

FEDERAL ENERGY REGULATORY COMMISSION
Office of Energy Projects
Division of Dam Safety and Inspections
Portland Regional Office
101 S.W. Main Street, Suite #905
Portland, Oregon 97204

MAR 19 2003

In reply refer to:
P-4441-WA
NATDAM-WA00153

Mr. Randy A. Londolt
Director, Hydro Resources
PacifiCorp
825 NE Multnomah, Suite 1500
Portland, OR 97232

Dear Mr. Landolt:

We have completed our review of the January 15, 2002 Fourth Part 12 Independent Consultant's Safety Inspection Report (2002 Report) for the Skookumchuck Project, FERC No. 4441. The following information was also reviewed in conjunction with the 2002 Report:

- Results of soil tests conducted by Shannon & Wilson and included in four letter reports (dated July 8, 1969, August 8, 1969, August 12, 1969, and September 11, 1969) to Bechtel Corporation;

- Report titled "Construction Report for Water Supply Facilities, Skookumchuck Dam, Pumping Plant", prepared by Bechtel Corporation, for Pacific Power & Light Company and the Washington Water Power Company, and dated August 1971;

- April 3, 2002 letter from Mr. Richard Gorny (Independent Consultant) of Black & Veatch regarding: (a) Material Properties; and (b) 1990 Displacement Analysis Results. Mr. Gorny also included some material regarding 'Liquefied and Non-Liquefied Gravel case Histories' based on information included in a paper titled "A Practical Perspective on Liquefaction of Gravels", by J. E. Valera, M. L. Traubenik, J. A. Egan, and J. Y. Kanshiro, ASCE Special Publication on Ground Failure Under Seismic Conditions, 1994;

- April 30, 2002 letter report from Shannon & Wilson titled "Re-evaluation of Field Data, Skookumchuck Dam, Thurston County, Washington";

- May 23, 2002 letter report from Mr. Gorny providing dam displacement analyses and stability analyses loading diagrams;
- Becker Hammer Exploration Study, Final Submittal, December 2000 (Becker Hammer Study, transmitted by PacifiCorp March 12, 2001 letter) prepared by Shannon and Wilson;
- Liquefaction Potential Evaluation Study, November 2001 (Liquefaction Study, submitted by PacifiCorp January 24, 2002 letter) prepared by Shannon and Wilson;
- Seismic Ground Motion Study for Skookumchuck Dam, March 2001 (Seismic Study, transmitted by PacifiCorp March 23, 2001 letter) prepared by Shannon and Wilson;
- Skookumchuck Dam Modification Project Geotechnical Report, February 2001 (Geotechnical Study, transmitted by PacifiCorp March 23, 2001 letter) prepared by Shannon and Wilson;
- Skookumchuck Embankment Seismic Analytic Study, January 2002 (Analytic Study, transmitted by PacifiCorp February 5, 2002 letter) prepared by Shannon and Wilson.

Our review of the seismic stability of the dam was coordinated with our consultant Dr. I.M. Idriss. A copy of his September 20, 2002 letter report is enclosed. We have reviewed his report and concur with his findings and have incorporated them into the body of this letter.

We have the following comments on the above submittals:

1. Your consultant concluded that the MCE for the project was due to an event occurring on the Cascadia Subduction Zone fault (CSZ), and the 1988 Supplement to the 1985 Part 12 Report characterized the maximum magnitude for the CSZ of $M=8.0$ to 8.5 . The peak horizontal ground acceleration was $0.25g$ and was developed using the attenuation model by Heaton and Hartzell (1986). We do not concur that this ground motion represents the maximum earthquake for this source.

The May 1999 "Report On Seismic Hazard Evaluation For The Pacificorp Merwin and Yale Dams, Southwest Washington," by Golder Associates, Inc., included a seismic evaluation of the CSZ. Based on Golder's findings, the appropriate magnitude for an event occurring on the CSZ would be $M_w = 9.0$, and because the CSZ has a fairly high recurrence interval and slip rate, about 300 years and 4 cm/yr, respectively, the 84th percentile ground motions should be used. This finding is consistent with Dr. I.M. Idriss' report. Using a distance of 68km, the PGA at Skookumchuck would be $0.41g$ for a M_w 9.0 event occurring on the CSZ.

The 1988 Part 12 D Supplement considered subduction zone events which may occur on the CSZ; however, deep intraplate events or those that may occur on the Juan de Fuca Plate were not mentioned. The Golder Report evaluated intraplate events and the estimated magnitude was 7.5. Although the size of these events are slightly smaller than the MCE, the ground motions for these events should be considered in a reevaluation of seismicity for Skookumchuck dam. Since the recurrence interval for these events is short, the 84th percentile ground motions should be determined.

2. In addition to the CSZ, the Seismic Study identified the Legislature fault as a possible seismic source. In the 2002 Report, your consultant reported that the USGS is scheduled to perform studies to evaluate the seismogenic nature of this fault in 2002, and recommended no action until the studies are completed. We do not concur. The Legislature fault should be considered as a potential seismic source. Dr. I. M. Idriss's September 23, 2002 letter report (enclosed) includes an evaluation of the Legislature fault based on a discussion with Dr. E. Weaver of the USGS. We have reviewed Dr. Idriss' comments and concur with them. The seismicity at Skookumchuck dam should be revised considering the recommendations contained in Dr. Idriss' report.

3. When Skookumchuck Dam was constructed, the question of liquefaction was considered - records and photos indicate the naturally dense gravelly alluvium was left in place beneath the downstream shell on the north side of the embankment while the less dense alluvium was excavated out. In September 2000, Becker Hammer borings were conducted to further evaluate the liquefaction potential in this area. Based on the Becker Hammer data, the Liquefaction Study considered that discontinuous zones of liquefaction occurs in the downstream berm with these zones possibly extending upstream to the core. We recognized that this assumption is conservative considering the gradations and that construction exploration Borings AH-1 and AH-6 indicated refusal and $N_{60}=300$, respectively, in the thin layer of alluvium left beneath the downstream shell. Further, we noted that boring SB-02 was not used in the liquefaction analysis since the soils were non-liquefiable or the potentially liquefiable soils were above the groundwater table.

In the April 2001 Journal of Geotechnical and Geoenvironmental Engineering by Youd and Idriss, Liquefaction Resistance of Soils: Summary Report From The 1996 NCEER and 1998 NCEER/NSF Workshops On Evaluation Of Liquefaction Resistance Of Soils, it was reported that although SPT blow counts can be roughly estimated from BPT measurements, there can be considerable uncertainty for calculating liquefaction resistance because of data scatter in the range of greatest importance, 0-30 blow counts. Based on review of the data for borings BD-1 thru BD-4, we noted that the blow counts were all below 26. Since the available subsurface information does not provide sufficient information to dismiss or confirm liquefaction or address the upstream extent of liquefaction beneath the dam, we agree with your consultant that additional explorations

are needed beneath the downstream shell to further explore the presence of liquefiable materials. A plan and schedule to accomplish this work must be submitted for our review.

4. In the May 23, 2002 letter report, dam displacement was estimated to be between 5 and 40 cm using Makdisi and Seed's Simplified Method and a $PGA=0.46g$. Pending the outcome of the upcoming field investigations, the current estimate may be adequate or it may be necessary to conduct a post-earthquake deformation analysis using residual shear strengths for the zones where liquefaction is triggered. In addition, it may be necessary to calculate the response of Skookumchuck Dam using a non-linear 2-dimensional dynamic analysis procedure.

5. It was reported that a new PMF study had been commissioned by the Corps of Engineers and when completed, it would be reviewed and presented in an addendum to the 2002 Report. We concur with your consultants' recommendation to submit this study as an addendum to the Part 12 report. We noted that the 9,020 cfs flood of record occurred on February 8, 1996; however, the consultant did not state that the current PMF inflow curve was checked in relation to this recent flood of record. This should be done for the PMF, and for the new PMF commissioned by the Corps.

The 2002 Report does not satisfy the requirements of Part 12 D of the Commission's Regulations. You must provide this office, within 45 days of the date of this letter, three copies of a plan and schedule for submitting a supplement which addresses the items discussed above.

If you have any questions, please contact Messrs. William Lagnion or Edward Perez of this office at (503) 944-6748 or (503) 944-6750, respectively.

Sincerely,



Harry T. Hall, P.E.
Regional Engineer

Enclosure

I. M. IDRIS
CONSULTING GEOTECHNICAL ENGINEER
P. O. BOX 330, DAVIS, CA 95617-0330

Tel: (530) 758-5739

Fax (530) 758-1104

e-mail: imidriss@aol.com

September 20, 2002

Mr. Constantine G. Tjoumas, P. E.
Director, Division of Dam Safety and Inspections
Office of Hydropower Licensing
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Subject: Seismic Stability Issues
Skookumchuck Dam – Lewis County, Washington

Dear Mr. Tjoumas:

INTRODUCTORY REMARKS

As requested by Mr. William Allerton, I attended a meeting on March 14, 2002, at FERC's Office in Portland, Oregon, to review the work completed to date regarding seismic stability issues of the Skookumchuck Dam in Lewis County, Washington. The general location of the dam is depicted in Fig. 1.

The following documents were provided to me after the March 14 meeting:

1. Results of soil tests conducted by Shannon & Wilson and included in four letter reports to Bechtel Corporation; the letters are dated July 8, 1969, August 8, 1969, August 12, 1969, and September 11, 1969, respectively.
2. Report titled "Construction Report for Water Supply Facilities, Skookumchuck Dam, Pumping Plant", prepared by Bechtel Corporation, for Pacific Power & Light Company and the Washington Water Power Company, and dated August 1971.

3. Report titled "Supplement to December 1985 Dam Safety Investigation, Skookumchuck Dam, FERC No. 4441", prepared by Bechtel Civil & Minerals, Inc., for Pacific Power & Light Company, and dated April 1988.
4. Report titled "Additional Information to the April 1988 Supplement to December 1985 Dam Safety Investigation, Skookumchuck Dam, FERC No. 4441", prepared by Bechtel Corporation, for Pacific Power & Light Company, and dated October 1990.
5. A pdf (Adobe Acrobat format) file of the report titled "Becker Hammer Exploration Study, Skookumchuck Dam Site, Lewis County, Washington", prepared by Shannon & Wilson, Inc., Seattle, Washington, for the Seattle District of the U.S. Army Corps of Engineers, and dated December 2000.
6. A pdf file of the report titled "Seismic Ground Motion Study for Skookumchuck Dam, Lewis County, Washington", prepared by Shannon & Wilson, Inc., Seattle, for the Seattle District of the U.S. Army Corps of Engineers, and dated March 2001.
7. A pdf file of the report titled "Liquefaction Potential Evaluation for the Skookumchuck Dam Site, Thurston County, Washington", prepared by Shannon & Wilson, Inc., Seattle, for the Seattle District of the U.S. Army Corps of Engineers, and dated November 2001.
8. A pdf file of the report titled "Skookumchuck Embankment, Seismic Analytical Study, Skookumchuck Dam, Thurston County, Washington", prepared by Shannon & Wilson, Inc., Seattle, for the Seattle District of the U.S. Army Corps of Engineers, and dated January 2002.
9. Mr. R. H. Gorny of Black & Veatch sent me a letter on April 3, 2002, which included copies of above items No. 3 and 4, and discussions (based on the contents of these two items) regarding: (a) Material Properties; and (b) 1990 Displacement Analysis Results. Mr. Gorny also included some material regarding 'Liquefied and Non-Liquefied Gravel case Histories' based on information included a paper titled "A Practical Perspective on Liquefaction of Gravels", by J. E. Valera, M. L. Traubenik, J. A. Egan, and J. Y. Kanshiro, ASCE Special Publication on Ground Failure Under Seismic Conditions, 1994. The material and discussions provided by Mr. Gorny were very helpful in expediting my review.

A conference call was held on April 25, 2002 to discuss the additional work being completed by Shannon & Wilson for the U.S. Army Corps of Engineers and to finalize the date of the next meeting, which was set for May 17 in Portland.

10. At the May 17 meeting, I was provided with a copy of the letter report by Shannon & Wilson titled "Re-Evaluation of Field Data, Skookumchuck Dam, Thurston County, Washington", and dated April 30, 2002.

GENERAL OBSERVATIONS

The review of the above documents and the discussions at the two meetings provide the following observations at this time:

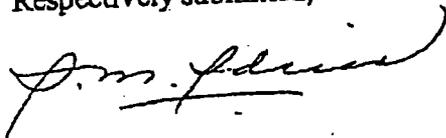
- As is common in the North Western Part of the USA, the seismic sources of concern consist of crustal sources and the subduction source. For this site, the Legislature Fault appears to be the controlling crustal source. Based on a telephone conversation with Dr. Weaver of the USGS in Seattle, it appears that this fault has a length of 50 to 60 km, its ground surface projection is about 9.3 km from the dam site, the rupture surface would have a width of about 15 to 20 km, the upper 5 to 8 km could be considered non-seismogenic, and that the slip rate of this fault is very low ($\ll 1$ mm/year). Based on these considerations, the maximum earthquake to be assigned to this source would be a magnitude 7 (using the equations of Wells & Coppersmith for length of 55 km and width of 17.5 km) occurring at a closest distance of 10.6 km (considering a horizontal distance of 9.3 km and a depth of 5 km) from the dam site. Because the fault has a very low degree of fault activity, the median estimates of the earthquake ground motions would be appropriate. Dr. Weaver also suggested that events on this fault are likely to be mostly strike slip, but that they may have a thrust component. Accordingly, it was agreed that a weight of 2/3 would be assigned to a strike slip mechanism and a weight of 1/3 would be assigned to a thrust mechanism.
- The subduction events considered in the report by Shannon & Wilson (item No. 6 above), are those that may occur on the Cascadia Subduction Zone (CSZ) or those that may occur on the Juan de Fuca Plate. For the deterministic estimate of earthquake ground motions Shannon & Wilson only considered the event on the CSZ ($M = 9$ at a distance of 68 km). It is necessary that estimates for a magnitude $7\frac{1}{2}$ earthquake occurring on the Juan de Fuca Plate be also included. The recurrence interval for these events is relatively short (on the order of a few hundred years, as summarized in item 6 above). Therefore, the 84th percentile estimates of earthquake ground motions need to be considered.
- Concern of liquefaction being triggered during future earthquakes is only in the alluvial soils, and not of the silt or the gravels.
- Shannon & Wilson (items No. 7, 8 & 10 above) considered that liquefaction would be triggered in a layer below the embankment extending from a short distance downstream of the toe of the downstream-berm almost all the way to the core trench. This assumption is certainly conservative, but the available subsurface information from investigations carried out prior to and during construction do not provide sufficient information to either fully dismiss this possibility or to confirm it. The most recent subsurface investigation concentrated on the downstream end of the downstream berm, and, therefore, does not provide

any additional input regarding the extent of possible liquefaction beneath the embankment. Accordingly, it was agreed at the May 17, 2002 meeting that additional drilling would be conducted beneath the embankment to delineate the presence of potentially liquefiable soils.

- Estimates of the deformations of the embankment following the occurrence of the postulated earthquakes will be needed. If it is eventually judged that liquefaction is unlikely to be triggered under the entire embankment, then a simplified Newmark-type deformation analysis will probably be adequate to judge the performance of this dam. If, on the other hand, it is concluded that a major portion of the foundation layer is likely to liquefy, then a more detailed nonlinear deformation analysis may be required.

It is essential that all the available information be integrated and synthesized to fully evaluate the potential behavior of the Skookumchuck Dam during future earthquakes. It is hoped that Shannon & Wilson will complete such an effort, which will include the results of the soon to be completed drilling.

Respectively submitted,



I. M. Idriss

Enclosures: Figure 1



May 1, 2003

Harry T. Hall, P.E.
Regional Engineer
Federal Energy Regulatory Commission
101 SW Main, Suite 905
Portland, Oregon 97204

**Subject: Skookumchuck Hydroelectric Project, FERC No. 4441
Fourth Part 12 Consultant's Safety and Inspection Report
Plan and Schedule to Submit Supplemental Reports**

Dear Mr. Hall:

Your letter dated March 19, 2003 included review comments and requested a plan and schedule to provide supplemental information to the Fourth Part 12 Consultant's Safety Inspection Report (CSIR) for the Skookumchuck dam in Washington. Your review was coordinated with your consultant, Dr. I. M. Idriss, and a copy of his letter report dated September 20, 2002 was included with your comments. In accordance with your request, PacifiCorp's plan and schedule to provide the five items described in your letter are as follows:

- 1 PacifiCorp will conduct a new seismic hazard evaluation to determine the MCE and associated ground motions for the Skookumchuck dam. This evaluation will include the Cascadia Subduction Zone (CSZ), deep intraplate events such as those that may occur on the Juan de Fuca Plate, and the Legislative fault (crustal event) as potential seismic sources. Since the recurrence interval of the CSZ and deep intra-plate events is short, the 84th percentile ground motions will be determined for these events. The new seismic hazard evaluation will be completed and submitted to the Commission by December 31, 2003.
- 2 In accordance with the information provided by Dr. Idriss in his September 20, 2002 letter, PacifiCorp will incorporate the Legislative fault in the seismic hazard evaluation. The information provided by Dr. Idriss will be used to characterize this fault and because this fault has a very low degree of fault activity, the median estimates of ground motions will be determined. The new seismic hazard evaluation will be completed and submitted to the Commission by December 31, 2003.

Mr. Harry T. Hall
May 1, 2003
Page 2

- 3 PacifiCorp will conduct a drilling and testing program that includes three additional boreholes to be located on 100-foot centers where the berm intersects the toe of the embankment slope. Standard penetration testing, shear wave velocity and permeability testing will be performed in all the boreholes. Laboratory testing will include gradation tests on all of the samples. Drawings and the specifications for the drilling program will be submitted to the Commission for review by July 31, 2003. Upon the Commission's authorization, drilling work will commence no later than October 31, 2003. The results of the drilling program and an evaluation of liquefaction potential based on information from the new borings and gradation tests will be provided to the Commission no later than March 31, 2004. If a wide variety of conditions are encountered during the drilling operation, PacifiCorp may elect to add additional borings to better define the subsurface conditions.
- 4 If appropriate, pending the outcome of the field investigations proposed in Item 3, PacifiCorp will conduct a post-earthquake deformation analysis using residual shear strengths for the zones where liquefaction may be triggered. Also, if appropriate, PacifiCorp will calculate the response of Skookumchuck Dam using a non-linear 2-dimensional dynamic analysis procedure. A plan and schedule for each of these activities will be developed accordingly.
- 5 The U.S. Army Corps of Engineers (COE) completed the PMF study work. The previous PMF studies were based on HMR 43, and PacifiCorp considers the Corps of Engineers PMF study to be the most valid to date. This study incorporates the more recent HMR 57 and the February 8, 1996 flood of record as a calibration point. The results indicate a peak inflow of 32,500 cfs and a peak outflow of 30,600 cfs. The peak reservoir elevation resulting from the PMF is 492.68 feet leaving a freeboard of 4.32 feet. A study performed for PacifiCorp by Bechtel Civil & Mineral, Inc. in 1987 estimated a maximum reservoir wave run-up of 3.8 feet, 0.52 feet lower than the available freeboard of 4.32 feet during the PMF. PacifiCorp's independent consultant is reviewing the new PMF study and PacifiCorp will provide this PMF study along with the Consultant's comments to the Commission by December 31, 2003.

As the Commission is aware, PacifiCorp has held discussions with TransAlta Centralia Generation LLC (TransAlta) regarding the sale of Skookumchuck dam and related assets. PacifiCorp and TransAlta expect to sign a letter of agreement in principle within two weeks to extend the expiration date for the existing right of first refusal to purchase Skookumchuck dam and related assets through June 2003. This extension will allow TransAlta the time necessary to complete various due diligence activities needed to prepare for closure of the sale. PacifiCorp will sustain the activities relative to the addendum to the 2002 Part 12 Report noted above until, and unless, subsequent license exemption transfer or surrender would alter the ownership or jurisdictional status of the project.

Mr. Harry T. Hall
May 1, 2003
Page 3

The original and two copies of this letter are enclosed. If you have questions or need further information, please contact Mildred Thompson at (503) 813-6664.

Sincerely,



R.A. Landolt
Managing Director, Hydro Resources

MT
RAL:MT:hb

Cc: Washington Department of Ecology, Dam Safety Team

bc: Fields/Strande - Merwin, Kirschenman, Leis, Raeburn, Snyder, Sturtevant,
Thompson/FERCEASE, File: Skookumchuck, FERC, Part 12, Compliance

In House Part 12 Supplemental Information Follow-up Task Schedule

Item Number	Description	Responsible Party	Due Date
Items 1 & 2	Submit new seismic hazard evaluation to FERC	Kirschenman, Raeburn, Thompson	December 31, 2003
Item 3	Submit additional drilling program drawings and specs to FERC	Kirschenman, Raeburn, Thompson	July 31, 2003
Item 3	Commence drilling program with FERC approval	Kirschenman, Raeburn	NLT October 31, 2003
Item 3	Provide drilling program results to FERC	Kirschenman, Raeburn, Thompson	NLT March 31, 2004
Item 4	Develop plan & Schedule for deformation analysis as necessary	Kirschenman, Raeburn	TBD
Item 5	Provide new PMF to FERC	Kirschenman, Raeburn, Thompson	December 31, 2003



July 30, 2003

Harry T. Hall, P.E.
Regional Engineer
Federal Energy Regulatory Commission
101 SW Main, Suite 905
Portland, Oregon 97204

**Subject: Skookumchuck Hydroelectric Project, FERC No. 4441
Fourth Part 12 Consultant's Safety and Inspection Report
Subsurface Investigation – Drilling Program**

Dear Mr. Hall:

Our letter dated May 1, 2003 included PacifiCorp's plan and schedules to submit supplemental reports to the fourth Skookumchuck Part 12 Consultant's Safety and Inspection Report. Item 3, of our May 1st letter contained a proposed plan and schedule for a drilling and testing program for three additional boreholes along the toe of the embankment slope of Skookumchuck Dam. Drawings and specifications for the additional drilling program are included in the attached, Skookumchuck Subsurface Investigation - Drilling Program, July 2003 for the Commission's review.

Upon the Commission's authorization, drilling work will mobilize and commence by October 30, 2003. As we indicated in our May 1st letter, results of the drilling program and an evaluation of liquefaction potential based on information from the new borings and gradation tests will be provided to the Commission no later than March 31, 2004. If a wide variety of conditions are encountered during the drilling operation, PacifiCorp may elect to add additional borings to better define the subsurface conditions.

The original and two copies of this letter and three copies of its attachment are enclosed. If you have questions or need further information, please contact Mildred Thompson at (503) 813-6664.

Sincerely,

A handwritten signature in black ink, appearing to read "R.A. Landolt", written over a horizontal line.

R.A. Landolt
Managing Director, Hydro Resources

RAL:MT:js

Attachment: (Skookumchuck Subsurface Exploration – Drilling Program, July 2003)

C: Washington Department of Ecology, Dam Safety Team*
(With Attachment*)

bc: Fields/Strande - Merwin, Kirschenman*, Leis,  Snyder, Sturtevant,
Thompson*/FERCEASE, File*: Skookumchuck, FERC, Part 12, Compliance

1.0 Subsurface Investigation

1.1 General

This investigation is to determine the in situ properties and liquefaction potential of the alluvial materials left in place beneath the downstream shell of Skookumchuck Dam during construction. Standard penetration tests, downhole shear wave velocity measurements, and falling head permeability testing will be performed in each borehole.

1.1.1 Scope of Work

Scope of Work shall include furnishing labor, equipment, materials, tools, supervision, testing, and other services required to perform subsurface investigations, laboratory testing, and other services as specified herein. The Scope of Work includes the following items:

Ensuring that all Contractor personnel utilize necessary safety equipment including hard hats, safety glasses, hearing protection, and steel toe boots.

Surveying the location and elevation of all investigation locations.

Performing all exploratory borings, designated BV-1, BV-2, and BV-3, and backfilling as required.

Sampling soil by split barrel methods at required intervals, at changes in stratum, or as required by the Company.

Providing all materials required to protect and preserve soil samples from damage, freezing, or loss of moisture.

Transporting all samples to the laboratory for testing.

Performing laboratory tests as required by the Company and preparing test reports.

Performing falling head permeability tests in boreholes as directed by the Company.

Installing casing for downhole shear wave velocity testing to be performed by others.

1.1.2 Items Furnished by Others and Interfaces

Items furnished by others and not in this Scope of Work include the following:

Downhole shear wave velocity testing.

At the Contractor's option, the Contractor can provide the downhole shear wave testing as an optional item as described in Section 2.0 of this specification. The Contractor's proposal for this optional item shall include the names and qualifications of Subcontractors, if any, to be utilized in performing the testing work. The Company retains the option to accept or reject the Contractor's proposal.

1.1.3 Performance and Design Requirements

Performance and design requirements for the subsurface investigations are indicated in Article 1.1.7.

1.1.4 Codes and Standards

Work performed under these specifications shall be done in accordance with the following codes and standards. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards specified herein shall be interpreted to be the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply. These references shall govern the work

except where they conflict with the Company's specifications. In case of conflict, the latter shall govern to the extent of such difference.

Work	In Accordance With
Auger borings	ASTM D1452
Split barrel sampling	ASTM D1586
Rotary wash borings	US Army Corps of Engineers, Engineering Manual, EM 1110-2-1907, Chapter 4

1.1.5 Materials

The following materials shall be used:

General	
Component	Material
Bentonite for drilling fluid	Naturally occurring, high yield sodium montmorillonite powder containing no polymer additives or chemical treatments
Revert [®] for drilling fluid	Biodegradable drilling fluid
Hole plug	Naturally occurring, high yield sodium montmorillonite graded chips
High solids bentonite grout	Naturally occurring, high yield sodium montmorillonite grout with a high solids content
Cement	ASTM C150, Type I
Concrete	Ready-mix for aboveground and flush mounted covers, and guard posts; 5,000 psi (34,474 kPa) concrete for aircraft rated covers
3 inch Polyvinyl chloride (PVC)	PVC that is National Sanitation Foundation (NSF) tested and approved, Schedule 40
Water	Clean, potable, and free from oil, acids, organic materials, or other deleterious substances

1.1.6 Approved Manufacturers of Components

For the following components, only the listed manufacturers are recognized as maintaining the level of quality of workmanship required by these specifications. If the Contractor wants to propose a nonlisted manufacturer that is considered to provide an equivalent level of quality, this manufacturer must be identified and supporting testimony provided. Acceptance of the manufacturer as a substitute is at the discretion of the Company.

Component	Manufacturer
Biodegradable drilling fluid	Johnson, "Revert"
High solids bentonite grout	Baroid Drilling Fluids, Inc., "Aqua-Grout Catalyst/Benseal"
Hole plug	Baroid Drilling Fluids, Inc.

1.1.7 Services

The following articles cover the services included in the Scope of Work. Services are divided into Field Services and Laboratory Testing Services.

1.1.7.1 Field Services. The following items detail the Scope of Work for Field Services to be performed by the Contractor. Depths of individual borings shall be approximately 80 feet. The estimated quantities for bidding are provided in ??????????.

Drilling	
Auger Drilling	Contractor selected
Rotary wash drilling	Contractor selected, 6.5 inch diameter maximum
Sampling	
Sampling frequency	At 5 foot (1.5 m) intervals between Elevation 390 (~ ground surface) and 350, and 2.5 foot intervals from Elevation 350 to refusal on bedrock (- Elevation 310).
Sampling methods	2 inch (50 mm) split barrel sampling.
Abandonment and Backfilling of Borings	
Boring abandonment	High solids bentonite grout with cuttings
Backfill boring with	High solids bentonite grout with cuttings
Downhole Shear Wave Velocity Casing Installation	3 inch PVC, flush joint.
Testing	
Falling head permeability testing	By Contractor
Downhole shear wave testing	By Others (Refer to Article 1.1.2.)

Auger drilling may be used from Elevation 390 to Elevation 350, but rotary wash boring is required between Elevation 350 and refusal on bedrock. Previous investigations indicate the bedrock is at Elevation 310 +/-.

1.1.7.2 Laboratory Testing Services. The following testing shall be conducted in accordance with the specified source. This testing is to be considered part of the defined Scope of Work, and all associated costs are the responsibility of the Contractor unless specifically identified as Company-conducted.

Tests	In Accordance With	Conducted By
Atterberg limits	ASTM D4318	Contractor
Grain size analysis	ASTM D422 with sample preparation by ASTM D2217 (wet preparation method), Procedure B	Contractor
Moisture content	ASTM D2216	Contractor
Specific gravity	ASTM D854	Contractor
Specific gravity of coarse grained soils	ASTM C136	Contractor

1.1.8 Technical Attachments

The following attachments are located at the end of this Section. The information contained in these documents constitutes requirements under the defined Scope of Work.

Document Number/Description	Title	Revision
Figure 1	Site Location Map	0
Figure 2	Dam Plan/Drilling Area	0
Figure 3	Boring Location Plan	0

1.2 Products

1.2.1 General

This article describes the labor, equipment, materials, tools, supervision, and services required to perform the subsurface investigation. The purpose of the subsurface investigation is to obtain geotechnical information used to support permitting, design, and construction. Geotechnical information obtained from investigations includes the description and classification of subsurface materials, engineering properties of subsurface materials, subsurface stratigraphy, presence or absence of groundwater, and the identification of potential geologic hazards.

The Contractor shall have all necessary permits, licenses, and insurance coverage required to perform the work. The Contractor shall provide the Company with a current insurance certificate with required coverage before mobilizing.

The location, number, types of investigation techniques, and required depth of investigations used in a subsurface investigation are dependent upon the scope of the investigation, geologic setting, and layout of project structures.

The Contractor shall be responsible for locating all underground utilities at each investigation location. No work shall begin until all utility services have been notified, utility locations have been marked at each investigation location, and the Company has issued an authorization to proceed.

The Company will have representatives in the field during the subsurface exploration program. They will observe the services performed to determine, in general, if the services are proceeding in accordance with the intent of the requirements herein. They may request adjustments in the services as required. The Company's field representatives, as required, will approve boring locations; maintain a log of each boring, select intervals for falling head permeability testing, authorize changes in the services to be performed; and oversee the performance of the services.

The Contractor shall add to or deduct from the depth and number of the borings indicated on the drawings as directed by the Company during the course of the work. The Contractor shall also add to or deduct from the number of each type of laboratory test as directed by the Company during the course of the work. Such changes will be determined by the Company, and changes in price due to changes in quantities will be calculated using unit prices.

The Contractor shall provide, on each drilling rig, a 20 pound (9.1 kg) ABC type fire extinguisher and one first aid kit equipped with an eyewash bottle.

The Contractor shall be held responsible for any damage to existing structures or property resulting from his operations and shall repair or replace any such damaged structures or property to the satisfaction of the property owner at no additional cost to the Company.

The Contractor shall be responsible for all damages to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property that may be used to transport equipment, materials, or personnel to or from the site and investigation locations, as required. The Contractor shall make satisfactory and acceptable arrangements with the responsible individuals having jurisdiction over the damaged property concerning its repair or replacement.

Access for the services will be provided by the Company and will be available so that services can proceed as scheduled; however, the Contractor shall have written notification from the Company to proceed before entering areas where the services will be performed. The Contractor shall become familiar with the site prior to bidding the work.

All Contractor personnel engaged in the field investigation services shall be trained for such activity, when required. Training shall include, but not be limited to, review of the proper use of personal protective equipment, safe operating procedures, and emergency response.

1.2.2 Drawings. Drawings indicating the location plan of the borings are included with these technical specifications in Article 1.1.8.

1.2.3 Materials

All materials required for the subsurface investigation shall be furnished by the Contractor and work shall be performed in accordance with the codes and standards specified herein.

The materials shall be new and undamaged and shall conform to the requirements specified in this specification.

1.2.4 Equipment. Equipment shall be in good operating condition and shall operate at the capacity specified or required to perform the work required for the subsurface investigation. Equipment shall be acceptable to the Company.

No payment will be made for mobilization costs for equipment brought to the site to replace equipment that breaks down, does not perform satisfactorily, or is found to be unsuitable for site conditions.

The Contractor shall provide the Company with all calibration information for calibrated equipment.

1.2.5 Water. The Contractor shall furnish all water required for drilling and other work, as required. No separate payment will be made for water or for time spent getting water. All water used shall be free from oil, acids, organic materials, or other deleterious substances. In addition, clean water shall be used for mixing grout for backfilling borings. Contractor shall obtain permission and pay all costs associated with using water from fire hydrants.

Potable water shall be used for all drilling and piezometer installation.

1.2.6 Discharge Water. Discharge water from the boring operations shall be conveyed to natural drainage by piping or ditches acceptable to the Company. The Contractor shall ensure that discharging of water shall be in accordance with all federal, state, and local requirements. At the conclusion of the work, the Contractor shall repair all erosion damage caused by the discharge water and restore ditches and other drainage facilities to their original condition.

1.2.7 Electrical Power. The Contractor shall furnish all electrical power required for drilling and other work. No separate payment will be made for providing electrical power.

1.3 Execution

All borings shall be drilled vertically unless directed otherwise by the Company or specified herein. The borings shall be kept straight and plumb within limits that will permit satisfactory installation of casings, as required. Should the boring prove unsatisfactory at any time prior to acceptance, the boring shall be considered abandoned with the requirements of Article 1.3.3, Abandonment of Boring/Piezometers.

Cuttings generated during advancement of the borings shall be spread evenly on the ground surface in the vicinity of the piezometer or boring in a manner that will not damage the area or be unsightly, unless directed otherwise by the Company. Water from the boring operations shall be discharged in accordance with Article 1.2.6, Discharge Water.

Sampling shall be performed in accordance with the requirements of Article 1.3.2, Sampling Method and Frequency. The borehole shall be cleaned prior to collecting samples.

Borings shall be left open for 24 hours after completion to allow the Company to obtain a water level, unless directed otherwise by the Company. After the 24 hour water level reading, or when directed by the Company, the Contractor shall install casing for downhole shear wave testing.

1.3.1 Rotary Wash Drilling. When required, rotary wash drilling shall include earth drilling with or without sampling as directed by the Company. Rotary wash borings shall have the minimum diameter specified in Article 1.1.7.1 and shall be of sufficient size to accommodate sampling equipment and down hole shear wave casing installation. Unless otherwise permitted by the Company, rotary wash borings shall be performed in accordance with Article 1.1.4.

In silty formations that might be disturbed by conventional side discharging bits, the hole shall be prepared for sampling equipment with a bit equipped with baffles to deflect the drilling fluid upward.

Drilling mud or temporary casing shall be provided by the Contractor if required to maintain an open hole.

Drilling mud shall consist of a mixture of high-swelling bentonite and water, or biodegradable drilling fluid as specified in Article 1.1.6 (or acceptable equivalent approved by the Company) and water, of sufficient viscosity to prevent penetration of the mud into the soil during sampling operations. Chemical additives for adjusting viscosity may be used if permitted by the Company. When piezometers are to be installed, high-swelling bentonite shall not be used.

If required for borehole stability and approved by the Company, temporary casing may be used by the Contractor. Temporary casing required to advance the boring in soil or rock shall be acceptable to the Company. The casing shall be steel pipe of the size to facilitate all required operations and may be either new material or used material in good condition.

Temporary casing shall remain in the boring until its removal is authorized by the Company. The Contractor may be required to move off any boring after drilling and casing placement are completed and then return to the boring to remove all temporary casing and backfill the boring as specified.

All temporary casing shall be pulled prior to or during backfilling to ensure complete backfilling of the hole in a manner acceptable to the Company. No payment will be made for temporary casings left in place because of the impracticability of removal.

1.3.2 Sampling Method and Frequency

When required by the Company, sampling shall consist of split barrel samples at the depths listed in Article 1.1.7.1.

The water level in each boring shall be maintained whenever drilling equipment is retracted in preparation for sampling to avoid unbalanced hydrostatic pressure that might wash in material from the sides and bottom of the boring or make the boring unstable.

The 2 inch (50 mm) diameter split barrel samples shall be obtained and resistance to soil penetration shall be measured using the split barrel sampler in accordance with Article 1.1.4. Penetration resistance (blow count) for each 6 inch (150 mm) increment shall be required.

The coupling head for the split barrel sampler shall be provided with a ball check valve and shall have open vents. The sampler shall also be equipped with a spring type sample retainer or an acceptable equivalent approved by the Company. The Contractor shall have a minimum of two complete split barrel samplers on the drill rig. The barrel for the sampler shall be at least 18 inches (457 mm) in length to allow for 18 inch (457 mm) long samples.

The Contractor shall break down all split barrel samplers after collecting a sample. Sample jars for split barrel samples submitted for physical analysis shall be supplied by the Contractor and shall not be larger than 2-3/8 inches (60 mm) in diameter. Sample jars for split barrel samples shall be moistureproof and vaporproof wide-mouth glass jars with self-sealing screw covers. Sample jars will be labeled by the Company. The Contractor shall supply labels with space for the job name, boring number, interval sampled, and blow count in 6 inch (150 mm) increments.

The Contractor may use sealable plastic bags in place of glass jars for storage of samples if approval is obtained from the Company before the start of work.

If the Company is away during sampling, the Contractor, under the direction of the Company, shall place the sample in a sample jar or plastic bag and label the sample jar or plastic bag in the manner directed by the Company. The sample jar or plastic bag should then be placed in its appropriate location for the Company to check at a later time.

1.3.3 Abandonment of Boring

Any boring that does not meet the depth, alignment, plumbness, or other requirements, or any boring on which the Contractor stops work before completion will be considered an abandoned boring. A new boring shall be started in the immediate vicinity at a location designated by the Company after the location of utilities has been established by the Contractor. No payment will be made for any work on an abandoned boring. An abandoned boring shall be backfilled and sealed with cement-bentonite grout, high solids bentonite grout, or cuttings as required in Article 1.1.7.1 or as approved by the Company.

Any newly installed piezometer that does not meet construction quality, accuracy of piezometer screen placement, or other requirements, or any piezometer on which the Contractor stops work before completion, will be considered an abandoned piezometer. No payment will be made for any work on an abandoned piezometer. Piezometer abandonment shall meet all regulations of the state where the services are performed and/or requirements of the Company and be in accordance with Article 1.3.4, Grout. A new piezometer shall be installed in the immediate vicinity at a location designated by the Company after the location of utilities has been established by the Contractor.

1.3.4 Grout

The cement-bentonite or high solids bentonite grout used to backfill borings not completed. The cement-bentonite or high solids bentonite grout seal shall be brought to the ground surface, or as required by the Company.

When required, the cement-bentonite grout slurry shall weigh between 12 and 14 pounds per gallon (1.44 and 1.68 kg/L) and consist of 95 percent (by weight) cement with 5 percent sodium bentonite mixed with no more than 6 gallons (23 L) of water per 94 pound (42.6 kg) sack of cement. Cement shall conform to Article 1.1.5. The grout shall be thoroughly mixed and shall be used before any stiffening occurs. The Contractor shall supply a balance to measure the weight of the grout.

When required, the high solids bentonite grout shall be as specified in Article 1.1.6, or an acceptable equivalent approved by the Company. The high solids bentonite grout shall be thoroughly mixed

according to the manufacturer's specifications. The bentonite grout shall weigh between 9.0 and 9.5 pounds per gallon (1.08 and 1.14 kg/L), unless otherwise directed by the Company. The Contractor shall supply a balance to measure the weight of the grout.

Grout shall be placed by the tremie method. The tremie method shall consist of pumping the slurry down the boring or annular space outside the piezometer casing through a pipe. The bottom of the pipe shall be placed near the bottom of the zone to be grouted and shall be raised as the grout is placed, always keeping the bottom of the tremie pipe below the top of the grout. The tremie pipe tip shall be equipped with baffles to discharge the grout upward. The tremie pipe tip shall be placed as close as possible to the top of the silica sand filter or seal. The tremie pipe tip shall be kept at least 5 feet (1.5 m) below the grout surface during grout placement. Before grouting is completed, the Company will weigh the grout exiting the borehole to ensure that the correct mixture has been brought to the surface. Pumps, piping, and other materials for mixing and pumping grout shall be provided by the Contractor.

When allowed in Article 1.1.7.1, borings may be backfilled with cuttings.

1.3.5 Downhole Shear Wave Casing Installation

The Contractor shall furnish all labor, materials, and equipment for completing the installation of casing for downhole shear wave testing. Casing shall be installed in accordance with Article 1.1.4 and as described below. Materials required for construction of the permanent casing shall be as required in Article 1.1.7.1.

Permanent Schedule 40 PVC casing, with a minimum inside diameter of 3 inches (75 mm), shall be installed to the completed depth of each boring. PVC pipe sections shall be joined using watertight, flush-threaded joints that are acceptable to the Company. A watertight bottom cap shall be provided to seal the bottom of the casing.

In accordance with the requirements in Article 1.1.4, the maximum boring diameter shall be 6.5 inches (162.5 mm). The annulus outside the casing shall be backfilled with cement bentonite grout using the tremie method in accordance with Article 1.3.4, Grout. The grout shall have a similar density to the in situ material, and shall consist of 1 pound bentonite (not synthetic materials), 1 pound of Portland Cement, and 6.25 pounds of water.

Bentonite drilling mud shall not be used to advance a borehole unless approved by the Company. A biodegradable synthetic drilling fluid acceptable to the Company may be used; the manufacturer's directions shall be carefully followed.

1.3.6 Falling Head Permeability Testing

The Contractor shall provide a suitable pump, water meter, water level indicator, necessary pipe and connections, and all other equipment and supplies required to perform falling head tests.

In general, the tests will be conducted between Elevation 350 and rock. The Contractor shall record the test results on a form acceptable to the Company. Based upon inspection of the samples, the purchaser will select intervals for testing. The hole will be cleaned out from the bottom of the casing to the top of the next sample interval, and the test will be performed.

The casing will be filled with water and the time to drop 10 feet, or the drop in 5 minutes will be monitored. If the casing can not be filled, the flow into the casing will be recorded.

1.3.7 Cleanup

As work at each boring location concludes, the Contractor shall remove all equipment, tools, material, and supplies and shall leave the site clean and clear of all debris generated by his work. All earth cuttings, drilling fluid, and discharge water from piezometer development shall be spread evenly on the ground around the piezometer or boring so as not to damage the area or be unsightly, unless directed otherwise by the Company.

1.3.8 Restoration of Damaged Property

The Contractor shall conduct all services in a manner to prevent any destruction, scarring, or defacing of the worksite. At the completion of services, the Contractor shall restore each location to its original condition.

The Contractor shall, at his own expense, restore all property damaged while accessing the drill sites and performing services.

The restoration work shall include, but not be limited to, the repair of fences and roads and the leveling of ruts produced by driving to the investigation locations.

1.3.9 Surveying

All locations of subsurface investigations shall be surveyed and staked. All surveying shall be performed by a land surveyor registered in the state in which the work is being performed.

The Contractor shall use the Company designated elevation datum and coordinate system to locate the subsurface investigations. The Contractor shall not start work at any location until the location has been staked, the surface elevation has been determined, clearance for underground utilities has been received, the location has been reviewed by the Company, and authorization to proceed has been issued. Subsurface investigations shall be located as indicated on the drawing included in these specifications.

The acceptable tolerance for elevation shall be 0.1 foot (30.5 mm) and for location shall be 1.0 foot (0.3 m). Locations shall not be moved more than 15 feet (4.6 m) from the planned location without Company's approval.

1.3.10 Laboratory Tests

Unless otherwise permitted by the Company, each laboratory test shall be performed as specified in the laboratory test standards specified herein. Test results shall be reported on forms suitable for reproduction and shall be acceptable to the Company.

Samples to be tested will be selected by the Company after completion of the drilling. The Contractor shall be responsible for delivering the test samples to the laboratory.

1.3.10.1 Atterberg Limits. When required, Atterberg limits shall be as specified in Article 1.1.7.2. The liquid limit shall be determined by securing the results of at least three trials. The test report shall include initial moisture content.

1.3.10.2 Grain Size Analysis. When required, grain size analysis shall be as specified in Article 1.1.7.2. This test is a complete sieve analysis, not just a measurement of the percent finer than the No. 200 sieve. This test does not include a hydrometer analysis. If the Company requires hydrometer analyses, they will be requested separately. Reports of the results of this test shall include data and a graph of the data.

1.3.10.3 Moisture Content. When required, moisture content determination shall be as specified in Article 1.1.7.2; no exceptions cited.

1.3.10.4 Specific Gravity. When required, the specific gravity of the soils shall be determined as specified in Article 1.1.7.2; no exceptions cited.

1.3.10.5 Specific Gravity of Coarse Grained Soils. Specific gravity determination for gravel and larger grained soils shall be as specified in Article 1.1.7.2.

1.3.11 Quantities Measurement

Quantities of work completed by the Contractor will be measured and paid for as specified herein. All work not specifically set forth as a pay item shall be considered a subsidiary obligation of the Contractor, and all associated costs shall be included in the unit prices.

1.3.11.1 Mobilization and Demobilization. When required, the initial mobilization of drill rig(s), bulldozers, backhoes, cone penetrometer rig(s), crosshole testing equipment, refraction survey equipment, and associated equipment as required in Article 1.1.5 and demobilization of same shall be made in the amount of the appropriate unit price stated herein, per drill rig, bulldozer, backhoe, cone penetrometer rig, crosshole testing equipment, or refraction survey equipment. If additional mobilization is initiated by a written request from the Company, additional payment for delivery to and removal from the site of all materials, tools, and drilling and sampling equipment will be made, for each item, in the amount of the appropriate unit price stated in this proposal.

The mobilization unit prices are to be for the complete mobilization and demobilization.

No payment will be made for mobilization costs for equipment brought to the site to replace equipment that breaks down, does not perform satisfactorily, or is found to be unsuited to site conditions. No payment will be made for mobilization costs for additional equipment the Contractor chooses to mobilize because of conditions brought about by adverse weather.

1.3.11.2 Drilling and Sampling. The unit price for drilling borings and securing samples shall include the costs of all labor, materials, and equipment required, including all costs of labor, materials, and equipment required for the boring and sampling services.

The unit price for borings shall include the costs of making borings and supplying water and all other appurtenant drilling costs, including moving equipment between piezometer and boring locations. Payment for borings will be made on the basis of actual footage of boring advanced, measured from the ground surface to the depth authorized by the Company.

The unit price for temporary casings shall include the cost of supplying, installing, and removing all temporary casings. No payments shall be made for temporary casings left in place because of impracticability of removal. Payment for temporary casings shall be made on the basis of actual footage installed, measured from the ground surface to the depth authorized by the Company.

The unit price for 2 inch (50 mm) diameter split barrel sampling shall include the costs of cleaning the bottom of the boring before sampling, making standard penetration tests with 2 inch (50 mm) samplers, recovering representative samples of soil from the sampler, opening samplers, and all other appurtenant costs, including the cost of containers and labels for samples, and placing samples in containers as needed. Payment for split barrel sampling shall be made on the basis of the actual number of sampling attempts authorized by the Company. No payment will be made for split barrel sample attempts where there is no recovery due to careless handling or sampling procedures used by the Contractor, as judged by the Company.

The unit price for grout sealing borings shall include the cost of all labor, materials, and equipment as required by the Company. Payment for grout sealing will be made on the basis of the actual footage of the boring grouted. If the boring has collapsed before backfilling, the quantity shall be measured from the ground surface to the depth of collapse as determined by the Company.

The unit price for sealing borings with granular bentonite below the bottom of piezometers shall include the cost of all labor, materials, and equipment as required by the Company. Payment for sealing will be made on the basis of the actual footage of the boring sealed.

1.3.11.3 Surveying. The unit price for surveying shall include the cost of all labor, materials, and equipment required to survey and stake the location and elevation at all borings, piezometers, and test pits, including tying the survey to a known bench mark or state plane coordinate system. The surveying unit price shall also include the cost of providing the survey results in a letter report and an electronic AutoCAD file. Payment will be made on the basis of the number of borings, piezometers, and test pits surveyed.

1.3.11.4 Falling Head Permeability Testing. The unit price for packer testing shall include all labor, materials, and equipment required to perform the testing and record the data during the tests. Payment for falling head testing will be made on the basis of the number of tests performed, including setup time.

1.3.11.5 Permanent Casing Installation for Downhole Shear Wave Velocity Testing. Payment for permanent casing installation for downhole shear wave velocity testing shall include the costs of all labor, materials, and equipment required for installing and grouting the casing. Payment shall be made on the basis of actual footage of casing installed, measured from the ground surface to the depth authorized by the Company.

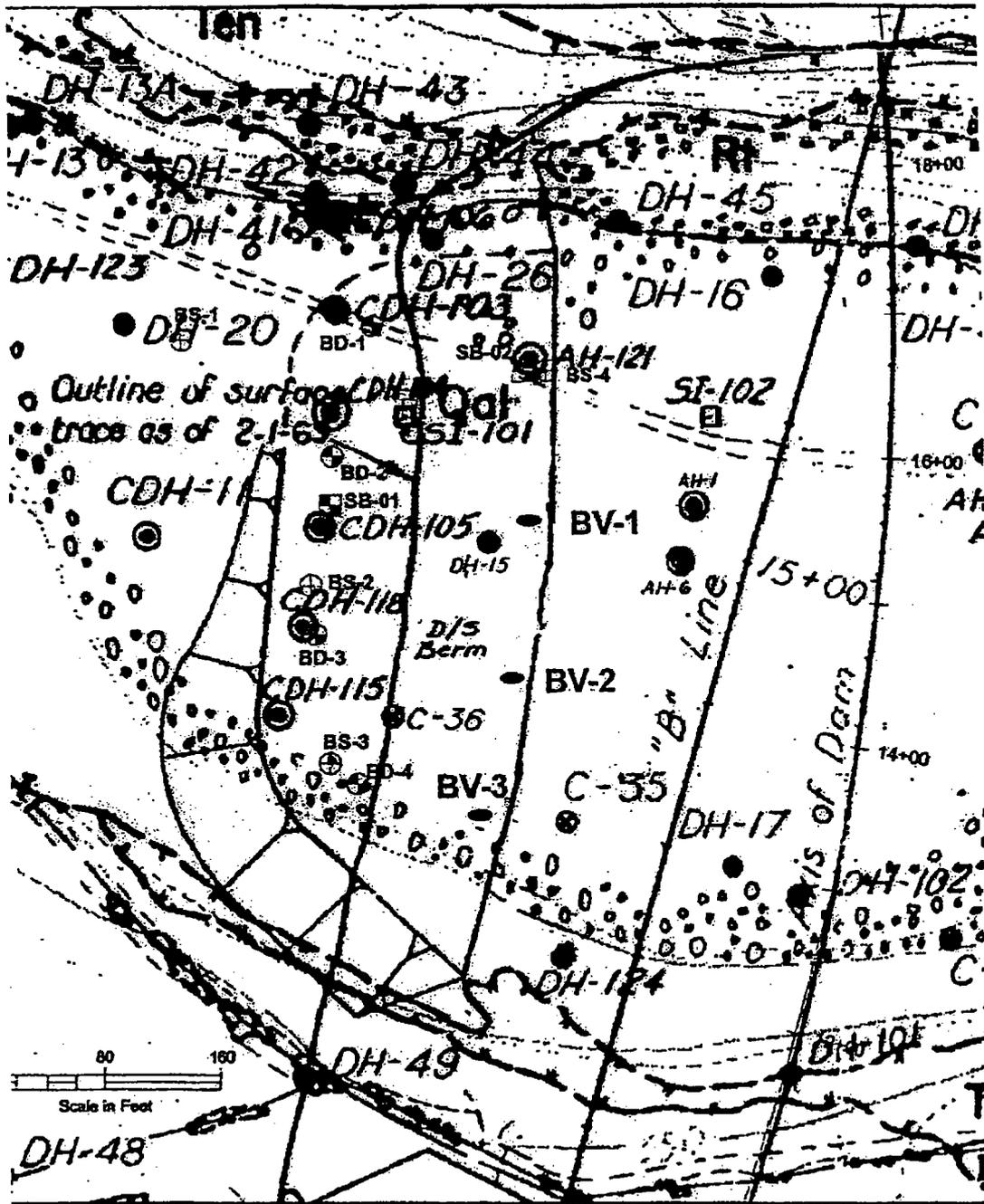
1.3.11.6 Laboratory Tests. The unit price for each laboratory test shall include all costs of labor, materials, and equipment for performing the tests and presenting five copies of the results.

1.3.11.7 Standby Time/Downtime. Standby time shall be time when the Contractor could be working, but the Company has directed the Contractor to discontinue working and to remain onsite and be prepared to resume services when directed by the Company. Downtime shall be time when services cannot be performed due to failure of the Contractor's equipment or other factors caused by the Contractor that prevent services from being performed. Standby time will be paid only if service stoppages directed by the Company exceed downtime caused by the Contractor. The Company will keep a record of both standby time and downtime. Payment will be based on the actual amount of standby time in excess of downtime. Work stoppage caused by inclement weather does not constitute standby time or downtime.

1.4 Schedule

The Field Services and Laboratory Testing Services shall be performed within the following completion dates.

Activity	Completion Date
Award Work	October 23, 2003
Mobilize Drilling Contractor	October 30, 2003
Conduct Drilling Work	November 20, 2003
Conduct Laboratory Testing	December 25, 2003



Proposed 2003 Boring

Skookumchuck Dam
Subsurface Investigations

Figure 3
Boring Location Plan
Rev. 0

2.0 Downhole Shear Wave Velocity Test

2.1 General

The intent of this testing is to determine the variation in compression (P-wave) and shear wave (S-wave) velocity with depth using downhole seismic test procedures. The boreholes and casing will be installed by others.

2.1.1 Field Procedures

A three component downhole geophone shall be used to record the seismic signals. Seismic signals shall be created by two sources. A sledge hammer and plate shall be used for as the P-wave source, and a vehicle weighted plank and sledge hammer shall be used as the shear wave source. To take advantage of the S-wave polarization, both sides of the weighted plank shall be struck, and the waveforms recorded separately.

P and S wave data shall be collected on 2.5 foot intervals. The recording device shall have at least 24 channels. Signal stacking shall be used to enhance the measurement of polarized signals and reduce ambient vibration interference.

2.1.2 Report

A report providing P and S wave velocity at each test depth shall be provided in tabulated and graphical form. A description of field procedures and data reduction methodology shall be provided.

2.2 Schedule

The downhole shear wave velocity testing shall be performed within the following completion dates.

Activity	Completion Date
Award Work	October 23, 2003
Boreholes and Casing Installed by Others	November 20, 2003
Conduct Downhole Shear Wave Velocity Tests	December 25, 2003

FEDERAL ENERGY REGULATORY COMMISSION
Office of Energy Projects
Division of Dam Safety and Inspections
Portland Regional Office
101 S.W. Main Street, Suite #905
Portland, Oregon 97204

Copied 8/11/03 CS:hb
Fields - Merwin
Scibelli - Merwin
Strande - Merwin
Thompson/FERCEASE - 1500 LCT
Skookumchuck Compliance,
FERC, Part 12 plan & schedule,
Acknowledgment

JUL 31 2003

In reply refer to:
P-4441-WA
NATDAM-WA00153

Mr. Randy A. Landolt
Director, Hydro Resources
PacifiCorp
825 NE Multnomah, Suite 1500
Portland, OR 97232

Dear Mr. Landolt:

This is to acknowledge your May 1, 2003 letter, in response to our March 19, 2003 letter, proposing a plan and schedule for providing supplemental information to the January 15, 2002 Fourth Independent Consultant's Safety Inspection Report for the Skookumchuck Project, FERC No. 4441. We have the following comments on the items addressed in your May 1 letter:

◦ Items 1 and 2 - You proposed to conduct a new seismic hazard evaluation, which would include the Cascadia Subduction Zone, deep intraplate events, and the Legislature fault. Further, the information provided in Dr. I. M. Idriss' September 20, 2002 letter report would be incorporated into the evaluation and the evaluation submitted to this office by December 31, 2003. This is acceptable.

◦ Item 3 - You proposed to submit plans and specifications for the Skookumchuck Dam drilling/explorations program by July 31, 2003; begin the drilling/explorations by October 31, 2003; and submit the exploration results and a liquefaction evaluation by March 31, 2004. This is acceptable. In addition to the plans and specifications, a Quality Control and Inspection Program, including a soil erosion and sediment control plan, should be submitted. By June 13, 2003 letter, Mr. Roger L. Raeburn, Manager, Hydro Plant Engineering, forwarded drawings showing the existing and proposed drill hole locations. We have reviewed this information; the proposed locations of the three new drill holes are acceptable. We concur that, as information is learned from the initial advancement of the borings, additional borings may be needed.

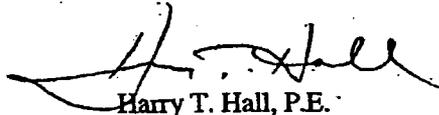
Critical Energy Infrastructure Information
-Do Not Release-

o Item 4 - Based on the results obtained from the drilling/explorations program addressed in Item 3, you indicated that a post-earthquake deformation analysis may be performed and, if appropriate, a non-linear 2-dimensional dynamic analysis would be performed. This is acceptable. If these analyses are considered necessary, the plan and schedule for the work must be submitted to this office for our review.

o Item 5 - You stated that your consultant will review the recently completed U.S. Army Corps of Engineers' Skookumchuck Dam PMF study, and that copies of the PMF study and your consultant's comments thereon will be submitted by December 31, 2003. This is acceptable.

As a reminder, all of the above discussed submittals should be made in triplicate to this office. If you have any questions, please contact Messrs. William Lagnion or Edward Perez of this office at (503) 522-2748 or (503) 552-2750, respectively.

Sincerely,



Harry T. Hall, P.E.
Regional Engineer

FEDERAL ENERGY REGULATORY COMMISSION

Office of Energy Projects
Division of Dam Safety and Inspections
Portland Regional Office
101 S.W. Main Street, Suite #905
Portland, Oregon 97204

Copied 10-10-03 CS:hb
Fields - Merwin
Kirschenman - 1500 LCT
Leis - 1500 LCT
O'Connor - 1500 LCT
Raeburn - 1500 LCT
Snyder - 1500 LCT
Strande - 1500 LCT
Sturtevant - 1500 LCT
Thompson/FERCEASE - 1500 LCT
File: Skookumchuck, Compliance,
FERC, Part 12 D Report 2002-Plan
and Schedule response, Instrumentation
Maintenance

2003

In reply refer to:
P-4441-WA
NATDAM-WA00153

Mr. Randy A. Landolt
Director, Hydro Resources
PacifiCorp
825 NE Multnomah, Suite 1500
Portland, OR 97232

Dear Mr. Landolt:

This is to acknowledge your July 30, 2003 letter providing plans and specifications for the drilling program regarding the January 15, 2002 Fourth Independent Consultant's Safety Inspection Report for the Skookumchuck Project, FERC No. 4441. We have the following comments:

(1) As requested in our July 31, 2003 letter, a Quality Control and Inspection Program (QCIP), including a sediment and erosion control plan (SECP), should be submitted. Your July 30 letter did not provide a QCIP or SECP. Section 1.2.6 - Discharge Water, states that drilling discharge water will be sent to ditches. Discharge water and cuttings from drilling activities should be contained within the area of drilling in a manner that will not cause adverse environmental impacts.

(2) Section 1.1.4 - SPT sampling should be performed in accordance with ASTM D 6066, "Standard Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential", in addition to ASTM 1586, "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils". However, you are required to perform continuous SPTs below Elevation 350 as stated in Item 6, below.

Critical Energy Infrastructure Information
-Do Not Release-

(3) Section 1.1.1 - Scope of Work, should include the installation of open tube piezometers in two of the borings for the purpose of measuring static water level readings and falling head permeability tests if appropriate. Tip installation elevations of the piezometers should be chosen on the basis of conditions encountered during drilling operations.

(4) Section 1.3.1 - Rotary Wash Drilling, states that casing may be used to maintain an open boring. This section should state that if casing is used, it should not be advanced within 2.5 feet of the current standard penetration testing (SPT) interval in conformance with ASTM D 6066 section 11.2.2.

(5) The type of hammer used to advance SPTs should be provided along with the appropriate calibration data. Calibration data should be provided with the information requested in Item 7, below. In addition, a liner should be used in the SPT sampler (creating a constant 1 3/8" ID) to eliminate the need to apply a correction factor in the normalization of N values.

(6) Section 1.1.7.1 - SPTs may be performed on 5-foot intervals from the ground surface to approximate Elev. 350 as indicated. SPTs should then be performed continuously from Elev. 350 to refusal on bedrock, instead of 2.5-foot intervals as stated.

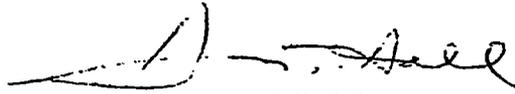
(7) A copy of the field boring logs, backfill records, and piezometer/casing installation records should be mailed or faxed to this office within 10 days upon completion of drilling activities. Field boring logs should include recovery, and details of casing advancement if used.

Once the above comments are incorporated, the plans and specifications will be acceptable. No work may proceed until a QCIP and SECP for the work is filed with and approved by this office. **Please provide the QCIP and SECP as soon as possible so that we can continue our review and that you may meet the current construction schedule.**

You are reminded that, as licensee, it is your responsibility to ensure that construction practices are such that erosion and other potential environmental impacts during and after the proposed work are minimized, and that all deleterious material and fluids are kept out of the river. In addition, you must notify this office as soon as possible if there are any developments that might affect the integrity of the Skookumchuck Dam.

As a reminder, all of the above discussed submittals should be made in triplicate to this office. If you have any questions, please contact Messrs. William Lagnion or Edward Perez of this office at (503) 522-2748 or (503) 552-2750, respectively.

Sincerely,

A handwritten signature in black ink, appearing to read "H. T. Hall", with a long horizontal flourish extending to the left.

Harry T. Hall, P.E.
Regional Engineer

SKOOKUMCHUCK FORECAST - November 2003 to January 2004

Description of Work	2004 - Estimated Budget Calendar Year					Assigned PM
	Labor	Emp Exp	Materials	Contracts	Other	
Fish Hatchery Security				138,000	8,500	146,500
Wildlife Management Plan				130,600		130,600
Hydrologic Data - USGS Data	6,000	240	14,400	39,000		59,640
Routine Operating Expenses				17,500		17,500
FERC Issues	16,900	500	2,200		5,300	24,900
Skookumchuck Stability Analysis Drilling Program	700	46		23,000		23,746
Skookumchuck Weyerhaeuser Easement Payment	9,600			100,000		109,600
Annual Revenue from Generation Sales					3,000	3,000
	33,200	786	16,600	448,100	13,800	512,486

LABOR

Description of Work	Nov-03	Dec-03	Jan-04	Feb-04	TOTAL
Fish Hatchery Security					
Wildlife Management Plan	500	500	500	500	2,000
Hydrologic Data - USGS Data					
Routine Operating Expenses	1,407	1,407	1,407	1,407	5,628
FERC Issues					
Skookumchuck Stability Analysis Drilling Program	3,000	2,000	2,000	1,300	8,300
Skookumchuck Weyerhaeuser Easement Payment					
Annual Revenue from Generation Sales					
TOTAL	\$ 4,907	\$ 3,907	\$ 3,907	\$ 3,207	\$ 15,928

EMPLOYEE EXPENSES

Description of Work	Nov-03	Dec-03	Jan-04	Feb-04	TOTAL
Fish Hatchery Security					
Wildlife Management Plan	20	20	20	20	80
Hydrologic Data - USGS Data					
Routine Operating Expenses	30	30	30	30	120
FERC Issues					
Skookumchuck Stability Analysis Drilling Program					
Skookumchuck Weyerhaeuser Easement Payment					
Annual Revenue from Generation Sales					
TOTAL	\$ 50	\$ 50	\$ 50	\$ 50	\$ 200

MATERIALS

Description of Work	Nov-03	Dec-03	Jan-04	Feb-04	TOTAL
Fish Hatchery	-	-	-	-	-
Security	-	-	-	-	-
Wildlife Management Plan	1,200	1,200	1,200	1,200	4,800
Hydrologic Data - USGS Data	-	-	-	-	-
Routine Operating Expenses	110	110	110	110	440
FERC Issues	-	-	-	-	-
Skookumchuck Stability Analysis Drilling Program	-	-	-	-	-
Skookumchuck Weyerhaeuser Easement Payment	-	-	-	-	-
Annual Revenue from Generation Sales	-	-	-	-	-
TOTAL	\$ 1,310	\$ 1,310	\$ 1,310	\$ 1,310	\$ 5,240

CONTRACTS

Description of Work	Nov-03	Dec-03	Jan-04	Feb-04	TOTAL
Fish Hatchery	34,294	-	-	34,294	68,588
Security	10,800	10,800	10,800	10,800	43,200
Wildlife Management Plan	4,000	1,500	1,500	4,000	11,000
Hydrologic Data - USGS Data	-	-	-	-	-
Routine Operating Expenses	-	-	-	-	-
FERC Issues	-	-	-	-	-
Skookumchuck Stability Analysis Drilling Program	15,000	25,000	20,000	10,000	70,000
Skookumchuck Weyerhaeuser Easement Payment	3,000	-	-	-	3,000
Annual Revenue from Generation Sales	-	-	-	-	-
TOTAL	\$ 67,094	\$ 37,300	\$ 32,300	\$ 59,094	\$ 195,788

OTHER

Description of Work	Nov-03	Dec-03	Jan-04	Feb-04	TOTAL
Fish Hatchery	-	-	-	-	-
Security	-	-	-	-	-
Wildlife Management Plan	-	-	-	-	-
Hydrologic Data - USGS Data	-	-	-	-	-
Routine Operating Expenses	442	442	442	442	1,768
FERC Issues	-	-	-	-	-
Skookumchuck Stability Analysis Drilling Program	-	-	-	-	-
Skookumchuck Weyerhaeuser Easement Payment	-	-	-	-	-
Annual Revenue from Generation Sales	(2,000)	-	-	(1,500)	(3,500)
TOTAL	\$ (1,558)	\$ 442	\$ 442	\$ (1,058)	\$ (1,732)

TOTAL FORECAST

Description of Work	Nov-03	Dec-03	Jan-04	Feb-04	TOTAL
Fish Hatchery	34,294	-	-	34,294	68,588
Security	10,800	10,800	10,800	10,800	43,200
Wildlife Management Plan	5,720	3,220	3,220	5,720	17,880
Hydrologic Data - USGS Data	-	-	-	-	-
Routine Operating Expenses	1,989	1,989	1,989	1,989	7,956
FERC Issues	-	-	-	-	-
Skookumchuck Stability Analysis Drilling Program	18,000	27,000	22,000	11,300	78,300
Skookumchuck Weyerhaeuser Easement Payment	3,000	-	-	-	3,000
Annual Revenue from Generation Sales	(2,000)	-	-	(1,500)	(3,500)
TOTAL	71,803	43,009	38,009	62,603	\$ 215,424

	Avg Mo
Routine Operating Expenses	400
Electricity	42
Telephone	80
Vehicle Maintenance	1,467
Maintenance (Not including Res Part-time Labor)	1,989
TOTAL	1,989

After Recording Return to:

Attn: _____

SPACE ABOVE LINE FOR RECORDER'S USE ONLY

Title of Document:

Special Warranty Deed

Grantors:

Pacificorp, an Oregon corporation (formerly known as Pacific Power & Light Company); Avista Corporation, a Washington corporation (formerly known as the Washington Water Power Company)

See page 2 for complete names of all Grantors

Grantee:

Skookumchuck LLC, a Washington limited liability company

Abbreviated Legal Description:

Ptn Sec 7, 11, 14, 15, 16, 17 & 18, T15N, R1E, and Ptn Sec 12 & 13, T15N, R1W

Complete legal description is on Exhibit A of this document

Assessor's Tax Parcel Account Nos.:

11512310400(TCA-540); 11512340100(TCA-540)
11513100000(TCA-561); 11513120000(TCA-561)
11513210000(TCA-561); 11513310000(TCA-540)

Additional tax parcel account numbers are on Exhibit B of this document

SPECIAL WARRANTY DEED

The Grantors, Pacificorp, an Oregon corporation (formerly known as Pacific Power & Light Company); Avista Corporation, a Washington corporation (formerly known as the Washington Water Power Company); The City of Seattle, a municipal corporation; The City of Tacoma, a municipal corporation; Public Utility District No. 1 of Snohomish County, a municipal corporation; Puget Sound Energy, Inc., a Washington corporation (formerly known as Puget Sound Power & Light Company); Public Utility District No. 1 of Grays Harbor County, a municipal corporation; and _____ Avista Corporation, a Washington corporation (non-utility) (collectively herein, the "Grantors") for good and valuable consideration, in hand paid, do hereby bargain, sell and convey to Skookumchuck LLC, a Washington limited liability company, the Grantee, the following-described real property situated in the County of Thurston, State of Washington:

See Exhibit A attached hereto and incorporated herein by this reference.

This conveyance is subject to taxes and assessments, general and special, not yet due and payable; and all agreements, easements, reservations, restrictions, covenants and conditions listed on Exhibit C attached hereto and incorporated herein by this reference.

The Grantors, for themselves and for their successors in interest, do by these presents expressly limit the covenants of this Deed to those herein expressed, exclude all covenants arising or to arise by statutory or other implication, and do hereby covenant that against all persons whomsoever lawfully claiming or to claim by, through or under the Grantors, and not otherwise, they will warrant and defend the title to the above-described real property.

EXHIBIT C

DATED: _____, 2003.

PACIFICORP, an Oregon corporation

By: _____
Printed Name: _____
Title: _____

AVISTA CORPORATION, a Washington corporation

By: _____
Printed Name: _____
Title: _____

THE CITY OF SEATTLE, a municipal corporation

By: _____
Printed Name: _____
Title: _____

THE CITY OF TACOMA, a municipal corporation

By: _____
Printed Name: _____
Title: _____

EXHIBIT C

**PUBLIC UTILITY DISTRICT NO. 1 OF
SNOHOMISH COUNTY, a municipal
corporation**

By: _____
Printed Name: _____
Title: _____

**PUGET SOUND ENERGY, INC., a
Washington corporation**

By: _____
Printed Name: _____
Title: _____

**PUBLIC UTILITY DISTRICT NO. 1 OF
GRAYS HARBOR COUNTY, a municipal
corporation**

By: _____
Printed Name: _____
Title: _____

**AVISTA CORPORATION,
a Washington corporation (non-utility)**

By: _____
Printed Name: _____
Title: _____

EXHIBIT C

STATE OF _____)
) ss.
COUNTY OF _____)

On this ___ day of _____, 2003, before me personally appeared _____, to me personally known to be the _____ of PACIFICORP, the Oregon corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that (s)he was authorized to execute said instrument and that the seal affixed, if any, is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the day and year first above written.

Signature: _____

Name (Print): _____

NOTARY PUBLIC in and for the State of _____, residing at _____

My appointment expires: _____

STATE OF _____)
) ss.
COUNTY OF _____)

On this ___ day of _____, 2003, before me personally appeared _____, to me personally known to be the _____ of AVISTA CORPORATION, the Washington corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that (s)he was authorized to execute said instrument and that the seal affixed, if any, is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the day and year first above written.

Signature: _____

Name (Print): _____

NOTARY PUBLIC in and for the State of _____, residing at _____

My appointment expires: _____

EXHIBIT C

STATE OF _____)
) ss.
COUNTY OF _____)

On this ___ day of _____, 2003, before me personally appeared _____, to me personally known to be the _____ of THE CITY OF SEATTLE, the municipal corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that (s)he was authorized to execute said instrument and that the seal affixed, if any, is the corporate seal of said municipal corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the day and year first above written.

Signature: _____

Name (Print): _____

NOTARY PUBLIC in and for the State of _____, residing at _____
My appointment expires: _____

STATE OF _____)
) ss.
COUNTY OF _____)

On this ___ day of _____, 2003, before me personally appeared _____, to me personally known to be the _____ of THE CITY OF TACOMA, the municipal corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that (s)he was authorized to execute said instrument and that the seal affixed, if any, is the corporate seal of said municipal corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the day and year first above written.

Signature: _____

Name (Print): _____

NOTARY PUBLIC in and for the State of _____, residing at _____
My appointment expires: _____

EXHIBIT C

STATE OF _____)
) ss.
COUNTY OF _____)

On this ___ day of _____, 2003, before me personally appeared _____, to me personally known to be the _____ of PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY, the municipal corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that (s)he was authorized to execute said instrument and that the seal affixed, if any, is the corporate seal of said municipal corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the day and year first above written.

Signature: _____

Name (Print): _____

NOTARY PUBLIC in and for the State of _____, residing at _____
My appointment expires: _____

STATE OF _____)
) ss.
COUNTY OF _____)

On this ___ day of _____, 2003, before me personally appeared _____, to me personally known to be the _____ of PUGET SOUND ENERGY, INC., the Washington corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that (s)he was authorized to execute said instrument and that the seal affixed, if any, is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the day and year first above written.

Signature: _____

Name (Print): _____

NOTARY PUBLIC in and for the State of _____, residing at _____

EXHIBIT C

_____, residing at _____
My appointment expires: _____

EXHIBIT A

(Complete legal description)

IN THE COUNTY OF THURSTON, STATE OF WASHINGTON

TOWNSHIP FIFTEEN (15) NORTH, RANGE ONE (1) EAST OF THE WILLAMETTE
MERIDIAN

PARCEL 1 - SECTIONS ELEVEN (11), FOURTEEN (14), FIFTEEN (15), SIXTEEN (16)
AND SEVENTEEN (17)

BEGINNING AT A POINT ON THE EAST-WEST LINE BETWEEN SECTIONS 11 AND 14 THAT IS NORTH 87° 00' 05" WEST 182.27 FEET FROM THE SOUTHEAST CORNER OF SAID SECTION 11; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SAID SECTION 11:

NORTH 53° 49' 14" EAST 100.09 FEET; NORTH 65° 55' 35" WEST 359.73 FEET; SOUTH 43° 16' 54" WEST 220.51 FEET; SOUTH 60° 49' 42" WEST 45.76 FEET, MORE OR LESS, TO A POINT ON THE SOUTH LINE OF SAID SECTION 11; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SAID SECTION 14:

SOUTH 60° 49' 42" WEST 255.90 FEET; SOUTH 71° 30' 17" WEST 338.46 FEET; NORTH 51° 54' 39" WEST 271.89 FEET; NORTH 83° 20' 37" WEST 254.24 FEET; NORTH 76° 03' 51" WEST 356.87 FEET; SOUTH 70° 40' 57" WEST 436.45 FEET; SOUTH 59° 49' 51" WEST 255.72 FEET; SOUTH 47° 47' 22" WEST 236.45 FEET; SOUTH 58° 20' 37" WEST 81.47 FEET; SOUTH 75° 59' 05" WEST 82.72 FEET; SOUTH 88° 24' 10" WEST 73.99 FEET; NORTH 73° 22' 49" WEST 69.10 FEET; NORTH 64° 51' 36" WEST 98.73 FEET; NORTH 53° 03' 31" WEST 177.29 FEET; NORTH 88° 20' 53" WEST 49.75 FEET; NORTH 70° 36' 08" WEST 92.49 FEET; NORTH 58° 47' 11" WEST 78.31 FEET; NORTH 46° 41' 53" WEST 221.29 FEET; SOUTH 74° 41' 45" WEST 662.79 FEET; NORTH 86° 11' 28" WEST 186.15 FEET; SOUTH 78° 26' 42" WEST 242.55 FEET; NORTH 87° 59' 29" WEST 494.18 FEET, MORE OR LESS, TO A POINT ON THE NORTH-SOUTH SECTION LINE COMMON TO SECTIONS 14 AND 15 THAT IS SOUTH 01° 52' 20" WEST 493.39 FEET FROM THE NORTHWEST CORNER OF SAID SECTION 14; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SAID SECTION 15:

NORTH 87° 59' 29" WEST 327.43 FEET; NORTH 74° 02' 53" WEST 400.22 FEET; NORTH 88° 45' 51" WEST 575.91 FEET; SOUTH 76° 33' 47" WEST 492.55 FEET; SOUTH 16° 25' 23" WEST 164.36 FEET; SOUTH 59° 05' 01" WEST 329.19 FEET; NORTH 76° 22' 18" WEST 407.09 FEET; SOUTH 32° 14' 15" WEST 423.58 FEET; NORTH 89° 33' 35" WEST 156.21 FEET; NORTH 33° 49' 33" WEST 186.80 FEET; SOUTH 62° 47' 03" WEST

EXHIBIT C

257.36 FEET; SOUTH 82° 05' 25" WEST 287.38 FEET; SOUTH 34° 00' 02" WEST 263.98 FEET; NORTH 52° 43' 21" WEST 152.81 FEET; SOUTH 86° 35' 42" WEST 664.04 FEET; SOUTH 25° 15' 30" WEST 378.46 FEET; NORTH 85° 32' 51" WEST 369.85 FEET; SOUTH 69° 45' 16" WEST 285.24 FEET; NORTH 88° 02' 05" WEST 120.15 FEET, MORE OR LESS, TO A POINT ON THE NORTH-SOUTH SECTION LINE COMMON TO SECTIONS 15 AND 16 THAT IS SOUTH 02° 26' 44" EAST 1,846.54 FEET FROM THE NORTHWEST CORNER OF SAID SECTION 15; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SAID SECTION 16:

NORTH 88° 02' 05" WEST 144.02 FEET; NORTH 62° 20' 54" WEST 244.42 FEET; NORTH 40° 31' 43" WEST 215.43 FEET; NORTH 82° 23' 41" WEST 161.01 FEET; SOUTH 83° 11' 32" WEST 349.15 FEET; SOUTH 88° 51' 12" WEST 334.53 FEET; SOUTH 76° 46' 31" WEST 564.62 FEET; NORTH 80° 09' 45" WEST 693.06 FEET; SOUTH 85° 54' 49" WEST 391.76 FEET; NORTH 73° 54' 40" WEST 592.15 FEET; NORTH 20° 12' 38" EAST 239.00 FEET; NORTH 06° 58' 06" EAST 165.47 FEET; SOUTH 74° 49' 49" WEST 104.10 FEET; SOUTH 62° 14' 25" WEST 776.84 FEET; NORTH 87° 28' 02" WEST 220.95 FEET; SOUTH 80° 53' 35" WEST 766.03 FEET; NORTH 85° 36' 44" WEST 46.89 FEET, MORE OR LESS; TO A POINT ON THE NORTH-SOUTH SECTION LINE COMMON TO SECTIONS 16 AND 17 THAT IS SOUTH 02° 20' 51" EAST 1,836.31 FEET FROM THE NORTHWEST CORNER OF SAID SECTION 16; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SECTION 17:

NORTH 85° 36' 44" WEST 132.92 FEET; NORTH 02° 21' 01" EAST 128.11 FEET; NORTH 23° 07' 41" WEST 325.96 FEET; NORTH 03° 45' 27" EAST 318.32 FEET; NORTH 85° 40' 34" WEST 162.58 FEET; SOUTH 28° 26' 02" WEST 320.98 FEET; SOUTH 03° 48' 36" WEST 182.46 FEET; SOUTH 22° 25' 40" EAST 232.05 FEET; NORTH 80° 33' 24" WEST 258.57 FEET; NORTH 65° 21' 10" WEST 287.74 FEET; SOUTH 69° 12' 12" WEST 394.31 FEET; NORTH 35° 32' 27" WEST 752.13 FEET; SOUTH 66° 44' 11" WEST 199.85 FEET; NORTH 79° 30' 27" WEST 173.22 FEET; NORTH 66° 00' 29" WEST 114.86 FEET; NORTH 77° 32' 52" WEST 350.23 FEET; SOUTH 62° 54' 49" WEST 169.14 FEET; SOUTH 33° 05' 59" WEST 584.71 FEET; SOUTH 74° 11' 20" WEST 845.70 FEET; NORTH 72° 17' 34" WEST 1,186.61 FEET; NORTH 47° 40' 31" WEST 156.06 FEET, MORE OR LESS, TO A POINT ON THE WEST LINE OF SAID SECTION 17 THAT IS SOUTH 00° 19' 55" WEST 1,415.45 FEET FROM THE NORTHWEST CORNER OF SAID SECTION, THENCE SOUTHERLY, ALONG THE WEST LINE OF SAID SECTION TO THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SAID SECTION; THENCE EASTERLY, ALONG THE SOUTH LINE OF THE NORTH HALF OF THE SOUTH HALF OF SAID SECTION, 402.17 FEET TO A POINT; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SECTION 17:

NORTH 79° 25' 38" EAST 846.57 FEET; SOUTH 51° 56' 54" EAST 123.58 FEET; SOUTH 85° 51' 31" EAST 166.81 FEET; NORTH 02° 52' 28" WEST 272.18 FEET; NORTH 62° 14' 10" EAST 317.25 FEET; SOUTH 52° 28' 44" EAST 313.04 FEET; NORTH 65° 55' 38" EAST 105.35 FEET; NORTH 87° 57' 47" EAST 703.00 FEET; SOUTH 83° 31' 25" EAST 427.31 FEET; NORTH 58° 18' 40" EAST 460.38 FEET; SOUTH 39° 38' 57" EAST 360.74 FEET; SOUTH 87° 17' 54" EAST 129.02 FEET; SOUTH 46° 56' 40" EAST 474.08

EXHIBIT C

FEET; NORTH 71° 34' 04" EAST 236.69 FEET; SOUTH 88° 48' 09" EAST 232.44 FEET; NORTH 71° 34' 25" EAST 453.41 FEET, MORE OR LESS, TO A POINT ON THE NORTH-SOUTH SECTION LINE COMMON TO SECTIONS 16 AND 17 THAT IS SOUTH 02° 20' 51" EAST 3,799.98 FEET FROM THE NORTHEAST CORNER OF SAID SECTION 17; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SECTION 16;

NORTH 71° 34' 25" EAST 66.25 FEET; NORTH 72° 01' 00" EAST 240.65 FEET; SOUTH 77° 56' 16" EAST 429.48 FEET; SOUTH 54° 48' 47" EAST 311.98 FEET; SOUTH 81° 21' 40" EAST 307.40 FEET; SOUTH 44° 57' 41" EAST 665.70 FEET; NORTH 50° 01' 56" EAST 508.54 FEET; SOUTH 86° 38' 08" EAST 146.78 FEET; NORTH 50° 50' 53" EAST 174.84 FEET; SOUTH 88° 33' 23" EAST 113.41 FEET; SOUTH 33° 23' 03" EAST 200.31 FEET; NORTH 42° 52' 15" EAST 187.86 FEET; SOUTH 65° 02' 35" EAST 250.65 FEET; SOUTH 39° 05' 42" EAST 698.82 FEET; NORTH 49° 22' 24" EAST 225.54 FEET; NORTH 01° 07' 02" WEST 507.66 FEET; NORTH 16° 09' 36" WEST 362.05 FEET; NORTH 04° 44' 27" WEST 217.89 FEET; NORTH 52° 03' 43" EAST 115.97 FEET; NORTH 81° 08' 00" EAST 455.98 FEET; NORTH 89° 02' 56" EAST 367.24 FEET; NORTH 39° 54' 40" EAST 320.69 FEET; SOUTH 37° 54' 29" EAST 342.62 FEET; NORTH 68° 50' 52" EAST 439.91 FEET, MORE OR LESS, TO A POINT ON THE NORTH-SOUTH SECTION LINE BETWEEN SECTIONS 15 AND 16 THAT IS SOUTH 02° 26' 44" EAST 2,979.49 FEET FROM THE NORTHEAST CORNER OF SAID SECTION 16; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SECTION 15:

NORTH 68° 50' 52" EAST 147.51 FEET; SOUTH 58° 22' 18" EAST 221.38 FEET; SOUTH 85° 10' 21" EAST 505.81 FEET; NORTH 20° 22' 33" EAST 180.03 FEET; SOUTH 80° 21' 39" EAST 478.83 FEET; NORTH 11° 20' 03" EAST 230.24 FEET; NORTH 68° 10' 44" EAST 275.97 FEET; NORTH 89° 30' 09" EAST 272.44 FEET; SOUTH 75° 41' 41" EAST 43.02 FEET; NORTH 78° 37' 48" EAST 506.93 FEET; NORTH 83° 20' 25" EAST 448.82 FEET; NORTH 46° 04' 37" EAST 296.71 FEET; NORTH 79° 33' 02" EAST 637.43 FEET; NORTH 51° 46' 37" EAST 551.52 FEET; NORTH 81° 28' 02" EAST 606.99 FEET; NORTH 75° 18' 13" EAST 290.80 FEET; SOUTH 85° 56' 25" EAST 134.60 FEET; NORTH 48° 23' 08" EAST 68.60 FEET, MORE OR LESS, TO A POINT ON THE NORTH-SOUTH SECTION LINE COMMON TO SECTIONS 14 AND 15 THAT IS SOUTH 01° 52' 20" WEST 1,452.35 FEET FROM THE NORTHEAST CORNER OF SAID SECTION 15; THENCE ALONG THE FOLLOWING COURSES AND DISTANCES IN SECTION 14:

NORTH 48° 23' 08" EAST 71.61 FEET; SOUTH 70° 59' 32" EAST 304.30 FEET; NORTH 68° 24' 16" EAST 286.10 FEET; NORTH 79° 00' 16" EAST 559.39 FEET; SOUTH 89° 13' 50" EAST 538.86 FEET; NORTH 61° 44' 25" EAST 315.72 FEET; SOUTH 85° 02' 10" EAST 1,180.34 FEET; NORTH 61° 30' 30" EAST 819.09 FEET; NORTH 71° 29' 01" EAST 761.67 FEET; NORTH 53° 49' 14" EAST 601.16 FEET, MORE OR LESS, TO A POINT ON THE EAST-WEST SECTION LINE BETWEEN SECTIONS 11 AND 14 THAT IS NORTH 87° 00' 05" WEST 182.27 FEET FROM THE NORTHEAST CORNER OF SAID SECTION 14, AND THE POINT OF BEGINNING FOR THIS DESCRIPTION.

PARCEL 2 - SECTION EIGHTEEN (18)

EXHIBIT C

THOSE PORTIONS OF THE NORTH HALF AND THE NORTH HALF OF THE SOUTHEAST QUARTER OF SAID SECTION 18 LYING SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT A POINT ON THE EAST LINE OF SAID SECTION 18 THAT IS SOUTH 00° 19' 55" WEST 1,415.45 FEET FROM THE NORTHEAST CORNER OF SAID SECTION; THENCE NORTH 47° 40' 31" WEST 951.19 FEET; THENCE NORTH 71° 15' 47" WEST 1,858.15 FEET; THENCE SOUTH 73° 14' 02" WEST 1,096.69 FEET; THENCE SOUTH 61° 46' 54" WEST 317.30 FEET; THENCE SOUTH 87° 40' 58" WEST 89.00 FEET, MORE OR LESS, TO A POINT ON THE NORTHEASTERLY LINE OF THAT CERTAIN TRACT CONVEYED BY SCOTT PAPER COMPANY TO HENRY W. TURNER AND EVELYN TURNER BY DEED DATED MAY 22, 1958 AND RECORDED JUNE 3, 1958 UNDER AUDITOR'S FILE NO. 597416; THENCE NORTHWESTERLY, ALONG SAID NORTHEASTERLY LINE OF SAID TURNER TRACT, TO THE NORTH LINE OF SAID SECTION 18; THENCE WESTERLY, ALONG SAID NORTH LINE OF SAID SECTION, TO THE NORTHWEST CORNER THEREOF;

AND LYING NORTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT A POINT ON THE EAST LINE OF SAID SECTION 18 THAT IS SOUTH 00° 19' 55" WEST 3,759.54 FEET FROM THE NORTHEAST CORNER OF SAID SECTION; THENCE NORTH 68° 11' 24" WEST 614.59 FEET; THENCE NORTH 44° 33' 55" WEST 1,275.23 FEET; THENCE NORTH 32° 13' 14" WEST 827.33 FEET; THENCE NORTH 86° 47' 55" WEST 1,202.47 FEET; THENCE SOUTH 34° 42' 19" WEST 811.72 FEET; THENCE NORTH 14° 23' 23" WEST 79.18 FEET, MORE OR LESS, TO A POINT ON THE SOUTHEASTERLY LINE OF THAT CERTAIN TRACT CONVEYED BY SCOTT PAPER COMPANY TO HENRY W. TURNER AND EVELYN TURNER BY DEED DATED MAY 22, 1958 AND RECORDED JUNE 3, 1958 UNDER AUDITOR'S FILE NO. 597416; THENCE SOUTHWESTERLY, ALONG SAID SOUTHEASTERLY LINE OF SAID TURNER TRACT TO ITS INTERSECTION WITH THE EAST-WEST CENTERLINE OF SAID SECTION 18; THENCE WESTERLY, ALONG SAID EAST-WEST CENTERLINE, TO THE WEST QUARTER CORNER OF SAID SECTION 18.

EXCEPTING THEREFROM THAT PORTION OF THE NORTHWEST QUARTER OF SAID SECTION 18 CONTAINED IN THAT CERTAIN TRACT CONVEYED BY SCOTT PAPER COMPANY TO HENRY W. TURNER AND EVELYN TURNER BY DEED DATED MAY 22, 1958 AND RECORDED JUNE 3, 1958 UNDER AUDITOR'S FILE NO. 597416, AND

EXCEPT THAT PORTION CONVEYED TO THURSTON COUNTY FOR COUNTY ROAD KNOWN AS JOHNSON CREEK ROAD SE BY INSTRUMENT RECORDED JANUARY 12, 1972 UNDER AUDITOR'S FILE NO. 857989, AND

EXCEPT THAT PORTION CONVEYED TO THE STATE OF WASHINGTON, DEPARTMENT OF GAME BY INSTRUMENT RECORDED AUGUST 18, 1972 UNDER AUDITOR'S FILE NO. 872705, AND

EXHIBIT C

EXCEPT THAT PORTION CONVEYED TO THE STATE OF WASHINGTON BY INSTRUMENT RECORDED APRIL 24, 1979 UNDER AUDITOR'S FILE NO. 1074923.

TOGETHER WITH THAT PORTION OF VACATED ROADWAY, IF ANY, THAT WOULD ATTACH TO BY OPERATION OF LAW AS DISCLOSED BY RESOLUTION 7312 AS RECORDED JULY 27, 1982 UNDER AUDITOR'S FILE NO. 8207270131.

PARCEL 3 - SECTIONS SEVEN (7) AND EIGHTEEN (18)

THAT PORTION OF GOVERNMENT LOT 4 OF SAID SECTION 7 AND THOSE PORTIONS OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER, GOVERNMENT LOTS 1 AND 2, THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER, THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER AND OF GOVERNMENT LOT 3 OF SAID SECTION 18, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID SECTION 7; THENCE NORTH 00° 18' 39" EAST, ALONG THE WEST LINE OF SAID SECTION, 122.21 FEET; THENCE SOUTH 78° 10' 12" EAST 528.20 FEET; THENCE SOUTH 61° 28' 14" EAST 362.28 FEET; THENCE SOUTH 15° 42' 23" EAST 390.98 FEET; THENCE SOUTH 09° 50' 00" EAST 575.00 FEET, MORE OR LESS, TO THE LINE OF ORDINARY HIGH WATER OF THE LEFT BANK OF SKOOKUMCHUCK RIVER; THENCE NORTHEASTERLY, ALONG SAID LINE OF ORDINARY HIGH WATER, 1,270.00 FEET, MORE OR LESS, TO A POINT DESCRIBED AS 747.00 FEET SOUTH AND 2,215.25 FEET EAST OF THE NORTHWEST CORNER OF SAID SECTION 18; THENCE SOUTH 07° 22' 35" WEST 434.30 FEET; THENCE SOUTH 34° 14' 22" WEST 298.32 FEET; THENCE SOUTH 33° 36' 51" WEST 327.28 FEET; THENCE SOUTH 46° 55' 48" EAST 32.33 FEET; THENCE SOUTH 46° 10' 44" WEST 222.71 FEET; THENCE SOUTH 19° 03' 38" WEST 142.48 FEET; THENCE SOUTH 36° 18' 34" WEST 426.57 FEET; THENCE SOUTH 03° 39' 39" WEST 300.86 FEET; THENCE SOUTH 42° 49' 24" WEST 597.78 FEET; THENCE NORTH 79° 22' 14" WEST 189.91 FEET; THENCE NORTH 56° 47' 53" WEST 186.23 FEET; THENCE NORTH 38° 24' 23" WEST 720.00 FEET, MORE OR LESS, TO SAID LINE OF ORDINARY HIGH WATER; THENCE SOUTHWESTERLY, ALONG SAID LINE OF ORDINARY HIGH WATER, 350.00 FEET, MORE OR LESS, TO THE WEST LINE OF SAID SECTION 18; THENCE NORTH 00° 06' 58" WEST, ALONG SAID WEST LINE, 2,748.00 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE STATE OF WASHINGTON, DEPARTMENT OF GAME BY INSTRUMENT RECORDED AUGUST 18, 1972 UNDER AUDITOR'S FILE NO. 872705.

TOWNSHIP FIFTEEN (15) NORTH, RANGE ONE (1) WEST OF THE WILLAMETTE MERIDIAN

PARCEL 4 - SECTION TWELVE (12)

EXHIBIT C

THE SOUTH HALF OF THE SOUTHEAST QUARTER, THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER, THE EAST HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER, AND THAT PORTION OF THE WEST HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER BOUNDED ON THE EAST BY THE EAST LINE OF SAID WEST HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND BOUNDED ON THE SOUTHERLY SIDE BY THE NORTHEASTERLY RIGHT OF WAY LINE OF THE TROLLER (SKOOKUMCHUCK) COUNTY ROAD AND BOUNDED ON THE NORTHWESTERLY SIDE BY A LINE THAT IS PARALLEL WITH AND 37.50 FEET NORTHWESTERLY OF THE CENTER SURVEY LINE OF THAT CERTAIN RIGHT OF WAY GRANTED TO PACIFIC NORTHWEST PIPELINE CORPORATION BY INSTRUMENT DATED FEBRUARY 24, 1956 AND RECORDED FEBRUARY 28, 1956 UNDER AUDITOR'S FILE NO. 557791B, ALL IN SAID SECTION 12.

EXCEPTING THEREFROM COUNTY ROAD KNOWN AS TROLLER ROAD, AND EXCEPT ANY OTHER COUNTY ROADS.

PARCEL 5 - SECTION THIRTEEN (13)

THE SOUTH HALF, THE NORTHEAST QUARTER, AND THE EAST HALF OF THE NORTHWEST QUARTER OF SAID SECTION 13.

EXCEPTING THEREFROM COUNTY ROAD KNOWN AS TROLLER ROAD, AND EXCEPT ANY OTHER COUNTY ROADS.

IN THE COUNTY OF THURSTON, STATE OF WASHINGTON

EXHIBIT B

(Additional tax parcel account numbers)

1151332000(TCA-540)	1151341000(TCA-540)
1151342000(TCA-540)	21507330100(TCA-540)
21511440200(TCA-320)	21514110100(TCA-540)
21514120100(TCA-540)	21515110000(TCA-320)
21515310000(TCA-320)	21516200000(TCA-320)
21516230100(TCA-320)	21517110000(TCA-540)
21518120100(TCA-540)	21518210000(TCA-540)

EXHIBIT C

EXHIBIT C

[INSERT PERMITTED ENCUMBRANCES LISTED ON SCHEDULE 3.7 AT CLOSING]

APPENDIX 2

SKOOKUMCHUCK DAM MANAGEMENT AGREEMENT

THIS SKOOKUMCHUCK DAM MANAGEMENT AGREEMENT (the "Agreement") is made as of May __, 2000 (the "Effective Date"), by, on the one hand, PacifiCorp, Public Utilities District No. 1 of Snohomish County, Washington; Puget Sound Energy, Inc.; City of Tacoma, Washington; Avista Corporation; City of Seattle, Washington; and Public Utility District No. 1 of Grays Harbor County, Washington (each a "Dam Owner" and collectively the "Dam Owners") and, on the other hand, TransAlta Centralia Generation LLC, a Washington limited liability company ("Plant Owner") (each a "Party" and collectively, the "Parties"), with reference to the following:

RECITALS

A. Dam Owners are the owners of the Skookumchuck Dam and the real property identified on Exhibit A (collectively, the "Dam") along the Skookumchuck River near Centralia, Washington. The Skookumchuck Dam impounds a reservoir on the Skookumchuck River (the "Reservoir").

B. Pursuant to that certain Centralia Plant Purchase and Sale Agreement, dated as of May 7, 1999 (the "Purchase and Sale Agreement") by, on the one hand, the Dam Owners and, on the other hand, TECWA Power, Inc., a Washington corporation (the "Buyer"), the Dam Owners have agreed to convey the Centralia Steam Electric Generating Plant and related assets located near Centralia, Washington (the "Plant") to the Plant Owner and subsequently to assign the membership interests in the Plant Owner to the Buyer.

C. The Parties wish to enter into this Agreement to govern how the Dam will be managed and how the Parties will bear the costs of management.

NOW, THEREFORE, in consideration of the premises and mutual agreements set forth in this Agreement and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties, intending to be legally bound, agree as follows:

AGREEMENT

1. Term.

1.1 Initial Term. Unless terminated sooner under Section 7 or extended as provided in Section 1.2, this Agreement shall take effect on the Effective Date and shall remain in effect until the second anniversary of the Effective Date (the "Term").

1.2 Extension of Term. Notwithstanding Section 1.1, the Parties may extend the Term from year to year, by written agreement, if the Dam Owners have not sold the Dam on or before the second anniversary of the Effective Date. The Parties shall begin to negotiate in good faith at least thirty (30) days before the second anniversary of the Effective Date either an extension or amendment of this Agreement, or a new agreement.

1.3 Right of First Refusal: Option to Purchase.

a. During the Term, if the Dam Owners wish to convey the Dam to any party other than Lewis County, Washington (or an agency of Lewis County or an entity created by or for the benefit of Lewis County), the Army Corps of Engineers or the City of Centralia, they shall give the Plant Owner prior written notice of the terms and conditions of the proposed transfer. Plant Owner shall have thirty (30) days from the receipt of such notice in which to accept the offered terms and conditions. If the Plant Owner accepts the proposed terms and conditions, it shall acquire the Dam in accordance with those terms and conditions within sixty (60) days of its acceptance. If the Plant Owner rejects the proposed terms and conditions, or if the Plant Owner does not accept the proposed terms and conditions within the thirty (30) day period, the Dam Owners may proceed to transfer the Dam for a price no lower than, and otherwise on terms and conditions not materially more favorable than, those offered to the Plant Owner.

b. If the Dam Owners have not sold the Dam on or before the second anniversary of the Effective Date, the Plant Owner shall have the option to purchase the Dam on terms to be agreed by the Parties in their reasonable discretion, at PacifiCorp's net book value multiplied by 2.105 (the "Dam Purchase Price"). This option shall expire on the third (3rd) anniversary of the Effective Date. Plant Owner may exercise this option at any time after the second anniversary of the Effective Date by giving written notice to the Dam Owners. If the Plant Owner exercises this option, the Parties shall close the sale of the Dam within sixty (60) days after the Plant Owner's exercise of the option. At the closing, (a) Plant Owner's delivery of the Dam Purchase Price shall be conditioned on the Dam Owner's conveyance of the Dam to the Plant Owner, (b) Dam Owner's conveyance of the Dam shall be conditioned on the Plant Owner's payment of the Dam Purchase Price to the Dam Owners in immediately available funds, and (c) the performance of each Party shall be conditioned on the receipt of any necessary third party consents.

1.4 Plant Owner's Right to Inspect the Dam. During the Term, Plant Owner and its agents or representatives may inspect the Dam during regular business hours at the Plant Owner's sole risk and expense. Plant Owner shall give PacifiCorp at least ten (10) days' prior written notice before commencing any inspection of the Dam. Upon reasonable notice to PacifiCorp, the Plant Owner may, during PacifiCorp's regular business hours, examine PacifiCorp's records pertaining to the condition of the Dam. Plant Owner and its agents or representatives shall keep confidential any information obtained from its inspection of the Dam or examination of records, except with PacifiCorp's prior written consent.

2. Dam Owners' Designation of Agent. The Dam Owners hereby designate PacifiCorp as their agent for the purposes of discharging their obligations as Dam Owners, including carrying out this Agreement on behalf of the Dam Owners.

3. Management Duties. During the Term, PacifiCorp shall employ one (1) part-time employee at the Dam (the "On Site Employee") to perform onsite management, including the

maintenance of the Dam in accordance with good utility practice. PacifiCorp shall supervise the employee and provide the management, materials, and equipment necessary to operate and maintain the Dam in such a manner in compliance with all applicable legal obligations, including the Centralia Steam Electric Generating Project Fish and Wildlife Agreement dated May 29, 1998 (the "DF&W Agreement") and applicable law. To the extent that items of equipment ordinarily used in the operation and maintenance of the Dam have been conveyed to Plant Owner under the Purchase and Sale Agreement, Plant Owner shall make such equipment available to PacifiCorp at no charge and at PacifiCorp's sole risk and liability solely for the purpose of carrying out the Dam Owners' duties under this Agreement.

4. COSTS.

4.1 Monthly Invoice for Costs. On or before the twentieth (20th) day of each calendar month, PacifiCorp shall invoice Plant Owner for all costs incurred by PacifiCorp during the previous calendar month to perform PacifiCorp's duties under this Agreement (except for direct costs and overhead costs for the On-Site Employee) ("Chargeable Costs"). Chargeable Costs shall include but not be limited to the costs of (a) operating and maintaining the Dam and the Reservoir in compliance with applicable law (including dam safety, measuring and monitoring costs); (b) complying with the DF&W Agreement (including paying fees); (c) controlling and removing debris in the Reservoir, (d) purchasing and storing necessary equipment and materials used in performing the Dam Owners' duties under this Agreement, plus PacifiCorp's standard overhead relating to equipment and materials (including without limitation shipping and insurance and warehouse restocking charges), (e) transportation of any personnel (other than the On-Site Employee), materials or equipment used by PacifiCorp to carry out its duties under this Agreement (which costs shall be equal to the internal allocated transportation costs PacifiCorp uses for its own accounting purposes), and (f) PacifiCorp's direct and overhead costs attributable to required supervision and management of the On Site Employee. To manage Chargeable Costs, PacifiCorp shall use reasonable efforts to keep the Plant Owner informed of operations and maintenance activities at the Dam and shall give the Plant Owner a reasonable opportunity to perform for its own account any of the maintenance or operations tasks that would otherwise be performed by PacifiCorp or a third party contractor.

4.2 Payment. Plant Owner shall pay all invoices issued by PacifiCorp under this Agreement within forty-five (45) days of receipt; provided, however, that Plant Owner shall not be required to pay an invoice to the extent that payment would cause the Plant Owner to pay more than US\$300,000 under this Agreement in any calendar year (which amount shall be prorated for any partial calendar year). Any amount of Chargeable Costs that exceeds US\$300,000 (or the prorated portion thereof) shall not rollover to any subsequent calendar year.

4.3 Sharing of Unreimbursed Costs. Any Chargeable Costs or other costs that are not reimbursed by the Plant Owner under this Agreement are "Unreimbursed Costs." The Dam Owners shall share Unreimbursed Costs in accordance with the percentage shares set forth on Exhibit B. On or before the twentieth (20th) day of each calendar month, PacifiCorp shall invoice each Dam Owner for any Unreimbursed Costs incurred by PacifiCorp during the preceding calendar month. If the Plant Owner fails to pay an invoice under this Agreement for

more than forty-five (45) days after the date on which the payment is due, PacifiCorp may include the unpaid amount as Unreimbursed Costs in its next invoice to the Dam Owners, subject to subsequent crediting upon receipt of the Plant Owner's payment. Payment is due no later than thirty (30) days after receipt of the invoice.

4.4 Records. PacifiCorp shall maintain reasonably detailed records of the costs incurred and invoiced by it under this Agreement. The Plant Owner or the Dam Owners collectively may, upon reasonable notice to PacifiCorp given not more than once per year, examine these records during PacifiCorp's regular business hours to verify the costs invoiced by PacifiCorp.

4.5 Late Payments. Late payments shall accrue simple interest from the due date until the date full payment is received by PacifiCorp at the interest rate of 1½% per month (18% per year) or the highest rate permitted by law, whichever is lower.

4.6 Disputed Invoices. If the recipient of an invoice disputes any charges included in an invoice delivered by PacifiCorp under this Agreement, the recipient shall nonetheless pay the undisputed amount included in the invoice. The recipient shall include with any partial payment a written description of the reasons for the dispute. PacifiCorp shall respond to the recipient's written protest within fifteen (15) days of receipt. Any payment resulting from the settlement of a disputed portion of an invoice will include interest at the rate specified in Section 4.5. Any invoice that has not been disputed within one (1) year of the date on which it was received by a Party shall be conclusive and not subject to adjustment.

5. Liability.

5.1 Limitation. NO PARTY WILL HAVE ANY LIABILITY TO ANY OTHER PARTY, WHETHER BASED ON CONTRACT, WARRANTY, TORT, STRICT LIABILITY, OR ANY OTHER THEORY, FOR ANY LOST PROFITS, LOST REVENUES, LOST USE OF FACILITIES, LOST DATA, OR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES.

5.2 Allocation Among Dam Owners. The Dam Owners will share any liability incurred with respect to the management and operation of the Dam in accordance with their percentage interests as set forth on Exhibit B.

6. Force Majeure. A Party shall be excused from performing any obligation or undertaking imposed upon it by this Agreement (other than the duty to make payments when due) in the event and/or for so long as the performance of such obligation or undertaking is prevented, delayed, retarded or hindered by (a) fire or explosion; (b) earthquake, flood, action of the elements or any other act of God; (c) war, invasion, insurrection, riot, mob violence, sabotage or malicious mischief; (d) strike, lockout, or other action of any labor union; (e) condemnation, requisition, law, order of government or civil or military or naval authority; (f) drought or other physical impairment of water supply or sources; (g) a law, statute, code, ordinance, order, award,

judgment, decree, injunction, rule, or regulation; or (h) any other external cause (excluding financial inability) not within the reasonable control of such Party.

7. Termination and Survival.

7.1 Termination. If the Dam Owners, on the one hand, or the Plant Owner, on the other, fail to perform their respective obligations under this Agreement, and the failure is not: (1) excused under Section 6 above, or (2) cured within thirty (30) days' of written notice from the non-defaulting Party of the failure, then the non-defaulting Party shall have the right to terminate this Agreement by providing written notice to the other Party. This Agreement shall also terminate upon the closure of the Plant and the Mine, and shall terminate, unless renewed or extended or provided in Section 1.2, upon the second anniversary of the Effective Date. This Agreement shall terminate upon sale or other transfer of the Dam to any third party.

7.2 Survival. All payment obligations and liabilities incurred before the termination or expiration of this Agreement shall survive its termination or expiration.

7.3 Cumulative Remedies. A Party's right to terminate under this Section 7 is in addition to any other remedies that a Party may have at law or in equity against a defaulting Party.

8. Waiver of Headwater Benefits. In consideration of the reimbursement obligations of the Plant Owner hereto, the Dam owners hereby release the Plant Owner and Mine Owner from any and all liabilities or obligations respecting headwater benefits, if any, due to the Dam Owners under applicable law, respecting any period in which this Agreement is in effect.

9. Notices. All notices, requests, demands, waivers, consents and other communications hereunder shall be in writing, shall be delivered either in person, by telegraphic, facsimile or other electronic means, by overnight air courier or by mail, and shall be deemed to have been duly given and to have become effective (a) upon receipt if delivered in person or by telegraphic, facsimile or other electronic means (b) one (1) Business Day after having been delivered to an air courier for overnight delivery or (c) three (3) Business Days after having been deposited in the U.S. mails as certified or registered mail, return receipt requested, all fees prepaid, directed to the parties or their permitted assignees at the following addresses (or at such other address as shall be given in writing by a Party hereto):

If to Dam Owners, addressed to:

Senior Vice President
Power Supply
PacifiCorp
One Utah Center, 23rd Floor
Salt Lake City, Utah 94140

with a copy to:

George M. Galloway
Stoel Rives LLP
900 SW Fifth Avenue
Portland, Oregon 97204
Facsimile: (503) 220-2480

If to Plant Owner, addressed to:

TransAlta Centralia Generation LLC
913 Big Hanaford Road
Centralia, Washington 98531

with a copy to:

TECWA Power, Inc.
110 12th Avenue SW
Calgary, Alberta
Canada T2P 2M1
Attn: General Counsel
Facsimile: (403) 267-3734

and a copy to:

Joel H. Mack
Latham & Watkins
701 B Street, Suite 2100
San Diego, California
Facsimile: (619) 696-7419

10. Successors and Assigns. Except as provided in Section 7.1, the provisions of this Agreement shall bind and inure to the benefit of all successors and other parties now having or obtaining any beneficial interest in the Parcels.

11. General Interpretation. This Agreement shall be governed by, and construed in accordance with, the laws of the State of Washington. If any term, provision or condition contained in this Agreement (or the application of any such term, provision, or condition) shall to any extent be invalid or unenforceable, the remainder of this Agreement shall be valid and enforceable to the fullest extent permitted by law. When the context in which the words are used herein indicates that such is the intent, words in the singular shall include the plural and vice versa, and all pronouns and any variations thereof shall be deemed to refer to all genders. The captions of the Sections in this Agreement are for convenience of reference only and shall not be considered or referred to in resolving questions of interpretation or construction.

12. Warranty of Authority. Each Person signing this Agreement represents and warrants that he or she has been duly authorized to enter into this Agreement by the entity on whose behalf it is indicated that the Person is signing.

[Signature Pages Follow]

IN WITNESS WHEREOF, the Parties have executed this Agreement the day and year first above written.

TRANSALTA CENTRALIA GENERATION LLC,
a Washington limited liability company

By: TECWA Power, Inc.
a Washington corporation.
its sole member

By: *[Signature]*
Name:
Title:

PACIFICORP

By: *[Signature]*
Name:
Title:

**PUBLIC UTILITIES DISTRICT NO. 1 OF
SNOHOMISH COUNTY, WASHINGTON**

By: *[Signature]*
Name:
Title:

PUGET SOUND ENERGY, INC.

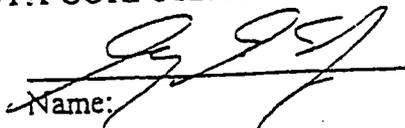
By: _____
Name:
Title:

CITY OF TACOMA, WASHINGTON,

By: *[Signature]*
Name:
Title:

AVISTA CORPORATION

By:


Name:
Title:

CITY OF SEATTLE, WASHINGTON

By:


Name:
Title:

PUBLIC UTILITY DISTRICT NO. 1 OF GRAYS
HARBOR COUNTY, WASHINGTON

By:

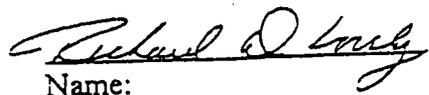

Name:
Title:

EXHIBIT A

Real Property

The real property located in Thurston County and described in the following Correction Deeds and Bills of Sale dated April 2, 1986, from Washington Irrigation & Development Company, as grantor, subject to all matters disclosed of record.

<u>Grantee</u>	<u>Thurston County Auditor's Number</u>	<u>Vol/Page</u>	<u>Recording Date</u>
<u>Pacific Corp</u>	<u>8604160017</u>	<u>1406/843</u>	<u>4/16/86</u>
<u>City of Tacoma</u>	<u>8604160012</u>	<u>1406/788</u>	<u>4/16/86</u>
<u>City of Seattle</u>	<u>8604160013</u>	<u>1406/807</u>	<u>4/16/86</u>
<u>Puget Sound Power & Light Company</u>	<u>8604160014</u>	<u>1406/816</u>	<u>4/16/86</u>
<u>The Washington Water Power Company</u>	<u>8604160015</u>	<u>1406/825</u>	<u>4/16/86</u>
<u>Portland General Electric - Company</u>	<u>8604160016</u>	<u>1406/834</u>	<u>4/16/86</u>
<u>Public utility District No. 1 of Snohomish County</u>	<u>8604160018</u>	<u>1406/852</u>	<u>4/16/86</u>
<u>Public Utility District No. 1 of Grays Ha</u>	<u>8604160019</u>	<u>1406/861</u>	<u>4/16/86</u>

8604160017

13-
OK

CORRECTION DEED AND BILL OF SALE

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to PACIFICORP, a Maine corporation, doing business as PACIFIC POWER & LIGHT COMPANY, Grantee, a Forty-Seven and Five Tenths Percent (47.5%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate; SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 26, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Weyerhaeuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington, an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 904, Page 578, Records of Thurston County, Washington, and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 366, Records of Thurston County, Washington.

8604160017

As condition of the making and acceptance of this conveyance:

Real Estate Sales Tax Paid None
 Receipt No. 240922 Date 4-26-86
 Lewis G. Hunter, Thurston County Treasurer
 by [Signature]

FD-26-MA-93

INDEXED

VOL 1406 PAGE 843
1406 843

8604160017

(a) Grantor covenants with Grantee, and the Grantee covenants with Grantor and with all other tenants in common thereof, that so long as the Centralia Thermal Plant is used or useful for the generation of electric energy, said real estate shall be used only for the purposes of constructing and operating thereon the Skookumchuck Reservoir and associated facilities used or useful in connection with said Centralia Thermal Plant, or for such other purpose as may be mutually agreed upon by all of said tenants in common; and

(b) Grantee, for itself, its successors and assigns, hereby accepts title to said real estate and any improvements now or hereafter constructed thereon as a tenant in common with Grantor and others who may now hold or hereafter acquire interests as tenants in common in said real estate, and AGREES that, for the period commencing with the date hereof and continuing so long as the Centralia Thermal Plant is used or useful for the generation of electric energy: (1) the interest hereby conveyed shall be held in such tenancy in common; (2) Grantee waives the right to partition of the Skookumchuck Reservoir and associated facilities or the real estate hereby conveyed whether by partition in kind or by sale and division of the proceeds thereof; (3) Grantee will not resort to any action at law or in equity to partition the Skookumchuck Reservoir and associated facilities or said real estate; (4) Grantee waives the benefit of all such laws as may now or hereafter authorize such partition; (5) the covenants herein made and restrictions set forth in this conveyance shall be binding upon Grantee, its successors and assigns, shall be an attribute of the title herein conveyed to Grantee, and shall be and remain covenants running with the real estate hereby conveyed; (6) Grantee recognizes and represents to the Grantor and others who may now or hereafter acquire interests in said real estate as tenants in common, that the

MICROFILM

9604160017

common ownership created hereby and the reservations, conditions, restrictions, waivers and covenants herein set forth are for the mutual benefit of Grantor, others who may now or hereafter acquire interests in said real estate as tenants in common and the Grantee and its successors and assigns, and that such benefit is best realized by insuring to each tenant in common the value of ownership, use and operation of the Centralia Thermal Plant and the Skokumchuck Reservoir and associated facilities during such period; and (7) said reservations, conditions, restrictions, waivers and covenants are reasonably related to a proper purpose to be accomplished, and that said period is therefore reasonable when so considered.

(c) Grantor covenants with Grantee that Grantor shall likewise be bound by all of the terms, conditions, restrictions, waivers and covenants hereof with respect to any interest retained by Grantor in said real estate and improvements thereon; and Grantor further covenants that any further conveyances of any interest in said real estate shall include all of the same terms, conditions, restrictions, waivers and covenants as contained herein.

This Correction Deed and Bill of Sale is filed to correct certain errors in the legal description contained in that certain Deed and Bill of Sale executed on November 16, 1984 from Grantor to Grantee.

DATED this 2nd day of April, 1986.

WASHINGTON IRRIGATION & DEVELOPMENT COMPANY

By: [Signature]
President

Attest: [Signature]
Secretary

FILED

8604160017

STATE OF WASHINGTON)
) ss.
County of)

On this 2nd day of April, 1986, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared Howard H. Meyers and Edward J. Leacy to me known to be the President and Secretary, respectively, of WASHINGTON INVESTIGATION & DEVELOPMENT COMPANY, the corporation that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute the said instrument and that the seal affixed (if any) is the corporate seal of said corporation.

WITNESS my hand and official seal hereto affixed the day and year first above written.

James R. Abbey
Notary Public in and for the State
of Washington, residing at Spokane



RECORDED

VOL 1406 PAGE 848

8604160017

EXHIBIT "A" TO DEED

FROM

WASHINGTON IRRIGATION & DEVELOPMENT COMPANY

TO

PACIFICORP dba PACIFIC POWER & LIGHT COMPANY

dated March 27, 1986

County of Thurston, State of Washington

Township Fifteen (15) North, Range One (1) East of the Willamette Meridian.

Parcel 1 - Sections Eleven (11), Fourteen (14), Fifteen (15), Sixteen (16) and Seventeen (17)

Beginning at a point on the east-west line between sections 11 and 14 which bears North 87° 00' 05" West 182.2 feet from the southeast corner of said Section 11, thence along the following courses and distances in said Section 11:

North 53° 49' 14" East 100.09 feet; North 65° 55' 35" West 359.73 feet; South 43° 16' 54" West 220.51 feet; South 40° 49' 42" West 45.76 feet, more or less.

to a point on the south line of said Section 11, thence along the following courses and distances in said Section 14:

South 60° 49' 42" West 755.90 feet; South 71° 30' 17" West 338.46 feet; North 51° 54' 39" West 271.89 feet; North 83° 20' 37" West 256.24 feet; North 76° 03' 51" West 356.87 feet; South 70° 40' 57" West 436.45 feet; South 59° 49' 51" West 255.72 feet; South 47° 47' 22" West 236.45 feet; South 48° 20' 37" West 61.47 feet; South 75° 59' 05" West 82.72 feet; South 88° 26' 10" West 73.99 feet; North 78° 22' 49" West 69.10 feet; North 64° 51' 36" West 98.13 feet; North 53° 03' 31" West 177.29 feet; North 88° 20' 53" West 49.75 feet; North 70° 36' 08" West 92.49 feet; North 58° 47' 11" West 78.31 feet; North 46° 41' 53" West 221.29 feet; South 74° 41' 45" West 662.79 feet; North 86° 11' 28" West 186.12 feet; South 78° 26' 42" West 242.55 feet; North 87° 59' 29" West 494.18 feet more or less.

to a point on the north-south section line common to Sections 14 and 15 which is South 01° 52' 20" West 493.39 feet from the northwest corner of said Section 14, thence along the following courses and distances in said Section 15:

North 87° 50' 29" West 327.43 feet; North 74° 02' 53" West 400.22 feet; North 88° 45' 51" West 575.91 feet; South 76° 33' 47" West 492.55 feet; South 18° 25' 23" West 164.36 feet; South 59° 03' 01" West 329.19 feet; North 76° 22' 18" West 407.09 feet; South 32° 14' 15" West 423.58 feet; North 89° 33' 35" West 156.21 feet; North 33° 49' 33" West 186.80 feet; South 62° 47' 03" West 257.34 feet; South 82° 05' 25" West 287.13 feet; South 36° 00' 01" West 263.98 feet; North 50° 43' 21" West 152.81 feet; South 86° 35' 42" West 654.04 feet; South 23° 15' 30" West 378.46 feet; North 15° 32' 51" West 369.85 feet; South 69° 45' 16" West 285.24 feet; North 88° 02' 05" West 120.15 feet more or less.

THURSTON COUNTY
MAR 16 9 49 AM '86
REC'D SAN
PPLK
MOR
117

UNRECORDED

8604160017

to a point on the north-south section line common to Sections 15 and 16 which is South 02° 26' 44" East 1,846.54 feet from the northwest corner of said Section 15, thence along the following courses and distances in said Section 16:

North 88° 02' 05" West 144.02 feet; North 67° 20' 54" West 244.42 feet; North 40° 31' 43" West 215.43 feet; North 82° 23' 41" West 161.01 feet; South 83° 11' 32" West 349.15 feet; South 88° 51' 12" West 334.53 feet; South 76° 46' 31" West 564.62 feet; North 80° 09' 45" West 693.06 feet; South 83° 54' 49" West 391.76 feet; North 73° 54' 40" West 592.15 feet; North 20° 12' 38" East 239.00 feet; North 06° 58' 06" East 165.47 feet; South 74° 49' 49" West 104.10 feet; South 82° 14' 25" West 776.84 feet; North 87° 28' 07" West 220.95 feet; South 80° 53' 35" West 766.03 feet; North 85° 36' 44" West 46.89 feet more or less.

to a point on the north-south section line common to Sections 16 and 17 which is South 02° 20' 51" East 1,833.31 feet from the northwest corner of said Section 16, thence along the following courses and distances in Section 17:

North 85° 36' 44" West 132.92 feet; North 02° 21' 01" East 128.11 feet; North 23° 07' 41" West 325.96 feet; North 03° 45' 17" East 318.32 feet; North 45° 40' 34" West 162.58 feet; South 28° 26' 02" West 320.98 feet; South 03° 48' 16" West 182.46 feet; South 22° 25' 40" East 232.05 feet; North 80° 33' 74" West 258.57 feet; North 65° 21' 10" West 287.74 feet; South 69° 12' 12" West 394.31 feet; North 35° 32' 27" West 152.13 feet; South 64° 44' 11" West 139.85 feet; North 73° 30' 27" West 175.22 feet; North 66° 00' 29" West 114.86 feet; North 77° 32' 52" West 330.23 feet; South 62° 54' 49" West 169.14 feet; South 33° 05' 59" West 584.71 feet; South 74° 11' 20" West 845.70 feet; North 72° 17' 34" West 1,186.61 feet; North 47° 40' 31" West 156.06 feet more or less.

to a point on the west line of said Section 17 which is South 00° 19' 55" West 1,415.45 feet from the northwest corner of said section, thence northerly along the west line of said section to the southwest corner of the northwest quarter of the southwest quarter (NW1/4SW1/4) of said section, thence easterly along the south line of the north half of the south half (N1/2S1/2) of said section 402.17 feet to a point, thence along the following courses and distances in Section 17:

North 79° 25' 18" East 846.57 feet; South 51° 56' 34" East 121.58 feet; South 85° 51' 31" East 166.81 feet; North 02° 52' 28" West 272.18 feet; North 62° 14' 10" East 317.5 feet; South 52° 28' 44" East 113.04 feet; North 63° 33' 38" East 105.35 feet; North 87° 57' 47" East 703.00 feet; South 83° 31' 25" East 427.31 feet; North 58° 18' 40" East 440.38 feet; South 39° 38' 57" East 340.74 feet; South 87° 17' 34" East 129.02 feet; South 46° 56' -0" East 474.08 feet; North 71° 34' 04" East 236.49 feet; South 88° 48' 09" East 232.44 feet; North 71° 34' 25" East 453.41 feet more or less.

to a point on the north-south section line common to Sections 16 and 17 which is South 02° 20' 51" East 3,799.98 feet from the northeast corner of said Section 17, thence along the following courses and distances in Section 16:

MICROFILM

VOL 1406 PAGE 848

S604160017

North 71° 34' 23" East 66.25 feet; North 72° 01' 00"
 East 240.65 feet; South 77° 51' 16" East 429.48 feet;
 South 54° 48' 47" East 311.98 feet; South 81° 21' 40"
 East 307.40 feet; South 44° 57' 41" East 645.70 feet;
 North 50° 01' 34" East 508.54 feet; South 84° 38' 04"
 East 146.78 feet; North 50° 50' 53" East 174.84 feet;
 South 88° 33' 23" East 113.41 feet; South 33° 23' 03"
 East 200.31 feet; North 42° 32' 15" East 187.86 feet;
 South 65° 02' 35" East 250.65 feet; South 39° 05' 42"
 East 698.82 feet; North 49° 22' 24" East 223.34 feet;
 North 01° 07' 02" West 507.66 feet; North 16° 09' 36"
 West 362.05 feet; North 04° 44' 27" West 217.83 feet;
 North 52° 03' 43" East 115.97 feet; North 81° 08' 00"
 East 455.98 feet; North 49° 02' 56" East 367.24 feet;
 North 39° 51' 40" East 320.69 feet; South 37° 34' 29"
 East 342.52 feet; North 66° 30' 52" East 439.91 feet
 more or less.

to a point on the north-south section line between
 Sections 15 and 16 which is South 02° 26' 14" East
 2,979.49 feet from the northeast corner of said Section
 16, thence along the following courses and distances in
 Section 15:

North 68° 50' 52" East 147.51 feet; South 58° 22' 18"
 East 221.18 feet; South 85° 10' 21" East 505.81 feet;
 North 20° 22' 33" East 180.03 feet; South 80° 21' 39"
 East 478.53 feet; North 11° 20' 03" East 230.34 feet;
 North 68° 10' 46" East 275.97 feet; North 49° 30' 09"
 East 272.44 feet; South 75° 41' 41" East 43.02 feet;
 North 78° 37' 48" East 506.93 feet; North 43° 20' 25"
 East 448.82 feet; North 46° 04' 37" East 226.71 feet;
 North 79° 33' 02" East 637.43 feet; North 51° 46' 37"
 East 551.52 feet; North 81° 28' 02" East 606.99 feet;
 North 75° 18' 13" East 290.80 feet; South 83° 30' 25"
 East 134.60 feet; North 48° 23' 00" East 68.60 feet
 more or less.

to a point on the north-south section line common to
 Sections 14 and 15 which is South 01° 52' 20" West
 1,452.35 feet from the northeast corner of said Section
 15, thence along the following courses and distances in
 Section 14:

North 48° 13' 08" East 71.61 feet; South 70° 39' 32"
 East 304.30 feet; North 68° 24' 16" East 284.10 feet;
 North 79° 00' 16" East 559.39 feet; South 89° 13' 50"
 East 538.86 feet; North 61° 44' 25" East 315.72 feet;
 South 85° 02' 10" East 1,180.34 feet; North 61° 30' 30"
 East 819.09 feet; North 71° 29' 01" East 761.67 feet;
 North 53° 49' 14" East 601.15 feet more or less.

to a point on the east-west section line between sections
 11 and 14 which is North 87° 00' 05" West 182.27 feet from
 the northeast corner of said Section 14, and the point of
 beginning for this description.

NOTE: All courses shown in the foregoing description are based on the
 State of Washington Coordinate System (South Zone).

TOGETHER WITH an assessment as granted in that certain deed recorded
 November 25, 1970, in Volume 525, page 303, Deed Records of Thurston County
 under Auditor's File No. 833263 for the temporary overflow of reservoir waters
 on any lands owned by WEITERMEIER COMPANY, a Washington corporation, in said
 certain deed within the Southeast Quarter of the Southeast Quarter of Section
 11, all of Section 12, the North Half of Section 13, the North Half of Section
 14, the North Half of Section 15, and the North three-fourths of Section 17,
 in Township 15 North, Range 1 East of the Willamette Meridian; PROVIDED,
 HOWEVER, that in the event of such overflow, Grantee shall pay for any damage
 to land, timber and improvements occasioned by such overflow.

MICROFILMED

WL 1406 PAGE 848

8504160017

ALSO TOGETHER WITH an easement contained in that certain Warranty Deed recorded December 14, 1970 in Volume 528, page 792, Deed Records of Thurston County, under Auditor's File No. 834257 for the temporary and intermittent overflow of the reservoir waters, upon and over the adjoining lands of Grantor therein; provided that, in the event of any such overflow, the Grantee herein shall be responsible for payment of any damage to growing timber, improvements or personal property, including rock inventories upon such adjoining lands of such Grantor, and shall be responsible for payment of compensatory damages resulting from any temporary interruption of quarry operations, if any, upon such adjoining lands of such Grantor, occasioned by such overflow.

Parcel 2 - Section Eighteen (18)

Those portions of the North Half and the North Half of the Southeast Quarter of said Section 18 lying southerly of the following described line:

Beginning at a point on the east line of said Section 18 which bears South $00^{\circ} 15' 35''$ West 1,415.43 feet to the northeast corner of said section; thence North $47^{\circ} 40' 31''$ West 951.19 feet; thence North $71^{\circ} 15' 47''$ West 1,828.15 feet; thence South $73^{\circ} 14' 02''$ West 1,096.69 feet; thence South $61^{\circ} 46' 54''$ West 317.30 feet; thence South $87^{\circ} 40' 58''$ West 89.00 feet, more or less, to a point on the northeasterly line of that certain tract conveyed by Scott Paper Company to Henry W. Turner and Evelyn Turner by deed dated May 22, 1958 and recorded in the Deed Records of said Thurston County under Auditor's File No. 597416; thence northwesterly along said northeasterly line of said Turner tract to the north line of said Section 18; thence westerly along said north line of said section to the northwest corner thereof;

and lying northerly of the following described line:

Beginning at a point on the east line of said Section 18 which bears South $00^{\circ} 19' 55''$ West 1,759.54 feet from the northeast corner of said section; thence North $68^{\circ} 11' 24''$ West 614.59 feet; thence North $46^{\circ} 13' 55''$ West 1,275.23 feet; thence North $32^{\circ} 13' 14''$ West 827.33 feet; thence North $86^{\circ} 47' 35''$ West 1,202.67 feet; thence South $34^{\circ} 42' 19''$ West 811.72 feet; thence North $14^{\circ} 23' 23''$ West 79.18 feet, more or less, to a point on the southeasterly line of the aforementioned Turner tract; thence southwesterly along said southeasterly line of said Turner tract to its intersection with the east-west centerline of said Section 18; thence westerly along said east-west centerline to the west quarter corner of said Section 18;

EXCEPTING THEREFROM, so much of the Northwest Quarter of said Section 18 as was conveyed by Scott Paper Company to Henry W. Turner and Evelyn Turner by said deed dated May 22, 1958.

FURTHER EXCEPTING THEREFROM, those portions conveyed under Auditor's File Nos. 857989, 872703 and 1074923.

TOGETHER WITH that portion of vacated roadway, if any, that would attach to the said Parcel 2 by operation of law as disclosed by Resolution 7312 under Auditor's File No. 8207270131.

Parcel 3 - Sections Seven (7) and Eighteen (18)

That part of Lot 4 of said Section 7 and those portions of the Northeast Quarter of the Northwest Quarter, Government Lots 1 and 2, the Southeast Quarter of said Northwest Quarter, the Northeast Quarter of the Southwest Quarter and of Government Lot 3 of said Section 18 described as follows:

Beginning at the southwest corner of said Section 7; running thence North $00^{\circ} 18' 39''$ East along the west line of said section 122.21 feet; thence South $78^{\circ} 10' 12''$ East

MENTIONED

5604160017

328.20 feet; thence South 61° 28' 14" East 362.28 feet; thence South 15° 42' 21" East 390.98 feet; thence South 09° 50' 00" East 575.00 feet, more or less, to the line of ordinary high water of the left bank of Shoahmuck River; thence northeasterly along said line of ordinary high water 1,270.00 feet, more or less, to a point described as 747.00 feet north and 2,215.25 feet east of the northwest corner of said Section 18; thence South 07° 22' 35" West 434.30 feet; thence South 34° 14' 22" West 298.32 feet; thence South 33° 36' 51" West 327.28 feet; thence South 46° 35' 48" East 22.33 feet; thence South 46° 10' 44" West 222.71 feet; thence South 19° 03' 38" West 142.48 feet; thence South 38° 18' 34" West 426.57 feet; thence South 03° 39' 39" West 300.86 feet; thence South 42° 49' 24" West 597.78 feet; thence North 79° 22' 14" West 189.91 feet; thence North 56° 47' 53" West 186.23 feet; thence North 38° 24' 23" West 720.00 feet, more or less, to said line of ordinary high water; thence southwesterly along said line of ordinary high water 350.00 feet, more or less, to the west line of said Section 18; thence North 00° 06' 58" West along said west line 2,748.00 feet, more or less, to the point of beginning;

EXCEPT that certain tract of real property conveyed to the State of Washington by Deed dated August 2, 1972 and recorded August 18, 1972 in Deed Records of Thurston County under Auditor's File No. 872705.

Township Fifteen (15) North, Range One (1) West of the Willamette Meridian-

Parcel 4 - Section Twelve (12)

The South Half of the Southeast Quarter, the Southeast Quarter of the Northeast Quarter of the Southwest Quarter, the East Half of the Southeast Quarter of the Southwest Quarter, and that portion of the West Half of the Southeast Quarter of the Southwest Quarter bounded on the east by the east line of said West Half of the Southeast Quarter of the Southwest Quarter and bounded on the southerly side by the northeasterly right of way line of the Troller (Shoahmuck) County Road and bounded on the northwesterly side by a line which is parallel with and 37.50 feet northwesterly of the center survey line of that certain right of way granted to Pacific Northwest Pipeline Corporation by instrument dated February 24, 1936 and recorded File No. 557791-8, all in said Section 12, EXCEPTING therefrom county road known as Troller Road and EXCEPT any other county roads.

Parcel 5 - Section Thirteen (13)

The South Half, the Northeast Quarter, and the East Half of the Northwest Quarter of said Section 13 EXCEPTING therefrom county road known as Troller Road and EXCEPT any other county roads.

MICROFILMED

Vol 1406 p. 851

APR 16 9 40 AM '86
REQUESTOR
SAM [initials]
EDITOR [initials]

8504160012

13
OK

CORRECTION DEED AND BILL OF SALE

8504160012

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to the CITY OF TACOMA, a municipal corporation of the State of Washington, Grantee, an Eight Percent (8%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate; SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 26, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Weyerhaeuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington, an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 904, Page 578, Records of Thurston County, Washington, and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 366, Records of Thurston County, Washington.

As condition of the making and acceptance of this conveyance:

(a) Grantor covenants with Grantee, and the Grantee covenants with Grantor and with all other tenants in common thereof, that so long as the

FD-26-4A-93

Real Estate Sales Tax Paid [initials]
Receipt No. 148927 Date 4-16-86
Harris G. Hunter, Thurston County Treas.
[Signature]

MICROFILMED

WL 1408 PAGE 788

8604160013

13
OK

CORRECTION DEED AND BILL OF SALE

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to the CITY OF SEATTLE, a municipal corporation of the State of Washington, Grantee, an Eight Percent (8%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate; SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 26, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Weyerhaeuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington, an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 934, Page 578, Records of Thurston County, Washington, and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 356, Records of Thurston County, Washington.

8604160013

As condition of the making and acceptance of this conveyance:

(a) Grantor covenants with Grantee, and the Grantee covenants with Grantor and with all other tenants in common thereof, that so long as the

Real Estate Sales Tax Paid

Receipt No. 140923 Date 4-26-26 VOL 1408 PAGE 807

FD-26-KA-92

Harold G. Hunter, Thurston County Trustee

By [Signature] Trustee

RECORDED

8604160014

13
CK

CORRECTION DEED AND BILL OF SALE

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to PUCKET SOUND POWER & LIGHT COMPANY, a Washington corporation, Grantee, a Seven Percent (7%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate: SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 26, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Weyerhaeuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington, an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 904, Page 578, Records of Thurston County, Washington, and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 366, Records of Thurston County, Washington.

As condition of the making and acceptance of this conveyance:

(a) Grantor covenants with Grantee, and the Grantee covenants with Grantor and with all other tenants in common thereof that so long as the

PD-26-WA-93

Real Estate Sales Tax Paid 7.00
 Receipt No. 48925 Date 4-16-86
 Harris G. Hunter, Thurston County Treas.
[Signature] Deputy

VOL 1400 PAGE 818

MICROFILMED

8604160014

8604160015

13-
CK

CORRECTION DEED AND BILL OF SALE

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to THE WASHINGTON WATER POWER COMPANY, a Washington corporation, Grantee, a Fifteen Percent (15%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate; SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 25, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances as of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Meyerhacuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington; an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 904, Page 578, Records of Thurston County, Washington; and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 366, Records of Thurston County, Washington.

8604160015

As condition of the making and acceptance of this conveyance:

(a) Grantor covenants with Grantee, and the Grantee covenants with Grantor and with all other tenants in common thereof, that so long as the

Real Estate Sales Tax Paid *[Signature]*

FD-26-WA-93

Receipt No. 1409211 Date 12/6-86
 Harris G. Hunter, Thurston County Treas.
[Signature] Deed

VOL 1406 PAGE- 826

MICROFILMED

8604160016

13-
CX

CORRECTION DEED AND BILL OF SALE

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to PORTLAND GENERAL ELECTRIC COMPANY, an Oregon corporation, Grantee, a Two and Five Tenths Percent (2.5%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate; SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 26, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Weyerhaeuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington, an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 904, Page 578, Records of Thurston County, Washington, and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 366, Records of Thurston County, Washington.

8604160016

As condition of the making and acceptance of this conveyance:

(a) Grantor covenants with Grantee, and the Grantee covenants with Grantor and with all other tenants in common thereof, that so long as the

Receipt No. 148923 Date 4-6-36
 Herra G. Hunter, Thurston County Treas.
 By 140923

VOL 1406 PAGE 834

MICROFILMED

8604160018

13
OK

CORRECTION DEED AND BILL OF SALE

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to the PUBLIC UTILITY DISTRICT NO. 1 of Snohomish County, a municipal corporation of the State of Washington, Grantee, an Eight Percent (8%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate; SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 26, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Weyerhaeuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington, an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 904, Page 578, Records of Thurston County, Washington, and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 366, Records of Thurston County, Washington.

8604160018

As condition of the making and acceptance of this conveyance:

FD-26-MA-93
 Instrument No. 148927 Date 4-16-86
 Jerris G. Hunter, Thurston County Trustee.
 [Signature]
 Vol 1406 Page 852

9604160019

13
OK

CORRECTION DEED AND BILL OF SALE

The Grantor, WASHINGTON IRRIGATION & DEVELOPMENT COMPANY, a corporation, in consideration of Ten Dollars and other consideration in hand paid, bargains, sells and conveys to the PUBLIC UTILITY DISTRICT NO. 1 of Grays Harbor County, a municipal corporation of the State of Washington, Grantee, a Four Percent (4%) undivided interest, as a tenant in common with Grantor and others, in and to the real estate situated in the County of Thurston, State of Washington, as described in Exhibit A attached hereto and by this reference made a part hereof; and in and to the structures, equipment and facilities now or hereafter constructed and installed in or on said real estate; SUBJECT TO rights of the City of Centralia as set forth in that certain letter agreement dated May 26, 1967 between Pacific Power & Light Company and the City of Centralia, also SUBJECT TO the easements, rights of way, restrictions, reservations and other encumbrances of record, including but not limited to an Easement for Access Roads, dated March 7, 1974, granted by Washington Irrigation & Development Company to Weyerhaeuser Company, recorded in Volume 666, Page 213, Records of Thurston County, Washington, an Easement for Access Roads, dated May 17, 1974, granted by Washington Irrigation & Development Company to Scott Paper Company, recorded in Volume 904, Page 578, Records of Thurston County, Washington, and an Easement for Access Roads, dated November 18, 1975, granted by Washington Irrigation & Development Company to the State of Washington, recorded in Volume 716 of Deeds, Page 366, Records of Thurston County, Washington.

9604160019

As condition of the making and acceptance of this conveyance:

FD-26-2A-93

Real Estate Sales Tax Paid None
 Receipt No. 48920 Date 4-6-86
 Harris G. Hunter, Thurston County, Treas.
 [Signature] [Signature] [Signature]

RECORDED
 VOL 1408 PAGE 661

EXHIBIT B

Percentage Shares

PacifiCorp	47.5%
Avista Corporation	17.5%
City of Seattle, Washington	8%
City of Tacoma, Washington	8%
Public Utility District No. 1 of Snohomish County, Washington	8%
Puget Sound Energy, Inc.	7%
Public Utility District No. 1 of Grays Harbor County, Washington	4%