conservation should be provided in the EIS. This was noted in our comments on the Draft EIS.

Comment C.10: The response adequately addresses the implications of cyclical growth in world oil prices on energy demand forecasts; however, it should be recognized that certain insulating features of the RED model (e.g., spending rule and corporate income tax component, P. A-15) help to maintain the demand forecasts at a minimum level. If these features were not assumed, the need for the proposed project at the presently planned capacity would require reevaluation under a cyclical or declining oil price scenario.

2 ECONOMIC EVALUATION

Comment C.12: The response misinterprets the comments, as presented. First, the intent of the comment was not to imply that the identification of relevant costs was incomplete (even though this was subsequently determined), but rather to identify the necessary conditions for the analytical framework used. Second, without further identification of project objectives, it must be presumed that the alternative which meets the energy demand requirements at the "least cost" is the preferred project. In this sense, benefits are measured only in terms of least cost, with all other factors effectively treated as being equal.

Comment C.13: The response does not adequately address the request for data to substantiate an assertion regarding economic feasibility of the project under the -2 percent world oil price scenario. Because this scenario is not considered a likely development, however, and since it was not evaluated in the Draft EIS, the generation of additional data to evaluate the scenario does not appear to be warranted.

Comment C.15: The response cites Response C.5 to justify not evaluating the effect of variable oil prices on other key economic factors. This response adequately addresses this specific concern. The need to evaluate the sensitivity of Susitna net benefits in terms of changes in the values of more than one factor from the table presented (C.15.1), however, is not adequately addressed. If, for example, fuel prices decreased by 20 percent and Watana capital costs increased by 20 percent, it appears that the net benefits of Susitna would approach zero. The combination of these two events is entirely possible.

Comment C.16: The response attempts to justify the exclusion of opportunity costs for the State's equity investment in the Susitna Project based on the theoretical problems associated with selection of "the" appropriate measure. Although numerous rationales exist as to which rate would be most appropriate, the need for some measure of opportunity cost is widely accepted. Clearly, the state could achieve some return on the equity invested in Susitna (e.g., State Permanent Fund), and exclusion of this rate of return from the economic evaluation, however conservative, underestimates the full cost of the project.

Comment C.17: The response does not adequately address the stated concerns. The best thermal alternative, as evaluated in the Draft EIS, would consist of multiple thermal generating plants of smaller size, developed over an extended period. For example, the gas scenario would consist of eight 200-MW combined-cycle units and two 70-MW combustion-turbine units to be installed between 1993 and 2022. This staggered construction period would not require the State equity investment needed to finance construction of the more capital-intensive Susitna Hydroelectric facilities. As identified in the analyses of Comment C.16, the opportunity cost of using State funds on project financing, as measured by a reasonable rate of return on alternative investments, should be included in the cost evaluation. This is particularly necessary, given that (as noted in our comments on the Draft EIS) none of the discount rates used corresponds to the real rate of return being earned by the State's Permanent Fund.

Comment C.18: This response is generally adequate, although some misinterpretation is apparent. The intent of the comment presented was not to question the appropriateness of the life cycle method employed or of the assumed economic life of the project; rather, the concern was, and still is, that the relative costs to maintain the two types of plant systems over the final 30 years could vary considerably from production costs in the year 2020. Although we recognize that this approach is not a standard practice in projecting production costs, it would provide information useful to more clearly assess project costs.

Comment C.20: The response does not adequately address the issues, as presented. The implications of foreclosing future options as a result of commitments to centralized power generation at Susitna have not been discussed. The difference between the alternatives in terms of system reliability needs to be discussed and compared in the Revised Draft EIS, including the possible effects of sabotage. If the system reliability of the alternatives is comparable, this should be stated in the Alternatives Comparison Chapter.

Comment C.21: This response addresses the concerns expressed by dismissing the economic importance of lost user benefits. Although it may be true that the economic value of lost recreational benefits pale when compared with other economic effects, the number of user days lost and some measure of the economic value of these lost benefits should be provided. Numerous studies have been prepared which estimate the economic value of recreational activities. This analysis should be conducted prior to dismissing the economic importance of the lost recreational opportunities.

3 PROPOSED ACTION AND ALTERNATIVES

Comment C.22: The response restates the objectives and procedures used to review and screen alternative energy systems. It is evident that a wide range of generating technologies were considered and evaluated in the referenced Railbelt Alternatives Study. Our review and subsequent comments on alternatives evaluation were based on the summary information provided in the application. The level of detail presented in this summary was the source of concern. A detailed evaluation of alternatives in the application was limited to the economic assessment of the "best thermal" alternative. The statement regarding additional alternative evaluation was made to ensure that alternatives comparable to the Susitna Project in terms of project details would be assessed in the EIS. Our review of this EIS indicates that the information describing the alternatives to the proposed project is not of equal depth, thereby precluding assessment of alternatives at the same level of analysis. The response indicates that APA conducted a relatively thorough evaluation of alternatives. The EIS must contain the results of FERC's independent review of APA's analyses. Additionally, given that the Commission staff has developed essentially new systems, these alternatives deserve a very thorough evaluation in the EIS. This is one of the reasons why we have recommended the development of a Revised Draft EIS.

Comment C.23: As stated in the analysis of Comment C.22, the level of detail in describing the alternative scenarios in the EIS is not comparable to that for the Susitna Project. This makes assessment of the alternatives on an equal basis difficult. Additional information on project alternatives should be included (or developed if unavailable) from previous studies. The description of alternative facilities should contain specific locations so that land use, vegetation, and wildlife impacts can be adequately assessed. It should also provide enough detail on any liquid or solid waste discharges or gaseous emissions to allow an analysis of water quality and air quality impacts. The nature of the environment at alternative facilities locations should also be described in more detail to support a more thorough impact analysis. Habitat types, flow regimes and quality of any receiving waters, and general land use patterns should be identified. The alternatives should then be evaluated and compared in terms of stated project objectives. These issues were all addressed in our comments on the Draft EIS.

Comment C.25: The response ducks the conservation issue by saying that not much conservation is expected. As stated in the analysis of Comment C.8, reasonable estimates of energy savings from program-induced conservation should be included in the EIS. APA has not suggested inclusion of meaningful conservation scenarios. We see this as a particularly important omission. Conservation has been shown several times to be the least expensive means of matching future power loads with available power resources. Moreover, it general results in less severe and widespread adverse environmental impacts. Finally, a recent study conducted for

the Bonneville Power Administration found that conservation results in more net employment than the construction and operation of nuclear power plants. Although the study did not address other convention power generation systems, we suspect that the results would be similar for these systems.

Comment C.26: The response indicates that it was found not economically justifiable to develop a hydroelectric scenario with the same capability as the Susitna Project. This ducks the issue of comparing equivalent projects from an environmental standpoint. The evaluation of non-Susitna hydroelectric facilities in the Draft EIS is inadequate due to the lack of project specific information and analysis.

Comment C.27: The response acknowledges that screening criteria changed twice during the screening process due to changing economic conditions. The response further indicates that each study iteration used internally consistent criteria. However, since some projects were eliminated by early screening while other projects were retained, our objections to this change in screening criteria remain. These objections could be resolved if the rejected candidate projects were retested with the final screening criteria and economic assumptions.

Comment C.29: This comment ducks the issue by illustrating the "units" in the Watana and Devils Canyon alternatives. Each dam must be fully constructed in order to emplace its first unit. The impacts of the Susitna Project with only one unit cannot be fairly compared with a gas- or coal-fired unit of equal size; however, scenarios with production capability equivalent to the Susitna Project should be evaluated. The level of detail for comparable alternatives described in the EIS does not facilitate a fair comparison of environmental impacts.

Comment C.30: The APA reply is unresponsive to the comment. It only seems to highlight weaknesses in the models used to analyze generating capacity. The effect of licensing delays should be addressed in more detail in the Revised Draft EIS.

4 WATER QUALITY AND QUANTITY

Comment C.35: The information contained in the response should have been included in the EIS. However, no specific discussion of this subject can be found in the Draft EIS. In general, the response given by APA is adequate. Information concerning sediment movement under the two scenarios, however, should be clarified. In the first scenario, the third paragraph of the response assumes that only the bedload fraction of the sediment load would be deposited in the borrow pits. In a river carrying a large sediment load, even a small reduction in velocity would allow the bedload and a significant portion of the suspended load to be deposited. Reductions of sediment load are likely to be much larger than the three percent implied by the response.

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In the second scenario, the response deals only with the coarse fraction of the sediment load. Although widening and deepening of the channel will reduce the overall carrying capacity, large amounts of smaller sized particles may still be transported by the flow.

Comment C.36: The response does not identify areas below borrow sites E and I which would be subject to scour or deposition; therefore, it is not responsive to the original comment. The statement concerning degradation on the order of 0.1 to 0.6 feet should be clarified by identifying specific reaches of the river which would be most affected by degradation.

The response also fails to discuss the morphological consequences downstream of the borrow sites if the Devil Canyon site is not developed. Morphological changes are important indicators of impacts on aquatic biota.

Comment C.37: Refer to the analysis of C.35 and C.36 above.

Comment C.38: The response given by APA and the stream morphology studies outlined should give a more complete understanding of possible impacts at the Chulitna-Susitna confluence. The Revised Draft EIS should contain FERC's evaluation of the results of these studies.

Comment C.47: Possible supersaturation of nitrogen downstream of the dams continues to be a concern. One reviewer suggested that samples collected at a prototype test of a cone valve outlet structure were not properly pressurized and did not reflect actual nitrogen levels. On the basis of these "spurious" data, the applicant apparently concluded that cone valves could be used to control dissolved nitrogen levels. Therefore, a question has been raised in regard to the ability of the valves to control downstream nitrogen levels. On the other hand, supersaturation of nitrogen on the order of 115 percent has been observed at Devil Canyon under natural conditions during high flows. These high flows would not exist under postproject conditions. The applicant response references an "attached report by Ecological Analysts" which was not attached and not available for review. The report apparently discusses prototype testing of the valves. The response also indicates that further analysis is now being conducted. The results of this analysis should be reported in the Revised Draft EIS.

Comment C.48: The response to Comment C.48 references several pages of the License Application (pages E-2-96, E-2-135, E-2-172) which state that the leachate products associated with bottom soils of the impounded area will "be confined to a small layer of water immediately adjacent to the reservoir floor" (page E-2-135). This is not true since the lakes will be dimictic, and will therefore mix twice a year during spring and fall. This has obvious lake water quality implications.

Comment C.51: The response to comment C.51 states that:

"Reservoir limnological conditions should be oligotrophic and very resistant to trophic status or water quality changes to nutrient

concentrations from either significant amounts of wastewater or anything but huge petroleum product spills, neither of which is reasonably expected to occur."

The first part of the statement is incorrect since oligotrophic systems are generally much more sensitive than eutrophic systems to increased nutrient loadings. Water quality conditions in the reservoir may be incorrectly analyzed in the EIS if this assumption were used.

Comment C.53: Intentions for clearing of vegetation in the impoundment areas of both Watana and Devil Canyon Reservoirs are cited in Volume 5A, Exhibit E, Chapter 2 of the FERC License Application on pages E-2-67, E-2-70, E-2-91, E-2-94, E-2-144, and E-2-151. For the Devil Canyon impoundment area, the following statement appears on page E-2-151:

"Prior to filling, all standing vegetation in the reservoir area will be cleared and burned, thereby eliminating much of the oxygen demand that would be caused by inundation and subsequent long-term decomposition of this vegetation."

The response to Comment C.53 indicates that:

"No plans exist nor are there any such plans included in the FERC License Application for clearing and burning of impoundment zone vegetation."

Since the response to Comment C.53 contradicts the FERC License Application, the Revised Draft EIS should indicate which approach will be used. Also, nutrient loading from submerged vegetation should be considered in the water quality modeling efforts.

Comment C.57: The Vollenweider modeling approach is appropriate for estimating the long-term eutrophication potential of reservoirs when they are phosphorus limited. However, it does not provide any information on the seasonal dynamics of water quality constituents within the reservoir. Dynamic simulation models are required for the latter type of analysis. Also, the description of the nutrient modeling provided on pages E-2-133 to E-2-135 of the License Application indicates that some of the assumptions used in the analysis may be questionable. For example, the phosphorus loading rates were based on dissolved orthophosphate concentrations measured in the Susitna River during June. These concentrations were then used with the annual average flows to determine the annual loading. In addition, it was assumed that "phosphorus species other than dissolved orthophosphate are not converted to bio-available form" and "no appreciable amount of bio-available phosphorus is released from the soil upon filling the reservoirs" (page E-2-134). These assumptions are not conservative and will tend to underestimate the actual phosphorus loading rate and resultant trophic status for the following reasons:

1. Loading rates should be based on total phosphorus rather than

orthophosphorus since all organic forms can decay to produce orthophosphate.

2. June may not be the best time to obtain representative values of phosphorus concentrations since (A) increased light will cause algal growth which removes available orthophosphate from the water, (B) June has the highest river flows so all constituents will tend to be diluted to low concentrations, and (C) silt concentrations are high in June, so some of the phosphorus may be adsorbed to silt and clay particles.
3. The assumption that "phosphorus species other than dissolved orthophosphate are not converted to a bio-available form" is not true and is not a conservative assumption since all organic forms can decay to produce orthophosphate.
4. The assumption that "no appreciable amount of bio-available phosphorus is released from the soil upon filling the reservoirs" is also not true and is not a conservative assumption since the decomposition of flooded vegetation and trees on the reservoir bottom will release substantial amounts of phosphorus which will mix throughout the lake during the spring and fall overturns.

Also, page E-2-133 states that the Vollenweider analysis may overestimate the trophic status since it is based on temperate lakes, and since the proposed lakes will have reduced light due to silt. This is also incorrect, since high latitude lakes have more light and longer days during the growing season than temperate lakes, and may therefore be more prone to eutrophication problems than temperate lakes. Also, turbidity may be much lower than current conditions due to particle settling in the reservoirs, so the epilimnion may be light limited.

DYRESM is appropriate for simulating temperature distributions in reservoirs as long as the dominant temperature gradients are in the vertical direction. In long, narrow, deep reservoirs with high inflow and outflow rates, a two-dimensional model would provide more accurate information on the hydrothermal behavior of the reservoirs.

The Peterson and Nichols (1982) report has again been cited as containing the details of the water quality studies. Since this report was not available for review, an assessment of the adequacy of these studies is not possible.

Comment C.58: The response notes that additional modeling was not considered necessary. Our review of the Draft EIS indicates that water quality standards violations are a significant possibility. Consequently, we have recommended the inclusion of more sophisticated water quality modeling in the Revised Draft EIS. The models recommended in our October 31, 1983 Scoping Report still appear to be appropriate.

Comment C.62: The APA response refers to dam failure analyses conducted as part of the Watana Dam feasibility studies, but the results of the analyses are not reported in the response or in the Draft EIS. APA also indicates that downstream

safety plans would be prepared "after final design and prior to reservoir operation." The EIS should contain some description of the areal extent and severity of impact a dam failure would have on lands and people downstream from the project area. This is an important consideration to decision makers when weighing the less quantifiable effects of project alternatives.

5 FISHERIES AND AQUATIC HABITATS

Comment C.63: The response lists a reference that provides quantitative information on fish impacts. This document was not available to EPA at the time of the Application review or the current review of the Draft EIS. Furthermore, the lack of a quantitative impact analysis is a major drawback of the Draft EIS.

Comment C.64: The response indicates that more quantitative fisheries data are being collected (e.g., instream flow studies that correlate fish habitat with flow). The Draft EIS did not reflect this new information. It should be included in the Revised Draft EIS.

The response also refers to difficulties in locating mainstem salmon spawners. Potential sampling errors of great magnitude and importance to impact analysis should be reflected in the discussion. The Draft EIS impact assessment chapter did not describe the relative proportion of spawning salmon in the mainstem.

Comment C.66: The response contradicts itself by stating that "The FERC License Application contains no worst-case scenario for any species" and that "the worst-case scenario developed in the License Application consists of an assumption that all habitat which is directly affected by the mainstem discharge might become unsuitable." The response also contains several inconsistencies or errors. First, an estimated 22.0-22.8 percent of the chinook, 5.0-11.4 percent of the chum, and 0.9-3.6 percent of the sockeye salmon observed at Sunshine Station were observed at upriver locations (Application Fig. 3.9) rather than the 6-7 percent chinook, 5-7 percent chum, and less than 1 percent of the sockeye, as cited in the response. Second, the response states that "All chinook salmon which enter the reach (Devil Canyon to Talkeetna) spawn in tributaries which will not be affected by project-induced changes." This statement is inconsistent with Table E.2.27 which indicates possible restriction of fish access to Sherman Creek and Jack Long Creek because of stream mouth perching (see Fig. 3.15 and 3.17 for fish counts). This table also lists fish access as a concern for numerous other tributaries in the reach. The fishery's impact analysis contained in the Draft EIS is suspect because of these inconsistencies.

Comments C.67-C.69: Reports referenced by APA as evaluations of sampling programs and techniques were not available to EPA and were not described in detail in the Draft EIS. Therefore, it is impossible to judge the effectiveness of the sampling programs and the accuracy of the fishery impact analysis.

Comment C.73: Although the Draft EIS mentions that water clarity will improve during the summer, it does not describe what effect this will have on predator-prey interactions of fish. This may not be a major impact, but it should be evaluated in the Revised Draft EIS.

Comment C.75: The response indicates "hand calculations" will be made to determine whether erosion or deposition occurs in slough habitats. It does not indicate how these calculations will be made.

6 WILDLIFE RESOURCES

Comment C.82: The APA response does not provide the requested information, nor is it presented in the Draft EIS. It is not possible to fully evaluate the implications of the proposed project if mitigation measures are still being developed. The significant habitat loss that would occur as a result of the project requires some assurance that adequate mitigation is actually feasible before responsible decisions on the project can be made.

Comment C.86: The data requested by this comment have not been provided in APA's response or in the FERC Draft EIS. Moose habitat data collection and model testing are still underway. It is difficult to assess the severity of project impacts on moose habitat without additional information, and impacts on moose should be adequately identified and mitigation planned before a decision is made on the project.

7 AIR QUALITY

Comment C.91: The response treats this paragraph as an independent comment rather than as a lead-in to the paragraph labeled "Comment C.92." The response addresses the issue of direct air quality impacts of the project and its alternatives. This issue is the focus of Comment C.94; see discussion of the response to that comment.

Comment C.92: The response fails to address the issue raised, implying that fuel use patterns are dependent primarily on (current) relative fuel prices. The nature of installed heating systems, rather than the relative price of different fuels, will dictate fuel use patterns. Even for new construction, fuel prices will not be the sole basis for selection of heating systems. The issue raised in the original comment is relevant to the evaluation of project alternatives. Will increased hydroelectric development alter electrical power costs sufficiently to affect heating

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systems chosen for new construction? Would fossil-fueled generating plants affect future fuel supply or fuel prices sufficiently to alter the types of heating systems chosen for new construction? Would the project or its alternatives affect fuel prices sufficiently to result in increased use of wood for supplemental heating in both existing and new construction (recognizing that not all wood is obtained through commercial dealers)?

Changes in wood burning practices could influence attainment of air quality standards.

Comment C.94: The response to this comment (combined with the response to Comment C.91) is inadequate. Compliance with emission limits set by air quality management agencies does not necessarily guarantee an absence of ambient air quality impacts. Screening level analyses are possible and feasible without precise site-specific topographic and meteorological data. The requested screening analyses have been provided in the Draft EIS. However, as noted in our comments on the Draft EIS, they were flawed in several respects. Our recommendations for the Revised Draft EIS describe how these errors and omissions could be corrected and will not be repeated here.

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EXECUTIVE SUMMARY

INTRODUCTION

This report presents the U. S. Environmental Protection Agency's (EPA) comments on the Draft Environmental Impact Statement (Draft EIS & DEIS hereafter) for the Susitna Hydroelectric project sponsored by the Alaska Power Authority (APA hereafter)¹. It discusses:

1. Analytical problems with the EIS' evaluation of alternatives and how they should be corrected.
2. Serious omissions in the EIS' evaluation of environmental consequences and how they should be corrected.
3. The FERC staff conclusions and the problems which EPA has with these conclusions.

Report Organization:

The report presents EPA's comments in their order of appearance in the Draft EIS. Chapters, sections, and subsections carry titles which correspond to the titles used in the DEIS. Where appropriate, section numbers from the DEIS are referenced in boldface type.

MAJOR FINDINGS & CONCLUSIONS

Nature of the Action:

The APA has submitted an application for license for a two dam hydroelectric system, called the Susitna Project, to serve the long term electrical energy needs of Alaska's Railbelt. The FERC staff has treated the problem before it as being one of determining, to the best of its ability, what type of

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1. This report was developed with the assistance of Jones & Stokes Associates, Inc. and Tetra Tech, Inc.

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electric power supply system would best meet the needs of the Railbelt. Thus, the decisions to be made are, in part, system level decisions. Consequently, the DEIS must examine the differences among power supply systems. However, because FERC must also determine what specific hydroelectric projects, if any, to license at this time, the analysis must also focus, in some detail, on the environmental and economic consequences of individual projects.

Review Criteria:

This decision framework requires that the EIS serve several purposes. Consequently, EPA reviewed it within the context of four somewhat different sets of criteria:

1. How well does the document serve the intent of NEPA and the Council on Environmental Quality (CEQ) Regulations [40 CFR Part 1500] governing the implementation of NEPA?
2. How well does it address the factors (primarily environmental standards compliance) which EPA uses in determining whether the environmental impacts of the proposed action, and its alternatives, are acceptable in terms of public health, welfare, and environmental quality pursuant to Section 309 of the Clean Air Act?
3. Does it make an adequate contribution towards FERC's mandate, under Section 10 of the Federal Power Act, to optimize water resources development within the basin (or region of interest)?
4. Does it provide the information necessary for the Commission's decisions to be able to meet the "substantial evidence" test applied under the Administrative Procedures Act to decision making procedures of this type?

Findings & Conclusions:

The major findings of our analysis are:

- The Draft EIS provides a very unbalanced evaluation of alternative electrical power supply systems. Although it contains a relatively thorough analysis of the Susitna Project, its treatment of other systems and the individual projects within them is too superficial to provide a reasonable basis for well informed decision making.
- The description of the Affected Environment (Chapter 3) for the various project alternatives is very unbalanced; there is generally insufficient environmental setting data to evaluate alternatives other than the proposed Susitna hydroelectric project.

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- The impact analysis as a whole (Chapter 4) is unbalanced because project alternatives have not been developed in sufficient detail; it is therefore difficult to accurately compare the environmental impacts of alternative actions.
- Insufficient information is provided in both the Environmental Impact Chapter and the Comparison of Alternatives section to justify FERC's conclusions regarding the significance of the impacts of the various project alternatives.
- The FERC staff recommendation of a mixed thermal-based generation scenario (Section 5.2.1) is based on questionable assumptions of future world oil prices and is not adequately supported by the impact analysis contained in the Draft EIS.
- Each of the alternative power supply systems has the potential to result in serious environmental degradation. Moreover, the evaluation of the Susitna project indicates that it could result in extended violations of State water quality standards.
- The discussion of mitigation measures is generally lacking; the fact that mitigation plans are being developed for loss of habitat is not an adequate basis for government agencies or the general public to determine if major project impacts can be mitigated. The magnitude of the potential impacts suggests that no action should be taken by the Commission until a thorough mitigation plan has been developed and reviewed by appropriate natural resource management agencies.

These basic problems with the Draft EIS, as well as several other major problems in the analyses presented, lead EPA to conclude that a revised Draft EIS is necessary. A revised DEIS could contain a corrected and more balanced evaluation of the alternatives. Developing a revised DEIS, before the Final EIS, would provide for adequate review of these improved analyses by concerned agencies and the public before the Commission holds its hearings on the license application and begins making decisions. We believe that it would be the most effective way of insuring that the decisions made fully implement the public's interest and achieve a reasonable balance among the goals of the various applicable Federal statutes.

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Chapter 1

PURPOSE OF AND NEED FOR ACTION

1.1 NEED FOR POWER

1.1.1 Major Concerns

In Section 1.2.4 (Load Growth Forecast), the central issue analyzed is the future price of world oil. As identified on page 1-9 of the Draft EIS, world oil prices affect future power needs and the feasibility of generation technologies to meet those needs in several key ways.

Because of the important influence of future oil prices on the price of fuel substitutes, especially natural gas, the oil price projections are critical to any subsequent economic analysis of alternatives, whether hydro- or thermal-based. The high degree of uncertainty associated with long-term forecasts of oil prices reflects the multitude of economic factors which can influence price levels.

As discussed in the Draft EIS, future world oil prices are forecasted based upon fundamental assumptions regarding future economic forces and conditions. In the near term (1983-1988), it appears generally agreed upon that world oil prices will decline in real terms as current non-OPEC production levels increase and fuel switching and conservation efforts continue. Much uncertainty exists, however, over the long term. Although there appears to be general agreement that prices will begin to rise sometime within the next decade, the key question is when and how fast will prices escalate thereafter.

The APA world oil price forecasts, which are based upon the SHCA "No Supply Disruption" scenario, project that from 1989 to 2010 the real rate of price change in oil will be 2.6 percent per year, resulting in a price of \$50.39 (1983 dollars) in 2010. As identified in the Draft EIS, an important underlying assumption to this forecast is "that OPEC will continue operating as a viable entity and will not limit production during the forecast period. Recent trends in economic growth in the United States and the free

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world will continue at reasonable rates."

The FERC forecast, in contrast, projects a more significant and prolonged reduction in world oil prices in the near term, with a more modest growth in prices thereafter. The price of world oil in the year 2010 is projected to be \$29 in 1983 dollars. The theoretical justification for this scenario is an assumption that the strength of economic forces which currently are reducing oil prices (e.g., fuel switching, conservation, and growth of non-OPEC oil production) will continue to predominate over economic forces which would increase oil prices, namely renewed world economic growth.

Because the economic feasibility of the proposed Susitna project and alternatives depends upon which oil price forecast is selected, the key question is which scenario more accurately describes probable future oil price conditions. Although both scenarios are reasonable if the underlying economic conditions are accepted, it would appear that, based on the forecasts identified in Figure 1-5, more support exists for the higher APA forecasts. The FERC forecast, although not included in Figure 1-5 (which is recommended), would appear to be similar to the State of Alaska DOR-Mean forecast. The forecasts which lend support to FERC's "lower growth" scenario are the three DOR projections. Because two of these forecasts (50 percent and 30 percent) are used for budgetary and economic planning purposes, some "conservatism" may have been incorporated. Also, only one additional study, apparently prepared for FERC, is cited as a reference for FERC's Draft EIS analysis of world oil prices.

The remaining forecasts in Figure 1-5, including two prepared by the Department of Energy, support a scenario of shorter (if any) periods of decline in prices and a higher rate of price increase thereafter. A review of recent forecasts of world oil prices prepared by the U. S. Energy Information Administration and published in the May 31 edition of Platt's Oilgram News, indicates a projected price of \$50 (1983 dollars) in 1995. This compares with \$22 per barrel (1983 dollars) in 1995 projected by FERC in the Draft EIS.

Thus, FERC's scenario of world oil prices, although based on sound economic reasoning and technical considerations, does not appear to be consistent with the majority of other forecasts. Because of the important implications of these forecasts to evaluation of the project and alternatives, additional data are needed to substantiate FERC's world oil price forecast. Specifically, the FERC staff should identify the factors which lead it to believe that this low price future is substantially more probable than a moderate or high price future. Better yet, given the large spread among forecasts of future world oil prices, it would be most appropriate for a Revised Draft EIS to contain the results of a sensitivity analysis which showed how the economic ranking of the alternatives changed with oil price changes.

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1.1.2 Minor Comments

The rate of change in projected world oil prices under the FERC scenario and the APA scenario should be presented in the same table. This will facilitate comparison of the forecasts.

The FERC oil price forecast should be included in Figure 1-5 and A-2. The base year identified in Figure 1-5 for constant dollars should be 1983.

The importance of oil prices to energy demand forecasts, as determined by the MAP and RED model projections should be accurately identified. In other words, is there sufficient justification to select world oil prices as the single exogenous variable to bracket potential energy demands in the Railbelt? A review of the Draft EIS and supporting information in APA's project application to FERC indicates that high and low values assumed for other variables also may have an important effect on energy and demand forecasts. For example, from the information provided in Tables B. 118 - B. 126 (Volume 2A of the license application), it would appear that the percentage effect (20%) from assumed high and low world oil price scenarios on projected households in the year 2000 (a key variable for estimating energy demand) is not dramatically different from the percentage effect (14.6%) from high and low estimates of State mining employment.

1.2 ALTERNATIVE ACTIONS

1.2.1 Non-Hydroelectric Alternatives

This section, together with the supplemental information presented in Appendix B, provides a reasonable description of selective energy resources which may contribute to power generation for the Railbelt. The discussion of natural gas, in particular, fully addresses the issues important to future utilization of the resources.

Two energy resources with potential for contributing to power generation in the Railbelt, which were not discussed, however, are wind energy and refuse-derived fuel. As stated in Exhibit D of APA's license application, "several areas of excellent wind resource have been identified in the Railbelt." The energy potential of and development opportunities for wind energy systems, especially large conversion systems in the Railbelt, should be discussed. Similarly, the energy potential from refuse-derived fuel plants, a resource considered in one of the mixed-thermal scenarios in

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Section 1.4, should be described.

The discussion of geothermal energy indicates that cost is a major factor in limiting the development of geothermal resources in the Railbelt area. Examples of heat distribution piping costs are provided as indications of the high cost. It is unclear, however, whether generation of electricity from geothermal (which would not require heat distribution piping) would be similarly noncompetitive from a cost standpoint. This should be addressed in the Revised Draft EIS.

1.2.2 Non-Structural Alternatives

The discussion of the effects of conservation on electricity demand should include reasonable estimates of potential energy savings from implementation of conservation programs in the Railbelt. Energy savings from programs currently planned for implementation, as well as potential savings from a more aggressive approach to conservation on the part of the State, utilities, and municipalities, should be estimated. The data provided should be sufficient to analyze a feasible conservation program as a component in an alternative energy resource development scenario.

While the estimates may not have a high degree of accuracy at present, a more reliable data base could be developed for future considerations of energy conservation. Efforts should be made to record the effects of ongoing program-induced conservation so that future estimates of power demand could more accurately reflect the influence of conservation. Also, the assumptions made regarding conservation in the energy demand forecasts for the Railbelt should be identified.

1.3 SCENARIO DEVELOPMENT

1.3.1 Susitna Basin Development

An assumption made in the production cost model (OPCOST) to estimate least total system costs for Susitna Basin hydropower development was escalation of real fuel costs from 1993 to 2013 and constant real fuel costs from 2014 to 2042. This assumption is inconsistent with the escalation of fuel costs for the thermal alternatives, which increase to the year 2022 and are held constant thereafter. The unequal treatment of future fuel costs biases the results in favor of systems with relatively large thermal components. The analysis should be corrected so that it uses a consistent set of fuel price assumptions across the development scenarios.

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Cost estimates for the proposed project should reflect some increment for opportunity costs, as it is clear that the State could achieve some return on the equity invested in Susitna (e.g., State Permanent Fund). Exclusion of this factor underestimates the full cost of the project. The discount rates used do not fully reflect this factor because they all appear to be below the real rate of return which the Permanent Fund could earn.

The Draft EIS states, on page 1-35, that OPCOST was run for each generation alternative using the staff's high, low, and medium load forecast." According to information on page 1-15, no load projections could be generated consistent with the low world oil price trajectory. Because world oil prices were identified as the single exogenous factor in generating alternate load forecasts, how were "low" load forecasts generated?

1.3.2 Non-Susitna River Hydroelectric Development Plans

The discussion of the non-Susitna River hydroelectric development plans should identify the amount of power generating capacity provided by thermal sources and the reasons why the load requirements could not be met mostly or entirely by non-Susitna River hydro projects. The environmental criteria used to eliminate the 86 other hydro sites through the 4-step iterative process should be identified.

The Draft EIS states, on page 1-36, that the six alternative hydropower development plans were screened on the basis of relative cost, energy capability, and environmental acceptability. Additional discussion of the criteria used to determine "environmental acceptability" is needed.

1.3.3 Natural-Gas-Fired Generation Scenario

1.3.3.1 Scenario Evaluation

The estimation of annual operating costs for the gas scenario assumes real escalation of fuel costs from 1982 through 2022 and held constant thereafter. The assumption of constant fuel costs is questionable based on other available forecasts and has the net economic effect of favoring the thermal alternatives over the hydroelectric alternatives. Also, the assumption of constant fuel costs appears inconsistent with projections on Table 1-23, which show a continual escalation in real prices of natural gas.

Although the assumption that future escalation of natural gas prices will be closely linked to world oil prices is reasonable, the world oil price

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projections which gas prices follow appear low, based on most forecasts currently available. FERC projects natural gas prices to increase to \$3.44 and \$4.09 (1982 dollars) in the year 2020 under the medium and high forecasts, respectively. The APA reference case assumes gas prices at the wellhead to be \$6.34 (1983 dollars) at the year 2020, or a minimum of 58 percent higher than FERC's. In its analysis, FERC should state whether the projected natural gas prices are wellhead prices or delivered prices.

The discount rates assumed for the analysis are 3.5 percent, 5.2 percent and 7.0 percent. Because of the importance of these assumed rates to the economic assessment, a discussion of these rates, including the theoretical justification for use of each rate, should be presented. The rate considered most appropriate by the FERC staff should be identified and the reasons for selecting this rate should be clearly stated. It should be noted that the assumed discount rate used by APA in its license application to FERC was 3.0 percent. Use of this rate, with the forecast of high fuel cost escalation, would result in levelized total power costs approximately equivalent for the natural gas scenario and the Susitna project.

1.3.3.2 Fuel Use Act Exemption

The assumption that an exemption would be approved to allow for use of natural gas as a fuel for base-load power generation should be further discussed and supported. The reasons for exempting the proposed scenario from provisions of the Act should be identified.

1.3.4 Coal-Fired Generation Scenario Evaluation

The Draft EIS states, on page 1-42, that "Fuel costs were escalated from 1982-2022 and held constant thereafter." Table 1-23 shows escalation of coal prices only under the high forecast and shows the escalation continuing to the year 2050. If coal prices are assumed to be held constant after 2022, this should be indicated in Table 1-23.

The discount rates assumed for the analysis should be discussed and justified.

The assumed real coal price escalation rate appears low compared with projected rates in studies cited by APA in its License Application (Appendix D-1). FERC projects coal prices to increase to between \$1.55 and \$1.70 (1982 dollars) by the year 2010, whereas APA assumes a year 2010 price of \$2.80 to \$3.41.

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1.3.5 Scenario Comparison and Combined Scenarios

The EIS needs to state what the basis is for comparing the scenarios. Criteria other than least cost such as system reliability and flexibility, should be identified as factors to be considered in the evaluation of alternative scenarios. Also, any differential effects from financing the alternative scenarios should be identified in the cost comparison. The scenarios should be compared in terms of all project objectives.

The mixed scenario evaluated should include analysis of a wider range of potential energy sources. Energy sources such as peat, geothermal, and conservation discussed in Section 1.3 and other potential sources such as wind energy should be included in an analysis of alternative sources of electricity supply.

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Chapter 2

PROPOSED ACTION AND ALTERNATIVES

Chapter 2 of the Draft EIS provides a thorough description of the proposed action which gives the reader substantial assistance in understanding the potential environmental impacts of the Susitna project. However, the other alternative regional power supply systems are not given nearly as much attention. This superficial treatment seriously limits the readers' ability to assess the scale or significance of the impacts of the alternatives. The chapter needs to be revised and expanded so that it provides thorough descriptions of each project included in an alternative generation scenario. Although specific design information is generally not available, more comprehensive descriptions could be developed based upon conventional power plant designs. This discussion should give special attention to the various waste streams produced by thermal power plants and their ultimate fates.

Additionally, given that the FERC staff is recommending an access plan which essentially eliminates the license applicant's recreation plan, this chapter needs to contain a new recreation plan which is consistent with the staff recommended access plan. Also, this chapter, in accordance with the CEQ regulations, must contain a summary comparison of the environmental impacts of the alternatives based on the revised impact analyses recommended later in this report.

Finally, we note that this chapter, at page 2-8, provides estimates of gross storage volume, live storage, and minimum reservoir level for Watana Dam which differ from those presented in the summary, at page xxi. The maximum water surface elevation for Devil Canyon reservoir is listed as being three feet higher than the dam's crest elevation. [page xii]. These apparent errors should be corrected.

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Chapter 3

AFFECTED ENVIRONMENT

The Affected Environment Chapter and supporting EIS appendices were reviewed in conjunction with the analysis of the Environmental Impact Chapter. The principal thrust of this review was to determine whether existing environment descriptions were sufficient to conduct the impact analysis and support the conclusions of the impact analysis contained in the Draft EIS.

In general the Affected Environment descriptions for the proposed Susitna Hydroelectric Project (Sections 3.1.3-3.1.6) are sufficient to support the analyses. Where background environment data were found to be lacking, it was noted in the comments on the Environmental Impact Chapter. Affected Environment descriptions for the project alternatives (Sections 3.2-3.5), however, were found to be too brief and too general to support an equal comparison of impacts of all alternatives. Specific locations for alternative facilities should be identified and data on habitat types, flow regimes and quality of any receiving waters, and general land use patterns should be described so that impacts on land use, vegetation, and wildlife can be adequately assessed.

We did find several additional minor technical problems with the Affected Environment Chapter. These are discussed, briefly, below.

3.1 PROPOSED PROJECT

3.1.1 Habitat Diversity and Quantity

The six habitat types listed in Figure 3-4 are not described. The figure is inadequate to differentiate between the habitat types. The text or figure should contain a brief description of each habitat type and reference Appendix E for more detailed information.

Information concerning the sediment input of the Talkeetna River should be

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presented in the Revised Draft EIS. If this river carries a sediment load similar to the Chulitna River, morphological changes at the Talkeetna-Susitna confluence may occur. This information is necessary because aquatic resources in side sloughs and channels downstream of the Talkeetna-Susitna confluence may be affected by altered sediment movement patterns.

The reference to Exhibit E, vol. 5A, Chapter 2, Table E.2.29 does not contain flood frequency information as stated in the text. Figure E.2.29 does give this information. This reference error should be corrected.

3.1.2 Surface Water Quality

Water quality information for Susitna River tributaries should be presented. The Draft EIS states that turbidity in the Susitna mainstem decreases with movement downstream due in part to dilution from clear water tributaries. This type of general statement yields little information concerning the specific water quality issues of these biologically important water bodies. Although tributaries may not be drastically affected by the project, some impacts are inevitable. The scope of these impacts can not be understood without knowledge of existing conditions.

3.2 NATURAL-GAS-FIRED GENERATION SCENARIO

The statement that water quality is not an issue because water use is zero is misleading. In Chapter 2 of the DEIS, the description of this alternative states that a complete water supply system, road system, camp facilities, sewage and waste treatment facilities, airstrip and transmission facilities would be constructed. Construction on this scale would undoubtedly affect water quality in the area.

3.3 COMBINED HYDRO-THERMAL GENERATION SCENARIO

A general description of the expected water quality of the Snow River and other surface waters likely to be affected by this alternative should be presented. If quantitative information is unavailable, the Revised Draft EIS should state whether these surface waters are influenced chiefly by glacial activity or snowmelt.

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Chapter 4

ENVIRONMENTAL IMPACT

4.1 PROPOSED PROJECT

4.1.1 Air Quality

The diesel generator emissions estimates appear to be incorrect for at least nitrogen oxides and carbon monoxide. We estimate 1581 tons per year for NO_x and 412 tons per year for CO. Both of these estimates exceed the 250 ton per year threshold for PSD. Also, for the SO₂ emissions to be as low as indicated, the sulfur content of the diesel fuel can not exceed 0.1%.

4.1.2 Water Quantity and Quality

4.1.2.1 Physical Habitat Availability

The description of habitat availability is fairly complete, but some attempt should be made to quantitatively describe slough substrate changes that may occur as a result of flow alteration. This type of information is necessary because the availability of sloughs would be a moot point if substrate conditions were unsuitable for salmonid species.

The Draft EIS fails to explain why side channel habitats would be less affected by the project than side sloughs or tributary mouths. This could be alleviated by first describing these habitats and then presenting cross-sections of side channels which show their decreased vulnerability to flow alteration.

4.1.2.2 Channel Stability and Sediment Transport

The Draft EIS should consider the possibility that the Devil Canyon site may not be developed. The Draft EIS assumes that borrow sites below the Watana

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Dam will be inundated by the Devil Canyon Reservoir. It is possible that construction delays, economic or environmental issues, or decreased power demands may delay or prevent construction of Devil Canyon Dam. In light of this, the sediment transport implications of a "Watana only" project should be fully addressed in the Revised Draft EIS.

The Draft EIS states that there would be an increase in the occurrence of high flows capable of initiating gravel bed movement. The Draft EIS, however, never defines the range of flows capable of transporting bedload and should therefore not predict frequency increases for these flows.

4.1.2.3 Suspended Solids

The Draft EIS fails to show that operation of Devil Canyon Dam would reduce the concentration of suspended solids compared to operation of Watana alone. Solids released from Watana would be small enough to have remained in suspension for over 600 days and would not settle out in the 58 days they would remain in the Devil Canyon Reservoir. Therefore, all particles released from Watana would also be released from Devil Canyon. Additional particles resulting from bank failures along the edges of the Devil Canyon Reservoir may also be released. The release from Devil Canyon Dam would, therefore, contain at least as much, if not more, suspended solids than that from Watana.

The suspended solids discussion fails to address the impact that ice formation in the Watana Reservoir might have on suspended solids levels both in the reservoir and downstream in the river. If 5-6 feet of ice is expected to form in the river, it seems likely that a greater thickness might form over the reservoir. With the drawdown schedule planned for the winter (Figure 2-10 in the Draft EIS), some scouring of reservoir shoreline and bottom should occur. The Revised Draft EIS should discuss the likelihood of this scouring and make some judgment as to its significance. It should also address whether similar scouring would occur at Devil Canyon Reservoir. While the drawdown schedule in Figure 2-10 indicates Devil Canyon would not fluctuate, statements on page 4-48 suggest it would be drawn down as much as 50 feet in August and September. This inconsistency should be rectified in the Revised Draft EIS and the water quality implications of any drawdown should be presented.

The APA license application contains an analysis of project effects on turbidity (in terms of NTUs), but this information has not been brought forward into the EIS. It would be helpful to summarize this turbidity information in the Revised Draft EIS or at least reference the data in Exhibit E so that the project-related changes in turbidity can be compared to State standards. The project is expected to reduce, rather than increase, turbidity in the Susitna River during the summer, but winter discharges are

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expected to increase turbidity. If Watana Dam discharges are in the 10-20 NTU range, this could exceed State requirements for protection of secondary recreation and propagation of fish.

The Draft EIS does not state assumptions and data used to calculate the predicted summer suspended sediment increases during construction. It should reference Appendix H (page H-45), which does contain this information. Quantification of impacts is useful, but the results are meaningless unless the assumptions and methodology employed are clearly stated or referenced.

The Draft EIS states that large or long-term increases in suspended solids resulting from vegetation clearing and construction are not expected. Large increases in sediment production are possible on small watersheds where even limited construction can alter hydrologic processes. The value of the document could be increased if qualifying statements were included concerning the relative importance of this type of impact.

The Draft EIS considers changes in only the average suspended sediment concentrations. Consideration should also be given to changes in peak sediment levels, which are often more detrimental to stream organisms.

4.1.2.4 Gas Saturation

This section provides a discussion of the problem of supersaturation of nitrogen downstream of the dams. It asserts that if the cone valve outlet structure works as designed, supersaturation of nitrogen below Devil Canyon Dam will be reduced. APA has indicated that the outlet structures have been subjected to prototype testing, and that further testing is now underway. The results of this testing and any other substantiation of the effectiveness of the structures at controlling nitrogen saturation should be reported in the Revised Draft EIS. This information is critical to a clear understanding of the project's water quality impacts. If the cone valve outlet structures do not reduce nitrogen supersaturation as expected, nitrogen levels could exceed the State standard of 110 percent.

4.1.2.5 Nutrients

This section contains a very brief review of nutrients in the lakes, which indicates that nutrients are not a major concern. Review of APA license application data and APA responses to EPA scoping comments that are background to the nutrient analysis, however, indicates some significant inconsistencies and data gaps in the analysis. First, it is unclear whether there are plans to clear and burn all vegetation in the reservoir inundation areas prior to filling of the reservoirs. There are conflicts in the intent

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as described in the license application and the Draft EIS. The assumption used in the Draft EIS impact analysis should be clearly stated in the Revised Draft EIS.

Second, the Vollenweider modeling approach used to predict nutrient conditions in the reservoirs is appropriate for estimating long-term eutrophication potential of reservoirs when they are phosphorus-limited, but it is not useful for predicting seasonal variations in water quality parameters. Some of the phosphorus loading assumptions used in the model are also questionable. We recommend, therefore, that a one-dimensional model (such as CE-QUAL-RI) be used to indicate potential problems in reservoir nutrient loads. This would aid in the analysis of different reservoir development scenarios.

4.1.2.6 Temperature

The Draft EIS predicts that water temperatures below Devil Canyon Dam would be increased by 4°C for late fall and early winter. It also predicts that temperatures would be reduced by 2°C for mid-summer conditions. The State water quality standards specify that "weekly average temperatures shall not increase by more than 1°C." This suggests that the State water quality standards would be violated by the project. The Revised Draft EIS must contain a more sophisticated evaluation of these water quality changes to determine the magnitude and duration of the potential standards violation. It should also contain a thorough evaluation of possible mitigation measures to reduce the project induced temperature changes to levels that are in compliance with the standards.

4.1.2.7 Other Water Quality Impacts

The Draft EIS does not identify which surface waters would receive wastewater discharges during the project construction phase. While the water quality impact of these discharges is expected to be small, the reader cannot assess the validity of this assumption without knowing the anticipated discharge point(s).

4.1.2.8 Ice Processes

This brief section states that "ice breakup has a profound influence on the morphology of the Susitna River." It also states that "after the filling of Watana commenced, the effect of ice breakup on river morphology would be significantly reduced." The Revised Draft EIS should describe how the morphology will be affected, with appropriate references (no references are currently provided). Also, it should describe how the sloughs will be

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affected.

4.1.3 Groundwater

This brief one paragraph discussion of groundwater should be expanded in the Revised Draft EIS and appropriate references should be included to support the statement that "the proposed dams have no impact on groundwater."

4.1.4 Aquatic Communities

The Draft EIS is generally deficient in its fishery resource impact analysis, due in part to a lack of data on the existing fishery in the Susitna River. Without a quantitative assessment of fishery impacts it is difficult to fully evaluate the proposed project.

4.1.4.1 Plant Communities

The Draft EIS states that "reductions in summertime turbidity and stabilization of flows . . . could significantly increase genetic aquatic plant and invertebrate productivity and thus food availability for fish." It should state in this paragraph that this may be possible only above the Chulitna River confluence.

The Draft EIS states that "Increased benthic algae and invertebrate production on the submerged river bed would occur concurrently with a decrease in wetted surface area due to reduced summer flows." This statement is misleading. Generally, a decrease in wetted surface area is equated with reduced total production. We agree that improved water clarity may favor lower trophic level production; however, other factors such as changes in water temperature and greater turbidity levels in winter (turbidity may damage overwintering invertebrates) should be considered. Also the Appendix (p. I-62) concludes that "summer temperature reduction may be sufficiently severe to retard growth of benthic food organisms" during operation of both dams.

4.1.4.2 Fish Communities

The Draft EIS states that juvenile salmon growth from June-September could be negligible above the Talkeetna River confluence and reduced by 50-60 percent in downstream reaches during reservoir filling (p. 4-26). Reduced growth would be caused by lower water temperatures. The Draft EIS should discuss the number or percentage of the salmon populations that might be affected. This discussion would require a detailed analysis of data that may already

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exist or is being collected at this time. The discussion should also address the effect of reduced growth on timing of juvenile outmigration and subsequent survival to the adult stage.

The Draft EIS also states that early spawning pink and chum salmon would produce offspring that would emerge prematurely and would not survive the winter (Watana Operations only). A detailed analysis is needed to determine the number or percentage of pink and chum salmon that would not survive and the effect this mortality may have on adult returns. Also, the discussion should expand on the statement that "later spawning salmon would be affected only slightly." To what extent would sockeye, coho, and chinook salmon be affected? Would the emergence period be shifted for embryos in slough habitats as well? What effect would early emergence have on 1) the ability of juveniles to feed in the river; 2) juvenile outmigration timing; 3) the ability of juveniles to feed in the estuary and ocean environment; and 4) overall survival?

The Draft EIS states that changes in mainstem water temperature related to operation of both dams could have "important implications for the survival of the emigrating juvenile salmon." This discussion should be extended to include the potential number and/or percentage of each salmon species that may be significantly affected. Considering the magnitude of this impact, the Affected Environment Chapter does not adequately address juvenile rearing in the Susitna River. Also, how will mainstem temperature changes affect rearing fish in slough habitats?

The Draft EIS states that "no combination of impacts has been projected that would reduce by as much as 50 percent any of the five salmon populations spawning in the Susitna River and tributaries above its confluence with the Talkeetna and Chulitna rivers . . ." This statement should be based on detailed analysis showing how the figure of 50 percent was derived. Estimates of mortality should be shown for each life stage that is affected. Also, the reach below the Talkeetna River confluence should be included in the analysis, as juvenile growth in this reach could be reduced 50-60 percent.

Although APA suggested that the Draft EIS evaluate the effects of high water flows on fish, the Draft EIS did not contain this analysis. Winter flows are expected to be approximately three times the present flow level after dam operation begins. Changes in fish habitat and possible effects on overwintering resident and anadromous fish should be evaluated.

4.1.4.3 Minor Comments

Results of the lower trophic level production analysis should be interpreted carefully when addressing fish production. Paragraph six, page 4-30

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suggests that "juvenile salmon production should increase" because of increased food production. Statements such as this are misleading because many other factors also contribute to juvenile salmon production.

The Draft EIS states that "Accessibility of tributaries to adult salmon is not likely to be a problem during June-September . . ." This statement is inconsistent with license application Table E.2.27, which indicates possible restriction of fish access to Sherman and Jack Long Creeks. The Application also lists other creeks where fish access is a concern because of perching.

The Draft EIS states that "some redd dewatering might occur in winter above Sherman during reservoir operations due to reduced ice staging." During project operation, winter flows are expected to be twice the present flow levels (see Draft EIS Fig. 4-2), and it would seem reasonable that these high flows might counter the effects of ice staging. This should be clarified.

The Draft EIS states that flow stabilization (due to project operation) would reduce stranding of fry caused by freshet flows in summer. Normal freshet flows and runoff do not always cause significant stranding because flow attenuation is often slow enough to prevent it. Gradual reductions in flow after a summer storm would ultimately depend on the permeability and absorptive capacity of the soils in the drainage.

The discussion of thermal effects on egg incubation during operation of both dams is confusing and incomplete. The discussion incorrectly leads the reader to believe that warmer water in the fall will enhance incubation success where it is likely that the newly emerged fry will starve during the winter. Again, a thorough analysis is needed. Also, the EIS should discuss the effect of temperature changes in the mainstem on temperature in sloughs and the resultant effect on salmon survival.

The Draft EIS' discussion on sedimentation of redds during dam operations is weak. The discussion should focus on sediment transportation and deposition during turbid winter flows and how this might affect embryo and alevin survival in the mainstem, side channel, and sloughs. The analogy to the glacial lake is not necessarily evidence that alevin survival will not be affected by turbid winter flows.

The Draft EIS mentions a concern for successful reproduction in the reservoir. The discussion should be expanded to include those species that would be affected and to what extent water drawdown might affect future populations. The mitigation chapter (section 5.3.4) should address this problem when discussing a plan to introduce resident fish in the reservoirs.

The Draft EIS cannot assume that adverse effects to salmon would be reduced because adult salmon might avoid the cooler Susitna River water and migrate

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up the Talkeetna River. First, there is no sound evidence that salmon will avoid the cooler water. Second, if salmon do avoid the cooler water and spawn in the Talkeetna or Chulitna Rivers, there is no evidence that salmon production in these rivers would improve. Numerous density-dependent factors could limit the survival of progeny from the straying salmon.

The Appendix of the Draft EIS (p. I-64) discusses the potential for an increase of mercury in fish inhabiting newly flooded reservoirs. It was concluded that mercury levels in fish would likely increase and could possibly reach the Food and Drug Administration's "action level" of 1.0 ppm (ug/g) mercury in the edible portion of the fish. This discussion should be undertaken in the main body of the EIS. Also, a mercury monitoring program was deemed necessary. A discussion of this program should be included in the mitigation section.

Finally, the Draft EIS states that increased fishing pressure is expected to be the major impact to fish inhabiting tributary streams and that "Cooperative regulation of fishing activities or fish removal . . . might mitigate these impacts." Fish removal may eliminate fishing pressure, but we would not call it a mitigation measure.

4.1.5 Terrestrial Communities

The discussions in this section are a condensation of material in Appendix K. While it seems proper to rely on an Appendix document to supplement descriptions of existing conditions, such an approach is not warranted for the impact discussion. An EIS should thoroughly discuss project impacts. Methodologies and background data are ideal candidates for presentation in appendices, but impact analyses belong in the main text. The material in this section has been condensed to the point that the biological implications of project impacts are not always apparent.

The impact discussions currently presented in Appendix K provide a generally adequate analysis of construction and operational impacts of various project features. These discussions give a better perspective on the magnitude of impacts than do the discussions in the Draft EIS text. Construction period impacts and impacts of increased access are much more thoroughly addressed in Appendix K than in the main EIS text.

Both Appendix K and the Draft EIS text treat the issue of poaching very lightly. This impact warrants additional discussion in the Revised Draft EIS, given the extended period of project construction with about 5,000 people living in the construction camps.

The Draft EIS does not contain the results of APA's moose habitat modeling efforts. If the model has been completed and checked for accuracy, the

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Final EIS should contain some quantitative assessment of project impacts on moose. The mile wide mudflats around Watana reservoir would have more than visual impacts. There would be permanent impacts to terrestrial communities as well. These impacts should be identified in the EIS.

4.2 NATURAL GAS-FIRED SCENARIO

Our experience modeling gas turbines has indicated that the plumes may be subject to building-wake induced downwash. The use of the EPA ISC Model (EPA-450/4-79-030 and 031) has therefore been required. PTPLU does not simulate building-wake induced downwash. Also, PTPLU does not compute concentration as a function of distance. Therefore, the model could not have been used as was indicated for predicting maximum concentrations at specific locations.

4.3 COAL-FIRED SCENARIO

On page 4-81 the ambient standards for CO are incorrectly specified as "5,000 ug/m³ for maximum 8-hr average and 2,000 ug/m³ for maximum 1-hr average." The standards are 40,000 ug/m³ for a one-hour average, and 10,000 ug/m³ for an eight-hour average. The Levels of Significant Ambient Impact are 2,000 ug/m³ for a one-hour average, and 500 ug/m³ for an eight-hour average.

4.4 COMBINED HYDRO-THERMAL GENERATION SCENARIO

4.4.1 Air Quality & Noise

One of the sources of potentially major air quality impacts not fully considered in the Draft EIS is the expansion of the Usibelli Coal Mine. Each of the alternatives that includes coal-fired generation should incorporate an evaluation of this impact. Increased coal production at the mine may lead to a significant increase in fugitive particulate matter emissions. Emissions should be considered as a function of activity, (e.g., blasting, loading, transportation, etc.), and meteorology (wind speed, precipitation, etc.). Particle size distribution and deposition should be considered in

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determining the effects of these emissions on ambient total suspended particulate levels and visibility in the area. These potential impacts are especially critical in light of the close proximity of the mine to a PSD Class I area; the mine is approximately ten kilometers northeast of the Denali National Park. Additionally, if the Beluga Coal Field could be developed as a fuel source for any of the coal-fired power plants, its air quality impacts should receive the same type of evaluation.

Other air quality impacts not fully considered in this portion of the alternatives analysis are the potential effects of sulfur dioxide (SO_2) emissions. Environmental effects, such as damage to lichens, due to SO_2 , may occur at ambient concentrations which are lower than the air quality standards. Since coal-fired power plant emissions (primarily SO_2 and NO_x) are known precursors to acid precipitation, the potential² for acid precipitation and its associated environmental effects must be evaluated. At least screening estimates of acid deposition should be developed and the sensitivity (buffering capacity) of potential receptor areas should be discussed.

Additionally, expanded development of the Usibelli Mine could have adverse noise effects from increased blasting and truck movement. The Revised Draft EIS should use available screening techniques to develop a worst case estimate of the extent and magnitude of this potential impact on Denali National Park.

4.4.2 Water Quantity and Quality

The Draft EIS does not contain enough background information concerning flow and water quality to accurately assess the potential impacts of this alternative. For example, information concerning the water quality of the Snow River and reservoir hydrology of the other non-Susitna hydropower sites is insufficient to forecast impacts. More complete knowledge of existing conditions is necessary prior to assessment of impacts.

Each of the project alternatives that would rely on coal-fired power plants could have significant impacts on water quality at the coal mining site. This is a major omission from the EIS' analysis. While the impact would be difficult to quantitatively assess without knowing the exact location of mining activity, the Revised Draft EIS should indicate, in a qualitative sense, that significant water quality impacts can be associated with coal mining. Additionally, the evaluation of the power plants' direct water quality impacts suffers from some serious omissions. It does not currently address the potential water quality problems which could result from the need to dispose of fly ash, bottom ash, and scrubber sludges. Absent specific data, a worst case analysis would also be appropriate here.

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4.4.3 Aquatic Communities

Although the Draft EIS attempts to address the relative impacts of this alternative (hydropower portion only), it is obvious that additional information is needed. How many adult salmon spawn in areas above and below each dam site? Where are important rearing habitats located? What are the expected changes in water quality and salmon habitat? The Draft EIS states that salmon migration blockages could result in salmon losses greater than those from the proposed project. The EIS should base this statement on a few facts. The Draft EIS did not discuss impacts related to thermal projects. The Revised Draft EIS should do so for a legitimate comparison of alternatives.

4.4.4 Terrestrial Communities

The discussion in this section is too generalized to allow more than a superficial comparison with impacts of the proposed Susitna project. The Draft EIS notes (page 2-41) that fairly detailed site information is available for the Chakachamna site. Additional detail on impacts associated with that site would be useful as a point of comparison with the Susitna area.

4.5 COMPARISON OF ALTERNATIVES

4.5.1 Water Quantity and Quality

The information presented on impacts of project alternatives is inadequate to allow meaningful comparison of alternatives. The assumption that total impacts would be a function of project size may not be accurate. Page 4-71 of the Draft EIS states that the Watana I-Reregulating Dam alternative (the "smallest" alternative) may have a greater impact on suspended solid concentrations than the proposed project, yet this alternative is rated as having the least water-related impact. The EIS should present specific impact analyses for each alternative and a table which allows direct comparison rather than ranking alternatives solely by the number of river miles affected. Without this type of analysis, the EIS simply does not provide a clear environmental basis for the Staff's second tier recommendation on Watana I in Chapter 5.

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4.5.2 Aquatic Communities

Additional information is needed before the EIS can conclude that the non-Susitna River hydropower alternatives would have less impact on aquatic communities than the proposed project or alternate versions of the Watana and Devil Canyon Dams. The EIS should make some attempt at quantifying the combined effects of the non-Susitna hydropower alternatives and comparing them to the Susitna project to support this conclusion.

4.5.3 Terrestrial Communities

Given the lack of detail in the information available about alternative projects, this section is generally adequate. It would have been useful, however, to have had a basis for comparing wildlife impacts using a measure other than gross acres affected by project construction. It is unclear whether enough information was available to perform a screening-level analysis using the U. S. Fish and Wildlife Service Habitat Evaluation Procedures (HEP) model for such a comparison.

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Chapter.5

STAFF CONCLUSIONS

5.1 RECOMMENDATIONS

5.1.1 Power Generation

The FERC staff has recommended a mixed thermal-based generation scenario based on considerations of engineering feasibility, economic characteristics, and environmental effects. This conclusion is not supportable based on the analyses provided in the Draft EIS.

Engineering feasibility was addressed only incidentally, with no comparison of the alternatives. With the exception of a brief analysis on the Susitna Project, potential impacts of the alternatives on the operation and reliability of the existing generation and distribution system in the Railbelt are not discussed. Also, the statement that "such an approach (mixed thermal-based generation scenario) would provide flexibility in systems planning and efficient fuel use to cope with the uncertainties of population growth and generation requirements" is not supported by any discussion in the Draft EIS. While we agree that a staged project would provide extra flexibility, the body of the EIS should provide some description of this flexibility and its effect on the planning of future power supply to support the statement in the staff conclusions.

The economic characteristics cited in support of the recommended mixed thermal-based scenario are based on highly uncertain economic conditions and questionable assumptions regarding future price behavior of oil and other fuels. The majority of forecasts available suggest that the price of oil and related fuels will increase at a considerably higher rate than the rate assumed in the FERC analysis. Inclusion of the higher rates would dramatically alter the results of FERC's economic comparison of alternatives. Moreover, the statement that "thermal generation costs for the medium load forecast are approximately 75 percent of the costs of the proposed Susitna development on a levelized, total annual cost basis" is meaningless unless the assumed discount rate and fuel escalation rate are

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stated. The subsequent statement regarding the impact on consumer energy costs from development of several plants versus the large capital commitment needed for the Susitna project, although important, is not supported with any analysis in the Draft EIS.

Regarding environmental effects, the conclusion that the alternative hydro and thermal scenarios would result in generally fewer adverse impacts than the Susitna project appears to reflect more the degree of site-specific information available for analysis of the Susitna project than the results of a comparable assessment of project alternatives. Little site-specific environmental setting data or impact discussion are provided for thermal or non-Susitna basin hydro power plant sites. This makes the FERC contention that the dispersed impact of a number of smaller facilities would be less than the full Susitna development generally unsupported by the Draft EIS. The cumulative impact of a number of independent power projects could be considerable, depending on location and nature of the developments.

FERC staff further recommends that "should any hydroelectric development be authorized in the Susitna Basin, it should be licensed and constructed in stages . . . The first stage of this development in the Susitna Basin would be the Watana I alternative . . ." The Draft EIS does not contain a discussion of the rationale for selecting Watana I as the best choice for a first phase project. It is not clear whether this option was chosen for its economic, environmental, or power generation advantages. The Revised Draft EIS should provide the rationale for this staff recommendation.

5.1.2 Flow Regulation

The FERC staff flow regulation recommendations appear to be appropriate. The actual effect of the minimum flows and proposed spiking flows on spawning activity in the main river and side sloughs will not be determined, however, until the facilities are in place and operational. We recommend that APA develop a monitoring program for postproject spawning in side sloughs. Spawning counts should be performed and compared to records of past spawning activity. It will be important to determine whether the 12,000 cfs minimum flow and 20,000 cfs spiking flow are successful in keeping side sloughs available to spawning salmon.

5.2 MITIGATIVE MEASURES

The Draft EIS' discussion of mitigation measures is generally lacking in terms of specific proposals and indications of the effectiveness of the

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proposals. At several points, the EIS describes ongoing efforts to develop mitigation programs. It is difficult to judge the effectiveness of mitigation measures that are still in the formative stage. We recommend that a detailed mitigation plan for all of the proposed projects' adverse impacts be included with the Revised Draft EIS. Agencies or organizations with primary responsibility for implementation should be identified with each mitigation measure. Accountability should be established if implementation of these measures is to be ensured.

5.2.1 Water Quantity and Quality

Several mitigation measures are discussed briefly. References should be provided for more detailed discussions of these measures. Considerable attention is devoted to implementing a "spike flow" release schedule during salmon spawning. No discussion is provided regarding prevention of possible drownings of sport fishermen or others during these releases. Even with elaborate warning programs, deaths can occur from sudden releases from dams. This factor must be considered, since this measure may therefore not be practical.

5.2.2 Land Use and Ownership

Chapter 4 describes the adverse secondary impacts that could occur as a result of the Susitna project. We support the FERC staff recommendation that an access plan with site access only from Gold Creek be approved, if a license is granted for the project. However, the Draft EIS indicates that even with appropriate land management practices, secondary development would still occur. This suggests that in-kind replacement or restoration of lost habitats should be evaluated as an additional mitigation measure in the Revised Draft EIS.

5.2.3 Aquatic Communities

APA's response to EPA's scoping recommendation C.63 is that "there will be no net loss of fisheries resources as a result of this project." In support of this statement, several mitigation measures have been developed to minimize and/or rectify impacts to the fish resources. However, as the Draft EIS states: "the long-term effectiveness of mitigation measures remains unclear." Several problems affect the reliability of the mitigation measures. First, there does not appear to be adequate information to assess present population sizes, yearly fluctuations, and use of specific habitats by salmon and other species. Second, such information is generally beyond the scope of any construction impact statement. Third, assessment of resource losses caused by the project would also be difficult, if not

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impossible, to quantify accurately. Therefore, careful interpretation of any monitoring data must occur during project construction and operation.

Quality control of such projects is essential. Several agencies and/or neutral consultants should review the monitoring programs and results in detail. Quarterly or annual reports should be prepared to assess the adequacy of the mitigation measures. An essential element of the mitigation should be establishment of minimum flows in the river for purposes of protecting the fish resource. Identification of these minimum flows is necessary to assess the overall impact of the project on anadromous fish.

Although avoidance, minimization, and rectification of impacts is preferred, it is probable that compensation for the impact may be needed. For example the Draft EIS states: "there are no specific plans to mitigate losses in fish growth due to low temperatures in summer or to rectify or compensate for loss of years." Similarly, there is no mitigation measure suggested to compensate for loss of juveniles due to premature emergence during winter or due to loss of habitat created by woody debris that normally originates from above dam sources, or from streams that perch. These factors suggest that artificial propagation or habitat enhancement should be evaluated as mitigation measures.

5.2.4 Terrestrial Communities

The Draft EIS has identified significant impacts of the Susitna project on area wildlife. The mitigation discussion indicates simply that mitigation programs are being developed. An essential part of the environmental analysis in an EIS is its analysis of possible mitigation measures in terms of their potential effectiveness and costs. Consequently, the mitigation program being developed by APA needs to be described in detail (in an appendix if necessary), including details of the moose habitat carrying capacity model being developed.

Discussions in the Draft EIS and Appendix K make it appear that the U. S. Fish and Wildlife Service HEP model will be used or perhaps modified to provide some of the analyses of mitigation measure effectiveness. The HEP procedure is a very useful tool, but the internal mathematics of the model have the potential for producing biased results if the model is not used carefully. The EIS should document any HEP analyses that are being done.

If HEP analyses are not being used, then the procedures being used must be thoroughly explained so that results of the mitigation program can be properly evaluated.

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Chapter 6

EPA'S FINDINGS AND CONCLUSIONS

6.1 DRAFT EIS ADEQUACY

We have concluded that the Draft EIS is inadequate; that is, it fails to meet the basic requirements of the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's (CEQ) regulations governing the implementation of NEPA. [40 CFR Part 1500]. The Draft EIS simply does not provide an analysis of alternatives which is thorough enough to resolve the issues which are ripe for decision at this time. Consequently, we believe that a Revised Draft EIS must be prepared before a Final EIS is developed for submission to the Commission. The omissions in the Draft EIS are so serious that we believe that this approach is the only one fully capable of resulting in a Final EIS which can serve as an effective basis for the Commission's hearings on the merits of the project and the alternatives. The major errors and omissions which must be addressed with a Revised Draft EIS include:

1. The economic analysis of alternatives must be revised so that consistent fuel price assumptions are used to evaluate each alternative. The analysis should include a sensitivity analysis which shows how the results change as predicted fuel prices increase. FERC staff must provide thorough support for its recommendations regarding which forecast or range of forecasts should be used for decision making purposes.

Finally, the economic analysis should be revised so that it reflects the full cost of complying with environmental standards. Specifically, the analysis of coal-fired power plants assumes a much lower level of air pollution control than EPA has ever approved for a coal-fired power plant in the Pacific Northwest or Alaska. The analysis should assume that 90% continuous removal of SO₂ would be required and should include scrubber sludge disposal costs.

2. The chapter on the proposed project and alternatives needs to provide

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more detailed descriptions of the alternatives so that more specific estimates of their potential environmental impacts can be developed for the Environmental Impacts Chapter. Additionally, given that the FERC staff is recommending an access plan which essentially eliminates the license applicant's recreation plan, this chapter needs to contain a new recreation plan which is consistent with the staff recommended access plan. Finally, this chapter, in accordance with the CEQ regulations, must contain a summary comparison of the environmental impacts of the alternatives based on the revised impact analyses.

3. The Affected Environment Chapter must be revised so that it provides more information about the potential sites of the alternative projects which make up the alternative regional electric energy supply systems. Specific locations for alternatives should be identified. Data on habitat types, flow regimes, the quality of receiving waters, and general land use patterns should be provided. This information is essential if the EIS is to provide a meaningful framework for evaluating the significance of the impacts of the alternatives.
4. The Environmental Impacts Chapter needs to be revised to correct the several errors and serious omissions noted, in detail, in this report. These revisions must address the potential water quality standards violations we have noted. They must also address in potentially serious impacts of coal mining and coal-fired power plant waste disposal.
5. The Staff findings and recommendations chapter should be revised to reflect the revised analyses. At a minimum, it needs to be reworked so that it is fully consistent with the environmental analysis results to date.

6.2 ENVIRONMENTAL RESERVATIONS

EPA is required by Section 309 of the Clean Air Act to determine whether the environmental impacts of proposed major Federal actions are satisfactory from the standpoint of public health, welfare, and environmental quality. Although the Draft EIS' analyses are too incomplete to support a firm or final determination on this question, we have concluded that we have serious environmental reservations about virtually all of the alternatives evaluated.

The Draft EIS suggests that the Susitna project could result in significant water quality standards violations, major adverse effects on anadromous

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fisheries, and serious consequences for terrestrial wildlife. Additionally, it could result in major losses of wetlands habitat. The other alternatives appear to have a significant potential for serious adverse impacts on air quality, water quality, and fisheries. EPA will not be able to make a final determination until we have received and reviewed a fully adequate Final EIS.

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Appendix A

APPENDIX COMMENTS

A.1 Appendix G

Page G-12, G-13, G-14, and G-29: The correct name for the first author of the User's Guide for the ISC Model is "Bowers", not "Bowles".

Page G-15 and elsewhere: It is implied that "one day's meteorological data" was input to the PTPLU Model. PTPLU uses a wide variety of assumed meteorological data to estimate worst-case conditions as a screening technique. Actual meteorological data for a given day can not be input to predict a maximum impact.

Page G-17, G-19, and G-18, Table G-5: The emissions from the gas turbines is described in the text as being "very hot", while Table G-5 lists the temperature as 350°F (450°K). This is relatively cool for a gas turbine; gas temperatures of 800 to 1000°K are not uncommon. The proposed turbines must have some sort of heat recovery. The high buoyancy of the turbine plumes is due in part to the large volumes of gas.

Page G-20: It is stated that PTPLU was used to model three sources. However, PTPLU can only simulate the emissions from a single source. Were all of the emissions from the three sources assumed to be emitted from one of the stacks? To accomplish a more detailed analysis of complex terrain impacts the appropriate model for use is COMPLEX I, not VALLEY. Hourly on-site meteorological data can be used in COMPLEX I.

Table G-8: The estimated Good Engineering Practice (GEP) stack height of the proposed coal-fired unit is 472 feet (the building height plus 1.5 times the height or width, whichever is less). Since the proposed stack height is less than the GEP height, the potential for building-wake induced downwash must be considered (that is, the ISC Model must be used).

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A.2 Appendix H

H.1.2 Habitat Types

The listing and definitions of the habitat types are inconsistent and incomplete. The text lists seven habitat types, but Figure H.1-3 lists only six. The text also describes only three of these seven habitat types. No explanation is given as to why the other habitat types are not described. In order to accurately assess potential habitat alteration, a clear understanding and description of the resource are needed.

H.2 Flow Regimes

H.2.1 Preproject Flows

The caption for Figure H-2-3 indicates that curves for the Gold Creek and Sunshine gaging stations are shown. However, the legend in the figure indicates that the Susitna and Gold Creeks are shown. Either the legend or caption should be corrected.

H.2.2 Postproject Flows

Companion figures and tables are provided for postproject conditions for comparison with figures and tables given in Section H.2.1 for preproject conditions. Some comparative discussions should also be provided to the sparse one paragraph text of this section. For example, a brief discussion of the order of magnitude of flow changes would be useful.

H.3 Habitat Alteration

The methodology employed in this section appears to adequately address the question of slough habitat alteration. The appendix should, however, also include a discussion of the alteration of other habitat types. In addition, there should be a summary section indicating how the results obtained from the sampled sloughs relate to those sloughs not sampled. Some discussion of potential substrate alteration would also be useful in assessing overall habitat changes.

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H.4 Temperature

No discussion of the results, findings or conclusions of the temperature modeling for either preproject or postproject conditions is presented in this section. As a minimum, a reference to discussion of temperature effects in the EIS or License Application should be provided.

H.5 Surface Water Quality

H.5.1 Salinity

A brief one paragraph description (plus two figures) is presented to describe salinity in Cook Inlet. Some mention of postproject salinity conditions should also be made.

H.5.2 Suspended Solids

Table H.5-1. should include the assumption that the DEPOSITES model does not include sediment contributions from reservoir bank failures. The same approach utilized in this section should be applied to the Devil Canyon Reservoir so that overall impacts can be addressed.

H.5.3 Nitrogen Gas Saturation

This section provides a realistic discussion of the possible supersaturation of nitrogen due to air entrainment in the Watana outlet works. This discussion suggests that the Alaska Department of Environmental Conservation (ADEC) standard of 110 percent saturation is likely to be exceeded during excess flow conditions, even with the installation of the fixed cone valve outlet structures. This section does not include a discussion of the data, which show that this standard is exceeded under natural conditions during high flows, nor does it mention the effects of the Devil Canyon Dam.

H.5.4 Nutrients

A brief (two paragraph) review of the nutrient levels in the reservoirs in support of the applicant's modeling results is presented. The statement that the lakes will have turbidity (and correspondingly low phytoplankton production) is not well supported. Suspended sediment size distributions (Figure E.2.80) indicate 80 percent to 85 percent of the suspended load is silt and sand which should quickly settle in the reservoirs.

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**SUSITNA HYDROELECTRIC PROJECT
FERC PROJECT NO. 7114
DRAFT ENVIRONMENTAL IMPACT STATEMENT
REVIEW REPORT**

July 20, 1984

Advisory
Council on
Historic
Preservation

The Old Post Office Building
1350 Pennsylvania Avenue, NW, #200
Washington, DC 20004

RECEIVED

SEP 12 1984

Pillsbury, Madison & Sutro

SEP 20 1984

Mr. Mark J. Robinson
Federal Energy Regulatory Commission
Washington, DC 20246

Dear Mr. Robinson:

The Council has received a copy of the Draft Environmental Impact Statement (DEIS) on the Susitna Hydroelectric Project (FERC Project No. 7114-Alaska); I am writing to offer our comments on this document. These comments should not be confused with the comments of the Council that FERC must request pursuant to Section 106 of the National Historic Preservation Act and our regulations (36 CFR Part 800). We are, however, prepared to consult promptly with FERC and the Alaska State Historic Preservation Officer as soon as FERC initiates the review process called for by our regulations.

As you may know, over the last two years we have engaged in informal correspondence with FERC, the Alaska Power Authority, the Alaska State Historic Preservation Officer (ASHPO) and others regarding the Susitna project; our specific area of concern has been the consideration of historic properties, with special reference to the very high costs that have been reported in connection with the handling of archaeological sites in the Susitna project. We are pleased to see that a number of our concerns are addressed in the DEIS, particularly in Appendix O. We are pleased to learn that efforts have been made to focus archeological survey on areas that have a probability of containing historic properties, that predictions of historic property distribution have been developed and refined, and that historic properties that are not archeological sites have not been ignored to the extent suggested by earlier documents.

The DEIS indicates clearly that a considerable number of highly significant archeological sites will be affected by the Susitna Project if it proceeds as presently planned. Of special importance is the fact that many of the sites contain interstratified cultural deposits and deposits of volcanic tephra or aeolian deposits, making detailed age determination possible. Based on present documentation it appears that the general approach to impact-mitigation proposed -- salvage excavation of sites subject to most direct project effects, and protection in-place and monitoring of those subject to more indirect effects -- is reasonable.

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We do continue to have concerns about the approaches being taken and proposed, however. These concerns generally fall into two classes: concerns about "overkill" -- doing more, more expensive, archeological work than is necessary, and concerns about the possibility that certain resources or resource values will be ignored or not given sufficient consideration.

The danger of overkill

In our review of earlier documents on the project we were concerned about implications that 100 percent of every land surface subject to any kind of effect would be subjected to physical inspection for historic properties, regardless of the likelihood that anything would be found. The DEIS makes it clear that this sort of overkill is not occurring. Survey is not yet complete, however, and care should be taken to ensure that it continues to be guided by responsible predictive models of historic property distribution.

It still seems to be anticipated that all archeological sites subject to direct impacts will be subjected to archeological salvage excavation (Sec. 5.3.9). We strongly recommend that this expectation be re-evaluated. Unquestionably the sites subject to impact constitute an important research resource, and should be treated as such, but it does not necessarily follow that each and every one should be excavated, either wholly or in part. What is needed, and what has yet to be provided, is a systematic, comprehensive research proposal that seeks to obtain maximum useful data to address demonstrably significant research questions through use of the sites that will be lost. In our experience it is unusual for such a research project to require excavation of all sites. In any event, it should not be assumed at the outset that all sites subject to direct effect will be excavated; the extent and nature of excavation should be determined by the requirements of the research design.

We also question whether it should be automatically assumed that the sites subject to effect by roads and transmission lines can best be protected through avoidance and monitoring (Sec. 5.3.9). Particularly with relatively small, uncomplicated sites, avoidance may be more expensive than data recovery, and where sites with substantial surface deposits are involved, avoidance by construction may only leave the sites open to vandalism. We believe that flexibility should be maintained in deciding how to treat sites subject to such effects as those of road construction and transmission lines, so that data recovery can be employed where appropriate.

Insufficiently considered resources

First, it should be noted that survey is not yet complete on certain elements of the project; thus some of the figures given in Section 5.3.9 are certainly not correct and should be expected to rise. It should not be expected, for example, that only 11 archeological and historic sites will be subject to effect by the transmission lines (5.3.9), since only preliminary work has been done on some corridors and more work is apparently underway (Appendix O, Sec. 0.1.1.3.1).

Second, we are concerned about the fact that when mitigation of impacts is considered, only archeological salvage research and avoidance are presented as options. While these are normally appropriate options for properties of archeological importance, they are not necessarily appropriate for properties of associational, architectural, engineering, or cultural importance. Adaptive use, relocation, and recordation are among the many mitigation options that may be appropriate for such properties. More consideration should be given to mitigation options appropriate for the preservation of non-archeological historic values, specifically including architectural, historical, and Native American cultural values.

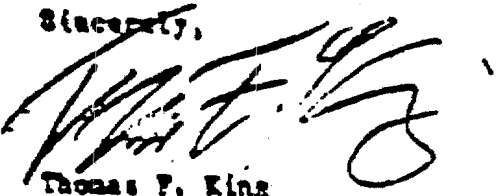
Third, we are sorry to see a lack of coordination in the DEIS between consideration of "socioeconomic factors" and "cultural resources." We note with interest, for example, that "non-Native residents value the isolated, rural settings..." of the area and that "...cultural conflicts exist in the Susitna Basin area among those who claim...hunting and fishing for rural custom and traditional uses..., others competing for the same harvests, and government agencies..." (Sec. 3.1.8.2). Do these valued isolated rural settings or areas in which traditional or customary subsistence activities take place have historical depth? Are some of them perhaps eligible for inclusion in the National Register of Historic Places because of their association with such settings or uses? Specific attention should be given to the possible historic character of the areas and values that, in the DEIS, are considered only with reference to socioeconomic concerns. If they are of historic value, they must be considered under Section 106 of the National Historic Preservation Act. The recent report of the Department of the Interior and the American Folklife Center entitled Cultural Conservation (Library of Congress 1983) should be reviewed in this regard.

Fourth, with respect to the archeology, we are disappointed with the apparent perception that the primary value of the sites to be subjected to salvage research will lie in their potential contribution to the construction of a "prehistoric cultural chronology" (cf. Sec. 0.2.1.1.1). In the absence of a research design it is difficult to be certain what this term means, but too often in American archeology it has meant the mere development of chronological sequences of artifact or feature types, or the description of chronologically arranged named phases without attempting to account for differences or similarities among them. If this is all that is done with the manifestly important archeological resources of the Susitna project areas, an important opportunity will have been lost to contribute to Alaska and world archeology. We cannot overemphasize the need for a thorough, highly sophisticated, fully justified research design to guide the data recovery that is proposed at Susitna. Such a research design is needed, as we have argued previously, to ensure that costs are kept under control and are fully justified, but it is also needed to ensure that the money invested in salvage research produces a maximum scientific payoff. It appears from Appendix O that there is an important potential at Susitna to study the whole sequence of Late Wisconsin-Holocene environmental change, using both direct paleoenvironmental data and the less direct but highly important corroborative data obtainable from the archeological record of human settlement, subsistence, and demographic patterns. There may be other important research topics that are not as obvious from the documents provided. We recommend close attention to our handbook,

Treatment of Archeological Properties, especially Appendices A and B, in
Developing a fully supportable, problem-oriented research design to guide
the proposed data recovery at Sealtna.

We will look forward to consulting with FERC and the Alaska SHPO to
conclude Section 106 review of this project at FERC's earliest convenience.

Sincerely,



Thomas F. King
Director, Office of Cultural
Resource Preservation

STATE OF ALASKA

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

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September 4, 1984

RECEIVED

SEP 6 1984

ALASKA POWER AUTHORITY

Mr. Kenneth F. Plumb
Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, NE
Washington, DC 20426

Dear Mr. Plumb:

SUBJECT: FERC NO. 7114

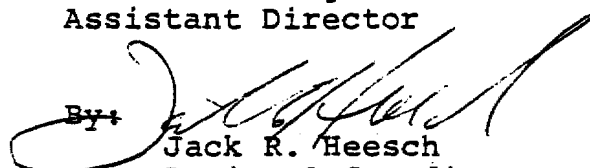
The State of Alaska has completed its review of the Susitna Hydroelectric Project, Draft Environmental Impact Statement. Attached for your consideration in the development of the FEIS are our comments.

Within the next two weeks, the Alaska Power Authority will be forwarding to you copies of all of the materials which have been referenced in our comments.

Thank you for providing us with this opportunity to review and comment on this important project. If I may be of any further assistance, or if you have any questions, please feel free to contact me at (907) 465-3562 or our Regional Coordinator, Jack Heesch in Anchorage at 274-1581.

Sincerely,

Robert L. Grogan
Assistant Director

By: 
Jack R. Heesch
Regional Coordinator

Enclosure

XC: J. Perkins
J. Ferguson

EXTRA
COPY

Mr. Kenneth F. Plumb
FERC No. 7114

-2-

September 4, 1984

cc: Esther Wunnicke, Commissioner
Department of Natural Resources

Don Collinsworth, Commissioner
Department of Fish and Game

Richard A. Neve', Commissioner
Department of Environmental Conservation

Larry Crawford, Director
Alaska Power Authority

Division of Governmental Coordination
Office of Management and Budget
State of Alaska
Comments on
Federal Energy Regulatory Commission
Office of Electric Power Regulation
Draft Environmental Impact Statement
Susitna Hydroelectric Project
FERC No. 7114 - Alaska
of May 1984

The Alaska Department of Fish and Game (DF&G) and the Department of Natural Resources (DNR) have reviewed the Susitna Hydroelectric Project, Draft Environmental Impact Statement (DEIS) prepared by the Federal Energy Regulatory Commission (FERC). Their reviews were based on an assessment of the adequacy of the identification and quantification of resources affected by the project and alternatives, the determination of impacts to those resources attributable to the projects and the specific mitigation options proposed to offset those impacts. Their separate comments have been combined into this document which represents state agency review of FERC's DEIS.

The FERC DEIS does not adequately address many issues that must be considered by state regulatory agencies when processing permit applications. If the comments presented in this review are adequately addressed in the FEIS, state regulatory agencies should be able to perform many of their adjudicative functions without disruptive delays.

The DEIS does not contain sufficient information on instream flows or fish and wildlife data on which to base decisions regarding the project. The major areas requiring more thorough consideration before an adequate assessment of the project's environmental impacts can be made are as follows:

1. A more comprehensive assessment of stream flow, water quality, and fish and wildlife resources of the Susitna River is needed downstream from Talkeetna. The anticipated impacts on downstream resources and on resource users which are attributable to the project need to be identified and quantified. Analyses should include the effects of changes in river stage, water quality and temperature, on rearing and overwintering fishes. Analyses should address riparian vegetation, wildlife (including moose) and the recreational fishery.
2. There is a need to identify stream flow requirements necessary to maintain instream resources (water supply, fish, wildlife, recreation and navigation) downstream from the proposed impoundments. Operational flow scenarios need to be developed that consider the requirements of all life cycle stages of fishes. Instream flow information should include target fish species, management objectives, habitat units associated with alternative flow scenarios, and the minimum and maximum flows necessary to maintain target populations during all seasons of the year.
3. The DEIS has not resolved the issue of an acceptable flow regime to protect fishery resources during project filling or operation. An effective release schedule capable of minimizing impacts is a necessary component in developing an acceptable mitigation plan and must be incorporated into the license. The FEIS should identify those habitats potentially affected by altered flows, the resources utilizing these habitats during all stages of their life-cycle, the processes which could affect these resources, and methods to sufficiently mitigate the impacts identified. The DEIS does not predict with any degree of confidence the project's effects on downstream water temperatures, turbidity, ice conditions, and groundwater upwellings. An understanding of these relationships is necessary to determine the project's effect on fish habitat and dependent fish populations. Information in the

DEIS is inadequate to determine whether the minimum summer flows or maximum winter flows will have positive or negative effects on anadromous or resident fishes.

4. The FEIS should discuss the full range of important impacts to fish and wildlife resources and should identify mechanisms for determining appropriate mitigation of these impacts. The mitigation plan should be based upon a quantified assessment of anticipated impacts to fish and wildlife populations and their habitat, and should include a process for agreeing on the magnitude of impacts, and a mechanism for the formulation of a comprehensive fish and wildlife mitigation policy and plan.
5. The impacts to fish and wildlife resources caused by the several alternative access routes to the project area must be more fully evaluated. These impacts include the effects of access to the project area for project construction and operation as well as the affects caused by increased access to surrounding lands by the general public and adjacent land owners.
6. Socio-economic impacts on commercial, recreational and subsistence use of affected resources and supporting industries require further assessment. This should include the identification of resources used; the quantification of use levels; the description of use patterns, including seasonality, its context within local communities, and descriptions of geographic areas of use.
7. Mitigation planning, as mentioned above, must be further developed. This is probably the most important remaining issue. This cannot be achieved until the impacts to fish and wildlife are better identified. The FEIS should include a discussion of how impacts to fish and wildlife resources will be mitigated through project design, operation or through compensatory measures. A comprehensive evaluation of impacts and applicable mitigation

alternatives needs to be conducted to evaluate environmental costs, the feasibility of mitigation, and the trade-offs of fish and wildlife resources and habitat.

8. The Alaska Power Authority (Applicant) in consultation with other state and federal agencies has developed a comprehensive listing of impact issues. (Please refer to issues listed in the March 6, 1984 letter from Jon Ferguson (APA) to Don Collinsworth (DF&G), the May 8, 1984 state response to the list from Robert Grogan of the Division of Governmental Coordination to Jon Ferguson, and the July 23, 1984 response from Mr. Jon S. Ferguson to Mr. Robert Grogan. References 1, 2 and 3). A process has been initiated for addressing project issues, evaluating the significance of each, and arriving at resolution. The FERC should review the impact issues as developed by the State of Alaska. An analysis of the impact issues, significant impacts and recommended plan to mitigate should be included in the FEIS.
9. FERC should be a participant in, or take advantage of, the presentations and discussions of the Susitna Hydroelectric Project, Issues Settlement Workshops.
10. Information presented regarding the environmental impacts of the alternative hydroelectric projects is not sufficiently detailed to permit a reasonable comparison of these projects with the proposed action. While there is relatively little quantifiable information available for some of the alternative sites, we believe the discussion on alternative hydroelectric sites could be better supported by information available from the DF&G, DNR and other agencies.
11. The level of information contained in the DEIS does not reflect the amount of project-specific information that is currently available to the FERC from the Applicant, state agencies and other

sources. Further, impacts that cannot be quantified need to be identified. Effective mitigation is based on the accurate prediction and quantitative evaluation of the impacts of a proposed action on resources and the incorporation of this knowledge into the planning process.

12. It is a requirement of the Federal "Fish and Wildlife Coordination Act" (48 Stat. 401, as amended, 16 USC 661 et. seq.) that the cost of mitigation must be incorporated in the benefit-cost assessment relating to project feasibility. The state recommends that fulfillment of this requirement be reflected in the FEIS for both the proposed project and the alternatives.
13. If mitigation planning for the Susitna Hydroelectric Project is adequately addressed in the FEIS, the state agencies can readily identify stipulations which may be necessary under state laws or regulations. This would insure that stipulations are no more conservative than necessary, and that the regulatory process is minimal and efficient.
14. Mechanisms which will incorporate information arising from ongoing studies and other sources into the impact assessment and mitigation planning process are not clearly identified.
15. A much more expeditious review could have been performed if (1) the DEIS included a topical index allowing cross references between volumes and (2) topics were adequately discussed, thereby saving the time required for researching points of concern.

Specific Comments

16. Section 1.4.5.3, Page 1-43, Economic Analyses

The DEIS states:

"A conclusion from these analyses is that, with the high construction costs of the larger hydroelectric projects and current uncertainties regarding Beluga coal development, the most prudent Railbelt generation expansion plan would be a mix of non-Susitna hydroelectric resources with a combination of gas-fired combined cycle generation in the Cook Inlet area and coal-fired generation in the Nenana area. The use of smaller, lower cost hydroelectric resources in such a plan would reduce thermal generation requirements and fuel demands through the study period."

Furthermore, Section 1.4.5.2 states: "The analyses in Sections 1.4.3 and 1.4.4 indicates that the coal and gas scenarios would meet the Railbelt power requirements at lower cost than the proposed Susitna Project."

The apparent superiority of coal and gas or some combination of the two is maintained over a range of price assumptions and real interest rates. This "superiority" is the result of two factors. First, the FERC load growth forecast is slightly lower than the Applicants, thus slightly reducing annual benefits regardless of assumed oil, natural gas, and coal prices. Secondly, the Susitna Project's capital intensiveness generates a significant annual debt burden at real interest rates as low as 3.5 percent.

A major problem with evaluating a project like Susitna is the long project life. The estimated benefits and costs are evaluated over a fifty year period. Economic forecasting is, at best, a minor art form and is not a scientific endeavor. The methodology of long run forecasting is as much philosophy as substance. Projections may not be accurate over so long a period, but they can be methodologically conservative and financially

prudent. Conservatism could manifest itself in the use of high discount rates for project analysis, thereby attaching less importance to forecasted events as they occur in more distant time periods. These are the periods for which we know the least.

The FEIS should present an objective analysis of the impact on the economics of the project and alternatives that would result from a broad range of projected real discount rates and provide a discussion of the risks involved with the discount rate assumptions.

17. Section 2.1.6, Page 2-11, Construction Monitoring

The DEIS does not contain adequate information on construction monitoring. No mention is made of a plan for continuous inspections and measurements of the fill placement or grouting during construction. Detailed and consistent inspections must be made to insure the accurate placement of the Watana impervious core. A discussion of the type and location of instrumentation is missing. The DEIS should discuss in detail the monitoring schedule and procedures taken during initial filling of the reservoir. Routine visual inspections are essential. It is unclear what measures would be taken in the event of piping, sloughing or misalignment observations.

Assuming worst-case scenarios, discoloration of the drainage system discharge would indicate piping of core materials - not leaching as stated by the DEIS. Piping would indicate severe inadequacies in the inner core which could only escalate. It may not be possible to simply locate and grout the problem area.

18. Section 2.1.6, Page 2-11, Dam Safety

Dam safety is an important aspect of overall project design. No mention is made of any emergency plan in case of the dam's failure. Under DNR's Dam

Safety Program, administered by the Division of Land and Water Management (DLWM), routine project inspections are mandatory. In particular, U.S. Army Corps of Engineers, Recommended Guidelines for Safety Inspection of Dams, (Reference 4), should be discussed as a basis for inspection on this project. These inspections are intended to be made jointly with the FERC inspections. DNR requires copies of all FERC inspection reports.

The final designs of the project plans and specifications will require approval by DNR and DF&G under 11 AAC 93. These applications have been submitted, but any further processing is held in abeyance pending submittal of detailed dam designs and specifications. Review and approval will take at least sixty (60) days.

19. Section 2.1.9, Page 2-13, State Approval of Plans and Specifications

Alaska Statutes 16.05.840 and .870 require that an applicant must have plans and specifications approved by DF&G before constructing a dam on a river that is important to anadromous fish. If these plans and specifications are not sufficient in the view of DF&G, approval may either be denied or conditioned with those measures which must be met to protect fish resources before construction of the project may begin. If mitigation planning for the Susitna Hydroelectric Project is adequately addressed in the EIS, state agencies can readily identify stipulations which may be necessary under either of the above mentioned authorities. This would insure that stipulations are no more conservative than necessary, and that the regulatory time frame is minimized.

20. Section 2.1.9, Page 2-13, Consistency Determination

The FEIS should consider whether the proposed project, or its alternatives, are consistent with the standards and guidelines of the Alaska Coastal Management Plan or approved coastal community management plans.

21. Section 2.1.12, Page 2-21, Mitigation Planning

The mitigation plan needs to contain contingency elements that can be incorporated as additional information is collected and anticipated impacts are better quantified. Mechanisms for modifying the mitigation plan as impact assessments are refined and as actual operating experience is gained should be outlined. Plans for habitat modification, as proposed for sloughs, should be provided and should include engineering designs, construction, operation, and maintenance plans and a detailed cost analysis. Without these, mitigation proposals cannot be evaluated nor developed with any assurance of success. This is necessary to ensure that appropriate mitigation occurs and the mitigation actions are in harmony with the overall development and conservation of the resources in the area.

22. Section 2.1.12.3, Page 2-24, Mitigation Planning

The State does not support or propose regulations to solve problems that are more appropriately dealt with through the development of an effective mitigation plan. Mitigation plans should indicate that a particular impact might require changes in fish and game regulations but they should not attempt to specify what those changes will be. Management options and mitigation options should be dealt with separately. The DEIS addresses management options as part of the mitigative process for the Deadman Creek drainage (p. 2-24). Regulatory restrictions are the responsibility of the Boards of Fisheries and Game. This does not apply to restrictions placed on individuals brought into the area to engage in construction activities. It applies only to regulations affecting the general public. It may be appropriate to have project stipulations, rather than regulations of the Boards to limit project personnel from engaging in certain activities, as construction projects can create unusual concentrations of people brought into the area by means not available to the general public.

23. Section 2.1.12.4, Page 2-25, Mitigation, Habitat Enhancement

Mitigation for wildlife habitat loss resulting from development of the project should be in the form of compensation. Compensation may include enhancement of the productivity of wildlife habitat and acquisition of replacement lands in order to obtain habitat quality commensurate with that lost from project development. The applicant's proposed plan is designed to enhance wildlife carrying capacity outside the project area to compensate for habitat loss resulting from the project. The feasibility and specifics of the plan are still being studied. The benefits to wildlife that will be derived from the proposed enhancement techniques are difficult to assess at this time. To assure adequate protection of the state's valuable fish and wildlife resources, an effective mitigation policy should address both habitat enhancement and replacement lands. Considering both habitat enhancement and acquisition of replacement plans is necessary to reasonably address biological requirements of the populations affected and to compensate for the loss of habitats of certain populations that cannot be mitigated through enhancement alone.

24. Section 2.1.12.3, Page 2-25, Mitigation, Fish

Losses of resident fish species and habitats within the impoundments can only be mitigated through compensatory habitat replacement or enhancement elsewhere. Resolution of this issue must be accomplished jointly between the applicant and the resource agencies in the context of presently feasible propagation technology and the benefits to the resource and user groups of artificially stocking waters in the project area. Therefore, it is not appropriate to make a decision on this tradeoff such as the artificial stocking of Kokanee in the Watana impoundment, until a process for addressing the overall mitigation plan is implemented. The compensating measures proposed to mitigate loss of Arctic grayling habitat in reservoir zones (p. 2-25) are not necessarily desirable options. Until the resource agencies discuss compensation measures, the options listed (research on grayling propagation, hatchery facilities for grayling, and introduction of

rainbow trout into the Devil Canyon reservoir), should be considered only as options proposed by the applicant as they have not been endorsed by any agency.

25. Section 2.1.12.6, Page 2-28, Recreation Plan

Volume 6 of the DEIS addressing Recreation Resources and Visual Resources appears to be a credible document.

Phase five of the applicant's proposed recreation plan (Table L-10, page L-37) for the Stephan Lake 40 acre site and development should be considered as a higher priority. This site will be the only public site on Stephan Lake and it will be a major access point to float the Talkeetna River. All other lands surrounding Stephan Lake have been or will be conveyed to native Corporations pursuant to ANCSA.

26. Section 2.1.12.8, Page 2-29, Visual Resources

The features of the applicant's proposed visual resource plan appear to be adequate if followed as specified in the DEIS.

27. Section 2.2.2, Page 2-29, Access Road

The FEIS should provide a comprehensive assessment of the secondary impacts of providing public road access into the middle Susitna basin. This assessment must address the impacts of increased opportunity for the use of federal public lands north of the project area as well as facilitating development of private native lands both north and south of the project area. These native lands are currently not open to public use nor would they necessarily be open to public use if road access were available.

In its discussion of secondary impacts of improved access, the FEIS should address impacts to ungulate populations, vegetation, and brown bear use at Prairie Creek. Prairie Creek attracts brown bear from an area of 7900 Km²

(not 5700 Km², p K-17 of DEIS). Only brown bear make seasonal movements to Prairie Creek during salmon runs, not black bears as reported on page K-82.

28. Section 2.2.2, Page 2-30, Access Road

Although public access may be restricted during construction, long term use by the public must be anticipated since state funds will be used to construct the access road. The road must be designed to Department of Transportation and Public Facilities (DOT/PF) and Matanuska-Susitna Borough road standards. There should be some discussion on designing recreational amenities, such as pullouts or viewing areas consistent with the area's future recreational uses.

29. Section 3.1.1.1, Page 3-1, Geology

The introductory statement on seismicity is poorly written. "Thrusting" is a form of "faulting"; "shearing" is what happens along faults. All of these items may or may not be the result of "plutonism" and are definitely not the result of "regional metamorphism" as stated but rather the other way around. The third period of deformation, for example the Castle Mountain Fault Zone, assuredly extends through the Quaternary. Northwest drifting continental blocks of the Cretaceous is a theory under considerable debate and not accepted widely enough to be quoted without a qualification in the DEIS. Rationale for using this theory should be further discussed.

A clear statement is needed on subduction zone faults. Although a surface rupture hazard to the sites may not be significant, the ground acceleration hazard from these sources should be discussed in greater detail.

The surficial geology within the region needs to be defined. The discussion in the DEIS is inadequate for evaluating the area.

Construction activities will modify the character of sediments overlying permafrost, resulting in thaw of permafrosts with resultant thermokarst and

erosion. Discontinuous permafrost has been encountered in scattered locations in the lowlands and should be considered within the entire project area.

30. Section 3.1.1.2, Page 3-1, Land Management

The FERC application briefly discusses the complex land ownership pattern in the project area. The DEIS assessment does not accurately portray this complexity. Land ownership for the entire project should be clearly delineated on large scale maps in the FEIS, including the transmission corridors and alternative project sites. The land ownership maps should show all the competing land selections and their selection date. DNR is assisting the Applicant in the development of a land acquisition program for the Susitna Project.

FERC should not presume future state ownership of lands currently selected by both the state and native corporations. The DEIS is written as if the project land were state owned or could be acquired by state selection. The state will probably have to wait until the Bureau of Land Management (BLM) has adjudicated all the competing land selection applications. BLM has suspended adjudication of the state's selections until the native selections are adjudicated. The potential time delays for resolving these competing selections could have a significant impact in the overall project schedule and cost and should be discussed in detail.

31. Section 3.1.3.1, Page 3-5, Streamflows

In many sections of the DEIS, various flows of the Susitna River are mentioned. However, a better understanding of measured streamflows would be reached if gaging stations were identified by name and location. It is critical to clearly identify where measurements are recorded to provide useful and accurate data for fisheries habitat, economic, and safety planning.

32. Section 3.1.5.1, Page 3-25, Timber Resources

The DEIS provides extensive, generally descriptive information on forest conditions in the project area. The descriptions are ecological in nature rather than economic. Volumes and values of wood involved are not discussed. The forest resources of the area are economic resources only in the personal-use context at the present time. Consequently, our concerns center on making any wood felled or "cleared" on state land available to the public in so far as is practical.

Prior to developing clearing schedules for state owned land, the applicant would be requested to consult with DNR's Mat-Su Area Forester to determine the feasibility of selling merchantable timber. In areas where public access may exist (along the transmission corridors) felled wood may be made available for pick up by the public for use as fuel.

33. Section 3.1.5.2, Page 3-31, Caribou

Major herd crossings of the impoundment area have usually occurred when population levels were relatively high. It appears likely that the probability of major crossings of the impoundment area and increased use of the northwestern portion of the range will increase if herd size increases. The peak size of the herd was recorded in 1962 when 65,000-70,000 animals were counted, not 40,000 animals in 1955 (p. K-12).

34. Section 3.5.4, Page 3-66, Talkeetna Fisheries

Results of DF&G studies indicate the Talkeetna River supports large runs of chum salmon, possibly exceeding 200,000 fish. The FERC staff expects that losses to salmon production in the Susitna River above Talkeetna during the filling operation of the reservoir would be partially offset by increased production in the Talkeetna River (p. 4-32). The FERC staff assumes that fish which normally would migrate up the Susitna River would select for the warmer water of the Talkeetna River. Even so, any displacement of

additional fish into the Talkeetna River system may lead to increased competition and overcrowding of spawning and rearing areas. The possibility of lost production in the Susitna River being compensated for by increased production on the Talkeetna River is highly speculative. (See comments on Keetna Project, page 34).

35. Section 4.1.1.1, Page 4-1, Geology, Seepage

The DEIS indicates there is a potential for seepage through the Watana relict channel at Tsusena Creek during the filling operations. The location of seepage is not identified. The DEIS recommends monitoring during filling; however, further provision may be necessary to control unforeseen seepage. It is unclear whether the relict channel will need to be excavated, then grouted. The procedures used to reduce seepage through the relict channel should be clearly stated.

36. Section 4.1.11, Page 4-1, Geology, Borrow Sites

Information on material sources and borrow site locations is not readily referenced in the DEIS. Material sources, such as local sources of building material, and availability should be more thoroughly discussed. It is unclear how much material is available at the various borrow and quarry site locations. A large amount of material will be essential to construct the project. There should be some discussion of the full extent the material can be excavated from a particular borrow site before the impact becomes excessive, in order to assess associated environmental effects.

Surface and subsurface ownership of these sites is unclear. This information could be critical to future management and planning efforts.

37. Section 4.1.1.1, Page 4-1, Geology

Geology and soils are fundamental issues of the DEIS and the subject of Appendix E, but are covered less adequately than are other parts of the DEIS.

Several types of mass movement are mentioned in the DEIS. Clarification with more detail on the potential impact of landslides into the reservoirs, is necessary. The DEIS does not adequately discuss prehistoric landslides located near the proposed Devil Canyon dam site. There is no mention made of the potential hazard and environmental effects resulting from giant waves produced when landslides enter the reservoir. No mention is made of the future headward (upslope) extension of these slides. Only shallow surface slides are discussed. There should be some discussion of major bedrock slides due to pore pressure buildup along pre-existing planes.

38. Section 4.1.1.2, Page 4-2, Land Use, Transmission Corridor

The proposed transmission corridor may affect some existing and proposed state agricultural disposal areas. The DEIS discussed placement of the towers along existing rights-of-way and stressed using single pole towers or "H" figure towers instead of the "X" figure towers to lessen this impact. These statements imply the area beneath the powerlines can continue to be used as agricultural land. There should be some discussion of the allowable uses of the land beneath the powerlines and the safety precautions necessary around the bases of the towers. This discussion should include an assessment of the cost/benefit ratio related to use of towers requiring considerably more expensive foundations than the proposed structures.

39. Section 4.1.1.2, Page 4-4, Land Use, Transmission Corridor

The DEIS contains a statement which implies that there will be an access road along the entire length of the transmission corridor. It is our understanding that the applicant has not proposed a continuous access road along the transmission corridor, but rather plans to utilize existing access and winter construction to the extent practical. In other areas it may be necessary to restrict ground access and utilize helicopter access. There should be further discussion of this issue.

40. Section 4.1.1.2, Page 4-2, Land Use, Transmission Corridor

DNR is concerned the transmission corridor may act to bisect state agricultural disposals if there are restrictions on the type of access that can be granted across or from the corridor. The extent of allowable public use along the transmission corridor is unclear. DNR, the state land managing agency requests further discussion on the type of access the state may grant across and along the transmission corridor. It is not clear who will manage and maintain completed transmission lines, and what access restrictions could ultimately be imposed.

41. Section 4.1.2, Page 4-4, Air Quality, Fugitive Dust

During construction, fugitive dust emissions from road dust and wind blown dust could probably be controlled by frequent road watering and would require a Temporary Water Use Permits (TWUP) from DNR.

42. Section 4.1.2, Page 4-4, Climate Conditions

The environmental impacts of the proposed project run about 16 pages and yet climatic effects are treated in only 4 1/2 lines, essentially saying no significant microclimate change will occur. The possibility of climatic coolings of the environs by reservoir evaporation and the higher ambient atmospheric moisture content (resulting in more condensation/precipitation downwind) should be discussed.

43. Section 4.1.3.1.1, Page 4-7, Spillway Capacity

The Watana dam is designed to discharge 156,000 cubic feet per second (cfs), the estimated 10,000 year flood. Reference to an emergency spillway and fuse plug indicates allowance for additional capacity to permit discharge of the Probable Maximum Flood (PMF). Projected PMF flows and the dam's capability of passing 100% of the PMF without overtopping need to be clarified.

The FEIS should discuss whether the Devil Canyon Dam would be able to withstand or control a flood surge caused by the overtopping or failure of Watana Dam. Further discussion of Devil Canyon's ability to withstand an overtopping without failing is necessary. The PMF has not been specified for the Devil Canyon area.

44. Section 4.1.3.1.2, Page 4-9, Flow Regime

The discussion on surface water resources is well done. However figures given for mean annual stream flows at the Watana and Devil Canyon dam sites are misleading due to the flow variations throughout the year. Mean monthly stream flows shown in Figure 4-2 are more accurate and should be used throughout the FEIS for consistency. The FEIS should discuss the instream flow methods used to determine the impacts of maximum and minimum flow scenarios on fish and wildlife habitat, fish life cycles, water quality, recreation, navigation, and transportation. Many sections mention probable effects on the fisheries but fail to mention what the effects are, or how they were assessed. This information is essential to evaluate the effectiveness of the mitigation measures.

The Applicant asserts that the project 10,000 cfs winter flow will not overtop the sloughs more frequently than under natural conditions.

The FEIS should determine the impacts of increasing winter flows to 10,000 cfs from normal flows of 1,000 to 2,000 cfs, in particular, determining under what conditions and at what frequency sloughs would be overtopped. The state has not established a position on 12,000 cfs required summer flows, to date no negotiations on minimum flows have taken place.

45. Section 4.1.4.2.1, Page 4-26, Downstream Temperature Effects

Table 4-2 shows significant temperature changes in the Talkeetna to Cook Inlet reach of the river during both reservoir filling and project operation. On page 4-26, the DEIS states that downstream of the confluence

of the Chulitna and the Talkeetna Rivers, growth rates of juvenile salmon and resident species would be suppressed by cool temperatures. The FERC staff estimated a reduction in accumulated June-September growth in this reach by about 50 to 60 percent compared to potential growth at pre-project temperatures. These values contradict previous statements (p. 4-23) that only minor temperature differences are expected downstream of the Chulitna confluence. The FEIS should reassess temperature effects of the project.

46. Section 4.1.4.2.1, Page 4-26, Downstream Habitat Effects

The State recommends a more thorough analysis of the fisheries and aquatic habitats downstream from Talkeetna. The impacts of the altered flows in this reach may be more significant than those upstream.

Below its confluence with the Chulitna River, the Susitna River is broad and relatively shallow. Therefore, an altered flow regime may affect relatively more aquatic habitat downstream than upstream. The state recommends that additional emphasis be directed toward the assessment of impacts downstream of the Talkeetna River.

47. Section 4.1.4.2.1, Page 4-30, Downstream Temperature Effects

If the growth reductions stated in the DEIS are realistic for the lower reach of the Susitna River, they could have major impacts on juvenile salmon utilizing this reach. This reach supports a major portion of the Susitna River salmon population. The significance of the potential impact on lower reach juveniles caused by reduced growth are not discussed in this DEIS and certainly should be further evaluated. There are virtually millions of emigrating juvenile salmon in the lower reach. Adult salmon enumerations on tributaries have been conducted for many years and would provide some rationale for estimating numbers of emigrating juveniles in the lower reach.

Unfortunately, little information is available on the timing of juvenile salmon emigrations out of the Susitna River. If the majority of juveniles

have emigrated prior to the period of projected temperature changes, impacts may be minimal. The FEIS should discuss timing of juvenile emigration in the lower Susitna River.

48. Section 4.1.4.2.1, Page 4-33, Downstream Impacts on Fisheries

The DEIS states that "It is not possible to quantify the direct impact of the project on the commercial, sport, or subsistence fisheries, except that all other factors being equal, changes in catch would be approximately proportional to increases or decreases in the size of the spawning stocks" (p. 4-33). For the sport fishery, this conclusion suggests a lack of familiarity with factors affecting the sport fishing effort and harvest. To understand the potential impacts of the project on the recreational fishery that occurs downstream from Talkeetna, it is necessary to understand how these fisheries function. Although this information was presented in OMB's comments on the license application (November 18, 1983, Reference 6) we will repeat it for consideration in future environmental analysis and mitigation planning.

On the Susitna River from Talkeetna downstream to its confluence with the Yentna River, there are nine tributaries flowing into the east side of the Susitna and one flowing in from the west that contain significant fish populations. Most of these streams support major salmon runs and jointly support up to 100,000 man-days of fishing effort each year. Access plays a major role in limiting growth of the recreational fisheries that occur on these streams. Much of the land adjacent to these streams is in private ownership and public land that is available is relatively undeveloped or inaccessible. Other than in the Talkeetna area, there are no public boat launches that allow anglers access to the Susitna River. There is a commercial access point at the mouth of the Kaskwitna River. The state has recognized the problem and has spent approximately \$500,000 to purchase lands at the mouths of Montana and Sheep Creeks. The state has also initiated a road construction project that will provide access directly to the Susitna River at the mouth of Willow Creek.

An important aspect of the recreational fisheries is that they are located primarily at confluences of tributaries to the Susitna River. Recreational activity in these confluence areas is directly related to the large number of salmon that are present at these sites. As five salmon species migrate up the Susitna River they tend to congregate at the mouths of all tributaries flowing into the Susitna River. During the open water season the areas around the mouths of tributaries provide ideal resting or staging areas for adults of all fish species as well as rearing areas for juvenile fish. The extent to which these areas are used is dependent on the depth and velocity of the water at the tributary mouths which in turn is sensitive to changes in mainstem flow. At high flows, the mainstem creates backwater areas at the tributary mouths, thus increasing water depth. At low mainstem flows, the backwater areas are eliminated, resulting in shallower water and increased flow velocities at the mouth. When these backwater areas are eliminated, their attractiveness to fish is significantly reduced and fish will be displaced to other areas more suitable. They could be displaced from tributary mouths that are easily accessible to anglers. In the Susitna River, natural low water conditions which affect recreational fisheries do occasionally occur. When they do, it occurs primarily during May and June at the time of chinook salmon migration.

Chinook salmon are the most highly prized sport fish in Alaska and as such they attract large numbers of anglers to the limited areas that are opened for fishing. The Susitna River chinook salmon is a limited resource that has been intensively managed and has a long history of allocation conflicts between various user groups. Sport fishing for chinook salmon is allowed on only five Susitna River tributaries in the Talkeetna to Cook Inlet reach with the exception of the Yentna and Talkeetna River drainages which are also open to chinook salmon fishing. Three of these streams, Willow, Caswell, and Montana Creeks are road accessible east side tributaries that are open to chinook salmon fishing only on weekends while the other two, the Deshka River and Alexander Creek which flow in from the west side, are open to chinook salmon fishing 7 days per week. The weekend-only fishing streams

receive extremely heavy fishing pressure during the chinook salmon fishery. Since the areas that are opened for chinook salmon fishing are extremely limited, any physical changes in backwater areas on these streams which may reduce holding areas for chinooks could be particularly damaging to the recreational fishery.

It is also important to note that salmon utilizing tributary confluence areas are not necessarily migrating into those tributaries. All five salmon species migrating to the upper Susitna, Chulitna, and Talkeetna Rivers enter, in varying degrees, the sport fisheries that occur at the confluence areas of the lower Susitna tributary streams. Any impact that occurs to salmon species that utilize the Susitna River in the Devil Canyon to Talkeetna reach has the potential to impact the recreational sport fishery which harvests these fish in downstream confluence areas.

Flow reductions under the proposed filling schedule may alter the physical characteristics of the tributary mouths in the upper portion of the Talkeetna to Cook Inlet reach. These are the areas where the major fisheries occur. During the open-water season, induced mainstem discharge reductions of 34 percent in June and 28 percent in July may reduce the areal extent of these backwaters. Water depths in these areas will also be reduced. The Susitna River below Talkeetna is moderately to extensively braided, with the river channels wide and shallow. Therefore, this reach is more sensitive to flow reductions than deeper more incised channels, which occur further upstream. Reductions in discharge during and after filling of the reservoir could result in substantial changes in the habitat at tributary mouths which may seriously impact existing recreational fisheries. Since the tributaries flow into a variety of habitat types, the impacts of reduced flows will vary.

The FEIS should quantify adult salmon escapement in the Susitna River below Talkeetna. It is very possible that adult salmon escapement in this portion of the Susitna River exceeds those estimates available for the river above Talkeetna. This would mean that the reach below Talkeetna is especially

important to rearing juveniles. Here again, there is very little quantitative information presented in the DEIS. Information is needed on juvenile rearing in the reach below Talkeetna. Large numbers of juvenile chinook salmon and adult resident species are migrating out of numerous east side Susitna tributaries in the reach below Talkeetna. They are dependent on over-wintering habitat in the Susitna River. There are no quantitative data presented that indicate their abundance or which habitats they are dependent upon. There is almost certainly going to be an impact on juvenile fish rearing in this reach with post-project winter flows changing by over 200 percent. The FEIS should show how winter habitat will change with the dramatic increase in flow and what impact this would have upon overwintering juvenile salmon.

It appears that the transmission line corridor will be crossing in the immediate area of the Burma Road's intersection with the Little Susitna River. The Little Susitna River is designated as a recreational corridor in the Willow Sub-Basin Area Plan, from the Parks Highway downstream to where it enters the Susitna Flats State Game Refuge. In the Area Plan the management intent is to protect recreational values and provide for visual and sound buffers in the corridor. Recreational use of the Little Susitna River is increasing at an extremely rapid rate, primarily due to upgrading of the Burma Road which accesses the lower Little Susitna River. In 1983 angling effort reached 35,000 man-days which resulted in this fishery becoming the second largest freshwater sport fishery in Alaska. This is an area of extremely high use and future plans include the development of a campground and boat launching facilities.

49. Sections 4.1.4 and 4.1.5, Pages 4-25 and 4-33, Fish and Wildlife
Impacts

-Impacts are usually stated in terms of the current populations, current habitat conditions and current management goals. In some cases, they focus only on the fate of currently living individuals rather than populations. This approach may be adequate for short-term impacts assessment. It is not

adequate when the duration of an impact is likely to span a period during which populations, habitats, management goals, and/or regulations may change significantly. Management objectives, populations, and regulations will change over the long period of the project life. Since these changes are well within the time frame of many of the impacts of the project, the FEIS should discuss impacts and mitigation that are responsive to a range of possible population levels and management objectives.

The results of cumulative impacts are not emphasized enough. While individual impact mechanisms may not be significant when viewed independently, cumulative impacts, resulting from a combination of lesser events, may have more severe effects on wildlife populations. The combination of events, such as increased human access, habitat loss, disturbance, disruption of migratory pathways, and changes in predator-prey ratios, may have impacts when acting together that exceed the sum of the impacts from the individual activities.

A large number of issues seem to be set aside simply because they cannot be precisely quantified. Clearly it is not possible to precisely quantify all of the impacts. However, it is difficult to see how reasonable and responsible mitigation decisions can be made unless there is some indication of the magnitude of the impact. Many of these issues can at least be narrowed to an order of magnitude. They should be thoughtfully examined and outer bounds placed on the problem. For example, a maximum possible level of habitat loss and alteration adjacent to the impoundment and downstream can certainly be determined. These estimates can be narrowed by developing more logical scenarios. The effects of several of the scenarios on a wildlife population can be examined to identify a worst case situation. If this worst case shows an unacceptably high impact, further studies can be designed to narrow the range of possibilities. The DEIS states that "In the reach from Talkeetna to the Yentna River, it is impossible to predict post project changes in vegetation with any certainty." Downstream vegetation changes could greatly affect wildlife populations over time and the possible range of impacts in this area needs to be discussed. There are presently

available more recent studies for moose, bears, wolverines, caribou and sheep. These should be incorporated in the FEIS.

A good analysis of the amount of habitat lost by the project, for all species, will not be available until the development of suitable habitat maps, currently in progress, is completed.

50. Section 4.1.5.2, Page 4-37, Wildlife Impacts

Changes brought about by the project may have widely different effects on different population sizes or under different environmental conditions. Mortality induced by the project might be insignificant at high population levels. In some instances, the project might permit continued existence of a population of the current size, but preclude growth to its current potential. In other cases pre- and post-project populations might be the same size, but the post-project population might have less capacity to sustain hunter harvest and predation or to recover from periodic environmental perturbations, such as severe winters. While the DEIS occasionally alludes to changes in productivity, it tends to focus on maintaining current population level. A range of possible population levels should be addressed in the FEIS.

51. Section 4.1.5.2, Page 4-37, Significance of Impacts

The FEIS should rank impacts within and among species to aid in identifying further study needs and to determine the importance of specific mitigation measures. Ranking impacts helps determine where the major efforts of the mitigation plan should be directed. In ranking impacts, certain questions need to be addressed. These include: what percentage of the available habitat, for each type within the region, will be affected? Is the acreage lost within a specific habitat type significant? How much similar habitat has been lost in nearby accessible areas? What species of wildlife use these habitat types? What factors limit the population growth of the species? How will cumulative impacts in the region affect these wildlife

populations? How will these habitat types change over the life of the project? By answering similar questions for the various types of project related alterations to lands and waters, the potential scope of a problem can be determined even when precise quantification is impossible. The FEIS should more realistically weight impacts so that the need for further study or specific mitigation measures can be assessed.

52. Section 4.5.1.2, Page 4-37, Caribou

An important consideration for the Nelchina caribou herd, not addressed by the DEIS is long-term management and the dynamic nature of caribou populations. The DEIS states that the DF&G's goal is to maintain the population at 20,000 animals. This information is outdated. The DF&G's goal is to increase the size of the herd and maintain it at 30,000 adult caribou (36,000 including animals less than 1 year old). The FEIS should address the effect of the reservoir and access road on a herd of this size because the Watana reservoir intersects a major historical migratory route of the Nelchina herd.

53. Section 4.1.5.2, Page 4-37, Dall Sheep

The assessment of impacts to Dall sheep in the DEIS contains several omissions and inaccuracies. The FEIS should incorporate DF&G studies on Dall sheep published in 1984. Most important are the predicted impacts to sheep. As all of the heavily used lick sites at the Jay Creek mineral lick area are about 2200 feet in elevation, they will not be inundated by the impoundment and mineral leaching will not occur. Only a few lick areas that receive relatively little use by sheep will be inundated. The greatest impact to Dall sheep may result from the Watana impoundment blocking or impeding sheep from crossing Jay Creek and limiting use of important lick sites on the east side of the creek. Lick sites on the east side of Jay Creek are heavily used by sheep which arrive from the northwest. As mentioned in the DEIS, the effects of construction activities and disturbances from recreational boaters and low-flying aircraft, may also

have significant impacts. Erosion at some lick sites could result from seasonal fluctuations in water levels in the reservoir, reducing the already limited escape habitat adjacent to the lick area.

54. Section 4.1.5.2, Page 4-37, Black Bear

The approach used in the DEIS to quantify impacts to black bears results in an inaccurate assessment of the impacts. To more accurately assess impacts, the study area needs to be divided into three distinct areas: Watana impoundment, Devil Canyon impoundment, and downstream of Devil Canyon. In the former, a very high percentage of forested black bear habitat (70-90 percent) will be inundated. This includes nearly all the important deciduous forest habitats. In the second and third areas, a much smaller acreage of forested habitats will be disturbed. Combining all three areas masks the effect of habitat destruction in the area of the Watana impoundment. Habitat destruction in the Watana impoundment will essentially eliminate the resident black bear population in this area, while the impacts in the Devil Canyon area will be much less.

55. Section 4.1.5.2, Page 4-37, Moose

The DEIS states a "...loss of about 10% of the major wintering and spring calving habitat within 10 miles of the impoundment area (p. 4-38)." How this figure of 10% was arrived at is unclear. In addition, it can be misleading by itself. A small percentage of available habitat may support a large number of moose, especially during the winter. If high quality habitat is inundated or disturbed by construction activities the consequences to the moose population would be more severe than if low quality habitat was disturbed. Therefore, the type and quality of lost habitat and its value to moose needs to be assessed, not just the areal extent. In the spring of 1983 over 600 moose were counted just in the Watana impoundment area and approximately 2800 moose range in the area of the Devil Canyon and Watana impoundments. The same problem previously described for assessing impact of lost habitat to bears applies for moose.

With better habitat maps, this assessment should be improved. In addition, displaced moose will be subject to much higher levels of mortality due to predation and higher concentrations of moose on reduced winter range.

56. Section 4.1.5.2, Page 4-43, Wolverine and Wolves

The impacts projected for wolverines and wolves (p. 4-43) are incorrect. At least 35 wolverines could be affected by the impoundment. Up to six wolf packs have territories overlapping the proposed impoundments, and all six could be disrupted. In addition, access roads, project facilities, construction activities, and transmission corridors would likely reduce additional habitat for wolves and wolverines or cause disturbance and increased mortality.

57. Section 4.1.7, page 40-47, Navigation

Further discussion is warranted on navigational impacts for each portion of the river. As indicated, recreational navigation is increasing; however a discussion of the historical use of the river is needed to support this statement. Commercial navigation should be given more consideration. Studies by the applicant should have been used to evaluate the probable impacts. Additional studies are required to evaluate the navigational limitations, if any, which may occur at the various flows proposed. 11 AAC 93.141(2) and (3) further define navigational flow requirements for recreation and transportation.

58. Section 4.1.8, Page 4-49, Fish and Wildlife Users

The subsistence section has several errors or has presented very vague discussion on local resource uses. Some of this has undoubtedly resulted from failure to use primary sources of information when discussing subsistence issues. The Subsistence Division of DF&G has prepared several reports and maps with valuable information on subsistence uses within this region. This information should have been included in the FEIS.

The limited information on specific subsistence use patterns for the area was not used. The DEIS states that "Subsistence user statistics are not distinguishable in harvest statistics for game species, with the exception of caribou." The Board of Game established a subsistence moose hunt in Game Management Unit 13 in 1983. This Game Management Unit encompasses the Upper Susitna River. Also, harvest estimates for all game species for a 12-month period in 1982-83 are available for Cantwell (DF&G, Subsistence Division, Reference 7).

In the discussion of socioeconomic impacts (Section 4.1.8) of the proposed project, no effort is made to quantify the number of subsistence users affected or the degree to which subsistence activities will be affected by the project.

59. Section 5.3.3, Page 5-9, Downstream Flows

An estimated 50% of side slough habitat will face acute access limitation under proposed summer flow release scenarios of 12,000 cfs. There is no mention how spiking with an additional 20,000 cfs to mitigate access limitations at these sloughs will be scheduled. It is unclear what the total spiked flow for three (3) continuous days will be. Plans for observation and prevention of overtopping of upstream slough berms are not discussed. The effect on the fisheries from these proposed spiking flows is unclear.

60. Section 5.3.5, Page 5-11, Mitigation Planning

The DEIS states that the "...lack of definitiveness is due, in large part, to a lack of sufficient information as to the feasibility of mitigation proposals" (p. 5-11). Another major factor for the poorly defined mitigation plan is the lack of supporting information to develop mitigation proposals. The vegetation mapping and moose carrying capacity model being developed by the applicant are two important elements for input into the mitigation plan. Previous vegetation studies have concentrated on describing "vegetation types" rather than "habitat types." "Habitat type" maps are essential for analyzing the amount of habitat lost for all species due to the proposed project. Habitat mapping has been undertaken by DF&G for the project area. While preliminary information will be available this year, complete maps are not expected until spring 1986.

The FEIS should assess the feasibility of enhancement for meeting the goals of wildlife mitigation, as well as other mitigation measures for loss of wildlife habitat (for all species) including replacement lands. Procedures for periodically reassessing the effectiveness of mitigation measures, and

procedures for implementing "mid-course" corrections should be discussed in the FEIS. Additionally, before altering habitats for the benefit of moose, the ultimate impacts of these changes on present wildlife inhabitants must be assessed.

61. Section 5.4.5, Page 5-15, Future Studies

DF&G supports the recommended and ongoing studies listed in section 5.4.5. Research conducted by the Subsistence Division should be used as a basis for designing future studies.

62. Section 5.4.5, Page 5-15, Subsistence

The DEIS is incorrect in stating that "...subsistence activities are protected by law for a particular population of Alaskans..." State and federal laws protect subsistence uses, which are not restricted to any specified group of people. It is also incorrect to imply that subsistence activities are important only to "rural native communities," since communities that are largely non-native (e.g. Skwentna) may rely greatly on subsistence uses of fish and game.

63. Appendix N, Page N-10, Ahtna

Neither the Copper River Native Association nor Ahtna Inc. are in "the regional corporation Cook Inlet Native Association, Inc. (p. N-10)."

Specific Comments on Alternatives

64. Section 3.5.1.2, Page 3-65, Alternatives, Land Management and Ownership

As with the Susitna Project, the Keetna Project could be subject to delays related to unadjudicated competing state and native selections for federal land in the project area.

65. Section 3.5.4, page 3-66, Alternatives, Keetna Project

The potential for fisheries impacts with the development of the Keetna alternative hydro site appears to exceed any other individual site discussed in the DEIS. The Talkeetna River is a major producer of salmon with rapidly increasing levels of recreational use. The DEIS implies that little is known about the size and composition of fish migration up the Talkeetna River. As mentioned in comment on Section 3.5.4, the Talkeetna River supports large runs of chum salmon, possibly exceeding 200,000 fish. The DF&G regularly monitors chinook and sockeye salmon escapement on several major clearwater tributaries of the Talkeetna River. Prairie Creek, above the Keetna site, has the highest density of spawning chinook salmon per stream mile of any stream within the Matanuska-Susitna Borough. Chinook salmon escapement in Prairie Creek generally range between 3,000 to 5,000 fish, but in 1976 it was as high as 6,513 fish. Equally important is the fact that these salmon support the highest concentration of brown bears during July and August of any known location within the Susitna basin. Nearly 40 bears are attracted to Prairie Creek to feed on chinook salmon. Prairie Creek also contains sockeye and coho salmon, but numbers are not well quantified.

Disappointment Creek, located at the Keetna site has a chinook salmon escapement of 200-300 fish, and is also popular for rainbow trout and Dolly Varden fishing which occurs at its confluence with the Talkeetna River.

Chunilna Creek (sometimes called Clear Creek), downstream of the Keetna site, is a major salmon producer and a major sport fishery occurs at its confluence with the Talkeetna River. On even years, pink salmon escapement often exceeds 250,000 fish. Chinook salmon escapements have been as high as 2,000 fish. Sockeye escapement into Fish Creek (a tributary to Chunilna Creek) range from 5,000 to 10,000 fish. Up to 2,500 coho salmon and 7,500 chum salmon have been estimated in this creek. Sport fishing on Chunilna Creek averaged 4,260 user-days annually of fishing effort between 1977 and 1981.

The potential impact of the Keetna dam on salmon resources is greater than that which would occur with the Susitna development because the Talkeetna River salmon populations greatly exceed those in the Susitna River above its confluence with the Chulitna River. The size, composition and behavior of fish runs above and below the Browne and Johnson sites are less well known and the magnitude of impacts are difficult to compare with the Susitna.

66. Section 3.5.8, page 3-71, Alternative, Johnson Project

In discussing the Johnson alternative hydro site (p. 3-71), there is no reference to the Subsistence Division's major paper on Dot Lake (Technical Paper #19 by Gayle Martin, reference 8). The community of Dot Lake would be flooded by this project. The Subsistence Division has also supported research in Nenana (Technical Paper #91 by Shinkwin and Case, reference 9), and this would be useful in the analysis of impacts at the Browne alternative hydro site.

67. Section 4.1.8, Page 4-49, Alternatives, Impacts on Subsistence

Local resource use is an integrated part of community life and local economics. The extent to which subsistence use may be impacted will continue to depend upon resource availability, habitat protection, and management practices. It must be stressed that the improvement of wage opportunities

in local communities will not reduce the impact on the local resource user of either increased competition with other hunters or with lots of target populations.

68. Section 4.3.8, Page 4-79, Alternatives, Impacts on Subsistence

The DEIS, when discussing socioeconomic factors affecting the village of Tyonek for the Natural-Gas-Fired Generation Scenario (4.3.8) states that "A construction camp to house workers near the site would reduce (impacts on subsistence activities) considerably." The past experience with workers at the timber mill south of Tyonek is an example of an industrial project bringing a new population to the area. The hunting and fishing activities of the new work force competed with Tyonek residents for fish and game resources, primarily moose. Therefore, regardless of how a new work force is housed, they will have an impact on customary uses of the resource. It should also be emphasized that regardless of the limits on the activities of the workforce, the construction of support facilities (airstrips, roads, etc.) improve access to the local area, hence increasing competition for local resources if the native corporations tolerate or encourage access into their lands.

69. Section 4.5, page 4-86, Alternative Dam Site

The alternative dam sites suggested by FERC have not been thoroughly analyzed. There are significant impacts associated with the alternative dam sites that reduce their feasibility. The sites cannot truly be considered as alternatives until an accurate assessment of their environmental impacts has been completed.

70. Section 4.5.8, page 4-89, Alternatives, Tyonek/Beluga Area

Information available from DF&G has not been utilized in developing the discussion of the Susitna development alternatives in the Tyonek area. The

Subsistence Division has prepared numerous technical reports on resource uses in the Beluga/Tyonek, Chakachatna areas.

71. Section 4.7, page 4-91, Alternatives

There is insufficient information available to compare the effects of the alternative hydroelectric project with the proposed project. Comparisons of alternatives with the proposed project need to be based on the amount, availability, and suitability of habitat types affected and the manner in which habitat changes would impact the wildlife species and populations dependent upon them. Total acreage comparisons above are inadequate.

References
OMB Comments
on
FERC DEIS
Susitna Hydroelectric Project

1. Issues list
March 6, 1984
Susitna Hydroelectric Project
Alaska Power Authority

2. Mr. Robert L. Grogan, Associate Director
Division of Governmental Coordination
Office of Management and Budget
Letter of May 8, 1984 to:
Mr. Jon S. Ferguson, Project Manager
Susitna Hydroelectric Project
Alaska Power Authority

Topic: Comment on Susitna Hydroelectric Project Issues List.

3. Mr. Jon S. Ferguson, Project Manager
Susitna Hydroelectric Project
Alaska Power Authority
Letter of July 23, 1984 to:
Mr. Robert Grogan, Associate Director
Division of Governmental Coordination
Office of Management and Budget

Topic: Responses to OMB's Comments on
The Susitna Hydroelectric Project Issues List.

References Cont'd

4. Department of the Army, Office
of the Chief of Engineers
Document ER 1110-2-106
Appendix D
Recommended Guidelines for Safety Inspection of Dams
5. Alaska Department of Natural Resources et al.,
June 1984, Susitna Area Plan, Public Review Draft
6. Mr. Robert L. Grogan, Associate Director
Division of Governmental Coordination
Office of Management and Budget
November 18, 1983
Letter to:

Mr. Larry Crawford, Executive Director
Alaska Power Authority
Review and Comment upon Application for License
Susitna Hydroelectric Project
(In: Responses to Agency Comments - January 19, 1984)
7. Alaska Department of Fish and Game, 1984
Cantwell Technical Paper
8. Alaska Department of Fish and Game, June 1983
Use of Natural Resources by Residents of Dot Lake, Alaska
Technical Paper No. 19, Gayle Martin, Division of Subsistence
9. Alaska Department of Fish and Game, February 1984,
Modern Foragers: Wild Resource Use in Nenana Village, Alaska.
Technical Paper No. 91, Anne Shinkwin and Martha Case,
Division of Subsistence

MEMORANDUM

State of Alaska

TO: Jack Heesch, Project Coordinator
OMB/Division of Governmental Coordination
Anchorage

DATE:

FILE NO:

TELEPHONE NO: 344-0541

FROM: Carl M. Yanagawa, Regional Supervisor
Department of Fish and Game
Habitat Division
Anchorage

SUBJECT:

Susitna Hydroelectric
Project (FERC #7114) DEIS

The Alaska Department of Fish and Game (ADF&G) has reviewed the Susitna Hydroelectric Project, Draft Environmental Impact Statement (DEIS) prepared by the Federal Energy Regulatory Commission (FERC). Our review is based on the adequacy of identification and quantification of fish and wildlife resources affected by the project and alternatives, the impacts to those resources attributable to the project, and the specific mitigation options proposed to offset these impacts.

Based on our review of the DEIS, the document does not contain sufficient fish and wildlife data on which to base decisions regarding the project. The major areas requiring more thorough consideration before an adequate assessment of the project's environmental impacts can be made are as follows:

1. There is need for a more comprehensive assessment of the fish and wildlife resources of the Susitna River downstream from Talkeetna. The anticipated impacts to these downstream resources and users which are attributable to the project need to be identified and quantified. Analyses should include the effects of changes in river stage and water quality on rearing and overwintering fishes. They should also address riparian vegetation, wildlife (including moose) and the recreational fishery.
2. There is a need to identify instream flows necessary to maintain fishery resources downstream from the proposed impoundments. Operational flow scenarios need to be developed that consider the requirements of all life cycle stages of fishes. Instream flow information should include target fish species, habitat units associated with alternative flow scenarios, fish population objectives, and the minimum and maximum flows necessary to maintain target populations during all seasons of the year.
3. The identification of the full range of important impacts to fish and wildlife and the establishment of mechanisms for approaching mitigation of these impacts must be achieved. This should include a more quantifiable assessment of anticipated impacts to fish and wildlife populations and their habitats, a process for agreeing on the magnitude of impacts, and the formulation of a comprehensive fish and wildlife mitigation policy and plan.

4. The impacts to fish and wildlife resources caused by access to the project area must be more fully evaluated. These include the effects of access to the project area for project construction and operation as well as increases in accessibility of surrounding lands to the general public.
5. Socio-economic impacts on commercial, recreational and subsistence use of affected resources and supporting industries require further assessment. This should include the identification of resources used; the quantification of use levels; the description of use patterns, including seasonality and its context within local communities; and descriptions of geographic areas of use.
6. Mitigation planning, as mentioned above, must be further developed. This is probably the most important issue. This cannot be achieved until the impacts to fish and wildlife are better identified. Then, the EIS should include a discussion of how impacts to fish and wildlife resources will be mitigated through project design and/or through compensatory measures. A comprehensive evaluation of impacts and applicable mitigation alternatives needs to be conducted to evaluate environmental costs, the feasibility of mitigation, and the trade-offs of fish and wildlife resources and habitat involved.

The Alaska Power Authority (APA) in consultation with other state and federal agencies (including the ADF&G) has developed a comprehensive listing of impact issues. (Please refer to issues listed in the March 6, 1984 letter from Jon Ferguson (APA) to Don Collinsworth (ADF&G) and the May 8, 1984 State response to the list from Robert Grogan of the Division of Governmental Coordination to Jon Ferguson.) A process has been initiated for addressing these issues, evaluating the significance of each, and arriving at resolution. The FERC should review the impact issues as developed by the State of Alaska. An analysis of the impact issues, subsequent identification of significant impacts and recommended plan to mitigate those significant impacts should be included in the EIS.

The FERC should also be made aware of the presentations and discussions of the Susitna Hydroelectric Issues Settlement Workshops. The mechanism by which FERC plans to incorporate this and subsequently prepared information into the licensing process should be identified.

7. Information presented regarding the environmental impacts of the alternative hydroelectric projects is not sufficiently detailed to facilitate a reasonable comparison of these with the proposed action. While there is relatively little quantifiable information available for some of the alternative sites, we believe the discussion on alternative hydroelectric sites could be better supported by information available from the ADF&G and other agencies.

These are the same concerns we expressed in our comments on the APA's application for licensing of the project. We found no significant improvements in the way that the DEIS addresses our concerns. We recognize that all impacts cannot be quantified at this time. However, the level of information contained in the DEIS does not reflect the amount of project-specific information that is currently available to the FERC from the APA, this department and other sources. Further, impacts that cannot be quantified need to be identified. Effective mitigation is predicated on the accurate prediction and quantitative evaluation of the impacts of a proposed action on fish and wildlife resources and the incorporation of this knowledge into the planning process.

It is a requirement of the Federal "Fish and Wildlife Coordination Act" (48 Stat. 401, as amended, 16 USC 661 et. seq.) that the cost of mitigation must be incorporated in the benefit-cost assessment relating to project feasibility. We recommend that fulfillment of this requirement be reflected in the FEIS.

Alaska Statutes 16.05.840 and .870 require that an applicant must have plans and specifications approved by the department before constructing a dam on a river that is important to anadromous fish. If these plans and specifications are not sufficient in the view of this department, approval may either be denied or conditioned with those measures which must be met to protect fish resources before construction of the project may begin. If mitigation planning for the Susitna Hydroelectric Project is adequately addressed in the EIS, the department can readily identify stipulations which may be necessary under either of the above mentioned authorities. This would insure that stipulations are no more conservative than necessary, and that the regulatory time frame is minimized.

The ADF&G does not believe that the information regarding the impacts of the proposed project on fish and wildlife resources is sufficiently complete. The document does not provide a comprehensive analysis of impacts, nor does it contain an acceptable mitigation plan. Information contained in the DEIS does not reflect the level of information available regarding the project. Not clearly identified are the mechanisms which will incorporate information arising from ongoing studies and other sources into the impact assessment and mitigation planning process. The ADF&G strongly recommends that the EIS be modified to accommodate the concerns expressed in this letter.

Our more detailed comments on the DEIS are enclosed. We hope these comments are useful in modifying the EIS to a point where it can be useful in making decisions on the feasibility of the project. If you have any questions regarding these comments please contact Mr. Norman Cohen in Juneau at (907) 465-4100.

Enclosure

cc: Commissioner Richard Lyon, Chairman, Alaska Power
Authority Board
Commissioner Esther Wunnicke, ADNR
Commissioner Richard Neve', ADEC
Larry Crawford, Executive Director, APA

Enclosure: Alaska Department of Fish and Game Comments on the Susitna Hydroelectric Project DEIS, prepared by the Federal Energy Regulatory Commission

FISHERIES

Impact Assessment

The DEIS has not resolved the issue of an acceptable flow regime to protect fishery resources during project operation. An effective release schedule capable of minimizing impacts is a necessary component for determining an acceptable mitigation plan and must be incorporated into the license. The DEIS should identify those habitats potentially affected by altered flows, the resources utilizing these habitats during all stages of their life-cycle, the processes which could affect these resources, and methods to sufficiently mitigate the impacts identified. The DEIS does not predict with any degree of confidence the project's effects on downstream water temperatures, turbidity, ice conditions, and groundwater upwellings. An understanding of these relationships is necessary to determine the project's effect on fish habitat and dependent fish populations. Information in the DEIS is inadequate to determine whether the minimum summer flows or maximum winter flows will have a positive or negative effect on anadromous or resident fishes.

Table 4-2 shows significant temperature changes in the Talkeetna to Cook Inlet reach of the river during both reservoir filling and project operation. On page 4-26, the DEIS states that downstream of the confluence of the Chulitna and Talkeetna Rivers, growth rates of juvenile salmon and resident species would be suppressed by cool temperatures. The FERC staff estimated a reduction in accumulated June-September growth in this reach by about 50 to 60 percent compared to potential growth at pre-project temperatures. These values contradict previous statements (p. 4-23) that only minor temperature differences are expected downstream of the Chulitna confluence.

If these growth reductions are realistic for the lower reach of the Susitna River, they could have major impacts on juvenile salmon utilizing this reach. This reach supports a major portion of the Susitna River salmon population. The significance of the potential impact on lower reach juveniles caused by reduced growth are not discussed in this DEIS and certainly should be further evaluated. There are virtually millions of emigrating juvenile salmon in the lower reach. Adult salmon enumerations on tributaries have been conducted for many years and would provide some rationale for estimating emigrating juvenile numbers in the lower reach. Unfortunately, little information is available on the timing of juvenile salmon emigrations out of the Susitna River. If the majority of juveniles have emigrated prior to the period of projected temperature changes, impacts may be minimal. Expanded effort should be directed toward determining juvenile emigration timing in the lower Susitna River reach.

The ADF&G has repeatedly recommended a more thorough analysis of the fisheries and aquatic habitats downstream from Talkeetna. The impacts of the altered flows in this reach may be more significant than those upstream.

Below its confluence with the Chulitna River, the Susitna River is broad and relatively shallow. Therefore, an altered flow regime may affect relatively more aquatic habitat downstream than upstream. We again recommend that additional emphasis be directed toward study of the resources and potential impacts downstream of the Talkeetna River.

The DEIS states that "It is not possible to quantify the direct impact of the project on the commercial, sport, or subsistence fisheries, except that all other factors being equal, changes in catch would be approximately proportional to increases or decreases in the size of the spawning stocks" (p. 4-33). For the sport fishery, this conclusion suggests a lack of familiarity with factors affecting the sport fishing effort and harvest. To understand the potential impacts of the project on the recreational fishery that occurs downstream from Talkeetna, it is necessary to understand how these fisheries function. Although this information was presented in ADF&G's comments on the license application, we will repeat it for consideration in future environmental analysis and mitigation planning.

On the Susitna River from Talkeetna downstream to its confluence with the Yentna River, there are nine tributaries flowing into the east side of the Susitna and one flowing in from the west that contain significant fish populations. Most of these streams support major salmon runs and jointly support up to 100,000 man-days of fishing effort each year. Access plays a major role in limiting growth of the recreational fisheries that occur on these streams. Much of the land adjacent to these streams is in private ownership and public land that is available is relatively undeveloped or inaccessible. Other than in the Talkeetna area, there are no public boat launches that allow anglers access to the Susitna River. The state has recognized the problem and has spent approximately \$500,000 to purchase lands at the mouths of Montana and Sheep Creeks. The state has also initiated a road construction project that will provide access directly to the Susitna River at the mouth of Willow Creek. This project is expected to exceed \$5 million and result in a substantial increase in angler access to the Susitna River and Willow Creek.

An important aspect of the recreational fisheries is that they are located primarily at confluences of tributaries to the Susitna River. Recreational activity in these confluence areas is directly related to the large number of salmon that are present at these sites. As all five salmon species migrate up the Susitna River they tend to congregate at the mouths of virtually all of the clear water tributaries flowing into the Susitna River. During the open water season the areas around the mouths of tributaries provide ideal resting or staging areas for all adult fish species as well as rearing areas for juvenile fish. The extent to which these areas are used is dependent on the depth of the water at the tributary mouths which in turn is sensitive to changes in mainstem flow. At high flows, the mainstem creates backwater areas at the tributary mouths, thus increasing water depth. At low mainstem flows, the backwater areas are eliminated, resulting in shallower water and increased flow velocities at the mouth. When these backwater areas are eliminated, their attractiveness to fish is significantly reduced and fish will be displaced to other areas more suitable. This could have significant effects on a recreational fishery since the fish may be displaced from a tributary mouth that is easily accessible to anglers. In the Susitna River, natural low water conditions

which affect recreational fisheries do occasionally occur. When they do, it is primarily during May and June during the chinook salmon migration.

Chinook salmon are the most highly prized sport fish in Alaska and as such they attract large numbers of anglers to the limited areas that are opened for fishing. The Susitna River chinook salmon is a limited resource that has been intensively managed and has a long history of allocation conflicts between various user groups. Sport fishing for chinook salmon is allowed on only five Susitna River tributaries in the Talkeetna to Cook Inlet reach with the exception of the Yentna and Talkeetna River drainages which are also open to chinook salmon fishing. Three of these streams, Willow, Caswell, and Montana Creeks, are east side tributaries that are open to chinook salmon fishing only on weekends while the other two, the Deshka River and Alexander Creek which flow in from the west side, are open to chinook salmon fishing 7 days per week. The weekend-only fishing streams receive extremely heavy fishing pressure during the chinook salmon fishery. Since those areas that are opened for chinook salmon fishing are extremely limited, any physical changes in backwater areas on these streams which may reduce holding areas for chinooks could be particularly damaging to the recreational fishery.

It is also important to note that salmon utilizing tributary confluence areas are not necessarily migrating into those tributaries. All five salmon species migrating to the upper Susitna, Chulitna, and Talkeetna Rivers enter, in varying degrees, the sport fisheries that occur at the confluence areas of the lower Susitna tributary streams. Any impact that occurs to salmon species that utilize the Susitna River in the Devil Canyon to Talkeetna reach has the potential to impact the recreational sport fishery which harvests these fish in downstream confluence areas.

Flow reductions under the proposed filling schedule may alter the physical characteristics of the tributary mouths in the upper portion of the Talkeetna to Cook Inlet reach. These are the areas where the major fisheries occur. During the open-water season, induced mainstem discharge reductions of 34 percent in June and 28 percent in July may reduce the areal extent of these backwaters. Water depths in these areas will also be reduced. The Susitna River below Talkeetna is moderately to extensively braided, with the river channels wide and shallow. Therefore, this reach is more sensitive to flow reductions than deeper more incised channels, which occur further upstream. Reductions in discharge during and after filling of the reservoir could result in substantial changes in the habitat at tributary mouths which may seriously impact existing recreational fisheries. Since the tributaries flow into a variety of habitat types, the impacts of reduced flows will vary.

There has been minimum effort, especially in tributaries, to quantify adult salmon escapement in the Susitna River below Talkeetna. It is very possible that adult salmon escapement in this portion of the Susitna River exceeds those estimates available for the river above Talkeetna. This would mean that the reach below Talkeetna is especially important to rearing juveniles. Here again, there is very little quantitative information. Information is needed on juvenile rearing in the reach below Talkeetna. Large numbers of juvenile chinook salmon and adult resident species are migrating out of numerous east side Susitna tributaries in the reach below Talkeetna. They

are dependent on over-wintering habitat in the Susitna River. There are no quantitative data presented that indicate their abundance or which habitats they are dependent upon. There is almost certainly going to be an impact on juvenile fish rearing in this reach with post-project winter flows changing by over 200 percent. There are no data which show how winter habitat will change with the dramatic increase in flow.

It appears that the transmission line corridor will be crossing in the immediate area of the Burma Road's intersection with the Little Susitna River. The Little Susitna River is designated as a recreational corridor in the Willow Sub-Basin Area Plan, from the Parks Highway downstream to where it enters the Susitna Flats State Game Refuge. In the Area Plan the management intent is to protect recreational values and provide for visual and sound buffers in the corridor. Recreational use on the Little Susitna River is increasing at an extremely rapid rate, primarily due to upgrading of the Burma Road which accesses the lower Little Susitna River. In 1983 angling effort reached 35,000 man-days which resulted in this fishery becoming the second largest freshwater sport fishery in Alaska. This is an area of extremely high use and future plans include the development of a campground and boat launching facilities.

Mitigation Planning

The mitigation plan needs to contain contingency elements that can be incorporated as additional information is collected and anticipated impacts are better quantified. Plans for habitat modification, as proposed for sloughs, should be provided and should include engineering designs, construction, operation, and maintenance plans and a detailed cost analysis. Without these, mitigation proposals cannot be evaluated nor developed with any assurance of success. This is necessary to ensure that mitigation occurs and the mitigation actions are in harmony with the overall development and conservation of the resources in the area.

Losses of resident fish species and habitats within the impoundments can only be mitigated through compensatory habitat replacement or enhancement elsewhere. Resolution of this issue must be accomplished jointly between the applicant and the resource agencies in the context of presently feasible propagation technology and the benefits to the resource and user groups of artificially stocking waters in the project area. Therefore, it is not appropriate to make a decision on this tradeoff such as the artificial stocking of Kokanee in the Watana impoundment, until a process for addressing the overall mitigation plan is implemented. The compensating measures proposed to mitigate loss of Arctic grayling habitat in reservoir zones (p. 2-25) are not necessarily desirable options. Until the resource agencies discuss compensation measures, the options listed (research on grayling propagation, hatchery facilities for grayling, and introduction of rainbow trout into the Devil Canyon reservoir), should be considered only as options proposed by the applicant as they have not been endorsed by any agency.

The ADF&G does not support or propose regulations to solve problems that are more appropriately dealt with through the development of an effective mitigation plan. Mitigation plans should indicate that a particular impact

might require changes in fish and game regulations but they should not attempt to specify what those changes will be. Management options and mitigation options should be dealt with separately. The DEIS addresses management options as part of the mitigative process for the Deadman Creek drainage (p. 2-24). Regulatory restrictions are the responsibility of the Boards of Fisheries and Game. This does not apply to restrictions placed on individuals brought into the area to engage in construction activities. It applies only to regulations affecting the general public. It may be appropriate to have stipulations, rather than regulations of the Boards, to limit project personnel from engaging in certain activities, as construction projects can create unusual concentrations of people brought into the area by means not available to the general public.

Results of ADF&G studies indicate the Talkeetna River supports large runs of chum salmon, possibly exceeding 200,000 fish. The FERC staff expects that losses to salmon production in the Susitna River above Talkeetna during the filling operation of the reservoir would be partially offset by increased production in the Talkeetna River (p. 4-32). The FERC staff assumes that fish which normally would migrate up the Susitna River would select for the warmer water of the Talkeetna River. Even so, any displacement of additional fish into the Talkeetna River system may lead to increased competition and overcrowding for spawning and rearing. The possibility of lost production in the Susitna River being compensated for by increased production on the Talkeetna River is highly speculative.

Alternatives

The potential for fisheries impacts with the development of the Keetna alternative hydro site appears to exceed any individual site discussed in the DEIS. The Talkeetna River is a major producer of salmon with rapidly increasing levels of recreational use. The DEIS implies that little is known about the size and composition of fish migration up the Talkeetna River. The ADF&G regularly monitors chinook and sockeye salmon escapement on several major clearwater tributaries of the Talkeetna River. Prairie Creek, above the Keetna site, has the highest density of spawning chinook salmon per stream mile of any stream within the Matanuska-Susitna Borough. Chinook salmon escapement in Prairie Creek generally range between 3,000 to 5,000 fish, but in 1976 it was as high as 6,513 fish. Equally important is the fact that these salmon support the highest concentration of brown bears during July and August of any known location within the Susitna basin. Nearly 40 brown bears are attracted to Prairie Creek to feed on chinook salmon. The ADF&G has recommended that this stream and its adjoining uplands be protected from incompatible land uses. Prairie Creek also contains sockeye and coho salmon, but numbers are not well quantified.

Disappointment Creek, located at the Keetna site has a chinook salmon escapement of 200-300 fish, and is also popular for rainbow trout and Dolly Varden fishing which occurs at its confluence with the Talkeetna River.

Chunilna Creek, downstream of the Keetna site, is a major salmon producer and a major sport fishery occurs at its confluence with the Talkeetna River. On even years, pink salmon escapement often exceeds 250,000 fish. Chinook salmon escapements have been as high as 2,000 fish. Sockeye escapement into

Fish Creek (a tributary to Chumilna Creek) range from 5,000 to 10,000 fish. Up to 2,500 coho salmon and 7,500 chum salmon have been estimated in this creek. Sport fishing on Chumilna Creek averaged 4,260 user-days annually of fishing effort between 1977 and 1981.

The potential impact of the Keetna dam on salmon resources is greater than what would occur with the Susitna development because the Talkeetna River salmon populations greatly exceed those in the Susitna River above its confluence with the Chumilna River. The size, composition and behavior of fish runs above and below the Browne and Johnson site are less well known and the magnitude of impacts are difficult to compare with the Susitna.

TERRESTRIAL

Impact Assessment

If public road access to lands adjacent to the project is provided, it should be clearly specified in the DEIS. This will enable assessment of impacts attributed to any increased access. These impacts can then be accounted for in the mitigation plans. Specifically, if vehicle access is allowed to the south side of the Susitna River via the Watana dam, this will initiate a host of secondary development and subsequent impacts directly related to the project that will require mitigation. With access to the south side of the Watana dam, ungulate populations will be affected by increased hunting and disturbance. In addition, ORV and ATV traffic will disturb vegetation. Brown bear use of Prairie Creek (see Fisheries section) can be expected to decline with increased access and development south of the Watana dam. This impact is recognized in the discussion of alternative access routes (p. 4-79), and the same impacts would occur if access to the south side of the river is provided. Prairie Creek attracts brown bears from a minimum area of 7,900 km² (not 5,700 km², p. k-17). Only brown bears make seasonal movements to Prairie Creek during salmon runs, not black bears as reported on page k-82.

Impacts are usually stated in terms of the current populations, current habitat conditions and current management goals. In some cases, they focus only on the fate of currently living individuals rather than populations. This approach may be adequate for short-term impacts. It is not adequate when the duration of an impact is likely to span a period during which populations, habitats or management goals or regulations may change significantly. Management regulations may change every 2 or 3 years, populations can certainly change significantly over a decade and habitat over 2 or 3 decades. These changes are well within the life of many of the impacts of the project.

Changes brought about by the project may have widely different effects on different population sizes or under different environmental conditions. Mortality induced by the project might be insignificant at high population levels. In some instances, the project might permit continued existence of a population of the current size but preclude growth to its current potential. In other cases pre- and post-project populations might be the same size, but the post-project population might have less capacity to sustain hunter harvest and predation or to recover from periodic

environmental perturbations, such as severe winters. While the DEIS occasionally alludes to changes in productivity, it tends to focus on whether the current population level can be maintained.

The results of cumulative impacts are not emphasized enough. While individual impact mechanisms may not be significant when viewed independently, cumulative impacts, resulting from a combination of lesser events, may have more severe effects on wildlife populations. The combination of events, such as increased human access, habitat loss, disturbance, disruption of migratory pathways, and changes in predator-prey ratios, may have impacts when acting together that exceed the sum of the impacts from the individual activities.

A large number of issues seem to be set aside simply because they cannot be precisely quantified. Clearly it is not possible to precisely quantify all of the impacts. However, it is difficult to see how reasonable and responsible mitigation decisions can be made unless there is some indication of the magnitude of the impact. Many of these issues can at least be narrowed to an order of magnitude. They should be thoughtfully examined and outer bounds placed on the problem. For example, a maximum possible level of habitat loss and alteration adjacent to the impoundment and downstream can certainly be determined. These estimates can be narrowed by developing more logical scenarios. The effects of several of the scenarios on a wildlife population can be examined to identify a worst case situation. If this worst case shows an unacceptably high impact, further studies can be designed to narrow the range of possibilities. The DEIS states that "In the reach from Talkeetna to the Yentna River, it is impossible to predict post project changes in vegetation with any certainty." Downstream vegetation changes could greatly affect wildlife populations over time and the possible range of impacts in this area needs to be discussed. There are presently available more recent studies for moose, bears, wolverines, caribou and sheep. These should be incorporated in the DEIS.

Some attempt at the ranking of impacts within and among species should be made to aid in identifying further study needs and determining the importance of specific mitigation measures. Ranking impacts helps determine where the major efforts of the mitigation plan should be directed. In ranking impacts, certain questions need to be addressed. These include: what percentage of the available habitat, for each type within the region, will be affected? Is the acreage lost within a specific habitat type significant? How much similar habitat has been lost in nearby accessible areas? What species of wildlife use these habitat types? What factors limit the population growth of these species? How will cumulative impacts in the region affect these wildlife populations? How will these habitat types change over the life of the project? By answering similar questions for the various types of project related alterations to lands and waters, the potential scope of a problem can be determined even when precise quantification is impossible. At the very least, impacts can be more realistically weighted so that the need for further study or specific mitigation measures can be assessed.

An important consideration for the Nelchina caribou herd, not addressed by the DEIS is long-term management and the dynamic nature of populations. The DEIS states that the ADF&G's goal is to maintain the population at 20,000

animals. This information is outdated. The ADF&G's goal is to increase the size of the herd and maintain it at 30,000 adult caribou (36,000 including animals less than 1 year old). The effect of the reservoir and access road on a herd of this size may be significantly different than the effect on the current population because the Watana reservoir would intersect a major historical migratory route of the Nelchina herd.

Major herd crossings of the impoundment area have usually occurred when population levels were relatively high. It appears likely that the probability of major crossings of the impoundment area and increased use of the northwestern portion of the range will increase if herd size increases. The peak size of the herd was recorded in 1962 when 65,000-70,000 animals were counted, not 40,000 animals in 1955 (p. k-12).

The assessment of impacts to Dall sheep in the DEIS contains several omissions and inaccuracies. These include ADF&G studies on Dall sheep published in 1984. Most important are the predicted impacts to sheep. As all of the heavily used lick sites at the Jay Creek mineral lick area are above 2200 feet in elevation, they will not be inundated by the impoundment and mineral leaching will not occur. Only a few lick areas that receive relatively little use by sheep will be inundated. The greatest impact to Dall sheep may result from the Watana impoundment blocking or impeding sheep from crossing Jay Creek and limiting use of important lick sites on the east side of the creek. Lick sites on the east side of Jay Creek are heavily used by sheep which arrive from the northwest. As mentioned in the DEIS, the effects of construction activities and disturbance from recreational boaters and low-flying aircraft, may also have significant impacts. Erosion at some lick sites could result from seasonal fluctuations in water levels in the reservoir, reducing the already limited escape habitat adjacent to the lick area.

The approach used in the DEIS to quantify impacts to black bears results in an inaccurate assessment of the impacts. To more accurately assess impacts, the study area needs to be divided into three distinct areas: Watana impoundment, Devil Canyon impoundment, and downstream of Devil Canyon. In the former, a very high percentage of forested black bear habitat (70-90 percent) will be inundated. This includes nearly all the important deciduous forest habitats. In the second and third areas, a much smaller acreage of forested habitats will be disturbed. Combining all three areas masks the effect of habitat destruction in the area of the Watana impoundment. Habitat destruction in the Watana impoundment will essentially eliminate the resident black bear population in this area, while the impacts in the Devil Canyon area will be much less.

A good analysis of the amount of habitat lost by the project, for all species, will not be available until the development of suitable habitat maps, currently in progress, is completed.

The DEIS states a "...loss of about 10% of the major wintering and spring calving habitat within 10 miles of the impoundment area (p. 4-38)." How this figure of 10% was arrived at is unclear. In addition, it can be misleading by itself. A small percentage of available habitat may support a large number of moose, especially during the winter. If high quality habitat is inundated or disturbed by construction activities the

consequences to the moose population would be more severe than if low quality habitat was disturbed. Therefore, the type and quality of lost habitat and its value to moose needs to be assessed, not just the areal extent. In the spring of 1983 over 600 moose were counted just in the Watana impoundment area and approximately 2800 moose range in the area of the Devil Canyon and Watana impoundments. The same problem previously described for assessing impact of lost habitat to bears applies for moose. With better habitat maps, this assessment should be improved. In addition, displaced moose will be subject to much higher levels of mortality due to predation and higher concentrations of moose on reduced winter range.

The impacts projected for wolverines and wolves (p. 4-43) are incorrect. At least 35 wolverines could be affected by the impoundment alone. Up to six wolf packs have territories overlapping the proposed impoundments, and all six could be disrupted. In addition, access roads, project facilities, construction activities, and transmission corridors would likely reduce additional habitat for wolves and wolverines or cause disturbance and increased mortality.

Mitigation Planning

The DEIS states that the "...lack of definitiveness is due, in large part, to a lack of sufficient information as to the feasibility of mitigation proposals" (p. 5-11). While we agree with this statement, another major factor for the poorly defined mitigation plan is the lack of supporting information to develop mitigation proposals. The vegetation mapping and moose carrying capacity model being developed are two important elements for input into the mitigation plan. Previous vegetation studies have concentrated on describing "vegetation types" rather than "habitat types." "Habitat type" maps are essential for analyzing the amount of habitat lost for all species due to the proposed project.

The DEIS expresses our concerns (p. 5-11) about the feasibility and specifics of habitat enhancement measures. ADF&G agrees with the FERC's analysis that "... the Applicant has not documented the likelihood of success for its rehabilitation and enhancement proposals, nor documented the amount of compensation that could be attributed to the enhancement efforts..." and the "...impacts to wildlife would not be compensated for by enhancement techniques" as currently proposed by the Applicant. Along with studies on the feasibility of enhancement for meeting the goals of wildlife mitigation, other mitigation measures for lost wildlife habitat (for all species) including replacement lands, and contingency plans, if experimental measures are not beneficial, need to be discussed. Additionally, before altering habitats for the benefit of moose, we must assess the ultimate impacts of these changes on its present wildlife inhabitants.

Alternatives

There is insufficient information available to compare the effects of the alternative hydroelectric project with the proposed project. Comparisons of alternatives with the proposed project need to be based on the amount, availability, and suitability of habitat types affected and the manner in

which habitat changes would impact the wildlife species and populations dependent upon them. Total acreage comparisons above are inadequate.

SOCIOECONOMIC FACTORS

Impact Assessment

The subsistence section has several errors or has presented very vague discussions on local resource uses. Some of this has undoubtedly resulted from failure to use primary sources of information when discussing subsistence issues. The Subsistence Division of the ADF&G has prepared several reports and maps with valuable information on subsistence uses within this region. This information should have been included in the DEIS.

The limited information on specific subsistence use patterns for the area was not used. The DEIS states that "Subsistence user statistics are not distinguishable in harvest statistics for game species, with the exception of caribou." The Board of Game established a subsistence moose hunt in Game Management Unit 13 in 1983. This Game Management Unit encompasses the Upper Susitna River. Also, harvest estimates for all game species for a 12-month period in 1982-83 are available for Cantwell (ADF&G, Subsistence Division).

In the discussion of socioeconomic impacts (Section 4.1.8) of the proposed project, no effort is made to quantify the number of subsistence users affected or the degree to which subsistence activities will be affected by the project.

ADF&G concurs with the DEIS analysis that subsistence users would be the resource user group most severely affected by project development. Local resource uses are integrated into and support community life and local economies. The extent to which this can occur and be maintained depends on resource availability and habitat protection. It must be stressed that the improvement of wage opportunities in local communities will not reduce the impact on the local resource user.

ADF&G supports the recommended and ongoing studies listed in section 5.4.5. However, research conducted by the Subsistence Division should be used as a basis for designing future studies.

The DEIS is incorrect in stating that "...subsistence activities are protected by law for a particular population of Alaskans ..." State and federal laws protect subsistence uses, which are not restricted to any specified group of people. It is also incorrect to imply that subsistence activities are important only to "rural Native communities," since communities that are largely non-Native (e.g. Skwentna) may rely greatly on subsistence uses of fish and game.

Neither the Copper River Native Association nor Ahtna Inc. are in "the regional corporation Cook Inlet Native Association, Inc. (p. N-10)."

Alternatives

Information available from ADF&G has not been utilized in developing the discussion of the Susitna development alternatives in the Tyonek area. The Subsistence Division has prepared numerous technical reports on resource uses in the Beluga/Tyonek/Chakachatna areas.

In discussing the Johnson alternative hydro site (p. 3-71), there is no reference to the Subsistence Division's major paper on Dot Lake (Technical Paper #19 by Gayle Martin). The community of Dot Lake would be flooded by this project. The Subsistence Division has also supported research in Nenana (Technical Paper #91 by Shinkwin and Case), and this would be useful in the analysis of impacts at the Browne alternative hydro site.

The DEIS, when discussing socioeconomic factors affecting the village of Tyonek from the Natural-Gas-Fired Generation Scenario (4.3.8) states that "A construction camp to house workers near the site would reduce (impacts on subsistence activities) considerably." The past experience with workers at the timber mill south of Tyonek is an example of an industrial project bringing a new population to the area. The hunting and fishing activities of this new work force competed with Tyonek residents for fish and game resources, primarily moose. Therefore, regardless of how a new work force is housed, they will have an impact on customary uses of the resource. It should also be emphasized that regardless of the limits on the activities of the workforce, the construction of support facilities (airstrips, roads, etc.) improve access to the local area, hence increasing competition for local resources.

MEMORANDUM

State of Alaska

DEPARTMENT OF NATURAL RESOURCES, OFFICE OF THE COMMISSIONER

TO: Robert L. Grogan, Associate Director
Division of Governmental Coordination
Office of Management and Budget

DATE: August 8, 1984

FILE NO: 620.6

AUG 16 1984

TELEPHONE NO: 465-2400

ALASKA POWER AUTHORITY

FROM: Esther C. Wunnicke
Commissioner

SUBJECT: Susitna Hydroelectric
Project

The Alaska Department of Natural Resources (DNR) appreciates the opportunity to comment on the draft Environmental Impact Statement (DEIS) for the Susitna Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Number 7114. My staff has reviewed the DEIS and provides the following comments.

We are concerned that the document generally did not provide sufficient information to allow this agency to properly assess the project's potential impacts upon area resources. The following comments include requests for additional information needed by DNR for a meaningful project analysis.

WATER MANAGEMENT

Flow Regime

The discussion on surface water resources is well done. However figures given for mean annual stream flows at the Watana and Devil Canyon dam sites are misleading due to the flow variations throughout the year. Mean monthly stream flows shown in figure 4-2 are more accurate and should be used throughout the DEIS for consistency. A discussion of instream flow methods used to determine those minimum flow requirement scenarios which could impact fish and wildlife habitats, fish life cycles, water quality, recreation, navigation, and transportation should be included. Also many sections mention probable effects on the fisheries but fail to mention what the effects are, or how they were assessed. This information is essential to evaluate the effectiveness of the mitigation measures. The Alaska Power Authority (APA) asserts that 10,000 cfs winter flow will not overtop the sloughs more frequently with the project than under natural conditions. Additional studies are needed to show that increasing winter flows to 10,000 cfs from normal flows of 1,000 to 2,000 cfs will not overtop the sloughs. Also, there are no comments on 12,000 cfs as the required summer flows. To date no negotiations on minimum flows have taken place.

In many sections of the DEIS, various flows of the Susitna River are mentioned. However, a better understanding of measured streamflows would be reached if gauging stations were identified by name and location. It is critical to clearly identify where measurements are recorded to provide useful and accurate data for fisheries habitat, economic, and safety planning.

An estimated 50% of side slough habitat will face acute access limitation under proposed summer flow release scenarios of 12,000 cfs. There is no mention how spiking with an additional 20,000 cfs to mitigate access limitations at these sloughs will be scheduled. It is unclear what the total spiked flow for three (3) continuous days will be. Plans for observation and prevention of overtopping of upstream slough berms are not discussed. The effects on the fisheries from these proposed spiking flows are unclear.

Spillway Capacity

The Watana dam is designed to discharge 156,000 cubic feet per second (cfs), the estimated 10,000 year flood. Reference to an emergency spillway and fuse plug indicates allowance for additional capacity to permit discharge of the Probable Maximum Flood (PMF). Projected PMF flows and the dam's capability of passing 100% of the PMF without overtopping need to be clarified.

The DEIS indicates there is a potential for seepage through the Watana relict channel at Tsusena Creek during the filling operations. The location of seepage is not identified. DEIS staff recommends monitoring during filling; however, further provision may be necessary to control unforeseen seepage. It is unclear whether the relict channel will need to be excavated, then grouted. The procedures used to reduce seepage through the relict channel should be clearly stated.

If the Watana dam overtops or fails it is not certain the Devil Canyon dam would be able to withstand a flood surge. Further discussion of Devil Canyon's ability to withstand an overtopping without failing is necessary. The PMF has not been specified for the Devil Canyon area.

Although questions about design and specifications are not answered in the DEIS, 11 AAC 93.150 through .200 requires that an application to construct or modify a dam must be submitted with detailed designs to this department for approval before construction. These applications have been submitted, but any further processing is held in abeyance pending submittal of detailed dam designs and specifications.

Monitoring Program

The DEIS does not contain adequate information on the construction process. No mention is made of a plan for continuous inspections and measurements of the fill placement or grouting during construction. Detailed and consistent inspections must be made to insure the accurate placement of the impervious core. A discussion of the type and location of instrumentation is missing. Also, routine visual inspections are essential. It is unclear what measures would be taken in the event of piping, sloughing or misalignment observations.

Assuming worst-case scenarios, discoloration of the drainage system discharge would indicate piping of core materials - not leaching as stated by the DEIS. Piping would indicate severe inadequacies in the inner core which could only escalate. It may not be possible to simply locate and grout the problem area.

Dam Safety

Dam safety is an important aspect of overall project design. No mention is made of any emergency plan in case of the dam's failure. Under DNR's Dam Safety Program, administered by our Division of Land and Water Management (DLWM), routine project inspections are mandatory. These inspections are intended to be made jointly with the Federal Energy Regulatory Commission (FERC) inspections. We also require copies of all FERC inspection reports.

The final designs of the project plans and specifications will require approval by the department under 11 AAC 93. This will take at least sixty (60) days.

The DEIS should discuss in detail the monitoring schedule and procedures taken during initial filling of the reservoir. In particular, the United States Committee on Large Dams (USCOLD) guidelines must be closely observed.

Permit applications to construct or modify a dam require detailed engineering designs and monitoring scenarios acceptable to the department. This review will also require at least 60 days.

Navigation

Further discussion is warranted on navigational impacts for each portion of the river. As indicated, recreational navigation is increasing; however a discussion of the historical use of the river is needed to support this statement. Commercial navigation should be given more consideration. Studies by Harza-Ebasco and R&M Consultants should have been used to evaluate the probable impacts. Additional studies are required to evaluate the navigational limitations, if any, which may occur at the various flows proposed. 11 AAC 93.141(2) and (3) further define navigational flow requirements for recreation and transportation.

Climate, Air Quality, Noise

During construction, fugitive dust emissions from road dust and wind blown dust could probably be controlled by frequent road watering. A road watering operation would require a Temporary Water Use Permit (TWUP) from DL&WM.

LAND MANAGEMENT

Ownership

The FERC application briefly discusses the complex land ownership pattern in the project area. The DEIS assessment does not accurately portray this complexity. The land ownership for the entire project should be clearly delineated on large scale maps in the DEIS, including the transmission corridors and alternative project sites. The land ownership maps should show all the competing land selections and their selection date. DNR is currently assisting APA with its land related research.

Decisions on project feasibility should not presume future State ownership of lands currently selected by both the State and Native corporations. The DEIS is written as if the project land were state owned or could be acquired by the State. The State will probably have to wait until the Bureau of Land Management (BLM) has adjudicated all the competing land selection applications. BLM has suspended adjudication of the State's selections until the Native selections are adjudicated. The potential time delays for resolving these competing selections could have a significant impact in the overall project schedule and cost and should be discussed in detail.

Habitat Mitigation

The applicant's proposed habitat enhancement plan is designed to improve wildlife carrying capacity outside the project area to compensate for habitat lost resulting from the project. Other state agencies are concerned about the feasibility and specifics of the habitat enhancement plan. The applicant is pursuing studies to address their concerns. The FERC staff assumed in its

analysis that enhancement techniques would not compensate for impacts to wildlife. This judgment was premature. The department would urge FERC to reevaluate its assessment following the studies in progress.

The Susitna Area Plan was prepared by this department, DF&G and the Matanuska Susitna Borough in cooperation with DOT/PF, the Kenai Peninsula Borough, USDA and BLM. The area plans classify State land for various purposes as required by AS 38.04.065 and AS 38.05.300. The lands encompassing much of the Susitna Hydroelectric Project have been categorized as private land to reflect Native selections. The remaining lands have been designated public recreation, wildlife habitat, forestry with some grazing and remote cabin areas. These designations were a result of agency compromises during plan development. Since the project lands are classified private in the plan, they should not be considered as an additional loss of designated wildlife habitat as a result of the project.

According to the DEIS, the Office of Management and Budget favored habitat compensation with replacement land. This department cannot recommend additional habitat replacement lands be established beyond the current level of lands with wildlife habitat classification. The State cannot control the development of federal lands selected by Natives. Habitat which could be lost to private use was considered in the development of the Susitna Area Plan. Additional state land is not available to compensate for the Susitna Hydroelectric Project through a replacement land program. To adopt a replacement land program would entail changing land designations from other primary purposes to wildlife habitat. Sufficient state land is not available for large scale reclassification. The applicant's proposal to enhance existing wildlife habitat to mitigate the loss of habitat carrying capacity in the project area is an acceptable solution.

Access

Historically, this department has agreed with the FERC staff conclusions favoring access from Gold Creek and recommended railroad access from Gold Creek to Devil Canyon with a road from Devil Canyon to Watana. The department has reevaluated its position and now favors the applicant's proposed road access south from the Denali Highway to the Watana dam site, along with a connecting road to the Devil Canyon dam site and a rail link from Gold Creek to Devil Canyon.

Although public access may be restricted during construction, long term use by the public should be considered since state funds will be used to construct the access road. There should be some discussion on designing a lower speed road which in the long term may be more consistent with the area's recreational uses.

Transmission Corridor

The proposed transmission corridor may affect some existing and proposed State agricultural disposal areas. The DEIS discussed placement of the towers along existing rights-of-way and stressed using single pole towers or "H" figure towers instead of the "X" figure towers to lessen this impact. These statements imply the area beneath the powerlines can continue to be used as agricultural land. There should be some discussion of the allowable uses of the land beneath the powerlines and the safety precautions necessary around the bases of the towers.

The DEIS contains a statement which implies that there will be an access road along the entire length of the transmission corridor. This may not be possible in environmentally sensitive areas. It may be necessary in certain areas to restrict the ground access and require helicopter only access. There should be further discussion on this issue.

This department is concerned the transmission corridor may act to bisect its lands if there are restrictions on the type of access that can be granted across or from the corridor. The extent of allowable public use along the transmission corridor is unclear. DNR would like further discussion on the type of access the State will be allowed to grant across and along the transmission corridor. It is not clear who will manage and maintain completed transmission lines, and what access restrictions will ultimately be made.

Borrow Sites

Information on material sources and borrow site locations is not readily referenced in the DEIS. Material sources, such as local sources of building material, and availability should be more thoroughly discussed. It is unclear how much material is available at the various borrow and quarry site locations. A large amount of material will be essential to construct the project. There should be some discussion of the full extent the material can be excavated from a particular borrow site before the impact becomes excessive, in order to assess associated environmental effects.

Surface and subsurface ownership of these sites is unclear. This information could be critical to future management and planning efforts.

Alternative Dam Sites

The alternative dam sites suggested by FERC have not been thoroughly analyzed. There are significant impacts associated with the alternative dam sites that reduce their feasibility. The sites cannot truly be considered as alternatives until an accurate assessment of their environmental impacts has been completed.

OTHER RESOURCE ISSUES

Geology and Soils

Geology and soils are fundamental issues of the DEIS and the subject of Appendix E, but are covered less adequately than are other parts of the DEIS.

Several types of mass movement are mentioned in the DEIS. Clarification with more detail on the potential impact of landslides into the reservoirs, is necessary. The DEIS does not adequately discuss prehistoric landslides located near the proposed Devil Canyon dam site. There is no mention made of the potential hazard and environmental effects resulting from giant waves produced when landslides enter the reservoir. No mention is made of the future headward (upslope) extension of these slides. Only shallow surface slides are discussed. There should be some discussion of major bedrock slides due to pore pressure buildup along pre-existing planes.

The introductory statement on seismicity is poorly written. "Thrusting" is a form of "faulting"; "shearing" is what happens along faults. All of these

items may or may not be the result of "plutonism" and are definitely not the result of "regional metamorphism" as stated but rather the other way around. The third period of deformation, for example the Castle Mountain Fault Zone, assuredly extends through the Quaternary. Northwest drifting continental blocks of the Cretaceous is a theory under considerable debate and not accepted widely enough to be quoted without qualification in the DEIS. Rationale for using this theory should be further discussed.

A clear statement is needed on subduction zone faults. Although a surface rupture hazard to the sites may not be significant, the ground acceleration hazard from these sources should be discussed in greater detail.

The surficial geology within the region needs to be defined. The discussion in the DEIS is inadequate for evaluating the area.

Construction activities will modify the character of sediments overlying permafrost, resulting in thaw of permafrosts with resultant thermokarst and erosion. Discontinuous permafrost has been encountered in scattered locations in the lowlands and should be considered within the entire project area.

Climatic Conditions

The environmental impacts of the proposed project run about 16 pages and yet climatic effects are treated in only 4 1/2 lines, essentially saying no significant microclimate change will occur. Concerns such as climatic coolings of the environs by reservoir evaporation and the higher ambient atmospheric moisture content (resulting in more condensation/precipitation downwind) should at least be mentioned.

Timber Resources

The DEIS provides extensive, generally descriptive information on forest conditions in the project area. The descriptions are ecological in nature rather than economic. Volumes and values of wood involved are not discussed. The forest resources of the area are economic resources only in the personal-use context at the present time. Consequently, our concerns center on making any wood felled or "cleared" on state land available to the public in so far as is practical.

Prior to the development of clearing schedules, the Mat-Su Area Forester should be consulted. Houselogs and sawlogs should not be cut up into shorter lengths, specifically, spruce trees over 12 inches in diameter at the stump. All felled wood on state land should be available for pickup by the public without charge unless there is sufficient interest in sale of the wood.

Opportunity for sale of wood to fuelwood dealers and houselog and lumber producers should be provided via the Mat-Su Area Forester.

Recreation Plan

Although access from the Denali Highway may not be the optimum choice, the recreational plan proposed by the applicant is acceptable.

Volume 6 of the DEIS addressing Recreation Resources and Visual Resources appears to be a credible document.

Phase Five of the applicant's proposed recreation plan (Table L-10, page L-37) for the Stephan Lake 40 acre site and development should be considered as a higher priority. This site will be the only public site on Stephan Lake and it will be a major access point to float the Talkeetna River. The features of the applicant's proposed visual resource plan appear to be adequate if followed as specified in the DEIS.

Economics

A petroleum economist with the Division of Oil and Gas reviewed the DEIS economic analysis and offered the following comments.

Section 1.4.5.3 states in part:

"A conclusion from these analyses is that, with the high construction costs of the larger hydroelectric projects and current uncertainties regarding Beluga coal development, the most prudent Railbelt generation expansion plan would be a mix of non-Susitna hydroelectric resources with a combination of gas-fired combined cycle generation in the Cook Inlet area and coal-fired generation in the Nenana area. The use of smaller, lower cost hydroelectric resources in such a plan would reduce thermal generation requirements and fuel demands through the study period."

Furthermore, Section 1.4.5.2 states: "The analyses in Sections 1.4.3 and 1.4.4 indicates that the coal and gas scenarios would meet the Railbelt power requirements at lower cost than the proposed Susitna project."

The apparent superiority of coal and gas or some combination of the two is maintained over a range of price assumptions and real interest rates. This "superiority" is the result of two factors. First, the FERC load growth forecast is slightly lower than APA's, thus slightly reducing annual benefits regardless of assumed oil, natural gas, and coal prices. Secondly, debt burden at real interest rates as low as 3.5 percent. (The real interest rate is currently about 8 percent.)

The major problem with evaluating a project like Susitna is the long project life. The estimated benefits and costs are evaluated over a fifty year period. Economic forecasting is, at best, a minor art form and is not a scientific endeavor. The methodology of long run forecasting is as much philosophy as substance. Projections cannot be accurate over so long a period, but they can be methodologically conservative and financially prudent. This conservatism would normally manifest itself in the use of high discount rates for project analysis, thereby attaching less importance to forecasted events as they occur in more distant time periods. These are the periods for which we know the least.

The APA's Financial Update (Feb. 1984) admitted that the Project has significant financial risks. Even with relatively bullish oil price and coal price projections the Project only has a real rate of return of around 5 percent. Given the magnitude of the potential state investment this rate of return is much too low to consider the Project as a prudent use of state funds.

The DEIS may present a more objective analysis of the economic tradeoffs involved in the Susitna project.

The FERC DEIS does not adequately address many issues necessary for processing future project applications submitted to the Alaska Department of Natural Resources. If the questions addressed in this review are adequately answered in the final EIS the department should be able to perform its adjudicative functions without disruptive delays.

This department could have performed a much more expeditious review if (1) the DEIS included a topical index allowing cross references between volumes and (2) topics were adequately discussed, thereby saving the time required for researching points of concern.

cc: Jon S. Ferguson, APA
APA Project Manager

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION
and PUBLIC FACILITIES

DEPUTY COMMISSIONER - CENTRAL REGION

Bill Sheffield, Governor

4111 AVIATION AVENUE, POUCH 6900
ANCHORAGE 99502 (TELEX 25-185)
PHONE: 266-1441

July 23, 1984

RECEIVED

JUL 26 1984

ALASKA POWER AUTHORITY

RE: Susitna Hydroelectric Project
Federal Energy
Regulatory Commission
May, 1984 Draft
Environmental Impact Statement

Mr. Jon S. Ferguson
Project Manager
Alaska Power Authority
334 West Fifth Avenue
Anchorage, Alaska 99501

Dear Mr. Ferguson:

The Alaska Power Authority has sent us several documents concerning the Draft Environmental Impact Statement for the proposed Susitna Hydroelectric Project and alternatives, and requested our preliminary assessment of potential impacts. We have used the Draft Environmental Statement and your letter of July 3, 1984, with attached maps, on which to base our comments. According to your latest notice, the comment period has been extended from July 9, 1984 to August 15, 1984.

The following comments refer to hydroelectric alternatives to the Susitna Project and finally to the Susitna Project impacts. As this is a preliminary assessment only, we request continued coordination as more information becomes available. We note that the Johnson, Browne and Keetna projects would be connected either directly or by a link to the Anchorage-to-Fairbanks Intertie. The Snow and Chakachamna projects would require transmission lines of significant length.

Specific comments on the Johnson, Browne, Keetna, Chakachamna, Snow and Susitna projects are listed below:

Browne Dam and Reservoir: Nenana River, 100 Megawatts

- o This project requires the relocation of over eleven miles of the Alaska Railroad and approximately seven miles of the George Parks Highway. The relocation of the railroad will require traversing over hills and possibly cut-and-fill procedures to allow suitable grading. The relocated road will be moved from the valley center to the perimeter, and may also require cut-and-fill. Protection of the roadway from dam failure and significant emergency spillage would have to be addressed.

6.4.2

Letter
Jon S. Ferguson

-2-

July 23, 1984

Johnson Dam and Reservoir: Tanana River, 210 Megawatts

- o The project entails relocating over twenty-five miles of the Alaska Highway, a Highway maintenance station and the rebuilding of a bridge (for the Highway) below the discharge site. Dam safety and spillage impacts mentioned above would also have to be addressed. The bridge and the extensive construction required to relocate the road would be very costly, especially as the area is geotechnically unstable. Several Department of Transportation gravel pits also exist in the vicinity. In addition, the site infringes upon a corridor designated for a proposed Fairbanks-to-Canada/Lower 48 railroad and possibly the TransAlaska Natural Gas Pipeline.

Keetna Dam and Reservoir: Talkeetna River, 100 Megawatts

- o The project does not appear to impact Department of Transportation facilities.

Snow Dam: Snow River, 100 Megawatts

- o The project is located near the Seward Highway and the Alaska Railroad. It does not, however, appear to impact either facility significantly.

Chakachamna Dam and Reservoir: Chakachamna River, 330 Megawatts

- o The project does not appear to impact any Department of Transportation facilities.

Susitna Project Dams and Reservoirs: Susitna River (Devil Canyon Dam and Watana Dam), Various scenarios for generation output

- o This project does not appear to impact any Department of Transportation facilities.

The potential projects mentioned above could impact Department of Transportation facilities both directly and indirectly. Because of the construction and access needs, railroad spurs and access roads might be constructed (e.g. to the Susitna Hydroelectric Project site). The indirect impacts of extra traffic feeding off and on to Department of Transportation facilities could be significant. (You may want to request specific comments from the Northern Region office concerning the Johnson Project as it is located within their region.)

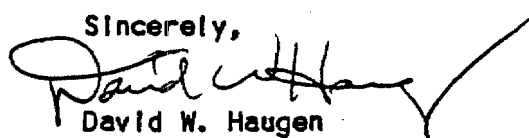
Letter
Jon S. Ferguson

-3-

July 23, 1984

We appreciate the opportunity to comment upon these plans and look forward to further coordination with you. If you have other questions or comments, please contact me.

Sincerely,



David W. Haugen
Deputy Commissioner
Central Region

cc: Jay Bergstrand--Systems and Program Planner, Central Region
John Burkholder, P.E.--Reconnaissance and Location Engineer, Central Region
R.J. Knapp--Commissioner, Department of Transportation and Public Facilities
Keith Morberg, P.E.--Design Chief, Central Region
John B. Olson, P.E.--Acting Director, Design and Construction, Central Region
Merlyn L. Paine--Regional Environmental Coordinator, Central Region
James J. Rhode, P.E.--Chief of Technical Services, Central Region



Tony Knowles,
Mayor

Municipal Light & Power

1200 EAST FIRST AVENUE — ANCHORAGE, ALASKA 99501-1685
TELEPHONE (907) 279-7671



RECEIVED

SEP 28 1984

ALASKA POWER AUTHORITY

August 9, 1984

Susitna Hydroelectric Project
No. 7114

Mr. Kenneth Plumb, Secretary
Federal Energy Regulatory Commission
Office of Electric Power Regulation
825 North Capitol St. N.E.
Washington, D.C. 20426

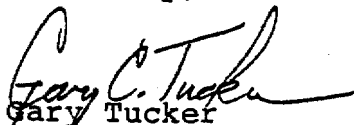
Dear Mr. Plumb:

The attached document is in response to the Federal Energy Regulatory Commission (FERC) Staff Draft Environmental Impact Statement on the Susitna Project (EIS) - Project Number 7114. The document provides comments on various portions of the draft report. Particular emphasis is given to the alternative scenarios developed within the Draft EIS.

The comments provided are intended to give some insight into those areas which we believe are deficient in the draft EIS. In this respect, it is hoped you will evaluate each for merit, and where appropriate, incorporate your findings into the Final EIS, published on this project.

Thank you very much for the opportunity to respond. Meanwhile, should you have any questions regarding our comments, or our data which supports these comments, please contact me at your convenience.

Sincerely,


Gary C. Tucker

Attorney at Law
Municipal Light & Power

GT/lb

Attachment



Tony Knowles,
Mayor

Municipal Light & Power

1200 EAST FIRST AVENUE — ANCHORAGE, ALASKA 99501-1685
TELEPHONE (907) 279-7671



UNITED STATES OF AMERICA BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

In the Matter of)
Alaska Power Authority) Project No. 7114
Application of a License for)
the Susitna Hydorelectric)
Project)

MUNICIPAL LIGHT & POWER COMMENTS TO FERC DRAFT EIS

Given a satisfactory agreement on the purchase of bulk power the The Municipality of Anchorage will be a major user of power generated by the Susitna Hydroelectric Project (FERC No. 7114) should the project be approved and constructed. As such, Anchorage Municipal Light and Power (AML&P) is extremely interested in the development of this project, or any suitable alternative which may provide a long-term stable, and cost effective, energy base. In this respect, if alternatives to the Susitna project exist which do not pose adverse effects in terms of air quality, does not cause unacceptable visual impairment or excessive damage to the state's largest renewable resource industry (the commercial and sport fisheries) and are of lower life cycle cost, then they must be considered and developed.

AML&P believes, however, that any alternative considered must be real, available, and be subject to the same rigorous scrutiny and study as the proposed project. In this regard, this response will center on the alternatives and the areas of these alternatives viewed as weak and requires more comprehensive evaluation and/or study to determine feasibility.

GAS FIRED GENERATION SCENARIO:

FERC Staff states in the Draft EIS that gas price projections and the development of this alternative is based on the assumption that sufficient volumes of gas will be discovered in the Cook Inlet region of the state, and that local utilities will be able to obtain contracts for this gas. ML&P staff believes that the basic assumption which drives this scenario is invalid, or at least suspect. Best estimates provided by the Alaska Power Authority and the Alaska Department of Natural Resources strongly indicates that with no change in the

PROVIDE FOR TOMORROW, SAVE ENERGY TODAY.

general gas consumption pattern of the railbelt region, the following reserves are most probable:

- proven Cook Inlet reserves (3.7 TCF)
will be exhausted by 1998.
- unproven Cook Inlet reserves (2.04 TCF)
will be exhausted by 2007.

ML&P staff believes that because long-term gas reserves are questionable, the doctrine of highest and best use should govern the use of this resource.

The best use doctrine is clearly the Goal in the "Power Plant and Industrial Fuel Use Act", a component of the "National Energy Act" of 1978. The purpose of this act, and the subsequent regulation by the Department of Energy's Economic Regulatory Administration is threefold. These objectives are:

- reduce oil consumption to a minimum
- severely restrict industrial and utility use of natural gas
- encourage the use of alternative fuels (Hydro prime consideration).

Based on FERC staff's assumption, it appears that the developed natural gas scenario is contradictory to prudent use of a limited natural resource, and to the principles of the Fuel Use Act. This situation creates a dilemma in which one agency of the Department of Energy advertises that natural gas is a viable alternative to the Susitna Hydroelectric Project while another arm is directed by law to severely restrict the use of natural gas for generating electric power. ML&P staff believes that FERC staff must address this conflict.

It appears reasonable that if the gas supply question and fuel use restrictions cannot be answered satisfactorily, then the viability of this alternative becomes questionable.

COAL FIRED GENERATION SCENARIO:

To develop this scenario FERC staff analyzes a number of different scenarios using five 200 MWe coal plants at two locations near existing coal sources. These analyses showed that an acceptable scenario locates 2-200 MWe coal plants at Nenana, Alaska and 3-200 MWe coal plants at the Willow, Alaska site. ML&P staff notes that the FERC contractor used simple EPA approved screening models to make this determination.

ML&P staff believes that through local and regional Alaskan experience, sufficient data exists which indicates that these models are not adequate to produce true air quality impact estimates of the various coal plant scenarios. ML&P staff further believes that if

more sophisticated modeling, which uses actual mixing height & cloud cover for each plant placement, is undertaken, the results would be vastly different. In this respect, if meteorological extremes which are commonly experienced at Nenana and Willow during the winter are taken into more realistic consideration (including site specific information) the probability is high that one coal plant, much less two coal plants, could not pass the PSD or the state standards acid test at Nenana without the employment of some very complex air quality control technology. This suspicion is evidenced by Golden Valley Electric Association's recent PSD experience in contemplating the construction of a smaller coal fired generation facility at Healy, Alaska. The plans were tabled after an economic analysis of the cost of required air pollution control equipment was assessed and found to be prohibitive.

These factors raise the question of validity of an economic analysis which does not take into consideration the potential costs for more complex air pollution control equipment. In turn, these costs cannot be established unless more sophisticated modeling is accomplished to determine just what level of control is necessary to meet all applicable standards, including PSD increments.

ML&P staff concludes that the questionable results from the simple air quality screening models, which are not site specific, does not accurately reflect the air quality impact potential of this alternative. ML&P staff further believes that to draw more proper conclusions, further analysis is required which uses models which accurately reflect expectant conditions. Only then can this alternative be properly put forward. These factors must be sharply focused because, if this alternative is found to ultimately not permissible, or if the cost of complex pollution controls are cost prohibitive, then the alternative cannot be considered viable.

COMBINED HYDRO-THERMAL SCENARIO:

FERC Staff considers a number of scenarios which involve the combined use of Thermal and non-Susitna hydropower facilities, and evaluates each as an alternative to the primary project. ML&P staff comments in this section will be confined to the selected hydro alternatives as generation development using the gas and coal alternative are addressed above.

ML&P staff agrees that if Hydro alternatives exist which are potentially more economical and environmentally attractive, they must be considered. To reiterate, however, ML&P staff believes that such alternatives must be subject to the same rigorous scrutiny as the proposed project. Such appears not to be the case as evidenced in FERC staff's recommendation as the most effective approach to meeting future power demand within the railbelt region.

FERC staff recommends a mixed thermal-based generation scenario, supplemented with selected non-Susitna basin hydropower facilities which would be developed after independent evaluation and determination of merit from an economic and environmental viewpoint. To evaluate the term "real potential" of these various combinations, ML&P

staff has analyzed these scenarios in great detail. ML&P staff's primary conclusion is that the stated potential for the development of an acceptable mixed generation scenario is based on an unsound foundation. On the validity of the thermal portion of mixed generation scenario, the major questions of gas supply, Fuel Use Act and coal burning air quality degradation potential must be comprehensively studied to determine impacts. Independent of cost and other economic benefits, if these facilities cannot be permitted, the approach fails. On the hydro side of this scenario, ML&P staff believes that the "reality potential" of the various sites evaluated by FERC staff also presents major problems. In this arena, ML&P staff questions the prudence of recommending a mixed thermal-hydro scenario which could have accumulative economic and environmental impacts far in excess of the proposed project. This conclusion is drawn based on factors, such as cost of each project (1982 dollars), total potential flood plain area inundation, and the potential for adverse impact on natural resources.

Individually, all hydropower projects identified in the FERC DEIS as non-Susitna hydro alternatives hold potential for major problems in terms of environmental and economic impacts. A number of these potential impacts are high risk and could be devastating in terms of resource loss, or increasing the seriousness of an existing hazard. As such, ML&P staff provides the following comments toward areas which would require extensive study before a selected project could be considered a candidate for the combined hydro alternative to the proposed Susitna Project. These impacts should also be measured in terms of a revised economic analysis to determine feasibility and ultimate replacement potential to the primary project.

CHAKACHAMNA PROJECT:

Comprehensive study has already been completed on the Chakachamna hydro alternative. Just recently this project was the subject of an extensive study by the State of Alaska through its contractor, Bechtel Corporation. The study identified seven exceptional risks associated with this project. They are:

1. A natural barrier glacier forms an ice dam which contains the lake.
2. An active seismic fault is located approximately one mile from the proposed powerhouse location.
3. A recently active volcano vent is located four miles from the natural ice dam.
4. Much of the proposed tunnel site is covered with high glacier and icefields which creates a real probability that adequate rock may not exist along all portions of the proposed tunnel alignment.
5. Extensive geological investigation is necessary to determine if machine boring of the proposed tunnel is feasible.

6. Significant Salmon runs (over 100,000) exist in both the Chakachamna and McArthur Rivers.
7. The probability is high that the proposed fish passageways may not function properly with a proposed 19% flow release.

These exceptional risks seriously jeopardize this project in terms of risk and the ultimate viability as a real alternative. In ML&P staff's assessment, these conclusions render the project an unlikely candidate for any type of revenue bond funding, which certainly cancels any hope of ever constructing the facility.

JOHNSON PROJECT:

This project, although not studied as comprehensively as the Chakachamna Project, also has been found to carry several exceptional risks. These risks are:

1. The reservoir will inundate an area at least twice the size of the Susitna Project and only develop approximately 1/5 the installed generation capacity.
2. Reservoir will inundate:
 - (a) the village of Dot Lake, as well as other small settlements.
 - (b) approximately 25 miles of the Alaska Highway, the primary transportation corridor within interior Alaska. Corridor will be difficult to reroute.
 - (c) approximately 25 miles of gasline corridor.
3. Geotechnical problems are suspected at the dam site which could significantly increase the cost of the project.
4. Significant King and Chum Salmon migrate through the dam site location.

Additionally, there is a significant amount of river traffic (subsistence and recreation uses) which will be impeded by this project.

Finally, ML&P staff is in severe disagreement on FERC staff's cost estimate of the project. FERC staff estimates the cost of this project (in 1982 dollars) at \$310,000,000. Based on earlier data (1967) provided in a study by the Federal Power Commission (1969), ML&P staff has estimated that a realistic cost of this project should be approximately 2 billion dollars.

Part of the estimate incongruence may be explained by the FERC staff statement that the dam would have a maximum height of approximately 140 feet (43 m) and a reservoir maximum water surface of 1,470 feet

msl. Both topographical charts and the previously cited study indicate tail water elevation at 1,290 feet msl making the difference in water level on the two sides of the dam approximately 180 feet. Obviously, a real dam must have freeboard and extend below the downstream water by a depth of the water plus the depth to suitable foundation base. The Federal Power Commission cost estimate was based on a dam height of 210 feet. Considering a crest length at least 6,400 feet, not counting diking of approximately one half mile in length required elsewhere, it appears that the cost estimate used for the 1969 study is more reasonable. This value projected in terms of 1982 dollars indicates the cost to be on the order of \$1.95 billion.

BROWN PROJECT:

The Brown Project is another project which is associated with several exceptional risks. These risks are:

1. The inundation of approximately one third the surface area of the Susitna Project with only one tenth the installed generation capacity.
2. The flood plain will inundate:
 - (a) Approximately 6 miles of the George Parks Highway which is the primary route from Anchorage to the interior portion of the state. Siting a new route will be difficult.
 - (b) Approximately 10 miles of Alaska Railroad right-of-way. New route will also be difficult to site.
 - (c) Approximately 6 miles of primary electrical transmission line.
 - (d) Some coal and gold resources.
3. Possible large Salmon impacts as several species of Salmon have been documented both above and below the dam site.

Additionally, this project will also impede navigation of the river to large numbers of subsistence and recreational uses. Further, there will be probable impacts on the state land disposal program in the area as the program offers a number of tracts in the area to the public for settlement.

Finally, this project will require a dam over a mile in length and must be higher than indicated by FERC staff if it is to hold water. Early estimates of the Bureau of Reclamation set the cost of this project at \$436,000,000. Using the same escalation rate as employed in the Johnson Project, the cost indicated would be closer to \$2.6 billion rather than the \$681 million estimated by FERC staff.

SNOW PROJECT:

This project has one exceptional risk that makes the project potentially hazardous if considered for construction. The potential is very high that a glacial lake, which is located in the drainage above the proposed reservoir, dumps periodically on a two to three year cycle. The unnamed lake, with its well known dumping characteristic, is well documented and creates an extreme flood hazard on the Snow River lowlands, and moderate flood hazards on the Kenai River. Placing a dam at this location would certainly create a high probability that the lake generated would periodically overtop the dam in an uncontrolled condition. In turn, such an event creates the potential for disaster in terms of dam washout, severe flooding of downstream facilities and unexpected life threatening situations.

Additionally, the Kenai River system and its tributaries (the Snow River) is a favored recreational area of a large majority of the population of Anchorage. The political climate and acceptance of constructing such a dam in this area leaves questions concerning local attitudes, how these attitudes would effect the eventual realization of the project.

The fisheries question concerning this project certainly must be considered in more detail, especially the Sockeye Salmon which have been documented in lower Paradise Lake, a lake which will be inundated by the reservoir.

KEETNA PROJECT:

The Keetna Project selection presents special problems because the river reach both above and below the dam site is clearly more important in terms of fish, recreation and subsistence use than the effected portions of the Susitna River. The famous Talkeetna River is a major source of recreation which would be severely impacted by dam construction. ML&P staff estimates that its construction will destroy, or adversely effect, significantly more species and numbers of fish than the total Susitna Project. Of prime importance will be the King and Chum species of Salmon. Any high dam in this location would create significant problems in passage for these fish and seriously decrease the recreation and subsistence value of the area.

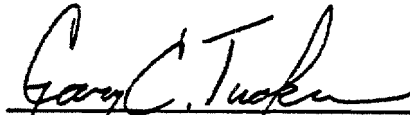
Politically, local attitudes are estimated to be at a very high degree of unacceptability as the recreational, subsistence and rural lifestyle is substantial. This uncertainty must be fully explored because it, along with the fisheries question, could render the project unacceptable in terms of total impact.

SUMMARY:

In summary, ML&P staff analyses indicate that the FERC staff recommended approach to Southcentral Alaska power needs precipitates more uncertainty in terms of accumulated impacts than the proposed Susitna Project. On an individual basis, impacts of certain selected hydro components are judged to have high potential to exceed those total projected impacts, and have higher overall costs (projected at greater

than 7.2 billion in 1982 dollars) than those of the Susitna Project. This conclusion is of deep concern to ML&P staff, as the alternative approach and various derivatives suggested are not based on one substantial fact, but speculative issues which may or may not prove to be valid. In light of this uncertainty, ML&P staff also concludes that the alternatives proposed by FERC, as the most cost effective and environmentally acceptable approach to future railbelt power needs, are proposals without foundation and cannot be relied upon as viable alternatives to Susitna. ML&P staff further concludes that because FERC staff has not made a convincing argument that the mixed thermal-hydro approach is more economical and environmentally sound, FERC should either engage in more extensive study to; (1) provide the facts required which removes the uncertainty of their position, (2) develop other alternatives which prove to be economical and environmentally sound, (3) or allow the Susitna project to go forward and be licensed for construction.

Respectfully submitted,



Gary C. Tucker
Attorney for Anchorage Municipal
Light & Power
1200 East First Avenue
Anchorage, Alaska 99501
(907) 264-4545

GCT/lb

alaska survival

RECEIVED

Susitna File # 6,4,2

SEP 12 1984 August 14, 1984

Pillsbury, Madison & Sutro

Box 343 Talkeetna AK 99676

Re: Comments on DEIS for SU—Hydro Project FERC No. 7114

Dear Secretary:

While we are in basic agreement with FERC Staff conclusions in the DEIS—that is that the proposed APA project is far more costly in both financial and environmental terms than a mix of less massive, decentralized alternatives—nevertheless there are major flaws in the current DEIS that we believe preclude meaningful analysis under NEPA. These flaws can in part be ascribed to the applicant's insistence on fast-tracking of this licensing process while consistently refusing to provide the sort of research and analysis necessary for a full consideration of the project, its impacts, and alternatives.

Among the data gaps, and analysis we believe necessary, are:

1) Lack of important fisheries data— As the National Marine Fisheries Service has noted, more detailed and substantive information is needed in this area before an informed decision can be made. Research on the river and fishery downstream from Talkeetna and tributary streams both above and below Talkeetna is lacking.

2) Alternatives are not adequately developed — The unwarranted dismissal of solar energy and failure to consider low-head hydroelectric dams are fatal flaws in this document. While it is true that solar-generated electricity is most abundant in the summer, the use of batteries, a variety of other generating sources, and other forms of storage makes solar cells an important element in railbelt electrification. In the past year my home has received all its lighting and radio power from a solar panel. Only in the middle of winter was it necessary to supplement the solar energy with 12-gallons of gasoline in a small generator. Others in this area are able to forego any thermal backup by using larger solar arrays and battery banks. Solar electricity is becoming the rule rather than the exception in many areas of bush Alaska including the railbelt. This trend must be recognized and made a part of any need for power and alternatives consideration.

Please see attachment for further detailed on low-head hydro alternatives

3) DEIS fails to provide Worst Case Analysis for impacts on subsistence— DEIS p4-64 states a failure to quantify the impacts of the project on subsistence users. In our petition for intervention, we requested a detailed analysis of these impacts and, in the event these impacts could not be quantified, a worst case analysis pursuant to 40 CFR 1502.22. Neither has been accomplished here yet these are critical issues in analyzing this project.

FERC - DOCKETED

AUG 31 1984

CLANIN 643

4) Socioeconomic impacts are too narrowly analysed- DEIS consideration of socioeconomic impacts are limited to those communities and areas which will receive the most direct impacts. PERC's Scoping Document II under 3.6 Socioeconomic - Secondary Issues states the "Capacity of Alaska State to support the project and to continue its support for community services ... and its numerous programs, on which a large portion of its citizens rely for employment." Unfortunately the DEIS has not analysed this key issue and its ramifications. In the light of recent history where massive public projects (such as nuclear plants) have produced severe economic problems, we believe the DEIS must address both the direct effects of this project and the indirect impacts to all residents of Alaska.

5) Mitigation Inadequate - Throughout the DEIS we are told that APA proposes to mitigate fisheries, socioeconomic, and various other impacts with general, yet unformulated plans. Given APA's history of failure to follow previously-promised guidelines in construction of the Anchorage-Fairbanks Intertie, we strenuously object to processing any license for this applicant predicated on vague, general promises for reducing or mitigating impacts.

Once these defects are cured in a new DEIS or supplement, we hope to make more detailed comments on a document which will better allow for an informed choice by the public and decisionmakers.

Regards,

Paul Bratton

Paul Bratton ..

for Alaska Survival

a/f

Rural Alaska Community Action Program, Inc.

RECEIVED

August 22, 1984

SEP 12 1984

Pillsbury, Madison & Sutra

1984 AUG 27 14 04 45

FEDERAL ENERGY
REGULATORY COMMISSION

Kenneth Plumb, Secretary
Federal Energy Regulatory Commission
825 N. Capitol, N.E.
Washington, D.C. 20426

REFERENCE: FERC-#7114 Susitna Hydroelectric Project:
Alaska Draft Environmental Impact Statement

Dear Mr. Plumb:

The comments filed on the DEIS in this proceeding by the Rural Alaska Community Action Program and the Alaska Regional Energy Association contained errors in the tables which may lead to confusion and omitted references to sources.

Please accept the enclosed corrected copies as the tables to accompany our comments.

Thank you.

Sincerely,

Matthew Zencey
Matthew Zencey
Energy Director
Rural Alaska Community
Action Program

Jeff Weltzin
Jeff Weltzin
Chair
Alaska Regional Energy
Association

Enclosures

MZ:JW:ct

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FERC - DOCKETED

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AUG 27 1984

CONTENTS OF

RURAL ALASKA COMMUNITY ACTION PROGRAM (RURAL CAP)

AND

ALASKA REGIONAL ENERGY ASSOCIATION (AREA)

FERC No. 7114

Susitna Hydroelectric Project: Alaska

Draft Environmental Impact Statement

August 1984

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Pillsbury, Madison & Sutro

I. INTRODUCTION:

The Rural Alaska community Action Program (RURAL CAP) and the Alaska Regional Energy Association (AREA) are organizations concerned with the affordability and reliability of energy supplies in rural Alaska. RURAL CAP operates state- and federally-funded energy programs in the areas of weatherization, consumer education, community training and technical assistance, and advocacy. AREA is an unincorporated association of 13 non-profit Native associations and the North Slope Borough. AREA is supported by the member organizations and by RURAL CAP.

RURAL CAP and AREA have had longstanding concern about the impact of the Susitna project on the ability of the State to respond to more urgent energy needs in rural areas of the State.

The Susitna project will have a wide-ranging impact on the entire State of Alaska, including rural Alaska. The impact will include direct effects of project-induced population increases and indirect effects on the rest of the State, which depends heavily on state spending for economic growth, (because the State will finance a substantial portion of the project's enormous cost). In spite of its finding that the alternatives are superior to the proposed project, the DEIS's analysis of both the direct and indirect socioeconomic impacts of the project is inadequate. The DEIS's conclusions regarding the economic and environmental superiority of the project alternatives need to be strengthened to reflect the lesser socioeconomic impact of the alternatives.

The DEIS offers the following findings of socioeconomic impact:

"Substantial population growth from project-induced in-migration in presently small communities would occur to some degree under all scenarios. This growth would cause shortages in all community services, changes in lifestyles, and disruption of subsistence activities. The combined hydro-thermal scenario with Chakachamna and all the

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Susitna Basin developments (including the proposed project) would have the greatest socioeconomic impacts. The coal-fired generation scenario would have more substantial impacts than the natural gas-fired scenario, but less than the other alternatives." (p. N-73.)

The DEIS also concluded:

"...from an environmental standpoint only, the thermal alternatives (natural gas and coal-fired generating facilities) would have the least severe consequences. Additionally, based on considerations of engineering feasibility, economic characteristics, and environmental impacts, the Staff concluded that a mixed thermal-based generation scenario, with selected non-Susitna hydropower projects added as needed, appears to be the most effective approach to meeting the projected generation requirements of the Railbelt area." (p. xxvi.)

These findings need to be strengthened for two reasons. First, the analysis of the direct socioeconomic impacts fails to properly account for project-induced population migration to the State. The socioeconomic impact of the non-Susitna basin alternatives would be more dispersed, but it would also be stretched out over a longer period. The physical extent of the direct impacts of the non-Susitna basin alternatives would be wider, but the impact in any one place and the cumulative impact on the state's economy as a whole would be less severe.

Second, non-Susitna basin alternatives would require less (if any) state financial support. This means that the alternatives would have less impact on the rest of the State by drawing away less state spending from their local economies than large-scale Susitna basin hydroelectric development would.

II. DEIS SOCIOECONOMIC ANALYSIS.

To summarize briefly, the DEIS conducts the socioeconomic analysis as follows:

The analysis defines the impact area of the project based on physical proximity to the site. The key to defining the impact area is where workers on the project will live. Since it is assumed they will live within reasonable commuting distance by automobile (if not actually in a construction camp), the impact area is limited to the area physically close to the site. Thus the major impact area

is the northcentral and northwest Mat-Su Borough and the Cantwell area of "The Yukon-Koyukuk Borough" (which is not a borough at all and which the DEIS should refer to as the "Yukon-Koyukuk Census District in the Unorganized Borough").

The second major step in the socioeconomic analysis is to select baseline population projections for the impact area. The analysis focuses mainly on the Mat-Su Borough and population projections made by several parties for that area. The staff has selected the lowest of the projections (done by ISER) as the lower bound estimate. The analysis chose this estimate because population growth statewide should taper off as the inflation-adjusted value of state spending declines with falling oil prices and falling state revenues from Prudhoe Bay (unless large-scale projects such as Susitna are built with substantial non-state revenues). For an upper bound estimate, the analysis uses the Mat-Su Borough's higher population projections.

The analysis then considers what rate of growth in population, attributable to the project, should be added to the baseline to begin assessing impact. The analysis adds the applicant's project-induced population projections to baseline projections in staff's revised definition of the impact area (expanded to include Paxson, Healy, and Nenana).

This procedure yields an upper bound and lower bound estimate of total population in communities of the impact area. Both estimates "indicate substantial population growth in the small communities near the project site." The analysis uses these population estimates to assess the impact of the project on quality of life, the economy and employment, housing, community services, fiscal status and transportation, for both the Watana and Devil Canyon phases of the Susitna project. The DEIS briefly discusses impacts in Anchorage and Fairbanks and generally dismisses them as minor.

After comparing the impact of project-induced population growth on the affected communities with the impact of the alternatives, the DEIS concludes that the natural gas scenario has the least impact, followed by the coal scenario. The combined hydro-thermal scenario and the proposed project (and Susitna basin alternatives) will have roughly equivalent impact, according to the DEIS.

III. IMPROVEMENTS NEEDED IN THE DEIS's SOCIOECONOMIC ANALYSIS.

The socioeconomic impact analysis in the DEIS is inadequate for several reasons and should offer a stronger conclusion

that the non-Susitna basin alternatives are superior to the proposed project:

- o The DEIS defines the significant impact area too narrowly, especially given the history of large-scale construction projects on the State as a whole and the recommended mitigation strategy of arranging air transportation to the site from Anchorage and Fairbanks.

The proposed project involves spending up to \$15 billion in actual dollars over a 15-20 year period, equivalent to the continuation of recent years' one-billion-dollar annual capital spending for 15 to 20 years. Such spending would be a tremendous economic stimulus to the State's economy.

The proposed project is a world class construction project, second only in Alaska's history to the Trans-Alaska Oil Pipeline, and by its sheer magnitude will directly affect at least the entire Railbelt.

The project's impact on the Railbelt centers of Anchorage and Fairbanks will be greater than the DEIS anticipates. The DEIS's estimate that Anchorage population will increase by 649 as a result of the project is shockingly low. This estimate is even more off base if the DEIS's recommended mitigation strategy is followed. The DEIS recommends low-cost transportation to the site from Anchorage to Fairbanks. The DEIS did not analyze impacts in Anchorage and Fairbanks arising from this mitigation strategy.

Such a strategy might also increase in-migration of job seekers to Alaska. Job seekers would be more likely to relocate to a larger population center as there will be a greater number of other jobs available in the event they cannot get jobs on the project.

- o The DEIS raises as an issue but does not analyze the implications of project-related migration to the State as unemployed workers from elsewhere move to Alaska to seek work on the project or in project-induced jobs. The DEIS mentions in passing that unemployment may increase (as has happened in the past) as in-migration to Alaska expands the labor force. However, the DEIS does no further analysis. This effect is crucial to an accurate projection of project-induced population growth and analysis of the resulting impact. The DEIS must analyze in-migration to Alaska in more detail.

- o The DEIS raises as an issue but does not analyze the implications of the frequent inaccuracies in large projects' estimates of the size of the peak work force

and the timing of the peak. The DEIS cites a 1982 study of large-scale construction projects by the Denver Research Institute which showed "the actual timing and magnitude of construction employment differed substantially from the estimates made prior to commencement of the project." (DEIS @ N-38.) The same study found higher than expected turnover in the project work force. The DEIS offers no sensitivity analysis of these factors on the overall impact of the project.

None of these factors is considered in comparing the impact of the alternatives with the proposed project. All of the non-Susitna alternatives involve numerous smaller projects which are more spread out over time and space. Therefore the peak employment at any given time under any of the alternatives is much lower. The boom-bust character of all the non-Susitna basin alternatives is therefore much less. As the DEIS notes, "the stability of the population and the percentage of the peak which remains in the area determines (sic) the severity of 'boom-bust' impacts... 'Boom-bust' phenomena are more difficult to plan for than gradual growth." (N-45.) Therefore alternatives with less concentrated peak employment and less boom-bust character will have less socioeconomic impact. However, the DEIS fails to fully recognize the superiority of the alternatives' lesser socioeconomic impact.

- o The DEIS mentions but fails to analyze the impact the project would have on the rest of the State by shifting state spending from those areas, whose economies depend heavily on state spending, to the project.

The DEIS recognizes that "Employment and income in many regions of Alaska are highly dependent on State government sources...on an individual level, the State government accounts for about 45% to 50% of personal wage-and-salary income in rural communities, and a statewide average of 31%." @ N-13.

However, the DEIS fails to analyze the impact of the Susitna project and the alternatives with respect to the effect they will have on local economies by changing the geographic distribution of state spending.

The basic concern is that the State appropriations required to make Susitna feasible must come at the expense of state spending in other areas of the State. There is no other possibility, given the huge sums required from the State (at least 2 to 3 billion in 1983 dollars), and the inevitable decline in state revenues as world oil prices fall and production from Prudhoe Bay,

the largest oil field in U.S. history, begins its steady decline in 1988.

There is no doubt Susitna will require substantial state expenditures (equity and/or rate stabilization). As the APA's Economic & Financial Update notes:

"All financing options which have seemed feasible or possibly feasible over the course of the ongoing review of Susitna have involved large levels of state assistance. It is clear that Susitna will have to be one of the State's highest capital funding priorities in order to achieve the required equity contribution."
@ 7-5.

Required state appropriations would range from a low of \$1,910 million nominal dollars (excluding future interest earned) under the tax-exempt Revenue Bond plan with state equity and rate stabilization paid up-front to \$3,588 million nominal dollars under the plan featuring a mix of tax-exempt revenue bonds and REA loans with a dedicated source of state funds for equity and rate stabilization.

As the tables in Attachment 1 show, the contributions to Susitna will consume a major portion of the State's capital budget--between 58 and 61% over the life of the project, assuming that growth in the operating budget stabilizes as revenues decline (see Tables I-III).

The 58-61% share of the capital budget consumed by Susitna over the life of the project is significantly higher than the Susitna service area's entire share of the State capital budget over the last five years--48.4% (see Table IV).

In every year between FY'88 and FY 1999 except one, Susitna's share of the capital budget will be substantially greater than the highest share ever obtained by the Susitna service area from the State capital budget.

As the APA itself admits, the State funding commitment to Susitna will have a major impact on the priorities in (and therefore the geographic distribution of) the State capital budget.

In the past, rural areas of the State have depended more heavily on the capital budget than on the operating budget for economic stimulus. As State funding for Susitna reshapes the distribution of the State's capital budget, it will have a serious impact on the rest of the

State, especially rural communities, because the rest of the State depends so heavily on state spending to support the local economy.

In 1982, a study of the NANA region found

"state revenues to education, construction, social services and so on alone support 50% of the total income earned throughout the NANA region." (Darbyshire & Associates, The Economy; 1982: Anchorage, Alaska.)

A 1980 study of Bethel found "state revenues directly or indirectly account for 34% (of total local income)." (Darbyshire & Associates, The Bethel Economy: Present and Future 1980: Anchorage, AK.) The percentage of local income dependent on state spending in Bethel is now much higher after several years of federal spending cuts and increased state spending fueled by the oil price rises in the early 1980's.

The Susitna project will have a great economic impact on other areas of the State because the project relies so heavily on state funding at a time when revenues are inevitably declining and because the entire State, especially rural areas, are so dependent on state spending to support their local economies.

In comparing alternatives, the DEIS fails to mention that all non-Susitna alternatives have less socioeconomic impact because they do not rely as heavily (if at all) on state funding.

IV. CONCLUSION.

In conclusion, the DEIS's findings that the alternatives to Susitna are environmentally more benign and economically more effective need to be strengthened to reflect the lesser socioeconomic impact of the alternatives in two respects:

1. The alternatives are more dispersed in space and more stretched out over time, lessening their cumulative "boom-bust" impact on the State;
2. The alternatives depend less, if at all, on state financial support, so their indirect economic effect on the rest of the State, especially rural areas, will be less.

TABLE I.

Department of Revenue
June '84
Forecast
(in millions)

Year	Petroleum Revenues	Total State Revenues*	General Fund Final Operating** Budget	Available for Capital
FY'84	2,704	3,181 (?)	2,124	
85	2,622	3,085 (?)	2,292	793
86	2,586	3,040	2,473	565
87	2,043	3,347	2,673	674
88	2,750	3,235	2,887	348
89	2,787	3,279	2,951	328
90	2,750	3,235	2,911	323
91	2,639	3,105	2,794	310
92	2,768	3,256	2,930	325
93	2,811	3,307	2,976	330
94	2,759	3,246	2,921	325
95	2,645	3,112	2,801	311
96	2,459	2,893	2,604	289
97	2,295	2,700	2,430	270
98	2,185	2,571	2,314	257
99	2,055	2,417	2,175	242
2000	1,942	2,285	2,056	229

*Assumes the current ratio between Petroleum Revenues and total revenues (85%) continues.

**Operating Budget assumed to grow at 8% per year until it reaches 90% of total revenues.

TABLE II.

Susitna Option A (no REA)
(in millions)

<u>Year</u>	<u>Available for Capital</u>	<u>Dedicated Revenue</u>	<u>Balance</u>	<u>Percent of Operating Budget</u>
FY'85	793	177	616	22%
86	565	196	369	35%
87	674	210	464	31%
88	348	227	121	65%
89	328	247	81	75%
90	323	246	77	76%
91	310	238	72	77%
92	326	237	89	73%
93	330	239	91	72%
94	325	233	92	72%
95	311	150	161	48%
96	289	256	33	89%
97	270	277	(7)	103%
98	257	247	10	96%
99	242	214	28	88%
2000	229	19	210	8%
	<hr/>	<hr/>	<hr/>	<hr/>
	5,920	3,413	2,507	58%

The Dedicated Revenue scenario was chosen for analysis because 1984 legislative proposals focused on this strategy and because it better represents the opportunity cost of the Susitna project for the State through time.

TABLE III.

Susitna Option B (REA)

Year	Available for Capital	Dedicated Revenue	Susitna Balance	Percent of Operating Budget
FY'85	793	199	594	25%
86	565	220	345	39%
87	674	236	438	35%
88	348	254	94	73%
89	328	276	52	84%
90	323	276	47	85%
91	310	266	44	86%
92	326	265	61	82%
93	330	268	62	81%
94	323	261	64	80%
95	311	179	132	58%
96	289	200	89	69%
97	270	253	17	94%
98	257	228	29	89%
99	242	198	44	82%
2000	229	9	220	4%
	<hr/> 5,920	<hr/> 3,588		<hr/> 61%

The Dedicated Revenue scenario was chosen for analysis because 1984 legislative proposals focused on this strategy and because it better represents the opportunity cost of the Susitna project for the State through time.

TABLE IV.

Susitna Service Area
Share of State Capital Budget
FY 1980-84
(in millions)

<u>Service Area</u> (Election Districts)	FY'80	81	82	83	<u>Service Area</u> (New Election Districts)	84	TOTAL
6	2.56	44.68	52.09	14.47	5	16.26	
7-12	42.90	221.45	308.68	148.01	6	39.50	
13	.58	35.97	62.38	16.27	7-15	331.77	
20	15.36	73.02	157.44	52.88	16	67.56	
					18-21	107.94	
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Total for Susitna Service Area	61.4	375.12	580.59	231.6		563.03	1,811.74
Total Allocated to Specific Districts	144.89	860.76	1,395.00	417.29		925.18	3,743.12
Percent	42.4%	43.6%	41.6%	55.5%		60.9%	48.4%

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UNITED STATES OF AMERICA

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

Alaska Power Authority)
Application for License for)
Major Project)

Project No. 7114.
(Susitna)

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Pillsbury, Madison & Sutro

COMMENTS OF THE ALASKA CONSUMER ADVOCACY PROGRAM

1. The Alaska Consumer Advocacy Program (ACAP) is a project of the Alaska Public-Interest Research Group (AkPIRG). ACAP is a non-profit organization, based in Anchorage, that represents residential utility consumers' interests before state and federal regulatory bodies.

ACAP submits these comments in the interest of addressing specific findings contained in the Draft Environmental Impact Statement (DEIS). ACAP is concerned that the DEIS misses some critical points in its approach.

Actual load growth will depend (among other things) on the success of non-structural alternatives in curbing or restructuring electricity usage. The DEIS deals with non-structural alternatives only in a cursory, short-term fashion. This treatment is inconsistent with the long-term nature of the Susitna project's productive life. In general, we believe the DEIS must reflect that the decision whether to proceed with the project is being made under great uncertainty about such factors as future load growth, oil prices, and state revenues available for financing. Alaska is

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particularly sensitive to oil prices changes -- a key index around which other determinants evolve. We believe that rational decision making (and its correlative preparatory analysis) must take into account this severe uncertainty.

The very "all or nothing" nature of a project of this magnitude flies in the face of the need for flexibility that will likely be necessary to meet changing conditions. A plan that is incremental in nature would spread the costs and avoid creating large amounts of excess generating capacity. The DEIS should address this aspect of rational energy planning in assessing the various generation scenarios advanced to date.

2. AVAILABLE GENERATING CAPACITY

In volume 1 of the Draft Environmental Impact Statement (DEIS), the main text, section 1.2.3. "Future Energy Resources" includes Table 1.5. This schedule of planned utility additions consists of two projects, Bradley Lake and Grant Lake. These projects are hydroelectric with a total capacity of 97MW, available in 1988. The schedule does not include a unit being developed in Soldotna, denoted REA Soldotna #1, which is a gas-fired generator of approximately 30MW. The schedule also fails to include the proposed 125MW mine mouth coal-fired unit currently being examined by Matanuska Electric Association, Inc., (MEA). The Alaska legislature appropriated funds to study this proposal in 1984; it is a longer-term project but could be built by 1993. Soldotna number one is scheduled to be on line by winter 1985.

In section 1.2.5 "Generation - Local Relationships of Existing and Planned Railbelt System." (p.1-15) at p.1-18, Table 1-12 (System Generation Capability - Selected Years) provides for 1993:

Existing generating capacity (1992) (MW)	1,034
Planned additions (1988) (MW)	<u>97</u>
Available capacity (1992) (MW)	1,131
Retirements (MW)	<u>-16</u>
Net	1,115
Peakload (as generated)	<u>818</u>
Margin	+297

Considering the above mentioned units, however, the schedule should more properly read:

Existing generating capacity (1992) (MW)	1,034
Planned additions (1988) (MW)	127
Planned additions (1992) (MW)	<u>125</u>
Available capacity (1992) (MW)	1,386
Retirements (MW)	<u>-16</u>
Net	1,370
Peakload (as generated)	<u>818</u>
Margin	452

3. Non-structural Alternatives

Volume 1, main text of the DEIS (as expanded slightly in Appendix C) notes three categories of non-structural alternatives:

1. Conservation
2. Rate design
3. Load management

The main text, 1.3.4.1 and 1.3.4.2, essentially discounts the potential contributions of these factors toward controlling energy requirements.

In light of the long term nature of the period of interest in the DEIS, this discounting is inappropriate. Even a one-fourth of one percent reduction in the forecast rate of growth would greatly affect the overall requirements through 2010. More important, this pessimism regarding the above factors fails to take into account 1) Alaska state policy of promoting conservation through Alaska Public Utilities Commission (APUC) rate setting activity delineated in 1980 (A.S. 42.05.141(7)(C) and 2) the recent decision of the APUC in U-83-47 (Investigation into Regulations Establishing Policy in Preparation of Rate Design Proposals). In U-83-47 (March 29, 1984) the Commission determined in Order No. 6 to "[I]ncrease the consideration given to conservation as a separate objective...." The conservation objective is a primary pricing objective and flat rates were set forth as the standard rate form. Moreover, in Order No. 13, the Commission set October 1, 1984 as reporting date for each electric utility to propose a specific date for submittal of a plan to implement innovative and experimental rates. While the newness of these areas in the country in general, and Alaska in particular, may

result in a history of success, the absence of a sufficient test period is no reason for concluding as done in section 1.3.4.2 that, "It is doubtful that in the near future rate design and load management will invalidate the need for additional generation."

The planning horizon for the Susitna project is longer than the "near future." Even if non-structural alternatives do not "invalidate" the need for additional generation, they may well effect the timing and amount of need. Timing may well be critical, given the effects that excess capacity over long periods of time would have on the overall economic viability of the project.

Given the emphasis recently placed on these non-structural alternatives at the state level, the DEIS must analyze the potential for meeting the needs served by the proposed project. Sensitivity analysis is required to ascertain the results if non-structural alternatives are effective. The burden of proving the project is upon the Alaska Power Authority and the Federal Energy Regulatory Commission. Dismissing non-structural alternatives out of hand fails to meet the burden.

4. Load Growth Forecasting:

A variety of forecasts for identifying the "necessary" amount of electricity generation for the Railbelt area have been prepared. The Alaska Power Authority sent four computer model forecasts to FERC for analysis: 1) Department of Revenue (DOR); 2) Man-in-the-Arctic Program (MAP) - Institute of Social and Economic Research (ISER); 3) Railbelt Electric Demand (RED) - Battelle; and 4) Optimized Generation Planning (OGP) - General Electric Company.

The APA settled on the following figures, denominated the "APA Reference Case":

<u>1983</u>	<u>1990</u>	<u>2000</u>	<u>2010</u>
2,808 (GWh)	3,737	4,542	5,858
580 (MW) peak			1,200 (MW)

Corresponding average annual growth rate = 2.8%.


The APA expressed some comfort with this forecast level -- in part due to comparison with utility sponsored demand forecasts that were significantly higher. One example, however, that the APA specifically referenced was the 1983 Burns and McDonnell Power Requirements Study done for Chugach Electric Association, Inc., (CEA). Since CEA supplies power not only to its own 60,000 consumers but to Matanuska Electric Association, Inc., (MEA) and Homer Electric Association, Inc., (HEA) and the City of Seward, CEA's needs are the greatest single part of overall Railbelt requirements. In APUC Docket U-82-47 (May 1984) testimony established that current demand throughout CEA's system is less than that postulated by Burns and McDonnell's "Low" scenario. The current requirements of CEA's system are being reevaluated, both by CEA and by an independent joint effort by MEA and HEA to separate their requirements from those of CEA. FERC should take these new efforts into consideration, even though FERC Staff has proposed load growth scenarios for analysis

which are lower than the Alaska Power Authority reference case.

Dated this 22nd day of August 1984 at Anchorage, Alaska.

Respectfully submitted,

ALASKA CONSUMER ADVOCACY PROGRAM


Ann M. Sugrue
Alaska Consumer Advocacy Program
Post Office Box 103111
Anchorage, Alaska 99510
(907) 272-6355/ 278-3663

UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

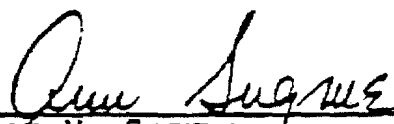
Alaska Power Authority)
Application for License for)
Major Project)

Project No. 7114
(Susitna)

Certificate of Service

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Anchorage, Alaska, this 22nd day of August, 1984.


Ann M. Sugrue
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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION
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SEP 12 1984

In the matter of:

Alaska Power Authority
Susitna Hydroelectric Project
Application for license

William Madison & Sons

PROJECT NO. 7114

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

As an intervenor I wish to comment on the Draft Environmental Impact Statement relevant to Project 7114 (Susitna). I will confine my comments to Volume 7: Appendix N. Socioeconomics. These comments are as follows:

1. The Federal Energy Regulatory Commission is to be highly commended for its overall insight and perception with regard to the social and environmental values esteemed by the residents who inhabit the potentially impacted communities and areas.

2. Appendix N frequently quotes the sociological study authored by Stephen Araund and commissioned by the Alaska Power Authority. While important information surfaced in the report, it should not be focused on to the exclusion of other data gathered by the F.E.R.C. For instance, on June 21, 1983, a Federal Energy Regulatory Commission Public Hearing was held in the Talkeetna-Trapper Creek area. It is disturbing that no reference is made in the E.I.S. to this particularly important hearing. Approximately seventy people attended, forty people testified orally, approximately thirty five additional written testimonies were submitted, in addition to the submission of newspaper documentation and other written exhibits.

Recommendation: That the F.E.R.C. review thoroughly all the

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testimony and data of the June 21, 1983, hearing (in the Talkeetna-Trapper Creek area) and include a substantial summary of this hearing in the Environmental Impact Statement.

3. It is regretful that the F.E.R.C. must rely on the Household and Business Survey Reports commissioned by the Alaska Power Authority and conducted by Frank Orth & Associates, Inc. These surveys, focusing on potentially impacted communities and areas, exhibit grave deficiencies. Please find attached a copy of a previous communication to you that protests the manner in which the surveys were conducted and points out some basic deficiencies.

Recommendation: That the F.E.R.C. compare the Household Survey Reports with the F.E.R.C. public hearing testimonies for each area. The Household Survey Reports consisted of many interviews with transient Intertie laborers and employees, most of whom are now gone from the area. The Public Hearing testimony reflected the views and concerns of established and permanent residents. Such a comparison should be included in the Environmental Impact Statement.

Respectfully submitted,



Roberta Sheldon, Talkeetna, Alaska

dated August 20, 1984

Transcription of Handwritten Letter

August 6, 1984

Dear Secretary Kenneth Plumb,

This is in reference to the Alaska Power Authority application for the Susitna Hydroelectric Project (FERC No. 7114 - Alaska).

I believe in FERC's draft Environmental Impact Statement found that the Susitna Project would be too costly and too environmentally detrimental to provide for the needs of the Railbelt community. It recommends smaller hydroelectric projects. I am writing to say that I agree with this wholeheartedly. I feel that this is a "white elephant" project, totally gone out of control in its planning. It has never been proven to me exactly how it will be financed. I certainly don't want public monies paying for this monster.

For the past few years, I've written my feelings on this project to my Legislators, Governor, and of course the Alaska Power Authority. The Power Authority seems to be willing to go to any lengths to get this project started. They may make a lot of money off it, along with all the agencies involved in studying it and building it. But it will hurt the public interest and probably leave the public with huge cost overruns.

I also want to mention the socio-economic impacts to Talkeetna and Trapper Creek. Our community is not set up to handle the rapid growth such a project would bring to the area. Yes, our area is growing, but not that fast. Right now, my family and I can't drink the water in town because we get sick.

This letter is a plea to turn down the APA's application. APA will give you more and more statistics to support their program. They'll say those are more accurate facts. That is only because they want this project regardless of the negative impacts.

Thank you for your time.

Becky Long
Box 344
Talkeetna, Alaska 99676

Dear Secretary Kenneth Plumb, (LUGO, 1984)
This is in reference to the **POOR ORIGINAL**
Alaska Power Authority application
for the Susitna Hydroelectric
Project, (FERC NO. 7114-ALASKA) OFFICE OF THE SECRETARY
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I believe in FERC's Draft Environmental
Impact Statement found that
the Susitna Project would be to
hasten and to environmentally
detrimental to provide for the
needs of the rail belt community.
It recommends smaller hydro-
electric projects. I am writing to
say that I agree with this
whole heartily. I feel that this
is a "white elephant" project,
totally gone out of control in its
planning. It has never been proven
to me exactly how it will be
financed. I certainly don't want
public monies paying for this
monster. 8408270396

For the past few years I've written
my feelings on this project to my
legislators, governor & of course the
Alaska Power Authority. The
Power Authority seems to be willing to
go to any lengths to get this project
started. They may make alot of
money off it along with all the
expenses involved in studying it & building
it. But it will hurt the public
interest & probably leave the public
with huge cost overruns.

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SEP 12 1984
FISHBURN, Washington, D.C. 20540
FERC - DOCKETED

AUG 13 1984

impacts to Tallektra & Thapper Cree
Our community is not set up to
handle the rapid growth such
a project would bring to the area
yes, our area is growing but not the
fast. Right now, my family and I
can't drink the water in town
because we get sick

This letter was paid to turn
down APA's application. APA will
give you more & more statistics to
support their program. They'll say
those are more accurate facts. That's
only because they want this
project regardless of the negative
impacts.

Thank you for your time

Bucky Long
Box 344
Tallektra, ALASKA
99676

POOR ORIGINAL

Transcription of Handwritten Letter

August 13, 1984

Dear Mr. Plumb:

This letter concerns the draft environmental findings by FERC on the proposed Susitna Hydroelectric Project.

First and foremost, I would like to say that I agree with the Commission's conclusion that the project would be environmentally unwise and that there may be less harmful ways of providing power for this part of Alaska. This position is exactly what many in this area (Southcentral Alaska) have been saying for years. The potential and probable damage to habitat would affect salmon, black and grizzly bear, moose, and caribou, not to mention the many small animals, birds, other fish species, and - lets not forget the river itself, the finest and most beautiful this side of the Yukon.

The latest update I have seen from the APA came out at a Talkeetna meeting late in the winter of this year. The main theme of the report was that most fish that came up the Su branch off to the Yentna, Talkeetna, and Chulitna Rivers. The Yentna intersects the Su downstream from Talkeetna, and the other two flow in right near the town. Only a few thousand salmon continue up the Susitna and spawn in sloughs and small creeks adjacent to the big river itself. "A few thousand" seems to be an insignificant amount to the APA, but it is definitely not to the people who live north of Talkeetna or boat in to fish. Many people of both groups really do obtain a significant amount of their yearly meat by salmon fishing in those waters.

Also, I believe that the fisheries on the aforementioned tributaries will be affected more than APA leads one to believe. Remember the Susitna has been freezing over, and following the laws of nature for more years than I can imagine - at least - thousands, maybe more. Sudden changes in this water quality - temperature, nitrogen content and salt content - are life and death for the salmon in all the rivers, and they are all interrelated.

But I'm getting long-winded. Hopefully, you will stick to your guns, and not be swayed by the APA's over zealous plan. Besides, I think they are just in it for the money.

Yours Truly,

Dennis Ransur
Box 344
Talkeetna, Alaska

August 13, 1984

POOR ORIGINAL

ALW

SECRETARY

Don Remy

SEP 17 1984

FERC P-7114

Dear Mr. Plumb

The letter concern the draft environmental
study by FERC on the proposed
Hydroelectric Project.

First & foremost, I would like to say that
I agree with the Commission's ~~position~~ opinion
that the project would be environmentally
unwise, and that there may be better less
harmful ways of providing power for this
part of Alaska. This position is exactly what
many in this area (Southern Alaska) have
been saying for years. The potential & probable
damage to habitat would affect caribou, black &
grizzly bear, moose, and caribou, not to mention
the many small mammals, birds, other
fish species, and - let's not forget the river
itself. The finest and most beautiful river
the side of the Yukon.

The latest update I have seen from
APA came out at a Fairbanks meeting last
in the winter of this year. The main theme
of the report was that most fish that come
up the Yukon off to the Yentna, Taltana,
and Chitina Rivers. The Yentna enters the
in downstream from Taltana, and the other two,

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SEP 12 1984

PHILSON, Madison & Sutor

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POOR ORIGINAL

flow in right now, the ~~river~~ ^{river}. Only a few
thousand continue up the ~~river~~ ^{river} again
in cloughs & small creeks adjacent to the
river itself. "A few thousand" seems to be
an insignificant amount to A.P.A., but it is
definitely not to people who live north of
the ~~river~~ ^{river}. At least in the fish. Many people of
both groups reely ^{reely} to obtain signif-
icant amount of their yearly meat by
salmon fishing in these waters.

(We) I believe that the fisheries in
the 3 aforementioned tributaries will
be effected more than I fear. I believe.
Remember, the ~~river~~ ^{river} has been
freezing over, and following the leaves of
nature for more years than we can imagine -
at least - thousands, maybe more. Such
changes in the water quality - like temperature,
nitrogen content & silt content - are life & death for
the salmon in all these rivers, and they are all
inter-related.

But, I'm getting long-winded. Hopefully
you will stick by your guns, and not be swayed
by A.P.A.'s overzealous plans. And, I think they
are just in it for the money.

THIS DOCUMENT CONTAINS
POOR QUALITY PAGES

Lawrence R. Anderson
Director, Office of Electric Power
Regulation
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

RECEIVED

SEP 12 1984

Pillsbury, Madison & Sutro

P-7114

Dear Mr. Anderson:

The attached comments on the draft EIS for the proposed
Susitna Hydroelectric Project are submitted as public comment on
behalf of Jeff Weltzin. It is hoped that in light of the timing
of the FERC EIS comment period during the busy, but short Alaskan
summer, that these comments will still be allowed to be included as
part of the record and that staff and commission members give
full consideration these comments.

Sincerely,

Jeff Weltzin

Jeff Weltzin
3844 Ullrbahn Rd.
Fairbanks, Alaska 99701

FERC - DOCUMENT

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AW

10/10/24 PM 2:07

COMMENTS OF JEFF WELTZIN
REGARDING THE PERC DRAFT EIS ON THE
PROPOSED SUSITNA HYDROELECTRIC PROJECT

These comments are submitted on behalf of Jeff Weltzin as public comment. The above referenced citizen has reviewed the DEIS and offer the following comments.

General Comments

The comments offered in the following text speak to the issue of enhancement potential of the Upper Susitna River drainage in absence of the proposed hydroelectric project on the Susitna. Development potential of the upper basin (above Devils Canyon) for use as salmon habitat should be addressed in much more depth than PERC staff have discussed in the DEIS. The staff assessment states that,

The conclusion was reached by the Alaska Department of Fish and Game, Fisheries Rehabilitation Enhancement and Development Division, that upriver expansion of anadromous salmon populations to areas above Devil Canyon was not practicable in the absence of the Susitna project. The Staff thus concludes that loss of upriver salmon potential would not be a significant project impact. (DEIS, p. 4-27).

The Staff's conclusion as stated above takes gross liberty in its determination of not significant impact by relying solely on the purported statement the Alaska Dept. of Fish and Game, FRED without investigating the overall upriver enhancement potential in greater detail. While Alaska Dept. of Fish and Game, FRED has performed the only reconnaissance level study of the upper Susitna river salmon potential, the study effort has been greatly criticized by other ADF&G staff assigned to the Susitna hydro

fishery studies, by ADF&G biologists assigned to the Cook Inlet Regional Planning Team for salmon enhancement and from private Cook Inlet area aquaculture organizations. These criticisms by other biologists within ADF&G bear serious questions as to the reliability of the many assumptions made by ADF&G, FR&D in performance of the study and are public record for use by FERC Staff in evaluating the potential of upper Susitna salmon enhancement. Copies of relevant memorandum have been attached for staff and commission members consideration.

As indicated from the attached memorandum, determination of the value of the potential enhancement through expansion of the Susitna anadromous stocks to the upper Susitna drainage is clearly impossible unless further investigation is performed. The Alaska Power Authority has failed to address this issue and should be requested by FERC to provide additional field data and investigation in order to make a rational determination of the proposed hydroelectric project's impact on the enhancement potential of the upper Susitna.

See attachments A, B, C & D

MEMORANDUM

State of Alaska

TO: Sarah Halsey
Director
FRED Division
Juneau

DATE: March 23, 1983

FILE NO:

344-0541

TELEPHONE NO:

FROM: Dan R. Flory *KMF*
Regional Management Coordinator
Commercial Fisheries
Anchorage

SUBJECT: Upper Susitna River
Enhancement Study
(Draft) FRED Report #4

I am writing to hopefully get some answers concerning questions I have received on the FRED Report #4 Draft of the Upper Susitna River Enhancement Study.

As you are aware, I am the Management Coordinator for Upper Cook Inlet and Bristol Bay. Part of my duties in this capacity for the past three years has been the Commercial Fisheries representative on the Cook Inlet Regional Planning Team for salmon enhancement planning and was recently named the Department's coordinator to that group. In addition, I have served for two years as a member of the Su Hyuro Steering Committee and the Su Hyuro Fisheries Mitigation Review Group. In short I am very familiar with the Su Hyuro Project and the fisheries it might affect.

Over the period of the last two weeks, I have been asked specific questions about the report released by your Division from non-Departmental people. I could not respond since I had not seen the report nor could I find anyone who had. I made a request to your office through Bernie Kephire for a copy of the report and was told my request would be passed along to Bob Burkett since it's distribution was under his control.

On March 23, I was given a copy of the Su Hyuro Aquatic Study Team's brief review of the report. Because the analysis made specific page and paragraph references to the document, I asked for and was given a look at the copy of the report in the FRED Regional office (the only copy in the Anchorage office). I also have it on good authority that Burkett gave strict orders the report was not for distribution outside FRED Division, so I was only able to review the report for about an hour. Frankly I believe Tom Trent's group was more than kind in their critique of the document.

I again called your office and asked Burkett directly for a copy of the report so I could give it a thorough review and was very plainly told what I could do with my request! Since I cannot get a copy of the report to refer to specifics, I'll keep my questions on a more general basis.

- 1) Why is an official FRED Report (New Series #4) being withheld from Inter-Divisional review pending approval from a Legislator (as per Bob Burkett during telephone call 3/24/83)?

- 2) Why is a draft report being released to a Legislator prior to any review, especially when an official correspondence channel has been established as per then Deputy Commissioner Collinsworth's April 26, 1983 memo concerning the formation of the Delta Hydro Interdepartmental Team?
- 3) Who made the decision that salmon produced by an Upper Susitna River hatchery could be harvested at the 90% plus exploitation rate? This is interesting since Cook Inlet is probably the most complex mixed stock/species fishery in the State and we are by statute required to manage for the wild stocks in a mixed stock fishery where hatchery returns are concerned.
- 4) Why was one of the authors of the report not given a chance to review the final draft report before its release, especially since he specifically asked not to have his name attached to the report?

There are other questions concerning how the benefit cost calculations used to estimate project feasibility were made but since I am told these questions were previously raised by some of your own Regional staff and then ignored, I'll not bother posing them. In addition, statements made in the draft report concerning grayling culture are in exact opposition to the official Departmental response in the review of the Draft Exhibit E. The response, by the way, was drafted by the R&D staff.

I believe the release of this report without Departmental review is a gross error in protocol if not in professionalism by your senior technical staff. It certainly does little to enhance the Department's image, especially in times of close perusal by the Legislature and public in general.

It is my suggestion as a professional biologist and request as a member of the Su Hydro Fisheries Mitigation group and Department Coordinator to the Cook Inlet Regional Planning Team that the draft document be recalled from public and Legislative distribution and a formal Departmental review process initiated. I also believe a review and explanation of how this process happened would be helpful to all of us.

The c.c. list includes either people or members of committees etc. mentioned in this memo.

cc: Commissioner Collinsworth
 Dick Logan
 Mark Warner
 Russ Rodick
 Paul Kramowski
 Bernie Kopchire
 Lowell Barrick
 Larry Hackett

Steve Penoyer
 John Clark
 Al Kingsbury
 Dave Daisy
 George Cunningham
 Bob Burkett
 Tom Trent

Attachment B
MEMORANDUM

Salmon Enhancement
State of Alaska

TO: Bob Durbett
Chief/Asst. Development
Fish
Division

DATE: June 1, 1985

FILE NO:

TELEPHONE NO: 344-0541

FROM: Kenneth Flacey
Regional Fish. Coordinator
Commercial Fisheries
Administration

SUBJECT: Review of Upper
Cuatina River Salmon
Enhancement Study

I must apologize for being late with the review of the draft report. Al Kingsbury had the document and gave it a partial review, Chuck Knechen was unable to look at it due to other more pressing priorities and I have had herring fisheries and FY85 budgets occupying my time for the past month. could

Anyway, here is a brief review of the report from Al Kingsbury and myself. Many of our specific comments have already been covered by Tom Trent.

I believe the main point we want to get across is the bias toward hatcheries which characterizes the entire report. No realistic harvest rates, consideration for the types or location of existing fisheries, or potential for new fisheries are discussed or even acknowledged in the report. Supporting reference material in some areas is either missing or very marginal. Potential negative impacts from the introduction of hatchery stocks on existing wild stocks (as they relate to a mixed stock fishery) are not discussed. The economic analysis section would require much more time than is available but these analyses do not reflect any variability or uncertainty in basic production data (i.e. a confidence interval).

Attached are a few specifics. The review was not forwarded to Senator Fletcher's office. Our Bureau HQ will do so if deemed appropriate.

Attachment

cc: Trent
Kingsbury
Clark

file

On-Hydro Enhancement Review

1. Page 1, 1. Forward - Only objectives (2) & (4) are addressed in any thorough manner in this report.
2. Page 8-13, 4.1.1 Cocheys Salmon - Question the assumption of Upper Division lakes equal in cocheys salmon production to Summit Lake. There are little or no comparative limnological data. The most serious criticism is any treatment of variability between years and between systems in smolt production and adult return per acre. Example of Summit Lake production would exceed Tustumena Lake (Page 11) uses only data from one year of smolt production from Tustumena Lake. It does not consider the fact that hatchery fry are stocked in Tustumena or give any physical or limnological parameters for the reader to draw his or her own conclusions. This type of "trust me" approach to pertinent data carries through the species discussions and the rest of the report.
3. Page 33, 65 - Not sure if sonic tagging or radio tagging is meant; On-Hydro Aquatic Studies investigations have shown there is limited movement of upstream migrants (chinook salmon) but numbers are small and conditions must be ideal to tag and track adult salmon.
4. Page 35, - The scenario discussing differential harvest rates for hatchery versus wild (fishway) salmon has already been discussed. The stocks would contribute to the Cook Inlet commercial fishery which is a complex mixed stock fishery. Under no conditions could these stocks be harvested at the 95% exploitation rate due to the potential overharvest of other wild stocks. Terminal sport harvest fisheries are probably not feasible.

The entire argument assumes that greater production will occur to smolt stage from a hatchery program. Carrying capacity (rearing potential) is not discussed from the point that given enough natural spawners, the maximum numbers of smolt could be produced from wild stocks utilizing a fishery.

The specifics of these species sections discussed in Tom Trent's review are adequate.

5. page 40, - 5.2.1.2 should be 5.1.1.2.
6. Page 40, The entire chinook enhancement program assumes smolt production from hatchery fingerling plants which are untried or unproven. The biocriteria references for Table 5-6 pertain mostly to other species not chinook. The only related reference is the FRED Directive #3 from the draft of the FRED Division Reorganization Manual.
7. Page 57, 5.1.1.5 (2) Needs reference cited. Also, needs discussion of successful salmon runs naturally occurring in high gas concentrations.
8. Page 81 & 85 - Contractor costs represent only a portion of project costs including annual maintenance costs; operating costs should be included.

9. Page 90 - Suitable donor stocks must be cleared by genetics and pathology. Transporting one major drainage stock to another major drainage is not extremely considered a good practice even though the actual locations may be geographically close. In addition, Gulkana River salmon pass through the Copper River commercial fishery during May and early June. The commercial salmon season does not open in Cook Inlet until the first Monday or Friday following June 25. If run timing remained the same as the donor stock (other transports suggest this is the case i.e. Halibut Cove chinook has similar run timing as Crooked Creek (donor stock) then the Gulkana River sockeye stock would pass through Cook Inlet at least two weeks prior to any commercial opening. There doesn't appear to be much benefit in this.
10. Page 103. Broodstocks - As per Trent's comments, these stocks are not appropriate broodstock sources.
11. Page 104. Sockeye broodstocks from the Gulkana River are not appropriate for the reasons stated in number 9.
12. Page 105. The statement that sockeye juveniles at the Gulkana hatchery have not been affected by IHV virus to date is incorrect. The Gulkana facility experienced an epizootic in one incubator this spring.
13. Page 109. Disadvantages of stocking smolt. What are the references that support statement #1 on homing response?
14. Page 118. I have to assume the cost construction estimates are accurate, but FRED Division has a history of building partially completed or scaled down hatcheries due to increased costs, so I question if 3.4 million dollars is sufficient to build a hatchery.
15. Page 124-142. Economic Analysis - Not being an economist I can't speak with any expertise on the benefit/cost calculation but on Page 136, (C). Potential harvest in the Upper Sunitna River - There is no commercial fishery in the Upper Sunitna River so the calculations using commercial catch are not valid. Also, if Cook Inlet commercial catch percentages are used, 60% for sockeye, chum and coho and 5% for Northern Cook Inlet chinook are more appropriate.

Page 138 - It is my understanding a FWF at 3% is extremely optimistic and that 4 to 5% is just as valid. Page 139-142, the cost analysis seems rather simplistic, so I asked for and received a copy of the draft of Jeff Hartman's Fishery and Economic Assumptions for 1982 FRED Enhancement and Rehabilitation Simulations which discussed benefit cost calculations. The analysis of costs includes such things as capital costs of salmon fishing and variable costs of fishing among others. These are not including the B/C equations used for the proposed Talkeetna hatchery.

Part of the permit requirement for the FNP Eklutna hatchery was to include the cost of a mark and recovery program to determine the hatchery contribution to the mixed stock fishery. This was a requirement because of the concern a large hatchery return the same

year as a poor wild stock return could promote overfishing of the wild
stocks in a mixed stock fishery. This at least should be included as
part of the costs of the fishery.

Using the simple equation listed but with a 60% exploitation the B/C
ratio is 1.111 instead of 2.201. This may or may not be accurate, but
I believe a realistic B/C ratio cannot be calculated with the limited
data available.

MEMORANDUM

State of Alaska

Robert D. Derratt
Chief, Tech. & Development
FRED Division
Anchorage

DATE: March 22, 1983

FILE NO: 02-23-7.10

TELEPHONE NO: 274-7523

SUBJECT: Review of FRED Upper
Susitna River Salmon
Enhancement Study
(Draft)

FROM: Thomas W. Trent
Aquatic Studies Coordinator
Su Hydro Aquatic Studies
Anchorage

Attached is the Alaska Department of Fish and Game - Su Hydro review, primarily done by Bruce Barrett and myself, of the subject report by FRED. This review was requested by Senator Vic Fischer's office and he asked we send the review to Commissioner Collinsworth with a carbon copy to his office.

Unfortunately, the letter from Senator Fischer was lost during the internal routing here. But we believe as a matter of protocol the letter should go to Senator Fischer directly from ADF&G headquarters rather than from ADF&G/Su Hydro.

The review is tardy and was due March 21. After discussions with Richard Logan, John Rattillon, and Dennis Kelso at the Board meeting here in Anchorage on the 23rd, it was decided that I should send the review to you. Kelso indicated he would call Senator Fischer's office and make arrangements regarding the consideration of our review and a response to Senator Fischer.

cc: Su Hydro Project Leaders
L. Hockart
A. Kingsbury
P. Krasnowski

by Daisy
Kille 3/24

1: 5.1.1 S.E.P. Without Hydroelectric Dams
page 34/para. 2

It specifically states in Section 5.1.1 that report sections 5.1.1.1 - 4 will provide an evaluation of the upper Susitna River watershed production potential for sockeye, chum, coho and chinook salmon. Sections 5.1.1.1-4 presented a reasonably clear definition of the streams or lakes system from which production could be expected. But beyond this, the evaluation is biased, in our opinion, and based on inaccurate data presentation and interpretation. On page 38 both paragraphs are based on data presented in Table 5-2 which is a conglomerate of mismatched information. For example, the recruitment numbers presented in Table 5-2 for the two alternatives cannot be identical to one another if the egg to smolt survival in fact is fifteen times greater under hatchery conditions than natural production! Additionally, if the survival rates on natural production presented in Table 5-2 are accurate and there is a 1:1 male female sex ratio and fecundity is 3000 eggs, recruitment cannot be computed as three fish per spawner but rather 1.5 fish per spawner. Also, the reference to "brood survival" in Table 5-2 is unclear. What life phases are specifically covered by the term "brood", and why is this presented when egg to smolt survival has already been quantified?

In report section 5.1.1.1 - 4, we question the accuracy of the recruitment data presented in Tables 5-2, 5-4, 5-6 and 5-8. Sockeye, chinook, coho, and chum salmon produce returns at higher rates than reported, at least in Cook Inlet. For example, sockeye salmon production in the Susitna River ranges between 2.9 and 5.3 fish per spawner (Tarbox, et. al, 1982). In the Kenai and Kasilof rivers, recruitment ranges between 12.1 and 1.2 fish per spawner. In Table 5-2, the recruitment number presented is for a spawning pair (male/female). If adjusted for individual spawners, the number would be 1.5 fish/spawner. This is markedly below the 2.9-5.3 fish/spawner reported for the Susitna River (Tarbox, et.al., 1982). Therefore, the non-hatchery recruitment (natural production) estimates are unrealistically low, in our opinion. Table 5-8 referenced a 2.75 fish per spawning chum salmon pair or 1.4 recruitment/spawner. A more realistic estimate would be 2.4 recruitment/spawner (Bakkala, 1970).

The 1982 preliminary Upper Cook Inlet commercial chum salmon harvest was 1.4 million fish. The Susitna River produces conservatively, 75 percent of the Upper Cook Inlet chum salmon catch. The 1982 Susitna River chum salmon escapement was approximately 0.5 million fish and the apportioned catch at 1.1 million fish. On this basis, it can be assumed the recruitment per parent year spawner was in the range of 3.2 fish, provided also, it is assumed the 1982 return was managed on a MSY basis. Whether the recruitment figure is 2.4 or 3.2 fish per spawner or the mean of these two numbers, the estimate of 1.4 fish per spawner used in the this draft report is too low in our opinion. We believe the economic analysis on chum salmon was based on

the 1.4 fish recruitment number, and that the analysis should be recalculated for expected returns using the 2.4 fish recruitment number per spawner.

2. 5.1.1.1 Sockeye Salmon
page 38/para. 1

The report states that "the number of adult sockeye salmon available to the fisheries depends on whether a fishway enhancement program or a hatchery enhancement program is used." The report goes on to state that "with a hatchery (no fishways) more salmon can be harvested..." These statements tend to exemplify the tone of the report. The two enhancement methods should be evaluated individually in separate sections and then compared in a single section in an evaluation of alternatives. The impression is given in the report from the onset that a hatchery is the enhancement answer. The facts should speak for themselves as to which alternative is the most favorable.

3. 5.1.1.5 Potential Barrier to Juvenile Salmon Emigration
and Adult Salmon Immigration

This entire section is presented without a reference source. What information is there available that supersaturated gases in Devil Canyon exist at levels which can cause mortality?

this hypothesized oligopoly power were to result in increased economic rent which we miss in the current analysis. One: demand curves for individual processors could not be perfectly elastic⁷ (though they could still have a high elasticity), and two: considerable excess capacity would have to exist in the industry (especially in those years when price is being used as a weapon in a competitive struggle with the other members of the industry and potential entrants).

Though the size of this rent to processors may be significant, we have conservatively assigned no value to it in the 1982 economic analysis.

Marginal Cost of Fishing Effort For Commercially Harvested Salmon:

In the foregoing discussion, we have accounted for private marginal revenue and total revenue of the enhancement production. We will now turn to estimating the private marginal cost and total cost of harvesting the enhanced stock. The three components discussed below are of primary importance in estimating the value the resources foregone in the process of harvesting the enhancement produced salmon.

A. Capital Costs of Salmon Fishing:

The Alaskan salmon fleet, as well as other Pacific salmon fishing fleets, have been characterized as being largely overcapitalized (Crutchfield and Pontecorvo, 1969 Pierce Commission Report, Pierce 1981). In short, the balance of literature on this subject points out that salmon fisheries have greatly expanded fishing power in recent years. But, because the quantity of fish is essentially fixed (except for annual fluctuations), new capital investments in vessels, gear and advanced technology added to the fleets have been largely wasted. One consequence of overcapitalization has been an established ability of the fleet to harvest well beyond the 1978 to 1982 five-year average harvest. The 1981 harvest of 125 million salmon clearly represents the one in ten to twenty year upper year bound for combined harvest of unaided stocks and the output from public and private hatcheries which can be expected to be produced at the writing of this text. It has been assumed in the analysis that, despite government efforts to limit numbers of fishermen in the fleet, the general response of fishermen to increased success as a result of enhancement harvested salmon will be a measurable, but relatively small scale, reinvestment in fishing capacity. Thus, average cost (total cost) of capital investment in the 1982 simulations is expected to vary with enhancement produced catch at a rate of five percent of the average revenue (total revenue). Implied in this assumption is the expectation that some current rent dissipating incentives, such as the low market interest rates available for salmon fishermen, will not exist beyond the late 1980's.

⁷ Perfectly elastic refers to a demand curve with an elasticity of infinity ($E_d = \infty$)

B. Variable Costs⁸ of Fishing:

The variable costs of catching the enhancement produced salmon include primarily the labor resources associated with the increased fishing effort. Other components of fishing effort costs are food, fuel, boat and gear maintenance, bait and ice. Estimates for these costs from various studies range from 0 (Orth, 1981) in his estimate for the economic feasibility of a private nonprofit hatchery in Valdez, to a range of 15 percent from an independent consultant-produced estimate for the Canadian salmonid enhancement program (Barclay and Morley, 1977).

In theory, small increases (less than 10 percent) in the harvestable stock of Alaskan salmon will probably result in no perceptible change in variable fishing costs, as an increase in the density of the stock in any given net fishery harvest zone will simply result in a higher catch per unit effort as opposed to longer fishing periods. Larger projected incremental increases in harvesting which are anticipated during the late 1980's and early 1990's through the proposed program are expected to require small additions to total labor. For the purposes of this study, an estimated fraction of 10 percent of the landed value will be used for estimating the enhancement associated average variable fishing cost over the 20-year projected life of the program.

C. Social Cost of Fishing Effort:

Total labor cost estimates should not be confused with social labor costs usually developed for efficiency estimates of this type (Shaffer, 1977). Social labor costs would be approximately equal to total costs only in a full employment economy. Due to conditions of pervasive unemployment in many Alaskan fishing communities, new entrants to the relatively small enhancement associated labor resources required can largely be expected to come from the pool of unemployed. Use of total labor costs in this analysis will clearly result in an overestimate of variable costs of fishing.

Public Costs from State Treasury:

The benefit cost framework demands an accounting of all public resources foregone in the process of building, operating and administering the enhancement facilities. Public capital resources from the state treasury included in the 1982 ex-ante economic simulations are taken primarily from the Alaska Department of Fish and Game Six-Year Plan⁹. Cost estimates from that report have been adjusted to 1982 dollars. Annual

⁸—It should be noted that since we are referring to long run costs and for the purpose of this analysis all long run costs are being treated as variable.

⁹ There are some notable exceptions to this.

operating costs (also from the state treasury) have been projected from past hatchery performance data and future salmon production estimates with the broodstock portion of the simulation program (Hartman and Rowson, 1982).

Additional public resources, such as the cost of biological evaluation and State administrative services, are each assumed to be approximately 15 percent of the annual operating cost of each enhancement facility. The administrative costs can be further broken down into approximately 2/3 Divisional administration and 1/3 State administration. The list below identifies major components of the Division and statewide administrative costs which are included in the analysis.

Components of Administrative
Costs in F.R.E.D. Division

1. Planning and Legislation
 information
2. Payroll
3. Purchasing
4. Budgeting
5. Management
 - fish culture
 - genetics
 - pathology
 - personnel

Components of Administrative Costs
in State as Whole

1. Legislation
2. Payroll
3. Purchasing

As discussed in the preceding section, conventional benefit cost analysis assumes that the price paid for labor, including public labor inputs, represents the full social cost of that labor, that is, the amount of other production lost if labor is shifted from some other gainful occupation to participate in any part of the enhancement program (Crutchfield, 1982). Again, since some labor resources for constructing and operating enhancement and rehabilitation facilities will clearly come from unemployed or underemployed ranks, total labor costs used for the benefit-cost framework in this analysis are slightly overestimated.

Recreational Values From the Enhancement Program:

The estimates of consumer surplus from recreationally harvested salmon used in the 1982 economic simulations are average consumer surplus measures from studies in the U. S. Pacific Northwest and British Columbia. The values have been compiled by the Canadian authors of Masse and Peterson (1977). The angler day values from that study apply separate rates to two classes of salmon and trout recreational opportunities. The general freshwater marine and recreational angler day value is \$15.00 per angler day for a non-trophy species such as coho salmon. The average value of \$25.00 per angler day was assigned to trophy recreational fishing opportunities for such species as chinook salmon and steelhead. To express these results in dollars adjusted for inflation with the 1977 Canadian/U.S. exchange rate of (\$1.06 Canadian = \$1.00 U.S.) and 1978 through 1982 United States consumer price indexes have been used to adjust these results to 1982 dollars. That adjustment results in an approximate value of respectively \$25.00 per angler day

and \$40.00 per angler day for the general fishing opportunities and trophy fishing opportunities.

Use of an average rather than marginal values for angler days values for our analysis implies that shifts in the demand curve from changes in catch expectations which result from enhancement, as well as such demand-shifting variables such as income growth, population growth, etc., will result in a constant long run value rather than a diminishing long run marginal value as the enhancement-produced harvest increases. Other investigators such as Crutchfield (1982) have used average surplus values in estimates of Alaskan salmon stock recreational values from such sites as Tasamina River.

Subsistence Valuation Methods:

Economic valuation methods for subsistence uses of salmon point to a neglected area of resource economics. Possible methods for valuation of enhancement-produced food fish catches range from the use of landed values, retail, black market, or wholesale prices (McKay, 1977). For the purposes of the 1982 economic simulations where subsistence or personal use harvests are expected to be a significant part of the overall interception (greater than 1%), the salmon are assigned a value equivalent to the marginal value of a commercially harvested fish. This approach is nothing new for Alaskan subsistence value projections and was used in the Tasamina River Study (see Crutchfield, 1982).

Interest Rate Assumptions:

Real interest rates used for discounting of public investments appear to vary between 2 percent and 10 percent. Recommendations from a few economists who have been interviewed on the interest rate subject during preparation of this text are summarized below.

1. Dave Reaume (1981), Economic Consultant, Juneau, Alaska:

"There are numerous articles on the subject of choice of discount rate that would take pages to summarize. Let me sum up my view of the matter in two caveats.

- A. Use a real interest rate for discounting if the dollar numbers are stated in constant base year totals. Use a nominal interest rate if the dollars are given in nominal terms. The real interest rate equals the nominal rate less the rate of inflation, to a first-order approximation.
- B. Let your nominal (real) discount rate be the average nominal (real expected) rate of return on new AA corporate bonds of the same maturity as your hatchery investment (or as close in years maturity as possible). In other words, use an opportunity cost discount rate than a social time preference rate. Use of a social time preference rate is a counsel of perfection in the face of an inability to agree on its level."

2. Jim Crutchfield, University of Washington, Professor of Economics (paraphrase of a discussion with Jeff Hartman in March 1983).

"I would advocate the use of an interest rate which represents a most likely opportunity cost of investment for Alaska. Probably this would fall between the range of 3% to 5%. When comparing an enhancement investment with an alternative use of public funds it is generally acceptable practice to use an identical interest rate for discounting. So, if you're comparing a F.R.E.D project with a hydro plant, for example, or some other project which used a 3% rate for discounting it would be acceptable to do the same for the enhancement project."

3. Dr. John Karpoff, Economics Professor, University of Alaska (paraphrase of personal communication with Jeff Hartman, March 1983):

"There are three primary components of discount rates which are applicable to deriving a valid rate for your analysis. The rate you use should reflect all of these components. The first is the normal riskless rate of interest which would be close to the long-term expected rate of growth in the economy. This is usually regarded as somewhere around 3%. A second is the risk premium due to uncertainty about inflation itself. This rate depends upon the nondiversifiable portion of the variability in the assets returned. A third is the risk premium associated with fishing for the just the enhancement-produced fish. Capital market theory suggests that this is the risk premium, which would result from a difference in the variance in that portion of the return for this type of investment that can be diversified away. Data reviewed from some Alaska fishing fleets suggests that this rate is about 5.5%. For efficiency estimates in your projects, I would suggest using approximately 6% interest rate in the analysis."

However, for applications where the enhancement investments are being compared with some alternative use of resources such as a hydro plant investment, it is conventional to use the same interest rate in each analysis. This would especially hold true where the hypothetical alternative is in some way mutually exclusive to the enhancement project(s). If that rate is 3%, for example, then for comparative purposes it is valid to apply it."

Two very large investments which the State of Alaska is currently involved with are the Permanent Fund program and the proposed Susitna Hydroelectric power project. A resolution (83-1) adopted by the Trustees of the Permanent Fund identifies a target long term real rate of return of 3.0% for (Jim Rhodes Pers. comm. with Jeff Hartman May, 1983) their investments.

A considerable body of economic assumptions has been compiled for the 1982 economic analysis of the proposed Susitna hydro project. (See attachment #1). An extensive interview with various economists conducted by Alaska Power Authority resulted in an application of a 3% interest rate for the 1982 Susitna economic analysis (Yould 1982). Thus, for purposes of comparison, all 1982 economic simulations have been developed at a real rate of interest of 3%.

Inflation Expectations:

The benefit cost framework of this analysis implicitly assumes that inflation affects revenues and costs proportionally and, further, that any changes in real prices and costs are offsetting in terms of their impact on the net present value. All prices and costs have thus been expressed in constant base year dollars.

Note on Economic and Biological Interactions:

The intent of this preceding documentation has been to quantify economic assumptions only for the F.R.E.D. Division 1982 enhancement simulations. While it would be worthwhile for the Division to develop a site-specific biological rationale for assumptions used in each of the 20 economic simulations, these documentations are not developed at this date. The reader may, however, find a thorough discussion of potential biological interactions and uncertainties in the 1982 draft of the enhancement cost benefit model written by Hartman and Rawson (1982).

The life-stage survivals in the 1982 simulations, are expected weighted averages of the future and represent the Division's most likely estimate of the net increase in a given stock which could be attributed to the enhancement program. Furthermore, a formal analysis of stock resources foregone as a result of removal of broodstock for developing hatchery runs has not been conducted. Since the conventional benefit cost framework demands an accounting of all benefits and costs and conversely, all gains and losses in the stream, lake, ocean and fishery, these hypothetical losses have been implicitly rather than explicitly dealt with in the analysis. On balance, some off-to-the-side estimates of recruitment and probable harvests from this type stock loss appear to be somewhere between negligible (where stocks are being taken from sites which have met or exceeded escapement goals) to small (from 2 to 3% of the unaided stock harvest). Similarly, the present value of the foregone stock in economic terms appear to be extremely small even when calculated using a perpetual discounting of the income stream. For the purpose of this analysis, it is assumed that the value of these foregone resources (should they be explicitly estimated) can certainly be expected to be less than or equal to the nonprice benefits earned from fisherman previously discussed in the text and therefore cancel.

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EXECUTIVE SUMMARY FOR THE
ENHANCEMENT BENEFIT-COST MODEL

Jeff Hartman and Kit Rawson
3-23-83

Most public investment planning, including fisheries development investment include treatment of both efficiency and equity issues. Efficiency issues in this manuscript are defined as those which are quantifiable in dollars through an accounting of national income. In social terms it is "maximum production from some given level of inputs or cost minimization for a given level of output", Randall(1981). Equity issues, on the other hand, concern themselves primarily with distribution of impacts between groups and the "fairness" of the government action or investment. While the science of economics does not attempt to make normative judgments on issues of fairness, it does employ a number of methods, theories and models to measure the changes in efficiency and the impacts of specific resource investments and policies.

One widely used analytical tool which yields useful information on public investment alternatives based strictly on measures of efficiency is benefit-cost analysis. In fishery resource applications it has arisen out of a goal to expend public funds to further a nation's or state's social and economic objectives in an effective manner with an efficient allocation of resources among competing groups. The analysis method differs from traditional forms of government budgeting in that it concentrates on the results or consequences of government activity rather than simply on the monetary resources required. Benefit-cost analysis is the emphasis of FRED Division's current and developing economic methods and in 1981 to 1982 resulted in the development of an in-house computer simulation model designed to evaluate public salmon and trout enhancement alternatives. Essentially, the methodology of this form of incremental analysis is identical to the methodology of many of the more familiar applications of benefit-cost analysis, such as the Susitna Hydro Feasibility Study. Yould (1982).

Applications of Enhancement Benefit-Cost Analysis

Though it is impossible to anticipate all potential uses of enhancement and rehabilitation economic model, since it is in the relatively early stages of development, the principal capabilities of the present model are as follows:

- 1) The economic model can be used for identifying the worth of an existing program and the value of a proposed investment such as a capital or operational budget request.

- 2) The model can be used to produce internal comparisons of alternatives to aid in optimizing the design and operation of physical plants and in identifying the most efficient capacity, size, facility locations, incubation and rearing schemes.
- 3) The routine, with input from other economic studies has some utility in identifying the distribution of user benefits to specific sectors of the industry as well as impacts on wages and employment from direct and induced sources.

General Structure of Models

Currently, the enhancement economic feasibility model is built out of two separate systems of computer programs which involve input of between 200 to 300 variables for a given simulation. The hatchery broodstock development (HBD) system projects future salmon production from a facility based on its current level of production, plans for expansion, life-stage survival assumptions, and fishery exploitation expectations.

The facility benefit cost (FBC) system is the economic simulation program which uses harvest predictions from a given (HBD) simulation and combines these with economic assumptions to generate predictions for benefit and cost stream² resulting from salmon and/or trout enhancement.

The (FBC) routine has also evolved into two separate components. The first, is a price index model which adjusts past nominal costs and benefits to base year dollars for ex-post analysis. The second, is an ex-ante or future oriented program which estimates present values for a number of benefit and cost stream alternatives for commercially and recreationally harvested salmon or trout which are directly attributable to a given enhancement project.

The general structure for the present value of the enhanced salmon production takes the following form for both recreationally and commercially harvested fish.

Economic Equations

- | | | |
|-----------|---|---|
| B_{pri} | = | Incremental benefits (revenue) from the private sector attributable to the enhancement produced fish. |
| C_{pri} | = | Incremental costs from the private sector attributable to the enhancement produced fish (e.g. cost of harvesting and/or processing etc.). |
| C_{pub} | = | Incremental public costs from producing and managing enhancement produced fish e.g. operational cost, capital cost and planning costs of hatchery; administration and evaluation. |

B/C = Benefit cost as expressed by a ratio

$$(B_{pri} - C_{pri})/C_{pub} = B/C.$$

NB = Net benefits as expressed as a difference

$$B_{pri} - C_{pri} - C_{pub} = NB$$

Salmon Fishery Benefits and Associated Costs

Evaluation of the efficiency of an investment for a specific project requires the analyst to estimate the gross benefits and gross costs of increasing the available salmon resource. In the (FEC) model the benefits to the private sector can be estimated as either the incremental value to the commercial fishery or as the incremental value to both the processing industry and the commercial fishery. In the first case the gross benefit to the commercial fishery from the incremental fish production is measured as the ex-vessel value of the product. The gross cost is measured as the resources foregone from the fleet to catch the incremental production. In the second case the gross benefit to the processing industry is the market value of the increased catch or first wholesale value. The processing costs are taken to be the value of the foregone resources required to both process and harvest the enhancement produced catch.

Sport Fish Valuation

Many of the projects and facilities in FRED Division are scheduled to or currently produce salmon and trout highly valued by sport fishermen. In fact, some facilities are targeted almost entirely at sport fishermen. Just what these recreation benefits are and will be is a subject discussed in the Documentation for the Enhancement Benefit Cost Model. Hartman and Rawson 1982. The analysis method presented in the text is intended to only serve the purpose of the enhancement program evaluation.

Although recreational evaluation procedures can encompass benefits of a program other than those directly received by Alaskan fishermen (such as existence valuation and option valuation techniques), the primary purpose of the valuation process is to identify the change in consumer surplus of a given recreational fishing investment. The consumer surplus is a measure of the satisfaction people enjoy from their consumption of a commodity and is based upon what they would be willing to pay for it. In the case of our enhancement investments, it is what they would be willing to pay for the opportunity to fish for the incremental increase in the available stock.

Alaskan Impact Analysis

If a decision-maker were only interested in a single objective, namely the maximization of fishing income, then the economic evaluation would not need to grow beyond benefit cost analysis. However, if the

decision-maker is also interested in formally dealing with distributional effects, then it is necessary to expand the scope of the stock to impact assessment, which must be dealt with separately from efficiency considerations. The purpose of impact analysis is to measure changes and the magnitude of changes in local or regional employment, labor force participation, real income distribution and business and industrial activity by the series of sectors. Though measurements of impacts from a project can take place even at the national level, we will extend any analysis only to assessments relevant to Alaska. Though not the primary function of the model, the facility benefit cost (FBC) routine can account for these interactions within the Alaskan economy indirectly by incorporating values from external impact models capable of generating multipliers relevant to the salmon fishing and processing industry. Such models take one of two forms. The first type are known as input-output models which are based upon a detailed accounting of the flow of goods and services at a given point in time.

A second form of impact assessments are dealt with in some types of econometric models which may also be used for predicting changes in employment and income from a change in economic activity from some primary sector (in our case, this would be the harvesting and processing of salmon).

One operating econometric model used by the Division of Budget for the Department of Revenue was used to produce a data set for the salmon industry based on a hypothetical increase in the salmon harvest of 10 percent over the naturally produced base level. This incremental increase resulted in an income multiplier for the seafood industry of approximately 1.84. The estimate indicates that for each one dollar of processing income produced an additional increment of 84 cents is produced in the form of induced wages to Alaskans.

What Constitutes an Efficient Return on Investments for an Enhancement Project?

Because resources are limited, the undertaking of any public investment, be it transportation, hydro-electric power generation, permanent fund, or a salmon enhancement facility will divert resources from an alternative use. The benefit cost concept essentially compares the gross benefits of the proposed project or resource allocation with all of the gross benefits forgone by its existence. Clearly, if the value of the benefits of the proposed project exceed the value of the benefits lost by the project's existence, then the project is in society's best interest, based on a measure of efficiency.

As a result, a single or series of benefit cost ratios or estimates of return on investment for Alaskan public hatcheries may not provide as much familiar information to the decision-maker as a broader formalized comparison of the rate of return from public hatcheries versus rate of return from some selected Alaskan investment alternatives. While State policy to date does not require a formal benefit cost analysis for all public expenditures, possibly since the value of some public goods are technically difficult to express in benefit-cost analysis, comparison with anticipated returns for a few notable public

investments will help shed light on the efficiency of a typical enhancement investment. Possible candidates for comparison would be the present permanent fund investments or proposed investments such as large public hydroelectric projects in Alaska.

Preliminary estimates from enhancement economic analysis suggest a typical hatchery investment benefit cost ratio would fall between a range of 2:1 and 3:1 with a typical return on investment (B-C) of approximately 20 million dollars over the anticipated economic life. While an explicit comparison of site specific cases with and without the proposed investment would be required to identify the alternative investment opportunities forgone from other public projects, it can be demonstrated that most existing enhancement projects compare favorably with some existing and proposed public projects.

1/ This definition of efficiency is often referred to as Pareto-efficiency or Pareto-optimality in the national sense.

2/ In this case a "stream" refers to a series of dollar amounts such as an income or cost stream extending into the past or future for a specific number of years.

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4. 5.1.1.6 Rapids
page 58/para. 2

There is no evidence that the chinook salmon fry produced from the two streams which enter Devil Canyon suffer any delayed emigration or mortalities in their downstream passage through the lower section of Devil Canyon.

5. 5.1.1.7 Total Dissolved Gas Supersaturation
page 59/para. 2

There is no mention in the second or third reference cited (Barrett, 1974; Friese, 1975) pertaining to the presence of adult salmon at the Devil Canyon rapids.

6. 5.1.3 Conclusion
page 67/para. 3

A grayling enhancement project does not necessarily equate with a hatchery program. Habitat enhancement is an alternative which could be considered. Grayling hatcheries have no record of proven feasibility or success. It is our recommendation that the report references to trout and grayling enhancement be deleted as inappropriate. It is clearly outside the scope of the study.

Please note also comments made on pages B-34 and B-35 of ADF&G's January 15, 1983 review of the APA's Draft Exhibit E for Susitna Hydroelectric project (attached) regarding grayling culture. Then comments were provided by FRED staff in the course of their review of the Exhibit E.

7. Enhancement Techniques (E.T.)
page 68/para. 2

The trail referenced was not constructed by miners or hunters but by the Bureau of Reclamation in the late 1950's in association with Devil Canyon dam investigations.

8. 5.2.3.5 Vertical Slot Baffle
page 81/para. 2

If the intent is to equate construction costs of the Russian River and Anan Creek fishways with the Devil Canyon fishway costs, then it is essential to define total project costs not just contractor payments.

9. 5.2.3.6 Fishway Construction Costs
page 90/para. 1

It is appropriate to define stock selection processes and alternatives before defining a recommended "stocking program."

page 90/para. 2

What evaluation processes were followed to ascertain whether it was feasible to establish weir facilities at Indian River and Portage Creek? What experience does FRED have in designing functional weirs on creeks with similar watershed characteristics as found in the Indian River and Portage Creek drainages? Both streams commonly flood in season. Indian River commonly undergoes channel changes. Portage Creek experiences flood flows in season and significant bed material (boulder and cobble) movement occurs. The point is whether a weir is feasible or needed for either stream. On an average escapement year there are not enough chinook salmon utilizing Indian River and Portage Creek combined to provide anywhere near the 2100 fish needed for a hatchery. The highest recommended escapement in these streams combined was 2306 fish. The situation is nearly the same for coho salmon. There are on the average probably more than 200 adult coho salmon spawning in these streams annually, but probably not more than 400. It would be unreasonable to remove 200 coho salmon and not expect a rather severe impact on natural stock production. Chum salmon are available from the Indian River in the numbers needed for a hatchery egg take. However, there are several other systems in the Susitna River drainage where chum salmon donor stocks could be obtained including the Talkeetna and Indian rivers by simply seining a few spawning areas. In our opinion, we do consider it reasonable to construct a weir on either stream.

10. 5.2.4.2 Brood Stocks

page 102/para. 3

The Indian River and Portage Creek are not appropriate sources for chinook and coho salmon eggs because based on aerial and foot surveys, there are not enough fish to provide the numbers required for an annual egg take.

page 103/para. 5

It is questionable whether adult capture and holding facilities could successfully be operated at Indian River and Portage Creek due to flooding problems. Further, the only area available at Portage Creek suitable for a holding area is extensively used by sport fishermen. There is no other camping or fishing area at the Portage Creek confluence which would serve as a substitute site.

page 104/para. 2

The statement that "the Gulkana River, a tributary of the Copper River, is an appropriate source for salmon eggs" is a conclusionary statement preceding a presentation of fact. Standard research evaluation procedures dictate an analysis or presentation of fact before stating a conclusion.

page 105/para. 3

The fact that the IHN virus is present in Gulkana River stocks, and that the the specific strain has caused mortality of Cook Inlet sockeye salmon fry in tests, makes the Gulkana River hatchery stock source inappropriate in our opinion. We would suggest that the author have the FRED pathology section evaluate alternative stocks from locations such as Larson Lake, Stephen Lake, and Talachulitna River.

page 106/para. 4

Stephen Lake is not accessible by boat from Talkeetna nor by boat from any other location.

11. 5.2.4.7 Hatchery Costs

page 115/para. 2

As indicated earlier, there are inadequate populations of coho and chinook salmon at Indian River and Portage Creek to annually provide the number of fish needed for a hatchery operation. Additionally, it is questionable whether weirs could be successfully operated in either stream primarily due to flooding.

If weirs were constructed at Indian River and Portage Creek, we would like it explained how sockeye salmon would be intercepted at these weirs inasmuch as there will be no sockeye salmon returning to these

streams. The presence of sockeye salmon in the Susitna River mainstem does not mean these fish will enter Indian River or Portage Creek and therefore be available for a hatchery egg take.

It would be enlightening to learn how the authors of the report propose to operate Indian River and Portage Creek weirs, and have their base camp for a twelve to fourteen man crew seventeen miles downstream at Gold Creek at an annual cost of only \$25,000.

12. 5.3 Biological Impact of Introduced Salmon on Resident Fish
page 120/para. 2

The greatest length Dolly Varden char intercepted by Su Hydro biologists above Devil Canyon was 205 mm. A total of sixteen were intercepted. It is doubtful that the existing Dolly Varden char population would have any recognizable impact on salmon production above Devil Canyon.

13. 6.1.2 Economic Factors, Assumptions, and Calculations.
page 126/items A, C & D

There is no value presented for sport caught sockeye or chum salmon. Both species are sport caught in the Susitna River drainage.

The numbers presented for the potential return of chinook, coho, sockeye, and chum salmon are too low as previously defined. In line with this a recalculation of potential harvest levels is required.

Value of the harvest as presented is inconclusive due to the inaccurate calculation of recruitment. Additionally, there is no recognition of sport caught sockeye or chum salmon.

page 128/para. 2

There is no value established for natural production losses associated with the taking of chinook, coho, chum, and sockeye salmon from donor systems during egg take years. The assumption that the fish used for hatchery brood stock would have produced nothing in the natural environment is inaccurate.

page 131/para. 3

The Anan Creek and Russian River projects had combined cost in the range of 1.0 million dollars. The Devil Canyon project is forecasted to cost 32.0 million dollars. It is presumptuous, in our opinion, to assume that the experiences gained by the Russian River and Anan Creek projects can be closely correlated with cost estimates of the proposed Susitna River fishway project.

14. 6.2.1 Benefit/Cost Ratio

The cost/benefit figures presented should be recalculated in line with standard recruitment numbers and value of natural production losses from fish used from egg takes.

15. 7.1 Salmon Enhancement Without Hydroelectric Dams
page 143/para. 2

We believe it would be beneficial to present a discussion on how the enhancement study team established that more than 90 percent of the hatchery created run can or will be harvested. It is our contention that it is not realistic to assume that any higher percentage of hatchery produced fish than that produced by the fishway proposal could be taken without overharvesting natural populations considering the nature of the existing commercial and recreational fisheries.

not available, it will be necessary to compensate for the loss of these grayling. Compensation is proposed to be in the form of hatchery propagation of grayling... Sufficient grayling will be planted such the number [sic] of catchable grayling will be similar to the number lost."

The FRED Division of ADF&G has been experimenting with grayling culture for several years, first at Fire Lake, then Ft. Richardson, and now at Clear Hatchery. We are continuing to work with grayling and intend to develop techniques that someday will support a grayling production program. At this time and for the foreseeable future, grayling production in Alaska must be considered experimental. In brief, several factors impact hatchery grayling production:

1. It is difficult to find egg sources that are sufficient in number. Whereas salmon egg takes in the tens of millions are common, a one million grayling egg take is a major undertaking.
2. The eggs and fry are extremely small and from a culturist's standpoint, very difficult to work with. Grayling fry hatch at 30,000 per pound as compared with salmon which are ten times that size at emergence. Marking and therefore evaluation of survival after stocking are not possible with existing technology.
3. Survival from green egg to fry have generally been low - 50 percent as compared to 80 to 95 percent for salmon production.

4. Attempts to rear fry in hatcheries have been largely unsuccessful.

The obvious survival advantage that could be gained by releasing larger fish cannot be obtained until techniques are developed which will permit holding and feeding of fry. Grayling have been successfully reared in the lower 48. However, those fish hatch at a larger size (20,000 per pound) and behave differently in raceways.

We intend to overcome these problems as we learn more about the performance of grayling in our hatcheries. However, the idea that an irrevocable loss of grayling due to habitat inundation can be compensated by hatchery propagation must be judged speculative at this point.

The development and operation of spawning channels and the modifications of sloughs, that has been proposed as mitigation warrants further discussion.

Reference the following seven excerpts from Chapter 3, of the Draft Exhibit E document:

1. "The slough habitat for the incubating salmon embryos may be enhanced through increased intergravel flow associated with larger flows, or it may be degraded if the higher flows substantially alter the intergravel temperature regime or ice conditions."
[E-3-131]

Salmon Enhancement

Attachment D
MEMORANDUM

State of Alaska

TO: Distribution

DATE: June 6, 1983

FILE NO:

TELEPHONE NO: 267-2240

FROM: Jeff Hartman *JH*
Team Leader
Economic Working Group
F.R.E.D. Division, Anchorage
Department of Fish and Game

SUBJECT: Review of Economic Narratives

Two narratives have been provided for your review in this package. The first is the corrected draft of the Fishery and Economic Assumptions for the 1982/83 Benefit Cost Simulations. An earlier version of this draft was submitted to some individuals on this distribution list in April. This draft will now be distributed for comment to a number of economists who have contributed to the information used in the manuscript.

The second narrative is an executive summary of the Economic Model documentation. It was suggested by Fred Johnson that a short summary such as this be put together for a quick review of how the model works. A copy of the complete documentation for the economic model should be available in July.

Comments?

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FISHERY AND ECONOMIC ASSUMPTIONS
FOR 1982/1983 FRED ENHANCEMENT
AND REHABILITATION SIMULATIONS

By
Jeff Hartman

Alaska Department of Fish and Game
Division of Fisheries Rehabilitation,
Enhancement, and Development (FRED)

Don Collinsworth
Commissioner

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March
1983

DRAFT: Not for quotation
without permission of author

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Furthermore, the author is solely responsible for any errors in the analysis.

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I. INTRODUCTION

In the fourth quarter of 1982, and first quarter of 1983, a series of enhancement project economic simulations were developed for the FRED Division by an in-house economic working group.¹ The project consisted of 20 enhancement and rehabilitation facilities which were simulated on the economic feasibility model (Hartman and Rawson, 1982). A general introduction to the mechanics of this salmon enhancement economic analysis is available from the Economic Planning Progress Report, 3-21-83, Hartman (1983).

This document is a formal explanation of all common assumptions in the 1982 hatchery and rehabilitation projects which are either explicitly listed in the data forms for each project or are implied in the analysis. The intended audience of this paper is an administrator or other decision-maker familiar with salmon enhancement in the Pacific Northwest and with the equivalent of at least one university level course in micro-economics. As many of these topics are potential subjects for a dissertation, they will only be covered in brief here.

II. DISCUSSION

Economic Rent:

General definitions and equations for estimating economic rent are presented in Hartman and Rawson (1982). The value from any given enhancement project is estimated from model number two in that study.

The private economic rent² from enhancement-produced salmon intercepted in the commercial fishery is estimated to be a sum of all of the marginal revenues from direct price benefits less marginal costs to the commercial fisherman. The margins from the commercial industry are derived from market prices of salmon at the exvessel level. Economic rent or profits from recreationally harvested salmon are estimated by the consumer surplus of the fishing experience.

Commercial Fishery Rent:

While controversy exists over the use of wholesale versus exvessel values, as a measure of willingness to pay for the intermediate good (salmon in the round), the margins for the commercial industry in this

¹ The working group has included Kit Rawson, Jeff Hartman, Jeff Hansen and Brynn Keith.

$B_{private} - C_{private}$

² Economic rent is defined here as ~~$B_{private} - C_{private}$~~ where the "rent" or profit is measurable in national income terms or through a Pareto-optimization definition of efficiency.

analysis are derived from market prices of salmon at the exvessel level. By restricting estimates of marginal revenue to only direct price benefits at the exvessel level, we are knowingly underestimating the economic rent to the commercial fishing fleet. The magnitude of this underestimate equals the market value of the nonprice benefits³ and producer's surpluses, to the fisherman, of nonmarket benefits⁴. These values are not included in ADF&G fish ticket data, and therefore not included in catch and production data used for 1982 statewide economic simulations.

Price Assumptions:

Demand functions for salmon have generally been demonstrated to be highly elastic⁵, from the Alaska Salmon Projected 1982 Market Conditions (DPRA, 1982). Elasticity values for canned pink salmon from that study, in the valid portion of the demand curve, are respectively 13 for canned pink salmon and 5 for canned sockeye salmon.

Demand functions for Canadian, British Columbia salmon products have been developed in an independent study by D. J. DeVortz (1982) which have been used to estimate long term marginal revenue curves for the Canadian Salmonid Enhancement Program (SEP). From that study: "The fact that the price elasticities for both salmon in general and individual species are far greater than unit bodes well for Canada's enhancement program. As supply increases in the future, any drop in price will yield a growth in revenue".

While fine-tuning price predictions for large increases in the Alaskan-produced salmon supply would require inputs from a market demand model designed for long-term price predictions, many authors have developed estimates of economic rent for both the value of a potentially eliminated stock (Crutchfield, 1982) as well as projected increases in stock sizes (Orth, 1981) in constant base year dollars. Several reviewers of various drafts of the F.R.E.D. enhancement model have recommended the use of constant base year landed values for estimating

³ A nonprice benefit refers to payments or goods received by fishermen, such as bonuses, lodgings, food storage or below market interest loans for boat, etc.

⁴ Nonmarket benefits refer to the value of satisfaction gained from the commercial fishing experience in the form of a surplus to the producer over and above the nonmarket surpluses that would be gained in the next most likely employment opportunity. Though worth mentioning, it is assumed that this nonpecuniary value is small.

⁵ Elasticity of demand is the percent change in quantity, divided by percent change in price. For many goods, elasticity is typically close to unity or 1.0. Thus, a high elasticity results in a relatively small price change for a given change in output (or in our case salmon harvested).

enhancement program economic rent. They include Dr. John Karpoff, economist, University of Alaska, 1983; Dr. Dave Reaume, economist, Alaska Econometrics, Juneau, 1981; Dr. Fred Johnson, in consultation with Dr. Jim Crutchfield, Resource Consultants Associates, 1982. The recommendations of these reviewers have been framed by the following general qualifications.

The incremental increase in total revenue with the proposed salmon enhancement investments and without the enhancement investments which would be produced in the evaluation of the entire salmon industry through use of a publication quality salmon demand model, will probably not be significantly different from total revenue estimates of just the enhancement-produced fish from exvessel base year dollar averages, if, growth in world supply of salmon from sources other than Alaska will continue to be small, or on the order of 1% to 2% per year and the contribution of enhanced stocks to the Alaskan salmon catch continues to be small (not exceeding 25% of the Alaskan harvest). Clearly, if these assumptions do not prove to be realistic, overestimates in total revenue attributed to the enhancement program in the 1982 simulations will occur.

Similarly, other assumptions such as unanticipated outward shifts in the demand curves for salmon products in international markets from such sources as changes in consumer tastes resulting from current and anticipated advertising campaigns could lead to significant underestimates in total revenue from enhancement-produced salmon⁶.

For the purposes of this analysis, projected prices for the 1982 enhancement evaluation will be averages of the 1979 through 1981 nominal prices developed from site-specific information or from State of Alaska catch and production statistics (ADF&G 1981, 1982, 1983). A similar approach was used to develop income stream estimates for Alaska salmon from (Crutchfield, 1982).

Economic Rent to Processing Sector:

Neoclassical economic theory suggests that if Alaska salmon packers operate as price takers in a perfectly competitive market, then economic rent from increased harvests will be largely dissipated in new investment in processing capacity.

Some long-time observers of the processing industry (from discussions of the Fish and Wildlife Economic Valuation Workshop 1982, Juneau, Ak.) have suggested that processing industry actions are the result of oligopolistic price searching. Two conditions would be necessary if

⁶ An outward shift in consumer demand for Alaska salmon products, which resulted from any given advertising campaign, which in turn resulted in an increase in total revenue for the enhancement produced fish, could only partially be attributed to the enhancement effort without some risk of double counting.

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C.O.A.L.

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**FEDERAL ENERGY
REGULATORY COMMISSION**

COAL OPERATORS AND ALASKA LEASEHOLDERS

July 5, 1984

P-7114

Mr. Kenneth Plumb, Secretary
Federal Energy Regulatory Commission
825 North Capital Street, N.E.
Washington, D.C. 20426

Dear Mr. Plumb:

This letter is written on behalf of the Coal Operator's and Alaskan Leaseholders (C.O.A.L.), an organization of companies interested in the common problems and opportunities associated with the development of Alaskan coal resources. As an association we have followed the activities associated with the Susitna Hydroelectric Project with detached interest.

In 1984, with the publishing of the Kentco study and the Alaska Power authority update, we felt it necessary to take a more active role. Our position changed because of our perception that these reports dealt unfairly with coal-based alternatives to the Susitna Hydroelectric Project. The decision to build or not to build the Susitna project is obviously an important long range decision for Alaska. We feel the decision should be made based on the best, most objective information available. The draft EIS prepared by the Federal Energy Regulatory Commission represents, in our opinion, one of the better evaluations we have seen.

C.O.A.L. is pleased with the thoroughness and objectivity of the Commission's analysis. No one can predict the future, but our analysis of previous work leaves us concerned that decision makers will be forced to make tough decisions based on very optimistic assumptions, with little knowledge of what these decisions might mean if key assumptions turned out to have been incorrect. We feel the range of possible outcomes the FERC considered provide a sound base for decision making.

Perhaps our biggest concern with the Alaska Power Authority update are the twin assumptions that coal prices are directly tied to oil prices, and that coal prices will escalate significantly in real terms over the next 50 years. C.O.A.L. believes

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both of these assertions to be absolutely incorrect. We were encouraged that FERC also believes "there is no persuasive reason to anticipate that the real costs of supplying the coal will escalate." (Draft EIS, page 1-33) We feel strongly that prices will not escalate in real terms, and that there will be sufficient competition for local markets within Alaska to keep prices down indefinitely, reflecting production costs.

C.O.A.L. has no specific quarrel with the FERC decision to base its coal alternative analysis on the costs and environmental effects of production from the Nenena field and electric power generation in the Nenena area. However, members of C.O.A.L. have stated publicly that they would open a mine in the Beluga field solely to serve an on-site power plant. Such a decision would and could be made with no specific tie-in to the development of an export market.

Discussions have also been held concerning a power plant fueled by reserves from the Matanuska coal field - the one other coal field in Alaska that has historically produced significant quantities of coal. In our view, plants analyzed at those sites would have resulted in similar impacts to those analyzed in the DEIS.

As an association C.O.A.L. has not taken a position on the Susitna Hydroelectric Project; however, our analysis supports the conclusion reached by FERC: "That a mixed thermal-based generation scenario, supplemented with selected non-Susitna Basin hydropower facilities, would be the most effective approach to meeting the projected generation requirements of the Railbelt area." (DEIS, Page 5-7) The flexibility provided by this approach, coupled with its apparent economic reasonableness, strongly recommends it.

We appreciate this opportunity to comment on the DEIS and, once again, would like to commend FERC on the thorough and complete analysis in the DEIS.

Very truly yours,

DIAMOND ALASKA COAL COMPANY



R. B. Stiles
President