Before The
Federal Energy Regulatory Commission

Application For License For Major Project

SUSITNA HYDROELECTRIC PROJECT

(PROJECT NO. 7114-000)

RESPONSES TO THE DEPARTMENT OF THE INTERIOR COMMENTS ON LICENSE APPLICATION

Volume II

February 15, 1984

ALASKA POWER AUTHORITY

FEDERAL ENERGY REGULATORY COMMISSION

SUSITNA HYDROELECTRIC PROJECT

PROJECT NO. 7114

RESPONSE OF THE
ALASKA POWER AUTHORITY
TO
COMMENTS
ON THE
ALASKA POWER AUTHORITY'S
APPLICATION FOR LICENSE FOR MAJOR PROJECT

February 15, 1984

VOLUME II

COMMENT I.200:

"Page E-3-436: (i) Muskrat: Paragraph 2: Because of the above concern we question the certainty of the conclusion that, 'Improved downstream habitat will compensate for ... [the impoundment area] loss.'"

RESPONSE:

Please refer to the Response to Comment I.199. Because of the apparently low population of muskrat in either impoundment zone, compensation of lost habitat due to reservoir flooding should be easily achievable in downstream reaches. Muskrat use of downstream sloughs to be enhanced for beaver (see Mitigation Plan No. 19, FERC License Application page E-3-537) should provide most, if not all, compensation. Muskrat use of impoundment shores (particularly Devil Canyon, which has low annual water fluctuations) is difficult to predict, although conversion to use of bank dens along these shores could conceivably occur, providing additional habitat for this species.

COMMENT I.201:

"Page E-3-436: (i) Muskrat: Paragraph 3: The potential for negative impacts to muskrat from daily flow fluctuations should be fully addressed."

RESPONSE:

As discussed in the Response to Comment I.198, average winter flows will be higher than normal under with-project conditions and daily fluctuations will be limited so that adverse effects on aquatic furbearers resulting from daily fluctuations are expected to be minimal. However, further evaluation of this impact mechanism is being conducted and will be completed following finalization of the operational flow regime including daily fluctuation limits. See also the Responses to Comments I.198, I. 346, I.542 and I.552.

COMMENT I.202:

"Page E-3-440: (l) Coyote and Red Fox: Paragraph 5: Red fox habituation to human activity may be overemphasized. The referenced studies were in areas protected from hunting

COMMENT I.202 (cont.):

and where vehicle use may be less frequent and at slower speeds than it will be during project development activities."

RESPONSE:

All studies referenced in this section (including Milke 1977, Tracy 1977 and Neuman and Merriam 1972) noted a lack of disturbance reactions to many human activities on the part of red foxes. As for any wildlife species, negative reactions to humans will be more severe if hunting of that species is allowed. If hunting is restricted in the area of construction and intensive access during the project, then reactions by red foxes would likely follow the scenarios mentioned in the text. Should hunting be allowed, the reactions may be stronger, but likely only toward known human sources, such as people on foot, gunshots, etc. The abundance of foxes in well-settled portions of North America indicates this species is well adapted to coexist with human disturbances, such as road traffic and other construction activities.

REFERENCES

Milke, G., Animal Feeding: Problems and Solutions, Joint State/Federal Fish and Wildlife Advisory Team, Special Report No. 14 (1977).

Tracy, D. M., Reactions of Wildlife to Human Activity Along the Mt. McKinley National Park Road, Master's Thesis, University of Alaska (1977).

Neumann, P. W. and H. G. Merriam, Ecological Effects of Snowmobiles, Can. Field Nat. 86:207-212 (1972).

COMMENT I.203:

"Pages E-3-441 to E-3-442: (m) Other Furbearers: Paragraphs 4 and 5: The difficulties with the marten model described here are sufficient to suggest that the attempted quantification of marten populations, although eventually desirable, is premature. In addition to seasonal differences in trapability, the fact that a professional trapper worked in that area the previous winter further negates the validity of this estimate. We suggest that the

COMMENT I.203 (cont.):

trapper be contacted for further information on Watana area marten populations."

RESPONSE:

Several trappers worked in the middle Susitna River Basin during years of furbearer studies. The presence of several trappers in this area represents the normal situation; therefore marten populations in the basin during the years of study were probably more representative of normal population levels than would be calculations accounting for trapper harvest levels. Thus, the model does predict the loss of marten due to impoundments and other facilities; but does not, at present, predict potential loss of marten populations that could be present given no trapping mortality (an artificial situation).

COMMENT I.204:

"Page E-3-442: (n) Raptors and Ravens: Section discussions leave the unproven impression that raptors and ravens will be displaced to downstream and adjacent areas. For example, on page 445, paragraph 5, it is inferred that downstream cliffs may increase in importance to golden eagles who lose upstream cliff nesting locations; however, no analysis is made of comparable foraging habitat at downstream locations. On page 448, paragraph 1, it is similarly concluded that raven use of areas downstream from the Watana damsite will increase after filling and before development of Devil Canyon. Response W-3-339 (in Chapter 11) to our comments on the draft license application and page 446, paragraph 3, includes no reference or criteria for assuming that bald eagles now inhabiting nests to be inundated by the Watana impoundment could later nest in adjacent areas upstream on the Susitna or Oshetna Rivers or downstream along Portage Creek, Prairie Creek, or near Stephan Lake.

"Little consideration has been given to the relative habitat values of these other areas, and why it is concluded that these areas are presently not fully utilized. If food is unobtainable after project completion, it would be meaningless to provide alternative nesting locations. Where alternative nesting habitat values are described, the potential mitigation values from manipulating those habitat areas or otherwise attempting to provide alternative nesting locations are unproven, and primarily speculative. For example, the one documented case where a bald eagle nest was successfuly reestablished involved an existing site which

COMMENT I.204 (cont.):

was restored, not establishment of a nest in an area currently uninhabited and unsuitable for nesting by bald eagles. The viability of such measures in Alaska or similar environments must be shown before they can be found acceptable."

RESPONSE:

Our re-reading of Exhibit E, Chapter 3, Section 4.3.1(n), (FERC License Application pages E-3-442 through E-3-454) does not, in our judgment, "leave the unproven impression that raptors and ravens will be displaced to downstream and adjacent areas." The example cited on FERC License Application pages E-3-445 and E-3-446 states:

> "Cliff-nesting habitat for golden eagles will become severely limited upstream from the Watana damsite once the impoundment is full. Loss of cliffs upstream from the Watana damsite may increase the importance of cliffs farther downstream in Devil Canyon, along Fog Creek, Tsusena Creek and other streams draining into the Watana to Devil Canyon reach. However, airspace is restricted in much of Devil Canyon, many of the cliff areas appear to be exposed to higher levels of moisture, and existing cliffs may lack suitable ledges on which golden eagles could construct nests.
>
> "Golden eagles often have several alternative nesting locations, some perhaps 4-5 miles (6-8 km) apart (McGhan 1968, Roseneau, et al. 1981), and thus the 6 nests lost to the project do not represent 6 pairs of eagles. The middle Susitna River Basin population of golden eagles will probably be reduced by 3-5 pairs as a result of the construction and filling of the Watana reservoir because of (1) losses of 38 percent of the well-established golden eagle nest sites along the river; (2) concomitant losses of most of the other potential cliff nesting habitat upstream from the Watana damsite; and (3) a suspected scarcity of alternative nesting locations through much of the remainder of the middle basin."

With regard to the question of loss of foraging habitat at downstream locations, it is pointed out on FERC License Application page E-3-438, paragraph 4,

> "Most raptors are limited by availability of nesting locations and nest sites, not food (Newton 1979). Furthermore, raptor 'hunting habitat' and productive

RESPONSE TO COMMENT I.204 (cont.):

> areas of prey habitat, including riparian zones and wetlands are not necessarily equivalent."

The discussion of this point continues through FERC License Application page E-3-449. The question of the validity of concluding that cliff- and tree-nesting raptors will find alternative nesting locations when displaced by project construction and operation will receive more detailed attention during impact assessment refinement. In the final analysis, however, it will not be possible to prove in advance that all raptors displaced from presently used nesting locations will in fact successfully nest in other locations near the project area or farther afield.

We disagree with the reviewer's comment that

> "Where alternative nesting habitat values are described, the potential mitigation values from manipulating those habitat areas or otherwise attempting to provide alternative nesting locations are unproven, and primarily speculative."

Successful applications of the proposed raptor mitigation methods are described and documented in FERC License Application Appendix E3I, along with the descriptions of specific techniques for their implementation.

The Power Authority anticipates that the DEIS will reasonbly analyze these topics and will incorporate available studies.

REFERENCES

McGhan, J., Ecology of the Golden Eagle, Auk.85:1-12 (1968).

Roseneau, D. G., C. E. Tull and R. W. Nelson, Protection Strategies for Peregrine Falcons and Other Raptors Along the Proposed Northwest Alaskan Gas Pipeline Route (1981).

Newton, I., Population Ecology of Raptors (1979).

COMMENT I.205:

"Page E-3-443: - Nesting Habitat: Review of Appendix 3.I shows that successful provision of artificial nest sites in Alaska remains unproven and untried. While we agree that

COMMENT I.205 (cont.):

lack of opportunity rather than lack of knowledge may be limiting such applications, we believe that such experiments do not serve as mitigation for raptor nest loss from project activities. Lack of opportunity is no reason to readily accept such measures without first demonstrating their viability within the project area.

"Information sources cited in the artificial nest examples 1, 3 and 9 are not included in the references listed for the Wildlife Section. Although nesting parameters are thoroughly described here, no information is provided on whether manipulated nesting locations are in areas with adequate foraging habitat for additional eagles. The usefulness of providing or manipulating nesting locations has not been proven for Interior Alaskan raptors."

RESPONSE:

The Power Authority intends to implement a thoughtful, carefully designed program to determine the efficacy of proposed mitigative measures. From applications elsewhere, documented in part in Appendix E3I to FERC License Application Exhibit E, there is every reason to expect that the proposed measures will accomplish the successful relocation of raptors to alternative nest sites.

The Power Authority appreciates the concern expressed with regard to the availability of adequate foraging habitat. However, we must re-emphasize that most raptors in most regions are in fact primarily limited by occurrence and availability of nesting locations, not by the availability of foraging habitat. We refer the reader to FERC License Application Exhibit E, Chapter 11, Appendix E11J, in which this question is thoroughly reviewed (Response to USFWS Comment W-3-461 on the November 1982 Draft License Application). Also refer to the Response to Supplemental Information Request 3W-4 (referenced in the Response to Comment I.209). The further development of mitigative proposals for raptors will be undertaken with the close involvement of USFWS Region 7 raptor specialists. Review, discussion and informed decisions will be made with the participation of USFWS personnel at every step in the further development of mitigation proposals for raptors.

It should be noted that mitigation measures for raptors need not be proven effective in Alaska to be of potential value to the Susitna Hydroelectric Project. If proposed techniques have been documented to be effective for the same

RESPONSE TO COMMENT I.205 (cont.)

or similar species in similar habitats, they are worthy of consideration, regardless of political boundaries.

The missing references for artificial nest examples 1, 3 and 9 (FERC License Application Appendix E3I) are provided below.

REFERENCES

Cugnasse, J. M., Adoption d'une aire artificielle par un couple de faucons pelerins et note sur la maturite sexuelle de la femelle, Nos. Oiseaux 35:238-242 (1980).

Dunstan, T. C. and M. Borth, Successful Reconstruction of Active Bald Eagle Nest, Wilson Bull. 82:236-327 (1970).

Fyfe, R. W. and H. I. Armbruster, Raptor Research and Management in Canada, pages 282-293 in: R.D. Chancellor (ed.), Proceedings of the World Conference on Birds of Prey, Vienna, Intl. Council Bird Preserv. (1975).

[Please note that Dustan and Borth (1970) is included in the references section of the FERC License Application (page E-3-576). However, due to a typographical error, "Dustan" is listed as "Dunshan."]

COMMENT I.206:

"Page E-3-445: Paragraph 4 through Page E-3-447: Paragraph 1: As cited in the folowing section, (ii), on disturbance, bald and golden eagles are protected under the Bald Eagle Protection Act (16 U.S.C. 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 U.S.C. 668a). 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. That taking may be permitted by the appropriate FWS Regional Director under eagle permit regulations (50 C.F.R. 22). "Take" is defined to include molest or disturb."

RESPONSE TO COMMENT I.206:

The information provided in this comment is provided in detail on page E-3-451 of the FERC License Application. Please refer to the Response to Comment I.210 for further information.

COMMENT I.207:

"Page E-3-448: Paragraph 2 through Page E-3-451: Paragraph 1: Hunting and Perching Habitat: Supporting references should be provided for this discussion. Only a brief subjective assessment has been made of hunting and perching habitat which would be available near artificially provided nesting locations and nest sites. Nests without perches are of limited value to bald eagles. Nesting habitat is useless without sufficient sources of food."

RESPONSE:

This Comment concerning the discussion of hunting and perching habitat is noted and appreciated. Additional evaluation of these concerns will be conducted during the refinement of impact assessments. Please refer to the Responses to Comments I.205 and I.209.

COMMENT I.208:

"Page E-3-449: Hunting and Perching Habitat: Paragraph 6: We question the validity of this discussion. Bald eagles hunt very close to the nest site and probably always within line of sight, especially during the early part of the nesting season."

RESPONSE:

Paragraph 6 of Exhibit E, Chapter 3, Section 4.3.1(n)(i), entitled "Hunting and Perching Habitat" (page E-3-449), states that "[m]ost raptors, especially the larger species, have the capability to range relatively long distances from their nesting locations to hunt." In response to our statement, the reviewer singled out bald eagles, stating "[b]ald eagles hunt very close to the nest site and probably always within line of sight, especially during the early part of the nesting season." The latter statement is generally supported by several studies of nesting bald eagles. However, it should be recognized that:

RESPONSE TO COMMENT I.208 (cont.):

- Bald eagles are opportunistic in their feeding habits. They are capable of exploiting one of the widest arrays of food sources of any raptor (including fish, birds, mammals, carrion, and human refuse).

- On the other hand, bald eagles have relatively specific requirements for nest sites. In interior Alaska, almost all bald eagles nest in balsam poplar or white spruce trees that are large, mature, and often decadent (cliff nests are rare). Conformation of the trees is important; i.e., spruce must have broad "bushy" upper sections, and poplar must have properly configured limbs and partially open canopies.

- Suitable nesting locations are often limited in number and widely scattered in interior Alaska. Trees of the appropriate size and conformation are not common in the Susitna River basin upstream of Talkeetna.

- Suitable nesting locations are not always conveniently located immediately adjacent to sources of prey. Furthermore, the distances and directions bald eagles hunt from their nests are strongly tied to the distribution, abundance, availability, and vulnerability of prey in the local area. Therefore, the sizes and shapes of hunting territories vary among nesting pairs and among nesting areas.

- In addition, the morphology of eagles suggests that they have the capability to range long distances from their nests to hunt for food. The size and shape of their wings (e.g., long and broad with slotted wing tips) in relation to body size, resulting in low wing-loading, facilitate long distance movements.

We point out that our original statement in the FERC License Application dealt with capability, not with the distances within which eagles are most often able to obtain food. Furthermore, an understanding of the eagles' (and other raptors') capabilities to exploit their environment is an important prerequisite when designing a sound mitigation plan, especially if plans include manipulating nests. Pertinent factors include capabilities to use a variety of nesting habitats and nest structures, take a variety of prey, or to fly long distances to obtain food.

It is true that the river valley in the middle basin where four pairs of bald eagles nest will be inundated. Although the river valley may presently afford some hunting habitat

RESPONSE TO COMMENT I.208 (cont.):

for these eagles, it probably does not provide the most suitable foraging habitat in the region. The river waters are turbid and swift, and anadromous fish, an important food source, rarely penetrate upstream of Devil Canyon. As a consequence, the bald eagles nesting here may not hunt entirely within the river valley. Instead it is quite possible that they use nearby wetlands where prey may be more abundant (e.g., Fog Lakes, Portage Creek Valley, Stephan Lake area). However, suitable nesting locations are almost non-existent in these areas; as a result of project actions, the Power Authority anticipates establishing compensatory nest sites in areas of suitable hunting habitat for the raptor species in question.

COMMENT I.209:

"Page E-3-450: Bald Eagles: Last Sentence: The text should clarify whether the assessment that food will '...be adequate for those eagles that remain after construction and filling of the Watana reservoir,' includes the potential new nests and eagle population to be provided in those areas by the Mitigation Plan."

RESPONSE:

The sentence in question (FERC License Application page E-3-450) states "Assuming waterfowl are never attracted to the impoundment, and that fisheries never develop there, surrounding habitat, including tributaries and waterbodies near the impoundment zone, is likely to be adequate for those eagles that remain after construction and filling of the Watana reservoir." This statement formally addresses only impacts which are likely to occur in the absence of mitigative measures. It should be noted however that FERC License Application page E-3-538 states, "A combination of several of the enhancement measures described in Appendix E3I will be used to provide artificial nesting locations for bald eagles until at least four successful new eagle nests have been established in the middle or upper basin. As shown in Table E.3.160, four known recently active bald eagle nests will be inundated by the impoundment areas, borrow areas or campsites if the project is constructed as described in the License Application. Hence, through mitigative measures and monitoring, the Power Authority intends that at least four successful new bald eagle nests be established after the loss of the existing nest sites documented in Table E.3.160. Because the availability of nesting locations is usually more limiting

RESPONSE TO COMMENT I.209 (cont.):

than the prey base (see Technical Response to Comment I.204), it is likely that food and foraging habitat will be adequate for the four nesting pairs of bald eagles which are expected to occupy new nest sites following construction and filling of the reservoirs.

For additional information concerning this and other Comments pertinent to bald eagles, the reader is referred to the Power Authority's Response to Supplemental Information Request 3W-4.

REFERENCES

Alaska Power Authority, Response to FERC Supplemental Information Request, 3W-4 (1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.210:

"Page E-3-451: Paragraph 2 through Page E-3-454: Paragraph 1: (ii) Disturbance: The APA has initiated 'consultation' with the Alaska Regional Director of the FWS with regard to the taking of eagle nests. The applicant's initial February 3, 1983 and subsequent May 23 and June 21, 1983 letters request information on the FWS's legal obligations and advice on how the apparent conflict can be resolved. Our June 9 and June 30, 1983 responses included a copy of the Bald Eagle Protection Act and appropriate regulations. We have described how the recent amendment to the Act does not allow indiscriminate destruction of nests but could allow nests to be moved on a case by case basis, under the appropriate conditions of a permit issued by the Secretary. There are no provisions for issuing permits to take or move bald eagles nests for other than, '...the scientific or exhibition purposes of public museums, public scientific societies, or public zoological parks' (16 U.S.C. 668a). That the act merely prevents taking 'without a permit' is an incorrect description of the Act by the applicant, in Section (ii) Disturbance, paragraph 1, and in the Chapter 11 response (W-3-344, paragraph 1).

"In their letter to the FWS Regional Director and in the Wildlife Resources section of the Exhibit E, the applicant has explained no such scientific or exhibition purposes for the taking of bald eagle nests in the project area; nor have any steps been taken by the applicant to obtain a case by

COMMENT I.210 (cont.):

case permit for the similar taking of golden eagle nests. The applicant has seemingly accepted the fact that up to five bald eagle and eight golden eagle nests will be destroyed with project construction. An additional bald eagle nest and up to seven additional golden eagle nests will be subject to disturbance from project access, construction, and associated activities. The Exhibit E Mitigation Plan assumes that provision of alternate nesting locations and nest sites will adequately mitigate for these impacts. The previously cited response to our comments on the draft application suggests that the Bald Eagle Protection Act will be met by implementing the Mitigation Plan:

> '...in a manner that should satisfy taking of bald eagle nests as part of a scientific study to learn about the effectiveness of several possible RESPONSE: mitigation methods useful as evaluative and mitigation tools should similar conflicts arise between this species and other future developmental or industrial projects' (Chapter 11, W-3-344).

"We have not agreed to the need for such a study. Nor have we reached agreement with the applicant on this subject. Successive comments on portions of the license application which deal with bald and golden eagles concern biological rather than legal aspects of this problem. We anticipate that the applicant will initiate discussions with the FWS Regional Director for resolving the project's apparent conflict with the Bald Eagle Protection Act."

RESPONSE:

The Alaska Power Authority has communicated with the Fish and Wildlife Service Regional Director in Alaska several times with regard to this matter. The Alaska Power Authority fully recognizes its obligations under the Bald Eagle Protection Act. The Power Authority will continue its efforts to meet with the appropriate Fish and Wildlife Service officials in that regard and to take all other appropriate actions to comply with that Act. The Power Authority anticipates obtaining the necessary permits subject to a reasonable Mitigation Plan.

COMMENT I.211:

"Page E-3-453: (ii) Disturbance: Paragraphs 8 and 9: Recognition of the eventual inundation of at least five of the seven golden eagle and two of the four bald eagle nests due to the Watana impoundment makes the issue of disturbance from reservoir clearing operations somewhat of a moot point."

RESPONSE:

Disturbance to eagle nests due to reservoir clearing operations is discussed in the cited paragraphs. The eventual fate of each of these nests is also discussed in these paragraphs.

COMMENT I.212:

"Page E-3-461: (q) Non-game (Small) Mammals: Paragraph 4: The text should explain how the estimated 5% decrease in northern red-backed vole numbers was derived."

RESPONSE:

This figure was derived from the estimate of 4.0 percent of white spruce habitat plus a smaller amount (area of type too small to be mapped) of balsam poplar ("cottonwood") habitat lost to the Watana impoundment in relation to the percent coverage of these types in the Susitna watershed upstream of Gold Creek. As stated in the text, these are preferred habitats of red-backed voles, therefore a decrease of up to 5 percent (4+%) in overall abundance of this species is expected.

COMMENT I.213:

"Page E-3-465: - Alteration of Habitat: Please see our previous comments and references on altered habitats under impacts from the Watana development (Section 4.3.1(a)[ii])."

RESPONSE:

Please refer to the Response to Comment I.181.

COMMENT I.214:

"Page E-3-469(i) Beaver: References in support of the conclusions drawn here should be provided. Please refer to our previous comments regarding uncertainties in the potential for downstream habitat improvement (Section 4.3.1[i]). We are concerned that, although modeling of hydrology, floodplain vegetation, and beaver populations is highly desirable, it is not now occuring as indicated in the response to our previous recommendations on this subject (Chapter 11, W-3-367)."

RESPONSE:

Further refinement and documentation of the impact assessment for beaver is being developed. Please refer to the Responses to Comments I.168 and I.198.

COMMENT I.215:

"Pages E-3-471 through E-3-474: (n) Raptors and Ravens: Please refer to our comments on Section 4.3.1(n) regarding the potential for conflict with the Bald Eagle Protection Act.

"Impacts of operating the Devil Canyon dam should be described."

RESPONSE:

Please refer to the Response to Comment I.210.

COMMENT I.216:

"Page E-3-474: (o) Waterbirds: Paragraph 1: We question the attributed benefits to migratory waterbirds from project-induced open water areas. We would not expect birds to arrive in the area any earlier. Birds which remain in the area longer may have problems finding food when encountering frozen waterbodies once they do leave. No data have been provided on any supplemental food values in the reservoir area; the discussion indicates shorebird feeding habitat would not be created."

RESPONSE TO COMMENT I.216:

Rereading of this section of the FERC License Application failed to reveal any inference made to attraction of waterfowl earlier or later than normal migration patterns already existing in the area due to open water. The statement: "The open water area near each end of the reservoir should benefit some early and later migrants when other waterbodies are frozen" (FERC License Application page E-3-474) refers to the fact that migrants during the very early or late periods often encounter frozen lakes and are forced to return to open water farther south, or land on ice and risk predation by land predators. Presence of open water in the Devil Canyon Reservoir will benefit these birds by providing limited areas of safe resting (and possibly feeding) habitat until other areas become ice-free (spring) or they continue migration (fall). If waterfowl were attracted to this open water late in the fall, they would only remain as long as food is available. Ice-free overwintering areas of waterfowl in Prince William Sound or Cook Inlet are well within one-day's flight time and are probable normal migration stopover or overwintering destinations for many waterfowl in the Susitna Basin in any event.

FERC License Application Section 4.3.2(O) states that the relatively stable water level in this impoundment "should allow for the development of some vegetation in the impoundment, although suitable shallow shoreline areas will be somewhat limited" (FERC License Application page E-3-474). This statement takes the predictive capability of future food resource assessment as far as is currently practical. The limited plant growth will provide some food for waterfowl, but again, limited amounts (quantitative assessment is not practical). The steep shorelines are not conducive to shorebird use; therefore, little usable habitat would be generated.

COMMENT I.217:

"Page E-3-476: (o) Waterbirds: Paragraph 2: Data should be provided to support the contention that 'distributional shifts' would occur and downstream habitats can support additional waterbirds."

RESPONSE TO COMMENT I.217:

The term "distributional shifts" could be eliminated from the referenced paragraph. It was meant to be interpreted loosely as distributional changes in relative abundance, which is already stated. The referenced section does not state nor is not meant to imply that downstream habitats can support additional waterbirds. However, as plant succession is influenced by changes in the water regime, so will the abundance of riparian species.

COMMENT I.218:

"Page E-3-476: 4.3.3 - Access Roads and Railway: Please refer to our previous comments and correspondence for any recommendations; those include dropping of the proposed Denali Highway-to-Watana access road segment (Sections 3.4.2(a), pages 256-262, and letters from the FWS to Eric P. Yould, APA, August 17, 1982 and January 14, 1983). A description of the proposed access plan should be included here for clarity."

RESPONSE:

A description of the proposed access plan is contained in FERC License Application Exhibit B, pages B-2-60 to B-2-76. Please refer to the Responses to Comments A.1, A.3, F.7 and I.384 for further discussion of the access plan and its impacts.

COMMENT I.219:

"Page E-3-477: (i) Mortality: Paragraph 2: While we agree with the statement '...carefully managed hunting may effectively mitigate for the indirect project effect of overutilization of remaining forage,' such management is the responsibility of the Alaska Board of Game and cannot be determined by the applicant. As proposed, the project will result in impacts which may foreclose some of the Board's options and desires for managing area game resources."

RESPONSE:

FERC License Application Exhibit E recognizes that the Power Authority will not have legal jurisdiction over hunting and trapping activities on public or private lands surrounding

RESPONSE TO COMMENT I.219 (cont.):

the Watana and Devil Canyon impoundments (see FERC License Application pages E-3-519 and E-3-534). The Exhibit also recognizes that the Board of Game may need to modify regulations with regard to project impacts (see FERC License Application pages E-3-519 and E-3-520). Please refer to the Response to Comment F.52 for additional discussion of this topic.

COMMENT I.220:

"Page E-3-481: (b) Caribou: Paragraph 7: We can find no table E.3.162 which includes estimates of vehicle traffic."

RESPONSE:

The paragraph in question contains a typographical error. The appropriate table should be "Table E.3.167: Total Average Daily Traffic on Access Road and Denali Highway During Peak Construction Year and Season."

COMMENT I.221:

"Page E-3-487: (h) Furbearers: Paragraph 1: First Sentance: Lack of accurate wetlands maps precludes a full assessment of project impacts."

RESPONSE:

Please refer to the Response to Comment I.330.

COMMENT I.222:

"Page E-3-487: (h) Furbearers: Paragraph 3: Potential use of material sites along Deadman Creek conflicts with assurances in the Botanical Resources section that use of such areas will be avoided through use of side-borrow and balanced cut-and-fill techniques for road development (Section 3.4.2[i]). This apparent discrepancy should be corrected."

RESPONSE:

The Botanical Resources Section (Section 3.4) does not make assurances that material sites along Deadman Creek will be avoided. Instead, on FERC License Application page E-3-265

RESPONSE TO COMMENT I.222 (cont.):

it states: "As shown in Figure E.3.37, nine borrow areas have been identified along the Denali Highway-to-Watana segment as far as MP 32. These will be excavated on a contingency basis to support road construction in cases where side-borrow material is not available in sufficient quantities." The furbearer impact section (see FERC License Application page E-3-487) reflects impacts in the absence of mitigation. Thus, given mitigation, the impacts of borrow areas from Deadman Creek on furbearers is essentially taken care of.

COMMENT I.223:

"Page E-3-489: (i) Raptors and Ravens: Please refer to our previous comments on Section 4.3.1(n) regarding requirements of the Bald Eagle Protection Act."

RESPONSE:

Please refer to the Response to Comment I.210.

COMMENT I.224:

"Page E-3-489: (i) Denali Highway to Watana Damsite: Paragraph 3: Inconsistencies regarding which bald eagle nesting locations will be destroyed by which project access features should be addressed. According to this section, one bald eagle nesting location, BE-6, in Deadman Creek, '...will be physically destroyed by access road construction.' The same statement, without the identifying location number, is repeated in Table E.3.159 under item (1). It is unclear whether the nest identified in that table is the same as the one previously described.

"In Table E.3.160, it is said that nest BE-6, '...may be affected by the access corridor in Deadman Creek,' and nesting location BE-8, '...may be affected by the construction of the railroad between Devil Canyon and Gold Creek.' These statements appear to contradict earlier descriptions in the Botanical Resources Mitigation Plan and Figure E.3.81 that, 'A balsam poplar stand near Deadman Creek at access milepost 37.5 has been avoided by a

COMMENT I.224 (cont.):

one-half-mile route realignment to protect a bald eagle nest in the stand' (page E-3-258, paragraph 2). While such road realignment is also described in Wildlife Resources Mitigation Plan (20), Section 4.4.2(b), the affected bald eagle nest is described as BE-8 (page E-3-537). No mention is made of BE-6 or mitigation for a bald eagle nesting location which would be disturbed by the railroad between Devil Canyon and Gold Creek. These apparent inconsistencies should be corrected."

RESPONSE:

Bald eagle nest BE-6 referred to on FERC License Application page E-3-489, is in fact the same bald eagle nest referred to under item (1) of FERC License Application Table E.3.159. The wildlife impact discussion referred to in the preceding sentence describes impacts that will occur in the absence of mitigative measures. As stated in the botanical resources mitigation option analysis (FERC License Application page E-3-258), "A balsam poplar stand near Deadman Creek at access milepost 37.5 has been avoided by a one-half-mile route realignment to protect a bald eagle nest in the stand (Section 4.4, Figure E.3.81)." The nest referred to is BE-6. FERC License Application Figure E.3.81 does indeed show that the original access route has been moved to avoid impacts to this bald eagle nest. The reference to nest BE-8 on FERC License Application page E-3-537 is a typographical error. The nest referred to is BE-6.

COMMENT I.225:

"Page E-3-492: 4.3.4 - Transmission Lines: We have previously described the problems with comprehensively assessing transmission line impacts in view of: (1) different vegetation classification schemes used for different segments of the line; (2) apparent inaccuracies in sums provided for affected vegetation types (e.g. Table E.3.86); and (3) inconsistent references to existence of a 69kv, 34 kv, or no temporary service transmission line adjacent to the Denali Highway-to-Watana access road. Please see Section 3.4.2(a)(i), page 269.

"We recommend that the resource agencies be consulted during detailed engineering design with regard to on-ground siting of the line and any maintenance access trails. Access trails to the line should be limited to reaches between major river crossings or topographical barriers. Locked gates or other impassible barriers should be placed at intersections of the maintenance access trails with public roadways. Please refer to our proposed Biological Stipulations, Attachment A, and Wetlands Construction Methods, Attachment C for further recommendations."

RESPONSE:

Please refer to the Response to Comment I.327 regarding a cumulative assessment of potential vegetation impacts associated with the transmission line. Please refer to Responses to Comments I.393 and A.7 regarding the construction power source. During the detailed engineering of the transmission line, appropriate agencies as well as landowners and managers will be consulted in finalizing the line route and access trails. Regarding access trails, please refer to Responses to Comments A.18, I.303, I.371 and F.39.

COMMENT I.226:

"Page E-3-493: 4.3.4 - Transmission Lines: Paragraphs 2 and 3: To minimize clearing requirements along the transmission corridor, we recommend that the 25-foot maintenance access trail be adjacent to the towers, in the area where vegetation will be kept to a minimum height. The applicant should provide the anticipated schedule and height criteria for safely maintaining vegetation clearing along the line. Opportunities to alter the schedule to maximize production of early successional vegetation types for moose and black

COMMENT I.226 (cont.):

bear should remain an option throughout project life. Clearing should be done after the ground has frozen and a snow cover is present to minimize the potential to damage soil and vegetation ground cover, assuming no bear dens are in the area.

"The referenced map of the transmission corridor (Figure E.3.37) is incomplete. We suggest addition of an overview map showing the locations of Figures E.3.48 through E.3.52.

"Changes in vegetation diversity will vary depending on which types are cleared, the existing interspersion of vegetation types and existing wildlife uses in specific areas."

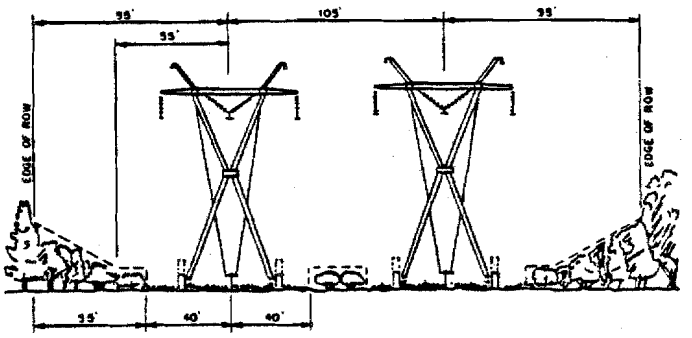
RESPONSE:

Final routing of the access trail for the transmission line will be determined by site specific data obtained through field investigations during the detailed construction planning for the line. It is anticipated that in areas of tall vegetation and, where allowable, due to terrain conditions, the access trail will follow the pattern shown in the attached Concept For Construction/Maintenance Access. Anticipated clearing heights are described in FERC License Application Exhibit E, Chapter 9, page E-9-48. Presently, the schedule for maintaining vegetation height standards is anticipated every ten years at a maximum. Final schedules for maintenance of the right-of-way will be determined by the operating contractor and will provide for flexibility depending on identified circumstances. FERC License Application Figure E.3.37 shows only the transmission line route between Watana and Gold Creek (the immediate project site). The complete transmission line route is referenced in FERC License Application Exhibit G, Plates G.30 through G.52. These maps are keyed to an overview index map shown in Plate G.4.

REFERENCES

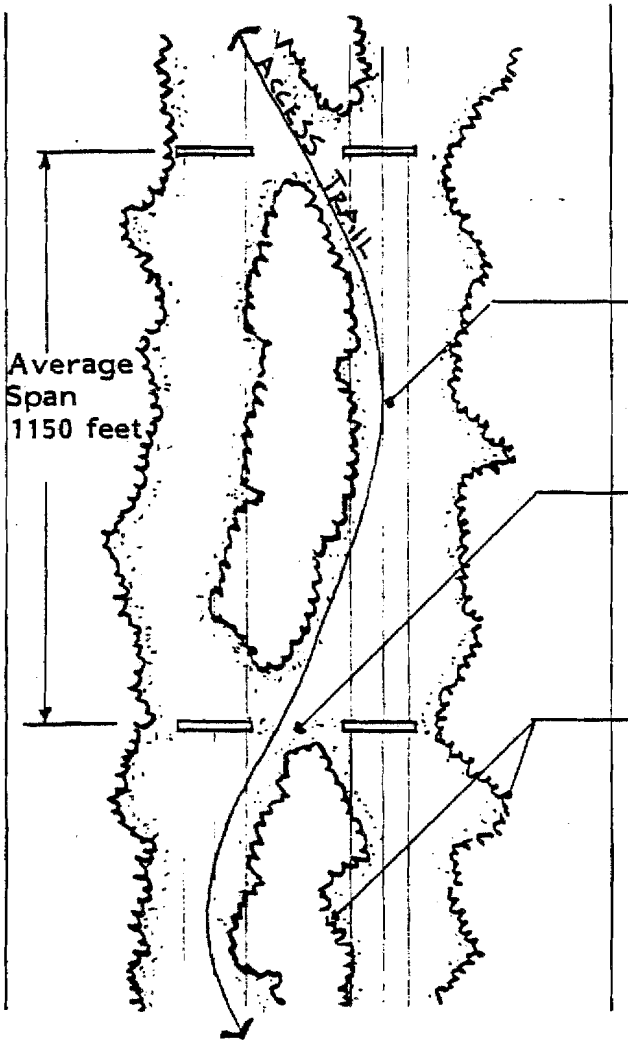
Alaska Power Authority, Susitna Transmission Concept For Construction, Maintenance Access and Clearing - Two Single Circuit Lines (January 1984).

TYPICAL CROSS SECTION



NOTE:
TOWER SPACING CENTERLINE TO CENTERLINE DISTANCE 105'
TOWER SPACING CENTERLINE TO EDGE OF RIGHT-OF-WAY 95'

NUMBER TOWERS	RIGHT-OF-WAY WIDTH
1	190 FEET
2	300 FEET
3	400 FEET
4	510 FEET



PLAN VIEW

Proposed access route through tall vegetation

Access utilizes cleared area under lines to minimize need for clearing center.

Tower areas kept clear of tall vegetation to provide access for maintenance.

Feather and selectively thin vegetation to reduce sheared-edge effect.

APPENDIX I. 226

SUSITNA TRANSMISSION

CONCEPT FOR CONSTRUCTION/MAINTENANCE ACCESS

AND CLEARING - TWO SINGLE CIRCUIT LINES

COMMENT I.227:

"Page E-3-494 through E-3-495: (a) Big Game: The contention that animals will relocate during construction and later return to the area should be scientifically supported or dropped. No information is provided on the availability and current wildlife use of areas immediately adjacent to the line. During detailed transmission line siting we would expect that additional bear denning areas would be located and efforts made to site the line away from those areas. At a mimimum, restrictive time-frames should be set during which construction of those segments would be allowed. This section fails to indicate that the 'temporary effects' of disturbances caused by human activities during construction will be repeated during as-yet-undefined periods of maintenance. Where increased browse production along the transmission line attracts moose, there is a potential negative effect if the transmission line is adjacent to roads or railways."

RESPONSE:

The reactions of animals to human disturbance along corridors has received considerable attention in northern areas (Geist 1963, Mathisen 1968, Klein 1971, Barry and Spencer 1976, Tracy 1977, Roby 1978, etc.). As expected, most wildlife species avoid areas of intense human activity, but will usually relocate into these areas once the disturbance has diminished. Several studies of ungulates, for example, have noted an increase in ungulate numbers in areas where human activities have purposefully or inadvertently improved habitat for these species. For example, Peek, et al. (1976) studied historical trends in moose populations in northeastern Minnesota, and reported that the marked increases in moose numbers that occurred from 1925 to 1933 and from 1960 to 1970 followed periods of sawtimber cutting and pulpwood harvesting, respectively. The population appeared to have increased by 300% from 1960 to 1970 according to aerial survey results. The creation of forest clearings and the retardation of forest succession by bulldozed clearings, prescribed burning, thinning and herbicide application are often used as management techniques to increase the use of areas by moose, deer and elk (Krefting 1941, Erickson, et al. 1961, Gysel 1961, Spencer and Hakala 1964, Dills 1970, McCaffery, et al. 1974, Euler 1975, Asherin 1976, Folliot, et al. 1977, Usher 1978). Use of these newly created areas and subsequent ungulate population increases could not have occurred if these species had failed to reutilize disturbed areas once human

RESPONSE TO COMMENT I.227 (cont.):

activities had ceased. Other examples, involving wildlife of many species repsonding positively to habitat manipulations also exist, but are far too numerous to mention here.

Although a research program into wildlife use and population densities present near the transmission corridor stretcing from Fairbanks to Anchorage does not seem warranted at this time, planning and route refinement for the corridor is a continuing process and includes site reconnaissance and interaction with wildlife regulatory agencies to ensure that important wildlife habitats and use areas near the corridor are protected. Included in this process is identification and avoidance of particularly sensitive sites, such as trumpeter swan and raptor nesting locations, ungulate calving sites and bear denning sites. Generally low growth rates of woody vegetation in northern latitudes allows clearing activities to occur several years after the previous cutting, a period of time sufficient for wildlife to reestablish use patterns in these corridors. Clearing operations for project transmission line rights-of-way are presently anticipated to occur every ten years at a maximum. Localized clearing associated with tower and line maintenance or repair may be required more frequently. Final schedules for vegetation maintenance of the right-of-way are likely to vary along the corridor depending on the type of vegetation encountered and its growth characteristics. These schedules will be determined by the operating contractor in consultation with appropriate wildlife regulatory agencies. Much of the transmission corridor has been sited away from roads and railways, although out of necessity it must cross several transportation corridors along its length. Methods for controlling access along the transmission line will be determined in consultation with appropriate agencies, land owners and land managers during preparation of the construction access and maintenance plan.

REFERENCES

Asherin, D. A., Changes in the Elk Use and Available Browse Production on North Idaho Winter Ranges Following Prescribed Burning, pages 122-134 in: Proc. Elk-Logging-Roads Symp., Univ. of Idaho, Moscow (1976).

Barry, T. W. and R. Spencer, Wildlife Response to Oil and Well Drilling, Can. Wildl. Serv. Prog. Note No. 67 (1976).

RESPONSE TO COMMENT I.227 (cont.):

Dills, G. G., Effects of Prescribed Burning on Deer Browse, J. Wildl. Manage, 34:540-545 (1970).

Erickson, A. B., V. E. Gunvabon, M. H. Stenlund, D. W. Burcalow and L. H. Blankenship, The White-Tailed Deer of Minnesota, Minnesota Div. of Game and Fish Tech. Bull. No. 5 (1961).

Euler, D., The Economic Impact of Prescribed Burning on Moose Hunting, J. Environ. Manage., 3:1-5 (1975).

Ffolliott, P. F., R. E. Thill, W. P. Clary and F. R. Larson, Animal Use of Ponderosa Pine Forest Openings, J. Wildl. Manage., 41:782-784 (1977).

Geist, V., On the Behaviour of the North American Moose (Alces alces andersoni Peterson 1950) in British Columbia, Behav., 20:377-416 (1963).

Gysel, L. W., Bulldozing to Produce Browse for Deer, Michigan Agr. Exp. Sta., Lansing, Quarterly Bull., No. 43:722-731 (1961).

Klein, D. R., The Reaction to Produce Browsing for Deer, Michigan Agr. Exp. Sta., Lansing, Quarterly Bull., No. 43:722-731 (1971).

Krefting, L. W., Methods of Increasing Deer Browse, J. Wildl. Manage., 5:95-102 (1941).

Mathisen, J. E., Effects of Human Disturbance on Nesting Bald Eagles, J. Wildl. Manage., 32:1-6 (1968).

McCaffrey, K. R., L. D. Martoglio and F. L. Johnson, Maintaining Wildlife Openings With Picloram Pellets, Wildl. Soc. Bull., 2:40-45 (1974).

Peek, J. M., D. L. Urich and R. J. Mackie, Moose Habitat Selection and Relationships to Forest Management in Northeastern Minnesota, Wildl. Monogr. No. 48 (1976).

Roby, D. D., Behavioral Patterns of Barren-Ground Caribou of the Central Arctic Herd Adjacent to the Trans-Alaska Oil Pipeline, M. S. Thesis, Univ. of Alaska, Fairbanks (1978).

Spencer, D. L. and J. Hakala, Moose and Fire on the Kenai, Proc. Ann. Tall Timbers Fire Ecol. Conf. 3:10-33 (1964).

RESPONSE TO COMMENT I.227 (cont.):

Tracy, D. M., Reactions of Wildlife to Human Activity Along Mount McKinley National Park Road, M.S. Thesis, Univ. of Alaska, Fairbanks (1977).

Usher, R. G., The Response of Moose and Woody Browse to Clearing in the Boreal Mixed-Wood Zone of Alberta, M.Sc. Thesis, Univ. of Calgary, Calgary, Alberta (1978).

COMMENT I.228:

"Page E-3-495: (iii) Willow to Healy: Paragraph 1: The text should indicate whether widening of the Intertie between Willow and Healy will be immediately adjacent to the existing line throughout that corridor."

RESPONSE:

Susitna transmission lines paralleling the Intertie route will be located adjacent to the Intertie line. Spacing requirements between the Intertie and Susitna lines will be similar to those shown in FERC License Application Figure E.3.85 (Typical Transmission Right-of-Way Cross Section). Deviations from this spacing requirement may occur in specific areas where site specific impacts or constraints resulting from construction of the Intertie have been identified. Such refinements in line routing will be determined during the detailed construction planning for the transmission line in consultation with the appropriate landowners/managers and agencies.

COMMENT I.229:

"Page E-3-496: (b) Furbearers: Paragraph 2: Please refer to our previously described concerns with the marten model, Section 4.2.1(m)."

RESPONSE:

Please refer to the Response to Comment I.203.

COMMENT I.230:

"Page E-3-497: (c) Birds: Paragraph 3: Reasons as to shy the 34kv construction transmission line could not be built to avoid the possibility of electrocution should be

COMMENT I.230 (cont.):

discussed. Electrocution is another reason why this should not be the power source for project construction. Please also refer to our previous comments on the construction of transmission lines, Section 3.4.2(a)(i)."

RESPONSE:

A final decision regarding the size and routing of a transmission line to provide construction power has not yet been made. Please refer to the Response to Comment I.393.

In general, without mitigation, the potential of raptor electrocution is greater on transmission lines 69 KV or smaller due largely to closer phase spacing and grounding practices. However, for the Susitna Project, if the lower voltage line is selected to supply construction power, the towers will be designed to conform to Rural Electrification Administration (REA) guidelines and will incorporate other standards (Olendorff 1981) for protecting raptors. Some of these mitigative measures are shown in Figures E.3.119 through E.3.123 of Exhibit E of the License Application. These mitigation measures are presented as Mitigation Plan 22 on page E-3-539 of FERC License Application Exhibit E.

REFERENCES

Olendorff, R. R., A. D. Miller and R. N. Lehman, Suggested Practices for Raptor Protection on Powerlines, The State of the Art in 1981, Raptor Res. Rep. No. 4 (1981).

COMMENT I.231:

"Page E-3-498: (c) Birds: Paragraph 7: Because of potential disturbance to golden eagle and raven nesting locations (GE-18, R-13, and R-21), we recommend that construction of the transmission line between Watana dam and the Intertie occur before March 1 and after May 10 (per Table E.3.128) if those nests are inactive, or before March 1 and after the interagency monitoring team confirms that the young have fledged and left (in July for ravens and in September for golden eagles) if the nests are active."

RESPONSE TO COMMENT I.231:

As stated on FERC License Application page E-3-533 and Table E.3.168, major ground activity will be prohibited within 1/2 mile of active golden eagle nests between August 31 and March 14. Nests will be assumed to be occupied until June 1 each year. No specific restrictions have been adopted for activities near common raven nesting locations, although construction activities will be avoided, where possible, in the vicinity of raven nests during sensitive periods. The raptor nest protection criteria listed in FERC License Application Table E.3.168 were developed for the proposed Alaska Natural Gas Transportation System by raptor biologists in Alaska and were modified for application to the Susitna Basin based on known phenology of nests.

COMMENT I.232:

"Page E-3-499: 4.3.5 - Impact Summary: Paragraph 1: Criteria used to determine whether impacts on wildlife populatons were, '...of sufficient magnitude to influence mitigation planning,' should be provided. We are concerned that emphasis appears to be on impacts for which mitigation measures can later be recommended. Uncertainties in predicting project impacts on the basis of existing information are evident here. The general and incomplete nature of the resulting Mitigation Plan are due to these uncertainties."

RESPONSE:

Mitigation goals and planning criteria are discussed in the FERC License Application Exhibit E, Chapter 3, Section 1.3 pages E-3-3 to E-3-6 and, in further detail at pages E-3-147 to E-3-190, E-3-250 to E-3-275 and E-3-508 to E-3-550. Mitigation planning focused on programs that are associated with significant species and for which practical mitigating techniques exist or are likely to be developed in time for application for this project. Additional studies are being performed to refine the precision of impact analyses and mitigation planning (see Responses to Comments A.10C, F.6, F.27 and F.47). In particular, the systems of aquatic models should provide increasing resolution on impact assessment, mitigation and enhancement plans for fisheries.

The Power Authority anticipates that the DEIS will discuss impact assessment uncertainties.

COMMENT I.233:

"Page E-3-499: 4.3.5 - Impact Summary: Paragraph 2: We previously commented on the need to integrate discussions of hunting with those in the Socioeconomic and Recreation Chapters of the Exhibit E. Hunting demand and harvest data presented throughout Section 4.3 are minimal and not up-to-date. The location of the section on socioeconomic/wildlife relationships, which has apparently been added to Chapter 3 in response to our comment (Chapter 11, W-3-424), should be noted."

RESPONSE:

Please refer to the Responses to Comments I.155 and I.185 and Section 4.4.1(b) Mortality Factors (i) Hunting and Trapping (FERC License Application Exhibit E, Chapter 3), which contains the detailed discussion of hunting and socioeconomic concerns related to alteration in human use patterns in the area, as requested from the Draft Application.

COMMENT I.234:

"Page E-3-499: (a) Big Game: Paragraph 2: The preliminary estimate of 300 moose which winter in the Watana impoundment should be indicted here; also see our comments on Section 4.2.1(a)(ii). Apparently more recent censuses by ADF&G have found over 600 moose wintering in the impoundment zone (Warren Ballard, personal communication)."

RESPONSE:

This estimate should be identified as "preliminary" as the commentor suggests. Please refer to the Reponses to Comments F.30 and I.153 for responses to the remainder of this comment.

COMMENT I.235:

"Page E-3-500: Paragraph 2: Estimated moose losses to other project facilities should be qualified as above. The last sentence in this paragraph is unsubstantiated and subjective. The amounts of existing vegetation types and the vegetation succession expected for each of those types, over time, should be quantified."

RESPONSE TO COMMENT I.235:

See the Responses to Comments I.306, I.336, I.344 and I.492.

COMMENT I.236:

"Page E-3-500: Paragraph 3: Although it may not be possible to accurately predict downstream habitat changes, alternative scenarios should be presented for different flow regimes, snow depths, and river morphologies. Such information would allow assessment of the range of possible impacts and thus necessary mitigation."

RESPONSE:

Please refer to the Responses to Comments C.87, I.326, I.346, I.542 and I.552.

COMMENT I.237:

"Page E-3-500: Paragraph 4: Whether alternative areas can support displaced moose or whether those moose will alter their movements in response to specific habitat alterations is unknown throughout the project area."

RESPONSE:

The most recent available information indicates that approximately 1,900 to 2,600 moose have home ranges which include any portion of the impoundment areas (and, by inference, surrounding facility sites) (Ballard, et al. 1983). Although individual moose will undoubtedly alter their movements to avoid the impoundment areas and other project facilities, and will probably use the transmission corridors as browse sources and as movement corridors, these alterations in movement are not expected to produce changes in the size or productivity of the 1,900-to-2,600-moose population in question. Moose populations through which the entire transmission system passes will cumulatively total far more than 2,600 individuals, and population-level impacts to these moose will be even less likely to occur. Avoidance behavior due to construction-related disturbances is also not expected to produce a detectable population-level impact on moose. Such short-term disturbances will probably result in temporary avoidance by moose of areas of concentrated human activity, especially in

RESPONSE TO COMMENT I.237 (cont.):

the immediate vicinity of the Watana and Devil Canyon dam construction sites.

As stated in the discussion preceding the paragraph questioned by the reviewer, "[m]oose will be most severely affected by habitat loss caused by inundation of spring and winter range" (Exhibit E, Chapter 3, page E-3-499). The entire moose impact assessment presented in the License Application supports this point. Alterations in the movements of individual animals to avoid facilities and human activities will have a negligible effect compared to that of habitat loss.

REFERENCES

ADF&G, Susitna Hydroelectric Project, Phase II Progress Report - Big Game Studies (1983), previously submitted to the FERC on May 31, 1983.

Ballard, W. B., J. S. Whitman, N. G. Tankersley, L. D. Aumiller and P. Hessing, Volume III, Moose - Upstream (1983).

COMMENT I.238:

"Page E-3-502: Paragraph 1: We concur with the ADF&G's concern."

RESPONSE:

The Power Authority also shares this concern. Impacts to current or higher population levels, as summarized on FERC License Application page E-3-501, may reduce management options, as noted on FERC License Application page E-3-502.

COMMENT I.239:

"Page E-3-502: Paragraph 2: Loss of escape cover and disturbance from reservoir clearing activities in the vicinity of the Jay Creek mineral lick area should be discussed."

RESPONSE TO COMMENT I.239:

Please refer to the Responses to Comments I.191 and A.11.

COMMENT I.240:

"Page E-3-502: Paragraphs 3 and 4: Increased access and developments near Prairie Creek are a further source of disturbance to brown bears using those salmon food resources."

RESPONSE:

No project construction activities are proposed for the Prairie Creek area. A potential recreational development (trails, campsites, dock) is included at Stephan Lake (approximately five miles away) in Phase 5 (last) of the Recreational Development Plan (License Application page E-7-108,109). Facilities will be developed there only if demand requires and if their development will not result in unacceptable adverse effects.

COMMENT I.241:

"Page E-3-504: (b) Furbearers: Paragraph 1: and Page E-3-505: Paragraph 2: Please refer to our comments on Section 4.3.1(i)[ii]."

RESPONSE:

Please refer to the Responses to Comments I.198, I.199, I.200 and I.201.

COMMENT I.242:

"Page E-3-504: Paragraph 3: Work on the beaver habitat model has been at a standstill since the February 28-March 2, 1983, follow-up AEA workshop. With no additional data collection or modeling efforts funded in the State's fiscal year 1984 budget, we question how this model will be developed."

RESPONSE TO COMMENT I.242:

Please refer to the Response to Comment I.168.

COMMENT I.243:

"Page E-3-506: Paragraph 1: The quantification of marten losses provided here (also see Section 4.3.1[m]) is inconsistent with the discussion under Devil Canyon impacts, Section 4.3.2(m), where losses are predicted to be 14 marten. The discrepancy should be corrected."

RESPONSE:

The text on FERC License Application page E-3-471, Section 4.3.2(m) should be corrected to read "Habitat for approximately 21 marten will be lost to the impoundment and construction sites, borrow sites, etc." Likewise, FERC License Application Table E.3.157 should also be corrected to read "Approximately 21 marten will be lost to D.C. impoundment." These corrections will then make these sections consistent with the estimate of marten lost due to habitat removal by the Devil Canyon impoundment and facilities as summarized on FERC License Application page E-3-506. The estimate of 21 marten was derived by using the estimate of forest habitat loss in the Devil Canyon area given in FERC License Application Table E.3.84, and the estimate of marten population density in the Susitna Basin from License Application Section 4.3.1(m), in the following equation:

Forest habitat lost x population density = No. of marten affected

(2,499 ha) x (0.0085/ha) = 21 marten

COMMENT I.244:

"Pages E-3-506 through E-3-507 (c) Birds and Non-game Mammals: Taking of bald and golden eagles is generally prohibited under the Bald Eagle Protection Act (see Section 4.3.1[n])."

RESPONSE TO COMMENT I.244:

Please refer to the Response to Comment I.210. The Power Authority's letters as early as February 1983 to the USFWS note this and requested assistance in determining a solution.

COMMENT I.245:

"Page E-3-508: 4.4 - Mitigation Plan: This is a good first step in developing a comprehensive plan for mitigating project impacts. Presentation of the plan in the license application is the first opportunity for interagency scrutiny and review by principal investigators. Studies must be completed, measures refined, numerous details added, and implementation assured before the plan can be approved. We suggest that the applicant works closely together with appropriate agencies to develop a detailed, mutually acceptable mitigation plan. The intent of this comment is to initiate and encourage continuation of studies to close data gaps identified in previous sections of the license application.

"Since many wildlife mitigation measures are identical to botanical mitigation measures, our concerns and mitigation recommendations on Section 3.4 are thus applicable to Section, 4.4; e.g., facility siting, reclamation, access regulation, habitat acquisition and improvement, etc. Please also refer to Attachments A through C."

RESPONSE:

On page E-3-508, the FERC License Application states that as additional information from "continuing studies becomes available, certain concepts contained in this mitigation plan will be refined to specify the number, location, and design of mitigation features." Mitigation plan refinement is an ongoing process that involves incorporation of field study and modeling results, as well as consultation with resource agencies. Agency consultation is being conducted through monthly meetings involving key terrestrial study team members, including representatives from the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game. In addition, numerous technical meetings on specific topics related to impact assessment and mitigation plan refinement are taking place which involve agency personnel. A mitigation plan refinement report to include the most refined version of the terrestrial mitigation plan including

RESPONSE TO COMMENT I.245 (cont.):

specific implementation procedures for many aspects, will be available in late May 1984.

COMMENT I.246:

"Page E-3-508: 4.4 - Mitigation Plan: Paragraph 2: In addition to the vegetation and wetlands mapping and vegetation data analysis described previously (Section 3.2.2), other required studies include: (1) moose food habits and browse information necessary to complete the moose carrying capacity model; (2) continued radio-tracking of collared big game, including moose downstream and recollaring of animals whose collars will soon become nonfunctioning, (also see footnotes 3W-5 and 3W-8); (3) fall cache counts and marking of beaver lodges for follow-up, (4) use of snow transects to census marten tracks, in and adjacent to the impoundment area, (5) examination of otter tracks for concentration in late fall relative to grayling overwintering areas, (6) continued development of species models through both small, single discipline work sessions and larger interdisciplinary workshops to ensure that objectives are coordinated, a common base of project assumptions are used, and plans are complementary; and (7) testing of recommended mitigation measures, e.g., disturbed site reclamation, habitat improvement (completion and follow-up of the proposed Alphabet Hills burn, follow-up on disturbed logging and mining areas near Palmer, etc.).

"We recommend that the Environmental Guidelines included as Appendix E.3.B to the Exhibit E '...be incorporated by the Alaska Power Authority,' (Chapter 11, W-3-437). We have attached to our comments a more complete set of Biological Stipulations. We recommend that Attachment A be incorporated into the license and construction contracts."

"3W-5/ Miller, Sterling D. and Dennis C. McAllister. 1982. Susitna Hydroelectric Project. Phase I Final Report. Big Game Studies. Volume VI, Black Bear and Brown Bear, page 60. Submitted to the APA by the ADF&G."

"3W-8/ Modafferi, Ronald D. March 1982. Susitna Hydroelectric Project, Phase I Fina 1 Report, Big Game Studies. Volume II. Moose-Downstream. Submitted to the APA by the ADF&G.

COMMENT I.246 (cont.):

"Ballard, Warren B., Craig L. Gardner, John H. Westland, and James R. Dav. March 1982. Susitna Hydroelectric Project, Phase I Final 1 Report, Big Game Studies. Volume III. Moose-Upstream. Submitted to the APA by the ADF&G.

"Also see Footnotes 3W-1 and 3W-3. [Footnote 3W-1/ Modafferi, Ronald D. April 1983. Susitna Hydroelectric Project, Phase II Progress Report, Big Game Studies. Volume II Moose-Downstream. Submitted to the APA by the ADF&G. Ballard, Warren B., Jackson S. Whitman, Nancy G. Tankersley, Lawrence D. Aumiller, and Pauline Hessing. April 1983. Susitna Hydroelectric Project, Phase II Progress Report, Big Game Studies. Volume III. Moose Upstream. Submitted to the APA by the ADF&G.] [Footnote 3W-3/ Everitt, Robert R., Nicholas C. Sonntag, Gregory T. Auble, James E. Roelle, and William Gazey. October 22, 1982. Susitna Hydroelectric Project Terrestrial Environmental Workshop and Preliminary Simulation Model. LGL Alaska, Anchorage, and Fairbanks. Everitt, Robert R., Nicholas C. Sonntag, Gregory T. Auble, James E. Roelle, and William Gazey. April 27, 1983. Susitna Hydroelectric Project, Draft Report, Terrestrial Environmental Mitigation Planning Simulation Model. ESSA Ltd., USFWS and LGL Alaska for Harza/EBASCO, Anchorage.]"

RESPONSE:

This Comment consists of many parts, most of which are individually addressed in greater detail by other Comments. Please refer to the appropriate Responses as follows:

Paragraph 1		Comments
1.	moose food habits, browse, carrying capacity model	C.86, I.53
2.	radio-tracking big game	C.78
3.	beaver studies	C.80, I.168
4.	marten studies	see below
5.	otter studies	I.172
6.	species models	see below
7.	testing of mitigation measures	C.82, F.80, F.61, I.2

RESPONSE TO COMMENT I.246 (cont.):

Paragraph 2	Comments
Environmental Guidelines/ Biological Stipulations	I.377 I.425-I.489

Regarding Item 4 under paragraph 1 of the Comment, additional marten studies are not currently planned. The ecology of marten have been studied for 2-1/2 years in the Project area (Buskirk 1983). The full results of these data were not available during preparation of the FERC License Application. As part of impact assessment refinement, improved estimates of marten numbers affected by the Project will be generated based on all available data.

Also, the Power Authority anticipates that the DEIS will describe and incorporate existing studies of the topics mentioned in this Comment.

REFERENCES

Buskirk, S. W., The Ecology of Marten in Southcentral Alaska, Ph.D. Thesis, Univ. of Alaska, Fairbanks (1983).

COMMENT I.247:

"Page E-3-509: (a) Reduction in Carrying Capacity: Our previous comments on minimizing disturbed areas, consolidating features, and using mitigative construction techniques apply here (see Section 3.4.2)."

RESPONSE:

Please refer to the specific Comments on the cited section, FERC License Application pages E-3-252 to E-3-291. Specifically, see the Responses to Comments I.381, I.382, and I.389.

COMMENT I.248:

"Page E-3-510: (i) Moose: Paragraph 1: Calculations of losses in vegetated habitat should be corrected. An additional 406 ha will be permanently lost to roads and

COMMENT I.248 (cont.):

highways. Neither borrow sites nor spoil areas for road construction were included in the 1875 ha calculated for temporary facilities and borrow sites (also see our comments on Tables E.3.83 and E.3.84)."

RESPONSE:

As stated on FERC License Application page E-3-253, which has been revised based on supplemental information, approximately 447 hectares will be lost to project-related roads, and an additional 14 hectares may be lost temporarily through the construction of borrow areas in support of the access routes. Because detailed mining plans have not been prepared for borrow sites, and because spoil areas for road construction have not yet been identified, it is not possible to determine areas of specific habitat types which will be affected by these facilities. During detailed engineering design, geotechnical investigations will determine more precisely the probable locations of borrow sites and spoil areas to be designed following detailed routine surveys. Because the precise locations and area extents of these facilities have not yet been determined, they cannot be included in the license application except in a general way. As detailed engineering design and construction planning proceed, environmental specialists working in the engineering design office will make more precise determinations with respect to specific vegetation types affected by these facilities. More importantly, these environmental specialists will provide the necessary information to insure that vegetation types of high value to wildlife or of other special resource interest (i.e., wetlands) will be avoided as much as feasible by detailed engineering design. See also the Response to Comment I.235.

COMMENT I.249:

"Page E-3-510: (i) Moose: Paragraph 6: We agree with the concept of transmission corridor clearing to maximize browse production for moose. The potential benefits should be quantified and then discussed in terms of adjacent moose uses, movements and limiting factors."

RESPONSE:

As stated in FERC License Application Exhibit E, on page E-3-526,

RESPONSE TO COMMENT I.249 (cont.):

"Minimization of habitat loss to the transmission corridor will be accomplished by selective clearing in the corridor (Figure E.3.85), leaving small shrubs and trees, and by leaving a 35-foot (10 m) wide strip of vegetation up to 10 feet (3 m) tall. Additional rectification for habitat loss will be provided by allowing vegetation to grow to a height of 10 feet (3 m) during operation. The transmission corridor design is described more completely in Section 3.4.2. This design will actually enhance habitat for moose and other wildlife preferring vegetation types in early successional stages."

COMMENT I.250:

"Page E-3-510: (i) Moose: Paragraph 7: Hunting is controlled by the Alaska Board of Game. To the extent that the need for a controlled hunt is caused by the project, then the project has foreclosed management options of the Board."

RESPONSE:

Please refer to the Response to Comment I.219.

COMMENT I.251:

"Page E-3-511: (ii) Caribou: Given the unknown nature of project impacts to caribou, provisions must be included in the license to later compensate for impacts found thru project monitoring."

RESPONSE:

The Power Authority objects to the impact assessment for caribou being characterized as "...given the unknown nature of project impacts..." The major uncertainty of the analysis is related to the conjectural impact mechanisms suggested by resource agencies and which the authors acknowledge in their discussion. Direct project impacts on caribou populations will probably be insignificant with respect to habitat loss, minor with respect to the access corridor, and minor with respect to crossing the reservoir (Fancy, 1983 and Jakimchuk, 1980).

The Power Authority in a letter from Richard Fleming to Chris Beck of the Department of Natural Resources dated 23 August 1983 suggested that if the Nelchina Special Use District ever became a reality, the upper portions of the reservoir and adjacent project lands could be managed in a manner compatible with the goals of the Special Use District. This and the other proposed management activities

RESPONSE TO COMMENT I.251 (cont.):

should provide sufficient compensation for the commentor's conjectural impact to caribou.

REFERENCES

Alaska Power Authority, Letter from Richard Fleming to Chris Beck, Department of Natural Resources (August 23, 1983).

Fancy, Steven G., Movements and Activity Budgets of Caribou Near Oil Drilling Sites in the Sagavanirktok River Floorplain, Alaska (June, 1983).

Jakimchuk, R. D., Disturbance to Barrenground Caribou; A Review of the Effects and Implications of Human Developments and Activities (July, 1980), previously submitted to the FERC on May 31, 1983.

COMMENT I.252:

"Page E-3-512: (iii) Dall Sheep: Lowering the Watana dam height would minimize or avoid impacts to sheep. If the dam were about 185 feet lower than now proposed, physical loss of the Jay Creek mineral lick and escape cover would be largely avoided and disturbance would be somewhat minimized."

RESPONSE:

Please refer to the Response to Comment A.11 for further discussion of the complex of lick sites known as the Jay Creek mineral lick.

Regarding major changes in the Project such as lowering the Watana Dam height by 185 feet, please see Responses to Comments B.1 - B.5 and F.39.

COMMENT I.253:

"Page E-3-513: (iv) Brown Bears: Paragraph 6: Cooperative management agreements to mitigate potential impacts of secondary development and access should be reached among the APA, resource agencies, and private landowners and incorporated into the project license. We recommend that public access not be allowed on the project spur road across the Watana dam. Such access prohibitions are necessary to

COMMENT I.253 (cont.):

prevent disturbance to bear concentrating on Prairie Creek during salmon runs."

RESPONSE:

Prairie Creek is located approximately 20 air miles southwest of the Watana site. At the present, the only access is by float plane to Lake Stephan. Project studies have indicated a significant gathering of grizzly bear feeding along the creek during the salmon runs up the creek. A host of conjectural impacts on bear populations have been proposed which related to the development of the surrounding lands by the landowner (i.e., native corporations). These have been viewed as secondary project impacts. The impacts relate primarily to increased human activity around Lake Stephan and along Prairie Creek and to increased hunting pressure.

At this time it is unclear how, or when, native corporations will develop their lands. The actions of the native corporations are the major determinant with respect to possible adverse impacts to bear populations.

The Power Authority is in no position, nor does it have any desire, to impede native development of native lands. In fact, the intent of the Alaska Native Claims Settlement Act was to provide a resource basis to support development of the native community. The Power Authority does not assume any burden related to conjectural impacts caused by native development of native land. Fish and Wildlife Resource Agencies should address their concerns directly with the native landowners and the land managing agencies.

COMMENT I.254:

"Page E-3-513: (v) Black Bears: Paragraph 2: Aligning transmission corridors through tundra areas may not minimize impacts to black bears, and may disturb brown bears; thus we question the rational for this alignment."

RESPONSE:

As documented in Miller and McAllister (1982) and Miller (1983), both bear species are wide ranging and utilize a variety of tundra, shrubland and forest habitats. Thus, from the standpoint of minimizing impacts to bears, the value of one transmission corridor alignment over another is difficult to demonstrate conclusively. The main reason for

RESPONSE TO COMMENT I.254 (cont.):

aligning the transmission corridor between Watana and Devil Canyon adjacent to the Watana to Devil Canyon access road is to provide consolidation of the two facilities within a common corridor, thus minimizing the zone of disturbance. We believe that this approach in itself is of value in minimizing impacts to both brown and black bears, and, in fact, accommodates the Department of the Interior's preferences as expressed in comments on the Draft License Application (Department of Interior, National Park Service letter on Draft License Application, January 14, 1983, FERC License Application, Volume 10B, Chapter 11, Comment W-10-019).

REFERENCES

ADF&G, Susitna Hydroelectric Project, Phase I Final Report - Big Game Studies (1982), previously submitted to the FERC on May 31, 1983.

Miller, S. D. and D. C. McAllister, Volume VI, Black Bear and Brown Bear (1982).

ADF&G, Susitna Hydroelectric Project, Phase II Progress Report - Big Game Studies (1983), previously submitted to the FERC on May 31, 1983.

Miller, S., Volume VI, Black and Brown Bear (1983).

COMMENT I.255:

"Page E-3-514: (vi) Wolves: Wolves may ultimately be negatively affected by reductions in prey populations and increased harvest pressures (page E-3-432, paragraph 1 and page E-3-518, paragraph 3). The text should acknowledge these impacts."

RESPONSE:

In addition to the cited pages, these impacts are clearly discussed on FERC License Application page E-3-503 in the Impact Summary Section (Section 4.3.5) and on FERC License Application pages E-3-514 and E-3-518 of the Impact Issues and Option Analysis Section (Section 4.4.1) under the Mitigation Plan.

COMMENT I.256:

"Page E-3-514: (viii) Beavers and Muskrat:and (ix) Mink and Otter: The APA should clarify the magnitude and certainty for downstream habitat improvements (see our comments on Section 4.3.1(i)(ii))."

RESPONSE:

Please refer to the Response to Comment I.198.

COMMENT I.257:

"Page E-3-515: (x) Marten: Please refer to our previous comments on the preliminary nature of quantified of marten losses (Section 4.3.1[m])."

RESPONSE:

Please see the Response to Comment I.203.

COMMENT I.258:

"Page E-3-515: (xi) Raptors and Raven: Paragraph 2: The potential for the project to be in conflict with the Bald Eagle Protection Act was previously detailed (Section 4.3.1[n])."

RESPONSE:

Please refer to the Response to Comment I.210.

COMMENT I.259:

"Page E-3-515: (xi) Raptors and Raven: Paragraphs 3 and 4: While the total golden eagle population will not be greatly affected, limited nesting habitat and sparse populations in the interior make project impacts locally significant."

RESPONSE:

The intent of this Comment is unclear, as it echoes statements made earlier in the FERC License Application. Specifically, FERC License Application page E-3-444, paragraph 2 states:

RESPONSE TO COMMENT I.259 (cont.):

> "As a consequence, direct losses of cliff-nesting locations in the middle basin as a result of construction of the Susitna Hydroelectric project are judged to be reasonably significant to the golden eagle population inhabiting the Susitna River drainage."

Should the commentor be concerned that mitigation efforts are not sufficient, mitigation for bald and golden eagles remains one of the highest priorities of mitigation efforts for affected wildlife. Considerable precedence has been established for compensation of project effects by replacing or moving nests or nest sites in other parts of North America, and it is anticipated these techniques will work in Alaska as well.

COMMENT I.260:

"Page E-3-517 through E-3-520: (i) Hunting and Trapping Mortality: Please refer to Section 4.4.1(a)[i])."

RESPONSE:

Please see the Responses to Comment I.219.

COMMENT I.261:

"Pages E-3-518 to E-3-519: (i) Hunting and Trapping Mortality: Paragraph 5: We have previously commented on the need to improve downstream sloughs for aquatic furbearers (Section 4.3.1(i)[ii]). It is currently unknown which lakes are deep enough to allow successful overwintering and dispersal for beaver and muskrat."

RESPONSE:

Please see the Responses to Comments I.198 and I.171 for responses to the first and second parts of this comment, respectively.

COMMENT I.262:

"Page E-3-520 through E-3-522: (ii) Additional Mortality: An environmental orientation program should be requisite at worker's initiation of employment (see Attachment A). Animal control measures should be coordinated. For example, beaver control efforts at culverts or sloughs may be

COMMENT I.262 (cont.):

desirable for salmon yet beaver colonization may be encouraged in other project areas."

RESPONSE:

As detailed project design, mitigation planning and execution and environmental monitoring continue, all of the implications of proposed control measures will be reevaluated and the most desirable solution identified considering all aspects, not only the initiating problem such as beaver in a culvert. Please refer to the Response to Comment I.425.

COMMENT I.263:

"Page E-3-522: (c) Disturbance Impacts: Paragraph 2: Disturbance of denning bears from transmission corridor, reservoir clearing, and reservoir filling activities is potentially a significant problem. Efforts should be made to locate dens before undertaking such activities. Transmission line routing and clearing schedules could be designed to avoid such impacts. Where dens within the impoundment area are to eventually be lost, it may be desirable to keep bears from denning rather than to disturb them while denning. Consultation with the resource agencies is necessary to plan these activities so as to minimize impacts."

RESPONSE:

Mitigation planning is being made more detailed with respect to specific protective activities to be undertaken prior to and during project construction and operation. Efforts are being made through meetings with representatives of the Game Division, ADF&G, to plan optimally effective ways in which adverse impacts to black bears and brown bears can be avoided. In coordination with ADF&G, documented denning locations are being identified on maps. Environmental specialists using these maps and other resources will provide direct input to engineering design products and construction plans early in their preparation. Transmission corridor routing, reservoir clearing, facility siting and other components of engineering design and construction planning, including scheduling of major construction activities will be guided through regular consultation with resource agencies. This consultation will include making available preliminary design products and scheduling documents for agency review, along with frequent discussions

RESPONSE TO COMMENT I.263 (cont.):

with agency representatives as the detailed design phase progresses.

COMMENT I.264:

"Page E-3-522: (c) Disturbance Impacts: Paragraph 3: Disturbance from on-ground recreational activities could further disturb sheep in the Jay Creek mineral lick area."

RESPONSE:

With proper mitigation measures, recreational activities should have no adverse effect on Dall sheep using the Jay Creek mineral lick area. As noted in the proposed Mitigation Plan (FERC License Application page E-3-532), ground activity and boat and floatplane use of the reservoir would be prohibited within 1/2 mile of the mineral lick between April 15 and June 15. These restriction dates are subject to revisions, as indicated by Comment I.283 and its Response, but the Mitigation Plan will prevent potentially disturbing activities near the Jay Creek mineral lick during the period of its use by sheep.

The proposed recreation plan would not lead to recreational use patterns that would be likely to disturb the Jay Creek area. The proposed facilities closest to Jay Creek are in the Kosina Creek drainage, consisting of trails to Clarence and Watana Lakes and undeveloped campsites at Watana Lake. These two developments account for a total estimated visitation potential of 857 visitor days per year, indicating low intensity use. Access to these trails and lakes would be either by floatplane or by boat.

Boat access could be from the west via the proposed Phase II boat launch at Watana Dam or from the east via Lake Louise or the Denali Highway bridge over the Susitna River. Kosina Creek is more than 20 miles from Watana Dam; given this distance and intervening recreation opportunities between the locations, relatively few boaters would make this trip. Those boaters who would reach Kosina Creek from Watana Dam would turn into the creek drainage two miles west of the confluence of Jay Creek and the reservoir, and therefore would be unlikely to pass near the mineral lick. Boat access from the east involves a much longer distance, roughly 50 miles by water from the Denali Highway bridge to Kosina Creek. While this route would cross the mouth of the Jay Creek arm of the reservoir, boaters traveling down the

RESPONSE TO COMMENT I.264 (cont.):

reservoir to Kosina Creek would pass approximately two miles to the south of the Jay Creek mineral lick.

COMMENT I.265:

"Page E-3-523: (a) Continued Monitoring and Study Needs: Overall, we endorse the intent and substance of continuing studies (1) through (11) described here. Monitoring is essential to determine additional mitigation needs. This section should include data needs for continuing impact assessment and mitigation planning efforts (see notes from the AEA modeling efforts) 3W-9/. Those efforts must be completed prior to project construction and concurrent with project design. A mechanism should be outlined for determining and implementing additional study and mitigation needs. The length of time or desired results of post-construction monitoring should be discussed.

"Key components of a monitoring program are that it: (1) include appropriate Federal, State, and local agency participation; (2) be fully supported by project funding; and (3) be utilized to modify, delete, or add to the Mitigation Plan in response to both information from ongoing studies and needs which become apparent as project impacts are realized.

"Another general recommendation on the Mitigation Plan is that consultation between the license applicant and resource agencies include of working sessions with project design engineers to fully incorporate wildlife mitigation plans."

"3W-9/ See Footnote 3W-3. [Footnote 3W-3/ Everitt, Robert R., Nicholas C. Sonntag, Gregory T. Auble, James E. Roelle, and William Gazey. October 22, 1982. Susitna Hydroelectric Project Terrestrial Environmental Workshop and Preliminary Model. LGL Alaska, Anchorage and Fairbanks.

"Everitt, Robert R., Nicholas C. Sonntag, Gregory T. Auble, James E. Roelle, and William Gazey April 27, 1983. Susitna Hydroelectric Project, Draft Report, Terrestrial Environmental Mitigation Planning Simulation Model. ESSA Ltd., USFWS and LGL Alaska for Harza/EBASCO, Anchorage.]"

RESPONSE TO COMMENT I.265:

Please refer to the Response to Comment I.245 and also note that mitigation plan refinement will include refinement of monitoring plans including the mechanism for modifying mitigation procedures based on feedback from the monitoring program. We appreciate your recommendations regarding monitoring. They will be considered during mitigation plan refinement. Refer to Response I.119B.

COMMENT I.266:

"Page E-3-523: (2): We recommend that low-level aerial photographs be made in both summer and winter and at least biannually to better quantify project impacts to determine downstream changes in vegetation cover."

RESPONSE:

The frequency and timing of aerial photography for the purpose of monitoring changes in vegetation cover in the downstream floodplain will be reviewed and your recommendations considered during mitigation plan refinement efforts.

COMMENT I.267:

"Page E-3-524: (3): Results of caribou monitoring may require further restrictions on access as recommended by the interagency monitoring team."

RESPONSE:

No further restrictions on access would be needed unless monitoring indicates unacceptable impacts. See also Response I.119B.

COMMENT I.268:

"Page E-3-524: (6): Surveys of active dens for brown bear, black bear, wolf and fox dens should continue during operation."

RESPONSE TO COMMENT I.268:

As stated on FERC License Application page E-3-524, the purpose of collecting information on the locations of active dens is so that major ground and aerial activity during construction can be controlled in order to minimize distrubance impacts. The occurrence of major ground and aerial activites will be minimal during operation. Please refer to the Responses to Comments I.245 and I.265 and note that refinement of the monitoring plan is a continuing process being carried out in consultation with resource agencies. While occasional monitoring might be useful in order to periodically assess bear populations, continuous monitoring does not seem justified.

COMMENT I.269:

"Page E-3-525: (8): Downstream beaver surveys should extend to the Yentna River to establish a baseline control for assessing upstream losses and downstream habitat modifications (see Section 4.3.1[i])."

RESPONSE:

An aerial beaver cache survey along the Susitna River, conducted during October 1983, extended from Cook Inlet to Portage Creek. Preliminary results for that portion of the survey between Talkeetna and Portage Creek were referenced in the Response to Comment C.80.

COMMENT I.270:

"Page E-3-525: (9): We concur with the need for annual raptor nest surveys. Should surveys identify the presence of the endangered peregine falcon, Section 7 consultation should promptly be initiated with the FWS."

RESPONSE:

The FERC has already initiated Section 7 consultation relative to the Susitna Project with the Department of the Interior.

COMMENT I.271:

"Page E-3-525: (10): If swan nesting is identified in areas where there is possibility for disturbance, surveys should continue through operation and maintenance."

RESPONSE:

The Power Authority agrees with your recommendation. Mitigation Plan refinements will reflect this.

COMMENT I.272:

"Page E-3-525: (11): Monitoring of moose habitat improvement efforts should begin now by evaluating disturbed areas in applicable vegetation types. Candidate sites easily accessible for a low cost analysis include recently logged and chained area near Palmer, Alaska.

"Annual big game counts and compilation of harvest records by location should be continued so that long-term changes can eventually be evaluated."

RESPONSE:

The Power Authority initiated work on the monitoring of moose habitat enhancement efforts in 1982 by cooperatively funding baseline studies to be used for monitoring the effects of the proposed Alphabet Hills Burn. A review of published and unpublished data regarding moose habitat enhancement in South Central Alaska is presently under way. A report presenting the results of this review is scheduled to be available in late April 1984.

The need for supplemental surveys of annual big game numbers and harvests in addition to those identified in Section 4.4.2(a) of the FERC License Application and those already conducted for management purposes by the Alaska Department of Fish and Game will be considered during efforts to refine the monitoring plan. The Power Authority is funding ongoing studies by ADF&G to monitor moose population in disturbed areas adjacent to the lower river.

COMMENT I.273:

"Page E-3-525: (b) Mitigation Plans: Expected mitigation benefits should be more adequately quantified. The potential effectiveness of many recommendations is unknown."

RESPONSE:

Please refer to the Responses A.10C, C.82, F.9, F.44, F.45 and F.46.

COMMENT I.274:

"Page E-3-525 to E-3-526: (1): Delaying reservoir clearing a few years may aid a few individuals, but will have minimal long-term affects on wildlife populations. Access as well as schedules for clearing should be planned in consultation with the resource management agencies. Clearing activity in the Jay Creek mineral area should be restricted to the period August 15 to May 1 to prevent disturbance to sheep using the area."

RESPONSE:

Access and schedules for clearing of sensitive areas such as the Jay Creek mineral lick are discussed on FERC License Application page E-3-532. As project planning continues, mitigation plan refinement will continue in cooperation with the resource management agencies. Precise clearing schedules will be refined in this manner as stated at the top of FERC License Application page E-3-526.

COMMENT I.275:

"Pages E-3-526: (2): Please refer to our previous comments, Section 3.4.2(a)(i) pages E-3-254 through E-3-268. To prevent significant habitat losses, disturbance, and loss of the remaining delta tributary to be unaltered by the Watana or Devil Canyon impoundment, we recommend that no borrow activities occur in the portion of borrow site E at the confluence of Tsusena Creek with the Susitna River."

RESPONSE:

During the feasibility study, it was perceived that, upon the excavation of material in Borrow Site E, much of the area would be below the Susitna Project operation river level (1,455 feet) and the Devil Canyon Reservoir level. At the present time, the portion of Borrow Site E at the confluence of Tsusena Creek and the Susitna River is included within this area.

During detailed design, a more detailed description of construction methods to be employed at Borrow Site E will be developed. Excavation from this primary source of dam embankment material will result in the area being inundated by the river. Even if we were to exclude borrow operations of the delta tributary area of the borrow site, subsequent erosion due to the adjacent deep pool would eventually degrade portions of the delta.

COMMENT I.276:

"Page E-3-526: (3): Information on existing vegetation cover and wildlife uses is necessary to assess the extent to which revegetation will provide forage desired by moose and bears. Black spruce may revegetate areas cleared of black spruce; terrain features, interspersion with other vegetation types, and habitual movements may stimulate or interfere with moose and bear use of revegetated areas. Please also see our comments on Section 3.4.2(a)(i), pages E-3-275 through E-3-281."

RESPONSE:

Shrubs, herbs and saplings which provide forage for moose characterize early successional plant communities on sites where all original vegetation has been removed. Species such as black spruce grow slowly and are a minor component of revegetated areas in early years. Surrounding vegetation

RESPONSE TO COMMENT I.276 (cont.):

does affect the seed rain and hence, the species composition and speed of revegetation. This is particularly true for alder and birch which usually disperse seeds relatively short distances compared with fireweed and willow which can disperse for several miles.

Terrain features, vegetation patterns, and habitual movements do affect moose and bear use of revegetated areas. However, factors which are probably more important in determining the value of revegetated areas for moose and bear are the proximity of project facilities, roads and human activity. Please refer to the Response to Comment I.397.

COMMENT I.277:

"Page E-3-525: (4): Anticipated forage gains from clearing of the transmission corridor should be compared with anticipated forage losses due to permanent project facilities. Also see Section 3.4.2(a)(i), pages E-3-269 through E-3-274."

RESPONSE:

Forage gains expected to result from clearing of the transmission corridors have not been estimated. Forage increases will depend on successional stages which occur following clearing of each vegetation type, and on the cumulative area of each vegetation type cleared. Areas of vegetation types to be crossed by the transmission corridors have been quantified (Exhibit E, Chapter 3, Tables E.3.79, E.3.80 and E.3.86).

It should be noted that the term "forage" is not specific, and that forage value and availability depend on the wildlife species under consideration. Forage loss for a certain number of individuals of one species may constitute a forage gain for a different number of individuals of another species. The tradeoff must therefore be extended from comparing only locations of available forage, so that it also includes a comparison of wildlife species potentially utilizing the forage in question.

COMMENT I.278:

"Pages E-3-526 and E-3-527: (5): This statement is inconsistent with previous statements about expected downstream areas of open water and frosting of vegetation (e.g., page E-3-408, paragraph 2; page E-3-435, paragraph 4). Also, refer to our comments on the uncertainty of reservoir temperature and river icing models (Section 3.3.1(b)(iii) and pages E-2-119, E-2-121, E-2-123, and E-2-124)."

RESPONSE:

As stated on FERC License Application pages E-3-526 and E-3-527, habitat alteration which will occur downstream from the Devil Canyon dam will be reduced through the use of multi-level intake structures that will maintain river temperatures as close to normal as possible. This will minimize the open water reach and therefore will aid in reducing vegetation frosting, and blockage of big game movements by open water in winter, as stated in the License Application. However, the impacts may still occur especially in the open water downstream from Watana, but they will be minimized to the extent possible. Thus the cited statements are not inconsistent with the discussions of blockage of movements by open water and frosting of vegetation as found on FERC License Application pages E-3-408 and E-3-435. The Power Authority awaits any analysis that indicates that frosting of vegetation represents a real problem for moose and not just a conjectural impact mechanism.

For further discussion of the reservoir temperature and river icing models, see the the Responses to Comments B.6, B.31, B.32, B.33 and I.39.

COMMENT I.279:

"Page E-3-527 through E-3-527 through E-3-530: (6): The lands to be managed must be examined to determine whether desired plant species will revegetate the areas. In evaluating the mitigation potential of candidate management lands, the management options foregone should be identified."

RESPONSE TO COMMENT I.279:

The Power Authority is presently funding studies to identify candidate mitigation lands and associated problems and to review habitat enhancement techniques for these lands. Reports providing the results of these studies are scheduled to be available in February and April 1984, respectively. Further site-specific evaluations of lands to be managed will be conducted after specific mitigation lands are identified. The base maps used to identify candidate mitigation lands were developed by the Habitat Division of the ADF&G and identify areas as having high potential for wildlife. See Response to Comment I.301.

COMMENT I.280:

"Page E-3-529: Paragraphs 3 and 4: Projected improvement of bear habitat should be quantitively supported through controlled burns and revegetation. It was stated earlier that permanent loss of bear habitats can be mitigated only through compensation (see page E-3-512, last paragraph). Provision of one seasonal food has little benefit if another seasonal food is the limiting factor to bears."

RESPONSE:

Please refer to the Responses to Comments C.82 and F.52.

COMMENT I.281:

"Page E-3-531: Paragraph (3): During 1983 field studies, ADF&G found the Jay Creek mineral lick area to be larger than they had previously believed. Thus, we recommend that the applicant consult with the ADF&G in defining the actual dates, and, and vertical distances from the lick in which aircraft activities may be prohibited."

RESPONSE:

Please refer to the Responses to Comments I.190, I.191 and A.11.

COMMENT I.282:

"Page E-3-531: Paragraph 5: Restrictions on aircraft activity near active fox dens should be established through consultation with ADF&G."

RESPONSE:

The Power Authority agrees with this Comment. Current restrictions will be incorporated into the Mitigation Plan as appropriate.

COMMENT I.283:

"Page E-3-532: Paragraph 4: Ground activity near the Jay Creek mineral lick should be prohibited between May 1 and July 30."

RESPONSE:

Tentative ground activity restrictions near sensitive areas are identified on FERC License Application pages E-3-532 and E-3-533. As project planning and mitigation plan refinement continue, these restrictions will be refined in cooperation with resource management agencies.

COMMENT I.284:

"Page E-3-532: Paragraph 5: The text should clearly indicate that sensitive areas include brown bear and black bear dens and the Jay Creek mineral lick area."

RESPONSE:

Because the cited page deals exclusively with sensitive areas and because paragraphs 4 and 6 of that page deal exclusively with restrictions for major ground activity near the Jay Creek mineral lick and bear dens, respectively, and because clearing activities are identified as a major ground activity (at the top of the cited page), the Power Authority believes that the Comment subject is clearly indicated in the text of the FERC License Application.

COMMENT I.285:

"Page E-3-532: Paragraph 8: Active fox dens should be included here."

RESPONSE:

The last paragraph on FERC License Application page E-3-532 should be amended to read:

> "Ground activity will be prohibited within 1/4 mile of known active wolf or fox dens or wolf rendezvous sites between May 1 and July 31."

COMMENT I.286:

"Page E-3-533: Paragraph 3: Final siting and scheduling of construction and use of the Watana to Devil Canyon access road near nesting location GE-18 should be decided in consultation with the FWS to ensure compliance with the Bald Eagle Protection Act."

RESPONSE:

The Alaska Power Authority intends to consult with the U.S. Fish and Wildlife Service regarding specific mitigation measures for each bald or golden eagle nesting location potentially impacted by the Project.

COMMENT I.287:

"Page E-3-533: Paragraph 4: Our previous comment on siting in consultation with the FWS also holds for the railroad alignment near nesting location BE-8."

RESPONSE:

Please see the Responses to Comments I.224 and I.286.

COMMENT I.288:

"Page E-3-533: (11): In areas of permafrost, higher road profiles may be required."

RESPONSE TO COMMENT I.288:

Access routing has been refined to avoid poorly drained as well as potential frozen soils where possible. Alignment of the access road along well-drained and non-frost susceptible soils will be maximized to enable the use of side borrow techniques in level terrain and balance cut-and-fill inside hill cut areas. In areas where the alignment crosses frost susceptible or frozen soils, the design of the road embankment will be based on the localized conditions. Since the site area is characterized by discontinuous, "warm" permafrost, the existing foundation conditions will determine whether the ground is allowed to thaw and consolidate prior to placement of the embankment fill or if the ground is to be kept frozen after construction of the road embankment. Prevention of permafrost degradation often requires an earth embankment sometimes exceeding five feet in depth. Alternatively, the thickness of the fill required can be reduced by insulating the subgrade by leaving the vegetation mat undisturbed and/or a layer of rigid insulation can be placed in the embankment.

For additional information, see the Response to Comment A.4.

COMMENT I.289:

"Page E-3-534: (12): We recommend that the APA consult with resource agencies in reviewing options for reducing traffic volume. If our recommendation to drop the proposed Denali Highway to Watana access road is not adopted, then we recommend that the road not be maintained following project construction. Rehabilitation of this link would inhibit public access and thus minimize impacts to all species from continued disturbance and habitat loss. Continued access for project maintenance could be through the railway and Devil Canyon to Watana Road."

RESPONSE:

The Power Authority will contact Federal and state agencies with land management, resource management and administrative responsibility regarding options to reduce traffic volume on the proposed access road from the Denali Highway to Watana. Such consultation can be best accomplished when construction plans are being formulated by the project's construction manager. It should be pointed out, however, that road access is required throughout construction of the Watana and Devil Canyon projects, and is desirable during operations.

RESPONSE TO COMMENT I.289 (cont.):

A review of access plans as related to the issue of public access is provided below.

Current plans call for restricted access from Denali Highway to the dam site during construction. Eliminating public access during construction is preferred from a construction standpoint. Such a policy prevents safety-related problems which would arise if the public were allowed to travel freely to the construction site. A restricted construction access policy also provides environmental benefits by minimizing impacts to all species and by preventing habitat loss.

After construction of the Watana project, plans call for construction of a road between Watana and Devil Canyon and rail access to the Devil Canyon project during this period. The Power Authority would continue to maintain the road from the Denali Highway to Watana and from Watana to the Devil Canyon project so that road access to Devil Canyon would exist throughout that project's construction. Maintaining road access provides flexibility for emergency or other situations when rail access is not possible.

Refer to the Responses to Comments A.1 and A.3.

COMMENT I.290:

"Page E-3-534: (13): The criteria for establishing a population-level effect on Dall sheep should be provided. Since loss of escape cover may be as critical as loss of portions of the lick, exposing new mineral soil may be of little value as mitigation (Nancy Tankersley, personal communication)."

RESPONSE:

It is unclear how "loss of escape cover" would occur. Specific criteria will be established for determining when additional mitigation measures should be implemented. These will be incorporated into refined mitigation plans.

COMMENT I.291:

"Pages E-3-534 through E-3-525: (14): Mitigation of project impacts through regulation of hunting will occur independently of project activities. When such regulation

COMMENT I.291 (cont.):

is determined necessary by the Alaska Board of Game, it will be at the expense of other managewment options (see Section 4.4.1(a)[i])."

RESPONSE:

Please refer to the Response to Comment I.219.

COMMENT I.292:

"Page E-3-535: (15): Environmental briefings should also be developed for workers' families who will be residing in the construction village."

RESPONSE:

Environmental briefing programs will be conducted with site authorizations for appropriate project personnel.

COMMENT I.293:

"Page E-3-536: (16): Please refer to our previous comments as to the uncertainty that downstream slough modifications will effectively compensate for upstream impacts to salmon and bear (Section 4.4.1(a)[iv]). Anticipated reductions in predator populations are somewhat inconsistent with Mitigation Plan. Before compensation can be made, quantification is necessary for the timing, locations, and quality of seasonal forage gained at revegetated sites compared to areas where it will be lost."

RESPONSE:

The FERC License Application does not state or imply "that downstream slough modification will effectively compensate for upstream impacts to salmon and bear." The section referred to by the reviewer (FERC License Application Exhibit E, Chapter 3, Section 4.4.1(a)(iv)) states:

> "A reduction in salmon spawning between Portage Creek and Talkeetna has been identified as a possible factor which would reduce carrying capacity for brown bear. This impact will be avoided through maintenance for downsteeam sloughs for salmon spawning (see Section 2.4.4[a])."

RESPONSE TO COMMENT I.293 (cont.):

It was the intention of the authors to point out that sloughs and side channels between Devil Canyon and Talkeetna appear to be important feeding areas for brown bears and black bears. As stated in FERC License Application Exhibit E, Chapter 3, Section 4.3.1(d)(ii), page E-3-426,

> "Indirect impacts on brown bears downstream from Watana will result from reduced populations of moose and salmon and from increased hunting along the transmission corridor. Moose, bear and salmon studies are being conducted downstream from Watana in an attempt to quantify project impacts. The carrying capacity of the areas adjacent to the river will decrease if salmon and moose populations are substantially reduced."

As discussed further on FERC License Application page E-3-429,

> "Downstream effects of the Watana development on black bears are likely to be much less severe. Impacts on salmon spawning areas, aircraft disturbance and increased hunting will probably have the greatest effect on the population. The expected successional changes in vegetation are not likely to have a noticeable effect on the population, nor will any open water areas during winter, since bears will be in dens at that time. The importance of salmon to downstream bears is unknown, but several bears from the middle basin moved downstream to feed on salmon during a berry crop failure, and bears are commonly seen along spawning sloughs in late summer (ADF&G 1982e). Twenty percent of the salmon radio-tagged during studies downstream were eaten by bears (Miller 1982 Personal communication). However, bear scats found along salmon streams comprise mostly berries, and thus the importance of salmon to these bears is uncertain. Bear studies downstream from Devil Canyon will be intensified in 1983, and consequently, the food habits of downstream bears will be better defined at that time."

The 1983 data referred to here will be available in April 1984. For more detailed discussion of food habits of downstream black bears, including a review of the question of salmon importance vs. berry importance in the black bear diet, see Miller (1983), Chapter 3, pages 39-48.

RESPONSE TO COMMENT I.293 (cont.):

Because upstream access by inmigrating salmon is largely restricted upstream of Portage Creek, it seems likely that impacts on brown bears and black bears resulting from decreased salmon availability in the Susitna River would only occur downstream from Devil Canyon. As stated above, studies of the downstream area are continuing in an attempt to quantify the importance of salmon available in sloughs and side channels of this reach to the brown bear and black bear diets. If salmon are indeed important to bears along the reach between Devil Canyon and Talkeetna, and if project implementation is likely to decrease salmon availability in this reach, then mitigative measures proposed to rectify or compensate for this reduction become important as mitigative measures to offset impacts to brown bears and black bears. On FERC License Application pages E-3-164 and E-3-165 of Exhibit E, it is stated that:

> "Impacts to salmon spawning areas will occur if mitigation measures are not employed in coordination with the proposed project flows (or the alternative regime of short-term augmented flows). The rectification methods selected are (1) to maintain access to the sloughs; and (2) to ensure suitable spawning and incubation habitat by physically modifying sloughs, to maximize use of reduced filling and operational summer flows. The following habitat enhancement measures will be applied either singly or in combination on sloughs, depending on the type of impact that limits salmon production. These methods, especially if used in combination with short-term augmented flows during the spawning season, will maintain salmon productivity in sloughs."

This section goes on to present a variety of mitigative measures designed to maintain use of these sloughs by spawning salmon. The referenced statement on FERC License Application page E-3-536, that "Decreased availability of salmon to bears will be completely compensated for by enhancement of 13 sloughs between Devil Canyon and the confluence of the Chulitna and Talkeetna Rivers" is substantiated and supported by proposed fisheries mitigation measures.

We agree that further quantification of expected changes in vegetation at rehabilitated facility sites will be necessary before a precise assessment can be made of the probable value of the revegetated sites to wildlife. Attention will be given to this question during impact assessment refinement. However, it should be noted that changes in

RESPONSE TO COMMENT I.293 (cont.):

facility siting may occur during the detailed engineering design phase, and that more detailed consideration will be given to the development of a comprehensive restoration plan at that time (FERC License Application pages E-3-279 through E-3-281). As detailed engineering design proceeds, a more precise picture of the probable value of rehabilitated areas to wildlife will evolve.

REFERENCES

ADF&G, Susitna Hydroelectric Project, Phase I Final Report - Big Game Studies (1982), previously submitted to the FERC on May 31, 1983.

Miller, S. D. and D. C. McAllister, Volume VI, Black Bear and Brown Bear (1982).

ADF&G, Susitna Hydroelectric Project, Phase II Progress Report - Big Game Studies (1983), previously submitted to the FERC on May 31, 1983.

Miller, S., Volume VI, Black and Brown Bear (1983).

COMMENT I.294:

"Page E-3-356: (17): Please refer to our previous comments on access road borrow areas (Section 3.4.2(a)[i])."

RESPONSE:

It appears that the page number listed above, FERC License Application page E-3-356, should be E-3-256. For an answer to that Comment, please see the Response to Comment I.386.

COMMENT I.295:

"Page E-3-537: (18): Development of the beaver model will not, '...mitigate for residual impacts on furbearers.' Use of the model will provide information for developing and implementing mitigative flow releases or other habitat manipulations."

RESPONSE TO COMMENT I.295:

It is the Power Authority's opinion that the development of state-of-the-art predictive models, that will have application for studying or assessing impacts to other populations, will have at least some inherent mitigation value.

COMMENT I.296:

"Page E-3-527: (19): Please refer to our previous comments on the unproven nature of slough modification for beaver (Section 4.3.1(i)[ii]). The text should indicate which sloughs are to be managed for beaver and which for salmon and then define exactly what is meant by '...slough enhancement measures.' Existing beaver populations in all sloughs should be assessed. Coordination betweeen aquatic and furbearer investigators is necessary to resolve potential conflicts between salmon and beaver uses and to determine how best to exclude beaver from sloughs which are to be managed for salmon."

RESPONSE:

Please refer to the Response to Comment I.198. We agree that coordination between aquatic and furbearer investigators should take place and will ensure that it will take place during mitigation plan refinement.

COMMENT I.297:

"Pages E-3-537 through E-3-539: (20) and (21): Please refer to Section 4.3.1(n)."

RESPONSE:

Please refer to the Response to Comment I.210.

COMMENT I.298:

"Pages E-3-540 through E-3-544: (c) Residual Impacts: While this section generally identifies additional mitigation needs, it lacks any procedures or mechanisms for implementing mitigation measures. There is no quantification to statements that most impacts will be mitigated - primarily though increasing moose browse. The

COMMENT I.298 (cont.):

value of proposed browse manipulation is unknown, yet these measures are claimed as out-of-kind mitigation for several other species.

"Alternative mitigation scenarios not yet developed may be foreclosed by dependence of the mitigation plan on increasing moose browse. The benefits of such measures will not be known for 10 to 20 years, by which time it may be too late to do anything else.

"The overall objectives of the Mitigation Plan are aimed primarily at moose and salmon. Other proposals are generally of unproven value (e.g. exposing new mineral soil for sheep; providing artificial nesting locations for raptors). A possible effect of this narrow approach is a decrease in species diversity.

"Out-of-kind mitigation proposals under (ii) Caribou, (iv) Brown Bears, and (vi) Wolves conflict with FWS designation of those species as being within Resource Category 2 and requiring in-kind mitigation under the FWS's Mitigation Policy (see Section 4.1.3)."

RESPONSE:

Please refer to the Responses to Comments C.82, C.88, F.50, F.51 and F.52 for discussions of issues raised in this Comment. In addition, because impact assessment and Mitigation Plan refinement are continuing processes, the specific Comments expressed here will be considered during future refinement efforts.

Please note that the U.S. Fish and Wildlife Service project area Resource Category Determination was not received by the Power Authority in time for it to be addressed by the Mitigation Plan presented in the FERC License Application (see FERC License Application, Volume 10A, Chapter 11, Appendix E11E, FWS letter to APA dated January 1983 and APA response letter to FWS dated February 1983).

COMMENT I.299:

"Page E-3-541: (iv) Brown Bears: The losses of food resources are viewed as the most significant project impact. 3W-10/ It has not been shown that burning will increase berry production. The statement that improved caribou recruitment will provide out-of-kind mitigation is inconsistent with previous information on the unknown and

COMMENT I.299 (cont.):

potentially negative nature of project impacts (see Section 4.4.1(a)(ii), page E-3-511, and Section 4.4.2(b)(16), paragraph 2, page E-3-536)."

"3W-10/ See Footnote 3W-5. [Footnote 3W-5/ Miller Sterling D. and Dennis C. McAllister. 1982. Susitna Hydroelectric Project. Phase I Final Report. Big Game Studies. Volume VI, Black Bear and Brown Bear, page 60. Submitted to the APA by the ADF&G.]"

RESPONSE:

The Power Authority does not believe that losses of food resources will constitute the most significant potential impact of the Susitna Hydroelectric Project on brown bears. As discussed on FERC License Application pages E-3-420 through E-3-426, loss of spring feeding areas and direct mortality resulting from bear/human interactions and increased hunting pressure will constitute the most severe impacts to brown bears in the project area. For example, it is stated on FERC License Application page E-3-421 that:

> "The two major impacts of the project on brown bears during the construction phase will be the loss of spring feeding areas during and after clearing, and direct mortality of bears resulting from bear/human conflicts at camps, construction sites and bear concentration areas. Unregulated hunting by construction workers would also have a major impact on brown bears during this period."

The point raised by the reviewer is extensively discussed in this section. For example, on FERC License Application page E-3-423 it is stated that:

> "Brown bears have one of the lowest reproductive rates of any land mammal in North America (Bunnel and Tait 1978). This, coupled with the low densities of brown bears in most parts of their range, makes the impact of sustained high levels of mortality particularly severe (Craighead et al. 1974)."

It is further pointed out on FERC License Application page E-3-423 that:

> "Human activities related to the Trans-Alaska pipeline project (TAPS) resulted in a minimum of 11 brown bear

RESPONSE TO COMMENT I.299 (cont.):

> and 30 black bear deaths (JFWAT files). One of the most serious problems encountered during TAPS construction resulted from the attraction of bears to areas of human activity."

On FERC License Application page E-3-425, it is stated that:

> "The loss of habitat as a result of the impoundment clearing and filling and the partial avoidance of project facilities will have the greatest impact on brown bears during the filling and operation phases. Indirect effects of decreased moose populations and increased hunting by people will also have measurable effects on brown bears. There is also some potential for the impoundment to interfere with bear movements, particularly during the spring."

The point here is that during project operation, when construction personnel and activities are no longer present, loss of habitat is likely to become a more important adverse factor in regulating population size and productivity of brown bears in the project area. On balance, it can be concluded that both habitat loss and direct mortality resulting from bear/human interaction (including increased hunting pressure) will produce significant impacts on brown bears in the project area.

We concur that it has not been conclusively demonstrated that burning increases berry production in Interior or South-Central Alaska. However, as cited on FERC License Application page E-3-527, the recent study by Friedman (1981) in Interior Alaska did demonstrate increased berry production following burning. The efficacy of various measures to increase browse and berry production in northern regions is currently being reviewed during mitigation plan refinement.

We agree that reductions in populations of brown bears would not necessarily improve recruitment to caribou populations within the project area. The evidence on this point is far more conclusive with regard to moose (e.g., Ballard, et al. 1981). Of course, it is not clear that reductions in predation by bears would necessarily increase the

RESPONSE TO COMMENT I.299 (cont.):

recruitment rate to moose populations to an extent sufficient to offset other adverse impacts.

REFERENCES

Ballard, W. B., T. H. Spraker and K. P. Taylor, Causes of Neonatal Moose Calf Mortality in South-Central Alaska, J. Wild. Manage., 45 (2):335-342 (1981).

Friedman, B. F., The Ecology and Population Biology of Two Targon Shrubs, Lingonberry and Alpine Blueberry, unpublished M.S. Thesis, University of Alaska, Fairbanks (1981).

ADF&G, Susitna Hydroelectric Project, Phase I Final Report - Big Game Studies (1982), previously submitted to the FERC on May 31, 1983.

Miller, S. D. and D. C. McAllister, Volume VI, Black Bear and Brown Bear (1982).

COMMENT I.300:

"Page E-3-543: (x) Raptors and Ravens: Potentially additive impacts of disturbance, loss of nesting locations, loss of foraging habitat, etc. remain unknown. The value and existing use of foraging areas near proposed artificial nesting locations has not been shown."

RESPONSE:

For several raptor species (e.g., golden eagles, rough-legged hawk, gyrfalcon), foraging areas are largely in higher elevation habitats that will not be flooded by the impoundments and will not receive extensive human disturbance. For these species, mitigation of nest site losses by establishment of new nest sites (and possibly moving of some nests) will probably wholly compensate for project impacts. Disturbance of nesting raptors remains the major concern during project construction and operation, although efforts at minimizing human disturbance to raptors along the Trans-Alaska Pipeline System have proved successful in recent years, and similar efforts are planned for the Susitna Hydroelectric Project.

As stated in FERC License Application Exhibit E, Appendix E3I, "raptors are one of the few groups of birds that are limited by availability of nesting locations and nest sites in most regions, rather than food ...." Foraging areas for bald eagles, goshawks and some other smaller raptors would likely be available after project completion (see FERC License Application pages E-3-442 through E-3-454), provided nesting locations are established to mitigate for nests lost due to flooding. While cumulative impacts may cause displacement of some raptor species, attempts at nest site enhancement outside of the impoundment zones should compensate for most losses, particularly for bald eagles which have historically responded favorably to artificial nesting sites (see FERC License Application Exhibit E, Appendix E3I).

COMMENT I.301:

"Pages E-3-544 through E-3-545: Cost Analysis and Scheduling: To provide for unforseen contingencies, we recommend that a trust fund be established at the start of license construction. Unspent monies would revert to the project sponsor at the end of the license period.

COMMENT I.301 (cont.):

"It should not be assumed that appropriate habitat management lands will be available through the State or Federal government. The applicant should initiate discussions with resource and land management agencies as soon as possible to identify potential management lands."

RESPONSE:

A. The Power Authority does not anticipate establishing any special trust funds. The commentor is apparently concerned about the solvency of the applicant. Such a concern is inappropriate in this case since the applicant is the State of Alaska.

   The Comment also reflects a concern that the applicant would not commit sufficient resources to mitigation measures or environmental enhancement. This concern is also misplaced. As a state agency, the Power Authority has a duty to act in the overall public interest of the state's citizens. This would necessitate due concern for the environmental, as well as power, benefits of the Susitna River. Also, the cost of environmental programs will be determined in the same manner as any other cost and included in either construction or operating costs. These costs are viewed as a normal part of project costs.

B. The Power Authority has determined that more than sufficient habitat management lands in state ownership are available. Proposed land use designations are compatible with proposed management activities. See the Responses to Comments A.17, I.80 and I.279.

COMMENT I.302:

"Page E-3-548: While we support monitoring, as well as plans to consult with the resource agencies, we believe that an interagency team should be established to oversee monitoring with some follow-up through project operation and maintenance."

RESPONSE:

See the Responses to Comments I.119B and I.147.

COMMENT I.303:

"Pages E-3-549 through E-3-550: Transmission Corridor Recommendations: Access could be beter controlled by signs, zoning (to prohibit off-road vehicle use), monitoring, and enforcing of fines."

RESPONSE:

Allowing or restricting public use of transmission corridors will be determined by a number of factors, such as: mode of use (motorized or pedestrian), conditions of granting the right-of-way, preference of adjacent landowners, environmental considerations and public interest.

Methods for controlling access along the transmission line and establishment of monitoring and enforcement procedures will be examined and their effectiveness will be determined. Actual locations in which access should be restricted will also be identified.

Issues regarding access will be addressed as the necessary implementing agreements are procured. Various approaches for restricting access and managing public use of areas will be developed in consultation with appropriate agencies, landowners and land managers. These will be identified in the construction access plan developed for the transmission line.

COMMENT I.304:

"Table E.3.87: Problems with the comparison of aerial habitat with Viereck and Dyrness vegetation classifications should be noted here as discussed in Section 4.2.1(a)(ii), page E-3-304, paragraphs 3 and 4.

"Table E.3.92: The very preliminary nature of this data should be indicated in the table title."

RESPONSE:

Table E.3.87: Problems with correlation of aerial habitat with Viereck and Dyrness vegetation classifications are noted in the text where this table is cited (on FERC License Application, page E-3-304) and do not need to be renoted here.

RESPONSE TO COMMENT I.304 (cont.):

Table E.3.92: Qualifications regarding these data are discussed in the text (on FERC License Application, pages E-3-318 through E-3-321) and Appendix EH of the FERC License Application, both of which are referred to in the table for an explanation of the methods used.

COMMENT I.305:

"Table E.3.144: This table is a useful, preliminary assessment of overall project impacts. However, we have identified the following errors:

"1. Permanent Habitat Loss:

"According to Table E.3.83, the Watana impoundment area is 14,736 ha. There is some confusion with the area calculated for the access corridors. The applicant should clarify how borrow sites included here correlate with figures given in Table E.3.85 and the discussion in the text which states that use of borrow areas for access road construction will be minimal (Section 3.4.1(a)[i]). Figures for a permanent village of 27 ha and temporary village of 49 ha are inconsistent with the 70ha village (8ha of which is a lake) listed in Table E.3.83. We find no description in the text or drawing in Plates F70 or F71 of a 9 ha airstrip for the Devil Canyon development.

"2. Habitat Alteration and Temporary Habitat Loss:

"As above, the figures given here for impoundment clearing, temporary village and temporary camp do not agree with figures in Table E.3.83. Figures for the Devil Canyon temporary village and temporary camp given here do not agree with figures given in Table E.3.84. The figures given for the transmission corridor are not consistent with Table E.3.80. According to Table E.3.80, the Devil Canyon to Gold Creek segment will alter 131.7 ha; no information or additional clearing for the Intertie is given here; and the source for the 209 ha of additional transmission corridor with Devil Canyon is unclear from Table E.3.80.

"Potential alterations in ice staging, scouring, etc. are further impact mechanisms which will result from hydrologic alterations.

"3. Barriers, Impediments, or Hazards to Movement:
"The permanency of these features should be mentioned.

COMMENT I.305 (cont.):

"4. Disturbance Associated with Construction Activities and 5. Increased Human Access:

"While we agree that project studies resulted in initiation of these impacts in 1982, increases in impacts that will result from the onset of project construction should also be noted."

RESPONSE:

Many of the inconsistencies and errors in the referenced tables and text, as well as other errors, were corrected and presented in the Response to Supplemental Information Request 3B-7 (see Reference I.370.1 in the February 15, 1984 APA Response Document, Reference Volume). Additional inconsistencies and errors, some of which were pointed out in this Comment and some of which were subsequently discovered, have also been corrected. These corrections are shown in Reference I.370.2 in the February 15, 1984 APA Response Document, Reference Volume. These additional revisions are primarily due to corrections in the right-of-way requirements for several transmission line segments. Other revisions were required due to mathematical errors and oversights in Table E.3.144. Specific Responses to this Comment follow:

1. Permanent Habitat Loss

   A. Table E.3.83 and the first page of Table E.3.144 have been revised and are included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume). As stated in both revised tables, the Watana Impoundment Area is 14,691 ha.

   B. For a discussion of the area calculated for the Access Corridor and borrow areas, please refer to the FERC License Application, page E-3-255 and E-3-256. As stated in the License Application, borrow areas which may be required for access road construction will be sited immediately adjacent to the route. As shown in Figure E.3.37, 14 borrow areas have been identified along the access route from the Denali Highway to Devil Canyon. Access routing has been refined to emphasize well-drained soils which will allow maximum use of side-borrow techniques in level terrain and balanced

RESPONSE TO COMMENT I.305 (cont.):

cut-and-fill in sidehill cut areas (Figure E.3.83). Therefore, the borrow areas shown in Figure E.3.37 are not expected to be fully excavated, as they will be used only to augment material requirements where side-borrow or balanced cut-and-fill techniques cannot be fully utilized. In general, it is expected that each site will be excavated at most to a depth of 8-feet (2.5m) and will range in area from less than 10 to no more than 20 acres (4 to 8 ha).

C. It is not clear what the reviewer's confusion is concerning borrow site figures given in Table E.3.144 and E.3.85, as the figures appear to be consistent with the original tables in the License Application. The figures given for the Access Corridor include borrow sites for access in both tables. However, these figures have since been revised based on supplemental information and are now incorrect. The correct figures are included in revised Tables E.3.144 and E.3.85 included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume). The clearing widths assumed are conservative enough to include areas required for borrow.

D. The correct figures for a permanent and temporary village can be found in revised Table E.3.144 and page E.3.253, which are included as Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume). Revised Tables E.3.83 and E.3.84 break out the total figures as given in revised page E.3.253 for the permanent and temporary villages and camps for Watana and Devil Canyon, respectively.

E. As stated in the License Application in Volume 6A, Exhibit E, Chapter 3, page E.3.127, no airstrip will be built; air access will be via the permanent runway at Watana. Table E.3.144 has been corrected to reflect this.

2. <u>Habitat Alteration and Temporary Habitat Loss</u>

A. The figures given for impoundment clearing, temporary village and temporary camp in revised Table E.3.144 are consistent with the figures

RESPONSE TO COMMENT I.305 (cont.):

given in revised Tables E.3.83 and E.3.84, included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume).

B. The figures given for the Transmission Corridor in revised Table E.3.144 are consistent with those figures sited in Table E.3.80, which has been revised and is included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume). As stated in revised Table E.3.80, the Devil Canyon to Gold Creek segment will alter a total of 202.9 ha, which is broken out into 194.4 ha and an additional 83.5 ha in revised Table E.3.144. These figures are based on a corridor width of 300 feet and 210 feet, respectively.

C. Impact mechanisms, including changes in ice scouring, ice staging, and spring and summer floods will affect the abundance of early vegetational succession, such as riparian vegetation types. This was intended to be included in Item 4 of Table E.3.144.

3. We agree; all features listed in Table E.3.144 are permanent features.

4. Construction activities will begin in approximately 1985, which is the time that increases in impacts and increases in human access will occur.

COMMENT I.306:

"Table E.3.146: The comparison presented here is of little value until vegetation is retyped to reflect understory values and geographic units corresponding to moose movements and habitat requirements. The larger the study area boundary, the smaller the proportionate loss will be, irrespective of what seasonal ranges are limited in a particular area."

RESPONSE:

Proportionate losses of vegetation-cover type areas expressed as percentages of arbitrarily defined geographical areas are one possible measure of significance from a

RESPONSE TO COMMENT I.306 (cont.):

biological standpoint. Please see the Response to Comment F.45.

COMMENT I.307:

"Table E.3.148: Anticipated and Hypothesized Impacts to Dall Sheep: (2) and (3): Borrow areas and roads in the vicinity of Tsusena Creek are an additional potential impact.

"(5): Floatplane landings and on-ground disturbance from recreational hikers and campers are an additional recreational disturbance to be considered."

RESPONSE:

Based on the data published to date (Ballard, et al. 1982, Tankersley 1983), it does not appear that borrow areas or access roads will impact the movements or habitat of the Portage-Tsusena Creek sheep population. Float plane landings and on-ground disturbance from recreational hikers and campers are sources of recreational disturbance which could be listed separately, although they are implied by the present descriptions of disturbance from air traffic and boats, which are the two modes of access by recreationists to the Jay Creek area.

REFERENCES

ADF&G, Susitna Hydroelectric Project, Phase I Final Report - Big Game Studies (1982), previously submitted to the FERC on May 31, 1983.

Ballard, W.B., J.H. Westlund, C.L. Gardner, and R. Tobey, Volume VIII, Dall Sheep (1982).

ADF&G, Susitna Hydroelectric Project, Phase II Progress Report - Big Game Studies (1983), previously submitted to the FERC on May 31, 1983.

Tankersley, N.G., Volume VIII, Dall Sheep (1983).

COMMENT I.308:

"Table E.3.149: Anticipated and Hypothesized Impacts to Brown Bear: (3): Roads have been found to affect movement of bears and could inhibit crossings. 3W-9/

"(4): Because of altered movements due to roads and construction activity, young bears may not learn about available food resources in certain areas. Thus, the project could influence the way future bear generations utilize the area."

"3W-9/ See Footnote 3W-3. [Footnote 3W-3/. Everitt, Robert R., Nicholas C. Sonntag, Gregory T. Auble, James E. Roelle, and William Gazey. October 22, 1982. Susitna Hydroelectric Project Terrestrial Environmental Workshop and Preliminary Simulation Model. LGL Alaska, Anchorage and Fairbanks.

"Everitt, Robert R., Nicholas C. Sonntag, Gregory T. Auble, James E. Roelle, and William Gazey. April 27, 1983. Susitna Hydroelectric Project, Draft Report, Terrestrial Environmental Mitigation Planning Simulation Model. ESSA Ltd., USFWS and LGL Alaska for Harza/EBASCO, Anchorage.]"

RESPONSE:

The Power Authority agrees with the reviewer's comments that roads, construction activities and the impoundment areas themselves may affect bear movements. These impact mechanisms are discussed on FERC License Application pages E-3-420 through E-3-429, E-3-483 and E-3-484, as well as other places in the FERC License Application.

COMMENT I.309:

"Table E.3.150: Anticipated and Hypothesized Impacts to Black Bear: Please refer to our comments under Table E.3.146 about misleading comparisions of the proportion of conifer forest to be lost because of the project. The proportion of conifer forest to be lost in the Watana dam area, as compared to the entire basin, is much higher.

COMMENT I.309 (cont.):

Moreover, the even more limited areas of deciduous forest may be the sites most preferred by black bears. 3W-10/"

"3W-10/ See Footnote 3W-5. [Footnote 3W-5/. Miller Sterling D. and Dennis C. McAllister. 1982. Susitna Hydroelectric Project. Phase I Final Report. Big Game Studies. Volume VI, Black Bear and Brown Bear, page 60. Submitted to the APA by the ADF&G.]"

RESPONSE:

Please refer to the Responses to Comments F.45.

COMMENT I.310:

"Table E.3.153: Anticipated and Hypothesized Impacts to Aquatic Furbearers (beaver and muskrat): (1): The text should indicate the source for numbers of muskrats estimated in the impoundment area.

"(2): Confirmation of those lakes supporting overwintering muskrats could be obtained by measuring water depths. Lakes of greater than 2 meters would likely be suitable for either overwintering muskrats or beaver (Phil Gipson, personal communication). Potential downstream improvements have not been quantified nor spacially identified in coordination with fish mitigation plans."

RESPONSE:

1. As indicated in FERC License Application Section 4.3.1(j), paragraph 2, the number of muskrat affected by the Watana impoundment was extrapolated from aerial survey data of muskrat pushups (lodges) in the impoundment zone by Gipson et al. (1982). As stated in the text, numbers of muskrats per pushup may be variable. Therefore a range (5-10 muskrats affected) is given to adjust for this variability.

2. Please refer to the Response to Comment I.171 for a response to the first part of this Comment. Because several beneficial impacts may accrue to beaver and muskrat due to the project, enhancement of habitat for negatively affected fish populations would likely take higher precedence. Mitigation plans for both groups

RESPONSE TO COMMENT I.310 (cont.):

will be coordinated as mitigation refinement efforts supported by the Alaska Power Authority continue.

REFERENCES

ADF&G, Susitna Hydroelectric Project, Subtask 7.11 - Phase I Report, Environmental Studies, Furbearer Studies (1982).

Gipson, P. S., S. W. Buskirk and T. W. Hobgood (April 1982)

COMMENT I.311:

"Table E.3.157: Anticipated and Hypothesized Impacts to Marten, Weasel, and Lynx: (1) and (2): Please refer to our previous comments on problems in quantifying marten losses (Section 4.3.1[m]). Figures for areas of spruce forest to be impacted by the project do not agree with information in Tables E.3.83 and E.3.84. As we commented on Table E.3.150, figures for proportions of conifer forest to be lost are misleading."

RESPONSE:

Please refer to the Responses to Comments I.203 and I.243 concerning problems in quantifying marten losses.

Figures for area of forest habitat to be reclaimed (listed under (2) Habitat Alteration and Temporary Habitat Loss) in FERC License Application Table E.3.157 are incorrect, and should read as follows:

Watana:

- 980 ha of total forest. This includes 770 ha of spruce forests, 67 ha of closed conifer-deciduous, 5 ha of closed birch and 138 ha of open conifer-deciduous.

Devil Canyon:

- 194 ha of total forest. This includes 11 ha of spruce forests and 183 ha of closed conifer-deciduous.

COMMENT I.312:

"Table E.3.159: Anticipated and Hypothesized Impacts to Raptors and Ravens: (1): The text should indicate whether destruction of the bald eagle nest in Deadman Creek will be avoided by access road rerouting shown in Figure E.3.812. According to the text, an additional golden eagle nest may be lost at borrow site E (Section 4.3.1(n)[i], page E-3-445, paragraph 4).

"(2): Claimed benefits of increased availability of small mammal prey appear doubtful when considering the length of time those areas would have been out of production during construction."

RESPONSE:

1. Please refer to the Response to Comment I.224. The Golden Eagle nesting location at Borrow Area E may not be destroyed, depending on the final configuration of this borrow site. Provision of an alternate nesting site should be attempted in any case, should disturbance due to borrow site activities cause abandonment of the nesting location. The text of FERC License Application Table E.3.159(2) should be corrected to read: "A Golden Eagle nesting location may be destroyed by Borrow Area E."

2. This benefit (increased availability of small mammal prey) will occur, although maximum benefits will not accrue until several years following construction. Some use of reclaimed lands by small mammals will probably occur even during the year of reclamation, because annual plants, the first groups to recolonize the site, are favored forage of many small rodent species.

COMMENT I.313:

"Tables E.3.171 through E.3.175: Estimated Mitigation Costs: Costs for follow-up monitoring to evaluate the effectiveness of the recommended programs should be included. Provisions for funding additional measures, should initial mitigation prove ineffective, should also be included."

RESPONSE:

Detailed cost estimates for the mitigation and monitoring programs described in FERC License Application Exhibit E,

RESPONSE TO COMMENT I.313 (cont.):

Chapter 3, Sections 3.4 and 4.4 will be developed during mitigation plan refinement. A general estimate of monitoring costs is included in the project capital costs presented in FERC License Application Exhibit D. The mitigation plan refinement program will include provisions for the funding of additional measures which may be determined to be required as a result of information gained during monitoring.

COMMENT I.314:

"Table E.3.178: Wildlife Mitigation Summary: Estimated costs for Monitoring Study 2 and Mitigation Plans 6 and 21 should be included in project capital costs, as should costs of any other mitigation necessary because of the project."

RESPONSE:

The reviewer's Comment has been noted. Please refer to the Response to Comment I.313.

COMMENT I.315:

"Page E-3-191: 3.1 - Introduction: Paragraph 1: It is our understanding the downstream study area extended only to the Deshka River, not all the way to Cook Inlet. 3B-1/"

"3B-1/ McKendrick, J. W. Collins, D. Helm, J. McMullen and J. Koranda. 1982. Susitna Hydroelectric Project, Phase 1 Final Report, Environmental Studies, Subtask 7.12: Plant Ecology Studies. University of Alaska Agricultural Experiment Station, Palmer. Prepared for the APA."

RESPONSE:

The Power Authority assumes this Comment refers to Paragraph 2 of the referenced FERC License Application Introduction rather than Paragraph 1 as indicated. Paragraph 1 does not refer to a study area. The study area described in Paragraph 2, which included "a corridor extending approximately 1 mile (1.6 km) to each side of the downstream floodplain between Gold Creek and Cook Inlet," represents the general study area "designated for botanical resources and wildlife of the Susitna Hydroelectric

RESPONSE TO COMMENT I.315 (cont.):

Project." This study area is addressed in FERC License Application Sections 3 and 4. The reference is not intended to represent the study area used by a specific study (i.e., McKendrick, et al. (1982) as cited in this Comment).

COMMENT I.316:

"Page E-3-193: (a) General: Last Paragraph: Floristic surveys were not completed in 1983 as described here and under (c) Summary, page E-3-198. A current schedule of when the surveys will be conducted, and when the information will be distributed, should be provided by the applicant."

RESPONSE:

The Power Authority anticipates that the DEIS will evaluate the adequacy of the existing floristic data base. However, as indicated by the USFWS in Comment I.318, it is felt that the likelihood of finding threatened or endangered plant species in the transmission corridors is very low.

COMMENT I.317:

"Page E-3-195: 3.1.3 - Contribution to Wildlife, Recreation, Subsistence, and Commerce: More specific information on different wildlife species' uses of various vegetation communities throughout the project area should be included in this section."

RESPONSE:

Specific information on wildlife uses of the various vegetation types that occur within the project area is presented in FERC License Application Exhibit E, Chapter 3, Section 4 (Wildlife). See also Responses to Comments C.83, C.84, C.96, F.41, F.44 and F.45.

COMMENT I.318:

"Page E-3-196: 3.2.1 - Threatened or Endangered Plants: Thirty-three, not 37, plant taxa are currently under review as candidate threatened or endangered species. Although the

COMMENT I.318 (cont.):

proposed surveys for candidate endangered plants were not done in 1983, it is felt that the likelihood of finding these species in those areas is very low."

RESPONSE:

Thirty-three plant taxa are presently under review as candidate threatened or endangered species as compared to the 37 that were listed in the cited 1980 report. The Power Authority appreciates this updated information and agrees that the probability of any candidate threatened or endangered plant species occurring along the Healy-to-Fairbanks and Willow-to-Anchorage transmission corridors is very low.

COMMENT I.319:

"Page E-3-196: (a) Watana and Gold Creek Watersheds: The word "candidate" should be added before "endangered plant taxa" in the last sentence on the page."

RESPONSE:

We agree.

COMMENT I.320:

"Page E-3-198: (a) Methods: Paragraph 1: The comparative widths of the different access and transmission corridor segments which were mapped and used for calculations in Tables E.3.77 and 78 should be stated. Also, see our comments on all of Section 3.2.2 (e) and Tables E.3.79 and E.3.86. Please see our more detailed comments under Wetlands, Section 3.2.3, regarding the inaccuracies of typing wetlands solely from a vegetation-type map."

RESPONSE:

As stated on page E-3-191 of the FERC License Applicaton, vegetation was mapped in "corridors approximately 5 miles (8km) in width encompassing the transmission routes from Healy to Fairbanks and Willow to Anchorage." Results of these studies are shown in Tables E.3.77 and E.3.78 of the FERC License Application respectively.

RESPONSE TO COMMENT I.320 (cont.):

The second half of the Comment references other Comments on Chapter 3 of the FERC License Application. For specific
RESPONSE TO COMMENT I.320 (cont.):

discussions of these aspects, please refer to the following Responses:

Section 3.2.2(e)	See Response to Comment I.327
Table E.3.79	See Response to Comments I.415 & I.370
Table E.3.86	See Response to Comments I.419 & I.370
Section 3.2.3	See Response to Comment I.330

COMMENT I.321:

"Page E-3-199: (a) Methods: Paragraph 3: The 1982 browse inventory, plant phenology, and Alphabet Hills pre-burn inventory and assessment studies should be briefly described."

RESPONSE:

The cited studies are described in a report by Steigers, et al. (1983). This report is referenced below.

REFERENCES

ADF&G, Susitna Hydroelectric Project, Subtask 7.12 - Phase I Final Report, Environmental Studies, Plant Ecology Studies (1982).

Steigers, W. D., Jr., D. Helm, J. G. MacCracken, J. D. McKendrick and F. V. Mayer report (1982).

COMMENT I.322:

"Page E-3-201: (a) Methods: Paragraphs 2,3, and 4: We support the proposed vegetation and wetlands mapping programs. An additional objective is to produce more realistic impact assessments by better integrating wildlife and botanical studies. For the vegetation maps, the necessary detail should be to Level V of Viereck, et al. for

COMMENT I.322 (cont.):

forests and Level IV for other types. 3B-2/ Wetlands should be mapped directly from aerial photographs, and incorporate

soils and drainage characteristics, according to Cowardin et al. (please also see our Comments on Section 3.2.3). 3B-3/ The application should be updated to include current mapping plans and information on how delays may affect the proposed permitting schedule. Continued mapping delays could lead to difficulty in re-siting facilities for environmental COMMENT I.322 (cont.):

considerations. The preliminary mapping scheduled for completion by June 30, 1983 was not accomplished."

"3B-2/ Viereck, L.A., T.T. Dyrness and A.R. Batten. 1982. Revision of Preliminary Classification for Vegetation of Alaska. Unpublished Report from Workshop December 24, 1981, Anchorage. Workshop on Classification of Alaskan Vegetation: 77 pp."

"3B-3/ Cowardin, L.M.,V. Carter, F.C. Golet and E.T. Laroe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. Publication FWS/OBS-79-31. U.S. FWS."

RESPONSE:

We acknowledge Department of Interior support for Power Authority activities to map vegetation and wetlands. The technical recommendations for mapping have been noted.

The Power Authority anticipates that the DEIS will reasonably analyze vegetation and wetlands and will incorporate prior studies of vegetation and wetlands.

COMMENT I.323:

"Page E-3-204: (b) Watana and Gold Creek Watersheds: Information on the seasonal values of vegetation types for food, cover, etc., should be related to specific wildlife species to document the importance of vegetation in wildlife habitat. This would allow better integration of vegetation as wildlife baseline data for impact assessment and clarify mitigation planning efforts."

RESPONSE TO COMMENT I.323:

The requested information is provided in the Wildlife Baseline and Impact Discussions (FERC License Application pages E-3-296 through E-3-508). As stated in Section 3.1 (FERC License Application page E-3-191),

> "[T]he primary importance of botanical resources within the project area is their key role as components of wildlife habitat. The following discussions have been coordinated closely with baseline descriptions, impact assessments, and mitigative measures presented in Section 4 (Wildlife), and formed an important basis for that section."

Thus the Botanical Resources, Baseline Impact and Mitigation sections were written to prepare the reader for the discussions of species habitat relationships which follow in the Wildlife discussions. However, the Botanical Resources section discusses botanical resources in themselves and not as wildlife habitat.

COMMENT I.324:

"Page E-3-211: (v) Aquatic Vegetation: The relationship of the aquatic vegetation surveys to wetland types, and values of these areas to specific wildlife species, should be described."

RESPONSE:

Please refer to the Response to Comment I.323. In FERC License Application Exhibit E, Chapter 3, Section 4, vegetation types are extensively discussed in relation to the wildlife species which utilize them. The plant species discussed on FERC License Application pages E-3-211 and E-3-212, and shown in Table E.3.70, are all associated with a single wetland class: lakes and ponds. In the USFWS wetland classification system of Cowardin, et al. (1979), lakes and ponds of the project area comprise lacustrine and palustrine wetlands. Wetlands are discussed in greater

RESPONSE TO COMMENT I.324 (cont.):

detail on FERC License Application pages E-3-220 through E-3-222.

REFERENCES

Cowardin, L. M., V. Carter, F. C. Golet and E. T. LaRoe, Classification of Wetlands and Deep Water Habitats of the United States, Office of Biological Services, U.S. Fish and Wildlife Service, Publication FWS/OBS-79-31 (1979).

COMMENT I.325:

"Page E-3-214: (c) Devil Canyon to Talkeetna: A comparison should be made of: (1) characteristics of the Viereck et al. vegetation types as classified in the upper and middle Susitna River Basins; and (2) the successional stages into which vegetation along downstream portions of the Susitna River were classified. Prevalence and association of wetlands types to downstream successional types should also be covered here."

RESPONSE:

In response to the first part of the Comment, a table providing a comparison between lower Susitna River successional stages and the Viereck and Dyrness (1980) vegetation classification system (which was used to classify the upper and middle Susitna River Basins) is attached.

In response to the second part of the Comment, the following discussion is provided:

Wetlands have been mapped along much of the lower Susitna River by the U.S. Fish & Wildlife Service under the National Wetlands Industry using the Cowardin, et al. (1979) system. On these maps, riparian areas dominated by alder and willow are classified as palustrine forested wetlands depending on plant height. About two-thirds or more of the vegetated floodplain represents riparian wetland vegetation given that spruce-birch, which is most likely not wetland, covers about one-third or less of the vegetated floodplain (see FERC License Application page E-3-216).

RESPONSE TO COMMENT I.325 (cont.):

COMPARISON OF LOWER SUSITNA RIVER SUCCESSIONAL STAGES WITH THE VIERECK & DYRNESS (1980) VEGETATION CLASSIFICATION SYSTEM

Lower River Successional Stage	Viereck and Dyrness (1980)* Classification Level III	Level IV
(1) Early Successional Stands - young willow, alder, balsam poplar saplings	Closed tall shrub	willow alder-willow
	Open tall shrub	willow alder-willow
(2) Mid-Successional Stands - mature willow, mature alder, young balsam poplar trees	Closed tall shrub	willow alder alder-willow
	Open tall shrub	willow alder-willow
	Closed deciduous forest	balsam poplar
(3) Late Successional Stands -mature balsam poplar trees, white spruce, paper birch	Closed deciduous forest	balsam poplar
	Closed mixed conifer and deciduous forest	spruce-birch poplar-spruce

* Viereck, L. A., and C. T. Dyrness, A Preliminary System For Vegetation of Alaska (1980), U.S. Forest Service Pacific Northwest Forest & Range Experiment Station, Gen. Tech. Rep. FNW-106.

REFERENCES

Cowardin, L. M., V. Carter, F. C. Golet and E. T. LaRoe, Classification of Wetlands and Deepwater Habitats of the United States, Office of Biological Services, U.S. Fish and Wildlife Service, FWS/OBS-79/31 (1979).

Viereck, L. A. and C. T. Dyrness, A Preliminary Classification System for Vegetation of Alaska (1980).

COMMENT I.326:

"Page E-3-217: (d) Talkeetna to Cook Inlet: An analysis of early, middle, and late successional stages above Talkeetna compared to the area below Talkeetna should be provided. We suggest that the unvegetated islands and braided channels of this section of the Susitna River indicate a more dynamic, rather than stable, character as compared to the river upstream of Talkeetna. Because of significant flow changes which can be expected with project construction, separate vegetation mapping should be undertaken of the 10-year floodplain downstream from Talkeetna (e.g. Table E.2.49 in Chapter 2 documents an expected doubling of mean flows at the Susitna Station (RM 26.0) from December through March with project operation)."

RESPONSE:

As stated on FERC License Application page E-3-191, unless cited otherwise, descriptions of vegetation are taken from McKendrick, et al. (1982). In the report cited, these investigators noted that, judging from average age and successional stage of riparian vegetation, islands and river bars downstream from Talkeetna were apparently more stable than those between Talkeetna and Devil Canyon. Although it was not greatly emphasized, this point was attributed to the probable greater severity of ice jam damage and flooding in the narrower floodplain upstream from Talkeetna. Considerable discussion of riparian succession along the downstream floodplain occurred during the Susitna Hydroelectric Project Terrestrial Environmental Workshop held in February and March 1983. Geomorphological cross sections already prepared could be used for long-term monitoring of vegetation changes along the downstream floodplain.

REFERENCES

ADF&G, Susitna Hydroelectric Project, Phase I Final Report, Environmental Studies, Subtask 7.12: Plant Ecology Studies (1982).

McKendrick, J., W. Collins, D. Helms, J. McMullen and J. Koranda report (1982).

COMMENT I.327:

"Page E-3-2.7: (e) Transmission Corridors: The applicant's response to our comments on the draft license application indicates that, because of different mapping resolutions, vegetation types quantified in Table E. 3.79 cannot be correlated with other segments of the transmission corridor beyond Level 1 of Verreck et al. (Chapter 11, W-3-112). Different map scales and corridor widths prevent a comparison or cumulative assessment of vegetation types to be impacted by the four transmission corridor segments.

"(We have previously commented on the interdependence of the Anchorage-Fairbanks Intertie and Susitna hydroelectric project, recommending these projects be analyzed as one (January 5, 1982 and January 14, 1983 letters to Eric P. Yould, APA)."

RESPONSE:

Vegetation types occurring within the Watana-to-Gold Creek, Healy-to-Fairbanks, and Willow-to-Anchorage transmission corridors cannot be correlated with vegetation types mapped within the Intertie transmission corridor beyond Level I or II of Viereck, et al. (1982). While it would be preferable to map all corridor segments in accordance with the same vegetation classification system, we do not believe that this is necessary to allow cumulative impact assessment.

REFERENCES

Viereck, L. A., T. T. Dyrness and A. R. Batten, Revision of Preliminary Classification for Vegetation of Alaska, unpublished report, Workshop on Classification of Alaskan Vegetation, December 24, 1981, Anchorage (1982).

COMMENT I.328:

"Page E-3-219: (iii) Willow to Healy: We recommend remapping so that this corridor can be compared to other sections mapped in greater detail by McKendrick et al. This would allow an assessment of cumulative transmission line impacts and mitigation needs."

RESPONSE TO COMMENT I.328:

Please refer to the Response to Comment I.327. Vegetation maps of the intertie corridor, presented at a scale of 1:250,000 in a Commonwealth Associates, Inc. (1982) report, were adapted from a map previously prepared by the Joint Federal-State Land Use Planning Commission for Alaska (1973). These maps are presented in the Commonwealth Associates report in Figures 14a-d on pages 101-108. Those figures note that additional sources for the vegetation mapping were 1"=3000' color infrared U-2 photographs taken in 1977 by NASA (unreferenced) and field investigations made by Commonwealth Associates in 1981.

REFERENCES

Commonwealth Associates, Inc., Environmental Assessment Report, Anchorage-Fairbanks Transmission Intertie (1982).

Joint Federal-State Land Use Planning Commission for Alaska, Major Ecosystems of Alaska, Map (1973), previously submitted to the FERC on July 11, 1983.

COMMENT I.329:

"Page E-3-220: (iv) Dams to Intertie: Figures E.3.39 and E.3.40, showing vegetation types crossed by this transmission corridor segment and other project facilities, are unreadable due to reduction for publication."

RESPONSE:

FERC License Application Figures E.3.39 and E.3.40 were transmitted to the FERC at their original size (30" X 36") as Supplemental Attachments 10-14-1 and 10-14-2 in the July 11, 1983 filing of supplemental information request responses. Interested parties may obtain at cost full size copies of these figures by requesting them from the Alaska Power Authority.

COMMENT I.330:

"Page E-3-220 and 221: 3.2.3 - Wetlands: Color infrared aerial photograph portions of the maps identified as Figures E.3.46, E.3.47, E.3.69 and E.3.70 were stereoscopically

COMMENT I.330 (cont.):

examined. The FWS found wetland and non-wetland areas were inaccurately distinguished. Large areas of upland are included in the map units classified as wetland. Many of these areas are greater than 100 acres in size. In addition, areas that have been designated as upland include many wetlands, some of which are larger than 50 acres. A reasonably accurate assessment of the amount of wetland to be impacted by the project cannot be made with the information provided in the license application. Another problem involves the use of only five broad wetland categories. The many wetland types that are known to occur in the area have been lumped into these categories. Wetland types vary considerably in their value as fish and wildlife habitat. The impacts of the project on wetland types that have high values are difficult to determine with the present wetland inventory information. A more detailed classification using lower levels of the Cowardin et al. (1979) system 3B-4/ would provide much of the needed data. The existing wetland maps break down wetlands to the class level (e.g. forested, scrub-shrub, and emergent wetlands). We recommend that wetlands be classified to the subclass and water regime level. We should be contacted for assistance prior to additional wetland mapping efforts in the project area."

"3B-4/ See Footnote 3B-3. [Footnote 3B-3/ Cowardin, L.M., V. Carter, F.C. Golet and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. Publication FWS/OBS-79-31. U.S. FWS.]

"Office of Environment, Office of the Federal Inspector. 1981. Revegetation Philosophy for the Proposed Gasline. June 26, 1981. Anchorage, Alaska. 3 page mimeo.

"Kubanis, S.A. 1982. Revegetation Techniques in Arctic and Subarctic Environments. Office of the Federal Inspector, Alaska Natural Gas Transportation System, Office of Environment, Biological Programs. Anchorage, Alaska. 40 pp."

RESPONSE:

The FERC License Application recognized the extent of the available wetland maps (see pages E-3-222, E-3-223, E-3-224 and E-3-245). The Power Authority anticipates that the DEIS will analyze the adequacy of existing maps and will describe affected wetlands in reasonable detail.

COMMENT I.331:

"Page E-3-221: 3.2.3 - Wetlands: Paragraph 4: The application defines wetlands as 'areas at least partly characterized by hydrophytic vegetation and the presence of standing water or sheet flows.' This definition needs clarification. It implies that wetland types that do not have standing water, but nevertheless exhibit saturated soil conditions throughout the growing season, are not addressed in the discussions. These saturated wetlands include many of the bog, floating-mat, and muskeg type wetlands in the project area. Since some of these types are of concern to the FWS, and since the U.S. Army Corps of Engineers (CE) extends permit authority to many of these wetlands, they should be included in mitigation and impact discussions."

RESPONSE:

The portion of the text cited is not meant to imply that wetland types that do not have standing water, but nevertheless exhibit saturated soil conditions, are not addressed in the discussions. The sentence in question (FERC License Application page E-3-221, Paragraph 4) should be amended to read as follows:

> "In discussions of impacts and mitigation involving wetlands in general, the term is used to denote areas at least partly characterized by hydrophylic vegetation and the presence of standing water or sheet flows."

It should be noted that in the two paragraphs immediately preceding the sentence in question, wetlands are specifically defined both from the standpoint of Cowardin, et al. (1979) and U.S. Army Corps of Engineers regulations promulgated under Section 404 of the Clean Water Act (33 C.F.R. §§ 320-330). Bog or muskeg type wetlands referred to by the reviewer are included in the discussions and mapping of wetlands contained in FERC License Application Exhibit E (Chapter 3, Section 3.2.3; Figures E.3.45 through E.3.47 and E.3.66 through E.3.73).

REFERENCES

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe, Classification of Wetlands and Deepwater Habitats of the United States Office of Biological Services, U.S. Fish and Wildlife Service, FWS/OBS-79-31 (1979).

COMMENT I.332:

"Pages E-3-221 and 222: 3.2.3: (a) Methods: Table E.3.81 attempts to display Viereck and Dyrness (1980) types which are interchangeable with Cowardin et al. (1979) system wetland types. The table points out several major problems. Enough information is presented in most of the Viereck and Dyrness (1980) vegetation types to allow for more detailed classification in the Cowardin et al. (1979) wetland categories. For example, open black spruce can be correlated to Palustrine, needle-leaved forests instead of Palustrine forests. Willow shrub can be correlated to Palustrine, broad-leaved deciduous scrub-shrub, not just Palustrine scrub-shrub. In addition, field data gathered during the initial vegetation mapping phase probably could provide enough information to add water regime modifiers to some of the Cowardin et al. (1979) wetland types. Open black spruce in wetland situations in the project area is nearly always characterized by a saturated water regime. The open black spruce vegetation type could be correlated with Palustrine needle-leaved evergreen, saturated. The wetland classes used in the license application are too broad. Assessments of project impacts wetland types of concern cannot be made with these lumped wetland categories. Some of the Viereck and Dyrness (1980) vegetation types that appear in Table E.3.81 would seldom occur in a wetland situation. This is especially true of the closed white spruce category. That category should have been classified as non-wetland (upland). With the mapping procedures described in the application, closed white spruce areas would be classified as wetland unless the mapping personnel excluded them due to the 'presence of steep slope and likely good drainage.'

"The process of classifying the vegetation types into wetland categories, and then excluding those areas that meet the ambiguous criteria of having 'steep slope and likely good drainage,' results in an inaccurate depiction of the wetlands in the project area.

"Separation of wetland and non-wetland portions of each of the Viereck and Dyrness (1980) vegetation types has to be done on the original aerial photography that was used to map the vegetation. Preferably this should be done during the initial photo interpretation. If a Viereck and Dyrness (1980) vegetation type appearing on the photo is only partially wetland, the wetland area should be made a separate polygon and given a modifying code that designates it as a wetland. To derive the wetland map, only those

COMMENT I.332 (cont.):

polygons containing the modifying code would be transferred. The Viereck and Dyrness (1980) classification would then be converted to the appropriate wetland classification."

RESPONSE:

The Power Authority concurs with the reviewer's Comment that enough information is presented in most of the Viereck and Dyrness (1980) vegetation types to allow for more detailed classification in the Cowardin, et al. (1979) wetland categories. However, at the time the vegetation mapping was prepared, correlation was made to the level of detail shown in FERC License Application Table E.3.81. On FERC License Application page E-3-222, it is also stated that:

> "Because the system of Cowardin et al. (1979) requires additional data on hydric soils and periodic ambient water conditions to characterize wetlands completely, the mapping is liberal and indicates areas which potentially qualify as wetlands under that system. Portions of these areas may be eliminated by further considerations of soil and water conditions."

REFERENCES

Viereck, L. A., T. T. Dyrness and A. R. Batten, Revision of Preliminary Classification for Vegetation of Alaska, unpublished report, Workshop on Classification of Alaskan Vegetation, December 24, 1981, Anchorage (1982).

Cowardin, L. M., V. Carter, F. C. Golet and E. T. LaRoe, Classification of Wetlands and Deepwater Habitats of the United States, Office of Biological Services, U.S. Fish and Wildlife Service, FWS/OBS-79-31 (1979).

COMMENT I.333:

"Page E-3-222: (a) Methods: Paragraph 3: The application states that 'Because the system of Cowardin et al. (1979) requires additional data on hydric soils and periodic ambient water conditions to characterize wetlands completely, the mapping is liberal and indicates areas which potentially qualify as wetlands under than system.' This implies that detailed soil and water permanancy data need to be available if wetlands are to be mapped accurately using the Cowardin et al. (1979).

COMMENT I.333 (cont.):

"In most areas, however, such data are not necessary if the wetland types are interpreted directly from aerial photography. The hydric soil and hydrologic conditions that are an important component of the Cowardin et al. (1979) system can be inferred from the information present on an aerial photograph. The experienced photointerpreter who is mapping wetlands synthesizes information on vegetation, slope, landform, drainage, etc. that is present on the imagery to derive a line that represents the boundary of a wetland. Soil and water permanancy data are only collected at sample field sites where the photointerpreter is determining the boundaries of representative wetland types on the ground, and comparing these boundaries to the tones and textures that appear on the aerial photography.

"The wetland mapping methodology described in the application does not involve direct interpretation of wetland types on aerial photography. An attempt was made to derive wetland maps from the existing vegetation maps. If efforts to refine the wetland maps does not involve additional photointerpretation, then collection of extensive soil and water data would be necessary. The FWS recommends that any wetlands map refinement involve direct interpretation of aerial photos. The Viereck and Dyrness (1980) vegetation units on the original aerial photography could be analyzed so that wetland portions are differentiated or entirely new wetland mapping could be done with delineation and classification of the wetland types on the aerial photos being done in accordance with the Cowardin et al. (1979) system. Costs and time involved to perform either method would be approximately the same.

"The FWS does not agree with the baseline report conclusion that detailed wetland maps in the project area would be extremely difficult to produce using standard photointerpretation techniques. The primary reason for this difficulty, according to the report, is the conclusion that 'wetlands are highly integrated with non-wetlands,' and plant species composition in wet and non-wetland is similar, differing only in the quantities of individuals. Analysis of the high altitude aerial photography covering the project area by FWS personnel indicates that detailed wetland maps can be produced, and the wetlands can be accurately classified to the subclass and water regime levels of the Cowardin et al. (1979) classification system. Although there are some wetland types that will initially be difficult to distinguish from adjacent upland areas, a moderate amount of ground truthing can provide the photointerpreters with enough information to draw the

COMMENT I.333 (cont.):

wetland boundaries with reasonable accuracy. The intricate pattern of mixing between wetland and non-wetland areas that occurs in portions of the project area would result in some generalizing, but the generalizing would be far less than that in the existing wetlands mapping. A minimum mapping size of approximately four acres could be displayed if the wetland maps were produced at a scale of 1:63,360.

"We suggest that site-specific field confirmation of wetlands be undertaken in coordination with concerned agencies (e.g. CE, FWS, EPA, and Alaska Department of Environmental Conservation). Particular concern would be where preliminary design shows potential conflict between project facilities and wetlands. Support and preliminary plans for such agency coordination were established at the December 2, 1982 wetlands meeting (please refer to notes from APA's license application workshop included as Appendix E11.H to Chapter 11)."

RESPONSE:

Please refer to the Response to Comment I.330. Also, the Power Authority anticipates that the DEIS will reasonably analyze wetlands in the Project area.

COMMENT I.334:

"Page E-3-223: (b) General Description: Discussion should be provided on successional patterns and fire predominance in wetland types.

"We question the wetlands classification of mapped vegetation types without use of other factors or field verification. Please refer to our two previous comments."

RESPONSE:

Succession in riparian wetlands is discussed in pages E-3-214 through E-3-217 of the License Application. Palustrine ferested and palustrine shrub-scrub wetlands, including sphagnum bogs, are subject to wildfire. Even sedge-grass wetlands may burn when conditions are dry enough. Large areas of all types of wetlands were burned in the recent fire in Minto Lakes area west of Fairbanks; fires ignited in wetlands in the Tanana Flats near Fairbanks ignited peat in the wetlands and have smouldered for several years; and during the very dry summer in 1977 wetland tussock tundra on the North Slope burned. Wetlands

RESPONSE TO COMMENT I.334 (cont.):

vegetation generally regenerates rapidly, with resprouting of herbs and shrubs.

Please refer to the Responses to Comments I.330 and I.332. Further analysis of wetland dynamics and impacts is being conducted during impact assessment refinement.

COMMENT I.335:

"Page E-3-223: (b) General Description: Paragraph 2: It should be indicated on wetland maps (Figures E.3.45 through E.3.47, and E.3.66 through E.3.73) that the areas depicted are potential wetlands."

RESPONSE:

The Power Authority agrees that these maps should have been labelled as potential wetlands maps.

COMMENT I.336:

"Page E-3-225: (a) Construction: Other than the direct vegetation losses due to inundation, and construction of camp, village, and borrow areas described here and in Tables E.80, E.82, E.83, and E.85, there is no quantification of types and areas to be potentially impacted by erosion, permafrost, melting, etc. Several of those impacts can and should be analyzed based on information in Chapter 6, Geological and Soils Resources, and Figures E.6.30 through E.6.45."

RESPONSE:

The area potentially affected by each type of slope failure for each reservoir was estimated based on the information presented in Chapter 6 of the FERC License Application including Figures E.6.22 through E.6.45. This information was provided in response to FERC Supplemental Information Request 6-7. A breakdown and distribution of each slope condition along both reservoirs is presented in Tables 3 and 4 of Supplemental Information Response 6-7. The estimates include all areas potentially affected above the minimum reservoir level and represent a worst case condition. A worst case estimate of the area above the maximum reservoir level (2,000 ft.) that would potentially be affected is provided by the third column of Table 3 for Watana. The sum

RESPONSE TO COMMENT I.336 (cont.):

of the areas in this column is 851.3 hectares. In the case of Devil Canyon, as indicated in Table 4, the area above the maximum reservoir level that is susceptible to slope instability is minimal due to the minimal fluctuation of the reservoir level and a drawdown zone which is primarily in contact with bedrock and/or low angle slopes.

For a more detailed discussion of slope stability as it relates to the Watana and Devil Canyon reservoirs, see the 1980-1981 Geotechnical Report by Acres American, Volume 2, Appendix K-Reservoir Slope Stability. See the Response to Comment I.361 for further discussion of erosion and soil losses following clearing.

As indicated on page E-3-285 of the License Application, precise areal extents and elevation ranges of slope stability effects cannot be reliably quantified in advance. Supplemental Information Response 6-7 provides worst case estimates and "reasonable estimates" of areas susceptible to different erosion processes. Worst case or "reasonable estimates" of the area of each vegetation type that occupies location susceptible to each erosion type are also possible, but these estimates would be even less precise than the totals, and predictions of the changes in vegetation cover that would potentially occur in each situation would require even further simplifying assumptions, making the value of this analysis questionable. Nevertheless, methods for deriving useful estimates of the areas impacted by erosional processes (including those resulting from permafrost thawing) will be considered during impact assessment refinement efforts.

REFERENCES

Acres American, Inc., Susitna Hydroelectric Project, Task 2 - Survey and Site Facilities, Subtask 2.15 - Slope Stability and Erosion Studies Closeout Report, Final Draft (1982).

Acres American, Inc., Geotechnical Report, Volume 2, Appendix K - Reservoir Slope Stability (1980-1981).

Alaska Power Authority, Response to FERC Supplemental Information Request 6-7 (1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.337:

"Page E-3-225: (i) Vegetation removal: Paragraph 1: We concur with intentions to confine spoil deposition to areas within the impoundment or areas already disturbed. We siggest that the potential size and locations of spoil areas be mapped and quantified in the discussion and accompanying tables."

RESPONSE:

Wherever practical, excess spoil will be deposited in the defined areas within the impoundment or areas already disturbed in accordance with criteria established by the Power Authority and the Design Consultants in project memoranda. These requirements will be stipulated in the Project Construction Specifications that the contractors will bid on and the Erosion & Sediment Control Plan that will be submitted by the construction contractor prior to implementing his activities. All spoil disposal sites will be identified and mapped during the detailed design phase of project development.

COMMENT I.338:

"Page E-3-226(ii) Vegetation Loss by Erosion: We recommend quantifying the permafrost and unstable slope areas mapped in Chapter 6, Figures E.6.30 through E.6.45, by vegetation type. Overlay maps of a readable size are necessary to fully assess botanical impacts and resultant implications to food, cover, movements, and other habitat needs of key wildlife species. An explanation should be given as to how the cited 1379 acres of unstable slopes were derived."

RESPONSE:

Please refer to the Response to Comment I.336 concerning quantification of vegetated areas potentially affected by unstable slopes due to several causes including permafrost thawing adjacent to the reservoir.

COMMENT I.339:

"Page E-3-226: (iii) Vegetation Damage by Wind and Dust: Paragraph 1: We find it difficult to quantify the miles of shoreline and the nearby area where blowdown of trees may

COMMENT I.339 (cont.):

occur. Tree blowdown could be critical with regard to loss of nest trees and wildlife cover adjacent to the reservoir. Please also refer to our comments on Wildlife Sections X and Y."

RESPONSE:

The Power Authority also finds it difficult to quantify areas where blowdown of trees may occur as a result of the Project.

COMMENT I.340:

"Page E-3-226: (iii) Vegetation Damage by Wind and Dust: Paragraph 2: As above, we suggest that: (1) quantification be made of the areas likely to be affected by dust accumulations, (2) time frames be outlined within which such areas are likely to be affected, and (3) correlation be made with wildlife uses in those areas."

RESPONSE:

Our current assessment indicates that reservoir clearing and borrow pit development will not create significant dust impacts outside of areas to be disturbed. Areas most likely to be affected by dust accumulation are those areas within a band 50m wide on each side of project roads (CRREL 1980). Additional attention will be given to the evaluation of vegetation impacts due to dust accumulations during impact assessment refinement.

REFERENCES

CRREL, Environmental Engineering and Ecological Baseline Investigations Along the Yukon River, Prudhoe Bay Haul Road, Report 80-19, U.S. Army Corps of Engineers (1980).

COMMENT I.341:

"Page E-3-227: (vii) Effects of Increased Fires: We concur with this description and note that fires occuring near populated areas will likely be repressed. Thus, the potential for using prescribed burns to stimulate natural successional patterns may be reduced."

RESPONSE TO COMMENT I.341:

Comment noted.

COMMENT I.342:

"Page E-3-228(b): Filling and Operation: Another impact which should be fully assessed is the potential for increases in fish mercury levels. Canadian studies have found reservoir impoundment to cause mobilization of natural soil mercury to occur, even where natural mercury levels in soil and vegetation are not high 3B-4/ We recommend that baseline mercury levels be measured in soils and vegetation. Such measurements should be made in similar areas which will and will not be inundated. Mercury levels should be monitored during and following project construction. Please also refer to our more detailed comments and references cited on Chapter 2, Section 4.1.1(e)(vii), Page E-2-96."

"3B-4/ See Footnote 3B-3. [Footnote 3B-3/ Cowardin, L.M., V. Carter, F.C. Golet and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. Publication FWS/OBS-79-31. U.S. FWS.

"Office of Environment, Office of the Federal Inspector. 1981. Revegetation Philosophy for the Proposed Gasline. June 26, 1981. Anchorage, Alaska. 3 page mimeo.

"Kubanis, S.A. 1982. Revegetation Techniques in Arctic and Subarctic Environments. Office of the Federal Inspector, Alaska Natural Gas Transportation System, Office of Environment, Biological Programs. Anchorage, Alaska. 40 pp.]"

RESPONSE:

Refer to the Response to Comment I.41.

COMMENT I.343:

"Page E-3-228: (i) Vegetation Succession Following Removal: Natural plant succession may also be inhibited or precluded following disturbance unless topsoil is restored and steps taken to minimize erosion, changes in area drainage, etc.

COMMENT I.343 (cont.):

"Please refer to our comments on the Mitigation Plan, Section 3.4 Attachment A, Biological Stipulations, XI and to the restoration plans and analyses prepared for the Alaska Natural Gas Transportation System.

"The discussion has not been expanded to include wetland types as the applicant had indicated it would be in response to our comment on the draft application (Chapter 11, W-3-122). We are concerned that the browse nutritional study referred to in that response has been reduced in scope, some aspects have been delayed, and others, such as the vegetation remapping, will probably be completed too late to optimize sampling."

RESPONSE:

The importance of topsoil replacement, erosion control and drainage are recognized and discussed in the Mitigation Plan (Section 3.4 of FERC License Application Exhibit E), which is based in part on the restoration plans, analyses and stipulations for the Alaska Natural Gas Transportation System. Use of the construction methods recommended in the FERC License Application for mitigating impacts to wetlands will minimize removal of wetland vegetation except for any gravel fill. In general, wet areas usually vegetate more rapidly than drier areas. If wetland vegetation is removed and/or the organic layer is compressed, the disturbed area usually becomes wetter and may pond, and species composition of vegetation may shift. For example, vehicle tracks in Alaskan shrub wetlands often regenerate to sedges. Further evaluation of wetland succession will be conducted during impact assessment refinement.

COMMENT I.344:

"Page E-3-229: Tundra: The areal extent of permafrost relative to vegetation cover types and project features should be quantified and figuratively represented here for the dam, impoundment, and associated construction facilities, and in the following sections for access and transmission corridors. Please also refer to our previous comment on Section 3.3.1 (a)(iii), Vegetation Loss by Erosion (page E-3-226)."

RESPONSE TO COMMENT I.344:

Impacts related to permafrost thawing will be related to development of project features such as the dams, camps, villages, borrow areas and access roads. Permafrost-related impact areas associated with these features are included in the areas tabulated for vegetation losses in Chapter 3 of the License Application. Permafrost mapping is not available for the project area in general and the reason for quantifying the area of each vegetation type underlain by permafrost outside of those areas affected by project features is unclear. Further geotechnical studies during detailed design will enable the identification of areas where special construction methods will need to be used to minimize permafrost degradation.

To the extent to which areal data on permafrost coverage of the project area are available, they will be evaluated along with vegetation data and the locations of project features. Quantification of vegetation losses will be carried to the extent feasible during impact asessment refinement efforts.

COMMENT I.345:

"Page E-3-230: (ii) Effects of Erosion and Deposition: Paragraph 2: Unstable slopes and permafrost areas are mapped in Chapter 6. However, because there is no interpretive description correlating those areas to vegetation cover types, it is difficult to analyze potential wildlife impacts. We recommend such an analysis."

RESPONSE:

In order to assess "potential wildlife impacts," the Power Authority needs to know what kind of impact mechanisms are being referred to by the commentor.

COMMENT I.346:

"Page E-3-231 through E-3-235: (iii) Effects of Regulated Flows: This discussion generally neglects consideration of the potential range and frequency of daily flow fluctuations in response to peak power needs.

"Several other potential project impacts relative to altered downstream flows have not yet been clarified, particularly with regard to wetlands and floodplains. These include

COMMENT I.346 (cont.):

impacts to floodplian areas which: (1) are now subject to annual, 5-year, 10-year, etc. flooding,and (2) will become exempt from flooding with project construction. Given the successional information depicted in Figure E. 3.78 and revised vegetation maps, it should be possible to quantify expected changes in vegetation, over time, for a variety of flow regimes. Such information is necessary to fully determine project impacts to wildlife and to make mitigation recommendations.

"We appreciate the thorough qualitative discussion of project impacts throughout this section. Once the recommended vegetation remapping is undertaken and analyzed in conjunction with hydrologic information, the information included here should be the basis for examining positive and/or negative impacts to wildlife of potential vegetation changes, over the life of the project. We recommend quantifying the maximum and minimum areas which may become available for the establishment of vegetation under alternative icing scenarios."

RESPONSE:

The Department of the Interior and other agencies have commented to the FERC regarding possible flow regimes, project operation alternatives and their impacts (see Comments B.2, B.3, B.4, B.5, B.7, B.64, B.65, C.87, F.2, F.3, F.10, F.11, F.25, F.39, I.5, I.24, I.25, I.29, I.131, I.133, I.149, I.198, I.201, I.236, I.558, I.560 and I.562, and the associated Power Authority Responses; see also FERC License Application (pages E-2-104, E-2-55 to E-2-62 (Case C target minimum flows)).

As indicated in the Responses to Comments B.65, F.11 and F.25, "The Power Authority anticipates that the DEIS and FEIS will analyze a full reasonable range of alternative operating scenarios." These alternative operating scenarios and their associated flow regimes could include base-load operation, an alternative already identified and analyzed in the FERC License Application, and also a range of load-following scenarios with hourly flow variations. The Power Authority has developed additional data and methods which FERC may utilize in its analysis of load-following alternatives, to the extent FERC deems any load-following operational scenario to be a reasonable alternative. The Power Authority has identified a load-following case and has analyzed the resulting stage fluctuations in the Susitna

RESPONSE TO COMMENT I.346 (cont.):

River downstream from the Project. A report documenting this analysis, illustrating appropriate methods of analyzing such alternatives, is referenced below and appended as a reference to this Response Document. This load-following hypothetical case may be characterized as "extreme," but remains within the flow constraint of the Case C scenario. This analysis was made to determine if, downstream of the Project, significant attenuation of the fluctuating water levels resulting from load-following operation would occur. The Power Authority does not currently believe that the flow release patterns in this report would be judged by many agencies to be an environmentally reasonable alternative. Neither is it necessarily thought that these patterns represent the optimum economic use of the resource. It may be of value in that it represents an environmentally extreme case; however, the FERC may not deem this case a "reasonable" alternative for its analysis. A second report which will document stage fluctuations for a more moderate case of discharge variations is anticipated in late March 1984.

We anticipate that the FERC will identify reasonable alternatives and analyze the environmental impacts of such modes of operation in preparing DEIS and FEIS. To the extent such alternatives are load-following, such an environmental analysis would include consideration of aquatic habitat effects of the mximum and seasonal mean changes in discharge occurring on a daily basis as well as the rates of change. Both rate of change and absolute change associated with alternative load-following modes of operation can be compared to natural existing conditions in the river.

A few examples of the natural range of the daily discharge variation is given in the Table below, taken from daily average discharge records at Gold Creek and two other locations at which rating curves are available. Rates of change under existing conditions can only be indirectly deduced from this table, but should be directly available from USGS gaging records. Please see also the Responses to Comments I.542 and I.552, as well as the Responses to Comments B.7, B.64, B.65, C.87 and F.39.

RESPONSE TO COMMENT I.346 (cont.):

TABLE I

Daily Changes in Discharges
and Associated Changes
in Water Surface Elevation

Date	Avg. Daily Discharge (cfs)	Change From Prev. Day (cfs)	Change in Stage at Gold Creek (ft)	Change in Stage at LR X 28 (ft)	Change in Stage at LR X 35 (ft)
08/31/82	16,000	+3,000	+0.6	+1.0	+0.8
06/08/82	30,000	+4,000	+0.5	+0.4	+0.5
08/02/81	54,000	+20,000	+3.2		
08/21/81	43,100	+8,000	+0.8		
05/07/81	13,600	+3,600	+1.1	+1.1	+1.1
05/09/81	30,000	+9,000	+1.3	+1.2	
09/15/80	21,600	+9,600	+1.8	+2.1	+2.1
09/14/80	12,000	+2,400	+0.6	+0.8	
07/02/80	33,800	-8,600	-0.9		
09/01/79	12,100	-2,000	-0.5	-0.6	
09/22/83	13,600	+3,000	+1.0		+1.0
09/23/83	17,500	+3,900			

Note: September 22, 1983 discharge increased from approximately 12,000 cfs to approximately 15,000 cfs during a one-day period. Discharge was 13,000 cfs at 0730 hours; approximately 15,000 cfs at 1800 hours.

REFERENCES

Harza-Ebasco, Susitna Hydroelectric Project River Stage Fluctuation Resulting From Watana Operation (January 1984).

COMMENT I.347:

"Page E-3-232:-Watana to Devil Canyon: Paragraph 4: We appreciate the discussion of rime ice formation in response to our previous comments (Chapter 11, W-3-125), but note omission of Wood, et al. (1975) from the document's reference list. An important concern with rime ice

COMMENT I.347 (cont.):

formation would be potential impacts to birch adjacent to the impoundment and winter use of those areas by moose."

RESPONSE:

The authors of the text have not been able to locate the reference to the effects of ice storms on oak forests (listed as Wood, et al. 1975). Effects of ice formation on moose are discussed in the Response to Comment I.352.

COMMENT I.348:

"Page E-2-234: Talkeetna to Yentna River: The project is expected to alter flows to the extent that mean winter flows at the Sunshine Station (RM 84) will be three times pre-project flows (Chapter 2, Table E.2.47). Scouring of vegetated banks resulting from river staging due to ice formation could be extensive and should be discussed."

RESPONSE:

Please refer to the Responses to Comments B.33, I.40 and I.54 with regard to simulation of ice processes in the Lower River downstream of the Susitna-Chulitna confluence. Additionally, please refer to the Response to Comment C.42 on ice scouring and vegetation removal in the reach between Talkeetna and Devil Canyon.

The same considerations in the Response to Comment C.42 apply to the Lower River with some modification. Post-project stages during freeze-up are expected to be higher than existing stages because of the higher freeze-up discharge. Ice cover induced staging may be expected to be similar to present conditions. However, the increased stages during freeze-up do not in themselves lead to increased bank scouring. Bank scouring and other changes to river morphology occur primarily during break-up (License Application page E-2-25 and R&M Consultants, Susitna River Ice Studies 1980-1981, 1981-1982 and 1982-1983). Freeze-up, under natural conditions is a much more gradual controlled phenomenon than break-up. No significant additional bank scouring due to higher water levels during the freeze-up period is expected.

Break-up jamming does not appear to have as significant an influence on channel morphology downstream of the confluence with the Chulitna as upstream. Observations by R&M during the winter of 1982-1983 indicated "The only significant ice

RESPONSE TO COMMENT I.348 (cont.):

jam observed below the Parks Highway Bridge occurred near the confluence with Montana Creek." A jam was observed in the same area as the 1980-1981 break-up. The lack of significant ice jamming is characteristic of braided channels as noted by Gerard (1983). With the project in place, the warmer releases from the reservoirs and the control of spring floods in the reach upstream of the Chulitna confluence would tend to moderate the break-up jamming which now occurs. This scour of banks and vegetation should be reduced with Project.

REFERENCES

R&M Consultants, Inc., Susitna Hydroelectric Project, Susitna River Ice Studies.

Ice Observations 1980-1981, 1981-1982 (1982), previously submitted to the FERC on July 11, 1983.

Ice Observations 1982-1983 (in preparation).

Gerard, L., Notes on Ice Jams, for Ice Engineering in Rivers and Lakes, University of Wisconsin, Madison (1983).

COMMENT I.349:

"Page E-3-235: Yentna River to Cook Inlet: We are concerned that minimal downstream impacts have been assumed even though a doubling in mean winter flows has been predicted at Susitna Station (RM 26) (Chapter 2, Figure E.2.49); and ice staging and break-up impacts are unknown."

RESPONSE:

Please refer to the Response to Comment I.348 on winter flow regime downstream of the Chulitna-Susitna confluence. The same considerations apply to the reach downstream of the Yentna-Susitna confluence. However, the influences of warmer temperatures released from the reservoirs and spring flood regulation on break-up would be minimal downstream of the Yentna confluence. This would be due to the large quantity of tributary inflow in the Lower River (i.e., Chulitna, Talkeetna and Yentna Rivers).

COMMENT I.350:

"Page E-3-236: (iv) Climatic Changes and Effects on Vegetation: The areas in which vegetation changes will occur must be known to fully assess implications to wildlife habitats."

RESPONSE:

Quantification of areas in which vegetation changes resulting from climatic changes will occur is difficult at best and may be beyond the state-of-the-art. Methods of estimating these areas will be considered and quantification will be carried to the extent feasible during impact assessment refinement efforts.

COMMENT I.351:

"Page E-3-236: (iv) Climatic Changes and Effects on Vegetation: Paragraph 2: Although phenology studies were undertaken in spring, 1983 to obtain data for better assessing project-induced temperature/vegetation/wildlife impacts, funding for analysis of that data cannot be assumed before State fiscal year 1985. We recommend that a list of available botanical data compiled by the University of Alaska be included as Attachment B to our comments, be critically scrutinized with regard to further study needs. Funding should be provided to complete analyses of critical information."

RESPONSE:

The Power Authority anticipates that the DEIS will reasonably address phenological effects.

COMMENT I.352:

"Page E-3-236: (iv) Climatic Changes and Effects on Vegetation: Paragraph 5: As with the discussion on temperature changes adjacent to the reservoir, the importance of fog banks and resultant ice formation relates to plant species, time of year, and wildlife uses which will be affected. In addition to providing such information, we recommend describing the period when area temperatures may be below -9.4°F and steam fog creation is likely."

RESPONSE TO COMMENT I.352:

Many Alaskan rivers have open water areas which produce fog throughout the winter. The ice crystals observed on vegetation in these areas, although large, are not dense and probably less likely to break twigs than a heavy snowfall. At a thermal springs area on the North Slope up to 90% of the available twigs adjacent to the water were browsed by moose (Masters, et al. in press). The ice crystals may be removed by wind and are not necessarily present all winter.

REFERENCES

Masters, M. A., R. A. Densmore, J. C. Zasada and B. J. Neiland, Moose Utilization of Riparian Willow in the Central Alaskan North Slope (in press).

COMMENT I.353:

"Page E-3-237: (v) Effects of Increased Human Use: We concur with this assessment and again cite the opportunity for minimizing project impacts on fish and wildlife by carefully siting and regulating access. Please refer to our commnents on Sections 3.3.3 and 3.4.2(a)(i) and previous letters to the APA on the issue of access dated August 17, 1982 and January 14, 1983 (the latter letter is included in Chapter 11)."

RESPONSE:

This Comment is noted and appreciated. Please refer to the Responses to Comments I.364 and I.384.

COMMENT I.354:

"Page E-3-238: - Fires: Paragraph 2: An additional point which should be considered in assessing the values to wildlife of post-fire regrowth is whether productivity, as well as density, of berry producing plants increase."

RESPONSE:

After resprouting following fire, blueberries produce larger crops of berries (Hall and Aalders 1979). Raspberries (Rubusidaeus) and currants (Ribes glandulosum), which

RESPONSE TO COMMENT I.354 (cont.):

germinate from buried seed following fire, also produce large berry crops in the early successional stages and disappear from the mature forest (Densmore 1979).

REFERENCES

Densmore, R. V., Aspects of the Seed Ecology of Woody Plants of Alaskan Tiaga and Tundra, Ph.D. Thesis, Duke University, North Carolina (1979).

Hall, I. V. and L. E. Aalders, Lowbush Blueberry Production and Management, in: Lowbush Blueberry Production (1979).

COMMENT I.355:

"Page E-3-240: (a) Construction: There is no quantification of vegetation types and geographic areas to be potentially impacted by erosion, permafrost, melting, etc. other than for direct vegetation losses due to inundation and construction of camp, village, and borrow areas described here and in Tables E.3.80, E.3.82, E.3.84, and E.85. Several of those impacts can and should be analyzed in conjunction with information in Chapter 6, Geological and Soils Resources, and Figures E.6.21 through E.6.29."

RESPONSE:

Please refer to the Responses to Comments I.248, I.305, I.336, I.338, I.344 and I.345.

COMMENT I.356:

"Page E-3-240: (i) Vegetation Removal: Natural vegetation of disturbed sites will occur only with proper site preparation, including storage of topsoil. Analysis of the figures given shows that, at most, no more than 10 percent of the vegetation to be lost from the Devil Canyon development will be replaced by reclamation. We again recommend prompt mapping of wetlands, reinterpretation of vegetation in a manner that is meaningful to wildlife, and consultation with resource agencies such as the FWS to confirm optimum siting of camp, village, and borrow areas."

RESPONSE TO COMMENT I.356 (cont.):

Rehabilitation plans for disturbed sites are conceptually described in the FERC License Application on pages E-3-275 through E-3-281 of the Mitigation Plan. As stated on page E-3-279 "preparation of a comprehensive restoration plan for the Susitna project has been designated as a task for the detailed engineering design phase." Please refer to the Responses to Comments I.77, I.330 and I.381 for responses to the last sentence of this Comment.

COMMENT I.357:

"Page E-3-240: (ii) Vegetation Loss by Erosion: Please refer to our previous comments on the need to quantify permafrost and unstable slope areas mapped in Chapter 6, Figures E.6.21 through E.6.29, by vegetation type (Section 3.3.1(a)[ii])."

RESPONSE:

Please refer to the Responses to Comments I.336 and I.344.

COMMENT I.358:

"Page E-3-241: (iv) Effects of Altered Drainage: Please see our comments on Table E.3.82 regarding the likely overestimation of wetlands as described here."

RESPONSE:

Please refer to the Response to Comment I.417 regarding FERC License Application Table E.3.82.

COMMENT I.359:

"Page E-3-241: (b) Filling and Operation: Please refer to our previous comments and study recommendations on the potential for soil/vegetation/reservoir interactions which result in increased mercury levels in fish (Section 3.3.1(b) and in Chapter 2, Section 4.1.1(e)[vii]."

RESPONSE TO COMMENT I.359 (cont.):

Please see the Responses to Comments I.41 and I.342.

COMMENT I.360:

"Page E-3-242: Filling and Operation: Paragraph 3: We find no delineation of the large landslide at RM 175 on Figure E.3.3. as referenced here."

RESPONSE:

The figure reference for the old landslide at River Mile 175 should be: FERC License Application Exhibit E, Chapter 6, Figures E.6.27. A copy of that Figure is attached.

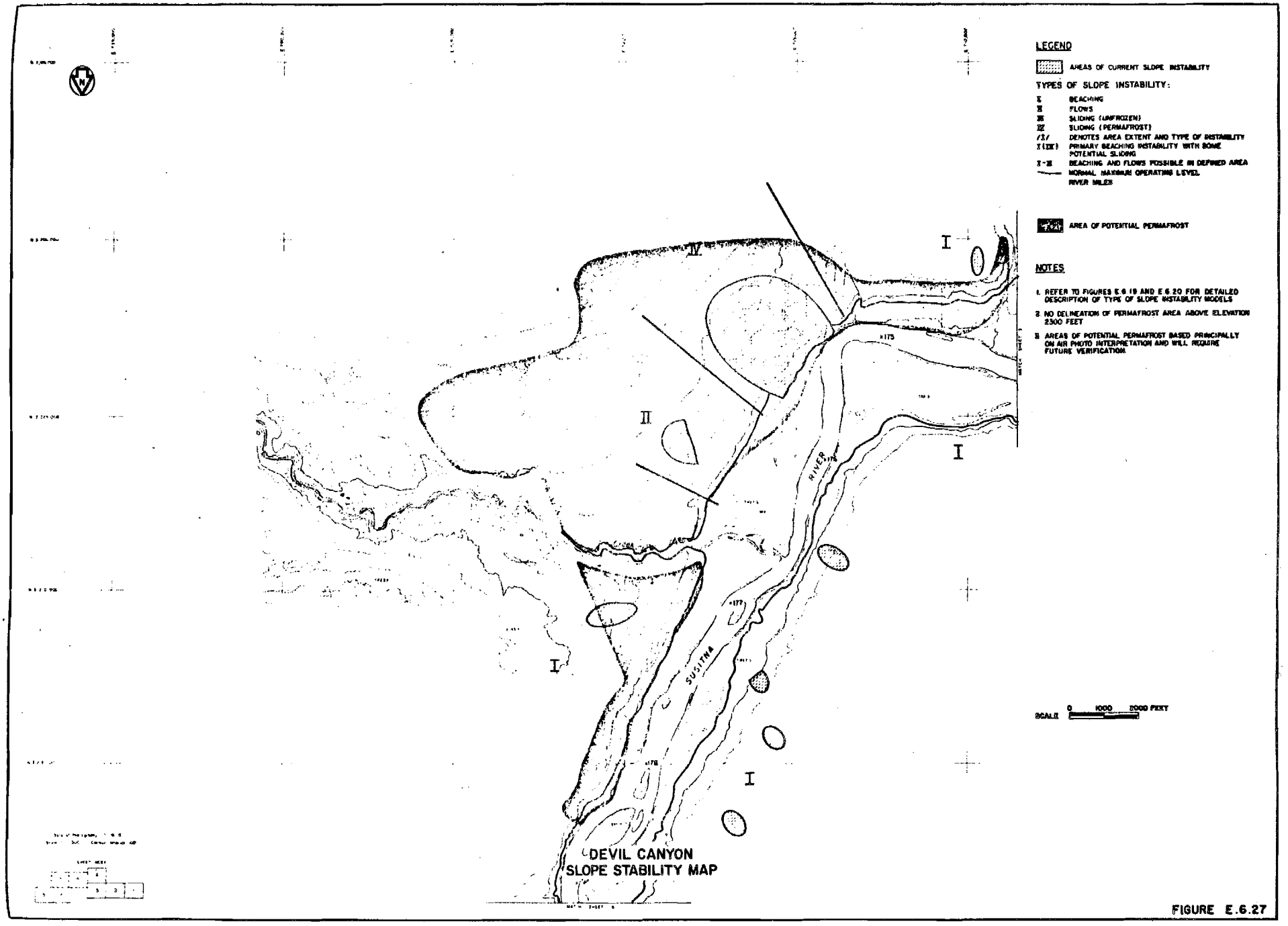
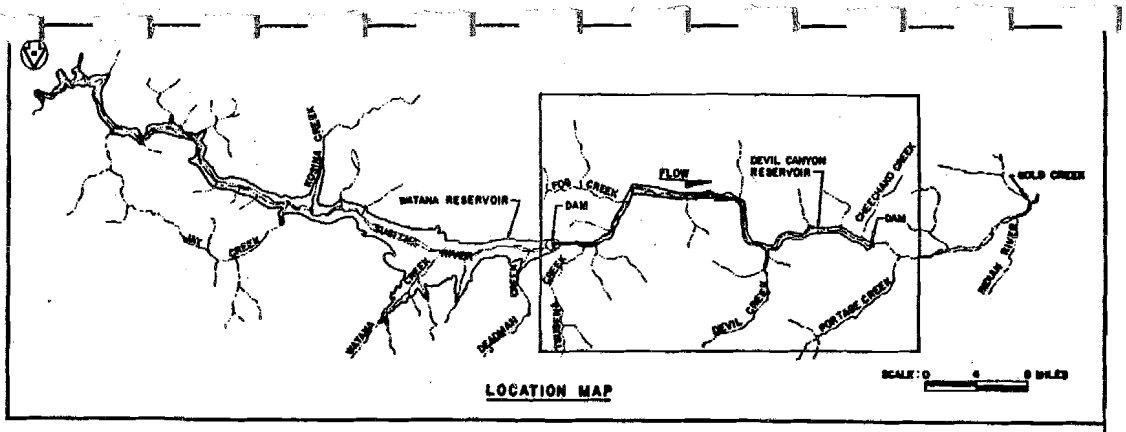
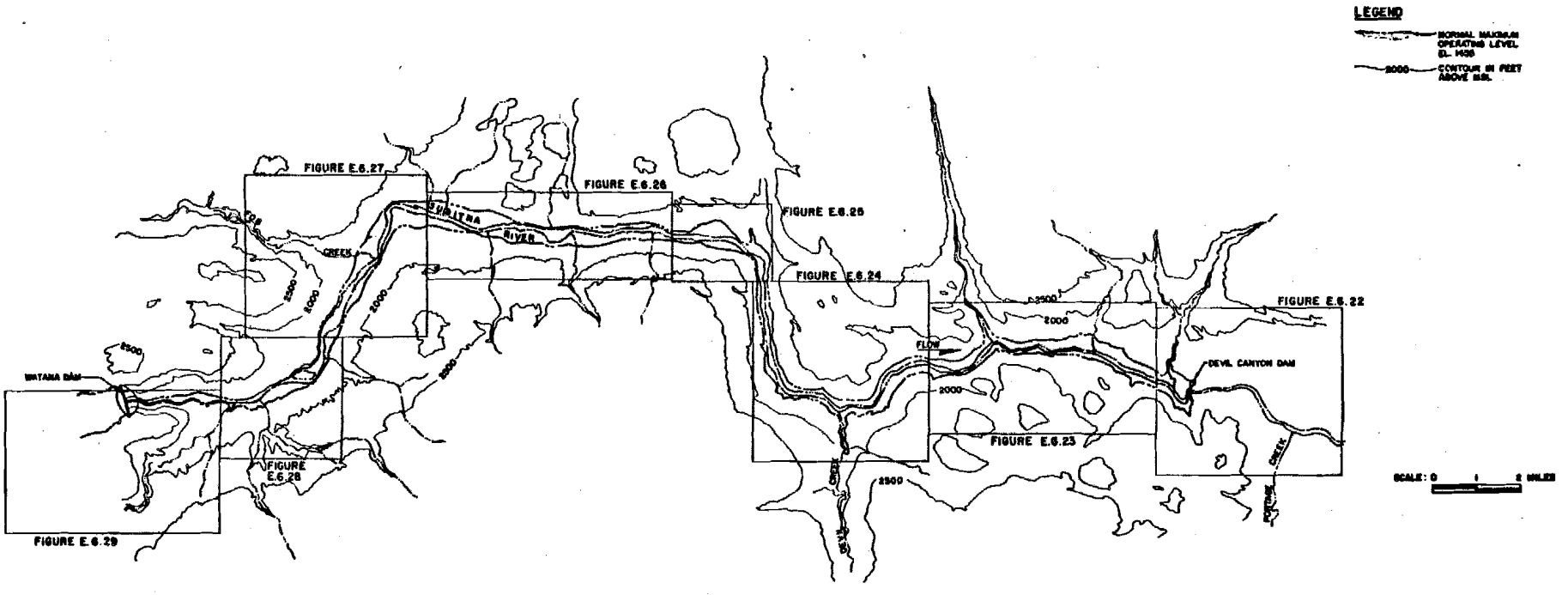

LEGEND
AREAS OF CURRENT SLOPE INSTABILITY
TYPES OF SLOPE INSTABILITY:
I BEACHING
II FLOWS
III SLIDING (UNFROZEN)
IV SLIDING (PERMAFROST)
/I/ DENOTES AREA EXTENT AND TYPE OF INSTABILITY
I(III) PRIMARY BEACHING INSTABILITY WITH SOME POTENTIAL SLIDING
I-II BEACHING AND FLOWS POSSIBLE IN DEFINED AREA
NORMAL MAXIMUM OPERATING LEVEL
RIVER MILES
AREA OF POTENTIAL PERMAFROST
NOTES
1. REFER TO FIGURES E.6.19 AND E.6.20 FOR DETAILED DESCRIPTION OF TYPE OF SLOPE INSTABILITY MODELS
2 NO DELINEATION OF PERMAFROST AREA ABOVE ELEVATION 2300 FEET
3 AREAS OF POTENTIAL PERMAFROST BASED PRINCIPALLY ON AIR PHOTO INTERPRETATION AND WILL REQUIRE FUTURE VERIFICATION
SCALE 0 1000 2000 FEET
SUSITNA RIVER
DEVIL CANYON
SLOPE STABILITY MAP

FIGURE E.6.27





DEVIL CANYON RESERVOIR
INDEX MAP

FIGURE E.6.21

COMMENT I.361:

"Page E-3-242: (ii) Erosion and Deposition: This statement is inconsistent with the previous discussion of erosion, Section 3.3.2(a)(ii), the proceeding paragraph which assumes some soil losses following clearing [Section 3.3.2(b)(i)], the description of the large landslide at RM 175, and the steep area topography."

RESPONSE:

As stated on FERC License Application page E-3-242, "due to the geologic character of the Devil Canyon region, erosional and depositional changes affecting vegetation will be minimal following filling of the reservoir." Because of the narrow, steep configuration of Devil Canyon, vegetation losses will be substantially less than the Watana Reservoir.

On cleared, unsubmerged lands, vegetational succession patterns will occur and a much greater mosaic of vegetation types may develop. Clearing along the periphery of the reservoir may facilitate erosion, which in turn may result in vegetation loss, but this will generally be within the drawdown zone. The old, large landslide at RM 175 could move after filling and as a consequence, it could cause a loss of mid- and late-successional vegetation. To summarize, a potential for vegetation loss may exist if either a landslide or erosion of areas cleared for the reservoir occurs. Therefore, in a relative sense, the potential for vegetation loss is considered minimal in the areas adjacent to the reservoir.

COMMENT I.362:

"Page E-3-242: (iii) Effects of Regulated Flows: Frost build-up on vegetation adjacent to the reservoir could result in a significant changes in vegetation. Wildlife would subsequently be affected, as we commented under Section 3.3.1(b)(iii). Please also see comments there regarding the need to quantify the range of areas which may become available for successional vegetation development."

RESPONSE:

The effects of frost on vegetation are discussed in the Response to Comment I.362.

COMMENT I.363:

"Page E-3-243: (a) Construction: Additional impacts from access road construction and use include thawing of adjacent permafrost and associated drainage and vegetation changes."

RESPONSE:

Where it is necessary for the access road between Devil Canyon and Watana to cross permafrost areas, appropriate construction techniques will be utilized to minimize thawing, provide cross drainage, prevent impoundment of water and avoid concentration of sheet flow. These techniques will be addressed in the Project Design Criteria Manual and Erosion Control Plan. Thawing and slumping at the toe of the road may occur in some areas after several years, and produce wet areas and a shift in vegetation immediately adjacent to the road.

COMMENT I.364:

"Page E-3-244: (b) Operation: Use and management of access routes in addition to those required for project construction will determine the magnitude of impacts to area fish, wildlife, and socioeconomics."

RESPONSE:

In general, access-related environmental impacts fall into two categories. First, there are the direct impacts resulting from construction of the access facilities themselves and the indirect impacts resulting from activities of workers involved in construction of the roads and other project facilities. The second category of impacts includes those impacts which would result from increased human activity due to improved access to the project area. Because construction worker activity and other construction impacts can be limited through management practices, the second category of impact is the one for which there is potentially the greatest variability in environmental impact. Moreover, because the direct construction-related impacts can be controlled through project design and management practices, the issue of access facilities for nonproject needs becomes the determining factor in assessing overall project-related environmental impacts. Therefore, the use and management of access roads, in addition to those required for project construction, will have a major influence in determining environmental impacts.

RESPONSE TO COMMENT I.364 (cont.):

Recognizing this fact, the Power Authority is committed to working with the resource agencies in formulating access policies. Please refer to the Response to Comment I.289 for additional discussion of this matter. See also the Responses to Comments A.1, A.3. and F.7.

The Power Authority anticipates that the DEIS will analyze such factors in connection with reasonable access alternatives.

COMMENT I.365:

"Page E-3-244: (a) Construction: Paragraph 1: In addition to the botanical impact analysis of individual transmission line segments described here and in Tables E.3.79, E.3.80 and E.3.86, we recommend a cumulative assessment of these impacts utilizing the same vegetation and wetlands classification systems for each segment. Please refer to our previous comments that existing analyses cannot be compared (Section 3.2.2[e]).

"Please also note apparent calculation errors in Table E.3.86 which double the estimate of total areas to be impacted by the Healy-to-Fairbanks and Willow-to-Cook Inlet transmission corridors. Subtotaled areas of forest, tundra, shrubland, and unvegetated cover types crossed appear to have been added to the individual sixteen forest, three tundra, four shrubland, and two unvegetated types in arriving at an overall total.

"Reference should be made to our comments on Table E.3.86 regarding potential inaccuracies in recalulation of transmission line right-of-way widths from 400 to 300 feet."

RESPONSE:

Please refer to the Response to Comment I.327 for the response to the first part of this Comment.

FERC License Application Table E.3.86 was revised to eliminate calculation errors due to double counting of forest, shrub, tundra and unvegetated cover types and this revision was included in the Response to Supplemental Information Request 3B-7 (see February 15, 1984 APA Response Document, Reference Volume, Reference I.370.1).

Recalculation of transmission line impacts on the basis of the 300-foot right-of-way width used in FERC License

RESPONSE TO COMMENT I.365 (cont.):

Application Table E.3.86 was by a straight-line proportion, which results in an accurate adjustment. However, the Power Authority has noted that the Willow-to-Cook Inlet portion of this Table should assume ultimate development of three circuits requiring a 400-foot right-of-way (see FERC License Application Exhibit G, plates G30-G34). Therefore, the Table has been revised appropriately and is included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume).

COMMENT I.366:

"Page E-3-244: (a) Construction: Paragraph 2: Please explain whether vegetation impacts were recalculated where the currently proposed route extends outside the corridor in which vegetation was originally mapped (e.g., see Figure E.3.52). Quantification of potential increases, in browse should be based on eventual remapping of vegetation, succession models, and proposed vegetation studies. Such quantification is needed to compare overall losses and thus mitigation requirements for the project."

RESPONSE:

Vegetation impacts have been accounted for in both the mapped and unmapped portion of the corridor. As stated in the second footnote of Revised Table E.3.86 (see revision referenced in the Response to Comment I.370), for the purpose of calculation of total acreages it was assumed that vegetation types along the unmapped portion of the route were representative of the vegetation types that occur along the mapped portion of the corridor.

COMMENT I.367:

"Page E-3-245: (b) Operation: According to the project description in Exhibit A, Section 4.2(d), page A-4-6, a 25-foot wide access strip is to run along the entire length of the corridor, 'except at areas such as major river crossings and deep ravines where an access strip would not be utilized for the movement of equipment and materials.' Please clarify whether low shrub and tundra types will be cleared within the access strip and the anticipated schedule for maintaining that access.

"We recommend that the applicant consult with the CE, FWS and ADF&G in siting of the proposed access strip to ensure

COMMENT I.367 (cont.):

that potential adverse impacts to wetlands and fish streams are avoided.

"During planning for the Intertie, the applicant assured the resource agencies that all access for construction and maintenance would be by helicopter to minimize the size of the area disturbed, length of time of distrubances, and potential off-road vehicle (ORV) use. However, pressure from the public utilities, who will eventually take over operation of the Intertie, resulted in design changes allowing on-ground access. Thus we are concerned that access plans for other segments of the transmission line not be similarly changed to the detriment of aquatic and terrestrial resources."

RESPONSE:

The 25-foot wide access strip parallel to the transmission line will be developed to the minimum standard necessary to allow for flat-tread, balloon tire vehicles to carry equipment to sites for construction.

Tundra vegetation will not be cleared. Low shrubs will not be cleared unless they are so tall and dense that access is restricted.

Schedules for access strip maintenance will be the same as for general maintenance of the right-of-way. Presently, clearing for the right-of-way is anticipated every ten years at a maximum. Localized clearing associated with tower line maintenance or repair may be required periodically. Final schedules for maintenance of the right-of-way will be determined by the operating contractor and actual field conditions after the transmission line is constructed.

During the detailed engineering phase and subsequent development of transmission line construction drawings and specifications, final siting of the line, including the access strip, will be located in consultation with appropriate agencies. This location will be identified in the construction access plan prepared for the transmission line.

Regarding the use of helicopter construction, please refer to the Responses to Comments I.387 and F.39. Also refer to

RESPONSE TO COMMENT I.367 (cont.):

Supplemental Responses 3-B-15 and 3-B-16, which were filed with the FERC on July 11, 1983.

REFERENCES

Alaska Power Authority, Response to FERC Supplemental Information Requests, 3-B-15 and 3-B-16 (1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.368:

"Page E-3-245: 3.3.5 - Impacts to Wetlands: The application states that the estimates of wetland acreage to be impacted by the proposed project' are extremely liberal and all values should be considered preliminary.' Acreage data for more specific wetland types are needed. Evaluation of the project's impact on those specific wetland types of special interest to the FWS cannot be made with the generalized information that is now available (see comments on Secton 3.2.3 - Wetlands). Thus, we recommend that impacts from access and transmission corridors not be assessed by applying the applicant's current wetlands classification by vegetation type system."

RESPONSE:

The Power Authority recognizes the concerns regarding the evaluation of wetlands. See the Response to Comment I.330.

COMMENT I.369:

"Page E-3-246: 3.3.6 - Prioritization of Impact Issues: In order to quantify project impacts over the life of the project, further details are needed on the anticipated length of time for each impact discussed here."

RESPONSE:

Most of the impacts discussed in the referenced section will occur for the life of the Project. The date of initiation and/or duration of many impact mechanisms is presented in Table E.3.144 of the FERC License Application, and the duration of many project impacts are presented along with their descriptions in Section 3.3. As impact assessment

RESPONSE TO COMMENT I.369 (cont.):

refinement proceeds, improved and more complete estimates of the duration of impacts will be possible.

COMMENT I.370:

"Page E-3-246: (a) Direct Loss of Vegetation: This section is repeated verbatim from the November 15, 1982 draft license application, thus, figures given here do not reflect the latest routing or project design as reflected in the accompanying tables. For example, Table E.3.83, shows direct vegetation losses from the dam, impoundment, and spillway as 14,829 ha; Section 3.3.1(a)(i), page E-3-225 lists those losses as 14,329 ha; yet this section cites a 12,667 ha loss. Similar inconsistencies are found in the Devil Canyon, Access Roads, and Transmission Corridors summaries."

RESPONSE:

The referenced text, as well as many other inconsistencies between the text and tables, were revised and presented in the Response to Supplemental Information Request 3B-7 (see February 15, 1984 APA Response Document, Reference Volume, Reference I.370.1). Many of these have subsequently been revised and are included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume). The subsequent revisions are primarily due to corrections in the right-of-way requirements for several transmission line segments. The corrected right-of-way requirements for each segment are noted in footnotes for each table. The Response to Comment I.305 discusses corrections to Table E.3.144 and other revisions which are all included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume) for simplicity.

COMMENT I.371:

"Page E-3-247: (iv) Transmission Corridors: Please refer to our previous comments under Section 3.3.4(a) and Table E.3.86 on apparent errors in the calculation of transmission line impacts. Inconsistencies between the description of access trails in Exhibit A, Sections 4.2(d), Section 3.3.4(b), and the applicant's response to our question on the draft license application that, 'Transmission corridor design has been revised and no longer incorporates longitudinal access strip' (Chapter 11, W-3-152), should be removed."

RESPONSE TO COMMENT I.371:

Errors in the calculation of vegetation impacts resulting from transmission line construction have been noted and corrected. Please refer to the Response to Comment I.369 and Reference I.370.2 (February 15, 1984 APA Response Document, Reference Volume). Clarification on the intent of longitudinal access is as follows:

- Longitudinal access will be necessary for right-of-way and tower/line maintenance.

- A "strip" in the sense of a constructed road requiring stripping of topsoil, gravel surfacing or cuts and fills will not be developed.

- Within the right-of-way, only vegetation that would impede access by 4-wheel maintenance vehicles would be removed. Siting of the access route will be done with field verification and in consultation with appropriate agencies to ensure that impacts are minimized. Please refer to the Response to Comment I.226 for further clarification on this topic.

- Though the development of longitudinal access will be restricted to removal of vegetation and stumps in areas, a trail is still likely to develop. Reasons for this are:

    1. The route will receive repeated construction use which will tend to impact soils and limit vegetation growth within the access relative to other areas within the ROW, and

    2. Over time, vegetation in the right-of-way will grow beyond height limits and need to be cut; the vegetation within the access route will tend to be cut lower in order to provide unimpeded access further emphasizing demarcation of a trail.

COMMENT I.372:

"Page E-3-248: (b) Indirect Loss of Vegetation: The cumulative impacts of project features described under the previous section and here should be considered. Many identified losses will be in riparian habitat important to wildlife species."

RESPONSE TO COMMENT I.372:

Discussion of indirect losses due to erosion and other factors is contained in Responses dealing directly with these factors (see, for example, the Responses to Comments I.336 and I.344).

COMMENT I.373:

"Page E-3-249: (c)(i) Downstream Floodplain: Please refer to our previous comments (Section 3.3.1(b)(iii) on the uncertainties underlying current downstream analyses, particularly downstream of Talkeetna. We again recommend quantification of potential vegetation changes over the life of the project for a variety of possible flow and ice scouring scenarios."

RESPONSE:

Please refer to the Responses to Comments I.54 and I.346.

In addition, information on hypothetical dam break scenarios is also available (R&M Consultants, 1982).

REFERENCES

R&M Consultants, Hypothetical Dam Break Analysis for Acres American, Inc. (March 1983).

COMMENT I.374:

"Page E-3-251: (a) Item 3: Where information for determining the extent to which mitigation will be achieved is unavailable, requisite studies, including monitoring, should be outlined and their implementation assured."

RESPONSE:

The Power Authority agrees that monitoring to determine the extent to which mitigation is achieved should be conducted where this information is not already available. Refined mitigation plans will incorporate specific monitoring programs for botanical resources which are necessary in addition to those already defined for wildlife (see FERC License Application Section 4.4.2(a)).

COMMENT I.375:

"Page E-3-251: Item 8: We are concerned that illustrations of mitigative design features are minimal and generally limited to road construction without specific data on the extent to which area materials will allow implementation of the side-borrow or balanced cut-and-fill techniques. Location maps should also be included for all mitigative design features."

RESPONSE:

This suggestion regarding the inclusion of more illustrations and location maps of mitigative design features will be carried out in more refined versions of the Mitigation Plan, especially as detailed engineering design proceeds. Please refer to the Response to Comment I.378 for additional discussion regarding the side borrow technique.

COMMENT I.376:

"Page E-3-251: (b): The FWS supports funding and implementation of mitigation concurrently with project planning and construction. We are concerned that outlined mitigation studies are generally limited to planning studies with some follow-up monitoring (Table E-3-177). Provisions are lacking for implementing measures that will be recommended through these study efforts. Please also see our comments on Table E.3.177."

RESPONSE:

The Mitigation Plan presented in FERC License Application Section 3.4 is specific where detailed design and construction planning have proceeded sufficiently and conceptual where they have not. As stated on FERC License Application page E-3-252, "as engineering design and construction planning proceed, features of this mitigation plan will be correspondingly refined with respect to specific locations, procedures and costs." The Power Authority cannot locate the referenced comments on FERC License Application Table E.3.177.

COMMENT I.377:

"Page E-3-252: Paragraph 1 to 4: We recommend that the Biological Stipulations included with our comments as Attachment A be made conditions of the FERC license and incorporated in any project contracts and bid specifications.

"With the exception of wetlands mitigation planning, we concur with the mitigation objectives and framework outlined here. As stated previously in Sections 3.2.3 and 3.3.5, inadequate identification of wetlands means that higher priority mitigation options to avoid and minimize impacts may now be more difficult to incorporate in project planning.

"We believe that a mechanism and responsible parties should be identified for ensuring that, 'features of this mitigation plan will be correspondingly refined with respect to specific locations, procedures, and costs' as project design and planning proceeds."

RESPONSE:

A. The Power Authority does not concur with the DOI recommendation that all Biological Stipulations included in DOI Attachment A be made conditions of the FERC License. It is the Power Authority's opinion that many of these conditions, or similar conditions, will be stipulated in state, Federal and local permits required for construction and operation of the Project. That being the case, it is unnecessary that they become FERC License conditions.

   Also, many of the proposed stipulations are either contradictory or untenable.

   See also Response to Comment I.425.

B. The Power Authority believes that several formal mechanisms already exist which may result in the refinement of the Mitigation Plan. These mechanisms are described below:

   Application Process

   Agency and public comments addressing the Mitigation Plan in the License Application may be used to refine the Mitigation Plan.

RESPONSE TO COMMENT I.377 (cont.):

NEPA Process

The Draft EIS will provide for agency and public comment on project features and alternatives as well as mitigation proposed for each. The Power Authority may use those comments to further refine its Mitigation Plan.

Settlement Process

The Power Authority has embarked upon an ambitious settlement process the main emphasis of which is to coordinate with agencies, local governments and intervenors and arrive at a mutually agreeable Mitigation Plan (see Response to Comment I.81).

FERC Hearing Process

If the NEPA process and the Settlement Process do not result in a mutually acceptable Mitigation Plan, the FERC may order hearings to address this issue. It is the Power Authority's intention, however, to avoid hearings to the maximum extent possible.

COMMENT I.378:

"Page E-3-252: (a) Direct Loss of Vegetation: We question the estimated area for access borrow areas. According to the following Section, (i), (page E-3-265, paragraphs 2 and 4) borrow needs could run from 90 to 180 acres the Denali Highway-to-Watana road segment and from 50 to 100 acres for the road between the Watana and Devil Canyon Dams. Potential borrow needs for the railroad link, work pads, airstrips, and camps/villages are not clearly identified, and the size of potential spoil disposal areas are not quantified. Our specific comments on the five mitigation options follow under Sections (i) through (v)."

RESPONSE:

The preliminary investigations performed in siting the access roads to both Watana and Devil Canyon and the railhead-railway for Devil Canyon established potential borrow sites to be used in case sufficient material from side borrow was not available. The definition of these sites was to indicate the potential resources available along the access routes. The upper limit on borrow areas indicated in the Comment does not reflect the area that will

RESPONSE TO COMMENT I.378 (cont.):

be required. Similarly, the lower limit would also indicate that each of the borrow sites identified would be utilized, which may or may not be the case. Optimum access siting requires a balance between the length of access (volume of material moved and placed) and the material haul lengths. The siting of an access maximizing the utilization of material adjacent to the access can justify an increased length and still be the most economical alternative. In FERC License Application Figure E.3.37 potential borrow sites are indicated along the alignments for the Watana access road, the Devil Canyon access road and the railhead-railway for Devil Canyon. The area requirements in hectares for these three accesses including borrow sites are presented in FERC License Application Table E.3.144 (see revised Table E.3.144 referenced in the Response to Comment I.370). Site material not suitable for use in access construction will be stockpiled until the borrow operation is advanced well enough at the site so that the spoil material can be placed in the used borrow area. This spoil material will be shaped and graded so as not to affect drainage and impact runoff water quality.

Borrow for construction camps and villages will be minimal, the permanent village requirements principally for landscaping can be obtained from borrow area D and quarry site B. Spoil from the construction camps that cannot be incorporated in grading or landscaping can be spoiled in designated areas that lie within the impoundment zone. Two specific areas are designated on each of FERC License Application Exhibits F 35 and F 71.

COMMENT I.379:

"Pages E-3-254 through E-3-275: (i) Minimization: The discussion is limited by the: (1) inadequacy of wetlands mapping (see our comments on Sections 3.2.3 and 3.3.5), and (2) vegetation classification which cannot be usefully integrated with the wildlife impact analyses and mitigation determinations. Without these items, it is impossible to assess the adequacy of minimizing impacts through siting."

RESPONSE:

The Power Authority anticipates that the DEIS will reasonably describe wetlands in the project area, classify vegetation as necessary and assess various mitigation options and that the DEIS will summarize and incorporate prior studies of these topics.

COMMENT I.380 (underlined text):

"Page E-3-254 Last Paragraph through Page E-3-256: Paragraph 2: We recommend that the proposed temporary airstrip be sited so that it can later be expanded to become the permanent airstrip. This suggestion is compatible with the applicant's recent request to fund a 2500-foot temporary airfield at the Watana base camp which would subsequently be expanded to the 6000-foot airfield necessary during project construction 3B-5/.

"We also recommend consolidation of the Watana constuction camp, village, and townsite. We note these facilities (Exhibit F, Plate F35) are spread out com pared to the Devil Canyon camp and village (Exibit F, Plate F70). We also note the Watana facilities are close to the environmentally sensitive Deadman Creek area. Following remapping of wetlands, the siting of Watana facilities should be reviewed.

"The purpose and scheduled use of the circular road system outlined in Exhibit F, Plate F35, between the emergency spillway, Susitna River, and Tsusena Creek should be explained. As we commented on the draft license application, we have not had input into the decisions regarding the type, administration or siting of the construction camp, village, and townsite (Chapter 11, W-3-046). We concur with the concept of common corridor routing for the Watana-to-Gold Greek access and transmission corridors although the map scale represented in Figures E.3.39 and E.3.40 makes it difficult to evaluate those project features. Consultation with resource agencies during the on-ground planning of detailed project design may indicate areas where winter movement of construction equipment and materials is preferable to prevent impacts in biologically sensitive areas. Please refer to our previous comments on access for line maintenance, Section 3.3.4(b)."

"3B-5/ Construction of Temporary Airfield at Watana. Appendix 4 to Agenda Item IV, Action Item No. 1, prepared for the APA Board of Directors."

RESPONSE:

Refer to the Response to Comment I.92.

COMMENT I.381 (underlined text):

"Page E-3-254 Last Paragraph through Page E-3-256: Paragraph 2: We recommend that the proposed temporary airstrip be sited so that it can later be expanded to become the permanent airstrip. This suggestion is compatible with the applicant's recent request to fund a 2500-foot temporary airfield at the Watana base camp which would subsequently be expanded to the 6000-foot airfield necessary during project construction 3B-5/.

"We also recommend consolidation of the Watana constuction camp, village, and townsite. We note these facilities (Exhibit F, Plate F35) are spread out compared to the Devil Canyon camp and village (Exibit F, Plate F70). We also note the Watana facilities are close to the environmentally sensitive Deadman Creek area. Following remapping of wetlands, the siting of Watana facilities should be reviewed.

"The purpose and scheduled use of the circular road system outlined in Exhibit F, Plate F35, between the emergency spillway, Susitna River, and Tsusena Creek should be explained. As we commented on the draft license application, we have not had input into the decisions regarding the type, administration or siting of the construction camp, village, and townsite (Chapter 11, W-3-046). We concur with the concept of common corridor routing for the Watana-to-Gold Greek access and transmission corridors although the map scale represented in Figures E.3.39 and E.3.40 makes it difficult to evaluate those project features. Consultation with resource agencies during the on-ground planning of detailed project design may indicate areas where winter movement of construction equipment and materials is preferable to prevent impacts in biologically sensitive areas. Please refer to our previous comments on access for line maintenance, Section 3.3.4(b)."

"3B-5/ Construction of Temporary Airfield at Watana. Appendix 4 to Agenda Item IV, Action Item No. 1, prepared for the APA Board of Directors."

RESPONSE:

Refer to Response to Comment I.91 relative to combining the Construction Camp, Village and Permanent Village. During final layout of facilities, impacts on wetlands will be

RESPONSE TO COMMENT I.381 (cont.):

minimized to the extent practical.

COMMENT I.382 (underlined text):

"Page E-3-254 Last Paragraph through Page E-3-256: Paragraph 2: We recommend that the proposed temporary airstrip be sited so that it can later be expanded to become the permanent airstrip. This suggestion is compatible with the applicant's recent request to fund a 2500-foot temporary airfield at the Watana base camp which would subsequently be expanded to the 6000-foot airfield necessary during project construction 3B-5/.

"We also recommend consolidation of the Watana constuction camp, village, and townsite. We note these facilities (Exhibit F, Plate F35) are spread out compared to the Devil Canyon camp and village (Exibit F, Plate F70). We also note the Watana facilities are close to the environmentally sensitive Deadman Creek area. Following remapping of wetlands, the siting of Watana facilities should be reviewed.

"The purpose and scheduled use of the circular road system outlined in Exhibit F, Plate F35, between the emergency spillway, Susitna River, and Tsusena Creek should be explained. As we commented on the draft license application, we have not had input into the decisions regarding the type, administration or siting of the construction camp, village, and townsite (Chapter 11, W-3-046). We concur with the concept of common corridor routing for the Watana-to-Gold Greek access and transmission corridors although the map scale represented in Figures E.3.39 and E.3.40 makes it difficult to evaluate those project features. Consultation with resource agencies during the on-ground planning of detailed project design may indicate areas where winter movement of construction equipment and materials is preferable to prevent impacts in biologically sensitive areas. Please refer to our previous comments on access for line maintenance, Section 3.3.4(b)."

"3B-5/ Construction of Temporary Airfield at Watana. Appendix 4 to Agenda Item IV, Action Item No. 1, prepared for the APA Board of Directors."

RESPONSE TO COMMENT I.382:

Please refer to the Responses to Comments I.92 and I.543 concerning airstrips. See the Responses to Comments I.380 and I.543 for Response to Comments on Construction Camp, village and townsite. We also confirm that final siting of these installations will take into consideration any wetlands (see Response to Comment I.330). The "circular road system outlined in Exhibit F, Plate F35" is for moving material excavated for project features to spoil areas and moving materials excavated in borrow and quarry areas for use in the project features. Given the scale of the drawing, the alignment shown is schematic. Detailed design will consider site specific topography and foundation conditions in selecting an alignment that will minimize environmental impacts during and after project construction and meet design and safety standards established in the design criteria and construction specifications. Please refer to the Response to Comment I.367 regarding access for transmission line maintenance.

The scheduled use of these temporary construction roads can be determined from the Watana Construction Schedule in FERC License Application Exhibit C (Figure C.1). For example, main dam excavation begins after mid-1986, fill operations begin in mid-1987 and continue intermittently until late 1993. Emergency spillway work begins early in the second quarter of 1991 and continues for approximately six months with the same schedule repeated in 1992.

COMMENT I.383:

"Page E-3-256: Paragraph 3: and Page E-3-258: Paragraph 2: Facility sitings presently are located in low biomass areas. It is important that these areas be not only economically advantageous to clear, but that such areas be of low value to wildlife, as acknowledged on page E-3-260, paragraph 2. For example, a low birch/mixed shrub area may be more important in providing moose forage, particularly if cover is available nearby, than the higher biomass of a tall alder area which provides cover but no food."

RESPONSE:

Comment noted.

COMMENT I.384:

"Paragraph 3 through Page E-3-258, and Pages E-3-260: Paragraph 4 through 262: We reiterate our recommendation to drop the Denali Highway-to-Watana access segment because of big game resource values described here, as well as area furbearer, raptor, and wetland values. Moreover, significant secondary impacts of increased disturbance will result from the increased access allowed by that route. Please refer to our letters dated August 17, 1982 and January 14, 1983 to Eric P. Yould, APA. Eliminating the Denali Highway-to-Watana access road is the design change with the greatest potential for mitigating access road impacts to wildlife."

RESPONSE:

The issues surrounding the selection of a preferred access route are complex from an environmental perspective (see Responses to Comments A.1, A.3 and F.7). It is recognized that the Denali route traverses a relatively inaccessible area considered to be of a relatively high quality for wildlife and other resources. From a purely wildlife standpoint, impacts could be greater for the Denali plan than for a plan involving access from the west. Impacts to large raptors, furbearers, brown bear and caribou could be higher under the Denali plan, while impacts to black bear and moose would likely be higher under the other alternative plans. Wetland impacts and the total amount of habitat lost could also be higher under the Denali plan. Probably of greatest concern from a wildlife standpoint, however, is the potential for increased accessibility to sensitive areas from road traffic along the Denali access road. With careful management and use restriction (see Responses to Comments I.289 and I.364), it will be possible to reduce nonconstruction-related secondary impacts.

Although wildlife-related impacts could be judged greater with the Denali access plan, the Denali access plan is preferred when all factors are considered. Thus, although it is recognized that wildlife impacts could likely be greater for the Denali plan, the other benefits of the Denali alternative outweigh the disadvantages.

Reasons supporting the Denali access route include the fact that the proposed Denali to Watana access road crosses fewer major streams than other routes along the Susitna River, and would not cross any anadromous fish streams. The Denali route generally traverses flatter terrain, with better drained soils than the other routes, and would be the least

RESPONSE TO COMMENT I.384 (cont.):

difficult to construct of the aternatives considered. These conditions result in the Denali plan having a lower initial cost, and its being favored from a construction standpoint. The Denali plan provides the best access for support of field forces since under the Denali plan the early stages of project construction can be completed more readily. These and many other factors were evaluated in several reports, including the Access Recommendation Report (Acres American, Inc. March 1983), which summarizes the major issues.

REFERENCES

Acres American, Inc., Supplement to the Feasibility Report (March 1983).

COMMENT I.385:

"Page E-3-258: Paragraph 1: Although the Watana-to-Devil Canyon transmission and access routes share a common corridor, it does not appear that they have adjacent or combined rights-of-way. Higher resolution mapping and field verification should be used to evaluate the viability of combining rights-of-way to minimize adverse impacts."

RESPONSE:

Sharing or combining rights-of-way generally results in less overall environmental impact and reduced construction and operating costs. The viability of combining more of the transmission and access road rights-of-way will be explored as tower siting and route refinement take place during the detailed engineering phase of the Project. At that time, up-to-date aerial photography will be utilized in conjunction with field investigation and construction site drawings. However, transmission right-of-way generally is point to point to minimize length. Road right-of-way must take advantage of contours to maintain acceptable grade, horizontal and vertical curves.

COMMENT I.386:

"Page E-3-256: Paragraphs 1 and 2 and Pages E-3-261 through 266: We concur with the objective of siting borrow areas adjacent to the access road and with the recommended side-

COMMENT I.386 (cont.):

borrow or balanced cut-and-fill techniques. These methods will work only where suitable materials exist within the proposed access corridor or when it is stipulated in project licensing requirements and contractor specifications and then monitored throughout project development.

"For side-borrow construction, we recommend that the project engineers work with interagency monitoring team in the selection of temporary overburden and topsoil stockpile locations. Schedules should be provided for use and reclamation of access borrow and spoil areas. Borrow areas which would remain open for maintenance of roads, workpads, or other facilities should also be indicated. Necessary reclamation, whether simply recontouring, scarification, and fertilization to promote reestablishment of native species, or seeding and possibly sprigging of willows in more erodable areas, should be detailed in project reclamation plans and receive concurrence of the monitoring team. Site preparation should be undertaken as soon as construction use of an area is completed; seeding should be done by the first growing season after site disturbance has been completed. Please refer to the Biological Stipulations we have included as Attachment A and our comments on Section 3.4.2(a)(ii) Rectification."

RESPONSE:

The adoption of certain construction practices, including the sideborrow concept, can limit the impact of access road construction. Since the development of large borrow areas has the potential of disturbing more area than the access roads themselves, special attention will be given to designing the access road to take advantage of opportunities to employ the sideborrow technique. In addition, Alaska Power Authority intends to have its engineers work with environmental scientists in selecting temporary overburden and topsoil stockpile locations. Other suggestions in the Comment will also be considered for incorporation into the access road design and construction specifications.

It is the Power Authority's intention to identify more potential borrow areas and stockpile sites than will actually be needed, so that the contractors will have a number of options for completing the access road construction. Resource agencies will have an opportunity to review design criteria and alignments.

COMMENT I.387:

"Page E-3-263: Paragraph 4: This section should explain how the transmission corridor in the Jack Long Creek area will be maintained since 'temporary' bridging of the creek will be accomplished for construction. We recommend transportation of construction materials and equipment via helicopter in this area to minimize potential disturbance, erosion, and loss of fish and wildlife habitats.

"Please refer to Attachment C, for additional recommendations."

RESPONSE:

The transmission line right-of-way in the Jack Creek area will be maintained by ground access. East of the Jack Creek crossing, the transmission line right-of-way will be maintained by access from the Devil Canyon access road. The line and right-of-way west of the crossing will be maintained via access along the Intertie route to the Gold Creek substation.

It is the intention of the Power Authority that ground access be used for construction and maintenance of the transmission line (FERC License Application page E-3-271). The many limitations of helicopter use (FERC License Application page E-3-271) make it impractical to specify helicopter use as the sole means of access except in very limited locations where rugged terrain or severe environmental impact make their use imperative. In addition, being forced to depend solely on helicopters as the means of transport for service restoration presents an unnecessary risk in terms of delay and safety.

Prudent planning for maintenance and restoration of the transmission line necessitates provisions for ground access to the line.

COMMENT I.388:

"Page E-3-264: Paragraph 1: We concur with realignments and improved siting of the railhead facility to further minimize project impacts to furbearers, eagles, and wetlands. The discussion should include how such siting will minimize disturbances to big game. Until additional assessment data can be incorporated into moose, black bear, and brown bear

COMMENT I.388 (cont.):

models, it is not possible to compare habitat values of alternative locations.

"Paragraph 3: A road crown of 2 to 3 feet above original ground level may not provide an adequate thermal blanket in areas of permafrost."

RESPONSE:

The railhead facility site, while necessary to be placed on the south side of Jack Long Creek due to a beaver pond and other wildlife concerns, is sited close to the construction camp and village to reduce disturbance effects on surrounding big game. It is also in fairly wet forested habitats containing some black spruce--habitats not highly productive for either browse species used by moose, or spring forage or berry plants utilized by bears.

FERC License Application Figure E.3.83 contains a typical cross-section of the side-borrow roadway. The feasibility design as shown indicates a variable sub-base thickness. The reference to a two-to-three-foot road crown on FERC License Application page E-3-264 is a generality for allowing the reader to compare a finished road section using side borrow with the conventional roadway section. The actual thickness of the roadway crown will be established prior to completing the construction specifications by design-related investigations of the sub-base material conditions in the field including permafrost.

Roads susceptible to deterioration by permafrost usually lie on silt-covered lower hillslopes or organic-rich soils in lowlands which contain a high percentage of ice and ice wedges. Thawing of such ground results in noticeable differential subsidence.

Because permafrost containing large amounts of ice has not been encountered along the proposed alignment, the roadway is expected to be subjected to only that subsidence caused by thawing of the so-called "warm" permafrost prevalent in the area. Some slough and swale deposits may contain segregated ice, but these deposits are restricted and easily removable. For these reasons, the feasibility design using two to three feet of road crown is considered to be appropriate. See also Response to Comment A.4.

COMMENT I.389:

"Page 266: Paragraph 3 through Page 268: We recommend that resource agency concurrence be obtained during detailed engineering design for final site selection and procedures for spoil disposal. Spoil should be armored with rock and/or gravel to stabilize the soils against wave action and prevent sedimentation during reservoir drawdown. Spoil which may be unsuitable for disposal because of cost, composition, or proposed construction schedules should be identified. Settling ponds may be necessary in conjunction with temporary construction berms or borrow pits. No spoil should be placed upon snow, even for temporary disposal, and overburden should not be pushed onto areas adjacent to roadways which cross tundra vegetation.

"Additional recommendations for settling ponds, should they be used in spoil disposal, follow:

1. Settling ponds should be sized for gravel processing quantities, and fines. 3B-6/.

2. Generally, when half the capacity of settling ponds are filled with silt, they should be cleaned out.

3. If the settleable fines are to be deposited between the flood pool's high and low water marks, they should be covered with a rock blanket for stabilization.

"The length of time and potential areas to be covered by any 'temporary' spoils disposals should be designated."

"3B-6/ U.S. Forest Service. Guidelines for Reducing Sediment in Placer Mining Wastewater. No date, available from Alaska Resources Library, Anchorage, Alaska. 31 pp."

RESPONSE:

Spoil sites are to be located within the impoundment or within the borrow pits themselves (see Plates F 34 and F 71 of FERC License Application).

During the detailed engineering design of spoil operations, technical specifications will be developed and incorporated into the earthwork contract packages concerning final spoil site selection and procedures for spoil disposal. See the Response to Comment I.425.

RESPONSE TO COMMENT I.389 (cont.):

The contents of these specifications will comply with Federal and State regulatory statutes and will include:

1. Classification of spoil materials;

2. Types of spoil sites (exterior to impoundment, interior impoundment, permanent - temporary);

3. Permit and code requirements;

4. Site preparation (stripping, grubbing, stockpiling organics);

5. Grading and drainage (excavation, construction berms, dikes);

6. Erosion control and spoil stabilization (slopes, surface treatment);

7. Sedimentation control (settling ponds, treatment);

8. Discharge requirements;

9. Quality control, sampling and testing procedures; and

10. Documentation.

By incorporating these specifications into all earthwork contracts, continuing long-term earthwork operations will be accomplished in compliance with applicable regulations through application of contract administration techniques and quality control testing and inspection.

COMMENT I.390:

"Page E-3-267 Last Paragraph through Page E-3-268: Paragraph 1: This section should explain the proposal to deposit spoil above the 50-year flood level for the Devil Canyon Reservoir. We recommend that all disposal be within the impoundment area and that vegetation slash be burned to preclude debris accumulations in water entrainment systems."

RESPONSE:

As stated on FERC License Application page E-3-253, generally spoil will be deposited within the impoundments or in the excavated borrow areas. Spoil disposal, siltation

RESPONSE TO COMMENT I.390 (cont.):

control and site rehabilitation will be addressed in detail in the Project Erosion Control, Waste Management, Revegetation/Rehabilitation Plans, to be developed by the Power Authority and reviewed by the appropriate agencies.

COMMENT I.391:

"Page E-3-268: Paragraph 3: Accurate wetlands maps should be used in geotechnical alignment studies so that wetlands and ice-rich soils can be avoided. Involvement of the environmental monitors should help further minimize sitings or drainage crossings potentially detrimental to fish and wildlife."

RESPONSE:

During detailed design, wetland maps at 1:63,360 of the project area as well as site specific studies along portions of the access road alignment will be completed prior to and in conjunction with geotechnical exploration. All wetland activities will comply with COE, ADEC and ADF&G regulations.

State-of-the-art practices in ice-rich soils and ADOT road design criteria will be used in the design and construction of the access road.

Please also refer to the Response to Comment I.147. In addition, the Power Authority and the U.S. Fish and Wildlife Service, Region Seven are currently negotiating an MOU that will support a joint wetland mapping program. Draft wetland maps are expected during the winter of 1984-85.

COMMENT I.392:

"Page E-3-269: Paragraph 3: It is unclear what portion of the Anchorage to Fairbanks transmission corridor to 'be widened to accomodate an additional single-tower right-of-way 190 feet (58 m) wide' has been included in the previous vegetation assessment (Section 3.3.4(a) and Tables E.3.79, E.3.80 and E.3.86). The statement that this alignment 'may depart from the previously established corridor' substantiates our previous concerns that by not evaluating the Intertie as an integral part of the Susitna project, further impacts could result from later needs to upgrade the line."

RESPONSE TO COMMENT I.392:

The additional single-tower right-of-way referenced in paragraph 3, FERC License Application page E-3-269 of Exhibit E, refers to the addition of the Devil Canyon transmission line from Gold Creek to Anchorage. This results in two lines existing between Gold Creek and Willow (not including the Intertie) and three lines existing between Willow and Cook Inlet (Knik Arm). FERC License Application Tables E.3.79 and E.3.86 did not include a calculation of the area of vegetation to be cleared for the additional line to Anchorage associated with Devil Canyon. These have been corrected and are referenced in the Response to Comment I.370. FERC License Application Table E.3.80 represents impacts associated with the transmission lines between Watana and Gold Creek and is not relevant to the Anchorage-to-Fairbanks corridor.

The statement that the alignment "may depart from the previously established corridor in locations" was intended to reflect the possibility that constraints identified during construction of the Intertie often may be avoided through route refinement. Major corridor deviations are not intended. Typical impacts associated with construction of transmission lines, such as change of vegetation, will occur when the later (Devil Canyon) line is constructed. However, since it will be adjacent and parallel to the other Susitna River and the Intertie line, the types, locations and significance of impacts within this corridor can be anticipated as a result of previous construction.

COMMENT I.393:

"Page E-3-269: Paragraph 4: The referenced 69 kilovolt (kv) service transmission line has not been previously mentioned and appears inconsistent the statement that diesel generators will be used to maintain the camp and village and construction activities (Exhibit A, Section 1.13(d)(i), page A-1-27). Please clarify the purpose of this line, proposed right-of-way, height of utility poles, distance of the centerline from the access road, and connections at the Denali Highway end. According to the APA, three alternatives are under consideration for supplying power during project construction; (1) a 69kv service transmission line from Cantwell along the Denali Highway-to-Watana access route; (2) a transmission line from the Intertie near Gold Creek along the railroad and access road which follow the Susitna River; and (3) use of diesel generators (Thomas A.

COMMENT I.393 (cont.):

Arminski, APA Deputy Project Manager, personal communications of September 30, 1983). The existence of those three alternatives should be described in detail in the license application. We recommend that alternative (3), diesel generation, be used to avoid impacts of an additional transmission line."

RESPONSE:

The type of power supplied for project construction and camp purposes has not yet been finalized. Issues that will be addressed in reaching a final decision include contractor preference and flexibility, construction scheduling, power availability and reserve from the Intertie, and agreements with utilities to tap Intertie power.

The three alternatives referenced in the Response to Comment I.393 are still under consideration. While a final decision has not been made, a combination of diesel and transmission line is considered most likely. Presently, the preferred option for supplying transmission line power is construction of a line from Gold Creek to Watana as shown in Exhibit G of the License Application (reference Response to Comment A.7). This line would be energized at 138 kV and then stepped down to the necessary power requirement at the construction site. Upon completion of Watana construction the line would then be upgraded to 345 kV for incorporation into the Susitna power system.

The 69 kV transmission line option, if selected, would run from Cantwell along the Denali Highway to the access road, and then parallel the access road to the construction site. Placement of this line would be within the right-of-way of the access road. Typical design characteristics for such a line include the following:

o	Tower Type	-	Single Circuit wood pole
o	Height	-	42-45 feet
o	Right-of-way	-	Approximately 50 feet
o	Proximity to access road	-	Outside edge of drainage swale
o	Connection at Cantwell	-	Transformer at Cantwell Substation

COMMENT I.394:

"Pages E-3-269 through E-3-274: The mitigative practices that are described here should be part of Biological Stipulations included in project licensing and contract bid specifications. Once the moose carrying capacity model and more detailed vegetation mapping is completed, an analysis should be undertaken of the potential to optimize browse production by additional transmission line clearing or varying vegetation heights by changing maintenance schedules within constraints of safe line operation. Follow-up studies should be initiated to confirm the value of expected browse enhancement and aid planning and implementation of such vegetation manipulations."

RESPONSE:

A. As mentioned in more detail elsewhere (I.425), the Power Authority does not concur with the U.S. Fish and Wildlife Service's recommendation that all biological stipulations be adopted as articles of license or (as presented) contract specifications.

B. The Power Authority will investigate the feasibility of enhancing moose browse within the transmission line right-of-way. If an enhancement program appears warranted and is embarked upon, an appropriate monitoring program will be initiated. Please refer to the Response to Comment I.277.

COMMENT I.395:

"Page E-3-273: Paragraph 4: Potential policy conflicts should be identified in conjunction with access road and transmission line siting studies. Agreements with public and private landowners which provide for the mitigation determined necessary by the applicant should be confirmed prior to project licensing. Unless such agreements are incorporated into the license, there is no guarantee that mitigative management policies will be adopted. The record on negotiation settlement proceedings for the Terror Lake hydroelective project now under construction by the applicant on Kodiak Island supports such careful planning."

RESPONSE TO COMMENT I.395:

The Power Authority is presently discussing policy issues with agencies and landowners including issues dealing with access and transmission lines. It is the Power Authority's intent to continue consulting with resource management agencies, land managers and owners to identify all relevant issues and resolve conflicts, if any.

As required by FERC regulations, measures and facilities recommended for mitigation by agencies have been described in the FERC License Application. When feasible and necessary, agreements with public and private landowners regarding mitigation may be obtained prior to project licensing. It is anticipated, however, that not all agreements regarding mitigation will be confirmed prior to the license. Refinements to mitigation plans are a continuous process based on information received from ongoing studies, site specific information gathered during field investigation and information based on detailed design. All of these will continue after granting of the FERC license.

In addition, given the length of time to completion of the Project and the dynamic arena of Alaska land use planning, it is prudent to reexamine policy issues and agreements prior to, during and after construction.

The Power Authority anticipates that the FERC license issued for this Project will include FERC's customary and appropriate conditions and will not include unnecessary conditions. For example, any mitigation agreements may be enforced in accordance with their terms and need not be duplicatively and wastefully enforced through FERC license conditions.

COMMENT I.396:

"Page E-3-274: Paragraph 4 and Page E-3-275: Paragraph 1: The text should explain: (1) inconsistencies between these figures and those in Section 3.4.2(a); and (2) calculations of areas where vegetation removal will be minimized."

RESPONSE:

Inconsistencies between figures on FERC License Application pages E-3-274 and E-3-275, and calculations of areas where vegetation removal will be minimized have been corrected in

RESPONSE TO COMMENT I.396 (cont.):

Supplemental Information Request Response 3B-7 provided to the FERC on July 11, 1983. The revised tables and relevant portions of the text that subsequently required modification is included in Reference I.370.2 (see February 15, 1984 APA Response Document, Reference Volume). Additional cross-sections to FERC License Application page E-3-252 have been included in Reference I.370.2 as well.

COMMENT I.397:

"Pages E-3-275 through E-3-281(ii) Rectification: A preliminary assessment should be made of vegetation cover type losses from the standpoint of how long each area will be disturbed. As reclamation and revegetation take effect and disturbance by construction activities decreases, some habitat values would be expected to slowly increase. We agree that predictions of how plant succession will proceed on these lands over time are difficult to justify. However, we suggest that the information presented here, coupled with the successional information presented earlier (Section 3.3.1(b)[i] and in Table E.3.144) will allow an assessment of the range of possible vegetation restoration over time. The typical 10-year time frames within which each area will be completely out of production must be coupled with the up to 150 year time spans necessary for revegetation in order to thoroughly assess project impacts. Although these losses may be 'temporary,' they are significant within the average life-spans of area wildlife."

RESPONSE:

The statement in the FERC License Application which discusses the rate of revegetation and states that 150 years may be required for revegetation refers to development of mature plant communities on harsh sites. The intervening successional phases provide productive habitat. Additional evaluation will be made during the Mitigation Plan refinement. Assessments of the rate and direction of revegetation can be made part of the site-specific restoration plans.

COMMENT I.398:

"Page E-3-276: Construction Camp: The text should clarify the double listing for dismantling and redraining the 78 acres involved here."

RESPONSE TO COMMENT I.398:

The FERC License Application text cites the rehabilitation action as "dismantling" of the temporary facilities such as the construction camp and "reclaiming" the area by preparing the acreage for re-establishment of vegetation. It is anticipated that the camp will be dismantled in phases and therefore will likely occur over a two-year period. This is why the 156 acres required for the construction camp is split into two parts.

COMMENT I.399:

"Page E-3-277: Borrow Area D: It appears that an additional 70 acres should be listed under the excavation and reclamation category for 1986."

RESPONSE:

Under Borrow Area D, on the listing of rehabilitated lands at Watana, an additional 70 acres should be added under excavation and reclaiming, for 1986. The revised list should read as follows:

RESPONSE TO COMMENT I.399 (cont.):

License Application Page E-3-277 - Revised

3.4 - Mitigation Plan

WATANA (CONT.)

Facility & Vegetation	Action	Year	Area (acres)
Borrow Area D	Excavate	1985	70
- Woodland Black Spruce	Excavate & Reclaim	1986	70 & 70
- Closed Birch Forest	Excavate & Reclaim	1987	70 & 70
- Open Mixed Forest	Excavate & Reclaim	1988	100 & 70
- Wet Sedge-Grass Tundra	Excavate & Reclaim	1989	100 & 100
- Closed Tall Shrub	Excavate & Reclaim	1990	100 & 100
- Birch Shrub	Excavate & Reclaim	1991	100 & 100
- Mixed Low Shrub	Excavate & Reclaim	1992	100 & 100
	Reclaim	1993	100

DEVIL CANYON

Facility & Vegetation	Action	Year	Area (acres)
Construction Camp	Start Const.	1994	45
- Closed Mixed Forest	Complete Const.	1995	45
	Dismantle & Reclaim	2002	89
Village	Start Const.	1995	48
- Closed Mixed Forest	Complete Const.	1996	48
	Dismantle & Reclaim	2002	96
Construction Roads	Start Const.	1994	75
- Open Black Spruce Forest	Complete Const.	1995	25
- Closed Birch Forest	Grade & Reclaim	2003	100
- Open Mixed Forest			
- Closed Mixed Forest			

COMMENT I.400:

"Pages E-3-279 to 280: (ii) Rectification: Refer to our Attachment A, Biological Stipulations, additional references, and ongoing revegetation of the Alaska Plant Material Center for further guidance on site restoration.

"Individual site restoration plans should be developed with the concurrence of the monitoring team. We recommend prompt site restoration (i.e., site preparation) upon concluding use of a construction site. This includes recontouring, replacement of the organic mat/topsoil, fertilization, and scarification and seeding and willow sprigging where necessary during the first growing season following conclusion of construction activities at a given site.

"We recommend that the resource agencies have the opportunity to review and comment on the reclamation plans at least one year prior to construction. The successful implementation of reclamation plans would be facilitated by limiting surface disturbances as the application has indicated.

"An essential step to achieving reclamation will be to develop a monitoring program which assigns monitoring responsibilities, and includes funding for yearly operation and maintenance. The plans must include criteria for measuring the relative successes of reclamation activities and a procedure for implementing additional measures if initial reclamation objectives are not achieved.

"The text should clarify the process by which 'slopes will be serrated.'"

RESPONSE:

The Alaska Power Authority anticipates preparing a Revegetation/Rehabilitation Manual that will describe rehabilitation and revegetation methodologies. See also the Response to Comment B.42. The basis for the practice contained therein will be successful practices used on other Alaskan projects. Before the manual is adopted for project use, it will undergo agency review. The practices contained in this manual will be applied on a site-by-site basis with the approval of a monitoring team. The monitoring team will also assess the efficacy of these rehabilitation measures. Refer to Response I.119B for additional information on the monitoring team.

COMMENT I.401:

"Pages E-3-281 through E-282: (iii) Reduction: By itself, monitoring is not mitigation. It should provide data on which to base mitigation recommendations, impact evaluations, and assess mitigation effectiveness. Monitoring can result in improvements to ongoing mitigation efforts, by leading to modification or additions to measures already implemented. For example, schedules for clearing to enhance browse production may be changed or additional acreage acquired or manipulated for wildlife uses as a result of monitoring findings.

"We concur with the assessment of additional impacts on page E-3-281, last paragraph. A mechanism for promptly implementing results of the monitoring program is needed here."

RESPONSE:

As described on FERC License Application pages E-3-6 and E-3-282, the detailed monitoring plan will be developed during the detailed engineering design and construction planning phases of the Project.

The Power Authority anticipates that the DEIS will discuss and incorporate results of prior monitoring and that the DEIS may include reasonable and customary monitoring programs as mitigation options.

COMMENT I.402:

"Pages E-3-282 through E-3-285: (iv) Compensation: We support the chosen option for compensation of vegetation losses. The incremental habitat values gained from selectively altering vegetation or acquiring and/or managing lands which would otherwise be developed or used represent a mitigation potential which can be used as compensation. Please note that location, interspersion with other vegetative cover types, and other habitat characteristics also affect the wildlife habitat wildlife habitat values of potential 'replacement lands'."

RESPONSE:

Comment noted.

COMMENT I.403:

"Page E-3-283: Paragraph 4: and Page E-3-285: Paragraph 2: We certainly support the efforts of the ADF&G, the University of Alaska, and the APA, in conjunction with the FWS, to develop "a habitat-based model for moose carrying capacity based on moose bioenergetic requirements and browse nutritional value." Unfortunately that program has been jeopardized by stop-work orders, budget cutbacks, and study delays. While progress has recently been made in some of the necessary vegetation data collections, no interagency modeling work has occurred since the workshop on February 28 to March 2, 1983. We are aware of no allocations within the state fiscal year 1984 project budget for further modeling work 3B-8/."

"3B-8/ APA. September 8, 1983. Appendices 2 and 3 to Agenda Item IV, Action Item No. 1, FY 1983 Program Changes and Their Impact on the FY 1984 Program and Current Proposed FY 1984 Budget Allocations Susitna Hydroelectric Project. Prepared for the APA Board of Directors."

RESPONSE:

Funding levels are now adequate to complete all previously planned studies by the ADF&G and the Power Authority's contractors.

COMMENT I.404:

"Page E-3-284: Paragraph 2: We have encouraged the Bureau of Land Management to widen the time-frame within which they would undertake the prescribed burn at the Alphabet Hills site. This would increase the possibility of obtaining suitable weather, soils, etc. for burning. Specifically, we recommend that a spring 1984 burn be undertaken. A spring burn would facilitate an assessment of revegetation and subsequent wildlife uses."

RESPONSE:

Comment noted.

COMMENT I.405:

"Page E-3-284: Paragraph 2: We support proposed vegetation mapping and integregation of that mapping with modeling efforts.

"Please note that periodic maintenance should be an integral part of any enhancement programs."

RESPONSE:

The Power Authority recognizes that there are operation and maintenance aspects and costs associated with enhancement programs as indicated by the average annual cost elements listed in FERC License Application Table E.3.169.

COMMENT I.406:

"Pages E-3-285 through E-3-289: (b) Indirect Loss of Vegetation: While we appreciate efforts to describe areas subject to erosion, blowdown and other vegetation losses, it is impossible to fully assess replacement lands or enhancement needs without some quantification of these cumulative impacts. We suggest that impact areas be modeled. For example, information from Chapter 6 and this chapter should be used to measure the areal extent of each vegetation type within the 10-mile reach near the headwaters of the Watana Reservoir."

RESPONSE:

Please refer to the Responses to Comments I.336 and I.344. As stated in the former Response, quantification of these impacts will receive continuing attention during impact assessment refinement. However, it may be best to base mitigation for the unpredictable losses due to the subject impacts on objective monitoring data collected during operation.

COMMENT I.407:

"Page E-3-286: Paragraph 5: Please refer to our Attachment A, Biological Stipulations, I. Environmental Briefings, for further guidelines."

RESPONSE TO COMMENT I.407:

Please refer to the Response to Comment I.425.

COMMENT I.408:

"Page E-2-289: Paragraph 2: We recommend that the APA determine and pursue agreements on necessary regulatory options in coordination with Federal and state resource management agencies as well as private landowners."

RESPONSE:

Public access to and within the project boundary is the subject of continuing study and assessment. Once a final decision has been made regarding the extent and frequency of public access, the Power Authority and agencies may enter into appropriate agreements to control access (if required).

An access policy will be developed in consideration of the concerns of adjacent private land owners, the Matanuska-Susitna Borough, state and Federal resource agencies, the Power Authority staff, its Board of Directors and construction and operations managers. See Responses to Comments A.3, A.6 and A.16.

COMMENT I.409:

"Pages E-3-289 through 291: (c) Alteration of Vegetation Types: Wetlands mapping referred to in this section has not been inititated (see our comments on Sections 3.2.3 and 3.3.5). Other than mitigative siting and a few general construction practices outlined in Section 3.4.2(a)(i), we find no specific examples here of measures for minimizing drainage alterations in wet sedge-grass tundra as referred to on page E-3-259, paragraph 3. As previously mentioned, we do, however, agree with proposed procedures for mapping and agency coordination.

"We support plans for aerial and on-ground investigations to finalize mitigative transmission corridor siting upon the assumptions that: (1) the more detailed vegetation and wetlands mapping efforts will have been completed and will be available for use, and (2) resource agency concurrence will be obtained."

RESPONSE TO COMMENT I.409:

Please refer to the Response to Comment I.330 for a description of the wetland mapping. Mitigative siting and construction techniques designed to minimize drainage alterations are discussed or referenced in FERC License Application Section 3.4.2(c). In addition, the text on FERC License Application page E-3-290 states "Proper engineering design and construction planning for wetland areas are considered to be a top-priority component of the project civil engineering program." The text on that page also states that "coordination with the COE and USFWS will continue so that incorporation of proper engineering design to mitigate for potential drainage alterations is assured." See also Response to Comment I.425.

COMMENT I.410:

"Page E-3-290 Last Paragraph through Page E-3-291: Paragraph 1: Reference to monitoring and "ongoing studies of moose, raptors and other wildlife by the ADF&G and USFWS" is confusing. While we heartily endorse post and pre-construction monitoring and studies, and will continue raptor and swan surveys within our funding constraints and legislative responsibilities, we caution that responsibility for funding and implementing project impact studies lies with the project sponsor. We will provide technical assistance to the maximum extent possible."

RESPONSE:

The Alaska Power Authority is well aware of its responsibilities for funding and implementing project impact studies. We are beginning at this time the fifth year of such studies, all of which are funded and implemented by the Power Authority specifically to assess Susitna Hydroelectric Project impacts. However, wherever impact assessment and monitoring efforts can make use of ongoing studies being funded by other sources, the Power Authority intends to make maximum use of them.

COMMENT I.411:

"Page E-3-291: Section 3.4.3 - Mitigation Summary: This section lacks a comprehensive analysis of overall project impacts, potential for achieving mitigation priorities and

COMMENT I.411 (cont.):

tradeoffs among mitigation options for various area resources."

RESPONSE:

As explained on FERC License Application page E-3-251, the information requested by the reviewer is provided in FERC License Application Section 3.4.2, Option Analysis (pages E-3-252 through E-3-291). As further noted on FERC License Application page E-3-251, the mitigation summary (Section 3.4.3) is intended only to provide a brief listing of mitigation measures already proposed for botanical resources in FERC License Application Section 3.4.2. We believe that the information provided in FERC License Application Section 3.4.2 amply provides the information requested by the reviewer.

COMMENT I.412:

"Table E.3.49: The taxa, Papaver alboroseum, was withdrawn from consideration as a candidate threatened or endangered species (FR 45, December 15, 1980)."

RESPONSE:

The Power Authority appreciates the correction.

COMMENT I.413:

"Table E.3.51: The text should indicate whether the mesic sedge-grass classification here and in Table E.3.71 and E.3.72 is the same as the sedge-grass classification in Tables E.3.52, E.3.77 E.3.80 and E.3.83 through E.3.86."

RESPONSE:

Mesic sedge-grass tundra should be listed as sedge-grass tundra.

COMMENT I.414:

"Table E.3.71 and E.3.72: There is an apparent inconsistency between the text which says that 1% of the study area is open spruce and these tables which show nearly

COMMENT I.414 (cont.):

8% of the Watana Watershed and over 2% of the Gold Creek watershed to be open forests (Section 3.2.2(b)(i), paragraph 1)."

RESPONSE:

The percentage of the Watana and Gold Creek watersheds covered by open spruce forest is 8% and 2%, respectively, as stated in Tables E.3.71 and E.3.72 of the FERC License Application. The text (page E-3-206) was incorrect.

COMMENT I.415:

"Table E.3.79: The vegetation classification is not directly comparable to that used for other transmission line segments, Tables E.3.77, E.3.78, E.3.80 and E.3.86."

RESPONSE:

Please refer to the Response to Commment I.327.

COMMENT I.416:

"Table E.3.3.81: Please refer to our comments on the inadequacy of this correlation, Section 3.2.3."

RESPONSE:

Please refer to the Response to Comment I.332.

COMMENT I.417:

"Table E.3.82: Please refer to our comments on the inaccuracies in wetland typing which make this table meaningless, Sections 3.2.3 and 3.3.5."

RESPONSE:

As indicated in the Response to Comment I.330, the FERC License Application recognized the scope of the available wetland maps (see pages E-3-222 through E-3-224), and also indicated that new mapping would be conducted. Although the numbers in FERC License Application Table E.3.82 represent conservatively high figures for the areal extent of wetlands affected by project facilities, they do represent

RESPONSE TO COMMENT I.417 (cont.):

preliminary estimates useful for comparison purposes and environmental impact study.

COMMENT I.418:

"Tables E.3.83 and E.3.84: Potential spoil areas outside of the impoundment or already disturbed areas should be quantified here."

RESPONSE:

All spoil areas will be located within the impoundment or the borrow pit from which the spoil was excavated. The only area disturbed to date is in the immediate vicinity of the Watana Camp already included in the tables. No modifications to the tables are required.

COMMENT I.419:

"Table E.3.86: Please refer to our comments under Section 3.3.4(a) regarding calculation errors which apparently result in double counting of forest, shrub, tundra and unvegetated cover types. Mosaics of two or more vegetation cover types may sometimes be the optimum mapping unit. However, no explanation is provided for the four mosaic vegetation types included in this table, but not in any other botanical resources tables or discussions. Where Table E.3.86 refers to an adjustment of right-of-way width, there is no explanation of how that adjustment was made. It appears that recalculation of transmission line impacts on the basis of a 300-foot clearing width used in Table E3.86 as compared to the 400-foot clearing width used in McKendrick et al. (1982) was by a straight proportion. 3B-9/ As the line is finalized and assuming vegetation is remapped in a manner more meaningful to wildlife, the affected vegetation types should be recalculated. Quantification of potential increases in browse should be possible on the basis of remapping, succession models, and continuing vegetation studies. Such quantification is needed to compare overall losses for a determination of mitigation requirements."

"3B-9/ See Footnote 3B-8. [Footnote 3B-8/ APA. September 8, 1983. Appendices 2 and 3 to Agenda Item IV, Action No. 1, FY 1983 Program Changes and Their Impact on the FY

COMMENT I.419 (cont.):

1984 Program and Current Proposed FY 1984 Budget Allocations Susitna Hydroelectric Project. Prepared for the APA Board of Directors.]"

RESPONSE:

Please refer to the Response to Comment I.365 concerning Table E.3.86 and elimination of double counting and adjustment of right-of-way width. As stated in the footnote of revised Table E.3.86 (refer to the Response to Comment I.370), the Tanana Flats portion of the transmission corridor is an area of extremely complex mosaics of vegetation types. As a result, various complexes were recognized.

There are no current plans to remap the vegetation in the transmission corridor from Healy to Fairbanks or Willow to Cook Inlet. We believe that the 1:63,360 scale mapping conducted to date along these segments is adequate for assessing transmission line impacts.

The quantification of increased browse production along the transmission line segments will be addressed during ongoing impact assessment and mitigation plan refinement efforts.

COMMENT I.420:

"ATTACHMENT C

"Recommended Construction Methods for Mitigating Impacts to Wetlands which cannot be Avoided by Project Development

"The first step in outlining mitigation recommendations pertinent to activities affecting wetlands is to define 'wetland.' This has been descriptively done in Chapter 3 of Exhibit E. However, until the wetlands mapping proposed and commented upon in Sections 3.2.3 and 3.3.5 is completed, wetlands will not have been defined geographically or in the field. Where wetlands are underlain by permafrost, construction activities may need to be further altered."

RESPONSE:

Please refer to the Response to Comment I.330.

COMMENT I.421:

"ATTACHMENT C

"Recommended Construction Methods for Mitigating Impacts to Wetlands which cannot be Avoided by Project Development

"The following is based on options outlined by the applicant in the Supplemental Submittal to FERC, Volume IIA of III. We are here providing further information and recommendations.

"(A) Construction methods in wetlands:

1. Clearing and construction should be undertaken when the ground is frozen; access should be by ice roads. Excavated spoil should not be wasted in wetlands. The workpads and access roads should be constructed so as to prevent thermal degradation while providing structural integrity.

2. Hand clearing should be utilized to avoid scalping or removal of the vegetative mat.

3. Slash disposal in wetlands should be prohibited.

4. Fill material for roads or pads should be placed over the original surface without stripping vegetation and organic layer. The objective is to minimize surface disturbance and prevent siltation of wetlands and waterbodies.

5. Geotechnical fabric should be utilized to minimize the need for stripping, and reduce settlement of finished road surface. Fabric use areas should be field staked so the fabric is not ripped up during road maintenance of blading operations.

6. Wetlands should not be used for material or disposal sites."

RESPONSE:

These recommendations are a useful expansion of the recommended construction methods for mitigating impacts to wetlands already listed in FERC License Application Section 3.4. They will be considered during development of the Design Criteria Manual or during the Susitna Settlement Process (see the Responses to Comments I.424 and I.425).

COMMENT I.422:

"ATTACHMENT C

"Recommended Construction Methods for Mitigating Impacts to Wetlands which cannot be Avoided by Project Development

"The following is based on options outlined by the applicant in the Supplemental Submittal to FERC, Volume IIA of III. We are here providing further information and recommendations.

"(B) Techniques for minimizing alterations to wetland drainage patterns:

1. Hydrologic assessments of quantity, direction and timing of surface drainage should be conducted in the field in late spring/early summer when flow patterns are readily visible. Culvert locations should be staked, sketches made of culvert locations, elevations of culvert inverts determined, and direction of water flow noted and culvert size determined.

2. Sufficient numbers of culverts of adequate size should be installed in the proper locations to prevent uphill ponding and downslope dewatering, avoid erosion from lateral flow along embankments, and minimize flow velocity and flow concentration in culverts. Areas should be evaluated for any fish passage needs. Temporary culverts (i.e., for two years or less) should be designed to handle a five-year flood event and permanent culverts (i.e., to remain in use for more than two years) should be designed to handle a 50-year flood event.

3. Install culverts with sufficient camber to prevent settlement. The camber may also be dependent upon fish passage requirements.

4. Install culverts low enough to intercept sheet flow. The culverts should maintain natural cross drainage patterns. Discharge should be diffused to preclude washing away of vegetative mat (of particular importance in permafrost areas to preclude thermokarst).

5. Install steampipes in culverts where icing is likely to occur. The steamfitted uprights should be installed to provide access in snow and ice conditions. Guide

COMMENT I.422 (cont.):

markers to the steam pipes will need to be able to withstand.

RESPONSE:

See the Responses to Comments I.424 and I.425.

COMMENT I.423:

"ATTACHMENT C

"Recommended Construction Methods for Mitigating Impacts to Wetlands which cannot be Avoided by Project Development

"The following is based on options outlined by the applicant in the Supplemental Submittal to FERC, Volume IIA of III. We are here providing further information and recommendations.

"(C) Additional recommendations for mitigating impacts of road construction on wetlands are:

1. Any placement of fills in a watercourse should be perpendicular to the stream flow.

2. Roads should be maintained in a crowned configuration and maintenance activities should be accomplished so as to prevent material being pushed into drainages, blocked culverts, or roadside berms along the driving surface.

3. Road fills at fish streams less than 50 feet wide should not exceed a 30-foot top width through the stream crossing.

4. There should be no storage of fuel in floodplains or wetlands.

5. Refueling and equipment servicing should be restricted to gravel fill areas and confined to preclude any product from reaching wetlands."

RESPONSE:

See the Responses to Comments I.424 and I.425.

COMMENT I.424:

"ATTACHMENT C

"Recommended Construction Methods for Mitigating Impacts to Wetlands which cannot be Avoided by Project Development

"The following is based on options outlined by the applicant in the Supplemental Submittal to FERC, Volume IIA of III. We are here providing further information and recommendations.

"(D) Case by case exemption to the above recommendations may be granted by the interagency monitoring team."

RESPONSE:

Wetlands construction activities are regulated and permitted by the U.S. Army Corps of Engineers (COE) pursuant to Section 404, Clean Water Act, 33 U.S.C. § 1344. Any modifications to the permitted activity must be submitted by the COE and exemptions cannot be granted by other agencies. It would be duplicative, unnecessary, unauthorized and perhaps dangerous for the interagency monitoring team to exercise a portion of COE's legislative authority.

COMMENT I.425:

"ATTACHMENT A

"Biological Stipulations

"By incorporating the Environmental Guidelines of Appendix E3.B, Chapter 3, Exhibit E of the draft Susitna Hydroelectric Project Federal Energy Regulatory Commission (FERC) License Application with other stipulations applicable to Alaska construction projects, a set of project stipulations has been compiled. It is our recommendation that these stipulations be incorporated into the FERC license as a binding exhibit. They should then become part of project contracting agreements.

"Preamble

"Implementation of these stipulations are appropriate during the construction, operation and maintenance, and termination of the Susitna Hydroelectric Project. Sound engineering practices shall be employed to preserve and protect fish and wildlife resources and their habitats.

"The Licensee, through guidance and direction to the Designer, Engineer and construction Contractor, shall balance environmental amenities and values with economic considerations and technical capabilities to be consistent with State and National policies. This evaluation shall include benefits or detriments to people, property and environmental resources which may result from a course of conduct."

RESPONSE:

The Power Authority is disappointed that the DOI/Office of the Secretary fails to understand or respect the Susitna Settlement Process. The Power Authority strongly objects to this attempt to avoid the Settlement Process by directly proposing specific license conditions to the FERC.

Pursuant to the Settlement Process (see also Responses to Comments B.59, F.1, F.6 and F.28), the development of specific project stipulations should involve a concerted effort by the Susitna Project environmental and engineering personnel, as well as state, Federal and local regulatory agencies, to ensure that all comments are considered. Any and all resulting stipulations should address broad-based requirements to avoid precluding planning efforts and/or

RESPONSE TO COMMENT I.425 (cont.):

conflicts with individual agency stipulations and regulations and reduce the repetition of concerns stipulated.

The Power Authority has scheduled the development of environmental plans with reviews by appropriate agencies for the following: Waste Management; Erosion Control; Fuel and Hazardous Materials Management and Revegetation/ Rehabilitation. Design Criteria and Construction Practices Manuals along with the Access Road Report, Transmission Line Report and Camp/Village Siting Report will be prepared to provide the vehicles for addressing many of the specific items listed as DOI recommended Biological Stipulations.

The Power Authority also objects to the DOI/Office of the Secretary's attempt to preempt the DEIS and FEIS NEPA process. By apparently making its own decisions before the NEPA process is complete, DOI/Office of the Secretary blatantly fails to discharge its own duties under NEPA (see, for example, 40 C.F.R. §§ 1500.1(b) (obligation to ensure environmental information is available "before decisions are made" by federal agencies), 1502.2(g) (EIS to serve as means of assessing impacts rather than "justifying decisions already made"), 1502.5, 1502.14 (DOI/Office of the Secretary's decisions preclude other alternatives, which are the "heart of the environmental impact statement"), 1505.2 (DOI/Office of the Secretary fails to provide a record of its decisions), 1506.1(a)(2) (DOI/Office of the Secretary decisions improperly "limit the choice of reasonable alternatives") and 1506.10). The Power Authority urges the FERC not to join or countenance these failures.

COMMENTS I.426 - I.489:

Please refer to individual Biological Stipulations identified as Comments I.426-I.489 on pages 71-83 of December 12, 1983 Department of the Interior/Office of the Secretary comment letter.

RESPONSE:

Reserved for Susitna Settlement Process. See Response to Comment I.425.

COMMENT I.490:

"Access Roads

"Page E-3-256 Side Borrow adjacent to or access balanced cut and fill techniques will minimize certain impacts, however, materials must be available in the access corridor. It should be stipulated the construction will have to be closely monitored. Monitoring will ensure contractors comply with licensing requirements and contract specifications.

"Page E-32-264 is two to three feet of road crown, enough in areas of permafrost?"

RESPONSE:

Please refer to Responses to Comments A.4 and I.288.

COMMENT I.491:

"Fish: We submit that the quality of the fisheries is highly dependent on water use and quality. The Chapter 2 analysis has some deficiencies most notably a valid temperature model and the lack of data on fish use downstream of Chulitna River."

RESPONSE:

This comment is the same as Comment A.9 for which a response has been prepared previously. See Response to Comment A.9.

COMMENT I.492:

"Vegetation: Vegetation section lacked quantification of areas which could be affected by changes in cover. A given species may benefit by vegetation cover changes whereas other species may be adversely affected. The vegetation map should be improved to better analyze moose and bear habitat."

RESPONSE:

Areas of vegetation to be affected by changes in cover as a result of temporary facility construction, dismantling and reclamation are quantified in Exhibit E, Chapter 3, Section 3.4.2(a)(ii), pages E-3-276 through E-3-278. We

RESPONSE TO COMMENT I.492 (cont.):

concur with the Commentor's statement that "a given species may benefit by vegetation cover changes whereas other species may be adversely affected." This point is discussed further in the Response to Comment I.277.

COMMENT I.493:

"Wildlife: The Jay Creek mineral lick for Dall Sheep will be impacted. Mitigation by exposing new soil in the area is suggested. No mention of an alternative, such as lowering the dam height to reduce the amount and escape route from being inundated, is mentioned. The dam will inundate Bald Eagle and Golden Eagle nest sites, which is in violation of the Bald Eagle Protection Act."

RESPONSE:

Please refer to the Responses to Comments A.11 on the Jay Creek mineral lick and Comment I.210 on the Bald Eagle Protection Act.

COMMENT I.494:

"In summary, mitigation agreements should be arranged with landowners prior to licensing and incorporated in the license to ensure they will be adopted. Also, we concur with the applicant's proposal to establish an interagency monitoring team which should include monitoring construction activities to ensure compliance. The team should be funded by the project."

RESPONSE:

As mentioned elsewhere (see Responses I.81 and I.301B), the Power Authority or the State of Alaska, Department of Natural Resources will, in all likelihood, have title to project lands for facilities. During the construction phase, some temporary construction facilities may be on lands leased from adjacent landowners.

Mitigation lands that are not located on project lands will probably be located on state lands. Management activities will have to be arranged with the Department of Natural Resources, the land manager. Thus, it is anticipated that the Susitna Hydroelectric Project license applicant (the State) is also the landowner for most mitigation lands. An Interagency Land Managment Transfer will probably be executed between DNR and the Power Authority for project

RESPONSE TO COMMENT I.494 (cont.):

lands. A Memorandum of Agreement providing for joint Management activities would probably be used for mitigation lands. See also Responses I.81 and I.119B.

COMMENT I.495:

"BLM will consider any archeological sites in this project that are under its jurisdiction and that have tephra chronology to have cumulative research potential (36 CFR 60.6(d)). We view these items as representing part of a significant entity, whose components may lack individual distinction (36 CFR 60.6(c))."

RESPONSE:

See the Responses to Comments A.2 and I.496 (below).

COMMENT I.496:

"The Advisory Council on Historic Preservation must be given the opportunity to comment on this project and the cultural resource reports.

"BLM agrees with the applicant's approach to inventory and systematic testing since we are in the process of developing an agreement with the State Historic Preservation Officer that incorporates an analogous approach.

"It is expressed several times that the project area 'holds excellent potential for addressing many long standing anthropological questions.' What these questions are is not specified. If sites are important for their ability to answer these questions, which sites answer which questions, and why, should be specified."

RESPONSE:

The Alaska Power Authority anticipates that a reasonable cultural resources mitigation plan for the Project will include provisions for surveys of the locations of all project facilities (such as transmission lines and access roads) whose exact locations have not been established at the time of FERC license issuance and which have not been

RESPONSE TO COMMENT I.496 (cont.):

identified through archeological sensitivity modeling as having a likelihood of containing cultural resources. All cultural resources identified during archeological surveys (both pre- and post-FERC license) will be evaluated in terms of a relative significance framework, which consists of a site classification system and a set of criteria against which the ability of a particular site to contribute to the solution of specific significant research questions can be measured. The results of this evaluation will, in turn, be used to determine whether total, partial or no data recovery (e.g., salvage excavation) will be necessary at those sites whose destruction cannot otherwise be reasonably avoided by project modifications or other means.

This approach has been informally reviewed with representatives of the State Historic Preservation Office and other agencies, and should satisfy all cultural resource regulatory requirements for the Susitna Hydroelectric Project.

See also the Response to Comment A.12.

COMMENT I.497:

"CHAPTER 5. SOCIOECONOMIC IMPACTS

"General Comments

"This evaluation should include: (1) a widely accepted projection of future population and economic growth (increasing user groups) or, if there is substantial uncertainty as to the validity of key assumptions (as we believe there is), then a multiple scenario model should be pursued examining at least high, medium, and low projects; and (2) tradeoff analysis examining the competing mitigation proposals for the different interests. Chapter 5 fails in respect to both points."

RESPONSE:

Socioeconomic projections for the Susitna Project were developed through the use of an integrated econometric model. The estimated socioeconomic impacts, which were presented in the FERC License Application, addressed the

RESPONSE TO COMMENT I.497 (cont.):

residency and movement of Project construction and operation personnel, adequacy of available housing, and impacts on public services and facilities, fish and wildlife user groups, and local government revenues and expenditures.

Harza-Ebasco conducted a workshop in July 1983 to facilitate a broader understanding by interested agencies and the general public of the analytical approach, assumptions and methodologies used to forecast potential socioeconomic impacts of the Project. Working Paper No. 1 (Susitna Hydroelectric Project Subtask 4.5 Socioeconomic Studies: Projection Assumptions, Methodology, and Output Formats) provided workshop participants with specific assumptions and methodologies used to forecast potential impacts. The paper addressed in detail the structure of the model, including the economic-demographic, public facilities and services and fiscal modules and their linkage.

Since preparation of this publication, the baseline and with-project projections have been revised in response to changing economic conditions in Alaska, the Railbelt and the Mat-Su Borough, and in light of new community-specific data. Three scenarios for transporting construction workers to the project site were used in updating the projections, including the use of personal vehicles, buses and fixed-wing aircraft. The revised projections, which will be updated annually, will be available in February 1984.

A mitigation plan update, which will be prepared in early 1984, will delineate measures that can be implemented to eliminate or reduce identified adverse socioeconomic impacts.

REFERENCES

Frank Orth & Associates, Working Paper No. 1, Susitna Hydroelectric Project Subtask 4.5 Socioeconomic Studies: Project Assumptions, Methodology and Output Formats (July, 1983).

COMMENT I.498:

"Page E-5-6: (b) Population: The population projections are outdated. Impact analyses and mitigation planning are tied to population projections with and without the project. We recommend that the population projections be updated."

RESPONSE:

The population projections have been revised to reflect data collected in household, business and public sector surveys in Talkeetna, Trapper Creek and Cantwell and from updated secondary data, including revised projections made by the Institute of Social and Economic Research based on reformulated assumptions regarding anticipated economic activity in Alaska, the Railbelt and the Mat-Su Borough. The baseline and with-project projections will be available in February 1984.

COMMENT I.499:

"Page E-5-6: (b) Population: Paragraph 5: The Knik Arm crossing should not be considered a foregone conclusion. The Alaska Department of Transportation and Public Facilities (ADOT/PF) has only recently begun their assessment of this project. The alternatives being given serious consideration by ADOT/PF for the draft environmental impact statement would result in minimal savings in driving time to the comunities indicated."

RESPONSE:

The alternative corridors as well as a no action alternative will be evaluated in the Alaska Department of Transportation and Public Facilities' Draft Environmental Impact Statement, which is expected to released in June 1984. According to the current schedule, the Knik Arm crossing is expected to be completed in 1990.

This information is in agreement with the assumption used in the FERC License Application.

COMMENT I.500:

"Page E-5-24: (b) Population: Paragraph 2: We concur with the underlying assumption that, in Alaska, population growth is strongly associated with natural resource development projects. An updated evaluation of the projects which are expected to be developed should be provided in this section."

RESPONSE:

The following table outlines other major potential developments in or affecting the Railbelt region, and presents their associated employment projections. These projects constitute the base case exogenous employment assumptions for the Institute of Social and Economic Research's Man in the Arctic Program Economic Model which was revised in May 1983. This information was subsequently incorporated into the revised socioeconomic projections, which will be available in February 1984.

TABLE 1

SUMMARY OF BASE CASE EXOGENOUS EMPLOYMENT ASSUMPTIONS FOR MAP MODEL RAILBELT ECONOMIC STUDY

Assumptions	Description
Trans-Alaska Oil Pipeline	Operating employment remains constant at 1,500 through 2010.
North Slope Petroleum Development	Construction employment developing Prudhoe Bay and Kuparuk fields peaks at 2,400 in 1983 and 1986. Operating employment remains at 2,502 through 2010 for overall North Slope production.
Upper Cook Inlet Petroleum Production	Employment declines gradually beginning in 1983 so as to reach 50 percent of the 1982 level (778) by 2010.
Tertiary Recovery of North Slope Oil	Tertiary oil recovery project utilizing North Slope natural gas occurs in early 1990s with a peak annual employment of 2,000.

RESPONSE TO COMMENT I.500 (cont.):

Table 1 (cont.)

SUMMARY OF BASE CASE EXOGENOUS EMPLOYMENT ASSUMPTIONS
FOR MAP MODEL RAILBELT ECONOMIC STUDY

Assumptions	Description
OCS Exploration and Development	The current OCS five year leasing schedule calls for 16 OCS lease sales subsequent to October 1982, including the Beaufort, Norton and St. George sales, which have already taken place (Sales 71, 57 and 70). Development is assumed to occur only in the Navarin Basin (1.14 billion barrels of oil) and the Beaufort Sea (6.1 billion barrels of oil). All other sales are assumed to result in exploration employment only.
Anchorage Oil Headquarters	Several oil companies establish regional headquarters in Alaska in mid-1980s.
Beluga Chulitna Coal Production	Development of 4.4 million ton/year mine for export beginning in 1994 provides total employment of 524.
Hydroelectric Projects	Employment peaks at 725 in 1990 for construction of several state-funded hydroelectric projects around the state.
U.S. Borax Mine	The U.S. Borax mine near Ketchikan is brought into production with oper- ating employment of 790 by 1988.

RESPONSE TO COMMENT I.500 (cont.):

Table 1 (cont.)

SUMMARY OF BASE CASE EXOGENOUS EMPLOYMENT ASSUMPTIONS
FOR MAP MODEL RAILBELT ECONOMIC STUDY

Assumptions	Description
Greens Creek Mine	Production from the Greens Creek Mine on Admiralty Island results in employ- ment of 315 people from from 1986 through 1996.
Red Dog Mine	The Red Dog Mine in the Western Brooks Range reaches full production with operating employ- ment of 448 by 1988.
Other Mining Activity	Employment increases from a 1982 level of 5,267 at one percent annually.
Agriculture	Moderate state support results in expansion of agriculture to employment of 508 in 2000.
Forest and Lumber Products	Employment expands to over 3,200 by 1990 before beginning to decline gradually after 2000 to about 2,800 by 2010.
Pulp Mills	Employment declines at a rate of one percent per year after 1983.
Commercial Fishing-Nonbottomfish	Employment levels in fish- ing and fish processing remain constant at 6,323 and 7,123 respectively.

RESPONSE TO COMMENT I.500 (cont.):

Table 1 (cont.)

SUMMARY OF BASE CASE EXOGENOUS EMPLOYMENT ASSUMPTIONS FOR MAP MODEL RAILBELT ECONOMIC STUDY

Assumptions	Description
Commercial Fishing-Bottomfish	The total U.S. bottomfish catch expands at a constant rate to allowable catch in 2000, with Alaska resident harvesting employment rising to 733. Onshore processing capacity expands in the Aleutians and Kodiak census divisions to provide total resident employment of 971 by 2000.
Federal Military Employment	Employment remains constant at 23,323.
Federal Civilian Employment	Rises at 0.5 percent annual rate from 17,900 in 1982 to 20,583 by 2010.
Tourism Assumptions	Number of visitors to Alaska increases by 50,000 per year from 680,000 in 1982 to over 2 million by 2010.

COMMENT I.501:

"Page E-5-27: 3 - EVALUATION OF THE IMPACT OF THE PROJECT: The evaluation of project-related impacts ignores the State's most recent experiences with large development projects; population and related impacts are due to the number of people the project attracts, not the number of people, with dependents, the project employs. We would agree that establishing a number, or narrow range, for this potential impact would be difficult. However, to ignore this potentially overwhelming factor would render much, if not all, of the fine-tuning in the socioeconomic models irrelevant. Recent large hydropower projects in Canada may provide case examples, in addition to the Trans-Alaska Pipeline System and Terror Lake hydropower project.

COMMENT I.501 (cont.):

"We recommend that the impacts of the project be reassessed in light of an updated Base Case.

"We expect that a high percentage of those attracted to the region would become fish and wildlife resource users. This would result in increased demand for the resources at the same time and in the area of more direct project-related impacts to these resources. Activities such as trapping, fishing, hunting, berry-gathering, and disruptive uses of fish and wildlife habitats would be expected to increase, possibly resulting in greater regulation of consumptive fish and wildlife uses."

RESPONSE:

1. The effects of speculative inmigration on the economy were not specifically addressed in the FERC License Application. Because the Susitna Project could attract job seekers who are not successful in obtaining work on the Susitna Project, it is important to examine the potential for speculative inmigration and its potential to increase job displacement, unemployment, and services and facilities.

   For additional information on this topic, please refer to Response to Comment A.14.

2. As indicated in the Response to Comment I.498, the socioeconomic impact projections have been revised to reflect updated baseline conditions. These projections will be available in April 1984.

3. The Power Authority generally agrees with the assessment in paragraph 3 of this Comment. Options for reducing impacts to fish and wildlife user groups are discussed in the Response to Supplemental Information Request 5-26.

REFERENCES

Alaska Power Authority, Response to FERC Supplemental Information Request 5-26 (1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.502:

"Page E-5-79: (a) Natural Resource - Dependent Businesses: We recommend that guides registered for Game Management Unit (GMU) 13 be surveyed to determine their reliance on GMU 13. Since most of these guides are also registered for other (up to three) GMU's it is difficult to determine, without a survey, the present reliance of these guides on GMU 13 and thus the potential impact of the project on this group."

RESPONSE:

In conjunction with the FY 1985 Social Science Program Work Scope approved by the Power Authority Board of Directors, a survey of project area guides is anticipated. The survey should be useful in determining project impacts on guides utilizing GMU 13.

COMMENT I.503:

"Page E-5-80: (a) Natural Resource - Dependent Businesses: Based upon the present status of the fish and wildlife studies, we consider the most likely potential impacts of the project on these resources to be unknown.

"With respect to furbearers, the increased accessibility may not result in greater trapping success should habitat losses result in significant population decreases. Changes in quality of consumptive fish and wildlife uses from potential shifts and concentrations of hunting and fishing activity should also be discussed."

RESPONSE:

The Power Authority anticipates refining information about the project's potential impacts on fish and wildlife resource users. Recently completed household and business surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who hunt, fish and trap; where and how often they hunt, fish and trap; what species they hunt, fish and trap; and the importance of hunting, fishing and trapping for recreation, food, income and cultural pursuits. The business survey included questions on the percent of gross annual revenues attributable to hunting, fishing and trapping activities; what areas are important to those activities; and what species are hunted,

RESPONSE TO COMMENT I.503 (cont.):

fished and trapped as part of their business. The results of the surveys, which will indicate the importance of the project area to natural resources dependent businesses, are being tabulated, and a summary report will be available in March 1984.

COMMENT I.504:

"Page E-5-80: 3.7 - Local and Regional Impacts on Fish and Wildlife Groups: Please refer to the above comments and our remarks on Chapters 2 and 3."

RESPONSE:

Please refer to the Responses to Comments I.15 through I.149.

COMMENT I.505:

"Page E-5-96: (a) Methodology: We consider it premature to conclude that impacts downstream of Talkeetna would be 'limited' to the extent that they can be dismissed. The number of fish utilizing the reach downstream of Talkeetna is much higher than the number using the reach between Talkeetna and Devil Canyon. Thus, a smaller adverse impact, resulting in a loss to a small percentage of this fishery could mean a greater loss of fish. The examination also appears to consider spawning access to sloughs between Talkeetna and Devil Canyon to be the sole determinant of fish losses. Temperature changes, ice regime changes, chemical changes, impacts to tributary mouths, and access to sloughs for rearing, are changes which could also influence the future viability and productively of the Susitna River in regard to fishery resources. AEIDC's report for Alaska Power Authority (APA), scheduled for completion in October, 1983, should provide insight as to the interactions of some of these factors."

RESPONSE:

The Power Authority has conducted considerable study on the fishery resources downstream of Talkeetna. These studies are discussed in the Responses to Comments I.98, I.99 and B.8.

The discussion of access conditions to spawning areas within side sloughs is only part of the entire discussion of the

RESPONSE TO COMMENT I.505 (cont.):

potential effects to fishery resources in the Devil Canyon to Talkeetna reach of the Susitna River. The Power Authority does not agree that Exhibit E states or implies that the sole determinant of fish losses hinges on access to the sloughs. The Power Authority has clearly recognized, as discussed in the FERC License Application, that spawning, incubation and rearing habitats in the sloughs may be affected because of reduction in groundwater upwelling, changes in the ice processes, changes in the temperature regimes and changes in the frequency of overtopping of the upstream berms. As a result, many aspects of the mitigation plan presented in the License Application are designed to protect these habitats given the anticipated changes.

The referenced AEIDC report was prepared and distributed in final form on January 20, 1984 and does provide further elucidation of the interaction of some factors and the fishery resources.

REFERENCES

Arctic Environmental Information and Data Center (AEIDC), Susitna Hydroelectric Project Aquatic Impact Assessment: Effects of Project-Related Changes in Temperature, Turbidity and Stream Discharge on Upper Susitna Salmon Resources During June Through September (January 1984), previously submitted to the FERC on January 20, 1984.

COMMENT I.506:

"Page E-5-98: (1) Specific Impacts: The discussion again fails to recognize the potential impact to fisheries downstream of Talkeetna (reference our comments immediately above), the potential of the river above Devil Canyon to support salmon (future opportunities lost), the importance of commercial fishing in terms of secondary and induced job creation, and the value of the fishery lost over the life of the project (based upon the same economic assumptions as the rest of the project)."

RESPONSE:

Concerning potential impacts to fisheries downstream of Talkeetna, please refer to the Responses to Comments I.98, I.99, I.505 and B.8. See also the ADF&G 1982 Stock Separation Feasibility Report.

Even without the project, it is still questionable if the

RESPONSE TO COMMENT I.506 (cont.):

upper river could be used for salmon because (1) the passage facilities (i.e., fishways) required for natural production would not produce a favorable cost/benefit ratio, and (2) the success of artificially introducing outmigrants to upstream areas would need field verification of some of the report assumptions prior to development of a large-scale program. Accordingly, the Power Authority believes that future opportunities for enhancement of salmon above Devil Canyon are not favorable. If the ADF&G actively pursues any upriver enhancement options for salmon and demonstrates that these options are viable, the implications will be examined in relationship to project construction and operation mitigation plans.

The scenarios developed in FERC License Application Exhibit E, Chapter 5, concerning commercial fishing, assume a 100 percent loss in salmon populations for analysis. The Power Authority has described mitigation plans in FERC License Application Chapter 3 that are designed to avoid and minimize such losses so as to maintain the existing fisheries resources. Therefore, there is no expectation that there will be a loss of either commercial fishing, induced job creation, or fisheries resources.

REFERENCES

ADF&G, Su-Hydro Stock Separation Feasibility Report, Adult Anadromous Fisheries (1982).

COMMENT I.507:

"Page E-5-100: (c) Non-Commercial Use - The Sport Fishery: We recommend that this section provide an examination of impacts for the resident fisheries of the impoundment zones.

"In conjunction with identifying potential impacts to the sport fishery, impacts to the sports fisherman should be evaluated. Efforts to evaluate these impacts, as stated above, have been dropped (reference response W-5-020 in Chapter 11). We recommend that these studies be reinstated. The type of evaluation necessary should be discussed with the appropriate resource agencies."

RESPONSE TO COMMENT I.507:

Impacts to resident fisheries of the impoundment zone have been addressed in Section 2.3 in Chapter 3, Exhibit E of the FERC License Application. Mitigation plans to avoid or minimize these losses are described in Section 2.4 in Chapter 3.

The Power Authority anticipates refining the information about the project's potential impacts on users of fishery resources. The U.S. Forest Service has provided the Power Authority with estimates of sport fishing values in Alaska (Mehrkens, personal communication 1983). Recently completed household and business surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the License Application. The household survey included questions on the number of persons in each household who fish; where and how often they fish; what species they fish; and the importance of fishing for recreation, food, income and cultural pursuits. The business survey included questions on the percent of gross annual revenues attributable to fishing; what areas are important to those activities; and what species are fished as part of their business. The results of the surveys are being tabulated, and a summary report will be available in March 1984.

REFERENCES

U.S. Forest Service, Joe Mehrkens, Regional Economist, personal communication to Ellen Hall, Envirosphere (December 12, 1983).

COMMENT I.508:

"Page E-5-100: (d) Non-Commercial Use - Subsistence Fishing: The impact of the project on subsistence fishery use has not been evaluated. The importance of the Susitna River system to subsistence, potential losses of subsistence resources, and how mitigation proposals affect subsistence use should be addressed. The data currently provided is not applicable to the project.

"The discussion skirts the issues of economic, cultural, social and recreational values of the subsistence fishery. Those issues should be clarified by defining subsistence

COMMENT I.508 (cont.):

use, clearly distinguishing between sport and subsistence fishing. As we have previously stated (see Chapter 11, response W-10-038), additional references are available on this subject.5-1/"

"5-1/ Foster, Dan. November 1982. The Utilization of King Salmon and the Annual Round of Resource uses in Tyonek, Alaska. ADF&G, Division of Subsistence, Anchorage. 62 pp.

"Darbyshire and Associates. December 1982. Socioeconomic Impact Study of Resource Development in the Tyonek/Beluga Coal Area. Anchorage, Alaska."

RESPONSE:

The Power Authority anticipates refining information about the Project's potential impacts on fish and wildlife resource users. As discussed above, the Forest Service has provided the Power Authority with estimates of sport fishing values in Alaska (Mehrkens, personal communication 1983). Recently completed household surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who fish, species caught, the location and frequency of fishing and the importance of fishing for recreation, food and cultural pursuits. The questions on the importance of fishing for recreation, food and cultural pursuits were asked to differentiate between subsistence and sports fishing. The results of the surveys will be available in March 1984.

REFERENCES

U.S. Forest Service, Joe Mehrkens, Regional Economist, personal communication to Ellen Hall, Envirosphere (December 12, 1983).

COMMENT I.509:

"Page E-5-101: 3.7.2-Game: The nutritional, cultural, religious, and other socioeconomic factors which make the non-commercial taking of fish and wildlife essential to the livelihood and lifestyle of many Alaskan residents should be discussed and quantified here.

COMMENT I.509 (cont.):

"Quantification of impacts to game species (reference our comments on Chapter 3 of the Exhibit E) and of the subsistence use of those resources is inadequate. Analysis of economic impacts to hunters, subsistence users, and associated businesses should occur after quantification of wildlife impacts and formulation of mitigation proposals."

RESPONSE:

The Power Authority anticipates refining information about the Project's potential impacts on fish resource users. Recently completed household surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who hunt, fish and trap; what species they hunt, fish and trap; and the importance of hunting, fishing and trapping foar recreation, food, income and cultural pursuits. The results of the surveys are being tabulated, and a general report will be available in March 1984.

COMMENT I.510:

"Page E-5-102: (i) Guides and Guide Services: Please refer to our comments on page E-5-79."

RESPONSE:

Please refer to the Response to Comment I.502.

COMMENT I.511:

"Page E-5-103: (i) Guides and Guide Services: Last Paragraph on Page Through Page E-5-104: The availability and quality of guide services and current use of alternative hunting areas should be discussed. These factors, together with the remote nature of project and alternative hunting areas, will determine the magnitude of project impacts on area guiding and of secondary impacts on alternative areas. The suggestion that guides and their clients can move to other hunting areas is analogous to the suggestion that wildlife may move to adjacent areas when their habitats are altered or destroyed.

"Page E-5-104: (i) Guides and Guide Services: Paragraph 2 on page: The potential for blocking of caribou movements remains unknown. Chapter 3, Sections 4.3.1(b) and 4.3.3(b))

COMMENT I.511 (cont.):

described possible significant decreases in caribou subherd populations. Potential population losses will affect hunting quality and should be acknowledged here."

RESPONSE:

As part of an ongoing monitoring plan, a questionnaire will be mailed to each guide and followed up by telephone, if necessary, in order to achieve an adequate response rate. Data will be collected on services offered, the number and residency of clients, use areas, reliance on the project area, and the location and utilization of facilities such as cabins and airstrips. The questionnaire will be administered annually in order to monitor the potential impacts on guides as construction begins. The purpose of surveying guides is to refine the discussion on impacts to guides that was presented in the License Application. Results from the questionnaire will provide information sufficient to determine the significance, if any, of those impacts. Mitigation measures will be formulated to reduce any identified adverse impacts and these will be addressed in the updated mitigation plan.

While the hunt for caribou is presently limited by the number of permits issued, the presence of the access road may increase hunting pressure on a portion of the Susitna-Nenana subherd. The main effects resulting from hunting from the access road will be on the geographic distribution of the harvest. In the long term, the local success rate for hunting the Susitna-Nenana subherd may decrease as a result of reductions in subherd populations. The overall success rate for hunting the Nelchina herd, however, is not expected to decrease significantly as the number of hunters is controlled by permit. Please refer to Jakimchuk (1980) for a review of possible impacts of roads on caribou.

REFERENCES

Jakimchuk, R. D., Disturbance to Barrenground Caribou; A Review of the Effects and Implications of Human Developments and Activities (July 1980), previously submitted to the FERC on May 31, 1983.

COMMENT I.512:

"Page E-5-104: Last Paragraph through Page E-5-105: (i) Guides and Guide Services: The non-resident proportion of guided hunts should be evaluated. Additional information should be provided on the schedule and scope of suggested user interviews."

RESPONSE:

See Responses to Comments I.170, I.503, I.509, I.520 and I.521. See also Responses to Comments F.59, F.60 and F.61.

COMMENT I.513:

"Page E-5-107: (ii) Lodge Operators: Please refer to our comments on the previous section. The quality, availability, location, and present utilization of alternative hunting areas should be discussed here. Inundation and the presence of project features will result in decreased quality and restrictions in areas used by lodge clients even if the lodges themselves are not directly affected.

"The draft license application referred to ongoing studies and planned interviews which were to address project impacts on lodges (page E-5-75 of the draft). The applicant should provide information on the status of those studies particularly as they relate to evaluations of disturbance and use of wildlife."

RESPONSE:

The Power Authority anticipates refining information about the Project's potential impacts on wildlife resource users. Recently completed household and business surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who hunt and trap, where and how often they hunt and trap, what species they hunt and trap and the importance of hunting and trapping for recreation, food, income and cultural pursuits. The business survey included questions on the percent of gross annual revenues attributable to hunting and trapping activities, what areas are important to those activities and what species are hunted and trapped as part of their

RESPONSE TO COMMENT I.513 (cont.):

business. The results of the surveys are being tabulated and a general report will be available in March 1984.

COMMENT I.514:

"Page E-5-108: The Hunter: The fact that harvest statistics, other than for caribou, do not distinguish between subsistence and recreational taking of game is no reason to omit a discussion or quantified study into the subsistence use of such resources. The number of people dependent on subsistence uses of fish and wildlife resources should be estimated. Alternative use areas are generally not an option for people who have homesteaded in remote or semi-remote areas.

"Page E-5-109: The Hunter: Last Paragraph: An explanation should be given for the large increase in subsistence caribou permits alloted in 1982. Present and future management plans and options should be discussed."

RESPONSE:

Recently completed household surveys of Talkeetna, Trapper Creek, and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who hunt and fish, where and how often they hunt and fish, what species they hunt and fish, and the importance of hunting and fishing for recreation, food, and cultural pursuits.

The number of subsistence caribou permits has been fluctuating over the past several years. The number of permits increased in GMU 13 in 1982 based on several factors, including slight increases or stabilization in the population of the Nelchina herd, increased demand for subsistence permits by local residents and changes in the criteria for obtaining a subsistence permit.

The most current management plan for the Nelchina herd (ADF&G 1976) calls for maintenance of the herd at about

RESPONSE TO COMMENT I.514 (cont.):

20,000 adult animals through harvest of the annual increment.

REFERENCES

Alaska Department of Fish and Game (ADF&G), Alaska Wildlife Management Plans, South-central Alaska (1976), previously submitted to the FERC on October 31, 1983.

COMMENT I.515:

"Page E-5-109: (ii) Resources and Use Patterns: The discussion provides some quantification for the importance of GMU 13 relative to state-wide game harvests. Quantification of the economic importance of consumptive wildlife uses should include consideration of travel costs, lost work time, support equipment, food, lodging, etc. Limitations to the data available on this subject are described, but no plans for overcoming these limitations are provided."

RESPONSE:

It is anticipated that the project-related impacts to big game harvests in GMU 13 would be insignificant relative to statewide game harvests as the harvest in GMU 13 represents only a relatively small proportion of statewide harvest and project-related decreases in GMU 13 harvest are not expected to be large. The analysis of impacts on big game species and their consumptive users will be refined through ongoing studies. If, based on these studies, the impacts to the harvests are determined to be significant, then quantification of the economic importance of consumptive wildlife users will be completed.

COMMENT I.516:

"Pages E-5-112 and 113: Supply and Demand for Hunting Opportunity: Given fluctuating harvests, demands and populations in recent years, a clearer picture of caribou hunting pressure would be obtained with the addition of 1981 and 1982 data.

"Potential impacts to the caribou herd and related harvest opportunities should be evaluated inlight of existing information available from the Alaska Department of Fish and Game (ADF&G). Tjos omc;ides [sic] present and future

COMMENT I.516 (cont.):

management plans, projected demand forecasts, likely behavioral responses of caribou to the reservoirs, access routing and control, alternative reservoir filling and operation schemes, construction and public use of the access routes, and the tradeoffs of difference mitigative proposals which conflict among user groups."

RESPONSE:

Caribou populations and the impacts of the Project on caribou are discussed in Chapter 3 of FERC License Application Exhibit E. Additional information is contained in the 1982 ADF&G annual report which was supplied to the FERC in May 1983. The annual reports for 1983 will be provided in May 1984. New information on impacts to the caribou herd and related harvest opportunities will be evaluated as it is available and utilized in preparation of the new Impact Assessment Update and Refinement Report, which is expected in late April.

REFERENCES

ADF&G, Susitna Hydroelectric Project, Phase I Final Report - Big Game Studies (1982), previously submitted to the FERC on May 31, 1983.

Pitcher, K. W., Volume IV, Caribou (1982).

COMMENT I.517:

"Page E-5-115: Transportation To and From Hunting Grounds: Figures showing both present access points and proposed project access should be correlated to current harvest intensities."

RESPONSE:

Please refer to the Response to Comment I.519.

COMMENT I.518:

"Page E-5-115: Hunting Pressure: The discussion should explain why hunting pressure in GMU 13 has generally decreased in the last decade while the Railbelt region population has increased nearly 50%. The influence of changing

COMMENT I.518 (cont.):

regulations, lifestyles of area residents, or quality of the hunt on hunting pressure should be examined. Better understanding of the moose harvest issue would come from inclusion of comparable demand, harvest, and population data for GMU's 14 and 16, as well as GMU 13."

RESPONSE:

As discussed on FERC License Application page E-5-116 and shown in FERC License Application Table E.5.51, changes in regulations controlling moose harvest in GMU 13 have had a marked effect on numbers of moose taken, but has had relatively little effect on the total number of hunters utilizing the area. The 1971 hunting season was the last year of either sex harvest in the area and 4881 hunters took advantage of this opportunity to harvest 1,814 moose. Since then, the number of hunters has ranged from 2,299 to 3,199 per year with harvests ranging from 557 to 863 moose per year. FERC License Application page E-5-117 contains a further discussion of the importance of regulations to both the harvest and the number of hunters in an area. Further discussion on regulation of moose harvest in GMU 13 and project-related effects is contained in the Response to Supplemental Information Request 5-23. See also Response to Comment F.8.

REFERENCES

Alaska Power Authority, Response to FERC Supplemental Information Request 5-23 (1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.519:

"Page E-5-117: Importance of Regulations: Access routes, restrictions on access, and construction schedules will greatly influence opportunities to hunt in the project area. Impacts should be evaluated under at least two scenarios: (1) severely restricted public access and hunting permits, and (2) unrestricted access and permits. Such evaluation should be coordinated with ongoing big game studies and discussed in Chapter 3. Given resource agencies recommendations to omit any project access from the Denali Highway, and the importance of those recommendations as a wildlife mitigation measure, we recommend the impacts on hunter access and harvest distribution both with and without that

COMMENT I.519 (cont.):

road corridor be evaluated. Additional consideration should be given to impacts both with and without restrictions on worker access and hunting. Again, regulation of such use can be a significant mitigation measure.

"Other game species (black bear, brown bear, Dall sheep, wolf, and wolverine) should be discussed. Harvest and (if applicable) permit information should be provided, with projected demand and access discussed. For example, bear harvest data and statistical analysis is contained in ADF&G annual reports.5-2/ Harvest data on other species is similarly available.5-3/ Annual hunter surveys for all big game include questions on harvest locations. While the data are not exact, they do indicate approximate take locations relative to existing access, proposed access, and project features. Such information should be evaluated and descriptive maps provided for this section of the license application.

"Future study plans for filing data gaps on these species and incorporating those data into project planning should be discussed."

"5-2/ ADF&G. 1982. Susitna Hydroelectric Project Phase I Final Report, Big Game Studies, Volume VI, Black Bear and Brown Bear. Prepared for APA.

"ADF&G. 1983. Susitna Hydroelectric Project Phase II Progress Report, Big Game Studies, Volume VI, Black Bear and Brown Bear. Prepared for the APA.

"5-3/ ADF&G. 1982. Susitna Hydroelectric Project Phase I Final Report, Big Game Studies, Vol. V, Wolf; Vol. VII, Wolverine, and Vol. VIII, Dall Sheep. Prepared for the APA."

RESPONSE:

Discussion of access-related impacts to hunters is provided in the Response to Supplemental Information Request 5-23. The Response to Supplemental Information Request 5-22 should be referred to for an analysis of the resource and human use

RESPONSE TO COMMENT I.519 (cont.):

patterns for species other than moose and caribou. Please refer to the Response to Comment F.8.

REFERENCES

Alaska Power Authority, Response to FERC Supplemental Information Request 5-22 (1983), previously submitted to the FERC on September 1, 1983.

Alaska Power Authority, Response to FERC Supplemental Information Request 5-23 (1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.520:

"Page E-5-120: (a) Data Limitations: Studies necessary to fill data gaps should be pursued by the applicant. Need for a survey of trapping pressure and estimates of socioeconomic impacts from increased trapping due to the project were two of the study recommendations from the Susitna Modeling Workshop held February 28 - March 4, 1983. That workshop involved agency representatives, principal investigators, consultants, and the project sponsor."

RESPONSE:

The Power Authority anticipates refining information about the Project's potential impacts on wildlife resource users. Recently completed household and business surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who trap, where and how often they trap, what species they trap and the importance of trapping for recreation, food, income and cultural pursuits. The business survey included questions on the percent of gross annual revenues attributable to trapping activities, what areas are important to those activities and what species are trapped as part of their business. The results of the surveys are being tabulated, and a general report will be available in March 1984.

COMMENT I.521:

"Page E-5-120 and 121: (b) Impacts of the Project: The issue of future opportunities lost or gained as a result of the project should be examined in determining project impacts. Consideration should also be given to the number of additional trappers the area could support under alternative access and management scenarios."

RESPONSE:

The significance of the potential effects of the Project on trapping activities will be further refined through an analysis of information obtained from surveys of fish and wildlife resource users.

Recently completed household and business surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who trap; where and how often they trap; what species they trap; and the importance of trapping for recreation, food, income and cultural pursuits. The business survey included questions on the percent of gross annual revenues attributable to trapping activities; what areas are important to those activities; and what species are trapped as part of their business. The results of the surveys are being tabulated, and a general report will be available in March 1984.

COMMENT I.522:

"Page E-5-122 and 123: (ii) Impacts of the Project: The extent to which negative impacts will be 'partially offset' should be described.

"For mitigation planning, coordination between project study components should include an assessment of the number, sizes, and potential habitat values of sloughs which are to be managed for salmon mitigation as compared to the number, size, and habitat values of those which are now and will remain available as beaver habitat. Tradeoffs in mitigation for one species over another should be clarified in terms of overall objectives for project mitigation. The potential for overharvest and need for regulation as a result of increased project access should be considered here."

RESPONSE TO COMMENT I.522:

Tradeoff analysis between terrestrial and aquatic species, in terms of the mitigation planning process, will proceed as decisions are made as to the relative importance of the habitat to each species and as the interference of one species on another is described and the values of specific habitats to the respective species are determined. The completion of this analysis will be dependent upon acceptance by the resource agencies of a prioritization of the species in question. For example, at a given slough, will the mitigation options implemented be ones which favor salmon or beaver? Once these decisions are made, appropriate mitigation options can be implemented.

By its nature, this process of prioritization and tradeoff analysis is best accomplished as a part of the Project Settlement Process. Meetings describing the Power Authority's plans for accomplishing this Settlement Process were held with the agencies listed below and the finalization of a comprehensive Issues List is currently underway.

Agency	Date of Meeting
Alaska Department of Natural Resources	November 2, 1983
Alaska Department of Environmental Conservation	November 15, 1983
U.S. Bureau of Land Management	November 17, 1983
National Marine Fisheries Service	November 18, 1983
National Park Service	November 18, 1983
U.S. Fish and Wildlife Service	November 22, 1983
Alaska Department of Labor	November 28, 1983
Alaska Department of Community and Regional Affairs	December 1, 1983
Alaska Department of Fish and Game	December 15, 1983
U.S. Environmental Protection Agency	February 17, 1984

COMMENT I.523:

"Page E-5-124: (f) Fox: Please provide comparative information on the commercial value of the fox pelts as was provided for other furbearers."

RESPONSE TO COMMENT I.523:

The value of fox pelts purchased from trappers in the project area ranges from $10-$90 and averages $50-$60.

COMMENT I.524:

"Page E-5-125: 4.2 Background and Approach: The last sentence in the first paragraph should be clarified, elaborated on, or eliminated.

"We are concerned that no outline or schedule is provided for the development of fish and wildlife use information referred to in the last paragraph here. Under current reduced project funding, we are unaware of additional studies or information which will be provided during the proposed licensing schedule."

RESPONSE:

The last sentence in the first paragraph of Section 4.2 "Background and Approach" on FERC License Application page E-5-125 should be eliminated.

The Power Authority anticipates refining information about the Project's potential impacts on fish and wildlife resource users. Recently completed household and business surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey included questions on the number of persons in each household who hunt, fish and trap; where and how often they hunt, fish and trap; what species they hunt, fish and trap; and the importance of hunting, fishing and trapping for recreation, food, income and cultural pursuits. The business survey included questions on the percent of gross annual revenues attributable to hunting, fishing and trapping activities; what areas are important to those activities; and what species are hunted, fished and trapped as part of their business. The results of the surveys are being tabulated, and a general report will be available in March 1984. The household and business surveys will be conducted on an annual basis.

COMMENT I.525:

"Page E-5-128: 4.4.1 - Mitigation Measures That Would Help Avoid Significant Adverse Project-Induced Impacts: The proposals lack specificity and adequate oversight. The mitigation plan should contain specific mitigation proposals in response to specific identified adverse impacts. We concur that close monitoring of the effectiveness of the mitigation plan would be necessary. However, no details on the recommended monitoring are provided, e.g., responsibility, participation, schedule, criteria for determining 'significant adverse impacts' and then modifying mitigation measure, etc. Furthermore, supplemental information provided in response to FERC's questions deletes parts of the mitigation proposed in the license application without offering any alternatives (Vol. IIA of III, Supplemental Information from page 5-30-1). The Supplemental Information was not distributed with the license application nor made generally available.

"We recommend the establishment of a monitoring panel, at project expense, consisting of representatives of appropriate local, State, and Federal agencies to carry out the functon of assessing the extent of actual impacts and recommending modifications to the mitigation program. Modification of the mitigation plan included in the license would be through license amendment."

RESPONSE:

An update of the socioeconomic mitigation plan is currently underway and will be completed by mid-1984. This plan will be based on revised socioeconomic projections (as discussed in the Response to Comment I.498), and will include three scenarios depicting different commuting options. The plan will be directed toward avoiding or minimizing project impacts on two groups: residents in the project vicinity, with emphasis placed on the Mat-Su Borough and the communities of Talkeetna, Trapper Creek and Cantwell; and on construction and operation workers residing at the construction camp and permanent village.

For a description of the methods used to monitor and update socioeconomic impact assessments, please refer to the Response to Comment 34 (Chapter 5) in the FERC's April 12,

RESPONSE TO COMMENT I.525 (cont.):

1983 Request for Supplemental Information (filed with the FERC on July 11, 1983). Refer also to Response I.119B.

REFERENCES

Alaska Power Authority, Response to FERC Supplemental Information Request, Comment 34 (April 12, 1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.526:

"Page E-5-132: 4.4.2 - Mitigation of Significant Adverse Impacts that Remain in Communities: Clarification is needed on whether costs of technical and financial assistance referred to here have been estimated and included in overall project costs. The potential magnitude of those costs should be described."

RESPONSE:

The costs of mitigation programs, including socioeconomic mitigation measures, have been estimated and are included in overall project costs. The overall cost of mitigation is approximately $32 million for the Watana dam and approximately $5 million for the Devil Canyon dam. The costs associated with socioeconomic mitigation measures have not been estimated separately.

COMMENT I.527:

"Page E-5-133: 4.5.1 - Developing Impact Information: Please refer to our comments on page E-5-125. No details are provided on proposed or ongoing of impact assessments. It is our understanding that no community surveys are funded for State fiscal year 1983, contrary to the Supplemental Information, Vol. IIA of III, pages 5-29-3 and 5-34-3.

"Page E-5-134: 4.5.1 - Developing Impact Information: Paragraph 3: An outline and schedule of studies necessary to obtain more detailed fish and wildlife use data should be included here. Need for this information was agreed upon by project investigators, the APA, and resource agency representatives during the February 28 - March 4 1983,

COMMENT I.527 (cont.):

mitigation planning workshop, as well as earlier workshops on resources modeling and project licensing."

RESPONSE:

Recently completed household and business surveys of Talkeetna, Trapper Creek and Cantwell residents will help supplement the information presented in the FERC License Application. The household survey was designed to obtain information on demographic characteristics, employment, length of residence, characteristics of the housing stock, satisfaction with public services and facilities and hunting, fishing and trapping activities. The business survey included questions on the types of products and/or services provided, the volume of revenues, number of employees, business expansion plans and revenues associated with hunting, fishing and trapping. The results of the survey are being tabulated, and a general report will be available in March 1984.

COMMENT I.528:

"Page E-5-135: 4.5.3 - Refining and Implementing Mitigation Measures: Plese refer to our comments under Section 4.4.1 on the need to establish a monitoring panel and describe responsibilities and criteria for adjusting mitigation measures."

RESPONSE:

Please refer to Responses to Comments I.119B and I.147.

COMMENT I.529:

"It appears that regional-statewide impacts or effects of the project are understated since as the State's oil revenue decreases, a high percentage of available capital and/or financing may be concentrated on the project, at the expense of other projects or programs. Other regional energy development may be adversely affected, as an example."

RESPONSE:

See Response to Comment A.13.

COMMENT I.530:

"The effects of in-migration on the economy are understated. Migration may include individuals travelling to speculate on employment, especially if employment or economic conditions in other parts of the State or Nation are unfavorable. A large in-migration affects the demand for road maintenance and public works expenditures, for example."

RESPONSE:

See Response to Comment A.14.

COMMENT I.531:

"The cost of bringing the existing Alaska Railroad up to the operating level and line capacity which would be required for project use is not discussed. There is additional uncertainty surrounding railroad operation costs or charges due to the uncertain status of rail ownership."

RESPONSE:

See Response to Comment A.15.

COMMENT I.532:

"Access will be opened to private lands when the State purchases the rights to build the necessary roads. The cost of access could perhaps be mitigated by landowner participation, being a potential recipient of economic benefit of the roads themselves. The cost of access road construction may not be 100% related or attributable to the hydro project alone."

RESPONSE:

See Response to Comment A.16.

COMMENT I.533:

"Access development, if exaggerated, will cause development of the region in general, not only development of a power-site. The effects of increased use and development, cannot be underestimated in effect upon the existing resident human population and local living conditions."

RESPONSE TO COMMENT I.533:

See Response to Comment A.17.

COMMENT I.534:

"There is no mention of the impact of the impoundment on Federal mining claims located, for example, along Jay Creek."

RESPONSE:

See Response to Comment A.5.

COMMENT I.535:

"Section 2.1 - Regional geology, seismic geology, and geologic conditions appear to be well written, accurate, and concise."

RESPONSE:

No response necessary.

COMMENT I.536:

"Sections 2,5,8 and 3.7 - Borrow pits and quarry sites - planning for eventual inundation of borrow pits, or their rehabilitation is sufficient unless the impoundment area is altered due to a change in project design. It is unclear where the borrow sites or material sources for the entire Denali access roadway are located."

RESPONSE:

The exact locations of borrow areas for construction of the Denali access highway have not yet been determined. General availability of free-draining materials potentially suitable for borrow along the Denali access corridor can be identified by examination of terrain unit maps and engineering soils data. The Alaska Power Authority considers the task of identifying borrow and stockpile areas as one requiring engineering and environmental input. Therefore, the Power

RESPONSE TO COMMENT I.536 (cont.):

Authority is committed to incorporating environmental considerations into the design of its facilities in order to help prevent and mitigate impacts.

COMMENT I.537:

"Sites 3.1.3 and 3.1.4 infer that access roads will be open to public use. Such decision, when made by the responsible land managers, should detail policy governing use and also the extent of facilities necessary to control or enhance public use and public safety. Public Access is not a foregone conclusion."

RESPONSE:

See Response to Comment A.6.

COMMENT I.538:

"The Denali Highway is a scenic attraction to the touring public. Therefore, all facilities and developments required by the project in relation with the Denali access corridor should be planned for minimum visual impact. This is to include temporary power lines, borrow pits, and staging locations as well as the roadway and its eventual operation and maintenance."

RESPONSE:

See Response to Comment A.7.

COMMENT I.539:

"The transmission line rights-of-way may eventually be used as access corridors for ORV or other unplanned uses."

RESPONSE:

See Response to Comment A.18.

COMMENT I.540:

"CHAPTER 10. ALTERNATIVE LOCATIONS, DESIGNS, AND ENERGY SOURCES

"This chapter should assess the effect of time delays in project construction. Listing various types of alternative energy sources does not allow an evaluation of what would, or should, occur in the event the Susitna hydroelectric project is delayed for a period of years, or is never built. We recommend that this type of planning effort be carried out to examine the effects of short-term and long-term delays."

RESPONSE:

An analysis of the delay of the Watana Project was not presented in the FERC License Application (see Responses to Comments B.3, C.30 and C.33). However, thermal and mixed thermal/hydro alternatives, which could be implemented if Susitna is not built, are analyzed.

If the implementation of the Susitna Project is delayed or postponed, energy that could be displaced by Susitna would have to be supplied by thermal generation. If the delays are short term, the installation of new alternative generation is expected to be at a minimum. At present, Railbelt utility planning anticipates the completion of the Anchorage-Fairbanks Intertie and the installation of Power Authority hydroelectric developments (i.e., Bradley Lake and Susitna). Short-term delays of the Susitna Project (Watana Dam) could be accommodated by power and energy exchanges over the Intertie, extending the useful life of existing generation, and reducing reserve margins.

If long-term delays are experienced or if the Susitna Project is never built, it is postulated that the Railbelt generation system would develop similar to the non-Susitna alternative or a mixture of gas- and coal-field generation.

The assumptions and variables used in the other planning models (MAP and RED) would not be affected by a delay of Watana because the effects of the construction of Susitna or the thermal alternative were not included in the analysis by these models.

COMMENT I.541:

"CHAPTER 10. ALTERNATIVE LOCATIONS, DESIGNS, AND ENERGY SOURCES

"In the assessments provided on hydropower alternatives, the proposed Susitna project and alternative basin developments are not evaluated on an equitable basis. There are explanations and tables (e.g. Tables E.10.6 and E.10.7) which compare alternative hydropower sites relative to the types and significance of environmental, cultural, recreational, and land use constraints, as well as power supply potentials. Yet, since the strengths and weaknesses of Susitna River proposals are not similarly included here, it is not possible to directly compare the Susitna project with other power alternatives. This is particularly unfortunate since the detailed evaluation of Susitna (e.g. Chapter 3) would leave one with the initial impression that it would have significant adverse impacts to many of the environmental criteria, including: (1) big game, (2) anadromous fish, (3) de facto wilderness, (4) cultural (subsistence), (5) recreation (existing), (6) restricted land use, and (7) access. Moreover, combinations of hydropower alternatives or hydropower with other power sources which would provide equivalent power are not contrasted directly with the Susitna project."

RESPONSE:

It is not reasonable to directly compare the 1620 MW Susitna Hydroelectric Project as described in the FERC License Application with the alternative hydropower sites as shown in FERC License Application Tables E.10.6 and E.10.7. As shown in FERC License Application Table E.10.7, the alternative sites have installed capacities ranging from less than 25 MW to "greater than 100" MW. The size of the reservoirs range from less than 5,000 acres to greater than 100,000 acres. In comparison, the combined Watana-Devil Canyon developments will have an installed capacity of 1,620 MW and a combined reservoir area of 45,500 acres. To be truly comparable, the net probable impact of a combination of alternatives with a total capacity comparable to Susitna would have to be compared to the net impacts after mitigation of the Susitna Project.

Nevertheless, in accordance with the wishes expressed in the Department of Interior letter, information is provided below in Table I.541.A so as to permit incorporation of the Susitna Project into FERC License Application Tables E.10.6

RESPONSE TO COMMENT I.541 (cont.):

and E.10.7. Information regarding the cumulative environmental impacts of thermal generation, as compared to Susitna, is presented in the Response to Comment I.569.

RESPONSE TO COMMENT I.541 (cont.):

Table I.541.A

SUSITNA PROJECT COMPARED TO NON-SUSITNA HYDROELECTRIC ALTERNATIVES[1]

Environmental Component	Sensitivity Scaling	Comments
Big Game	B	Moose, Caribou, Dall Sheep and Black and Brown Bear present. Winter concentration area for Moose.
Agricultural Potential	D	None identified.
Waterfowl, Raptors, Endangered Species	B	Active and inactive nests to be affected: Golden Eagle - 8; Bald Eagle - 6; Goshawk - 2; Gyrfalcon - 1; Common Raven - 17.
Anadromous Fisheries	B	None within reservoir area; five species present and spawning in sloughs, side channels and tributaries downstream.
Wilderness Consideration	B	Area presently relatively inaccessible. Good to high quality scenery. Natural features (only one of which is affected by the Project).
Cultural, Recreational and Scientific Features	C	Class VI boating waters; archaeological sites found following extensive surveying.
Restricted Land Use	D	State and Native claims.
Access	B	Presently accessible only from air.

RESPONSE TO COMMENT I.541 (cont.):

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1 Non-Susitna alternatives as described in FERC License Application Tables E.10.6 and E.10.7.

The results of expansion planning studies with thermal generation, non-Susitna hydropower and Susitna Basin hydropower which provide equivalent system power comparisons are contained in the FERC License Application as filed February 15, 1983.

Side-by-side comparison of generation system mix and total system present worth of costs of alternative plans is presented in Table I.541.B and was prepared from the following tabulations.

1. Non-Susitna Alternatives - FERC License Application Exhibit D, Table D.17 - Results of Economic Analyses of Alternative Generation Scenarios

2. Susitna Alternatives - FERC License Application Exhibit B, Table B.11 - Results of Economic Analyses of Susitna Plans

The information presented below in Table I.541.B includes the specified on-line dates for the various stages of the plans, the OGP5 run index number, the total installed capacity at the year 2010 by category, and the total system present-worth cost in 1980. The present-worth cost was evaluated for the period 1980 to 2040, i.e., 60 years. The OGP5 model was run for the period 1980-2010; thereafter steady-state conditions were assumed and the generation mix and annual costs of 2010 were applied to the years 2011 to 2040. This extended period of time was necessary to ensure that the hydroelectric options being studied, many of which only come on-line around 2000, were operated for periods approaching their economic lives and that their full impact on the cost of the generation system were taken into account.

The basic data used in the studies and a reference to their location in the FERC License Application follows:

1. Load forecast over a specified period of time (Exhibit B, Table B.71).

2. Details of the existing generating system (Exhibit D, Table D.14).

RESPONSE TO COMMENT I.541 (cont.):

Table I.541.B

RESULTS OF ECONOMIC ANALYSES OF ALTERNATIVE GENERATION SCENARIOS[a]
(ISER December 1980 Medium Load Forecast)

Generation Scenario		Cumulative Avg. Annual Hydroelectric Energy Production[b]	OGP5 Run	Installed Capacity by Category in 2010					Total System Installed Capacity	Total System Cost in
				Thermal			Hydroelectric			
Type	Description	(GWh)	Id. No.	Coal (MW)	Gas (MW)	Oil (MW)	Existing (MW)	Added (MW)	in 2010 (MW)	1980 ($ million)
All Thermal	No Renewals		LME1	900	801	50	144	-	1895	8130
Thermal Plus Non-Susitna Hydroelectric Alternatives	No Renewals Plus: Chakachamna (500)[c]-1993	1925	L7W1	600	576	70	144	600	1990	7080
	Keetna (100)-1997	2320								
	No Renewals Plus:		LF17	700	501	10	144	650	2005	7040
	Chakachamna (500)-1993	1925								
	Keetna (100)-1997	2320								
	Snow (50)-2002	2540								
	No Renewals Plus:		LWP7	500	576	60	144	678	1958	7064
	Chakachamna (500)-1993	1925								
	Keetna (100)-1996	2320								
	Strandline (20), Allison Creek (8), Snow (50)-1998	2658								
	No Renewals Plus:		LXF1	700	426	30	144	678	1978	7041
	Chakachamna (500)-1993	1925								
	Keetna (100)-1996	2320								
	Strandline (20), Allison Creek (8), Snow (50)-2002	2658								

RESPONSE TO COMMENT I.541 (cont.):

Table I.541.B (cont.)

Generation Scenario Type	Generation Scenario Description	Cumulative Avg. Annual Hydroelectric Energy Production[b] (GWh)	OGP5 Run Id. No.	Installed Capacity by Category in 2010 Thermal Coal (MW)	Thermal Gas (MW)	Thermal Oil (MW)	Hydroelectric Existing (MW)	Hydroelectric Added (MW)	Total System Installed Capacity in 2010 (MW)	Total System Cost in 1980 ($ million)
	No Renewals Plus:		L403	500	576	30	144	778	2028	7088
	Chakachamna (500)-1933	1925								
	Keetna (100)-1996	2320								
	Snow (50), Cache (50), Talkeetna-2 (50), Strandline (20)-2002	3060								
Thermal Plus Susitna Basin Hydroelectric	No Renewals Plus:		L8J9	300	426	0	144	1200	2070	5850
	Watana (400)-1993	2990								
	Watana (400)-1996	3250								
	Devil Canyon (400)-2000	6070								
	No Renewals Plus:		L607	200	651	30	144	1180	2205	6530
	Watana (800)-1993	3250								
	Watana (50) and Tunnel (330)-1996	5430								
	No Renewals Plus:		L601	300	651	20	144	1200	2315	6370
	High Devil Canyon (400)-1993	2760								
	High Devil Canyon (400)-1996	3400								
	Vee (400)-2000	4910								

(a) Prepared from data shown in Exhibit D, Table D.17 and Exhibit B, Table B.11.

(b) Based on data shown in Exhibit E, Table E.10.13 (also Exhibit D, Table D.16) for Non-Susitna Hydroelectric Alternatives and Exhibit B, Tables B.9 and B.10 for Susitna Basin Hydroelectric Alternatives.

(c) [Footnote (c) is missing.]

RESPONSE TO COMMENT I.541 (cont.):

3. A list of future thermal generating sources with associated annualized costs, installed capacities, fuel consumption rates, etc. (FERC License Application Exhibit B, Table B.14). Natural gas-fired generation was modeled in OGP5 assuming a natural gas consumption constraint identified as No Renewals. Under the No Renewals constraint all new gas-fired generation would be restricted to not more than 1500 hours of annual operation at design capacity and retired gas-fired generation would not be reconstructed.

4. Annual fixed carrying charges and fuel prices and escalation rates (FERC License Application Exhibit B, Table B.13).

5. A specified hydroelectric development plan, i.e., the annualized costs, on-line dates, installed capacities, and energy production capability of the various stages of the plan.

   5a. Non-Susitna Hydroelectric Alternatives Development Plans (FERC License Application Exhibit E, Table E.10.12).

   Costs (FERC License Application Exhibit E, Table E.10.13, also Exhibit D, Table D.16).

   5b. Susitna Basin Hydroelectric Alternatives Development Plans (FERC License Application Exhibit B, Tables B.9 and B.10).

   Costs (FERC License Application Exhibit B, Tables B.9 and B.10).

   The following tables, contained in Volume IV-Candidate Electric Energy Technologies for Future Application in the Railbelt Region of Alaska of the Railbelt Alternatives Study, summarize and compare technologies on selected technical, economic and environmental characteristics.

RESPONSE TO COMMENT I.541 (cont.):

Volume IV is one of seventeen volumes that document the Railbelt Alternatives Study. The study was submitted to the FERC on July 11, 1983, in the following report:

Battelle Pacific Northwest Laboratories, Railbelt Electric Power Alternatives Study: Evaluation of Railbelt Electric Energy Plans (1982), prepared for the Office of the Governor, State of Alaska.

On the basis of the information presented here and in Response to Comment I.569, the Power Authority anticipates

RESPONSE TO COMMENT I.541 (cont.):

that the DEIS will reasonably evaluate the alternatives to the Susitna Project.

REFERENCES

Battelle Pacific Northwest Laboratories, Railbelt Electric Power Alternatives Study, Volume 1-17, Prepared for the Office of the Governor, State of Alaska (1982), previously submitted to the FERC on July 11, 1983.

Volume I, Evaluation of Railbelt Electric Energy Plans (1982).

COMMENT I.542:

"CHAPTER 10. ALTERNATIVE LOCATIONS, DESIGNS, AND ENERGY SOURCES

"Previously, we recommended that further details on alternative power sources be provided. We reiterate that recommendation here while agreeing that, in some cases, information may be lacking. Where assessments of environmental, cultural, social, land use, and other constraints can be compared among non-hydropower alternatives, as well as with the Susitna project and other hydropower alternatives, a more systematic and complete evaluation of alternatives will result. We have noted the applicant's disagreement with our recommendations to include fish, wildlife, social, and land use assessments in comparisons among non-hydropower and hydropower alternatives (e.g. comments W-10-024, W-10-027, W-10-029, W-10-031, W-10-032, W-10-034 and responses to those comments included in Chapter 11, Exhibit E). It is our view that without such information, the license application does not provide an adequate basis for preparation of an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA).

"Such information would complement the environmental comparison of Susitna River hydropower alternatives, Tables E.10.16 and E.10.19, as well as the overall summary evaluation of those alternatives (Table E.10.20)."

RESPONSE TO COMMENT I.542:

The Department of the Interior and other agencies have commented to the FERC regarding possible flow regimes, project operation alternatives and their impacts (see Comments B.2, B.3, B.4, B.5, B.7, B.64, B.65, C.87, F.2, F.3, F.10, F.11, F.25, F.39, I.5, I.24, I.25, I.29, I.131, I.133, I.149, I.198, I.201, I.236, I.558, I.560 and I.562, and the associated Power Authority Responses; see also FERC License Application (pages E-2-104, E-2-55 to E-2-62 (Case C target minimum flows)).

As indicated in the Responses to Comments B.65, F.11 and F.25, "The Power Authority anticipates that the DEIS and FEIS will analyze a full reasonable range of alternative operating scenarios." These alternative operating scenarios and their associated flow regimes could include base-load operation, an alternative already identified and analyzed in the FERC License Application, and also a range of load-following scenarios with hourly flow variations. The Power Authority has developed additional data and methods which FERC may utilize in its analysis of load-following alternatives, to the extent FERC deems any load-following operational scenario to be a reasonable alternative. The Power Authority has identified a load-following case and has analyzed the resulting stage fluctuations in the Susitna River downstream from the Project. A report documenting this analysis, illustrating appropriate methods of analyzing such alternatives, is referenced below and appended as a reference to this Response Document. This load-following hypothetical case may be characterized as "extreme," but remains within the flow constraint of the Case C scenario. This analysis was made to determine if, downstream of the Project, significant attenuation of the fluctuating water levels resulting from load-following operation would occur. The Power Authority does not currently believe that the flow release patterns in this report would be judged by many agencies to be an environmentally reasonable alternative. Neither is it necessarily thought that these patterns represent the optimum economic use of the resource. It may be of value in that it represents an environmentally extreme case; however, the FERC may not deem this case a "reasonable" alternative for its analysis. A second report which will document stage fluctuations for a more moderate case of discharge variations is anticipated in late March 1984.

We anticipate that the FERC will identify reasonable alternatives and analyze the environmental impacts of such

RESPONSE TO COMMENT I.542 (cont.):

modes of operation in preparing DEIS and FEIS. To the extent such alternatives are load-following, such an environmental analysis would include consideration of aquatic habitat effects of the mximum and seasonal mean changes in discharge occurring on a daily basis as well as the rates of change. Both rate of change and absolute change associated with alternative load-following modes of operation can be compared to natural existing conditions in the river.

A few examples of the natural range of the daily discharge variation is given in the Table below, taken from daily average discharge records at Gold Creek and two other locations at which rating curves are available. Rates of change under existing conditions can only be indirectly deduced from this table, but should be directly available from USGS gaging records. Please see also the Responses to Comments I.346 and I.552, as well as the Responses to Comments B.7, B.64, B.65, C.87 and F.39.

RESPONSE TO COMMENT I.542 (cont.):

TABLE I

Daily Changes in Discharges
and Associated Changes
in Water Surface Elevation

Date	Avg. Daily Discharge (cfs)	Change From Prev. Day (cfs)	Change in Stage at Gold Creek (ft)	Change in Stage at LR X 28 (ft)	Change in Stage at LR X 35 (ft)
08/31/82	16,000	+3,000	+0.6	+1.0	+0.8
06/08/82	30,000	+4,000	+0.5	+0.4	+0.5
08/02/81	54,000	+20,000	+3.2		
08/21/81	43,100	+8,000	+0.8		
05/07/81	13,600	+3,600	+1.1	+1.1	+1.1
05/09/81	30,000	+9,000	+1.3	+1.2	
09/15/80	21,600	+9,600	+1.8	+2.1	+2.1
09/14/80	12,000	+2,400	+0.6	+0.8	
07/02/80	33,800	-8,600	-0.9		
09/01/79	12,100	-2,000	-0.5	-0.6	
09/22/83	13,600	+3,000	+1.0		+1.0
09/23/83	17,500	+3,900			

Note: September 22, 1983 discharge increased from approximately 12,000 cfs to approximately 15,000 cfs during a one-day period. Discharge was 13,000 cfs at 0730 hours; approximately 15,000 cfs at 1800 hours.

Information on the comparative environmental implications of the Susitna Project, other hydro and non-hydropower alternatives is presented in Chapter 10 of the License Application and is supplemented by the Responses to Comments I.541, I.544 and I.569.

RESPONSE TO COMMENT I.542 (cont.):

On the basis of this information, the Power Authority anticipates that the DEIS will reasonably evaluate the alternatives.

REFERENCES

Harza-Ebasco, Susitna Hydroelectric Project River Stage Fluctuation Resulting From Watana Operation (January 1984).

COMMENT I.543:

"CHAPTER 10. ALTERNATIVE LOCATIONS, DESIGNS, AND ENERGY SOURCES

"Alternatives to the proposed construction camps, village and permanent town should be addressed in this Chapter. These construction facilities have large implications for the fish and wildlife resources and users. At a minimum, the alternative of combining the three Watana facilities should be discussed. The alternative of a Prudhoe Bay type camp should also be considered. In addition, project design includes three airstrips (two at Watana, one at Devil Canyon). The alternatives of consolidating two of the airstrips, and all three of the strips, should be discussed. Construction facilities alternatives should be discussed in terms of minimizing adverse impacts to fish and wildlife resources and their use. Resource agencies have not been consulted in regard to project facilities."

RESPONSE:

Refer to Response to Comment I.91 relative to combining the Construction Camp, Village and Permanent Village.

The reference to an alternative of a "Prudhoe Bay type camp" is assumed to mean the multi-story facilities built by two of the petroleum ventures on the North Slope of Alaska. Facilities of this type are permanent in nature, i.e., they require longer construction times and cannot be dismantled for reuse, and are not acceptable for use in the Susitna Construction Camp or Construction Village. Multi-story facilities for the Permanent Village is one option to be considered. The housing of the Permanent Village families in multi-story facilities will produce sociological and

RESPONSE TO COMMENT I.543 (cont.):

psychological problems due to the close proximity of families with a focus on the Project and limited possibilities for diversification. Some inhabitants undoubtedly will prefer the apartment-type dwelling lifestyle of a townhouse facility and this could be a major feature in the Permanent Village concept. Detailed solutions will mitigate potential, sociopsychological and environmental problems prior to the construction of the Construction Village to ensure compatibility of concepts and use with the Permanent Village.

With regard to the Comment on the airstrips, we refer you to the Responses to Comments I.380, I.92 and the following discussion.

Relative to the project design of "Three" Airstrips (two at Watana, one at Devil Canyon), reference is made to the License Application Volume 6A, Exhibit E, Chapter 3, dated February 1983, page E-3-127. No airstrip will be built at the Devil Canyon site. Access and supply to devil Canyon will be through the access road from Watana, or railhead to Gold Creek. (License Application Volume 3, Exhibit F, dated February 1983, Plates F 40, F 70 and F 71).

At the Watana site, two airstrips will be required. A temporary strip (2500' long) has just been permitted for construction as described in Response to Comment I.92. This strip will be designed to accommodate light aircraft for the specific purpose of providing access and support to the Watana camp during environmental and geotechnical site investigations. At a later date, the strip may be extended to 4000 feet or 6000 feet in length to support such activities as camp expansion, equipment mobilizations and construction activities on the access road.

Although the temporary airstrip is expandable to 6000 feet, it cannot be considered as permanent since the majority of the strip is located in Borrow Site D, close to the main dam. During the construction of the main dam, the temporary strip will be removed so that the borrow material closest to the dam can be utilized.

If the temporary strip were made permanent, its location would seriously impact borrow operations and availability of material for the main dam central core.

Access to the airstrip and safety to flights and construction personnel during the borrow operations will take on

RESPONSE TO COMMENT I.543 (cont.):

significant proportions at this location. Conversely, if the temporary strip were located at the site indicated in the License Application, an extensive access road between the airstrip and the now-existing camp would be required. The associated land disturbance and costs for this alternative are not justifiable during the project licensing process.

Thus, two separate strips are proposed to be constructed at the Watana site. No strip will be constructed at the Devil Canyon site.

COMMENT I.544:

"Page E-10-1: 1 - ALTERNATIVE HYDROELECTRIC SITES: We recommend that all evaluation matrices include the project as proposed and other Susitna River basin alternatives."

RESPONSE:

Information on project alternatives other than alternatives on the Susitna River itself is provided in the Responses to Comments I.541, I.542, I.569 and I.579. Basic information on the physical characteristics of other Susitna River alternatives and combinations thereof that have been studied is contained in FERC License Application Tables B.9, B.10 and B.11 and in the Response, filed December 19, 1983, to Comment D, Section 10, No. 1 of the November 3, 1983 request for information from the FERC.

The Feasibility Report (Acres 1982), the Development Selection Report (Acres 1981) and the Corps of Engineers 1977 Final Environmental Impact Statement (COE 1977) for the Project all consider the environmental implications of alternative Susitna River developments. Twelve sites were identified on the river upstream of Gold Creek. These are:

Gold Creek
Olson (Susitna II)
Devil Canyon
High Devil Canyon
Devil Creek
Watana
Susitna III
Vee
Maclaren
Denali
Butte Creek
Tyone

RESPONSE TO COMMENT I.544 (cont.):

Two basic screening criteria were initially used to evaluate these sites, environmental considerations and alternative sites for essentially the same development. In the environmental screening, the potential impact on the environment of a reservoir located at each of the sites was assessed and categorized as being relatively unacceptable, significant or moderate.

Unacceptable Sites

Sites in this category were classified as unacceptable because either their impact on the environment would be extremely severe or there are obviously better alternatives available.

The Gold Creek and Olson sites both fall into this category. As salmon are known to migrate up Portage Creek, a development at either of these sites would obstruct this migration and inundate spawning grounds.

Development of the mid-reaches of the Tyone River would result in the inundation of sensitive big game and waterfowl areas, provide access to a large expanse of wilderness area and contribute only a small amount of storage and energy to any Susitna development. Since more acceptable alternatives are obviously available, the Tyone site is also considered unacceptable.

Sites With Significant Impact

Between Devil Canyon and the Oshetna River, the Susitna River is confined to a relatively steep river valley. Upstream of the Oshetna River, the surrounding topography flattens and any development in this area has the potential of flooding large areas even for relatively low dams. Although the Denali Highway is relatively close by, this area is not as isolated as the Upper Tyone River Basin. It is still very sensitive in terms of potential impact on big game and waterfowl. The sites at Butte Creek, Denali, Maclaren and, to a lesser extent, Vee fit into this category.

Sites With Moderate Impact

Sites between Devil Canyon and the Oshetna River have a lower potential environmental impact. These sites include the Devil Canyon, High Devil Canyon, Devil Creek, Watana and Susitna sites and, to a lesser extent, the Vee site.

RESPONSE TO COMMENT I.544 (cont.):

Sites which are close to each other and can be regarded as alternative dam locations can be treated as one site for project definition study purposes. The two sites which fall into this category are Devil Creek, which can be regarded as an alternative to the High Devil Canyon site and Butte Creek, which is an alternative to the Denali site.

On the basis of further comparisons discussed in Exhibits B and E of the FERC License Application and in the cited reports, the Watana-Devil Canyon Project was shown to be preferable from environmental, engineering and cost standpoints.

REFERENCES

Acres American, Inc., Susitna Hydroelectric Project Feasibility Report, Volume I Engineering and Economic Aspects, Final Draft (1982), previously submitted to the FERC on March 15, 1982.

Acres American, Inc., Susitna Hydroelectric Project, Development Selection, Final Report (December 1981), previously submitted to the FERC on March 15, 1982.

U.S. Army Corps of Engineers, Office of the Chief Engineer, Final Environmental Impact Statement, Hydroelectric Power Development, Upper Susitna River Basin, South-central Railbelt Area, Alaska (January 1977).

COMMENT I.545:

"Page E-10-6: 1.1.5 - Plan Formulation and Evaluation: The tables referenced in this section should include the proposed project and other Susitna River basin alternatives. If the Susitna project proposal is superior to the various alternatives, incorporating the proposal into the tables would help to demonstrate this conclusion."

RESPONSE:

Please refer to the Responses to Comments I.541, I.542, I.544, I.569 and I.579.

COMMENT I.546:

"Page E-10-7: 1.2.1 - Description of Chakachamna Site: The accompanying tables should be corrected to indicate that the potential installed capacity would be 330 megawatts (MW), rather than the indicated 500MW."

RESPONSE TO COMMENT I.546:

The Chakachamna studies contained in FERC License Application Exhibit E, Chapter 10 were performed using an installed capacity of 500 MW which was computed using a plant factor of about 45 percent and estimated average annual energy generation of 1,925 GWh. The Chakachamna plant factor was based on similar plant factors considered for the Susitna Basin development plans. It would not be correct to change the installed capacity to 330 MW since the expansion planning studies (OGP5) contained in FERC License Application Exhibit E, Chapter 10 were based on 500 MW.

The 330 MW installation which was computed using a plant factor of 45 percent and estimates average annual energy generation of 1,301 GWh resulted from subsequent studies which were submitted to the FERC on July 11, 1983, in the following reports:

1. Bechtel Civil and Minerals, Inc., Chakachamna Hydroelectric Report, Interim Report (1981), prepared for Alaska Power Authority, submitted to the FERC on July 11, 1983.

2. Bechtel Civil and Minerals, Inc., Chakachamna Hydroelectric Report (1983), prepared for Alaska Power Authority, submitted to the FERC on July 11, 1983.

COMMENT I.547:

"Page E-10-9: (d) Aquatic Ecology: Paragraph 2: The low number of spawning salmon observed in the mainstem and side-channel habitats was possibly a result of the methods utilized. Data were previously gathered through counts from helicopters with ground verification. This type of methodology is appropriate for the clear water tributaries but not for the glacial flow mainstems and side-channels."

RESPONSE TO COMMENT I.547:

Comment noted. The data and description provided here are taken from the Chakachamna Feasibility Report.

REFERENCES

Bechtel Civil and Minerals, Chakachamna Hydroelectric Interim Feasibility Assessment Report (1983), previously submitted to the FERC on July 11, 1983.

COMMENT I.548:

"Page E-10-14: 1.2.4 - Environmental Impacts of Selected Alternatives: Paragraph 7: The tunnel alternatives are in conjunction with a dam to raise the Chakachamna Lake level. The impacts to the aquatic system could, potentially, be lessened through the alternative of restricting the project to the Chakachatna River system instead of diverting flows to the McArthur River. Fish passage facilities have been proposed by the Alaska Power Authority (APA) as a component of the preferred Chakachamna project plan."

RESPONSE:

The Chakachamna Lake hydroelectric study for which the Power Authority provided a reference in Comment I.546, evaluated the merits of developing power potential by diversion of water southeasterly to the McArthur River via a tunnel about 10-miles long, or easterly down the Chakachatna Valley either by a tunnel about 12-miles long or by a dam and tunnel development.

Aquatic system impacts would be limited to the Chakachatna River with development restricted to that river system whereas aquatic systems in both the Chakachatna and McArthur Rivers would be affected with the McArthur alternative.

However, the cost of energy from the Chakachatna Valley development is estimated to be 25% higher than that for the McArthur alternative and is close to the cost of alternative coal-fired resources. Therefore, there was justification to concentrate further studies on the McArthur River alternatives. In addition, building on the lower slopes of Mt. Spurr--an active volcano--was not deemed prudent in view of the evidence of geologically recent debris flows.

RESPONSE TO COMMENT I.548 (cont.):

The recommended scheme, designated Alternative E, includes a dam and provisions for fish passage at the Chakachamna Lake outlet, an intake, 10 miles of power tunnel, and a power plant on the McArthur River.

COMMENT I.549:

"Page E-10-18: 1.3.3 - Formulation of Susitna Basins Development Plans: The subplans should be corrected to indicate the current proposed Watana dam installed capacity of 1020MW."

RESPONSE:

The Susitna Basin development studies contained in FERC License Application Exhibit E, Chapter 10 (also Exhibit B, Section 1) were performed using installed capacities based on a desired annual plant factor in the range of 50 to 60 percent. For Watana, capacity of 800 MW was used. For Devil Canyon, the study used 400 MW. Subsequent, detailed studies of Watana and Devil Canyon, contained in FERC License Application Exhibit B, Section 2 - Alternative Facility Design, Processes and Operations, led to refinement and optimization of project designs including installed capacity. These optimization studies demonstrated that the optimal installed capacity for the Project would be 1020 MW at Watana, and 600 MW at Devil Canyon. The results of the optimization studies, however, were not used in the comparison of alternatives. It would not be correct to change the installed capacity of the Watana and Devil Canyon developments in FERC License Application Exhibit E, Chapter 10 (also Exhibit B, Section 1), since expansion planning studies (OGP5) were based on the installations shown.

COMMENT I.550:

"Page E-10-31: 2.1.1 - Diversion/Emergency Release Facilities: Paragraph 1: The Case C flows (minimum flows of 12,000 cfs) were not established as proposed '...to avoid adverse affects on the Salmon [sic] fishery downstream.' The Chapter 11, Exhibit E, W-10-008 Response states that avoidance flows (i.e. flows necessary to avoid adverse effects on the salmon fishery downstream), '...would be 19,000 cfs in August.' According to the Alaska Department of Fish and Game (ADF&G) Synopsis Report prepared for the Susitna project, five of nine sloughs examined do not achieve unrestricted access until flows exceed 20,000 cfs. 10-1/ In additon, the applicant's letter, dated May 16, 1983, to the Regional Director, U.S. Fish and Wildlife (FWS), stated that the applicant's analysis of flows versus habitat would not be available until September 1983. Given the preliminary status of the instream flow studies, the FWS believes that recommendation of an appropriate flow regime, at this time, is premature (please reference the May 27, 1983, FWS letter to Eric P. Yould, APA)."

"10-1/ ADF&G. 1983. Synopsis of the 1982 Aquatic Studies and Analysis of the Fish and Habitat Relationships. Prepared for the APA."

RESPONSE:

The question raised in this Comment is discussed extensively in the Response to Comment I.94.

COMMENT I.551:

"Page E-10-32: 2.1.3 - Power Intake and Water Passages: Paragraph 2: The statement is made that a multi-intake structure would be used, "...in order to control the downstream river temperatures within acceptable limits." Since temperature changes are inevitable, it is important that "acceptable limits" be established and agreed upon by resource agencies.

"Page E-10-32: 2.1.3 - Power Intake and Water Passages: Paragraph 3: Please reference our comments on page E-10-31 concerning minimum flows."

RESPONSE TO COMMENT I.551:

The multi-level intakes have been incorporated into the design of the Susitna Project to enable flexibility in releasing water with a desired temperature. It is necessary, however, to emphasize that it will only be possible to release water with temperatures that are within the range available in the reservoir. It is anticipated that designation of "acceptable limits" for the control of downstream temperature will be agreed to in conjunction with the overall designation of an acceptable flow regime.

See also Responses to Comments B.16, B.22, B.23, B.29, B.31 and B.38 for discussions on downstream temperatures.

COMMENT I.552:

"Page E-10-33: 2.2.1 - Installed Capacity: Paragraph 1: It is stated that the Devil Canyon facility would be operated, "...primarily as a base loaded plant..." The circumstances and anticipated operating regimes under which peaking operations at the Devil Canyon dam are envisioned need to be explained. The potential impacts of peaking operations at the Devil Canyon dam on the aquatic resources should be discussed."

RESPONSE:

Deviation from base-load operation at Devil Canyon is envisioned only to react to system generation needs under emergency conditions. Under normal circumstances, regulation of frequency and voltage and provision of spinning reserve and reserve capacity would be accomplished by Watana and thermal generating units. Therefore, deviation from base-load operation at Devil Canyon would be very infrequent. Even under emergency conditions restrictions on discharge change are under consideration to minimize potential impacts to aquatic resources.

The installed capacity at Devil Canyon has been selected as the maximum capacity needed to utilize the available energy from the 32 years of hydrologic flows used in the study, as modified by operation rules of Watana Reservoir. In months when plant capacity output corresponding to the total estimated monthly energy available is less than the installed capacity, the remaining increment of capacity could be considered in part or in whole as reserve capacity in the system depending upon the discharge required to

RESPONSE TO COMMENT I.552 (cont.):

operate the reserve capacity and the restrictions on change of discharge. In addition to reserve for emergencies, Devil Canyon would provide reserve for its own maintenance outages.

The Department of the Interior and other agencies have commented to the FERC regarding possible flow regimes, project operation alternatives and their impacts (see Comments B.2, B.3, B.4, B.5, B.7, B.64, B.65, C.87, F.2, F.3, F.10, F.11, F.25, F.39, I.5, I.24, I.25, I.29, I.131, I.133, I.149, I.198, I.201, I.236, I.558, I.560 and I.562, and the associated Power Authority Responses; see also FERC License Application (pages E-2-104, E-2-55 to (Case C target minimum flows)).

As indicated in the Responses to Comments B.65, F.11 and F.25, "The Power Authority anticipates that the DEIS and FEIS will analyze a full reasonable range of alternative operating scenarios." These alternative operating scenarios and their associated flow regimes could include base-load operation, an alternative already identified and analyzed in the FERC License Application, and also a range of load-following scenarios with hourly flow variations. The Power Authority has developed additional data and methods which FERC may utilize in its analysis of load-following alternatives, to the extent FERC deems any load-following operational scenario to be a reasonable alternative. The Power Authority has identified a load-following case and has analyzed the resulting stage fluctuations in the Susitna River downstream from the Project. A report documenting this analysis, illustrating appropriate methods of analyzing such alternatives, is referenced below and appended as a reference to this Response Document. This load-following hypothetical case may be characterized as "extreme," but remains within the flow constant of the Case C scenario. This analysis was made to determine if, downstream of the Project, significant attenuation of the fluctuating water levels resulting from load-following operation would occur. The Power Authority does not currently believe that the flow release patterns in this report would be judged by many agencies to be an environmentally reasonable alternative. Neither is it necessarily thought that these patterns represent the optimum economic use of the resource. It may be of value in that it represents an environmentally extreme case; however, the FERC may not deem this case a "reasonable" alternative for its analysis. A second report which will document stage fluctuations for a more moderate case of discharge variations is anticipated in late March 1984. We anticipate that the FERC will identify reasonable

RESPONSE TO COMMENT I.552 (cont.);

alternatives and analyze the environmental impacts of such modes of operation in preparing DEIS and FEIS. To the extent such alternatives are load-following, such an environmental analysis would include consideration of aquatic habitat effects of the mximum and seasonal mean changes in discharge occurring on a daily basis as well as the rates of change. Both rate of change and absolute change associated with alternative load-following modes of operation can be compared to natural existing conditions in the river.

A few examples of the natural range of the daily discharge variation is given in the Table below, taken from daily average discharge records at Gold Creek and two other locations at which rating curves are available. Rates of change under existing conditions can only be indirectly deduced from this table, but should be directly available from USGS gaging records. Please see also the Responses to Comments I.346 and I.542, as well as the Responses to Comments B.7, B.64, B.65, C.87 and F.39.

RESPONSE TO COMMENT I.552 (cont.):

TABLE I

Daily Changes in Discharges
and Associated Changes
in Water Surface Elevation

Date	Avg. Daily Discharge (cfs)	Change From Prev. Day (cfs)	Change in Stage at Gold Creek (ft)	Change in Stage at LR X 28 (ft)	Change in Stage at LR X 35 (ft)
08/31/82	16,000	+3,000	+0.6	+1.0	+0.8
06/08/82	30,000	+4,000	+0.5	+0.4	+0.5
08/02/81	54,000	+20,000	+3.2		
08/21/81	43,100	+8,000	+0.8		
05/07/81	13,600	+3,600	+1.1	+1.1	+1.1
05/09/81	30,000	+9,000	+1.3	+1.2	
09/15/80	21,600	+9,600	+1.8	+2.1	+2.1
09/14/80	12,000	+2,400	+0.6	+0.8	
07/02/80	33,800	-8,600	-0.9		
09/01/79	12,100	-2,000	-0.5	-0.6	
09/22/83	13,600	+3,000	+1.0		+1.0
09/23/83	17,500	+3,900			

Note: September 22, 1983 discharge increased from approximately 12,000 cfs to approximately 15,000 cfs during a one-day period. Discharge was 13,000 cfs at 0730 hours; approximately 15,000 cfs at 1800 hours.

REFERENCES

Harza-Ebasco, Susitna Hydroelectric Project River Stage Fluctuation Resulting From Watana Operation (January 1984).

COMMENT I.553:

"Page E-10-34: 2.3 - Access Alternatives: Please refer to our letter dated August 17, 1982 to Eric P. Yould, APA (included in Chapter 11) for our comments and recommendations specific to access routing. With the elimination of the Denali Highway to Watana roadway link, the FWS would

COMMENT I.553 (cont.):

endorse the access routing corridors and mode. Timing of access route construction is very important to avoiding or minimizing adverse environmental impacts."

RESPONSE:

As indicated in the Responses to Comments I.384, A.1 and A.3, the decision to select a particular access plan is difficult, requiring the consideration of a complex set of factors, and the analysis of a series of tradeoffs. The Power Authority has elected to propose access from the north, after weighing all the advantages and disadvantages of the routes under study. Further, the adoption of various management and use restrictions controlling both the project-related and public access impacts will limit the extent of impacts expected.

Please refer to Mitigation Plan 10 on FERC License Application pages E-3-531 through E-3-533 for a description of restrictions to be followed regarding minimizing wildlife impacts from aerial and ground disturbance. In the case of mitigation of fish impact, please refer to FERC License Application pages E-3-150 through E-3-160 for a discussion of measures to mitigate impacts of construction on aquatic habitat. Restrictions regarding timing of construction activities will be reviewed and refined in consultation with resource agencies prior to adoption in the final Mitigation Plan.

From an engineering standpoint, timing is also critical, but in a different context. Timing is important for project engineering and construction because scheduling access construction, as well as construction activities at the project site itself, is very important. The benefits of the Denali access plan in this regard are significant compared against other access alternatives. For example, adoption of a rail-only access to the project gateway could cause difficulty in equipment delivery, supply and personnel movement, and such delays could significantly increase project logistics cost.

COMMENT I.554:

"Page E-10-43: (v) Denali Highway to Watana: Paragraph 1: Impacts to caribou would be largely avoided by eliminating the Denali Highway-to-Watana access road. This would be

COMMENT I.554 (cont.):

consistent with the APA Mitigation Policy, the recommendations of the resource agencies, and Access Plan Recommendation Report (August 1982) which states:

> 'From a caribou conservation viewpoint, the Denali access route is far less desirable than proposed routes originating on the Alaska Railroad and Parks Highway. The Denali route would most certainly have immediate detrimental impacts on the resident subherd and future negative impacts on the main Nelchina herd although these impacts cannot be quantified.'"

RESPONSE:

The Power Authority concurs that from a caribou conservation viewpoint, the Denali access route is less favorable than proposed routes originating on the Alaska Railroad and Parks Highway. However, the selection of an access route is a many faceted issue with numerous tradeoffs. In this instance, other factors (as discussed in the Responses to Comments F.40, I.364 and I.384) indicated that the preferred routing, considering all factors, was from the Denali Highway.

COMMENT I.555:

"Page E-10-54: 2.4 - Transmission Alternatives: Please refer to our letter dated January 5, 1982, to Eric P. Yould, APA (included in Chapter 11) for our comments and recommendations specific to transmission corridors."

RESPONSE:

Responses to Comments in the January 5, 1982 letter can be referenced in the April 14, 1982 letter from Mr. John Lawrence to Mr. J. Morrison, Acting Assistant Regional Director, USFWS.

COMMENT I.556:

"Page E-10-83: 2.4.11 - Conclusions: We concur with the recommended transmission corridors."

RESPONSE TO COMMENT I.556:

No response necessary.

COMMENT I.557:

"Page E-10-83: 2.5 - Borrow Site Alternatives: Except in situations where no practicable alternatives exist, borrow sites should be restricted to areas within the future impoundments and/or to upland sites. Guidance on minimizing specific adverse environmental impacts are contained in the Biological Stipulations provided in the FWS comments on Chapter 3, Appendix E3B."

RESPONSE:

At the present time, the primary borrow and quarry sites are A, D and E at the Watana site and G and K at Devil Canyon. The other sites were not considered as primary borrow because of lengthy haul distance to the dam sites, adverse environmental impacts, insufficient quantities and poor quality material.

Borrow and quarry sites will be utilized only if necessary and, upon completion of the excavation operations, the sites will be rehabilitated.

Of the above borrow and quarry sites, E and G are within the impoundment areas or beneath the river, i.e., material is from the river bed and therefore will pose no visual impact. The remaining sites, A, D and K, are necessary to supply the required materials for the dam even though they are situated on the upland surface. These areas adjacent to the dam sites will be rehabilitated. See also the Responses to Comments A.4, A.22, C.35 and I.425.

COMMENT I.558:

"Page E-10-105: 3.1. - Project Operation and Flow Selections: The effects of various reservoir releases on fishery habitats between Talkeetna and the reservoir(s) is currently insufficient for recommending flow releases. The relationship of mainstem and groundwater flows must be understood. The interrelated effects of ice, sediments, stream flow, and temperature changes which will accompany construction, filling, and operation of the dam(s) must be understood for predictive purposes.

COMMENT I.558 (cont.):

"The Arctic Environmental Information and Data Center (AEIDC) is under contract to the APA to develop a linked system of simulation models which will rely on data from other project studies, available literature, and professional judgement. The AEIDC study is intended to: 1) predict system-wide stream flow and temperature effects of the dam(s), and 2) interprete the effects of such changes in terms of aquatic habitats and fish populations. An AEIDC report scheduled for completion in October, 1983, is expected to demonstrate how the model functions. If the model proves satisfactory, and the appropriate level of baseline information is made available, we will be able to examine the relationship between flows and aquatic habitat. Much of the discussion on flows as they relate to habitat is speculative."

RESPONSE:

The discussions in the FERC License Application that concern flows as they relate to habitat were based on field studies (primarily by the Alaska Department of Fish and Game and other Power Authority contractors), available literature and professional judgment based on experience. The field studies were extensive, having encompassed several years of data collection efforts. In addition, extensive studies, designed to expand and refine the information collected in earlier studies, have been made. The various resource agencies have been appraised of these studies (e.g., a workshop on Susitna fisheries studies was held at the Power Authority in July 1983 which described present and future studies). The agencies are apparently aware of these studies as reflected by the references made to these studies in the Comments. All of this information from the various studies will be considered in the Power Authority studies. Therefore, the Power Authority believes that flow discussions are not based on speculation. In addition, the flow descriptions provided in Chapter 10 of the License Application Exhibit E are not intended to provide extensive detail. These details are provided in Chapters 2 and 3 and in the references cited for these chapters. Please see also the Responses to Comments I.346, I.542 and I.552.

COMMENT I.559:

"Page E-10-106: 3.1.2 - Pre-project: The impacts of the 1969 water year (extreme drought) should be fully addressed, not dismissed. The effect of this naturally occurring event

COMMENT I.559 (cont.):

should be described in regard to project operations and how biological resources would be affected. We recommend this analysis continue through water year 1970, which was also dryer than average."

RESPONSE:

The flow of water year 1969 was the lowest flow of record. Because of its very low probability of occurrence, it was replaced by a synthesized low flow of a 30-year return period in the analyses presented in the FERC License Application.

Recurrence of the water years 1969 and 1970 drought during the life of the Project would be very rare if it ever occurs. Potential impacts of the Project on the biological resources would be favorable compared to the natural conditions because the low flow would be augmented and the duration of the extreme low flow would be reduced by the Project.

COMMENT I.560:

"Page E-10-108: 3.1.4 - Energy Production and Net Benefits: It is our understanding that the power demand projections, alternative fuel costs, and economic growth evaluation included in the application are considered to be high and have been re-evaluated by the applicant. We recommend that the net benefits versus flows discussions utilize the current economics evaluation."

RESPONSE:

The Power Authority disagrees with the conclusion that the FERC License Application includes power demand forecasts, alternative fuel costs and economic growth evaluations that are high.

The estimates of power demand and fuel costs and the economic evaluations contained in FERC License Application Exhibits B and D were performed in the spring of 1983, and reflect the Power Authority's most current data and analyses. The studies are based on the reasoning, methodology and experience of well-known forecasts, as discussed in the Power Authority's Response to Comment I.1.

COMMENT I.561:

"Page E-10-109: 3.2.1 - Susitna River Fishery Impacts: Please refer to our comments on page E-10-105."

RESPONSE:

Please refer to the Response to Comment I.558.

COMMENT I.562:

"Page E-10-110: 3.3.4 - Riparian Vegetation and Wildlife Habitat: The post-project instream flow regime has tremendous potential to impact the timing and extent of floods, freeze-up, and spring ice jams, as well as the riparian groundwater relationships. We do not understand how it can be stated that the regime, '...is unrelated to any of these factors.'"

RESPONSE:

The FERC License Application does not state that "the regime is unrelated to any of these factors." The correct statement is "Riparian vegetation is affected by one or more of the following: floods, freeze-up and spring ice jams. Minimum flow selection for the cases considered is unrelated to any of these factors. Hence, riparian vegetation effects were not considered in minimum project flow selection."

The minimum flows for the cases considered for the License Application (Table E.2.34, Figure E.2.130) would not control discharge from the reservoir during periods of spring or summer floods, freeze-up or spring ice jams. Minimum flood discharges for spring floods were considered (FERC License Application page E-10-111), but because of the importance of spring flood storage to project economics, were not implemented. The impacts of minimum flow selection on summer floods is also discussed on page E-10-111. Freeze-up normally occurs between late October and December when reservoir discharge is controlled by the demand for power. Provisions of a minimum discharge greater than the power demand during this period would raise the water level and possibly adversely affect riparian vegetation as noted in the Responses to Comments C.42 and I.348. Spring ice jams occur as a result of warming air temperatures, precipitation in the form of rain, runoff from the basin and resulting increased stream flow. The Project will regulate these spring floods and should reduce the severity of ice jamming

RESPONSE TO COMMENT I.562 (cont.):

(License Application page E-2-126). Please see also the Responses to Comments I.346, I.542 and I.552.

In addition to floods, freeze-up and spring ice jams, riparian vegetation is affected by riparian groundwater relationships, primarily groundwater levels. Reduced mainstem flows during the summer with-project may result in a reduction of groundwater levels near the stream, as described in the License Application (page E-2-97). Farther away from the river, the change will be less, since fluctuation of groundwater levels in response to changes in river stage is generally effectuated with distance from the river. To adapt to somewhat lower groundwater levels, there may be a change in plant species composition near the stream bank.

COMMENT I.563:

"Page E-10-111: 3.3.4 - Riparian Vegetation and Wildlife: It is stated that, '...it may be desirable to maintain riparian vegetation by simulating spring floods for a short period of time. However, the spring runoff storage is a key element of the project. Large releases for even a few days would have severe economic impact on this project. Hence, no minimum flood discharges were considered.' In response to our concern that the receeding limb of high spring flows may be important to stimulate smolt outmigration, it is stated in the Chapter 11, Response W-3-026, 'When the significance of flow-related stimuli to smolt out-migration is defined, the flow regime can be adjusted.' The apparent conflict in the statements in the application should be reconciled and the environmental implications of this flow decision examined."

RESPONSE:

See Response to Comment I.29.

COMMENT I.564:

"Page E-10-112: 3.5 - Maximum Drawdown Selection: This section should be reexamined in light of the most recent economic evaluation.

"The environmental impacts implications of water year 1969 alone, and in conjunction with water year 1970, should be examined. This is a naturally occurring sequence and could repeat during the life of the project."

RESPONSE TO COMMENT I.564:

Maximum drawdown selection is based on the natural streamflows of record, instream flow regime and power and energy demand. In the reservoir operation studies being undertaken to evaluate the effect of project operation on the instream flow regime and biological resources, the flows as recorded at the gaging stations are being used without adjustment, as discussed in the Power Authority's Response to Comment I.559. Selected flow regimes will form the basis for flow regime settlement negotiations.
The estimates of power demand and the economic evaluations contained in FERC License Application Exhibits B and D were performed in the spring of 1983. The studies are discussed in the Power Authority's Response to Comment I.1. Maximum drawdown was selected under load forecasts of comparable magnitude.

COMMENT I.565:

"Page E-10-115: 4.1 - Coal - Fired Generation Alternative: The Nenana and/or Bering River coal fields are potential sources of coal for power generation. The Usibelli mine is expected to double its coal production in the next year for export to Korea. The proximity of that mine to the Railbelt area, the ongoing nature of mine operations, and indications that with a market the Usibelli mine could be further expanded to produce 4 million tons per year for the next six decades, suggest that greater attention should be given to this potential power supply and its comparative environmental impacts.

"Although less accessible, Bering River coal should also be considered here as an alternative generating resource. Exploratory work on Bering River coal development is currently being undertaken by a joint venture of the Chugach Native landowners and Korean interests. Preliminary environmental and engineering work for the associated transportation infrastructure is being supported by the State.

"Although specifics of Beluga plant design and location are not available, existing Beluga lease-areas are well-defined. A tentative 30-year mine pit and alternative transportation corridors have been outlined by Diamond Shamrock-Chuitna Coal, a major area leaseholder. General environmental data on the Beluga area, as referenced in Chapter 3 of this Exhibit (Alaska Department of Natural Resources (ADNR), 1982b), are available. Baseline environmental studies are

COMMENT I.565 (cont.):

in their second year. Preliminary reports on the 1982 studies are now available and should be incorporated into the discussions.10/2/

"We note that the referenced economic and technical feasibility analysis is included in Exhibit D, not Exhibit B as stated here. Please also see our General Comments on this Chapter's failure to directly compare non-hydropower alternatives with the Susitna proposal, even to the general extent that those comparisons are provided for other hydropower alternatives."

"10-2/ Environmental Research and Technology, Inc. April 1983. Surface Hydrology and Water Quality, Interim Report, Volumes I-IV. Fort Collins, Colorado Environmental Research and Technology, Inc. April 1983. Preliminary Analysis of Terrestrial Biology Data Collected in the Diamond Chuitna Study area, May 3, 1982 through February 13, 1983, Interim Report, Volumes I and II. Fort Collins, Colorado. Environmental Research and Technology, Inc. and OTT Water Engineers, Inc. April 1983. 1982 Data Report Aquatic Biology, Diamond - Chuitna Project Baseline Studies. Fort Collins, Colorado."

RESPONSE:

Based on economic and engineering analyses of the major coal fields in Alaska, it appears that the state's coal requirements could be satisfied by mining only the two largest and least expensive coal fields: Beluga and Nenana. The generalized environmental impacts caused by mining and electrical generation of these two coal fields were presented in Exhibit E of the FERC License Application, and in the earlier Railbelt electrical alternatives study.[1] The environmental impacts of the remaining coal areas were not investigated, because it appears unlikely that there will be future economic incentives to develop those sites.

The site-specific environmental impacts caused by major development of either the Beluga or Nenana would certainly have to be investigated in detail prior to their actual development. An extensive NEPA environmental impact statement would have to be prepared, comparing the environmental impacts of the proposed coal field development with the impacts of other alternatives. The April 1983

RESPONSE TO COMMENT I.565 (cont.):

baseline studies referenced by the commentor would be useful for preparation of that EIS.

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1 Battelle Pacific Northwest Laboratories, Railbelt Electric Power Alternatives Study (December 1982).

COMMENT I.566:

"Page E-10-116: 4.1.1(d) Terrestrial Ecosystem: (i) Flora: More detailed vegetation type maps of the area have been developed by the U.S. Soil Conservation Service and Forest Service. The FWS has completed National Wetland Inventory maps which are available for the area's coastal wetlands. Those wetlands are important habitats for the bird life described under section (f) Marine Ecosystem."

RESPONSE:

We are aware of the referred-to vegetation and wetland mapping, much of which has only recently become available. Please note that the FERC License Application, at the top of page E-10-119, notes the importance of the area's coastal wetlands to birds as it states: "The coastal wetlands and mud flats are heavily utilized by waterfowl, cranes, and shorebirds, while the offshore waters and sea cliffs are inhabited by sea birds such as gulls, puffins, and murres."

COMMENT I.567:

"Page E-10-117: (ii) Fauna: Nests of trumpeter swan in the Beluga and Susitna areas have been mapped and the location data computerized. This information is readily available from the FWS for comparative analyses."

RESPONSE:

The Power Authority is aware of and has utilized this information base.

COMMENT I.568:

"Page E-10-118: (c) Aquatic Ecosystem: Preliminary quantitative baseline data are now available on Beluga area resources. 10-3/"

"10-3/ See Footnote 10-2. [Footnote 10-2/ Environmental Research and Technology, Inc. April 1983. Surface Hydrology and Water Quality, Interim Report, Volumes I-IV. Fort Collins, Colorado Environmental Research and Technology, Inc. April 1983. Preliminary Analysis of Terrestrial Biology Data Collected in the Diamond Chuitna Study area, May 3, 1982 through February 13, 1983, Interim Report, Volumes I and II. Fort Collins, Colorado. Environmental Research and Technology, Inc. and OTT Water Engineers, Inc. April 1983. 1982 Data Report Aquatic Biology, Diamond - Chuitna Project Baseline Studies. Fort Collins, Colorado.]"

RESPONSE:

The potential impacts of the Beluga coal field development on the marine ecosystem in the Cook Inlet region were discussed in Exhibit E of the FERC License Application. It was concluded that the coal field development would result in some reduction in anadromous fish production. The detailed Cook Inlet baseline studies referenced by the commentor should provide excellent background data for any future NEPA environmental impact studies, which would be required prior to the actual coal field development, if any.

COMMENT I.569:

"Page E-10-120: 4.1.2 - Environmental Impacts: With recent acceptance of the Alaska Surface Coal Mining Control and Reclamation Program by the Federal Office of Surface Mining, a comprehensive regulatory program for Beluga, Nenana, and other Alaska coal development exists and should be mentioned here. We assume that the intended reference in paragraph 5 is to the Clean Air Act.

"To fully compare alternative power developments within the NEPA process as described previously, a comparative discussion on environmental impacts should be provided here. For example, Susitna hydropower development will result in significant and irreversible habitat losses, with primary habitat impacts occurring within a concentrated time frame,

COMMENT I.569 (cont.):

and a work force of several thousand individuals during the first several years of project development. In comparison, Beluga coal development would result in small but continual annual habitat losses, potentially reversible habitat impacts, and an initially smaller work force which would remain for the project life. Quantitative estimates of these habitat impacts, work force needs, and transportation requirements, should be provided and compared here for the Beluga development, the incremental impacts of expanding the Nenana coal mine, and the proposed Susitna project."

RESPONSE:

The Alaska Surface Coal Mining Control and Reclamation Act was enacted in 1982, under Alaska Statutes, Title 41, Chapter 45. This law was enacted in response to the federal SMCRA, and placed the permitting and regulation of surface mines under the jurisdiction of the Alaska Department of Natural Resources (ADNR). The regulations and performance standards of the Alaska program are designed to be consistent with the federal surface mining guidelines under the Department of the Interior. Point source discharges from mining and power plant operations are still regulated under the federal NPDES program.

In response to the commentor, paragraph 5 of page E-10-120 of the FERC License Application does indeed refer to the Clean Air Act.

The environmental impacts of the proposed Susitna Hydroelectric Project, the Beluga coal mine/power plant, the Nenana mine expansion/power plant, and various North Slope natural gas transport/electrical generation options have already been presented in earlier studies (1), (2) and (3). A hydroelectric alternatives study was also conducted by the U.S. Army Corps of Engineers. The impacts of these projects on air quality, soils/geology, hydrology/water quality, terrestrial ecology, aquatic ecology and socioeconomics are compared in the attached Table 1. It should be noted that

RESPONSE TO COMMENT I.569 (cont.):

the Susitna project represents 1620 MW of installed capacity as compared with only 400 MW for each of the thermal alternatives.

REFERENCES

Battelle Pacific Northwest Laboratories, Railbelt Electric Power Alternatives Study, Volumes 1-17, Prepared for the Office of the Governor, State of Alaska (1982), previously submitted to the FERC on July 11, 1983.

Volume II, Selection of Electric Energy Generation Alternatives for Consideration in Railbelt Electric Energy Plans (December 1982)

U.S. Army Corps of Engineers, Office of the Chief Engineer, Final Environmental Impact Statement, Hydroelectric Power Development, Upper Susitna River Basin, South-central Railbelt Area, Alaska (January 1977).

RESPONSE TO COMMENT I.569 (cont.):

Table 1

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY
ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
Hydrology and Water Quality	Impoundment of the Susitna River would inundate approximately 86 miles of river (plus associated tributaries). The reservoirs may alter downstream temperature and flow regimes. Between Devil Canyon and Talkeetna, peak summer water temperatures are expected to be decreased and minimum winter temperatures are expected to increase. To avoid or minimize temperature changes, multi-level	Strip mining could interfere with groundwater flows and degrade water quality. Surface water could be affected by runoff from the mine, coal pile, and other constructed areas. Groundwater could be affected by acid mine drainage and ash disposal pond leachate. Long-term changes in pH, turbidity, and trace metals concentrations are expected. Discharges would be minimized by compliance with SMCRA and NPDES guidelines. The power plant would require	Because the Nenana mine is already in operation, the incremental impacts of mine expansion may be less than those for the new Beluga mine. Long-term impacts of the power plant would be similar to those caused by the Beluga option.	The gas fired power plant would require roughly 2,200 gpm of fresh water for boiler makeup and miscellaneous uses. The gas pipeline would cross 15 major streams and and numerous small streams. The buried, chilled pipe could disrupt both groundwater and surface water flows. Road cuts for pipeline access could cause disruption of groundwater flows, and also cause changes in surface runoff and soil erosion.

(a) Watana plus Devil Canyon Developments.

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY
ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	intakes will be provided in the dams which allow for control of downstream temperatures. A more stable flow regime is expected downstream of the Project with low winter flows increased and high summer flows (particularly flood events) decreased. Ice formation is expected to decrease, particularly between Talkeetna and Devil Canyon. Suspended sediment levels between Talkeetna and Devil Canyon will be significantly reduced. Turbidity levels will be significantly reduced in the summer and slightly increased during winter. Downstream of Talkeetna,	roughly 4,000 gpm of fresh water for boiler makeup and miscellaneous uses.		

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY
ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	project impacts are expected to be less significant due to the influence of flows from the Chulitna and Talkeenta rivers.			
Terrestrial	Construction of the Susitna Hydroelectric projects (Watana and Devil Canyon dams and reservoirs) will result in the direct removal of vegetation from an area of approximately 42,000 acres covering a range of elevations from 900 to 2400 feet. An additional 7300 acres of unvegetated areas (mostly existing river area) will be inundated or developed. 84% of the vegetated area to be cleared is forest land. This	Surface mining and power plant operation would create long-term impacts on wildlife habitats. For one mining scenario, the ultimate pit boundaries cover roughly 8 sq. miles and the support facilities would cover roughly 500 acres. Mining operations would consume roughly 250 acres/yr. of habitat. New roads into the mine area would cause substantial losses in carrying capacity and productivity in the affected areas.	The incremental impacts of the Nenana mine expansion would probably be less than operation of the new Beluga mine. Impacts of the Nenana power plant would be similar to those of the Beluga plant.	Pipeline construction would require clearing of a 50-ft. right-of-way. Construction-related impacts could intermittently disrupt wildlife habitats during the 3-year construction period. The pipeline compressor stations and metering facilities would require roughly 100-150 acres of land. The Fairbanks generating station would have a minimal impact on wildlife.

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY
ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydro-electric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	represents 10% of the forest land within 10 miles of the Susitna River from Gold Creek to the north of the MacLaren River. Removal of vegetation and filling of the reservoir will reduce the carrying capacity of the area for wildlife. The presence of the reservoirs and the access roads will potentially impact movements of moose, caribou and other big game in the area. New roads would add access to this presently remote area. The Project, including access and transmission routes, will disturb			

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	18 recently active raptor and raven nests and 16 or 17 inactive nests.			
Air Quality	Short-term emissions during dam construction: particles, 1,300 tons/yr.; SO_2, 300 tpy; NO_x, 2,300 tpy. Long-term emissions after dam completion should be minimal. Ambient pollutant concentrations should be well below all applicable standards.	Short-term emissions would occur during power plant construction. Long-term power plant emissions: particles, 1,800 tpy; SO_2, 1,700 tpy. These emissions would occur for the entire power plant life. Ambient SO_2 concentrations would be higher than the short-term concentrations for the Susitna project, and could violate state air quality standards.	Emissions from the Nenana power plant should be similar to those from the Beluga plant. However, the Nenana site is located in a Class I PSD area. The air quality impacts of power plant emissions on the protected area would be very significant, and siting of any major power plant to meet very stringent PSD regulations would be extremely difficult.	Short-term emissions would occur during pipeline and power plant construction. Long-term power plant emissions: negligible particulates and SO_2; approx. 5,300 tpy of NO_x. Negligible emissions from pipeline compressor stations. Ambient pollutant concentrations would exceed those for the Susitna project.
Geology and Soils	Dam construction, reservoirs, borrow sites and construction camps would affect roughly 50,000 acres. Roughly 80-90	The Beluga mine and facilities would cover roughly 9 sq. miles. Mining operations would impact roughly 250 acres/yr. Topography in the mine area would be	The Nenana coal mine is already operating, so initial expansion would probably cause less impact than would startup operations of the new Beluga	The buried pipeline would cause localized soil impacts along the entire right-of-way. Pipeline compressor stations, gas conditioning plants and

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY
ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	miles of new access roads would be needed.	permanently affected. The power plant, coal storage, and ash disposal facilities would occupy roughly 75-150 acres.	mine. Long-term incremental mining operations would create impacts similar to those for the Beluga project. The Nenana power plant would create impacts similar to those for the Beluga plant.	the power plant would require roughly 150-200 total acres.
Aquatic Ecosystem	In the reservoir area, existing Susitna River and affected tributary aquatic habitat will change from free flowing to a reservoir. Aquatic resources characteristic of a large glacially-fed lake or reservoir would develop. Small lakes within the inundation zone would be similarly changed. Between Talkeetna and Devil Canyon, flow alteration is expected to provide a more stable regime and aquatic habitat with	Some aquatic habitat would be lost due to mining operations. In addition, increased siltation, streamflow reductions, reduced stream pH and increased trace metal concentrations could result from mine drainage and power plant effluent discharges. The adverse water quality impacts could reduce fish populations in local streams and interfere with anadromous fish runs, potentially reducing marine resources in the Cook Inlet region.	Impacts of the Nenana mining activities and power plant operation could adversely affect fish populations and anadromous fish runs in local streams. These impacts would be similar to those caused by the Beluga operation.	The gas pipeline would cross numerous small streams, as well as 15 major rivers and streams. Considerable mitigative measures would be required to prevent stream blockage due to pipeline freezing, increased stream velocity due to stream diversion, changes in stream temperature caused by presence of the chilled pipeline, and prolonged stream freeze-ups that could hinder fish migrations. The Fairbanks power plant would have minimal impacts on the aquatic ecosystem.

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY
ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	increased winter flows and decreased high summer flows (particularly floods). Access for adult salmon to sloughs is expected to be hindered. However, access is to be maintained by mitigation measures. Temperature regime changes resulting from reservoir releases may alter timing of specific life stages of fish such as time of spawning, incubation time and rearing. Multilevel intakes in the dams are expected to provide control of downstream temperatures so as to avoid or minimize this effect. Decrease in			

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY
ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	downstream sediment loads would be expected to increase benthic habitat; however, turbidity may minimize light penetration and productivity. Downstream of Talkeetna, project impacts are expected to be less significant due to the influence of flows from the Chulitna and Talkeetna Rivers.			
Socioeconomic	Impacts on the Mat-Su Borough should be minor, because most construction workers will be housed at the dam site. The total expected population increase during the Watana construction is 4,700 persons, 3,600 of which will live at the full service townsites at Watana.	Construction and operation of the Beluga mine and power plant could have major socioeconomic impacts. Construction activities would create an influx of over 500 workers into an area with low population and minimal infrastructure. Even if a construction camp were established, the presence of the	The Nenana site is situated near Fairbanks. Most of the 500 person labor force would probably originate from and live in the Fairbanks region. A severe boom due to Nenana plant construction and operation would therefore be unlikely. The overall socioeconomic impacts of the facility would probably be minimal.	Generator construction should have a minimal effect on the Fairbanks region. The estimated workforce for generator construction is 200-400 persons. Most construction workers would come from the Fairbanks labor pool. Minimal additional housing and services would be needed. Facility construction would create

RESPONSE TO COMMENT I.569 (cont.):

Table 1 (cont.)

SUMMARY OF ENVIRONMENTAL IMPACTS CAUSED BY ALASKA RAILBELT ELECTRIC POWER ALTERNATIVES

Parameter	Susitna Hydroelectric Project, 1620 MW[a]	Beluga Coal Field and 400 MW Coal Fired Generator	Nenana Coal Field Expansion with 400 MW Coal Fired Generator	North Slope to Fairbanks Gas Line with 400 MW Combined Cycle Generator
	Virtually all social services for the 3,600 persons will be provided by the contractor. The remaining 1,100 persons are expected to inmigrate to the local towns of Cantwell, Trapper Creek and Talkeetna. This relatively low population influx would increase the utilities and services costs for those towns by only a few percent. The total traffic flow on the existing Parks and Denali Highways will increase by only 30-35 trucks per day plus commuter vehicles. Additional snow removal and maintenance will be required for the Denali Highway.	required access roads and other facilities would probably create significant impacts. Operation of the mine and power plant would require between 100-200 permanent employees, most of which would probably live near the site. Considering that the largest local town, Tyonek, has a population of less than 250, the influx of permanent workers would create major socioeconomic impacts.		slight short-term increases in Fairbanks' traffic flow. Operation of the power plant would provide additional tax revenues for the region. For pipeline construction, workers could be housed in existing campsites used for the Trans-Alaska oil pipeline.

COMMENT I.570:

"Page E-10-122: Aquatic and Marine Ecosystems: We appreciate inclusion of quantitative estimates on area fishery resources and potential impacts to them. Similar estimates for consumptive use and for Susitna area resources should also be included."

RESPONSE:

Comment noted.

COMMENT I.571:

"Page E-10-141: 4.3.1 - Natural Gas: Since natural gas is considered by many to be the best single energy source alternative to the Susitna project 10-4/ it is disconcerting to see so minimal an effort expended examining this alternative. The effort should be at least equal to that provided for assessments of alternative hydropower sites and of coal. Anything less must be considered inadequate. No specific examination is made of natural gas and potential environmental impacts nor is a tradeoff examination made of natural gas and other alternatives."

"10-4/ Erickson, G.K. March 1981. Natural Gas and Electric Power Alternatives for the Railbelt. Legislative Affairs, State of Alaska, 9 pp.

"Tussing, A.R. and G.K. Erickson. August 1982. Alaska Energy Planning Studies: Substantive Issues and the Effects of Recent Events (Draft). Institute for Social and Economic Research, University of Alaska, 15 pp.

"See Footnote 10-1. [Footnote 10-1/ ADF&G. 1983. Synopsis of the 1982 Aquatic Studies and Analysis of the Fish and Habitat Relationships. Prepared for the APA.]"

RESPONSE TO COMMENT I.571:

The Power Authority objects to the characterization of its assessment as "inadequate." An economic and financial assessment of natural gas as an alternate source of electric power for the Railbelt is presented in Exhibit D. The economic analysis presented in Exhibit D indicates that natural gas is not an acceptable alternative to Susitna.

For a summary comparison of the environmental impacts of the proposed Susitna project, two separate coal mining/power plant options, and one North Slope natural gas transmission/electric generation alternative, please refer to the Response to Comment I.569.

COMMENT I.572:

"Page E-10-143: 4.3.4 - Environmental Considerations of Non-Coal Thermal Sources: We do not consider the potential environmental impacts of burning natural gas to be the same for diesel, oil, or coal. We recommend that environmental considerations be examined separately for each of these fuel alternatives. Then they should be examined through a tradeoff analysis which would include the proposed Susitna project, within basin alternatives, hydropower projects outside the Susitna basin, and non-hydropower alternatives to the proposed Susitna project."

RESPONSE:

Both diesel oil and crude oil were eliminated as viable fuel options because of economic considerations. Economic analyses were presented in Exhibit D of the FERC License Application.

For a summary of the environmental impacts of natural gas and coal usage, please refer to the Response to Comment I.569.

COMMENT I.573:

"Page E-10-162: 4.6.3 - Potential Application in the Railbelt: Greater emphasis 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

COMMENT I.573 (cont.):

potential geothermal development site within their jurisdiction. The lease sale was undertaken because the site: 1) has high potential (until exploratory drilling occurs, the viability of the site will be unknown); 2) is located on State land; and 3) is close to existing transmission lines (Beluga Station). In addtion, it is located between the Chakachatna River and the Beluga Coal fields, an area already being explored for power development, and crisscrossed by logging roads. It would also seem logical to explore the possibility of a West Cook Inlet power generation alternative to the Susitna project. This combination could include: Mt. Spurr geothermal, Chakachamna hydropower, Beluga coal, and West Cook Inlet natural gas. Obvious advantages would be found in the restriction of adverse environmental impacts to a relatively small area which already has transmission facilities."

RESPONSE:

As was discussed in Exhibit E of the FERC License Application, geothermal energy is not expected to be an electrical generating alternative to the Susitna project. The advantages and disadvantages to the use of geothermal energy were presented in Exhibit E. While the commentor's information on the Mt. Spurr geothermal site provides some additional advantages for that site over other geothermal areas, it is unlikely that the Mt. Spurr site would serve as a major power source for the Railbelt.

COMMENT I.574:

"Page E-10-173: 5 - ENVIRONMENTAL CONSEQUENCES OF LICENSE DENIAL: The evaluation should assess the timing and probable mix of alternatives if the license is denied. The objective should be to examine the environmental consequences of meeting the incremental increases in power demands as they occur, in light of current economic and power demands projections. The analysis should be directed at: 1) short-term planning, in the event that the Susitna project is delayed for various lengths of time; and 2) long-term planning so that the Railbelt region does have a fall back plan in the event that the Susitna project is not licensed. We recommend that such planning be undertaken."

RESPONSE TO COMMENT I.574:

The specific sequence of electrical power projects that would be constructed by private and public organizations would depend on many economic considerations. Please refer to Exhibit D of the FERC License Application for economic evaluations of alternative hydroelectric and geothermal power facilities that would have to be constructed if the Susitna FERC license were denied. See also the Power Authority Response to Comment I.540.

COMMENT I.575:

"The total proposed access plan is duly influenced by the preferences of private landowners in the Susitna project area. However, the more complete the project area is opened, the more significant attendant impacts on natural values and resources of the area will result."

RESPONSE:

See Response to Comment A.3.

COMMENT I.576:

"It is indicated that bridges are preferred (to culverts) but specific locations or limits of use are not specified."

RESPONSE:

See Response to Comment A.8.

COMMENT I.577:

"The transmission corridors are acceptable if state of the art siting and construction practices are employed."

RESPONSE:

See Response to Comment A.19.

COMMENT I.578:

"Section 4.3.1 infers that there is a supply of natural gas far exceeding expected demand in Cook Inlet. This source of fuel for energy generation was abruptly discussed and insufficiently weighed as an alternative."

RESPONSE:

See Response to Comment A.20.

COMMENT I.579:

"POWER SITE CONSIDERATIONS

"From the standpoint of resource utilization we note potential flaws with the plan formulation and selection methodology. Two basic assumptions were made which limited full consideration of the hydroelectric potential of the basin.

"The first assumption made was that rockfill dams should be used for comparison purposes at all damsites evaluated. We believe that valid comparisons can only be made if the type of dam that best suits the particular site is used for evaluation. To emphasize this point, it is noted that final designs use a thin arch dam at Devil Canyon and an earth fill dam at Watana rather than rockfill.

"The second assumption is that hydroelectric power sites can be compared on an individual basis when evaluating the potential of a river system. This simply is not so. The entire river system must be evaluated. The four principal local factors that determine the value of a power site are flow, head or water drop, damsite characteristics and storage which determines the percentage of flow that can be regulated so that it will pass through the turbine rather than over the spillway. Alaska hydroelectric sites need a large amount of storage because most of the streamflow is in the summer months and the heaviest electric loads are usually in the winter. An excellent damsite such as Vee would receive a low rating on an individual basis because of low storage unless it is combined with a site such as Denali which develops a large amount of storage with a low, relatively inexpensive dam. All of the upper Susitna sites except Denali have inadequate storage. Adequate storage can be developed at Vee and Watana only by building very high dams that are very expensive because it is necessary to extend the dam above the existing canyon.

"All of the sites on the upper Susitna River, i.e., Devil Canyon, Watana, Susitna No. 3, Vee, Maclaren and Denali could be developed at a cost that should be at least $1 billion less than the proposed plan by limiting Watana height to the tailwater of Susitna No. 3 and not submerging Susitna No. 3 and Vee. This would permit utilizing the full available head of about 1,550 feet versus about 1,300 feet in the proposed plan. Power could also be developed at Denali. A past decision not to install a powerplant at Denali was made when crude oil cost about $2 per barrel.

COMMENT I.579 (cont.):

"Further cost reduction may be possible by utilizing either a rockfill or thin arch dam at Watana after the height reduction brings the dam back within the natural canyon.

"The application appears to have rejected Denali solely on economic grounds with the single dam evaluation methods employed. The Corps of Engineers in its 1975 report on the Upper Susitna Basin also decided not to investigate Denali further because of geologic considerations. It does not appear that a thorough geologic examination was conducted to reach this conclusion.

"In 1958-59, our Bureau of Reclamation drilled five holes and excavated fourteen test pits and trenches at the Denali site. Samples were sent to the laboratory at the E&R Center, Denver Colorado. After the geologic examination was complete, it was concluded that Denali was a physically suitable damsite. Even if considerable foundation work is required, it would appear that this key damsite should not be abandoned without a thorough investigation. It offers the only low-cost storage in the Upper Susitna Basin.

"Full system development offers the advantage of staging whereas the applicant's proposal does not. Its proposal is saddled with the enormous initial costs required for the first stage which would be the high Watana Dam. In contrast, Denali, MacLaren and Vee, along with all transmission faciliites, could all be built for half the cost of Watana."

RESPONSE:

The Power Authority believes that the plan formulation and selection methodology used for alternative site considerations is reasonable and that the evaluation is adequate.

The planning principle espoused by DOI is indeed valid, that is to say "...valid comparisons can only be made if the type of dam that best suits the particular site is used for evaluation." This is recognized by the Power Authority; however, the use of rockfill dams for comparative studies should not significantly affect the choices for project development for the following reasons:

1. Where foundation data were not available, it was considered prudent to use fill dams rather than concrete dams because fill dams can accommodate weaker foundations. The regional geology interpreted in light

of the serious foundation problems at some of the sites where there had been a degree of foundation exploration (Devil Canyon, Denali, Vee and Watana) did not justify optimism concerning foundations at the remaining sites. Indication of (a) no substantial rock in the foundation (Denali), (b) deep weathering, drift and talus on the abutments (Vee) or (c) deep relict channels near the Susitna River (Vee, Watana and Devil Canyon) were not conducive to high expectations at sites that had not been drilled (MacLaren, Susitna III and High Devil Canyon). Reference Appendix D, Table D.2 - Geotechnical Design Considerations contained in the following two-volume report: Acres American Incorporated, Susitna Hydroelectric Project, Development Selection Report (December 1981), prepared for the Alaska Power Authority.

2. The later comparison of costs of rockfill dams to concrete dams at Watana and Devil Canyon tended to demonstrate that the choice of rockfill over concrete dams did not affect the evaluation of project development sites in any event. Comparison of cost of a rockfill dam with a concrete dam at the Watana site indicated that the concrete would not produce any significant cost savings. A similar analysis of the Devil Canyon site showed that the rockfill dam did not offer significant cost savings in relation to a thin arch dam. Reference Appendix H, pages H-5 and H-4, respectively, of the above-referenced Development Selection Report.

3. The "rockfill" assumption was extended to consider earth/rockfill with a flattening of embankment slopes (and increase in volume of fill although the incremental fill costs less per unit of volume than the average cost of rockfill) where the foundation was known (Denali) or suspected (MacLaren) to be weak. Reference Appendix D, Table D.2, of Development Selection Report. At these sites, the layout most appropriate to the foundation conditions, i.e., earth/rockfill, was used.

The premise that the comparison of individual sites cannot be used when evaluating the potential of a river system is not universally true, but can be accepted on a limited basis for the Susitna Basin. However, this comment is something of a puzzle since the underlying studies contain both comparisons of systems and sites. For example, FERC License Application Exhibit B, Table B.5 clearly demonstrates the

RESPONSE TO COMMENT I.579 (cont.):

results of comparisons of systems as well as individual sites.

During the site screening studies four basic criteria were used; these included environmental, alternative sites, costs and energy contribution. Individual sites were eliminated as being unacceptable for environmental reasons or for being the least promising of two mutually exclusive alternatives as shown below (see also the Response to Comment I.544).

Unacceptable	Excluded By More Favorable Alternatives
Gold Creek	Devil Creek/High Devil Canyon
Olson	Butte Creek/Denali
Tyone	

A screening model was used with data on the Devil Canyon, High Devil Canyon, Watana, Susitna III and Vee as power sites and MacLaren and Denali as sites for river regulation. Both MacLaren and Denali were eliminated, in the process of program operation, because they did not contribute enough to energy generation, in comparison to their cost, to be justified. Reference Appendix E, Paragraphs E.3 (page E-3) and E.5 (page E-5), Development Selection Report.

The screening studies did in fact test the cost aspects of different arrangements of the sites with different sizes of dams (License Application Exhibit B, Table B.5). However, power generation at Denali was never included. This increment to the Susitna Basin development is not precluded by the proposed project. This is only partly pertinent since it was shown that an increment of generation at Denali is much more costly than a unit of generation at the Susitna Project.

There is also a point made that additional head (1,550 feet vs. 1,300 feet) could be derived by including Vee (or Susitna III). For the given demands, the screening studies determined the most economical solution was Watana and Devil Canyon when compared to a development with Vee. The additional head is not justified.

The data provided from the Bureau of Reclamation drilling indicates that Denali has relatively unsuitable foundations. Reference Appendix D, Table D.2, Development Selection Report. However, Denali was excluded from the Susitna Project on the basis of the economic evaluation. This conclusion does not preclude or even prejudice its eventual development. Denali also is known to be very objectionable

RESPONSE TO COMMENT I.579 (cont.):

environmentally because of its effects on caribou feeding grounds and migration routes (see also, the Response to Comment I.544).

The Power Authority's study incorporates the following preliminary data regarding costs of Denali, MacLaren and Vee as contrasted to Watana.

Development	Cost 1980 $ x 10^6	Dam Height feet	Annual Energy GWh/yr	Investment per Annual KWh $
Watana	1,860	880	3,250	0.57
Vee	1,060	610	1,370	0.77
MacLaren	530	185	180	2.94
Denali	480	230	245	1.96

MacLaren and Denali would provide downstream storage benefits at Vee. Denali plus Vee, with Denali contributing 600 GWh annually to Vee, would provide 2,215 GWh annually for $1,540 million or $0.70 per annual kilowatt hour. The cost of energy from the combination exceeds the cost of energy from Watana.

A study of combinations of sites shows the following:

Sites	Cost 1980 $ x 10^6	Annual Energy GWh/yr	Investment per Annual KWh $
Watana plus Devil Canyon	2,860	6,230	0.46
High Devil Canyon plus Vee	2,560	4,910	0.52
Devil Canyon plus Watana 680 ft plus Vee	3,260	5,290	0.61
Devil Canyon plus Watana 680 ft plus Denali	2,680	4,165	0.64

The investment cost of Watana is indeed greater than most of the alternatives but its power generation is more than correspondingly greater. The features of the three alternative development sites are not additive in that backwater from Vee will interfere with the MacLaren site

RESPONSE TO COMMENT I.579 (cont.):

once the height of the dam at Vee exceeds 405 feet. This summary analysis, while containing approximations, is a comparative illustration of costs and functions of the alternatives. The much more comprehensive screening analysis of the plan selection studies addressed the question of this and other alternatives before indicating the preference for proposed Project.

REFERENCES

Acres American, Inc., Susitna Hydroelectric Project, Development Selection, Final Report (December 1981), previously submitted to the FERC on March 15, 1982.