UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of PUGET SOUND POWER & LIGHT COMPANY, et al.	)	Docket Nos. 50-522 50-523
(Skagit Nuclear Power Project, Units 1 and 2)	)	November 30, 1979

APPLICANTS' REPLY TO SCANP PROPOSED FINDINGS

This is Applicants' reply to Intervenor SCANP's proposed findings of fact dated October 12, 1979 (SCANP Proposed Findings).

1595 093

TABLE OF CONTENTS

TABLE OF CONTENTS

1595 095

A. Environmental Impact Statements

1. As is the case in many parts of the SCANP Proposed Findings, much of the discussion under this heading is actually an attempt to raise new issues. Thus, while the adequacy of Applicants' Environmental Report; compliance with the Fish & Wildlife Coordination Act; responsiveness to environmental impact statement comments; recognition of Ranney Collector System design modifications; consideration of Indian populations; environmental impact statement completeness with respect to cooling water system alternatives; and consideration of environmental impacts outside of the United States are nowhere mentioned in the SCANP Contentions or those of any other party, they are the subject of the bulk of this portion of the SCANP Proposed Findings. SCANP Proposed Findings Nos. 1, 2-7, 14-15, 22-25, pp. 1-4, 6-7, 9-11. SCANP was cautioned concerning this problem a number of times and offered an opportunity to amend its contentions. See, e.g., Tr. 2147-168, 2171-178. However, it never bothered to do so. Having failed to raise issues in contentions, it is now too late to attempt to place them in controversy by means of proposed findings, at least in the complete absence of a showing of direct interest. See, e.g., Northern States Power Co. (Prairie Island Nuclear Generating Plant, Units 1 and 2) 8 AEC 857, 867 (1974); 10 CFR Part 2, App. A. § III(a)(3). Further, they are all without merit.

2. As for the adequacy of the environmental review of the Project with respect to aquatic and terrestrial impacts, construction work force impacts, the economic significance of the Skagit River fisheries and surrounding agriculture, Ranney Collector System design modifications, alternative sites, genetic or somatic effects due to releases, the impact of cooling towers and other structures on birds, and the consideration of accidents (see SCANP Proposed Findings Nos. 9-21, pp. 5-9), full consideration of these matters is presented in the Staff and Applicants proposed findings and/or elsewhere in this reply and need not be repeated here. Further, the social and economic costs associated with the generation of electricity to meet regional needs will be treated in proposed findings on the cost-benefit analysis for the facility, to be filed later.

3. Insofar as the issue of a surface water intake structure as an alternative to the proposed Ranney Collector System is concerned (SCANP Proposed Findings Nos. 1, 23, pp. 1, 9-10), the record reveals that the matter was fully disclosed and discussed in both the Environmental Report, Exh. 4, §§ 10.2.1 and 10.2.2, and the FES, p. 9-13. Consideration of this alternative was later discontinued as being unreasonable and, in any event, would require additional NRC and State approvals. Tr. 7869, 7917-920, 10,471-474, 10,636, 12,281-283.

4. With respect to SCANP's complaint concerning the NRC Staff's response to a Department of Commerce comment on fish facility discharges in light of possible, future pollution standards (SCANP Proposed Finding No. 7, pp. 3-4), the reply was, in fact, responsive. Among other things, it referred to section 3.7.3 of the FES which notes that the effect of the fish-rearing facility on the composition of Project discharge "will be nearly negligible." The comment then concludes that

> [T]he total effect of the discharge is not expected to violate established water quality standards. Therefore, additional treatment of the fish-rearing effluent appears unnecessary.

FES, p. 11-4. In context, the term "established" need not be limited to encompassing present, but may be expanded to include anticipated standards.[1] As for compliance with Council on Environmental Quality guidelines, as embodied in 40 CFR

---

[1]Further, 10 CFR § 51.26(b), contrary to the reading suggested by SCANP, does not require a complete response to each and every comment but "a meaningful reference to the existence of any responsible opposing view not adequately discussed in the draft environmental statement, indicating the response to the issues raised." It then continues:

> All substantive comments received on the draft (or summaries thereof where the response has been exceptionally voluminous) will be attached to the final statement, whether or not each such comment is individually discussed in the text of the statement.

(Emphasis added.)

§ 1500.8(a)(1) (1978) (see SCANP Proposed Finding No. 12, pp. 5-6), it should be noted that the FES Final Supplement was modified to take into account precisely the State of Washington Department of Game comment referred to by SCANP. See FES Final Supp., pp. 4-19, 11-6, A-12.

5. SCANP also asserts that there has been a failure to comply with the Fish and Wildlife Coordination Act, 16 U.S.C. § 661 et seq. SCANP Proposed Findings Nos. 4-6, pp. 2-3. The short answer is that it has long been well established that good-faith compliance with NEPA will automatically take into consideration all of the necessary factors under the Fish and Wildlife Coordination Act (FWCA), and that to require separate compliance with both would be unreasonable. See, e.g., Environmental Defense Fund, Inc. v. Froehlke, 473 F.2d 346, 356 (8th Cir. 1972); Sierra Club v. Morton, 400 F. Supp. 639, 640 n.47 (N.D. Ca. 1975); Cape Henry Bird Club v. Laird, 359 F. Supp. 404, 417-18 (W.D. Va. 1973), aff'd, 484 F.2d 453 (4th Cir. 1973). Since the Skagit proceeding clearly reflects good-faith compliance with NEPA, the requirements of the FWCA have been met.

6. Moreover, National Wildlife Federation v. Andrus, 440 F. Supp. 1245, 10 ERC 1353 (D.D.C. 1977), cited by SCANP, is not to the contrary. Although the court there did find a

failure to comply with the FWCA, it did so in a situation where not only had there been a failure to meet the requirements of NEPA, but--in addition--the construction of a federal dam was proceeding without proper congressional authorization. Accordingly, action was occurring of which Congress, in the absence of the report prescribed by the FWCA (16 U.S.C. § 662(b)), was unaware. Id. at 1255, 10 ERC 1360. Thus, the facts of that case are clearly distinguishable from those here.

7. Further--and apart from the question of compliance with NEPA, as such--the requirements of the FWCA have, in fact, been met. The Department of Interior was consulted at the time of the preparation of both the FES and FES Final Supplement and commented on both.[2] See FES, p. ii; FES Final Supp., pp. ii-iii. Washington State has been consulted and constantly involved with the Project by means of, for example, proceedings before the Washington State Energy Facility Site Evaluation Council--of which both the State Department of Fisheries and the State Department of Game are members--and comments of the

---

[2]Contrary to SCANP (see SCANP Proposed Findings, p. 2) the comments have been thoroughly considered. The effects of dredging should not be of concern since no dredging is expected in connection with the pressure vessel delivery. See, e.g., FES Final Supp., fol. Tr. 7766, p. 4-20. Floodplain effects, of course, have been addressed in detail. See, e.g., Tr. 14,472-558.

State Parks and Recreation Commission, Department of Ecology, and the Department of Game on the FES and FES Final Supplement. See, e.g., Exhs 57, 84; FES, p. ii; FES Final Supp., p. iii. All are part of the record of this proceeding. Thus, the specific requirements of the FWCA, as embodied in 16 U.S.C. § 662(a), (b) have, in fact, been met.

8. Finally, with respect to environmental impacts and Indians (see SCANP Proposed Finding No. 22, p. 9), the FES and FES Final Supplement are both nondiscriminatory in addressing, among other things, environmental impacts on the population as a whole, including Indians. Where special impacts are concerned, such as Indian fishing, they have been considered. See FES, Table 2.11 and §§ 4.3.1, 11.7.9. Insofar as environmental impacts outside of the United States are concerned, they, too, have been adequately considered, as discussed in "Applicants' Answer to Intervenor SCANP's Motion To Require Implementation of Executive Order 12114," filed with the Board on November 1, 1979. SCANP Proposed Findings Nos. 24-25, pp. 10-11.

B. Impacts of Construction

9. The matter of construction impacts was nowhere raised in the contentions of SCANP or any other party. Accordingly,

1595 101

as in the case of Environmental Impact Statements, it is improper to place issues into controversy now by means of proposed findings. Nevertheless, as the discussion below demonstrates, the points raised by SCANP are without merit.

10. With respect to terrestrial impacts (SCANP Proposed Findings Nos. 1-3, pp. 13-15), and in contrast to the statement on page 13 of the SCANP Proposed Findings, the Staff did not characterize the impact of land clearing as "temporary." In fact, the very portions of the record cited by SCANP in support of its statement are to the contrary; the cited portions refer to such things as "a loss of habitat for several species of fauna," and the permanent nature of the "terrestrial impacts associated with . . . road construction."

11. The other point missed by SCANP is that only a relatively small amount of land will be disturbed in the first place: an onsite plus offsite total of about 500 acres. FES, § 10.1.1.1. Moreover, the record contains extensive documentation--other than the Goldstein and Dvorak testimony criticized by SCANP--establishing that the onsite and offsite construction areas represent but a tiny fraction of terrestrial biota habitats in the site region and contain no unique habitats. Myers, fol. Tr. 2627, p. 2; FES, §§ 2.7.1, 4.4.1, 5.1.1; FES Final Supp., §§ 5.4, 5.5, 5.6; Exh. 4, §§ 2.7.2.2, 2.7.3.2, 4.1.1, 4.3.

12. With respect to siltation control measures and "flash storms,"[3] (SCANP Proposed Finding No. 4, p. 16), limits have been established in the NPDES Permit on the basis of a 10-year, 24-hour rainfall event. See Exh. 83, Attachment I, p. 9. A monitoring program will be established and, if limits are not met, remedial action taken. See Exh. 4, § 4.1.2.1.2.

13. With respect to the discharge diffuser (SCANP Proposed Findings Nos. 5-6, pp. 16-17), its location has been determined. See, e.g., FES Final Supp., pp. 4-14; Exh. 83, Attachment I, p. 2. The NPDES Permit does require an investigation with respect to the precise location of the diffuser and possible improvements. Exh. 83, Attachment I, p. 17. However, no major changes in the impact of the diffuser are expected. FES Final Supp., § 11.12.2. As to the actual installation of the diffuser itself, construction effects, including the production

---

[3]It should be noted, from the record, that Mr. Newman's testimony, referenced on p. 16 of SCANP Proposed Findings, does not concern construction run-off, but that from the Bacus Road SR-20 intersection pavement. Tr. 6821-823.

of some turbidity and the loss of some benthic habitat, have been evaluated and found acceptable. See, e.g., FES, § 4.4.2; Derickson, Tr. of 31 July 1975 (Vol. II), pp. 1-3. See also Applicants Proposed Finding No. 30, p. 17.

14. As for barge slip construction (SCANP Proposed Finding No. 7, pp. 17-18), there is no inconsistency between the Staff's statements in the FES and FES Final Supplement and the quoted finding of fact. It is clear that the turbidity expected by the Staff is from cofferdam installation and removal, as well as possible shoreline restoration, and not from discharges of construction water. See FES Final Supp., § 4.4.3. Insofar as coordination with the Army Corps of Engineers is concerned (SCANP Proposed Finding No. 8, p. 19), required permits for both the barge slip and discharge diffuser will, of course, be obtained. Thus, Corps involvement is assured.

15. In connection with Reactor Pressure Vessel (RPV) delivery, SCANP suggests that the removal of snags in the river (which might impede barge passage) could have adverse effects on the aquatic environment. SCANP Proposed Finding No. 9, p. 19. The NRC Staff, however, conducted a detailed assessment of barge travel up the river and found the expected impact on aquatic biota from snag removal to be insignificant. NRC Staff Assessment of Impacts Associated with the Delivery of the Reactor Pressure Vessel ("RPV Delivery Assessment"), fol.

Tr. 12,216, pp. 4-8. See also Hulman, et al., fol. Tr. 14,476, p. 5; Tr. 14,490-495. As for the installation of culverts and resultant "reduction in spawning and rearing habitat" (SCANP Proposed Finding No. 10, pp. 19-20), it is relevant to note that only small portions of Hansen and Coal Creeks will be affected. RPV Delivery Assessment, fol. Tr. 12,216, pp. 10, 12. Further there is no evidence in the record indicating that the affected areas will not return to their original state. In fact, the uncontradicted conclusion of the Staff is that culvert installation and the lining of the bottom with gravel "may produce salmonid spawning habitat but, at a minimum, culvert installation should not remove potential spawning habitat." Id., p. 12. With respect to siltation, as the Staff has noted, most particulate matter will settle out near the construction area and remain there until fall, when runoff increases, whereupon it will be redistributed downstream with natural sediments by the flushing action. Id., p. 9. Further, the number of any steelhead trout emerging should be small; with emergence complete by mid-July. Id.

16. SCANP devotes considerable attention to possible siltation resulting from road and sewer pipeline construction and related effects. SCANP Proposed Findings Nos. 11-20, pp. 21-29. However, in spite of SCANP's statements to the contrary, the record is clear that virtually no harmful siltation

should result. The road and sewer work was analyzed by numerous witnesses, including Mr. Goettge, a civil engineer for the Applicants, and Dr. Goldstein, an aquatic ecologist for the Staff. Tr. 6727; Goettge, fol. Tr. 6598, Appendix A. No serious problems with siltation were identified. See, e.g., Goettge, fol. Tr. 6598, Appendix A, pp. 5-6, 11-12; Dvorak, et al., fol. Tr. 6732, pp. 6-8. With respect to the road work, even SCANP witness Newman indicated--modifying his earlier testimony somewhat--that direct surface drainage, carrying silt, from the area of major work would not enter Wiseman Creek. Tr. 6812-815, 6818-825. As far as the sewer line is concerned, as it approaches each of the bridges (over Wiseman, Coal and Hansen Creeks), it angles up from the trench to the ground surface near the bridge. The routing is such that the stream banks will not have to be disturbed with any heavy equipment, thereby preventing the possibility of silt entering the streams from the work. See Goettge, fol. Tr. 6598, pp. 2, 3; Finnegan, fol. Tr. 6591, p. 4; Exh. 104.

17. SCANP also makes mention of allegations--all raised by Mr. Newman--concerning the possibility that the sewer line trench could act as an aquifer, causing water to flow toward the streams (especially on the west side of Coal Creek); that the trench could drain existing wet areas; and that significant erosion might occur as a result of roadwork. SCANP Proposed

Findings Nos. 11-13, pp. 21-23. With respect to the possible flow of water to the streams, however, the sewer line profile drops quite rapidly west of Coal Creek (Exh. 113, Sheet 5 (Stations 43+75 to 55+00)) except in a 160-foot stretch just west of the creek. In that stretch, there is a slight slope of the sewer line down toward the creek, but this slope ends outside the creek bank as the sewer line rises to be attached to the bridge. Exh. 113, Sheet 5 (Stations 42+13.77 to 43+75). Therefore, even if the sewer line might act as an aquifer, the amount of drainage would be small and would be intercepted by the creek bank. Near the other creeks the sewer line slopes away from the creeks. Exh. 113, Sheet 3 (as modified at Tr. 6926-926), and Sheets 11, 12; Tr. 6839. Accordingly, the stated concern is not justified.

18. As for the possibility that the sewer line might drain wet areas, this would appear extremely unlikely since the wet areas are already lower than surrounding terrain and, hence, would not be drained by the sewer line trench. Tr. 6870, 6893-894. For example, Mr. Newman pointed out a boggy area north of SR-20 and west of Coal Creek. Exh. 112, Photograph 9; Tr. 6827. However, the profile of the sewer line shows this area as being a depression with the sewer line rising both east and west of the area. Exh. 113, Sheets 5, 6, and 7 (Stations 43+75 to 80+00). In addition, Mr. Newman indicated that the

possibility of draining wetlands is based on his assumption that the trench would be left open for a month or two during the dry season. Tr. 6893-894. As he recognized, such a practice is extremely unlikely. Tr. 6705, 6882.

19. In addition, with respect to erosion, measures such as revegetation, netting and straw will be employed for control. Goettge, fol. Tr. 6598, pp. 6-7, and Appendix A, p. 10; Dvorak, et al., fol. Tr. 6732, pp. 9-10. Even SCANP witness Newman has agreed as to their efficacy. See, e.g., Tr. 6846, 6853-854.

20. In essence, the conclusions offered by SCANP are based on the premise that there will be significant siltation. As discussed above, however, this premise is in error. Such siltation as does occur will be small and distributed over various phases of construction. Further, construction activities will be timed to minimize the impact of erosion. See, e.g., Tr. 2656-661-A. Insofar as SCANP's criticism of environmental monitoring is concerned, conclusions of the Applicants and the NRC Staff are based on recent field work[4] and the

---

[4]With respect to "differences of opinion between the Washington State Department of Fisheries and the Dames and Moore consultant to the Applicant" (SCANP Proposed Findings, pp. 24-25), information has, in fact, been updated as a result of certain more recent investigations performed in connection with the Project. See Tr. 2026-028. However, this is not a problem and, in fact, would be expected.

application of standard scientific techniques and clearly provide an adequate basis for assessing impacts. See, e.g., Exh. 4, § 2.7.5; FES, § 4.4.2.; Tr. 7025-027.

21. In concluding, SCANP refers to effects of clearcutting along streams, the discharge of water used to flush water-bearing systems, noise, dust and the burning of non-merchantable timber. SCANP Proposed Findings Nos. 21-24, pp. 29-31. With respect to tree removal, due to recent clear-cut logging in the site vicinity, construction activity onsite and along rights-of-way will result in only a small increase in stream length from which the canopy is removed, therefore causing only minor alteration in ambient temperature, with little impact on fish populations. Minimizing the length of stream bank cleared and preserving a buffer zone adjacent to the stream will further reduce temperature effects, as will the cooling effects of downstream ravines and waterfalls. Furthermore, most salmon spawning occurs during the period of high-water flow and minimal insolation when temperature increases will be least. FES, § 4.4.2.2; Exh. 4, § 4.1.2.1.1. System flushing water, of course, will meet NPDES standards; and the generation of noise, dust and burning of non-merchantable timber have all been evaluated and found acceptable. FES Final Supp., §§ 4.1.11, 4.2.10, 4.3.10, 4.4.10, 4.5.10, 4.7.1, 4.7.10, 5.9; FES, § 4.5.3; Myers, fol. Tr. 2627, pp. 6-7; Exh. 4, §§ 4.1.1.4, 4.1.1.5.

C. Socio-Economic Impacts

22. In its proposed findings on socio-economic impacts, SCANP addresses two subjects: (1) construction work force immigration, and (2) construction traffic. SCANP Proposed Findings, pp. 32-41. Since neither subject was raised in any contention, it is impermissible for SCANP to attempt to place these matters into controversy now by means of proposed findings. In any event, the findings proposed by SCANP are without merit.

1. Construction Work Force Immigration

23. SCANP argues that the delay in the commencement of construction will result in a significantly larger labor force. SCANP Proposed Finding No. 3, p. 32. This is speculation, without support in the record.

24. SCANP challenges Dr. Winters' conclusion that it is likely that the Skagit work force can be recruited from the Bellingham-Seattle labor pool. SCANP Proposed Finding No. 4, p. 33. SCANP attempts to undercut this conclusion by suggesting that it is an assumption with no basis in fact and that Dr. Winters failed to consider the possibility of other major construction activities within the same labor pool area. It is clear, however, that Dr. Winters' conclusion was no mere

assumption but was based on data comparing worker availability with the needs of Skagit. Winters, fol. Tr. 13,361, pp. 8-10. These data show excess workers in all crafts, who would be available for other construction projects in the area. Id., p. 10. As for the possible effects of the Boeing expansion in Everett, the suggestion that Boeing will employ the same skills as needed for Skagit is speculation, at best. Tr. 13,893-895. The possible effects of the proposed Northern Tier pipeline are also quite speculative, both as to area of impact and construction schedule. Tr. 13,828-831; Exh. 194.

25. Dr. Winters estimated that "perhaps 5 to 10 percent" of the Skagit work force would be willing to commute daily from the Seattle area. Winters, fol. Tr. 13,361, p. 8. However, SCANP argues that even fewer will be willing to do this because of the expense. SCANP Proposed Finding No. 5, pp. 33-34. It is equally logical to conclude that the increased cost of gasoline will promote carpooling and that this, coupled with the tight housing market in Skagit County, will increase rather than decrease the number of workers willing to commute from the Seattle area. At best, this matter also is rather speculative.

26. SCANP seeks to undermine Dr. Winters' estimate that about 20 percent of the peak work force will move to Skagit, Whatcom and Snohomish Counties, by suggesting that his estimate

is based on guesswork and unfounded assumptions. SCANP Proposed Finding No. 6, pp. 34-35. To the contrary, Dr. Winters relied, in part, on the experience at Trojan. Winters, fol. Tr. 13,361, p. 10. The figure for Trojan was an estimate, not an assumption or guess, as implied by SCANP. This was made clear by Mr. Myhra in the questions and answers that immediately follow those quoted by SCANP:

> Q. Did they conduct any surveys to establish that or did they advise you that they established that?
>
> A. They advised me that that was their best estimate.
>
> Q. They advised that 90 percent of the workers were workers who previously resided in the area?
>
> A. Yes, that's correct.

(Myhra testimony, TPPSEC Application 74-1, Vol. X, p. 166, as cited by SCANP, p. 35.)

27. Finally, SCANP questions the ability of Skagit County, through land use, zoning and other measures, to control and mitigate the effects of whatever level of work force immigration may occur. SCANP Proposed Finding No. 8, pp. 36-38. In so doing, however, SCANP ignores the opinion of the Skagit County Planning Department that "adequate measures can be taken to mitigate any adverse impacts arising from this influx of construction workers." FES, p. A-37. It also ignores the pertinent provisions of the rezone contract between Puget and Skagit County, particularly Articles 5.2 and 5.3, which provide

for construction impact payments to school districts and for law enforcement agencies. Exh. 4, Appendix K, Part 4. Even more comprehensive is Article VI C, Social and Economic Impacts, of the Skagit Site Certification Agreement between Puget and the State of Washington, which provides for the monitoring of primary and secondary socio-economic impacts, and for the payment of claims for such impacts to counties, cities, school districts and other governmental agencies. Exh. 83, pp. 32-34. When these matters are taken into account, the conclusion of the Staff that the impacts associated with the in-migration of workers will be acceptable is amply supported. Winters, fol. Tr. 13,361, p. 12.

2. Construction Traffic

28. All parties recognize that the construction traffic will, at times, result in some traffic congestion. The question is how bad will the congestion be and how much weight should be attributed to it in striking the cost-benefit balance. Although not mentioned by SCANP in its proposed findings, an important factor in answering this questi s Article III N, Construction Traffic, of the Site Certification Agreement, which provides for the development of plans and methods to prevent traffic overloads. Exh. 83, pp. 22-23.

1595 113

These measures provide assurance that the impacts of construction traffic will be acceptable. We turn now to the details urged by SCANP.

29. SCANP argues that the average vehicle occupancy rate used by MacIsaac, Applicants' traffic expert, was overly optimistic and based on specious assumptions. SCANP Proposed Finding No. 10, pp. 38-39. SCANP attempts to support this argument by suggesting that MacIsaac failed to understand the derivation of the 1.44 occupancy rate stated in a Woodward-Clyde report, and revised it upward without sound reasons. However, as MacIsaac explained, the derivation of the 1.44 figure is simply not given in the Woodward-Clyde report. Tr. 2345-346. MacIsaac did not revise the Woodward-Clyde figure, he simply rejected it as unsupported. Then, using the same raw data as Woodward-Clyde, he derived his own occupancy rate estimate in the manner and using the sources and rationale he identified. MacIsaac, fol. Tr. 2292, pp. 5-6; Tr. 2343-348. If anything, in view of the worsened outlook for the price and availability of automobile fuels since MacIsaac testified in July 1975, it seems likely that his occupancy rate estimate was too low rather than too high.

30. SCANP argues that MacIsaac's assumption of service level E caused him to overestimate the capacities of the local roads. SCANP Proposed Finding No. 11, pp. 39-40. SCANP fails

to note, however, that the road capacities MacIsaac used in preparing his estimates were those suggested by the Washington State Highway Department for the particular roads involved. Tr. 2324-325. Thus SCANP's level of service argument misses the point. The same is true of its argument based on the sub-standard lane width (11 vs. 12 feet) of SR-20. SCANP Proposed Finding No. 12, p. 40. Again, the capacities used by MacIsaac reflect the judgment of the State Highway Department as well as the existing conditions of the particular roads involved. Tr. 2324-325.

31. SCANP's final point is that as of the time of MacIsaac's testimony in July 1975, neither Skagit County nor the State of Washington had developed plans or appropriated funds for the road improvements envisioned by MacIsaac. SCANP Proposed Finding No. 14, p. 40. However, MacIsaac was optimistic that the legislature would respond favorably to the identified need given the relatively low cost of the improvements envisioned. Tr. 2333-334. Additionally, subsequent to MacIsaac's testimony, Puget entered into the previously mentioned site certification agreement which includes, among other improvements to facilitate construction traffic, left turn channelization as well as financing by Puget. Exh. 83, Article III N, pp. 22-23.

D. Cooling Tower Operation

32. SCANP exaggerates plume visibility by citing only the maximum winter plume length. The visible plume is longer in the winter because the capacity of air to hold moisture decreases with colder temperatures. SCANP Proposed Finding No. 1, p. 42. The plume lengths will average 300 meters (980 feet) in summer, and about 1300 meters (4300 feet) in winter. Exh. 4, § 5.1.3.2, FES § 5.3.1.1. The Staff found these predictions of plume lengths to be reasonable. FES § 5.3.1.2.

33. SCANP Proposed Finding No. 2, pp. 42-43, includes quotations from the FES regarding 1) the possibility of inadvertent weather modifications, and 2) the suggestion that fallout of salts contained in the drift could adversely affect soil and vegetation in the area. However, the subsequent conclusions of the Staff, which SCANP fails to quote, are first, that "observations do not support any serious concern over possible weather modifications," and second, that, "the maximum salt deposition from drift is therefore expected to be less than the normal deposition from rainfall." FES § 5.3.1.2. SCANP Proposed Finding No. 2, should, therefore, be rejected as incomplete and misleading.

34. Contrary to SCANP's assertion that few studies have been made on the impacts of existing natural draft cooling towers (SCANP Proposed Finding No. 2, p. 43), studies on the characteristics, operation, and impacts of existing natural draft cooling towers are wide in scope and numerous. See, e.g., FES § 5 (Refs. 1-7, 10-17, 19, 23, 24); FES § 11 (Refs. 11, 12, 13); Exh. 4, § 3.4 (Ref. 1); Exh. 4, § 5.1 (Refs. 19, 22, 23); Tr. 3123-125, 3247, 3255-256.

35. With regard to SCANP's assertion that studies have been done in places "very different" from the Skagit Valley (SCANP Proposed Findings No. 2, p. 43), the record indicates that the areas studied have not been dissimilar to Skagit in topographic features, Tr. 3257, or in climate, FES § 5.3.1.2. Even SCANP's own witness, Professor Badgley, testified that the British experience with natural draft cooling towers indicated, at most, minimal effects on climate, rain, and snow, and that this represented an analogous situation to the Skagit River Valley. Tr. 3151-152.

1. Meteorological Data Base

36. SCANP states that Professor Badgley found numerous flaws and shortcomings in the Applicants' study of meteorology and that more studies are needed. SCANP Proposed Findings Nos. 3-7, pp. 42-45. In fact, SCANP witness Badgley testified that he was in general agreement with the Staff's evaluations,

calculations, and conclusions. Tr. 3132. He testified that the routine determinations of meteorological conditions had been performed and that no deficiencies in the gathering of the data existed. Tr. 3135. Dispersion calculations had been made in a proper and routine fashion and accurately reflected dispersion at the site. Tr. 3149, 3178.

37. With regard to the concern that the induced wind from the cooling tower could overpower the natural winds and draw in materials, Professor Badgley testified that no additional data is needed. Tr. 3154-155. With regard to maximum downflow of air from the site to the valley, no additional data is necessary to determine the extent of the flow and its confinement within the valley. Tr. 3181. With regard to the Pasquill categories, Badgley testified that the use of 60-meter and 10-meter data was sufficient to delineate those categories. Tr. 3160. When asked whether instrumentation at a level of 3,000 or 4,000 feet on Cultus Mountain would be helpful, Badgley testified that from a theoretical standpoint it would be "very nice" but that from a practical standpoint no additional information relevant to diffusion would be gained. Tr. 3169, 3175-171, 3180-181. In addition, the radiosonde data for 3,000 feet at Quiliut would be "fairly well correlated" to 3,000-foot level winds over Skagit. Tr. 3179.

38. SCANP's contentions relating to the adequacy of Applicants' meteorological data and studies are addressed in additional detail in Section III C, Meteorology, of Applicants' proposed findings and in Section I, Meteorology, of this reply. In sum, SCANP's proposed findings are contrary to the evidence and should be rejected by the Board.

2. Weather Modifications

39. SCANP asserts that plumes form cumulus clouds. SCANP Proposed Finding No. 8, p. 45. In fact, the authority cited by SCANP states that the formation of cumulus clouds is rare and appears only to precede natural cloud formation. FES § 5.3.1.2. Weather conditions which favor long plumes are also favorable for cloudy skies at the Skagit site. Under these conditions, the cooling tower plumes will either level off below the existing cloud cover or actually merge with it, reducing the visual impact. FES § 5.3.1.2. Only occasionally is the plume expected to increase low-level cloud substance and duration. Exh. 4, § 5.1.3.2. While the plume will cause a small amount of shading, the staff has evaluated this impact and concluded as follows:

> Apart from the visual impact, the only environmental effect of the plumes is expected to be a small reduction in the amount of sunshine in the area beneath the plumes. The area affected will be small and will be mainly on the plant property. The staff expects no measurable impact on agricultural production from this cause.

FES § 5.3.1.2. See also, Applicants Proposed Findings, Nos. 50-51, pp. 29-20.

40. SCANP states that "precipitation has, in the past, been enhanced by cooling tower plumes." SCANP Proposed Finding No. 9, p. 46. In fact, in only one study has the possibility of precipitation enhancement even been suggested. Exh. 4, § 5.1.3.6. As for possible ecological effects, the amount of water vapor contributed by the Skagit forest cover alone is three times that which will be contributed by the cooling towers. Exh. 4, § 5.1.3.4. At most, this slight increase in moisture may cause minor changes in distribution of moisture sensitive vegetation.

41. SCANP Proposed Finding No. 10, pp. 46-47, states that plumes from cooling towers in Pennsylvania have been reported to descend to ground level, causing ground fogging. In fact, the record shows that this was an isolated event, the only one ever reported in the literature. FES § 5.3.1.2. Observations of cooling tower operation support the conclusion that visible plumes seldom, if ever, descend to ground level. While instances of snow showers and ice crystal formation have been reported, SCANP omits the fact that the amounts of precipitation were very small. FES § 5.3.1.2.

42. The occurrence of subfreezing temperatures may result in icing on SR-20 from cooling tower drift. Subfreezing temperatures can be expected during approximately 65 days of

the year but advance warning is usually available. Exh. 4, § 5.1.3.3. Icing from drift is indistinguishable from that due to natural causes. FES § 5.3.1.2. During icing, normal county highway procedures are expected to be maintained. While the Burlington Northern railroad tracks may experience some icing, because the diesel locomotives carry sand for the purpose of improving traction and since limited use is made of this line, no significant impact on rail transportation is expected. Exh. 4, § 5.1.3.3. In addition, the major portion of the drift deposition will occur within the plan site boundary. Exh. 4, §§ 5.1.3.3, 5.4.4.

3. Drift Deposition

43. SCANP argues that no basis exists for estimating cooling tower drift losses to be .005 percent of the circulating water rate. SCANP Proposed Finding No. 11, pp. 47-48. This figure is based on the current state-of-the-art of drift eliminator design. Exh. 4, §§ 5.1.3.3., 5.4.4. In addition, the results from experimental methods, such as the Isokinetic Sampling method and the Particle Instrumentation via Laser Light Scattering method used to measure the drift rate for operating cooling towers, indicate drift loss to be approximately .005 percent of circulating water flow. Exh. 4 § 3.4.1.

44. The major portion of drift deposition will occur within the plant site boundary. Exh. 4, § 5.1.3.3. At a distance of five miles from the cooling towers, the annual deposition will be no more than two pounds per acre. Exh. 4, § 5.4.4. Even the maximum salt deposition from the drift is expected to be less than normal deposition from rainfall. FES § 5.3.1.2. While the drift may have a maximum salt concentration of 850 mg/l (SCANP Proposed Finding No. 12, pp. 48-49), the average salt concentration will be 537.1 mg/l. Exh. 4, Table 3.6-6. By comparison, the Skagit River contains an average salt concentration of 46.6 mg/l. Exh. 4, Table 3.6-6. Most of the drift deposition will take place within 1 mile of the cooling towers. The deposition for two units will be highest in the west sectors where the estimated annual deposition, within 1 mile of the tower, will be 59 lbs./acre. This annual deposition will be reduced to about 2 lbs./acre at a distance of 5 miles from the cooling tower. Exh. 4, § 5.4.4.

45. Plants demonstrate no signs of stress when salt deposition remains lower than 1 ton of soluble salts per acre per year. Injurious levels of chloride on crop plants vary from 14 to 200 lbs./acre/year. The maximum chloride deposition will vary from 0.1 to 3 lbs./acre/year within 5 miles of the cooling towers and thus will not be detrimental to plant life. Exh. 4, § 5.4.4. The chloride concentration anticipated from

drift from the cooling tower is 53 mg/l or approximately one-seventh of the safe chloride dose. Tr. 3233-234. Sodium may be harmful to strawberry plants at levels of 70 to 100 mg/l. The maximum sodium concentration in the drift will be 50 mg/l. Tr. 3235.

46. Critical factors to foliage absorption are droplet size and total deposition. Tr. 3285. Most of the drift will fall on the plant site. Exh. 4, §§ 5.1.3.3, 5.4.4. At 1 to 2 miles from the cooling tower, i.e., the nearest strawberry patch location, the concentration of chlorides is approximately 15-20 mg/l. Tr. 3282. Similarly, droplet size decreases with distance from the plant site. FES § 5.3.1.1. Decreased size correlates with decreased foliage absorption and leaf spotting. Tr. 3236-237.

47. Contrary to the assertion by SCANP that the experiments involved one-time salt application and did not investigate the effect of exposure over long periods (SCANP Proposed Finding No. 13, pp. 49-50), the experiments involved multiple applications over a substantial period of a plant life-span. The sprays were applied weekly for two and one-half hours. The total treatment time was divided into three treatments with a total exposure of seven and one-half, nineteen, and thirty-two and one-half hours. Tr. 3269.

48. No need for further data on rainfall and washing effect has been demonstrated. As Mr. Dvorak testified, the amount of drift which is deposited as droplets is a function of the relative humidity. In the summertime, as the droplets evaporate the salts evaporate; the salts become an aerosol and are dispersed even more widely than with the droplets themselves. Tr. 3280-381. For further discussion of drift deposition and its possible effects, see Applicants Proposed Findings Nos. 52-56, pp. 30-32.

4. Impact on Birds

49. There is no support in the record for any finding of substantial bird kills as proposed by SCANP. SCANP Proposed Finding Nos. 17-19, pp. 51-53. See also Applicants Proposed Finding No. 57, pp. 32-33. SCANP cites the results of a single two-month Davis-Besse study in support of its proposed finding without mentioning the differing topography which the Staff found to be so significant. The Davis-Besse plant is located in flat terrain adjacent to a marsh; the Skagit plant will be in wooded terrain, 400 feet above the river. FES Final Supp. § 11.1.1. In addition, SCANP ignores the results of a study at Three Mile Island Nuclear Station: 17 birds killed during June 5-30, September 1-November 30, 1974; 22 birds during

March-June, 1975. Because the impacts have not been significant, the monitoring program was discontinued. FES Final Supp. § 11.1.1. The Three Mile Island facility is, as is the one at Davis-Besse, located at the shoreline and, therefore, has a relatively greater impact on birds than is anticipated at Skagit. FES Final Supp. § 11.1.1.

50. With regard to impact on waterfowl (SCANP Proposed Finding No. 18, p. 52), the Staff has evaluated the necessity for a monitoring program and has determined that such a program is not justified. FES Final Supp. § 11.1.1; FES § 2.7.2.1.

E. Visual Impacts

1. Cooling Towers

51. SCANP states that the plumes emitted from the cooling towers will be between 4300 feet and 2.4 miles long. SCANP Proposed Finding No. 1, p. 54. This is misleading. The plume lengths will average 300 meters (980 feet) in the summer, and 1700 meters (4300 feet) in the winter. FES § 5.3.1.1. The winter weather conditions which favor long plumes are also favorable for cloudy skies at the Skagit site. Under these

conditions, the plume will either level off below the existing cloud cover or actually merge with it, reducing the visual impact. FES § 5.3.1.2.

52. SCANP implies that the cooling towers contravene the Wild and Scenic Rivers Act. SCANP Proposed Findings Nos. 3-4, pp. 54-55. However, the Secretary of Agriculture, in his determination under that Act, found that, although the towers "diminish the scenic values, the impacts are not unreasonable." Exh. 203, p. 8. See Section II J, Wild and Scenic Rivers Act, of Applicants Proposed Findings.

53. SCANP asserts that visual quality decreases with the introduction of man-made elements. SCANP Proposed Finding No. 4, p. 55. Forest Service research has shown that this assertion is without empirical foundation. Instead, research indicates that a person viewing scenery who sees a man-made object may or may not be offended, depending on how that man-made object affects the natural landscape and depending on the individual's background, and education. Tr. 8036.

54. Witnesses for the Staff, Applicant and SCANP, agreed that visual impact varies among individuals. Applicant witness Myers testified that visual taste depends on background, education and experience. Tr. 2785. SCANP witness Sweeney stated that opinion on visual impact is individual (Tr. 8160), and that visual impact is primarily psychological. Tr. 8153.

Staff witness Henley explained how the assumption that people are offended by man-made objects set in natural surroundings is without empirical basis. Tr. 8036. Applicant witness Myers was asked for his personal opinion regarding the visual impact of the cooling towers. His response that the cooling towers are "nice, lovely structures" is consistent with the above cited observations, and contradicts SCANP Proposed Finding No. 5, p. 56. Elsewhere in the record, other witnesses, including a SCANP witness, recognized that to some people, the cooling towers would be objects of beauty, or at least neutral factors. FES § 5.1.4; FES Final Supp. § 4.5.9.6, A-43; Tr. 8035.

55. Contrary to SCANP's assertion (SCANP Proposed Finding No. 6, pp. 56-57), the Staff does not assume a contradictory posture in stating that the plant's mountainous backdrop will "soften the view" while also stating that the presence of the cooling towers is incongruous with the natural, mountainous backdrop. The Staff's view is, granting that the visual impact of the cooling towers will be adverse, the choice of site location will do much to mitigate this impact. The cooling towers, when seen against a 4000-ft mountain, will present less impact than would the same towers on flat terrain. Staff testimony, fol. Tr. 3290 (Vol. 2, 31 July 1975) pp. 1-2; Tr. 2784-785. Thus, while the presence of the cooling towers is incongruous

with the natural mountainous setting, the mountainous setting will mitigate the adverse visual impact of the towers better than any other setting.

56. SCANP states, as a conclusion of the NRC Staff and the Forest Service, that the visibility of the cooling towers would diminish the quality of the recreational experience available in the area. SCANP Proposed Finding No. 7, p. 57. The supporting quotations from the EAR and the Supplement to the FES are misleading because they omit qualifying portions. For example, while the Supplement to the FES does state, as quoted by SCANP, that recreational activities in the area would be affected, the statement is made in the following context:

> The cooling towers and their vapor plumes would have no direct impact on the recreational potential of the Skagit River.
>
> The towers would have a secondary impact on the quality of the recreational experience available on this lower portion of the river. This impact is psychological. For those persons prepared to accept nuclear power as a necessary facet of modern technological society, the recreation experience in that stretch of the river from which the towers would be visible would be unaffected. However, to those persons who either oppose or are frightened by nuclear power, the visible presence of the cooling towers and all they symbolize could prove so disturbing that recreational activities in this area would be avoided.
>
> It can be surmised that, for some people, the quality of the recreation experience available on the lower Skagit River would be seriously diminished; for others, it would not be affected.

FES Final Supp. § 4.5.9.

SCANP Proposed Finding No. 7, p. 57, should be rejected because it is incomplete and misleading. Additionally, SCANP's suggestion that the visual impact on local residents would be prolonged and more severe than the impact on visitors is without foundation and contrary to the record. In fact, Staff witness Henley testified that a person viewing an environmental change for the first time, is more aware of the change than an habitual viewer, Tr. 8035.

57. Furthermore, contrary to SCANP Proposed Finding No. 8, p. 58, the siting of the cooling towers will mitigate their impact. SCANP stresses that the towers will extend to about 930 feet above sea level, but neglects to note that Bacus Hill is approximately 570 feet above mean sea level and is forested with trees 60-100 feet tall and thereby obscures the towers from the southwest. FES Final Supp. § 4.5.8. Downstream from river mile 33, the towers would not even extend above the horizon line. FES Final Supp. § 4.5.8.

58. In addressing the adequacy of tower visibility studies, SCANP misrepresents the extent and independence of the Forest Service and NRC Staff studies. SCANP Proposed Finding No. 9, pp. 58-59. SCANP states that "the U.S. Forest Service's Study pursuant to the Wild and Scenic Rivers Act was not performed independently, instead relying upon information provided by the Applicant, which performed such tasks as raising an

indicator balloon and taking photographs." However, Staff witness Hesseldahl testified that the Forest Service did independent analysis of visual quality of the towers and Wild and Scenic aspects of the river. Tr. 7803. For analysis of the visual impact of the plant, two methods of evaluation were used: the Forest Service system of visual analysis, and a system utilized both by private industries and the Forest Service in California. The latter system involved raising balloons on cables to the height of the proposed structures and observing these balloons from principal viewing points. This method was used because Hesseldahl determined this to be the best method for evaluating the visual impacts. Tr. 7831-832. Hesseldahl was accompanied by a photographer who took pictures for him. Tr. 7887-888. However, because the photographs taken by Applicants were more accurate than those taken by the government photographer, the government photographs were not used. Tr. 8030-031.

2. Visual Impacts of Other Onsite Alterations

59. In addressing the visual impacts of other onsite alterations, SCANP exaggerates. SCANP Proposed Finding No. 11, pp. 59-60. Of the 1500-acre site, only approximately 260 acres will be disturbed by construction. FES § 4.1.1. Contrary to SCANP's assertion that the land not permanently cleared will retain an altered appearance following "revegetation," the

Staff found that vegetation of the plant site has been partially influenced by logging and reforestation activities for a considerable period of time. See Exh. 5, e.g., slide 4.6. The Staff concluded that the land clearing and subsequent replanting could be considered an extension of these activities, rather than an intrusion on a natural landscape. FES § 4.4.1. Further, only the 130 acres occupied by plant structures and facilities will be fenced, not 300 acres as indicated by SCANP. The rest of the 1500-acre site will remain as a wildlife habitat. FES § 5.1.1. As to the visual impacts of the plant structures other than the cooling tower, SCANP is simply mistaken in suggesting that these impacts have not been addressed. FES §§ 3.1, 5.1.4; Exh. 4, § 3.1.

3. Visual Impacts of Offsite Alterations

60. With regard to the effect of siltation on water quality (SCANP Proposed Finding No. 12, p. 60), SCANP cites FES § 4.4.2.1 for the fact that excavation of the site will result in substantial erosion and siltation. However, FES § 4.4.2.1 states only that some erosion and siltation will occur. Further, the Staff conclusions regarding siltation emphasize that Applicants will be required to control siltation in accordance with EPA regulations and that any impact from siltation will be temporary. FES § 4.4.2.1. In addition, SCANP cites no evidence for the proposition that the increase

in suspended solids will significantly decrease the natural visual quality of the river. In fact, in issuing the NPDES permit for Skagit, the State Siting Council made the following finding:

> Maximum levels of total suspended solids associated with the Construction Runoff Discharges will be less than levels of total suspended solids occurring naturally in Wiseman and Tank Creeks with some frequency.

Exh. 57, Finding No. 33, p. 10.

61. The adverse effect on visual quality which SCANP anticipates from construction of the barge slip (SCANP Proposed Finding No. 13, p. 61) will either be temporary, and the entire site will be restored to its natural condition, or be sanctioned by a public agency, to which the site would be turned over for maintenance and use as a public access site for recreational activities on the river. FES Final Supp. § 4.4.1. Since it will be located in a reach of the river which is already extensively developed with powerlines, pipelines, bridge crossings, roads, and houses, the Staff concluded that the barge slip would hardly dominate its setting. FES Final Supp. § 4.4.8.

62. SCANP asserts that there has been inadequate study of the visibility of the two 500-KV transmission lines. SCANP Proposed Finding No. 14, p. 61. To the contrary, the Staff

considered the possible visual impact of these lines from the river and SR-20 and concluded that they would not be visible. FES Final Supp. § 4.6.1.

63. In sum, the visual impacts of construction (SCANP Proposed Findings Nos. 15, 16, pp. 61-62) have been reviewed by the Staff and found to be temporary and of no real significance. FES §§ 4.2, 4.5; FES Final Supp. § 4.7.8. SCANP's proposed findings on visual impacts are without merit and should not be adopted.

F. Project Discharge

64. Contrary to SCANP Proposed Finding No. 3, p. 65, the potential effects within the mixing zone have been well considered in this record. For example, Applicants analyzed the dilution of thermal and chemical effluents within the discharge plume. Berthrong, et al., fol. Tr. 3382, pp. 9-12, Figs. 2-5. Furthermore, issues such as thermal shock, thermal attraction, migration blockage, and the chemical effects of the discharge have been thoroughly considered. Applicants Proposed Findings Nos. 79-97, pp. 45-57. Each of these issues involves, to some extent, conditions within the mixing zone. Further-

more, all of these issues have previously been considered and decided by the Washington State Siting Council.[5] Exh. 57, pp. 15-24; Exh. 84, p. 49.

65. SCANP contends that no model adequately depicts the discharge plume. SCANP Proposed Finding No. 4, p. 65. Applicants analyzed the discharge plume using the best model available (that by Jirka and Harleman) and "worst case" conditions. Applicants Proposed Finding No. 79, p. 45. While SCANP's witness Brubaker was critical of the model used, he would not have been satisfied with anything less than an in situ test. Tr. 8309. The Staff concluded that even if the thermal plume volumes calculated by Applicants were an order of magnitude too small, the state water quality standards would not be threatened. FES, p. 5-6. The dilution of 20 used by Applicants was considerably less than the dilution of 39 calculated by the Staff for the edge of the mixing zone. Id.;

---

[5]The decision of the Siting Council (Exh. 57) appears to provide an alternative ground on which this Licensing Board could base its decision on all issues relating to the water quality effects of the construction and operation of Skagit. These issues include not only the effects of the project discharge (addressed in Section F of the SCANP Proposed Findings) but also the water quality effects of construction (addressed in Section B of the SCANP Proposed Findings) and of the Ranney Collector system (addressed in Section G of the SCANP Proposed Findings). The applicable legal principles were recently reexamined and confirmed by the Appeal Board in Carolina Power & Light Company (H. B. Robinson, Unit No. 2), ALAB-569, _____ NRC _____, October 31, 1979 (CCH Nuclear Regulation Reporter, ¶ 30,429). See also the Seabrook, Yellow Creek and Peach Bottom decisions cited in Robinson. Although

Tr. 3474. SCANP also claims that the bottom characteristics must be known to formulate an adequate velocity profile. They cite no support for that claim. SCANP Proposed Finding No. 4, p. 66. Other than knowing certain physical parameters at the diffuser site, the bottom characteristics would not seem relevant to the modeling of the plume. Such physical parameters were available from Applicants' hydrographic surveys and diffuser design. Exh. 4, Fig. 2.5-7; Berthrong, et al., fol. Tr. 3382, p. 9. The characteristics of the plume have been described sufficiently to assess in a conservative manner the effects of the project discharge.

66. SCANP urges that at least a 30-year low flow condition should be used for the worst case analysis. SCANP Proposed Finding No. 5, p. 66. We note that the Washington State water quality standards use a 7-day, 10-year low flow criterion. Id. These standards have been approved by the EPA. FES,

---

we are not aware of any decision in which a Licensing Board has dealt with the possibility, as in this case, of accepting and factoring in a decision made by a state agency (rather than by the EPA) in issuing an NPDES permit and Section 401 certification pursuant to the Water Act, we believe that for a Board to do so would be consistent with the principles confirmed in Robinson and the legislative history of the Water Act reviewed there. However, because the water quality issues were also heard in this proceeding, the state decision not having been issued until later, we do not urge the Board to base its decision solely on the state decision, but rather to adopt its own findings consistent with the state decision.

p. 5-6. They provide a reasonable guide for assessing the environmental impacts of the project discharge. We also note that the 7-day, 30-year low flow (about 4050 cfs) at Sedro-Woolley is about 85% of the 7-day, 10-year low flow (4740 cfs), and that the 7-day, 100-year low flow (about 3490 cfs) is 74% of the 7-day, 10-year low flow. Exh. 4, Fig. 2.5-5. Therefore, the use of a 30-year or even a 100-year low flow, in addition to being unnecessary, would not materially change the worst case analysis that has been made.

67. Citing work by Spigarelli, SCANP asserts that salmonids are likely to be attracted to the thermal discharge plume during the winter. SCANP Proposed Finding No. 6, p. 67. The Spigarelli research, which is not completed, is of little applicability because it concerns a once thorough cooling system on Lake Michigan. Tr. 8051, 8065. SCANP's witness Brubaker, who is not an expert in fish biology, was not aware of any studies evaluating thermal plume attraction. Tr. 2959. Evidence presented by Applicants negated the likelihood of thermal attraction to the discharge plume. Applicants Proposed Finding No. 84, pp. 48-49. Laboratory studies, such as proposed by SCANP, would be quite expensive and would not be likely to predict with much accuracy what may occur in nature. Tr. 8061, pp. 13,203-204.

68. SCANP next claims that if there is thermal attraction, fish would be exposed for longer periods to chemicals in the project discharge. SCANP Proposed Finding No. 7, pp. 67-68. The premise of thermal attraction to the plume is contradicted by the evidence, as discussed in the preceding paragraph. The comment of the Washington Department of Game which was referenced by SCANP, was answered by the Staff. As the Staff explained, it is juvenile fish that will not be able to maintain themselves in the currents of the discharge. FES Final Supp. p. 11-6, A-13. The 1.5 fps river velocity discussed by SCANP is a minimum velocity, which would be found only at 10-year, 7-day low flows. Only minor variations in this velocity are expected. The 1.5 fps velocity neglects the contribution of water discharged through the diffuser. These jet velocities can reach 13 fps when two units are operating. Berthrong, et al., fol. Tr. 3382, pp. 9-10; Tr. 3395, p. 3575; See also Applicants Proposed Finding No. 84, pp. 48-49. SCANP's witness Brubaker did not doubt that juvenile salmonids would be swept through the plume in 10-year, 7-day low flow conditions. Tr. 8311-12.

69. Hence, SCANP's position seems to be that migrating adult fish might maintain themselves in the plume. SCANP Proposed Finding No. 7, p. 68. However, the evidence indicates that adults prefer remaining near the bottom while the plume

would be elevated above the bottom. Applicants Proposed Finding No. 84, pp. 48-49. SCANP disagrees with this evidence, claiming that the river bottom characteristics are unknown and could contain irregularities that would direct the plume toward the bottom. However, several studies including hydrographic surveys have been made at the diffuser location with no bottom irregularities reported. Schreiber, et al., fol. Tr. 12,226, pp. 23-25; Exh. 4, Fig. 2.5-7. SCANP further claims that there will be areas of lower current for resting adults near the discharge pipe. This claim lacks and SCANP has not cited any support in the record. Moreover, the jet velocity and angle of the discharge would carry the plume past any such low velocity areas. Thus, fish in such areas would not experience chemical concentrations approaching those in the discharge plume.

70. Brubaker mentioned a study by Sylvester (not by Battelle, as SCANP stated in its Proposed Finding No. 8 at p. 68) about increased susceptibility to predation for fish exposed to a temperature increase of 18° F for sixty seconds. Tr. 2931. The maximum delta T in the low flow winter condition is 16° F. An organism carried downstream through the plume under this condition would pass within three seconds into a portion of the plume where the delta T was only 4° F. Berthrong, et al., fol. Tr. 3382, p. 12. Hence, the Sylvester study has no applicability in this case.

71. SCANP claims that fish acclimated to 15° C (59° F) could experience cold shock if the temperature dropped to 5° C, during a plant shutdown. SCANP Proposed Finding No. 9, p. 69. SCANP has not shown how fish could become acclimated to 15° C in the plume. Such temperatures in the discharge will be experienced only in the summer months, when the delta T between the discharge and the river is only a few degrees centigrade. FES, p. A-59, Table 6-A. Cold shock during plant shutdown is thus not even remotely possible.

72. Contrary to SCANP Proposed Finding No. 10, p. 69, the composition (ratio of riverwater to groundwater) of water to be supplied by the Ranney Collectors was determined by several methods, none of which depended upon analyzing water samples taken at the proposed intake site. Applicants Proposed Finding No. 117, p. 68; Mikels, fol. Tr. 10,688, pp. 2-9; Anderson, fol. Tr. 10,735, pp. 4-6. River flow conditions have virtually no bearing on the composition (ratio of riverwater to groundwater) of water to be produced by the Ranney Collectors. The quality of that water should closely approximate the excellent quality of Skagit River water. Id. Additionally, SCANP's proposed finding on the subject should also be dismissed in that SCANP relies on the testimony of Dr. Brubaker, who is not a hydrologist.

73. SCANP next urges that various impurities may in the future be added to the ground and river waters and subsequently appear in the project discharge. SCANP's Proposed Finding No. 11, p. 70. The record contains no support for this speculation. We note that state water quality standards and restrictions of the Wild and Scenic Rivers Act on development upstream of the collector site would tend to maintain the excellent water quality now found in the Skagit Valley.

74. SCANP challenges the Staff's calculation on the amount of gaseous radioactive releases that might be entrained in the cooling towers. SCANP Proposed Finding No. 12, pp. 70-70a. Its witness Badgley thought that the releases might be directed toward the cooling towers about 10% of the time--or about twice the estimate used by the Staff. Tr. 3152. Applicants based their analysis on the conservative assumption of winds being directed towards the cooling towers about 19% of the time. Tosetti, fol. Tr. 2629, p. 2. Badgley thought that Applicants' assumption was conservative for purposes of predicting the worst case. Tr. 3159-160. The doses calculated by Applicants for the entrainment phenomenon were extremely small. Tosetti, fol. Tr. 2629; See Applicants Proposed Finding No. 132, p. 80.

75. SCANP next challenges the amount of chloramine that may be produced in the fish facility. SCANP Proposed Finding No. 13, p. 71. As recognized by SCANP (Id.), the amount of chlorination of the circulating water system will vary depending upon the chlorine demand of the water. An amount of sodium hypochlorite solution will be added until a maximum concentration of 0.5 mg/l of free available chlorine is reached at the condenser outlet involved. Berthrong, et al., fol. Tr. 3382, p. 8. Before the blowdown reaches the fish facility, essentially all of the free available chlorine will have reacted with the chlorine demand both in the condensers being chlorinated and in the blowdown from the other cooling tower. Tr. 3348. In any event, a conservatively estimated maximum concentration of total residual chlorine at the point of discharge is 0.09 mg/l for up to thirty minutes per day with one unit operating. Applicants Proposed Finding No. 89, p. 52. This limit is set in the NPDES Permit, Exh. 83, Attachment 1, p. 5.

76. SCANP argues that the maximum level of chlorine in the discharge, 0.09 mg/l, will be lethal to fish. SCANP Proposed Finding No. 15, p. 72. The 0.09 mg/l concentration is an extremely conservative estimate of the maximum amount and thus will not often be encountered. Berthrong, et al., fol. Tr. 3382, p. 9. In fact, the Staff's analysis indicated that

no detectable residual chlorine would appear in the discharge. Milsted, fol. Tr. 3345, p. 4. The maximum level of 0.09 mg/l will not cause any adverse impact due to the rapid dilution of the discharge in the river. Applicants Proposed Finding No. 89, pp. 52-53. SCANP totally ignores the fact of dilution, as well as the importance of exposure time, in its findings. SCANP Proposed Finding No. 15, p. 72. SCANP also misquotes witness Orrell, who said ".1 or one-tenth" not .01, as stated by SCANP. Exh. 40, p. 105, line 6.

77. SCANP contends that the concentrations of copper, zinc, ammonia, lead and the ferrous form of iron in the discharge will be damaging to the aquatic biota. SCANP Proposed Findings Nos. 15a-19, pp. 72a-73. The water quality parameters reported by Applicants for the discharge are maximum concentrations based on maximum Skagit River concentrations from three data sets. Berthrong, et al., fol. Tr. 3382, p. 6. The maxima in the river data occur independently, e.g., the highest value for zinc does not occur simultaneously with the maximum value for lead. Tr. 3539. The most important factor, which SCANP fails to even discuss, is that the chemicals in the discharge will be rapidly diluted in the river. As a result, aquatic organisms will only briefly be exposed to the chemical concentrations of the project discharge and thus will not be affected. Applicants Proposed Findings, pp. 53-55. Finally,

as to SCANP's request for more analysis of the ferrous iron content in the discharge, we note that iron in the discharge will mostly be ferric, and not ferrous iron. Tr. 3452.

78. SCANP apparently urges that the concentrating of any impurities present in makeup water, prior to discharge, should not be allowed with respect to certain chemicals. SCANP Proposed Finding No. 21, pp. 73-74. The concentration of chemicals due to evaporation from the cooling towers, however, has no impact on either water quality or aquatic life, due to the rapid dilution of the discharge and the fact that following dilution the concentration of chemicals naturally occurring in the river will be increased only 1.6 percent under maximum operating conditions. Berthrong, et al., fol. Tr. 3382, p. 16; Exh. 4, Table 3.6-5.

79. SCANP raises the possibility of synergistic and additive effects from the discharge. SCANP Proposed Finding No. 22, p. 74. However, SCANP has not shown that any of the circumstances necessary for such effects to occur will be present at the project discharge. The coincidence of low flow, maximum concentrations of various metals in the river water, maximum discharge temperature, and long exposure times, which is necessary for synergistic effects, has an extremely low probability. Tr. 3539-3540. SCANP claims that a thermal shock of 10° C would be harmful to fish exposed to 0.04 mg/l of residual

chlorine for two hours a day. SCANP Proposed Finding No. 22, p. 74. The delta T of 10° C is higher than the worst case expected for the project discharge. In addition, there is no possibility of fish being exposed to 0.04 mg/l of chlorine for two hours a day. Synergistic and additive effects will not be measurable. Applicants Proposed Findings Nos. 93-95, pp. 55-56.

80. SCANP's next allegation is that certain phases of project construction and super saturation of water flowing over Skagit River dams may cause fish to be more vulnerable to the project discharge. SCANP Proposed Finding No. 23, p. 75. However, these phases of construction will precede by several years the operation of the facility. Thus, these construction impacts, if any, will have ceased or been mitigated before discharge begins. There is no evidence of any super saturation produced by the dams on the Skagit, all of which are tens of miles upstream from the discharge site.

81. The possibility of chlorine acting as an attractant to fish (SCANP Proposed Finding No. 24, p. 75) has been fully considered and found not to be of concern at the project discharge. Applicants Proposed Finding No. 85, pp. 49-50. Brubacker's opinion that fish facility effluent could act as an attractant was not based on any studies or literature references. Tr. 8231-232. Since Brubacker is not a fish biologist, we place little weight on his opinion.

82. SCANP raises the possibility of the plume being a barrier to salmon migration. SCANP Proposed Finding No. 25, p. 76. However, this possibility was fully and adequately considered and found to be inconsequential. Applicants Proposed Finding No. 86, p. 50.

83. SCANP asked the Board to accept certain comments by the Washington Department of Game in the Final Supplement to the FES. SCANP Proposed Finding No. 25, pp. 76-76a. These comments were made without any supporting data or studies. FES Final Supp. pp. A-12, A-13. The Staff, the Forest Service and the Washington State Siting Council all independently concluded that the operation of the Skagit project would produce minimal adverse effects on the aquatic environment. Id., p. 11-6. SCANP Proposed Finding No. 26, p. 76a, regarding the Federal Fish and Wildlife Coordination Act was answered above in our reply findings on environmental impact statements.

84. All of SCANP's proposed findings relating to the project discharge must be rejected because they are contrary to the evidence.

G. Ranney Collector System

1. Bank Stability

85. In its findings, SCANP described two threats to the Ranney Collector System. One is the possibility of a cut-off

channel developing across the meander from river mile 38.6 to some point downstream. SCANP Proposed Finding No. 3, p. 79. That possibility was considered by Applicants and is remote. See Applicants Proposed Findings Nos. 124-126, pp. 73-74. The second threat seen by SCANP is the scour of the riprap during a flood, with resultant damage to the discharge lines. SCANP Proposed Findings, pp. 78-81.

86. SCANP mistakenly characterizes the Skagit River as presently being a meandering river. While the Skagit River has historically meandered, the addition in about 1959 of riprap protection has stopped the meandering process in the area of the proposed collector site. Exh. 4, App. L, p. L-17; Tr. 10,789-790. Applicants will inspect and maintain the riprap so as to keep it in place. Exh. 204. Applicants' maintenance activities are well within the scope of activities permitted by the Wild and Scenic Rivers Act. Exh. 207, p. 8.

87. The 1978 legislation, which designated the Skagit River as a component of the National and Wild Scenic System, provides that:

> Riprapping related to natural channels with natural rock along the shorelines of the Skagit segment to preserve and protect agricultural land shall not be considered inconsistent with the values for which such segment is designated.

16 USCA § 1274(a)(18). The proposed Ranney Collector site is within the designated Skagit segment. In sum, there is no

basis for concluding, as SCANP suggests, that the Skagit River will be allowed to meander out of its present channel in the Ranney Collector site area.

88. SCANP mistakenly refers to Dr. Borland as a "representative of the NRC Staff," when he was a consultant to Applicants. Exh. 4, App. L; Tr. 10,944. Dr. Borland's work was performed in 1974. He recommended extending the riprap upstream and downstream of the proposed site so as to minimize maintenance costs. Exh. 4, App. L, pp. L-7, L-8; Tr. 10,949. Subsequently, and in accordance with the Secretary of Agriculture's Section 7 determination, Applicants changed the flood protection design for the Ranney Collector System. Plans for additional riprap were dropped. New flood protection measures included increasing the inspection and maintenance of the existing riprap, moving the caissons further from the river, thickening caisson walls, burying deeper the water distribution pipes, and turning the pipelines away from the river. Tr. 10,656, 10,951-954, 10,960-961.

89. SCANP contends that the riprap protection would be totally inadequate in even a 50-year flood, and further, that the river will "interfere with" the Ranney Collectors about every five or ten years. SCANP Proposed Finding No. 6, p. 80. The impact of a 100-year flood on the Ranney Collectors has been well considered; it poses little, if any, threat to the

Ranney Collector System. See Applicants Proposed Finding No. 125, pp. 73-74. In December 1975, the collector site experienced a 10-year flood with damage to about 125 feet of riprap. Such damage is easily repaired. A 100-year flood would create only slightly greater velocity than would a 10-year flood, thereby possibly causing a similar amount of repairable damage. Tr. 10,664-668. For the above reasons, flooding will not affect the reliability of the Ranney Collector System.

2. Yield

90. SCANP presented several criticisms of Applicants' yield calculations. SCANP Proposed Finding Nos. 9-12, pp. 82-83. These included the absence of a perpendicular line of observation wells during pumping tests, the assignment of permeabilities in calculating yields, and the reliance upon Darcy's Law. Applicants covered these matters in their findings, as did the Staff. Applicants Proposed Findings Nos. 107-117, pp. 62-69; Staff Proposed Findings, pp. 46-50. In addition, SCANP considers the yield calculations questionable due to the "significant possibility" of meandering of the Skagit River. SCANP Proposed Finding No. 12, p. 83. However, as previously observed, neither is the Skagit River presently a

meandering river in the collector site area, nor is future meandering expected. We find, contrary to SCANP's position, that the yield calculations are conservative.

3. Iron Bacteria

91. Relying upon its witnesss Brubaker, SCANP contends that the Skagit PUD situation of high iron content causing iron bacteria in the PUD Ranney Collector laterals might be experienced at the proposed Ranney Collector site. SCANP Proposed Finding No. 13, p. 83. However, the hydrogeologic environments differ quite substantially at these two sites. Applicants Proposed Finding No. 121, p. 71. Brubaker obviously was unaware of such differences. He did not know, for example, that the Skagit PUD site was in a tidal reach of the river. Mikels, fol. Tr. 10,688, p. 3; Tr. 8,240-241.

92. SCANP further contends that the iron content of water from the Ranney Collectors will be higher than that river water because diverted river water will dissolve iron as it moves towards the laterals. SCANP Proposed Finding No. 14, p. 83. Overlooked is that the ground water near the proposed collector site has a low dissolved iron content, which indicates only a small amount of iron is available for dissolution into the diverted river water. See Applicants Proposed Finding No. 121, p. 71.

93. SCANP further claims that the iron content in the water to be produced by the Ranney Collectors has been underestimated because water samples at the collector site were taken during high river flow conditions. SCANP Proposed Finding No. 15, p. 84. SCANP's claim, however, is not supported by evidence in this record. Tr. 8,322-324. In any event, the ground water conditions at the collector site were measured over a six-month period under a broad range of river flows, with no correlation between iron content and river level being found. Mikels, fol. Tr. 10,688, Exh. E. As previously noted, the iron content of water to be produced by the Ranney Collectors will be quite low and, hence, the growth of iron bacteria is very unlikely.

4. Effects of Chlorine Flushing

94. Contrary to SCANP's inference, should a chlorine solution ever be necessary for treatment of iron bacteria, a measured amount would be used, thereby restricting the volume of gravel aquifer affected. Applicants Proposed Finding No. 122, p. 72. Furthermore, the ground water does not, as SCANP suggests, come into contact with nearby stream beds. SCANP witness Brubaker concluded that there must be such contact to hold the water in the creeks. Tr. 8,247. His inspection of the area was cursory and he made no measurements.

Tr. 8,246-248. Furthermore, he was not a hydrologist. Brubaker fol. Tr. 8,211, p. 1. Observations by experienced hydrologists and water level measurements established that the streams are perched above the water table. Applicants Proposed Finding No. 106, pp. 61-62.

95. SCANP further alleged that chlorine solution, if used, could reach the river. SCANP Proposed Finding No. 18, p. 84. Applicants answered this allegation in their findings. Applicants Proposed Finding No. 122, p. 72. SCANP also cites witness Brubaker in support of this allegation. Brubaker, however, was not very familiar with the treatment technique. Tr. 8,242. SCANP also references the synergistic effects between thermal pollution and chlorine as a cause for concern. However, there are no thermal effects of the Skagit Project at or near the proposed Ranney Collector site.

5. Sedimentation

96. Contrary to SCANP Proposed Finding No. 20, p. 85, periodic maintenance of the riprap will not measurably increase the bedload of the Skagit River. Tr. 8,291-293. Conversely, allowing the existing riprap to lapse into a state of disrepair could permit greater erosion of the river bank, thereby adding to siltation of the river. Tr. 8,250-251.

H. Alternative Sites

1. Applicants' Methodology

97. Citing Staff witness Stull, SCANP asserts that the Bechtel siting studies are of little utility for the evaluation of potential sites. SCANP Proposed Finding No. 1, p. 86. That assertion does not adequately reflect Stull's testimony. She said that the Bechtel siting studies were not, standing alone, sufficient for her purpose. Her purpose was to determine whether any of the sites that Bechtel did not consider further might be potentially preferable to Skagit. Tr. 13,140, 13,173. In carrying out her purpose, she drew information not only from the Applicants' siting studies, but also from numerous other sources. Applicants Proposed Finding No. 151, p. 90.

98. SCANP's position is that the Applicants' site selection process was inadequate, in that neither was it comprehensive, nor did it involve "the consistent application of appropriate criteria." SCANP Proposed Finding No. 2, pp. 86-87. However, the Staff in its review found Applicants' siting studies to be sufficiently comprehensive. Leech, et al., fol. Tr. 12,542, p. 13. The Staff also observed that Applicants' studies contained enough information to support the selection of the three candidate sites of Skagit, Goshen, and Ryderwood.

Tr. 12,663. The proof of the adequacy of Applicants' studies is the Staff's conclusion following its own independent evaluation that the three sites are among the best in western Washington, and that no obviously superior sites are likely to be available. Leech, et al., fol. Tr. 12,542, p. 13. Finally, SCANP's claim that Applicants did not consistently apply appropriate criteria must be dismissed for lack of any support in the record.

2. Staff's Methodology

99. SCANP criticizes the Staff's alternative site review and Applicants' selection process by comparing them to the Environmental Standard Review Plan. SCANP Proposed Findings, Nos. 2, 4, 6, pp. 86-88. The standard review plan has no applicability to comparison of alternative sites required by law of the Staff. The standard review plan was issued in preliminary form in February 1979. Exh. 182. It is only an advisory document, providing general guidance to the Staff in the conduct of its review. It offers no benefit to Applicants, having come into existence many years after the Skagit site had been selected and an application made. Tr. 12,651-653. We find that the standard review plan does not govern either the Applicants' or the Staff's alternative site methodology.

100. SCANP characterizes the Staff's objective in reviewing alternative sites as being merely confirmatory. SCANP Proposed

Finding No. 5, p. 87. Clearly, the Staff's objective and their actual review was independent and, hence, much more than merely confirmatory. See Applicants Proposed Findings Nos. 150-154, pp. 89-92.

101. While the Staff did not analyze meteorology in connection with its 1979 testimony (Tr. 13,167), the Staff and Applicants separately considered meteorology in their earlier comparisons of alternative sites. Dvorak, et al., fol. Tr. 7336, p. 6 and Table 1; Jacobsen, fol. Tr. 5869, Table 1; Jacobsen, fol. Tr. 6012, pp. 7, 10. SCANP Proposed Finding No. 8, p. 88, is in error.

102. SCANP suggests that site election criteria were inconsistently applied to the Thornwood and Skagit sites. SCANP Proposed Finding No. 9, p. 88. The Thronwood site is located eight to ten miles north of the Skagit River, whereas the Skagit site is less than two miles from the river. Tr. 13,032; FES, Fig. 2.2. If makeup water could be directly removed from the Skagit River, the pipeline to Thornwood would be six to eight miles longer than the one at the Skagit. Conversely, if makeup water had to be withdrawn indirectly from Ranney Collectors, the pipeline from the proven Ranney Collector site near Hamilton to Thornwood on the upper Samish River would have to pass by the Skagit site and continue about ten miles further. Exh. 46, p. C-15 and plate 1.

3. Replacement Power

103. SCANP criticizes the use of a three-year delay period for estimating the cost of replacement power. SCANP Proposed Finding No. 11, p. 89. The Staff provided a current estimate of the time needed for an applicant to select a site on the Hanford Reservation, conduct the necessary field work, and prepare an application and supporting documents, for the NRC to docket the application, prepare an environmental impact statement, conduct a hearing and reach its decision. The estimate was a range of 30 to 48 months, and assumed a minimum of intervention. Tr. 13,236A-244A. The three-year delay given by the Staff is very reasonable, especially in the current licensing climate. Additional delay could well arise during state proceedings. Jacobsen, fol. Tr. 6012, p. 15.

104. SCANP further criticizes the Staff for relying upon the West Group Forecast in its estimate of the amount of replacement power needed. SCANP Proposed Finding No. 12, p. 89. One of SCANP's criticisms is of the use of a 75 percent capacity factor for the first year of operation of the Skagit project. However, the West Group Forecast uses a 60 percent capacity factor for the first full year. Exh. 185, Estimated Loads and Resources Table, n. 1. Contrary to SCANP's proposed finding, the reasonableness of the West Group Forecast is checked by an econometric model, which allows price elasticity

to be considered. Exh. 185, pp. 3-4. By accepting the West Group Forecast, the Staff accepts the Applicants' proposed need for power, which is included in the West Group Forecast. Since we have previously found a need for the Skagit project, the Staff's use of the West Group Forecast is reasonable.

105. SCANP next urges that the cost assigned to replacement power should be lower than that used by the Staff. SCANP Proposed Finding No. 13, p. 90. Both Applicants and Staff agree that replacement of the energy from the Skagit project would come from oil-fired generation located either in the northwest or southwest. Applicants Proposed Finding No. 177, p. 105; Staff's Proposed Findings, pp. 107-108. The Staff now agrees with the Applicants' conclusion that the Staff's low estimate of replacement power cost was grossly understated. Id.

106. SCANP claims that there would be no replacement power cost if the replacement power could be purchased for less than the cost of generating power at Skagit. SCANP Proposed Finding No. 14, p. 90. SCANP has not demonstrated the source of any such less expensive power. Furthermore, even if such power were available, it would be used to reduce the generation from oil-fired units--a more expensive type of generation than Skagit. Knight, fol. Tr. 14,329, pp. 3-4. Given the large

amount of oil-fired generation projected by the Western States Coordinating Council for the late 1980s, SCANP's premise is wrong. Id.

4. Transmission Costs

107. SCANP alleges that an east-west line across the Cascades may be no less reliable than a north-south line west of the mountains. SCANP Proposed Finding No. 15, p. 91. What SCANP neglects is that the east-west cross mountain transmission lines are longer and thus more vulnerable to outages. Tr. 12,746-747. While there have been occasions when Western Washington was close to a blackout due to failures of cross mountain transmission capability (Applicants Proposed Finding No. 156, p. 93), there is no evidence in this record of a similar threat to north-south transmission lines. Also overlooked by SCANP is that an outage on a cross mountain transmission line might be much more difficult to repair within a short period of time due to the relative inaccessibility of such lines. Knight, fol. Tr. 3687, pp. 6-7.

108. SCANP witness Carstens claimed that Hanford was closer than the Skagit site to the load centers of the four participants in Skagit. SCANP Proposed Finding No. 16, p. 92. Carstens had no qualifications in this area and pointed out that Applicants had the best information on load centers. Carstens, fol. Tr. 14,008, p. 1; Tr. 14,080-081. Carstens

chose to neglect where the power from Skagit would actually flow; clearly, it would flow to the Western Washington load center. Tr. 14,081-085; Applicants Proposed Finding No. 155, p. 92. Moreover, the comparison of transmission costs and incremental losses for alternative sites that was presented by witness Eastvedt of BPA shows that Carstens' purported load center proximity calculation is totally misleading. Leech, et al., fol. Tr. 12,542, App. B (Eastvedt testimony), pp. 17-18, Tables 1 and 2.

5. Demographics

109. SCANP contends that accident analyses were required but were not made for any of the sites studied. SCANP Proposed Finding No. 18, p. 92. Not being an environmentally related issue, an accident analysis is not required by NEPA. As explained above, the mention of accident analyses in the Preliminary Standard Review Plan certainly does not create a regulatory requirement. In any event, the Staff compared the population densities of alternative sites against the regulatory guide criteria of 500 people per square mile. Exh. 183. Because the candidate sites did not exceed the population density criterion, there was no need to prepare accident or evacuation analyses for the alternative sites. Tr. 13,114.

110. SCANP criticizes the Staff's demographic comparisons for not using the latest census figure. SCANP Proposed Finding No. 19, p. 92. When the 1978 population estimates of SCANP's witness Darland are used, the population density within ten miles of the Skagit site is only about 60 people per square mile--far below the NRC's of 500 people per square mile. Tr. 13,863; See Staff Proposed Findings, pp. 100-101. Even if additions to the population were made for transient population or for future developments, as SCANP urges, the relatively low population density near Skagit would clearly not be affected to the extent of making Skagit an unsuitable site. Tr. 13,117.

111. SCANP next urges that the Hanford and Pebble Springs sites should be distinguished from the Skagit site on the basis of traffic impact. SCANP Proposed Finding No. 20, p. 93. We disagree. Traffic congestion during construction is a temporary and limited impact, and hence is, at most, a minor factor in the comparison of sites. Applicants Proposed Finding No. 48, p. 28. See also Staff Proposed Finding No. 181, p. 97. While SCANP's witness Darland opined that the Skagit site should be assigned higher economic costs associated with a higher risk of injury during an evacuation, he paid no attention to the probability of occurrence of events requiring an evacuation. Tr. 13,871-872.

6. Aquatic Impacts

112. The Woodward Clyde siting study screened out the Skagit site because it had already been chosen for a nuclear plant. Tr. 13,287A-288A. It also screened out the Skagit Valley due to Woodward Clyde's interpretation of the Wild and Scenic Rivers Act. Tr. 13,142. However, the Wild and Scenic Rivers Act and the Skagit Project are compatible. Exh. 207. Hence, the Woodward Clyde siting study lends no support to SCANP's position.

113. SCANP's reconstruction (SCANP Proposed Finding No. 22, p. 94) of witness Stull's testimony on salmon spawning areas is misleading. She noted the rerouting of Black Creek (Tr. 13,227); however, Black Creek contains no salmonid spawning areas. FES, Table 2.14. While Stull agreed that Coal and Hanson Creeks would be affected by construction activities, she concluded such impacts would be negligible. Tr. 13,228-229. Clearly, such potential impacts were not disregarded by her. Tr. 13,229.

114. SCANP alleges that there was no investigation of whether salmonid spawning areas might be affected by the project discharge. SCANP Proposed Finding No. 23, p. 94. Applicants' baseline studies found minimal spawning gravel in

the vicinity of the proposed diffuser location. Exh. 4, pp. 2.7-69, 5.1-6. SCANP has presented no evidence of spawning occurring in the discharge area.

115. The only rare or endangered pecies in the plant site vicinity are bald eagles. Tr. 13,151. The Skagit Project will not affect the eagles. Applicants Proposed Findings, pp. 33-34.

116. Contrary to SCANP Proposed Finding No. 26, p. 95, the Wild and Scenic Rivers Act is not an institutional barrier to the licensing of the Skagit project. Tr. 12,658; Exh. 207. The status of the Skagit River under the Wild and Scenic Rivers Act has been fully considered here. FES Final Supp.; Exhs 119, 203-207. Since the Secretary of Agriculture has determined that the Skagit project will not directly and adversely affect the Skagit River and its associated values (Exh. 207), the Wild and Scenic Rivers Act has no bearing on the alternative site question.

7. Geology

117. SCANP urges that no final decision be made on alternative sites until the geological review of the Skagit site is completed. SCANP Proposed Finding No. 27, p. 95. The Board notes, however, that the Staff has been able to compare the geology, seismology, and geotechnical engineering of alternative sites based upon the available information. Leech, et al., fol. Tr. 12,542, p. 17. A further observation is that

geological differences between alternative sites are differences in cost, not in environmental impacts, as the Staff has noted in its proposed findings. Staff Proposed Findings, pp. 93-95. Hence, completion of the geologic review for Skagit will not impact the conclusions that, from an environmental standpoint, the Skagit project is superior to other western Washington sites studied and is comparable to the Pebble Springs and Hanford sites, which lie east of the Cascades, outside the region of interest. Applicants Proposed Findings, pp. 99-102.

118. SCANP alleges that there is no evidence that Applicants uniformly applied geologic criteria in its siting studies. SCANP Proposed Finding No. 28, p. 95. Applicants explained how they applied geologic and seismologic factors in their site comparison. Jacobsen, fol. Tr. 5,869, pp. 3-4; Jacobsen, fol. Tr. 6,012, pp. 6-8; Exh. 4, § 9.2. The Staff was not aware of any important inconsistencies in Applicants' siting studies. Tr. 13,029.

119. The question of landslides at the Skagit site was specifically considered by the Staff. Leech, et al., fol. Tr. 12,542, p. 19. SCANP claims that the Staff's conclusion was cast in doubt by Blunden's report of June 1978. SCANP Proposed Finding No. 29, p. 95. We note that the Staff in its prefiled SFR Section 2.5 addressed the issue of slope stability

at the Skagit site. SER, § 2.5.5.1. The Staff's conclusion that landsliding will not affect the seismic category 1 facilities has not been altered by Blunden's report.

120. SCANP alleges that the Staff should have weighed into its alternative site evaluation the possibility of damage to the Ranney Collectors from flooding. SCANP Proposed Finding No. 30, p. 95. This potential problem, which is solely an economic concern, has been considered elsewhere. Applicants Proposed Findings, pp. 73-74; Applicants Reply Findings, paragraphs 86-89, supra. Because, as we found, flooding will not affect the reliability of the Ranney Collector system, it has no bearing on the alternative site question.

121. SCANP next alleges that the Staff should have given greater consideration to earthquakes in the Skagit Valley. SCANP Proposed Finding No. 31, p. 96. Such events were minor, i.e., less than about magnitude 3. Tr. 13,709. While Cheney felt that such earthquakes were especially significant (Id.), he is not a seismologist. Tr. 13,723. Testimony by seismologists in this record indicates that these minor earthquakes are not of concern to the Skagit Project. Staff Geology and Seismology Summary, fol. Tr. 8974, pp. 29-30; USGS Status Review, fol. Tr. 8974, p. 14; Bolt, fol. Tr. 857, pp. 3-4.

122. SCANP further claims that in its alternative site evaluation the Staff should have accounted for the USGS's position on the 1872 earthquake. SCANP Proposed Finding No. 32, p. 96. We note preliminarily that the Staff must perform its comparison of alternative sites based upon its best judgment. Postulating an event similar to the 1872 earthquake very near the Skagit site, the USGS found the 0.35g seismic design to be acceptable. USGS Status Review, fol. Tr. 8974, p. 19; Tr. 12,980. Hence, the USGS position does not change the Staff's evaluation.

123. SCANP urges that the Hanford and Pebble Springs sites are clearly advantageous to Skagit due to insufficient geological information and greater geological complexity with respect to the Skagit site. SCANP Proposed Finding No. 33, p. 96. For this finding, SCANP relies on Cheney's testimony. Cheney's review of sites other than Skagit was extremely limited. His testimony provided little more than a criticism of the Skagit site. Cheney, fol. Tr. 13,668, p. 2; Tr. 13,761. Cheney obviously gives little credit to the enormous amount of geological information on the Skagit site that has been collected. However, even if the Skagit site is in a more geologically complex area, we fail to see how the alternative site comparison should be influenced. Geological complexities might affect the SSE for a site; nevertheless differences

in SSEs are economic, not environmental. Similarly, SCANP's challenge of a 0.35g SSE for the Skagit Project (SCANP Proposed Finding No. 34, p. 97) is of no consequence to a NEPA comparison of alternative sites.

8. Nuclear Parks

124. Relying on its witness Carstens, SCANP contends that the Hanford site enjoys a clear advantage due to the existing plants located there. SCANP Proposed Finding No. 35, p. 97. However, Carstens possessed no apparent expertise on either nuclear siting or the Hanford Reservation. Carstens, fol. Tr. 14,008, p. 1. Several of his alleged advantages appear to assume a common owner or builder--e.g., common site preparation equipment, common security forces, common public relations facilities, and common administration buildings. There are no grounds for such an assumption. His alleged advantages are speculative.

9. Canadian Concerns

125. SCANP claims that the Staff should have given weight to the concerns of Canadians. SCANP Proposed Finding No. 36, p. 98. The Staff has considered the enviromental impacts of the Skagit Project without regard to the nationality of the interest affected. FES; FES Final Supplement. There has been

no demonstration that Canadians would be impacted more than Americans. Obviously, impacts on Canadians would be less, owing to their being located a greater distance from the site.

I. Meteorology

126. In its findings, SCANP warns of purported failings in the Applicants' meteorological research activities. SCANP Proposed Finding No. 1, p. 99. However, as documented in the Applicants Proposed Findings No. 205, pp. 119-120, the nature and magnitude of the error in recordation were identified and an acceptable method by which the erroneous windspeed data could be corrected was developed. The corrected data appear in the PSAR § 2.3. Moreover, the effect of the error (prior to its correction) was to produce higher chi/Q values (indicating greater impacts) than the correct data. Tr. 749-51; Exh. 15.

127. As to the possible effects of downslope winds (SCANP Proposed Findings Nos. 2-4, pp. 99-100), according to SCANP, witness Badgley testified that downslope winds under certain conditions could result in restricted dispersion and a concentration of blow-down (sic). However, Professor Badgley admitted that since the drainage air is cold and is produced almost

in contact with the ground, as it drains down the valley it incorporates itself into the warmer air above it and becomes "churned up." He testified that any released particles would become well mixed with the drainage layer because of the mechanically generated turbulence. In addition, any particle released above the ground level occupied by the drainage air would not even move downslope but would instead act as a plume and immediately ascend. Tr. 3174-175. This explanation apparently satisfied Chairman Jensch since in the subsequent questioning by the Board, he asked only one question and it concerned definitions of shortand long-range. Tr. 3177, 3180.

128. SCANP cites Professor Badgley's criticism of Applicants' monitoring of wind velocity and direction. SCANP Proposed Finding No. 5, p. 100. However, Professor Badgley acknowledged that the data obtained from the onsite meteorological tower are appropriate for determination of dispersion characteristics at the site, and that they have been properly used with conventional methods to predict the dispersion of the cooling tower plume and radioactive releases. Tr. 3126, 3135, 3149, 3178. The onsite meteorological measuring program conforms to the recommendations of Regulatory Guide 1.23, "Onsite Meteorological Program." SER, fol. Tr. 14,441, § 2.3.3. See also Applicants Proposed Finding Nos. 202-204, pp. 117-119.

129. With regard to the duration of Applicants' meteorological monitoring activities, SCANP contends that a three-year study would be minimally acceptable. SCANP Proposed Finding No. 6, p. 100. However, the Staff views one year of onsite meteorological data as sufficient at the PSAR stage of review. Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants, LWR Edition, Regulatory Guide 1.70, § 2.3.3. In fact, the PSAR includes onsite data for a two-year period. PSAR, § 2.3.

J. Wild and Scenic Rivers Act

130. In Section J of its Proposed Findings, pp. 102-107, SCANP challenges the adequacy of the consideration given to impacts of the proposed facility on the Skagit River in view of its status as a component of the Wild and Scenic Rivers System, as well as the environmental review associated with the Secretary of Agriculture's determination approving licensing of the facility. It is clear that, as a matter of law, the Nuclear Regulatory Commission is bound to accept the determination of the Secretary of Agriculture under the Wild and Scenic Rivers Act. Wild and Scenic Rivers Act § 7, 16 U.S.C. § 1278; Applicants Proposed Finding No. 187, pp. 110-111. This is not the

proper forum in which to challenge the Secretary's determination. Additionally, it is clear that the impacts of the Project were fully and properly reviewed and considered in this proceeding.

131. The Forest Service of the Department of Agriculture carefully studied the possible impacts of the Project on the River. It collected information from Applicants, NRC Staff, and from independent sources by means of field trips, government reports and interviews with private individuals knowledgeable about the River. See, e.g., Tr. 7769-780, 7925-958. Thereafter, additional work was conducted and the environmental analysis report (Exh. 119) prepared and submitted to the NRC for its use in developing the FES Final Supplement under the "lead agency" concept. Tr. 7824-832, 7904-907; FES Final Supp., pp. 1-1 to 1-2. Work on the FES Final Supplement by the NRC Staff with the assistance of the Forest Service involved the gathering of additional information, investigations and evaluation. FES Final Supp., pp. xi, 1-2; Tr. 7823-832, 7845-849, 7886-890. Information thus gathered and evaluated, as well as numerous submissions by proponents and opponents of the Project, formed the basis for the Secretary of Agriculture's determination. Exh. 203, p. 2.

132. The full, independent environmental consideration given to facility impacts is clearly consistent with requirements. The "lead agency" concept, as implemented in developing the FES Final Supplement was proper. The lead agency technique has been sanctioned and, indeed, encouraged by the Council on Environmental Quality. 10 CFR § 1500.7(b) (1977); 43 F.R. 55,978, 55,992-993 (1978). Courts, too, have found it consistent with NEPA and approved its use. See, e.g., National Resources Defense Council, Inc. v. Callaway, 389 F. Supp. 1263, 1272-274 (D. Conn. 1974), aff'd in pertinent part, 524 F.2d 79, 85-87 (2d Cir. 1975).

133. Further, environmental consideration was given to the impact of the Project on values listed in The Skagit Final Environmental Statement (Exh. 117). In particular, the values for which the River was designated a component of the Wild and Scenic River System, as well as the specific matters mentioned on pages 103-106 of the SCANP Proposed Findings (land use, transportation, socioeconomic and scenic values, the Skagit River fishery and eagles) have all been considered. See, e.g., Exh. 119, pp. 24, 27-34; Exh. 203, pp. 2-3; Exh. 207; FES Final Supp., pp. 4-7 to 4-8, 4-11 to 4-19, 11-3 to 11-7, 11-11 to 11-12; Tr. 7886-896.

134. Finally, SCANP's criticism of Mr. Hesseldahl on page 103 is wholly unjustified. SCANP Proposed Finding No. 3, p. 103. The record reveals that Mr. Hesseldahl was well qualified to testify concerning the Skagit as a component of the Wild and Scenic Rivers System and potential impacts. See, e.g., Tr. 7769-770, 7787-789. No objection whatever to Mr. Hesseldahl's appearance as a witness was raised during the hearings. In fact, at one point SCANP counsel himself described Mr. Hesseldahl as perhaps "the Forest Service's most experienced employee with regard to the Wild and Scenic Rivers Act as it applies to that [the Skagit] River." Tr. 7832-833.

K. Radiological Releases

135. Again, most of the matters discussed in the SCANP Proposed Findings (i.e., calculated doses as presented in the SER Supp. 1, pp. 108-109; NEPA review of revised dose estimates, pp. 109-111; dose evaluation models, pp. 111-112; and building ventilation design, pp. 114-115) were not placed in issue by any contentions and cannot be properly raised now. In addition, however, they are without merit.

136. As for the calculated doses presented in the SER Supp. 1, the value given in Table 11-7 for "Doses to any organ from all pathways" (15 mrem per year per site) is simply that number calculated by rounding off to two significant figures so as to be comparable to the proposed dose design objectives contained in RM-50-2. The Staff concluded that this calculated dose satisfied the proposed dose design objective. SER Supp. 1, p. 11-7. Although the calculated doses in Table 11-7 of SER Supp. 1 are greater than those presented earlier in Table 5.6 of the FES, they are still very small. For example, the highest whole-body exposure predicted (2.2 mrem per year) represents only a few percent of background. See FES, § 5.4.3. Since the effect of the changes is small, and the Licensing Board's decision will be based upon all of the information in the record, the FES need not be redrafted and recirculated. See Long Island Light Co. (James- port Nuclear Power Station, Units 1 and 2), LBP-77-21 5 NRC 684 (1977); Niagara Mohawk Power Corp. (Nine Mile Point Nuclear Station, Unit 2), ALAB-264, 1 NRC 347, 371-372 (1975).

137. With respect to the dose calculations and the methodology described in Appendix A to the prefiled testimony of NRC Staff witness Essig (fol. Tr. 2722), there is no indication in the record that the assumptions utilized were unreasonable.

Further, the mathematical models employed in calculating the doses presented in SER Supp. 1, Table 11-7 (which replaced FES Table 5.6) are those presented in Regulatory Guide 1.109 (Rev. 1). SER Supp. 1, p. 11-5. Accordingly, SCANP's criticism of the methodology described in Appendix A to Mr. Essig's testimony is irrelevant since it was not employed in developing the referenced SER tables.

138 As for the matter of cooling tower entrainment of radiological releases, SCANP Proposed Finding No. 5 (pp. 112-113) completely ignores Professor Badgley's statement that, insofar as winds blowing toward the cooling towers are concerned, the frequency assumed by Applicants' witness Tosetti was, if anything, conservative, i.e., higher than he would assume. Tr. 3159-160. Tosetti, in turn, calculated that any doses resulting from such entrainment would be small. Tosetti, fol. Tr. 2629.

139. Finally, insofar as ventilation exhaust from the fuel and auxiliary buildings is concerned, the NRC Staff has found the facility to be in full compliance with the "as low as is reasonably achievable" requirements of Appendix I. SER Supp. 1, p. 11-7. That conclusion was based upon, among other things, Applicants' February 6, 1978 submittal entitled "10 CFR

50, Appendix I Compliance Evaluation," which was distributed to all of the parties. Id., p. 11-2. As indicated on page 14 of that submittal, potentially contaminated auxiliary building ventilation will be passed through charcoal and HEPA filters. The fuel building, on the other hand, is not a source of radioactive gaseous effluents. See also Exh. 176 (PSAR), §§ 9.4.2, 9.4.6. In case of contamination, building ventilation will be exhausted through the Standby Gas Treatment System (SGTS), but the SGTS will not be employed during normal operation. Exh. 176, §§ 9.4.2, 9.4.6. Accordingly, SCANP's concerns are unfounded.

L. Effects of Postulated Accidents

140. Most of the SCANP Proposed Findings concerning the effects of postulated accidents constitute an attempt to expand an old contention, raise new ones, or reargue motions previously denied. Applicants Proposed Findings Nos. 138-141, pp. 82-85. SCANP Contention J.7 alleges that the environmental statement for the Project "entirely ignores the likelihood and consequences of accidents of any kind," and that

> It is unreasonable . . . to ignore the consequences of accidents for purposes of environmental and economic impact evaluation since the consequences of accidents are evaluated with respect to other aspects of the licensing process, including the safety analysis.

SCANP Contentions, fol. Tr. 67, p. 9. In contrast to pages 116-119 of the SCANP Proposed Findings, Contention J.7 contains no mention, whatever, of risk probabilities and the potential failure of safety systems, calculational conservatism, sabotage or operator-induced malfunctions, anticipated transients without scram, loss-of-coolant accidents or fuel handling accidents. Even though warned of the deficiency--specifically in connection with this contention--and offered an opportunity to amend its contentions (see Tr. 2148-178), SCANP refused to do so.

141. In any event, with respect to the possible failure or malfunction of a safety system during an accident and calculational conservatism (SCANP Proposed Findings Nos. 2-3, pp. 116-117), analyses may properly assume--absent a special showing of a particular deficiency--that emergency components will operate as designed. Evaluation of realistic, not worst-case, effects is sufficient. See, e.g., Long Island Lighting Co. (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 835-836 (1973), aff'd by unpublished order sub nom. Lloyd Harbor Study Group v. AEC (D.C. Cir. No. 73-2266, Nov. 11,

1976), vacated on other grounds sub nom. Long Island Lighting Co. v. Lloyd Harbor Study Group, 435 U.S. 964 (1978) [hereinafter cited as Shoreham]; Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2) LBP-76-26, 3 NRC 857, 925 (1976), vacated in part and remanded on other grounds, ALAB-366, 5 NRC 39 (1977). In addition, contrary to SCANP Proposed Finding No. 4, p. 117, NEPA does not require consideration of sabotage. Shoreham, 6 AEC at 851.

142. With respect to Applicants' alleged failure "to assure lowest possible levels of accidental radiological release" in connection with "anticipated transients without scram," a "design basis loss-of-coolant accident with reference to the project's final design parameters," and "postulated fuel handling accidents" (SCANP Proposed Findings Nos. 5-8, pp. 117-119), there is no requirement that releases be held to the absolute "lowest possible" level. Compliance with NRC regulations is sufficient to meet the requirements of the Atomic Energy Act of 1954. Maine Yankee Atomic Power Co. (Maine Yankee Atomic Power Station), ALAB-161, 6 AEC 1003, 1009-010 (1973), aff'd sub nom. Citizens for Safe Power v. NRC, 524 F.2d 1291 (D.C. Cir., 1975). Further, any uncertainties as

to the specifics of final design details[6] do not pose a bar to the issuance of an LWA or a construction permit because the ultimate cost-benefit balance cannot be precisely computed. See, e.g., Union of Concerned Scientists v. AEC, 499 F.2d 1069, 1082-085 (D.C. Cir. 1974).

143. Finally, with respect to Class 9 accidents and the "event at Three Mile Island" (SCANP Proposed Findings Nos. 9-10, pp. 119-120), the relationship, if any, between the incident at Three Mile Island, Unit 2, and the Skagit Project appears nowhere in the record. Most importantly, the Commission itself has provided guidance by means of its announcement that the rulemaking begun with the 1971 proposal to place nuclear power plant accidents in nine categories to take them into account in preparing environmental impact statements will be completed. Offshore Power Systems (Floating Nuclear Plants), 1 Nuclear Regulation Reporter (CCH) ¶¶ 30,415, 30,415.01, 30,415.06. Since the matter of Class 9 accidents

---

[6] It has long been settled that a complete, final design is not necessary under the Atomic Energy Act of 1954 for the issuance of a construction permit. All that is required at the construction permit stage is reasonable assurance that a facility of the general type proposed can be constructed and operated without undue risk to the public health and safety. See Power Reactor Development Co. v. Electrical Union, 367 U.S. 396, 406-409 (1961).

and their consideration is being investigated within a general rulemaking, additional separate consideration within the context of this proceeding would be neither desirable nor proper. Potomac Electric Power Co. (Douglas Point Nuclear Generating Station, Units 1 and 2), ALAB-218, 8 AEC 79, 85 (1974).

144. With the record reflecting that the Staff's analysis of the probability and consequences of accidents has been sufficiently performed in accordance with Commission guidance, the Board should properly find that the Staff has considered the consequences of accidents in accordance with Commission regulations and that the environmental risks due to postulated radiological accidents are exceedingly small.[7]

---

[7] In announcing its intention to proceed by rulemaking the Commission requested that the NRC Staff, "[i]n the interim, pending completion of the rulemaking on this subject, bring to our attention, any individual cases in which it believes the environmental consequences of Class 9 accidents should be considered." Offshore Power Systems (Floating Nuclear Plants), 1 Nuclear Regulation Reporter (CCH) ¶ 30,415.06. Thus, the matter is being monitored on a continuing basis.

M. Alternative Energy Sources

through

HH. Order

[Reply findings on these subjects will be filed, as necessary, after SCANP files its proposed findings.]

Dated: November 30, 1979.

Respectfully submitted,

PERKINS, COIE, STONE,
OLSEN & WILLIAMS

By _____
F. Theodore Thomsen

By _____
Douglas S. Little

Attorneys for Applicant
1900 Washington Building
Seattle, Washington 98101
Phone (206) 682-8770

Of Counsel:

Lowenstein, Newman, Reis,
Axelrad & Toll
1025 Connecticut Avenue, N.W.
Washington, D. C. 20036

1595 179

TRANSCRIPT

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
		- ° -		
1	4/15/75	Special Prehearing Conference		1-76
		- ° -		
		JULY - AUGUST 1975 SESSION		
2	7/15/75	Limited Appearances		77-430
3	7/16/75	Limited Appearances		431-701
		FERGUSON	Introduction	
		FINNEGAN	Wild and Scenic	
4	7/17/75	MYERS	Application, ER, PSAR and LWA	702-926
		MYERS) STARKE) LOU) FARRELL) HUI)	Site Suitability	
		FINNEGAN) DOBRIN) ADAIR) BOLT) LESLIE) MILLER) COOMBS)	Geology/Seismology	
5	7/18/75	Panel Contd.	Geology/Seismology	927-1161
6	7/21/75	IVEY) DOBRIN) ADAIR) MILLER) COOMBS)	Geology/Seismology	1162-1407
		CHENEY	Geology/Seismology	

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
6-II	7/21/75	CHENEY	Geology/Seismology	
7	7/22/75	CRANDELL	Geology/Seismology	1408-1631
		RASMUSSEN	Geology/Seismology	
8	7/23/75	IVEY) DOBRIN) ADAIR) MILLER)	Geology/Seismology	1632-1865
9	7/24/75	STEPP) LeFEVRE) GRIMES) PELTIER)	Site Suitability Report	1866-2062
10	7/25/75	STEPP) GRIMES) PELTIER)	Site Suitability Panel	2063-2286
11	7/28/75	MYERS) MacISAAC)	LPZ Evacuation and Construction Traffic	2287-2537
		CROSSON	Geology/Seismology	
12	7/29/75	SMITH	Geology/Seismology	2538-2798
		MYERS) LARSEN) HOUGHTON) REICHARD) KRAFT) SHICKER) RABIN) TOSETTI) CARLTON) FINNEGAN)	Environmental Impact	
		HEWITT) ESSIG) LEECH)	Appendix I	
13	7/30/75	Panel Contd.	Environmental Impact	2799-3032

1595 181

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
		LEECH) MILSTED)	FES; Independent Review by Staff	
		BRUBAKER	Ecological Effects	
		ESSIG) LEECH) MILSTED)	Genetic and Somatic Effects	
14	7/31/75	MIKELS	Ranney Collectors	3033-3290
		LOU	Meteorology	
		HEILMAN	Aesthetics	
		BADGLEY	Meteorology	
		MILSTED) LEECH) CARSON) BESKID) DERICKSON) DVORAK)	Environmental Effects	
14-II	7/31/75	DERICKSON) MILSTED)	Fishery	
		MILSTED) DVORAK)	Agriculture	
		MILSTED) DVORAK) DERICKSON)	Birds	
		MILSTED) LEECH) CARSON)	Visual	
		DERICKSON	Board Questions 1 and 2	
15	8/ 1/75	LEECH) MILSTED)	FES; Independent Review by Staff	3291-3511
		LEECH	Wild and Scenic	
		MILSTED)	Board Question 3	

1595 182

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
		MYERS) FINNEGAN) HOUGHTON) BERTHRONG) SCOTT) CHAKRAVORTI)	Project Discharge	
16	8/ 4/75	MYERS) FINNEGAN) HOUGHTON)	Project Discharge	3512-3737
		PELTIER) HOUSTON)	Site Suitability and Evacuation	
		JACOBSEN) KNIGHT)	Alternate Sites	
		KNIGHT	Alternate Energy Sources	
17	8/ 5/75	KNIGHT	Alternate Energy Sources	3738-3979
		ADAIR) COOMBS) MILLER)	Geology/Seismology	
18	8/ 6/75	KNIGHT	Alternate Energy Sources	3980-4240
		FERGUSON	Cost of Power	
		BESKID) CONNOR)	Alternate Energy Sources	
		LEECH) CONNOR)	Alternate Sites	
		SMILEY	Evacuation	
19	8/ 7/75	SWARTZELL) KNIGHT)	Need for Power	4241-4517
		KNIGHT	Board Question 4	
		CONNOR	Need for Power	

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
20	8/ 8/75	CONNOR	Need for Power	4518-4722
		CONNOR	Postponing Construction; Board Question 4	
		ANDERSON	Need for Power	
		LEECH) CONNOR)	Capacity Factor	
		- ° -		
21	5/12/76	Special Prehearing Conference		4723-4844
		- ° -		
		JUNE 1976 SESSION		
22	6/ 2/76	Limited Appearances		4845-5090
		MECCA	Revised Exhibits	
		JACOBSEN	Cherry Point	
		LEECH	Cherry Point	
		KNIGHT	B. C. Coal	
23	6/ 3/76	KNIGHT	B. C. Coal	5091-5335
		COBB	Aircraft Routes	
		GENS	BPA Transmission System	
		STARKE	Aircraft Routes	
		CONNOR) BESKID)	Coal Alternative	
24	6/ 4/76	BESKID) CONNOR)	Coal Alternative	5336-5597
		PELTIER) LEECH)	Cherry Point	
		LEECH	Capacity Factor	

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
		READ	Military Aviation	
			JULY 1976 SESSION	
25	7/ 7/76	ADAIR) DOBRIN) MILLER)	Geology/Seismology	5598-5846
		Limited Appearances		
26	7/ 8/76	JACOBSEN)	Cherry Point	5847-6085
		FERGUSON) OSTROM) SUMMERS)	Dollars for .35g	
		FINNEGAN	Cherry Point	
		KNIGHT) JACOBSEN) FERGUSON) OSTROM) SONSTELIE)	Skagit/Pebble Springs Comparison	
		Limited Appearances		
27	7/ 9/76	WOODLEY) KNIGHT) JACOBSEN) FERGUSON) OSTROM) SONSTELIE)	Skagit/Pebble Springs Comparison	6086-6341
		FERGUSON) SONSTELIE)	Coal/Nuclear Cost Comparison	
28	7/10/76	JAYE) KOPPE) SONSTELIE) FERGUSON)	Nuclear Fuel Cycle Costs; Nuclear Capacity Factor	6342-6552

AUGUST 1976 JOINT NFP SESSION

VOLUME	DATE	WITNESSES	SUBJECT	NFP PAGES
29	8/17/76	KNIGHT) BREDEMEIER) HEINRICH) SWARTZELL) LISBAKKEN) NOGLE)	Need for Power	1-279
		Limited Appearances		
30	8/18/76	Panel Contd.	Need for Power	280-549
		Limited Appearances		
31	8/19/76	Panel Contd.	Need for Power	550-815
		GEKAS) TAYLOR)	Need for Power	
		Limited Appearances		
32	8/20/76	GEKAS) TAYLOR)	Need for Power	816-1054
		SCHULTZ	Need for Power	
		NOGLE	Need for Power	
33	8/21/76	CONNOR	Need for Power	1055-1253
		TIMM	Oregon Report	
		Limited Appearances		
34	8/23/76	TIMM	Oregon Report	1254-1542
		MURRAY	Need for Power	
		Limited Appearances		

1595 186

VOLUME	DATE	WITNESSES	SUBJECT	NFP PAGES
35-I	8/24/76	TIMM	Oregon Report	1543-1733
		LAMBERT	Need for Power	
		BOLY	Need for Power	
35-II	8/24/76	TIMM	Oregon Report	

MARCH 1977 JOINT NFP SESSION

36	3/ 1/77	Limited Appearances		
		MILLER) WELLS) FANG) NADAL)	Oregon Report	1734-1983
37	3/ 2/77	WELLS) FANG) MILLER) NADAL) TIMM)	Oregon Report	1984-2192
		MURRAY	NRDC Scenario	
38	3/ 3/77	MURRAY	NRDC Scenario	2193-2463
39	3/ 4/77	NETSCHERT	Industrial Conservation	2464-2706
		ANDERSON	Econometric Forecast	
40	3/ 5/77	ANDERSON	Econometric Forecast	2707-2967
		SCHULTZ	Hydro Resources	
		BLOOD	Surplus Energy	
41	3/ 7/77	TAYLOR	Need for Power	2968-3219
		DAVENPORT) SWARTZELL) McCLELLAN) SOOT)	Conservation	
		TAYLOR	Need for Power	

1595 187

VOLUME	DATE	WITNESSES	SUBJECT	NFP PAGES
42	3/ 8/77	TAYLOR	Need for Power	3220-3498
		BLOOD	West Group Forecast Power Imports and Exports	
		HEINRICH	PGE Forecast	
		McCLELLAN) SWARTZELL)	Conservation	
43	3/ 9/77	HEINRICH) KNIGHT) LISBAKKEN) NOGLE) BREDEMEIER) SWARTZELL)	Need for Power	3499-3756
		- ° -		
43-I	3/ 9/77	Conference of Counsel		1-24
		- ° -		

		MAY 1977 PRE-LWA WORK SESSION		CONTD. PAGES
44	5/11/77	Limited Appearance		6553-6804
		GOETTGE) FINNEGAN) BURKE)	Sewer Line and Road Work	
		DVORAK) GOLDSTEIN)	Environmental Analysis of Proposed Pre-LWA Work	
		NEWMAN	Construction Impacts	
45	5/12/77	NEWMAN	Construction Impacts	6804-7061
		CLOUGH	Environmental Impacts	
		BRUBAKER	Construction Impacts	

1595 188

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
		DVORAK) GOLDSTEIN)	Environmental Analysis of Proposed Pre-LWA Work	
		HOUGHTON) LEDER)	Aquatic and Terrestrial Effects	
46	5/13/77	HOUGHTON) LEDER)	Aquatic and Terrestrial Effects	7062-7161
		JULY 1977 SESSION		
47	7/19/77	MECCA	Chapter 2 of PSAR	7165-7413
		PATTERSON	Uranium Resources Availability	
		PARKER) LEECH) DVORAK) PELTIER)	Alternative Sites	
		Limited Appearance		
48	7/20/77	PARKER) LEECH) DVORAK) PELTIER)	Alternative Sites	7414-7667
49	7/21/77	PARKER) LEECH) DVORAK)	Alternative Sites	7668-7922
		LEECH) DVORAK) PARKER) WINTERS) HESSELDAHL) HENLEY)	Wild and Scenic; Final Supplement to FES	
50	7/22/77	Panel Contd.	Wild and Scenic	7923-8193
		SWEENEY	Aesthetic and Secondary Impacts	

1595 189

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
51	7/23/77	BOWER	Exhibit 124	8194-8375
		BRUBAKER	Aquatic Impacts	
		READ	Military Aviation (F8325)	
		LEECH	Revised Table S-3	
		GOETTGE	Proposed pre-LWA Reduced Scope Road Work	
			- ° -	
52	1/24/78	Prehearing Conference		8376-8484
			- ° -	

MARCH 1978 SESSION

53	3/ 7/78	BOLT	Geology/Seismology	8485-8700
54	3/ 8/78	ADAIR) MILLER)	Geology/Seismology	8701-8947
55	3/ 9/78	HAYS) WASTLER) LEFEVRE) BROCKMAN) WHETTEN) MORRIS) DEVINE) KELLEHER) STEPP)	Geology/Seismology	8948-9160
56	3/10/78	Panel Contd.	Geology/Seismology	9161-9410
		DOBRIN	Geology/Seismology	
57	3/11/78	DOBRIN	Geology/Seismology	9411-9640
		Panel Contd.	Geology/Seismology	
58	3/13/78	Panel Contd.	Geology/Seismology	9641-9900

1595 190

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
59	3/14/78	Panel Contd.	Geology/Seismology	9901-10129
60	3/15/78	Panel Contd.	Geology/Seismology	10130-10315
		- ° -		
61	6/20/78	Prehearing Conference		10316-10475
		- ° -		

JUNE 1978 SESSION

62	6/21/78	GOTCHY	Coal-Nuclear Health Effects	10476-10718
		MIKELS) PETERSON) CASSIDY) ANDERSON)	Ranney Collectors	
63	6/22/78	MIKELS) PETERSON) CASSIDY) ANDERSON)	Ranney Collectors	10719-10978
64	6/23/78	MORRIS) WHETTEN)	Geology/Seismology	10979-11236
		BLUNDEN	Bore Hole Logging	
65	6/24/78	ADAIR) TALMADGE) CROSBY)	Geology/Seismology	11237-11480
		CHENEY	Geology/Seismology	
		- ° -		
66	1/16/79	Conference of Counsel		11481-11645
67	1/17/79	Conference of Counsel		11646-11775
68	4/24/79	Conference of Counsel		11776-11953
		- ° -		

1595 191

JULY 1979 SESSION

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
69	7/17/79	Limited Appearances Preliminary Matters		11954-12146
70	7/18/79	SCHREIBER) MARMER) ZUSSMAN)	Ranney Collectors	12147-12354
		Limited Appearance		
71	7/19/79	WEBER	Ranney Collectors	12355-12543
		LEECH	Alternative Sites	
72	7/20/79	Limited Appearance		12544-12760
		LEECH) EASTVEDT) STULL) DVORAK) LEFEVRE) WINTERS)	Alternative Sites	
73	7/21/79	Panel Contd.	Alternative Sites	12761-12890
74	7/23/79	Panel Contd.	Alternative Sites	12891-13088
75	7/24/79	Panel Contd.	Alternative Sites	13089-13326 -13227A
76	7/25/79	Panel Contd.	Alternative Sites	13228A-13327A 13328-13458
		WINTERS	Socio-Economic Impacts and Cost-Benefit Analysis	
77	7/26/79	ELLIS) FERGUSON) PADGETT) HETTINGER)	Quality Assurance	13459-13670
		WINTERS	Socio-Economic Impacts and Cost-Benefit Analysis	
		CHENEY	Alternative Sites	

VOLUME	DATE	WITNESSES	SUBJECT	PAGES
78	7/27/79	CHENEY	Alternative Sites	13671-13912
		DARLAND	Alternative Sites	
79	7/30/79	MECCA	Amended Application and Complete PSAR	13913-14171
		CHENEY	B. C. Coal	
		CARSTENS	Alternative Sites	
80	7/31/79	MJKELS	Ranney Collectors	14172-14387
		KNIGHT	Alternative Sites	
		AUGUST 1979 SESSION		
81	8/27/79	Limited appearances		14388-14573
		PELTIER	Safety Evaluation Report and Supplement No. 1	
		HULMAN)) STULL)	Floodplain Management	
82	8/29/79	GITTLEMAN	Financial Qualifications	14574-14801
		LAZAR	Financial Qualifications	
83	8/30/79	LAZAR	Financial Qualifications	14802-15048
		OLSON) COBERLEY) PACK) COOMBS)	Financial Qualifications	

1595 193