RELATED CORRESPONDENCE TERA

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
PUGET SOUND POWER & LIGHT COMPANY, et al.,	)	DOCKET NOS. STN 50-522 50-523
(Skagit Nuclear Power Project, Units 1 and 2)	)	August 13, 1979

INTERVENOR SCANP'S RESPONSE TO APPLICANT'S INTERROGATORIES AND REQUESTS FOR PRODUCTION OF DOCUMENTS

Interrogatory No. 1. Our sole sources of information are available through the University of Washington Geophysics Program. We would recommend contacting Professors Smith, Malone, or Crosson. The details requested are presumably available from these sources. We do not presently have them.

Interrogatory No. 2.

a) McClery, J., Dohrenwend, J., Cluff, L., and Hanson, K., April, 1978, Straight Creek Fault Zone Study, prepared by Woodward-Clyde Consultants (San Francisco, Cal.) as a part of the 1872 Earthquake Studies for WPPSS Nuclear Project Nos. 1 and 4.

b) McCleary, J.R., Dohrenwend, J.C., and Risdley, A.P., 1979, Geol. Soc. Amer. Abstracts with Programs, p. 90-91. The authors are employed by Woodward-Clyde Consultants, San Francisco, California.

c) Seattle City Light is currently studying the geological feasibility of the Copper Creek damsite, and such investigation may provide additional information about the Straight Creek Fault. This information can be obtained by the Applicants through Dr. H.A. Coombs.

Interrogatory No. 3.

a) Whetten,, J.T., et al., 1978 in Howell, D.G., and McDougall, eds., Pacific Section Soc. Econ. Paleontologists and Mineralogists: Pacific Coast Paleontology Symposium 2, p. 117-132.

b) Rogers, G.C., and Hasegawa, H.S., 1978, Seis. Soc. Amer. Bull., v. 68, p. 653-675.

c) Milne. W.G., et al., 1978, Canadian Jour. Earth Sci., v. 15, p. 1170-1193.

d) Gower, H.D., 1978, U.S. Geol. Surv. Open File Report 78-426, 17 p.

e) Crosson, R.S., and Nosson, L.J., 1978, Wash. Div. Geol. and Earth Resources Info. Circ. 64, 12 p.

f) Crosson, R.S., and Noson, L.J., 1978, Wash. Div. Geol. and Earth Resources Info. Circ. 65, 13 p.

Interrogatory No. 4. None

Interrogatory No. 5. See Attachment A by Professor Thomas Dunn, Department of Geological Sciences, University of Washington, dated 11 June 1979 concerning bank erosion studies of the Skagit River. Also see the series of reports prepared by Dr. E. Cheney, previously made available to you, and previous studies discussed

by Mr. Roy Blunden. Also see the attached letter report of Mr. Blunden. (Attachment B).

Interrogatory No. 6. Our witnesses offered their presentation on this subject at the last hearing.

Interrogatory No. 7. Our witness, Dr. Eric Cheney, has completed his presentation, which answered the questions raised.

Interrogatory No. 8. The information requested is not yet available to us.

Interrogatory No. 9. Prefiled testimony on evacuation planning was distributed to all parties on July 20, 1979, and responds to this question.

Interrogatory No. 10. The testimony of Jim Lazar has been distributed to all parties and responds to this question.

Interrogatory No. 11. To the extent such information is now available, it has already been furnished.

Request for Production No. 1.

a) The reports listed under Interrogatories No. 2 and 3 can be obtained from the referenced sources.

b) Dunne's Memorandum (Attachment A described in Answer to Interrogatory No. 5) and the Blunden report dated June 29, 1979 are enclosed. (Attachment B).

Request for Production No. 2. See Attachments C through F.

DATED this ___ day of August, 1979.

Respectfully submitted,

ROGER M. LEED
Counsel for Intervenor SCANP
1411 Fourth Avenue Bldg.
Seattle, Washington 98101

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
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PUGET SOUND POWER & LIGHT COMPANY, et al.,	)	DOCKET NOS. STN 50-522 50-523
	)	
	)	
(Skagit Nuclear Power Project, Units 1 and 2)	)	
	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of. Intervenor Scanp's Response To Applicant's Interrogatories and Requests For Production Of Documents

dated August 13, 1979, have been served on the following by depositing the same in the United States mail, postage prepaid, on this 16 day of August, 1979.

Valentine B. Deale, Esq., Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
1001 Connecticut Avenue N.W.
Washington, D.C. 20036

Dr. Frank F. Hooper, Member
Atomic Safety and Licensing Board
School of Natural Resources
University of Michigan
Ann Arbor, MI. 48104

Gustave A. Linenberger, Member
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Alan S. Rosenthal, Chairman
Atomic Safety and Licensing Appeal Board
U.S. Nuclear Regulatory Commissi
Washington, D.C. 20055

Dr. John H. Buck, Member
Atomic Safety and Licensing Appeal Board
U.S. Nuclear Regulatory Commissi
Washington, D.C. 20555

Michael C. Farrar, Member
Atomic Safety and Licensing Appeal Board
U.S. Nuclear Regulatory Commissi
Washington, D.C. 20555

Docketing and Service Section
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Richard L. Black, Esq.
Counsel for NRC Staff
U.S. Nuclear Regulatory Commission
Office of the Executive Legal Director
Washington, D, C. 20555

Nicholas D. Lewis, Chairman
Energy Facility Site Evaluation Council
820 East Fifth Avenue
Olympia, Washington 98504

Robert C. Schofield, Director
Skagit County Planning Department
120 West Kincaid Street
Mt.Vernon, Washington 98273

Richard M. Sandvik, Esq.,
Assistant Attorney General
Department of Justice
500 Pacific Building
520 S. W. Yamhill
Portland, Oregon 97204

Robert Lowenstein, Esq.
Lowenstein, Newman, Reis & Axelrad
1025 Connecticut Avenue, N.W.
Washignton, D.C. 20036

H. H. Phillips, Esq.
Vice President and Corporate Counsel
Portland General Electric Company
121 S.W. Salmon Street
Portland, Oregon 97204

CFSP and FOB
E. Stachon & L. Marbet
19142 S. Bakers Ferry Road
Boring, Oregon 97009

Canadian Consulate General
Peter A. van Brakel
Vice-Consul
412 Plaza 600
6th and Stewart Street
Seattle, Washington 98101

F. Theodore Thomsen
Perkins, Coie, Stone, Olsen & Williams
1900 Washington Building
Seattle, Washington 98101

Alan P. O'Kelly
Paine, Lowe, Coffin, Herman & O'Kelly
1400 Washington Trust Financial Center
Spokane, Washington 99204

Russel W. Busch
Evergreen Legal Services
520 Smith Tower
Seattle, Washington 98104

Thomas Moser
Deputy Prosecuting Attorney
Skagit County Courthouse
Mt. Vernon, Washington 98273

DATED: August 16, 1979

ROGER M. LEED

By _____

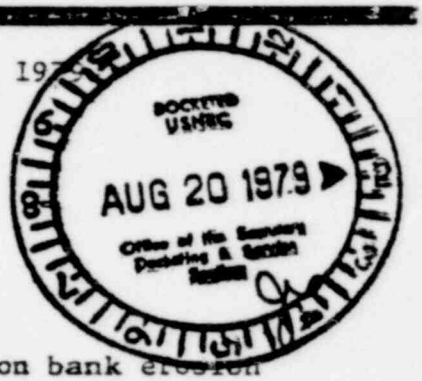
Attachment A

RELATED CORRESPONDENCE

University of Washington Correspondence

INTERDEPARTMENTAL

GEOLOGICAL SCIENCES



June 11, 19

TO: Eric Cheney

FROM: Tom Dunne - Tom

I looked over the aerial photos and the consultant's report on bank erosion in the Skagit.

Bechtel hired a good consultant, Borland, who is experienced in and has published good papers on the engineering of large rivers. He has told them, correctly, that they have a real problem most places on that river. The Skagit moves rapidly around its floodplain. However, they have chosen a relatively stable and predictable bend, which was shifting at an average rate of 25 ft/yr before its outer bank was protected by a rip-rap that he judges to be inadequate. Recent failure of the rip-rap at the proposed wall site in a modest flood (2-3-yr recurrence interval) confirms this. The failure occurred because the point bar (the opposite, convex bank) continued to grow after the rip-rap was installed, and it forced the main velocity thread against the outer bank, increasing the shear stress, and probabably) undermining the protective wall by scouring out its toe.

In spite of this experience, Borland believes that the bank can be stabilized, stating (p. 3, line 4 ff)

> "It has been proven on many rivers that if the concave(sic) or outside of a bend can be stabilized and held rigid by structures, the bedload of the river will be transported through the bend and the point bar on the convex(sic) or inside of the bend will also be stabilized, no longer growing in size."

The statement is true, but its most important content is the work "if." The Skagit is a big, steep river that exceeded 200,000 cfs at Sedro Woolley at least four times in the century 1815-1923, according to U.S. Geological Survey Water Supply Paper 1527. The authors of that report estimated that such a flood was the 20-year flood (i.e., had a 5 percent chance of being equalled or exceeded in any one year). Borland (p. 3), presumably on the basis of more recent information about the effect of dams on flood peaks (check?), indicates that 225,00 cfs has only a one-percent chance of being exceeded in any year. This is still an important probablility for an event which is 2.8 times larger than the 1974 flood that caused failure and would rise about 8 feet higher (according to USGS Water Supply Paper 1527, p. 52).

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I do not wish to imply that Borland is wrong. I suspect that he is correct, particularly if the maintenance that he refers to (p. 3), is faithfully carried out. But I would ask him to strengthen his contention by pointing to other cases where a rip-rap of the kind proposed in Figure 2 of his report has repeatedly withstood the magnitude of stress and the degree of basal scour that will be imposed in the Skagit during a major flood. I do not know the details of the topography and proposed land use below the potential failure site, so I cannot suggest how bit a flood should be considered. In any case the recurrence interval to be considered is a planning and politic . decision, rather than a hydrological one.

If the proposed protection is emplaced, I suggest that one important detail be thoroughly checked beforehand. On Fig. 2, Mr. Borland proposes that the toe of the rip-rap be extended to a depth of three feet below the Thalweg. It is my feeling that on a river the size of the Skagit, this is too shallow for safety. The sketch indicates that the river channel is 8 to 25 feet deep. The depth of scour is almost certainly greater than 3 feet in a big flood, particularly on the outside of a bend where the flow will be partly confined by some future growth of the point bar. The sketch suggests a minimum of 3 feet. I suggest that the problem be addressed more thoroughly by field measurements and the use of empirical scour formulae before a final decision is made. The question of rock size in the rip-rap should also be looked at in more detail. The sketch suggests "24-inch maximum" for the rock size. I would like to know what the mean size would be, and how much of the smaller sizes will be included. I would also judge on the basis of local field observation what size of rock can be moved in that reach, as well as on the basis of cautious use of handbook values. I assume Mr. Borland did this, but that is a big, steep river.

TD:CR

Attachment B

RECEIVED

JUL 31 1979

L- ...

R. H. Blanden
Consulting Geologist
Coastal Geology
Engineering
Environmental

June 29, 1979

File No. C337.79

Mr. Craig Martin, President,
S.C.A.N.P.,
P.O. Box 137,
Burlington, Wa. 98233

Dear Sir:

Re: 1978-1979 Geological Investigations for proposed Skagit Nuclear Power Project.

Upon the instructions of Mr. Roger Leed, Attorney, I have reviewed reports by Bechtel Inc. for Puget Sound Power & Light Company, in his office between June 6th and 8th, 1979. I also held a general discussion of the investigation data with Dr. Eric Cheney and with Dr. Fred Pessl, Jr. of the U.S. Geological Survey.

The reports studied were contained in the Report of Geologic Investigations in 1978-1979 concerning investigation of deformed Pleistocene sediments. Included was a report by Dr. Don J. Easterbrook, dated April 3rd. As the actual investigation findings appeared not to have been fully included in that report, a further report of Bechtel Inc. dated December 29th, 1978 was also studied.

Two specific areas of deformed Pleistocene sediments were considered in the reports, neither of which have been studied in the field by the writer. Of the two areas referred to in the Bechtel Inc. reports only the Cavanaugh Road exposures were subjected to sub-surface

1106 024

2045 East Broadway • Vancouver, British Columbia V5N 1V8 • Phone (604) 253-5477

investigation and are here considered in the following analysis. This analysis is concerned with the expectations, findings and interpretation of the investigation findings by Dr. Easterbrook and Bechtel Inc.

REVIEW OF LAKE CAVANAUGH ROAD AUGER-HOLE INVESTIGATION

The purpose of the sub-surface investigation conducted by Bechtel Inc. was to determine the causes of the deformation of Pleistocene sediments observable in road cuts along Lake Cavanaugh Road. These deformed sediments occur along the southern projection of a regional lineation postulated by Dr. John Whetten as being a fault-line. This postulated fault-line, the Gilligan Creek fault, has been studied by the U.S. Geological Survey (U.S.G.S.) who presumably located and reported the occurrence of the deformed materials.

A description of the area of investigation by the U.S.G.S. and by Dr. Easterbrook indicate the presence of a till morainal ridge to the west, and transverse to the road, backed to the east by lacustrine deposits folded into anticline-syncline deformations. Along the inner flank of the western anticline multiple faults were observed. In addition flame structures were present in the syncline and inner flank of the eastern anticline. An auger hole investigation conducted by the U.S.G.S. suggested there might be a displacement of underlying glacial deposits in the order of some seven metres.

The apparent intent of the Bechtel Inc. investigation, as suggested by the data presented, was to determine the continuity of the sub-surface glacial deposits and by inference the presence or absence of faulting associated with the Gilligan Creek lineation.

Dr. Easterbrook ascribes the surface morainal ridge a Vashon age and the lacustrine deposits as being of similar recessional Vashon age. In the same report, however, Dr. Easterbrook identifies two sub-surface glacial sequences encountered in auger holes, the lowermost of which he also ascribes of contemporary Vashon age without citing additional supporting evidence.

Within the auger hole logs of Bechtel Inc. (report dated December 29th, 1978), the lowermost till of Dr. Easterbrook was visually recognized and generally described as "Till: blue-gray diamicton, dense to very dense." Standard penetration tests results indicate that after an initial penetration of six inches, hammer blows required to drive the split spoon sampler a further twelve inches (N-value) varied between

$$N = 21 \text{ \& } 100^{+}$$

The mean N-value was 62 blows per foot which tends to confirm the field attribution.

In contrast, Dr. Easterbrook also identified an upper till which in no instance is reported to have been recognized as such in the field. Dr. Easterbrook would appear to have established the existence of the upper till according to the jumping action of the auger bit when gravel and boulders were encountered at an approximately common depth within a bedded silty sand sequence. General auger hole log descriptions for this 'upper till' are "Silty Sand: blue-gray, variously sorted, scattered gravel and cobbles throughout occasionally with bedded materials. Logged drilling indications (i.e. the jumping action of the rods) for the same horizon range from small gravel to small boulders. Reported standard penetration values fall between

$$N = 9 \text{ \& } 97$$

The mean N-value was 27 blows per foot, less than half that of the recognized lower till. The two highest N-values, viz: N = 80 (AH #19) and N = 97 (AH #12) are reported from gravel zones and therefore spuriously high.

Dr. Easterbrook in his analysis of the sub-surface conditions places considerable stress upon the existence of the "upper till" to demonstrate that tectonic faulting was not the cause of the soil deformations. The auger-hole logs in contrast would suggest that rather than an irregular till horizon up to three metres in thickness, the "upper till" is the fortuitous assemblage of gravel seams and small boulders in a bedded silty sand assemblage. Unless Dr. Easterbrook based his identification of the "upper till" upon data not reported in the quoted sources, it must be concluded that the existance of the "upper till" is an unproven product of his imagination.

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R. M. Blunden
Consulting Geologist • 2045 East Broadway • Vancouver, British Columbia V5N 1W6 • Phone (604) 251-3970

The continuity of the basal till horizon would appear to have been confirmed within the limitations of the investigations. From the data presented it must be concluded that any single, large displacement of this horizon, suggested by the U.S.G.S., has been shewn to be nonexistant. In contrast, however, the assertion by Dr. Easterbrook that the faulted and deformed sediments do not persist to significant depths below road level due to the presence of the "upper till" cannot be substantiated from the investigation findings.

The sub-surface investigation also has neither proven nor disproven the existance of recent post-glacial faulting within the Lake Cavanaugh Road investigation area. Both Dr. Easterbrook and Bechtel Inc. would appear to have assumed that any recent fault activity would involve the glacial deposits in easily identifiable vertical dislocations, as originally suggested by the U.S.G.S. Such reasoning would by implication mean that the absense of dramatic evidence of recognizable dislocation would nullify any postulated recent faulting along the Gilligan Creek lineation. The form and method of the investigation confirms that only such dramatic evidence was sought, indeed using the augering methods adopted, was the only evidence that could have been identified.

Quaternary faulting reported near Lake Cushman, Washington (Wilson et al 1979) do offer the dramatic uplifts of up to eight metres. Examination of the published photographs of test trenches excavated across those faults reveals that had they been investigated using core drilling they would probably not have been recognized. In the photograph (Fig. 2, A p.237, loc.cit) an approximately 3-1/2 metre faulted uplift, had that been core drilled, would have yielded a log:

0.7 m^{+}	Till
3.2 m	Cataclastic rock
0.2 m	Till
1.1 m^{+}	Vitric tuff

With coring breaks, even had the lower till been recovered, the most probable interpretation of such a log would have been a regular till deposit, containing large boulders, overlying a pluckered rock surface. In a soil formation composed of silty sands and tills, such as along Lake Cavanaugh Road, such alternating materials would not be

R. M. Blunden
Consulting Geologist • 2045 East Broadway • Vancouver, British Columbia V5N 1W6 • Phone (604) 253-3970

identified as evidence of faulting.

In contrast slip faulting with surface rupturing associated with the Californian Galway Lake earthquake (Hill & Beeby, 1977) yielded shear planes which would be unrecognizable in any augering investigation. Similarly even using advanced soil sampling techniques, in a drilling investigation such shear planes would, in the absence of other information, be interpreted as soil fissures probably as a result of dessication.

A critical review of the investigation reports of Bechtel Inc. for the Lake Cavanaugh Road Auger-hole study of deformed Pleistocene sediments has neither confirmed nor disproved a tectonic origin for the features observed. The crudity of the augering process adopted would be unlikely to yield unequivocable evidence of even dramatic faulting. Similarly the auger-hole investigation has yielded insufficient evidence to confirm or disprove alternative origins for the features observed.

Respectfully submitted,

Roy H. Blunden

R. H. Blunden
Consulting Geologist • 2433 East Broadway • Vancouver British Columbia V5M 1Y8 • Phone (604) 255-3970

References

Hill, R. L. & D. J. Beeby, 1977, Surface faulting, associated with the 5.2 magnitude Galway Lake earthquake of May 31, 1975: Mojave Desert, San Bernadino County, California. Bull. Geol. Soc. Amer., vol. 88, Pp 1378 - 1384.

Wilson, J. R., M. J. Bartholomew & R. J. Carson (1979), Late Quaternary faults and their relationship to tectonism in the Olympic Peninsula, Washington, Geology, Geol. Soc. Amer. vol. 7, No. 5, Pp 235-239.

Attachment C

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Department of Geological Sciences

February 2, 1978

Dr. R. W. Couch
School of Oceanography
Oregon State University
Corvallis, Oregon 97331

Dear Dick:

I would appreciate a copy of the following report:

> Couch, R. W., Victor, L., and Keeling, K., 1974 Coastal and offshore earthquakes of the Pacific Northwest between 39°N and 49°10'n Latitude and 123 and 131 W Longitude, 67 p.

You could either tell me where I can get a copy, or I would be happy to pay for a Xerox copy.

My colleague Darrell Cowan tells me that you have recently published a compilation of the geophysical studies and tectonics of the same or somewhat larger area. He said the report was for NOAA or the USGS. How do I get a copy of this new report?

Sincerely,

Eric S. Cheney
Associate Professor

ESC:ck

Attachment D

ROBERT W. STRAUB
GOVERNOR

Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE
1069 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

January 12, 1979

Dr. Eric Cheney
Department of Geological Sciences
University of Washington
Seattle, Washington 98195

Dear Dr. Cheney:

Thank you for the opportunity to review your compilation and analysis of the geology of the Sedro Wooley site and region. Thank you in particular for your patience in letting us keep it so long.

We found the information useful in gaining a perspective on the issue as relates to similar concerns in Oregon. Mental retention all the material, of course, is impossible and we may choose to contact you and others from time to time as the need arises.

Sincerely,

John D. Beaulieu

JDB:lk
Encl.

John D. Beaulieu
Deputy State Geologist

1106 031

Attachment E

Lee C. Bennett, Jr.
LCB Consultants
224 Haverford Ave.
Swarthmore, Pa. 19081

POOR ORIGINAL

February [illegible]

Eric

Thanks for your December note & Christmas package!!

Happy Valentines Day in return.

Most of our [illegible] materials including some of the [illegible] records have been crated in storage since [illegible] in July. [illegible] [illegible] have [illegible] crated at the [illegible] [illegible] that [illegible] [illegible] in the [illegible] two weeks.

Thanks for your [illegible]

Lee

Attachment F

Energy, Mines and Resources Canada
Science and Technology

Énergie, Mines et Ressources Canada
Science et Technologie

March 1, 1978.

Your file Votre référence

Our file Notre référence

Dr. Eric Cheney,
Department of Geological Sciences,
University of Washington,
Seattle, Washington, 98195,
U.S.A.

Dear Dr. Cheney,

Enclosed is a preprint of a paper entitled "A second look at the British Columbia earthquake of 23 June 1946" which has been accepted for publication in the June 1978 issue of the Bulletin of the Seismological Society of America. This represents my current thinking on the 1946 earthquake and I think will answer the questions in your letter of Feb. 8.

My collegue, Dr. Hasegawa has indicated to me in the last week that there may be an error in the section he has written on ground deformation. This would affect only that section and Figures 8 and 9. If there is a revision I will mail you the corrections.

Sincerely,

G.C. Rogers

G.C. Rogers,
Division of Seismology & Geothermal Studies.

GCR:dc

P.S. Please note the change of name and new address of our organization.

c.c. W.G. Milne.

Pacific Geoscience Centre
9860 West Saanich Road
P.O. Box 6000
Sidney, B.C.
Canada
V8L 4B2

Centre géoscientifique du Pacifique
9860, chemin Saanich ouest
C.P. 6000
Sidney, C.-B.
Canada
V8L 4B2

1106 033