Environmental Concerns Re: Ranney Collectors
at the Proposed Skagit Nuclear Power Plant Site

We have had the opportunity to examine a number of documents relating to the environmental impact of the proposed Ranney Collectors on the surrounding environment and the converse environmental constraints on the collector wells.

Several items have not been considered, or have received inadequate consideration in the documents we have seen. These include concerns about effects of operating these collectors and effects related to river channel stability.

COLLECTOR OPERATION

The following items concern operation:

1) Yield Calculations.

2) Water quality, particularly in reference to iron content.

3) Effect of possible chlorine flushing.

4) Effect on local wells.

5) Effect on tributary streams.

We do not propose to repeat the previous testimony except where necessary to explain our concerns. The items herein are additional concerns not covered in the material to date.

1) Yield calculations

Mikels has answered concerns of the adequacy of the yield calculation with a question as to whether the flow will be laminar or turbulent. This is not the entire problem. An additional instance where Darcy's law might not be applicable is in the analysis of coarse sands and gravels wnich

might not be able to sustain the groundwater gradient proposed. In this case, the low yield pumping tests are not sufficient to determine the available yield at very high rates. The yield, as can be observed from the calculations presented would decrease proportional to the falling gradient.

The effect of an inability to sustain the proposed gradient would be to cause increased draw of stored groundwater, as well as reducing the total yield.

2) Water quality, especially iron content

Although the precise proportion of infiltrated river water to stored groundwater cannot be determined, the theoretical consideration presented indicates that it will be high. Nonetheless, additional iron and other minerals over the river water content, can be expected to dissolve as the water filters through the ground. Additional comments presented by Jeffrey Haley indicate that iron bacteria can form in water with iron contents in the range known here.

Mikels noted in his affidavit (p.2) that the 48-hour pumping tests (E, F & G) were used only to "establish the initial chemical characteristics of the relatively stagnant groundwater." Yet the water level in these wells "responded rapidly and consistently to changes in river stage." These wells were pumped at rates from 913 to 1013 gal/min. The fluctuating levels indicate influx of river water.

He also concludes that for a 6-month test on the 16-inch well "the water pumped during the test was primarily intercepted groundwater flow...." (p.14). This test was pumped at 1,325 gal/min.

Pumping rates on the 6-month tests are similar to the 48-hour tests and induced filtration can be initiated at these rates. Although the groundwater level at the start of the test was .6' above river level (31.4' MSL vs.

80.8 MSL), indicating a gradient toward the river, recharge from both the groundwater and river could be expected.

Iron contents on the 16" well varied from .003 ppm to .57 ppm. Although the exhibit notes two high values "appear to be anamalous" they should not be discounted as they are in exhibit E. Lab determinations may not always be reliable but the tendency to discount all high values is detrimental. We might note that two silica values were discounted elsewhere because they appear high. Other applicable iron values are trace amounts discovered in the drilling program and a comment that a well 200' from the collector site contained objectionably high iron (p.10,825 review board).

Behavior of the 48-hour and 6-month pumping tests indicate that infiltrated river water was pmuped. In addition, although both river and groundwater showed generally low iron contents, they are currently sufficient to sustain iron bacteria. The well 200' off-site indicates that there is soluble iron in the vicinity which will likely be mobilized by the pumping operation and further increase the iron content.

3) Effect of possible chlorine flushing

Both the staff report and Mikels recognize the possibility of iron formation and note that there will be no effect on the environment if chlorine flushing is required. We strongly disagree. There is no possibility that the chlorine can be restricted to the laterals. When the pump is not operated the water table will begin to readjust toward natural conditions. This constitutes a flow of water from the river and the vicinity of the laterals away from the river. Some of that water will be contaminated with chlorine. The chlorine treatment requires 16 to 24 hours of standing time after which some of the diffused chlorine can be recovered and pumped to waste.

Some of the chlorine will migrate away from the site and could contaminate the tributary creeks to the north and wells in the vicinity.

4) Effects on local wells

The Environmental Report shows that a large number of the water wells within a three mile radius of the proposed plar were located and data tabulated. However, the proposed collector well site is outside that radius and the wells have not been investigated. There are undoubtedly wells in this area and the drastic drawdown contemplated for the collector wells will affect them. Also possible contamination should be considered.

5) Effect on tributaty streams.

- Muddy Creek has only been shown to be perched in the section (approximately 1/4 mile) from Lyman-Hamilton road to its confluence with the Skagit River during low flow conditions (Nov. 2, 1978). In terms of salmon-spawning this reach is critical as a dry creek mouth would preclude spawning.

RIVER STABILIZATION

Concerns related to river channel stability are poorly defined as the proposed riprapping construction and possible repair have been eliminated. We are not aware what stabilization measures have been substituted.

Adequate protection for collector - laterals, caissons and lines should be developed. From the analysis by Whitney M. Borland (Appendix L - River Stabilization Study) it is evident that the current reprapping is insufficient in a 80,000 cfs flood. The 100-year flood is 225,000 cfs. During the January 1974 flood the central portion of the existing 4,600 lineal feet of riprap failed. Additional weak points are upriver from the Red Cabin Creek (east fork) enters the Skagit at mile 39.5 and at the lower end of the riprap where a slough enters the river channel.

From 1918 to 1958 the channel migrated 1,000' northward. After stabilization work the river has been contained from 1958 to the present. In the intervening twenty years the river has directed its current move severely against the bank and the possiblity of resumed migration has increased.

Two undiscussed possibilities are:

1) Outflanking of the existing bank and stabilization structures by single flood event entrenching the channel at the proposed collector site, and 2) A cut-off developing across the meander from mile 38.6 to some point downriver.

## DOCUMENTS EXAMINED

1) ER (Environmental Report), Sec. 2.5 Hydrology

2) ER, Appendix G, Hydrogeologic Study

3) ER, Appendix L, River Stabilization Study consisting of
   a) Jan. 25, 1974 report by Whitney M. Borlund
   b) Feb. 15, 1974 letter from Bechtel to Borlund
   c) Feb. 27, 1974 report by W.M. Borlund

4) Figures 3,4-3, 5 & 6

5) Dec. 23, 1977 Applicant's Memorandum Regarding Quality of Make-up Water, with attached
   a) Affidavit of Frederick C. Mikels
   b) Affidavit of Keith E. Anderson

6) NRC Staff report by D.L. Schreiber, R.A. Zussman, and G.J. Marmer, Hydrologic Engineering Issues.

7) Feb. 22, 1978, Testimony of F.C. Mikels

8) May 22, 1978 letter from Puget Sound Power and Light to NRC, subject: Wild and Scenic Rivers Decision

9) Supplemental Testimony of David L. Schreiber

10) June, 1978 letter from NRC to PSPL, subject. Wild and Scenic Rivers Determination

11) Intervenor's Interrogatories and Request for Production, June 13, 1978

12) June 12, 1978 letter in response to NRC request for additional information

13) June 16, 1978 PSPL's response to SCANP Interrogatories and Request for Production, includes
   a) May 17, 1978 report by F.C. Mikels, Design Criteria and Proposed Design Modifications to Makeup Water Supply System, and
   b) June 14, 1978 letter by F.C. Mikels to Bechtel

14) June 22, 1978 report by Jeffrey Haley, Potential Iron Bacteria Problems in Ranney Collectors for Skagit Nuclear Power Plant

15) Record of Board Meeting including most of p. 10,762 to 10,967.

PAUL WEBER & ASSOCIATES

GROUND ENGINEERING



## PROFESSIONAL QUALIFICATIONS & EXPERIENCE

PAUL R. WEBER

- 36 years of age
- Eleven year Seattle resident
- BSCE, Arizona State University, 1964
- Recently completed four full-time quarters as graduate student in Geology and Geotechnical Engineering, University of Washington
- Registered Engineer, Washington, Oregon and Georgia

## EMPLOYMENT EXPERIENCE

- Southwest Materials Laboratory, Phoenix, June '64 to Jan. '66
- Dames & Moore, Seattle, Jan. '66 to Nov. '71
- Owner of Private Practice, Seattle, Nov. '71 to Present

## GROUND ENGINEERING

Paul Weber & Associates provides Ground Engineering services to Designers and Contractors in the following areas:

- Soils, materials, and subsurface investigations
- Engineering Geol[illegible] / Environmental Geology
- Investigations for claims, failures and legal disputes arising from ground construction and engineering
- Design and cost estimating for foundations, retaining structures and excavation bracing systems
- Design, installation and evaluation of Geotechnical Instrumentation
- Applied research in ground engineering

1969 WEYERHAUSER HEADQUARTERS BUILDING - Lake and drainage studies for a man-made lake at the Federal Way office complex.

1969 CITY OF MARYSVILLE WATER SUPPLY - Investigations for expanding and improving the Marysville Storage Pond and water supply system.

1974 CHERYL LEE HEIGHTS - Subsurface drainage design, 30 acre Maple Valley Subdivision.

1974 TERMINATION POINT LANDSLIDE - 200 foot high by 1200 foot long landslide on Hood Canal, Jefferson County, Washington.

1974 BIG BEAVER LAKE AGGREGATE SOURCE - Environmental geology and aggregate quality studies for Kitsap County project.

1975 GOLDEN GARDENS LANDSLIDE - 300 foot high by 1500 foot long landlside in Seattle. Stabilization measures following failure by City of Seattle forces.

1975 WOODWAY PARK LANDSLIDE - 300 foot high by 1300 foot long landslide near Edmonds, Washington. Drainage stabilization of landslide for Burlington Northern and local residents.

1976 SAN DIEGO HARBOR DREDGING - Geologic studies of changed conditions in Corps of Engineers contract for dredging San Diego Harbor - for General Construction.

1977 CARKEEK ESTATES - Environmental geology studies for 6.7 acre condominium development in Carkeek Park drainage basin, Seattle.

1977 QUEEN ANNE DEVELOPMENT - Environmental geology, foundation and ground engineering studies for 300-acre comprehensive development plan.

1977 SOUTHPARK APARTMENT PROJECT - Environmental geology and storm drainage design to King County standards, six-acre site, Southpark, Seattle.

1977 RED DOT HEATER CORPORATION - Environmental geology and storm drainage design for 19 acre Green River Valley site, Kent, Washington

1977 MARATHON CORPORATION - Environmental geology for major downtown office complex with two towers, one 11-story and the second 20-story, Bellevue, Washington.