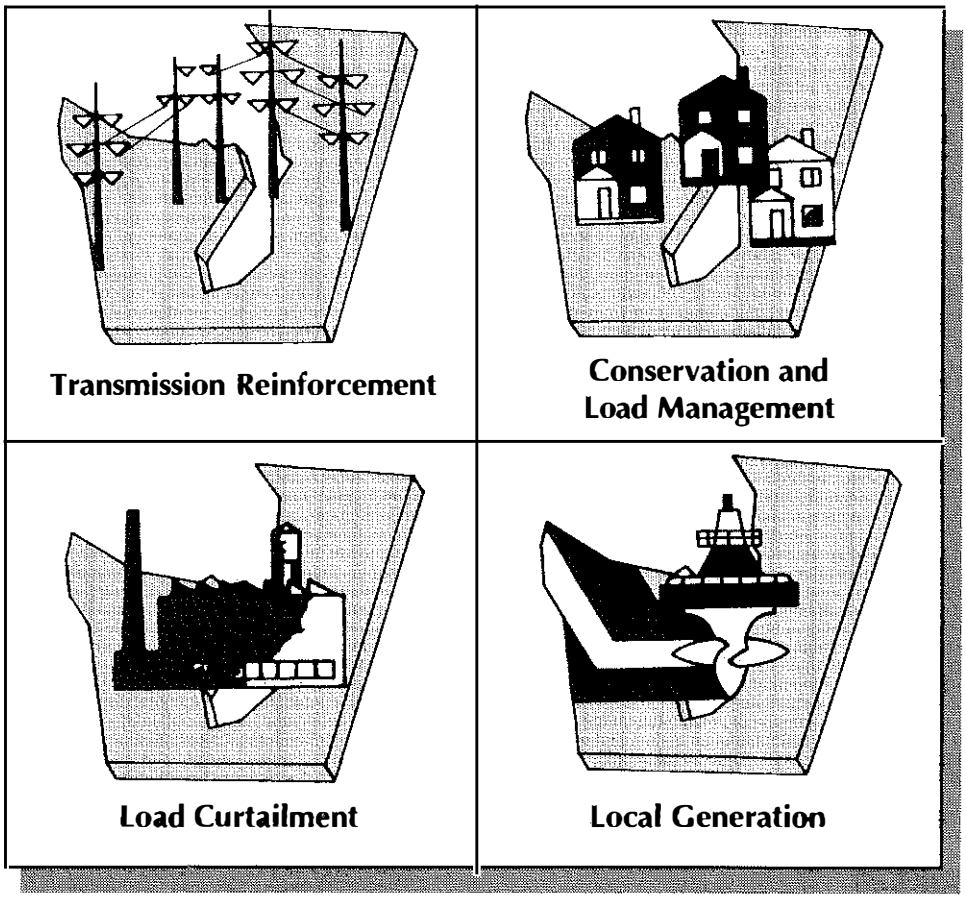
File Copy

Puget Sound Area Electric Reliability Plan

Final Environmental Impact Statement



DOE/FEIS-0160

April 1992

Bonneville
POWER ADMINISTRATION

DRAFT ENVIRONMENTAL IMPACT STATEMENT

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN

DOE/EIS - 0160

Bonneville Power Administration
U.S. Department of Energy

April 1992

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

April 9, 1992

In reply refer to: EFBG

Dear Reviewer:

Here are some suggestions to help you review the final environmental impact statement (FEIS) on the Puget Sound Area Electric Reliability Plan. First, Alternative Strategy 2, the voltage support plan, remains the preferred alternative. A new Chapter 8 titled: "Public Comments on the Draft Environmental Impact Statement" was added in the FEIS. In the remaining chapters paragraphs containing changes are highlighted by a dark line in the margin. A summary of these changes is provided on the back of this letter.

Council on Environmental Quality (CEQ) regulations on implementing the National Environmental Policy Act instruct Federal agencies to prepare and publicly distribute a Record of Decision (ROD) no sooner than 30-days following filing of the FEIS. This 30-day period provides a last opportunity for an individual or group to voice their preferences. BPA expects to issue a Record of Decision as soon as practical following the Final EIS. The preferred alternative identified in both the Draft and Final EIS is likely to be the alternative selected in the Record of Decision.

To order BPA publications mentioned in the FEIS, please call our toll free recording: (800) 622-4520. For information call: (800) 622-4519.

Thank you for your interest in this plan.

Sincerely,

Charles F. Clark
Assistant Administrator
for Engineering

Summary of Changes in the Final EIS

Chapter 1

- A description of other related energy planning processes in the Northwest is added at the end of Chapter 1.
- An update on the load forecast is added. A new Table 1-1 gives forecast peak and average annual energy loads.
- Information on surplus capacity resources that might serve Puget Sound peak loads is provided in the load/resource balance discussion (Section 1.4.5).

Chapter 2

- The Preferred Alternative remains unchanged since the Draft EIS. Most public comments on the preferred plan were supportive.
- BPA will name the proposed substation near Ellensburg "Schultz Substation" in honor of Sol Schultz, BPA's first Chief Engineer.
- The preference hierarchy between the contingency actions is described in the preferred alternative discussion. More information is given on the combustion turbine contingency.
- A discussion on conservation in the PSAERP relative to the Northwest Power Planning Council's Power Plan is provided. The explanation of how conservation potentials were derived is also expanded.
- A discussion on the lack of utility consensus on the appropriate role of fuel switching is added.
- The No Action Alternative is better explained.

Chapter 3

- Minor editorial and map changes were made.
- Site 2 for the new Schultz Substation was dropped from consideration.

Chapter 4

- The definition for "low impact" was changed. The word "insignificant" was removed from the health and safety impact magnitude definition.
- Minor editorial changes.

Chapter 5

- Updated information on consultations with the U.S. Fish and Wildlife Service and the Washington State Historic Preservation Office was added. No adverse impacts were uncovered.

Chapters 6 and 7

- Minor editorial changes.

Chapter 8

- New chapter - Public Comments/Responses.

Chapters 9,10, and 11

- Minor editorial changes.

Appendix E

- This appendix was reprinted with updated electrical system planning information incorporated. It includes the results of an independent consultant's review of the system planning study methods and results.

Appendix G

- This appendix was reprinted with new information and indicates Site 2 was dropped from consideration.

Other Appendices

- No Changes

Final Environmental Impact Statement

Responsible Agency: Department of Energy, Bonneville Power Administration (BPA)

Title of Proposed Action: Final Environmental Impact Statement, Puget Sound Area Electric Reliability Plan, DOE/EIS - 0160

State and Counties Involved: Washington - Chelan, Clallam, Douglas, Grant, Grays Harbor, Island, Jefferson, Lewis, King, Kitsap, Kittitas, Mason, Okanogan, Pierce, San Juan, Skagit, Snohomish, Thurston, Whatcom, Yakima

Abstract: BPA and Puget Sound Power & Light, Seattle City Light, Snohomish County Public Utility District No. 1, and Tacoma Public Utilities, are working on a coordinated plan to address a power system problem in the Puget Sound area of Washington State. A load forecast developed jointly by the utilities indicates an operating problem may develop on the power system if loads grow as expected. Independent action by utilities is not precluded by this coordination effort, however BPA, in coordination with the Puget Sound area utilities, developed certain solutions for this problem. The attached EIS is BPA's independent evaluation of the preferred alternative and all other reasonable alternatives.

The preferred alternative remains Alternative Strategy 2. Alternative Strategy 2 would accelerate conservation programs in Puget Sound; add capacitors in BPA's Echo Lake Substation; establish a new 500-kV Schultz Substation near Ellensburg, Washington; and, as a contingency against higher than expected demand, begin environmental and permitting work on a new cross-Cascades transmission line. Other alternatives considered were Alternative Strategy 1 - Transmission Line, Alternative Strategy 3 - Demand Reduction, and Alternative Strategy 4 - Combustion Turbines. The preferred alternative would have lower environmental impacts than Alternative Strategies 1 and 4, and slightly higher impacts than Alternative Strategy 3. Other alternatives, including other local generation measures, were evaluated and found infeasible. Taking no action would put the area at risk for blackouts, and would violate regional utility reliability criteria.

BPA mailed the DEIS to about 1000 agencies, groups, and individuals. A 60-day public review period ended on December 24, 1991. Seven meetings were held in November to review and receive comments on the Draft EIS. Thirty-two public comment letters were received. Public comment in general was favorable toward the preferred alternative. BPA expects to issue a Record of Decision as soon as practical following the Final EIS.

The Final EIS looks much like the Draft EIS with one exception. A new Chapter 8 was inserted in the Final EIS. This chapter categorizes and responds to public comments. Comment letters are included at the end of Chapter 8. Other chapters of the Final EIS changed less dramatically. Paragraphs containing changes are highlighted by a dark vertical line in the left margin. Appendix E has been updated.

Send requests for copies of the Final EIS, or requests for additional information on this project to the Public Involvement Manager, P.O. Box 12999, Portland, Oregon 97212.

For Further Information Contact: Kenneth Barnhart, Environmental Team Leader, at 503-230-3667, or call the Public Involvement Office at 503-230-3478 in Portland; toll-free 800-622-4519. Information may also be obtained from:

Mr. Terence Esvelt, Puget Sound Area Manager, 201 Queen Anne Avenue, North, Suite 400, Seattle, Washington 98109-1030, 206-553-4130.

Mr. Wayne Lee, Upper Columbia Area Manager, Room 561, West 920 Riverside Avenue, Spokane, Washington 99201, 509-353-2518

Mr. Ron Rodewald, Wenatchee District Manager, 301 Yakima Street, Wenatchee, Washington 98807-0741, 509-662-4377

For Information on DOE NEPA activities Contact: Carol Borgstrom, Director, Office of NEPA Oversight, EH-25, U.S. Department of Energy, 1000 Independence Avenue, SW, Washington, DC, 20585, phone (202) 586-4600 or (800) 472-2756.

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SUMMARY

Bonneville Power Administration, an agency of the U.S. Department of Energy, in accordance with Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act, has prepared a Draft and Final Environmental Impact Statement (EIS) on the Puget Sound Area Electric Reliability Plan (PSAERP). The preferred plan in this Final Environmental Impact Statement (FEIS) is unchanged from the Draft EIS. Most public review and comment on the preferred alternative was supportive. Public comments on the Draft EIS and responses are in Chapter 8.

The PSAERP is undertaken by Bonneville Power Administration (BPA), Puget Sound Power & Light, Seattle City Light, Snohomish Public Utility District No. 1 (PUD), and Tacoma Public Utilities. The Plan proposes a variety of utility actions both in Puget Sound and other areas in the State of Washington. BPA intends to issue a Record of Decision after filing and distributing the FEIS.

BPA anticipates several decisions. The first decision anticipated is a decision to adopt The Puget Sound Area Electric Reliability Plan developed jointly by the above mentioned utilities. Second, BPA will decide on its role in implementing the plan. Specifically, BPA proposes to construct Schultz Substation at Site 3 and add additional voltage support facilities at Echo Lake Substation. BPA and the Puget Sound utilities also expect to accelerate Puget Sound conservation programs, and to begin preparation of an EIS on the contingency cross-Cascades transmission line.

PURPOSE AND NEED FOR ACTION

A specific need exists in the Puget Sound area for balance between east-west transmission capacity and the increasing demand to import power generated east of the Cascades. At certain times of the year, and during certain conditions, there is more demand for power in the Puget Sound area than the transmission system and existing generation can reliably supply. This high demand, called peak demand, occurs during the winter months when unusually cold weather increases electricity use for heating. The existing power system can supply enough power if no emergencies occur. However, during emergencies the system will not operate properly. As demand grows, the system becomes more strained. To meet demand, the rate of growth of demand must be reduced or the ability to serve the demand must be increased, or both.

The plan to balance Puget Sound's power demand and supply has these purposes:

- The plan should define a set of actions that would accommodate ten years of load growth (1994-2003).
- Federal, State and local governmental environmental quality requirements should be met.
- The plan should be consistent with the plans of the Northwest Power Planning Council.
- The plan should serve as a consensus guideline for coordinated utility action.
- The plan should be flexible to accommodate uncertainties and differing utility needs.
- The plan should balance environmental impacts and economic costs.
- The plan should provide electric system reliability consistent with customer expectations.

This plan is different from other ongoing regional planning processes that are related but address unique needs. This Plan's scope is to solve the peak load reliability problem caused by growth in demand in the Puget Sound area while most generation resources are east of the Cascades. Existing transmission capacity limits how much power can be imported from the east to Puget Sound.

The growing need for new energy resources in the Northwest is a distinctly different problem. Each utility has its own independent energy planning process under the coordinating umbrella of the Northwest Power Planning Council's regional energy plan.

Transmission problems within the Puget Sound area also are not addressed by this plan. These problems, brought on by load growth, development of new generation, and impacts of power exchanges with Canada, are being addressed by the affected utilities under separate planning processes.

Utility actions already underway or planned will add substation facilities and local generation in 1992 and 1993, bringing system capacity and peak demand back into balance by late 1993. These actions have been covered by other environmental documents and are outside the scope of this EIS. The actions proposed in this EIS will begin to take effect in late 1993, keeping the system in balance as load grows.

AFFECTED ENVIRONMENT

This FEIS covers the Puget Sound area, and parts of the Columbia River Basin that might be affected. The land use, vegetation, topography, and natural and man-made features are varied. Land uses range from urban to forest and agricultural. Vegetation west of the Cascade Mountains reflects the wetter climate found there compared to the drier climate east of the Cascades. The Puget Sound area includes Pacific coastline and the Cascade Mountains. East of the Cascades the foothills turn into agricultural and rangeland. Historic and cultural resources are found throughout the study area.

ANALYSIS

This FEIS describes the environmental analysis and an economic and technical analysis of alternatives. The environmental analysis covers effects to living and non-living resources. The analysis is generic in nature, except for the study area where a new substation, which is part of the Preferred Alternative, might be built. Each alternative is evaluated environmentally, economically and technically. The environmental analysis uses four environmental impact ratings: minimal, low, moderate, and high. The economic and technical evaluation covered the following factors: net present value of total system costs, sensitivity to load growth, revenue requirements (near-term and long-term), reliability, and deliverability.

UTILITY INVOLVEMENT

The planning which led to this FEIS was a cooperative effort among BPA and various Puget Sound area utilities, including Snohomish County PUD, Puget Sound Power & Light, Seattle City Light and Tacoma Public Utilities. A copy of the agreement establishing a management structure for this planning effort is in Appendix A.

PUBLIC INVOLVEMENT

Four public scoping meetings were held. Members of the general public, special interest groups, consultants and utility representatives attended. Comments from the scoping meetings and written comments were incorporated into the Draft EIS.

A Technical Review Group (TRG) representing state and local government, business and industry, public interest groups, and the general public was formed to provide input and review results during this project.

To access the business community, labor, government agencies, key interest groups and others mostly outside the utility industry, a group called the Sounding Board was organized. This group provides opinions, suggestions and other feedback on elements of this Plan and represents a cross-section of community interests in the Puget Sound area.

The Draft EIS was distributed for public review. The public had 60 days to respond. During that time, seven public meetings were held throughout the Puget Sound area and eastern Washington. The public was encouraged to ask questions and give comments. All verbal and written comments have been responded to in the FEIS in Chapter 8. Where appropriate, text of the EIS has been changed in response to comments.

Table S-1.
Preferred and Alternative Strategies
Summary Table

	Alternative Measures							
	Conservation	Transmission Line	Voltage Support 1	Voltage Support 2	Load Management	Fuel Switching	Combustion Turbines	Curtailment
Preferred Alternative								
Proposed Actions	●		●	●				
Contingency Actions		●					●	●
Alternative Strategy 1								
Proposed Actions	●	●	●					
Contingency Actions				●				●
Alternative Strategy 2								
Proposed Actions	●		●	●				
Contingency Actions		●					●	●
Alternative Strategy 3								
Proposed Actions	●		●		●	●		
Contingency Actions				●			●	●
Alternative Strategy 4								
Proposed Actions	●		●				●	
Contingency Actions				●				●

ALTERNATIVES

The No Action Alternative and four Alternative Strategies were originally considered. The Alternative Strategies have common elements: accelerated conservation measures and Voltage Support Option 1, and, as a contingency, load curtailment measures. Elements of each strategy are shown in Table S-1. Unique elements of the each strategy are:

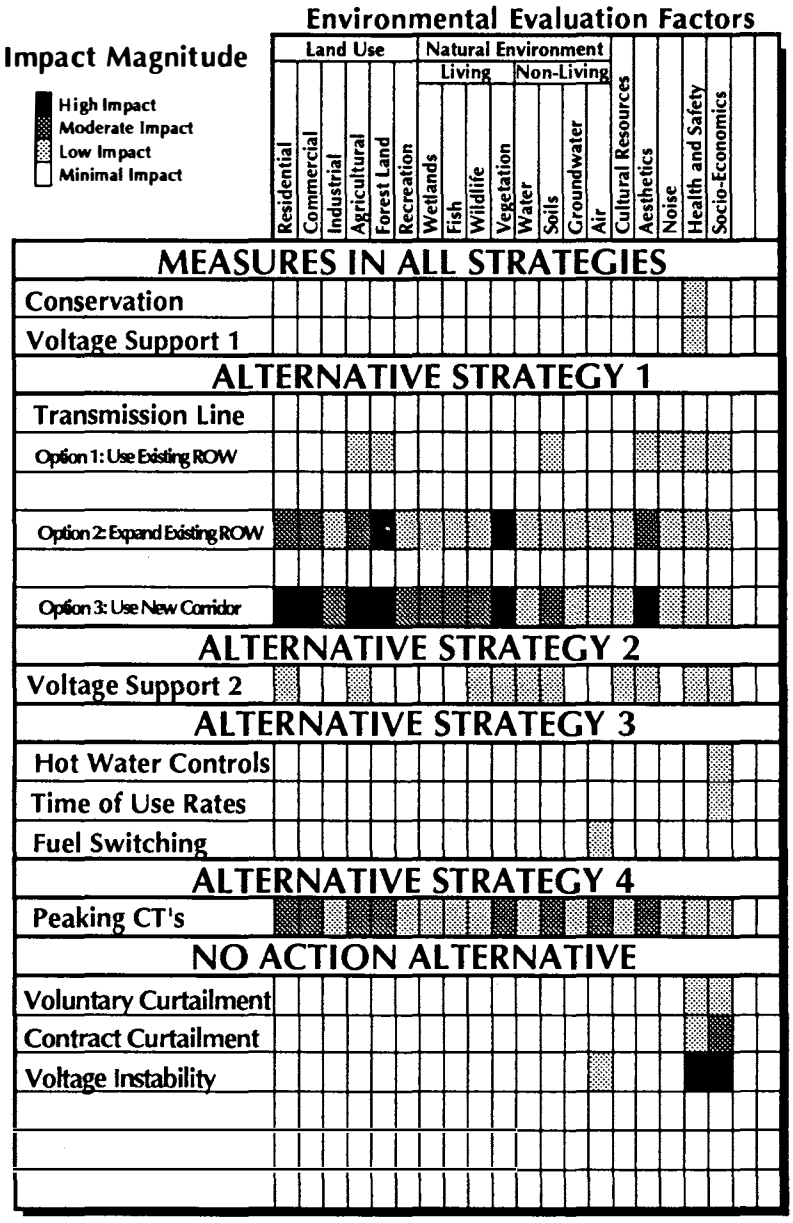
Alternative Strategy 1 - new cross-Cascade transmission line
Alternative Strategy 2 - new substation near Ellensburg, Washington
Alternative Strategy 3 - load management (water heater control, time-of-use rates) and fuel switching
Alternative Strategy 4 - combustion turbines in Puget Sound.
No Action Alternative - uncoordinated planning

Because load growth and resource supply could vary substantially from that assumed in this analysis, each alternative strategy includes contingency measures that could be used to make each strategy flexible and able to respond to unexpected circumstances.

Preferred Alternative

After weighing the environmental, economic, and technical trade-offs and carefully considering recommendations of the Sounding Board, BPA in coordination with Puget Sound utilities decided Alternative Strategy 2 is preferred as the primary solution to the transmission reliability problem in the Puget Sound area. It ranks second to Alternative Strategy 3 in minimizing environmental impacts (see Table S-2), and ranks high in economic and technical evaluation factors (see Table S-3). Puget Sound utilities concur with BPA's decision.

Table S-2.
Strategy Impact Comparison Matrix



Under the Preferred Alternative, Puget Sound utilities will ramp up conservation programs in 1993 to achieve initial peak reductions by the winter of 1993-94. BPA will complete Voltage Support Option 1 by the fall of 1993, which would provide 600 MW of additional transmission capacity. Another voltage support element, Voltage Support Option 2, would be implemented by the winter of 1994-1995. In Voltage Support Option 2, BPA would develop a new 500-kV substation (Schultz Substation) east of the Cascade Mountains near Ellensburg, Washington. Schultz Substation will provide 1000 MW of increased transmission capacity.

Table S-3.
Economic and Technical Evaluation Summary Table

	ALTERNATIVE STRATEGIES			
EVALUATION FACTORS	**Strategy 1**	**Strategy 2***	**Strategy 3**	**Strategy 4**
Net Present Value	$67,000,000	**$105,000,000**	-$128,000,000	$39,000,000
Sensitivity to Load Growth	$196,000,000	$126,000,000	**$84,000,000**	$102,000,000
Near Term Revenue Requirements	$50,000,000	**$25,000,000**	$50,000,000	**$20,000,000**
Long Term Revenue Requirements	$75,000,000	**$40,000,000**	$110,000,000	$105,000,000
Deliverability (1=Hi, 4=Low)	**1.6**	**1.5**	**2.0**	**1.7**
Reliability (1=Hi, 4=Low)	**2.0**	**2.0**	**2.0**	**2.0**
* Preferred Alternative				

BPA, utilities and the Sounding Board recognized the need for a plan to be broad and flexible to adapt to unanticipated future developments. There are three contingency actions for the Preferred Alternative. To provide the flexibility to respond to medium-high load growth, the preferred alternative includes preparing for a transmission line project to be available in 2000 if necessary. A 7-8 year lead time is assumed because a transmission line may be controversial. A decision will be necessary in 1996 or 1997 to either complete or delay this project. The second contingency element of the Preferred Alternative is combustion turbines. One or more combustion turbines could be sited in the Puget Sound area to respond to a greater than expected peak load deficit. The third contingency is using load curtailment contracts.

Environmentally, the Preferred Alternative ranks a close second to Alternative Strategy 3. Conservation programs have low health and safety impacts. Voltage Support Option 1 has minimal impacts because additions are in existing substation yards. The impacts of Voltage Support Option 2 are minimal or low and result from establishing a new substation. Curtailment contracts would have low to moderate socio-economic impacts. The environmental impacts of the contingency transmission line and/or combustion turbines are described under Alternative Strategies 1 and 4.

This alternative ranks highest in several economic and technical evaluation factors (see Table S-3).

Alternative Strategy 1

This strategy includes a new cross-Cascades transmission line. The line, together with accelerated conservation programs and Voltage Support Option 1, provides a surplus capacity of 1600 megawatts in 2003. Given this large surplus, contingency measures for Strategy 1 (load curtailment contracts and Voltage Support 2) would not be used for increased demand. They would be needed if completion of the transmission line is delayed. If the deficit is less than expected, completion of the transmission line would be delayed.

Conservation programs have low health and safety impacts. Voltage Support Option 1 has minimal impacts because the equipment will be installed in an existing substation. Transmission line impacts vary from low to high depending on the kind of corridor used (existing, expanded, or new).

If contingency measures are needed, Voltage Support Option 2, which involves a new substation near Ellensburg, Washington, will have minimal or low impacts. Curtailment contracts would have low to moderate socio-economic impacts.

This strategy ranks second in net present value, near- and long-term revenue requirements, and deliverability. The plan is least sensitive to load growth. The plan is judged reliable.

Alternative Strategy 2

Alternative Strategy 2 is identical to the Preferred Alternative. For a description of the strategy refer to the Preferred Alternative discussion.

Alternative Strategy 3

This strategy adds load management programs (water heater control and time-of-use rates) and fuel switching (from electricity to natural gas). Contingency measures include load curtailment and adding Voltage Support Option 2 if the deficit increases, or delaying measures if the deficit decreases.

Load management creates low socio-economic impacts, and fuel switching creates low air quality impacts. This strategy has the fewest environmental impacts.

Alternative Strategy 3 is ranked best of all strategies for the sensitivity to load growth evaluation factor. Economically, Strategy 3 is the least desirable plan. It has a negative net present value, and ranks highest in near- and long-term revenue requirements. The measures used in Strategy 3 were felt less deliverable than those used in other strategies.

Alternative Strategy 4

This strategy adds peaking combustion turbines used only during peak load periods. Combustion turbines require a site of about four acres. Contingency measures include additional combustion turbines, load curtailment contracts and Voltage Support Option 2 if the deficit increases, or delaying the combustion turbines if the deficit decreases.

Combustion turbines have low to moderate land use and natural environment impacts depending on the site selected. Air quality impacts are moderate. This strategy has the lowest short-term revenue requirements. Contingency measure impacts were described under the other strategies.

From an economic and technical standpoint Alternative Strategy 4 is tied for first with Strategy 2 for near-term revenue requirements. Strategy 4 ranks third in net present value, long-term revenue requirements, and deliverability. This strategy is second in sensitivity to load growth.

No Action Alternative

This alternative assumes utilities will take some actions to meet their individual needs. However, these actions may not be coordinated. This alternative is more likely to cause decreasing reliability as loads grow. By 2003, normal winter peak load will stress the power system and minor disturbances could cause instability and blackout in the Puget Sound area.

This alternative could have high health and safety and socio-economic impacts, and moderate air quality impacts. It would avoid impacts of new facilities and it could result in increased utility emphasis on conservation and other demand-side programs.

The No Action Alternative was not evaluated from an economic and technical standpoint. However, it would not yield reliable service and the costs of a blackout, although difficult to determine precisely, are expected to exceed the costs of the alternative strategies.

CONSULTATION, PERMITS AND REVIEW

The requirements for consultation, permits or review for different types of resource acquisitions are listed, and all alternatives were assumed to meet these requirements during the analysis. BPA completed consultation for siting a substation east of the Cascade Mountains.

1.0 PURPOSE AND NEED FOR ACTION

The Puget Sound area reaches from the Pacific Ocean to the Cascade Mountains and from just south of Centralia, Washington to the Canadian border. This chapter explains a problem that exists on the bulk power transmission system serving the Puget Sound area. The electric power system includes power plants that generate electricity, conservation that saves energy, and the transmission system that delivers power from resources to customers. This chapter also describes how Bonneville Power Administration (BPA), Puget Sound Power and Light, Seattle City Light, Snohomish County PUD, and Tacoma Public Utilities developed and evaluated potential solutions to this problem.

1.1 NEED FOR ACTION

A specific need exists in the Puget Sound area for a balance between east-west transmission capacity and the increasing demand to import power generated east of the Cascades. At certain times of the year, and during certain conditions, there is more demand for power in the Puget Sound area than the transmission system and existing generation can reliably supply. This high demand, called peak demand, occurs during the winter months when unusually cold weather boosts electricity use for heating. The existing power system can provide enough power now if no emergencies occur. However, during emergencies the system will not operate properly. As demand grows, the system becomes more strained. To meet demand, the rate of growth of demand must be reduced or the ability to serve the demand must be increased, or both.

1.2 PURPOSE AND SCOPE

BPA and Puget Sound area utilities are developing a plan to solve the power system problem. Any plan that balances power demand and the ability to serve that demand, is expected to also accomplish the following purposes:

- The plan should define a set of actions that would accommodate 10 years of load growth (1994 - 2003).
- Federal, State and local governmental environmental quality requirements should be met.
- The plan should be consistent with the plans of the Northwest Power Planning Council (Council).
- The plan should serve as a consensus guideline for coordinated utility action.
- The plan should be flexible to accommodate both uncertainties and differing utility needs.
- The plan should balance environmental impacts and economic costs.
- The plan should provide electric system reliability consistent with customer expectations.

The PSAERP is different from other ongoing regional planning processes that are related but address unique needs. The Plan's scope is to solve the peak load reliability problem caused by growth in demand in the Puget Sound area while most generation resources are east of the Cascades. Existing transmission capacity limits how much power can be imported from the east to Puget Sound.

The growing need for new energy resources in the Northwest is a distinctly different problem. Each utility has its own independent energy planning process under the coordinating umbrella of the Northwest Power Planning Council's regional energy plan.

Transmission related problems within the Puget Sound area are not addressed by this plan. These problems, brought on by load growth, development of new generation, and impacts of power exchanges with Canada, are being addressed by the affected utilities under separate plans. These plans do not conflict with the alternative strategies.

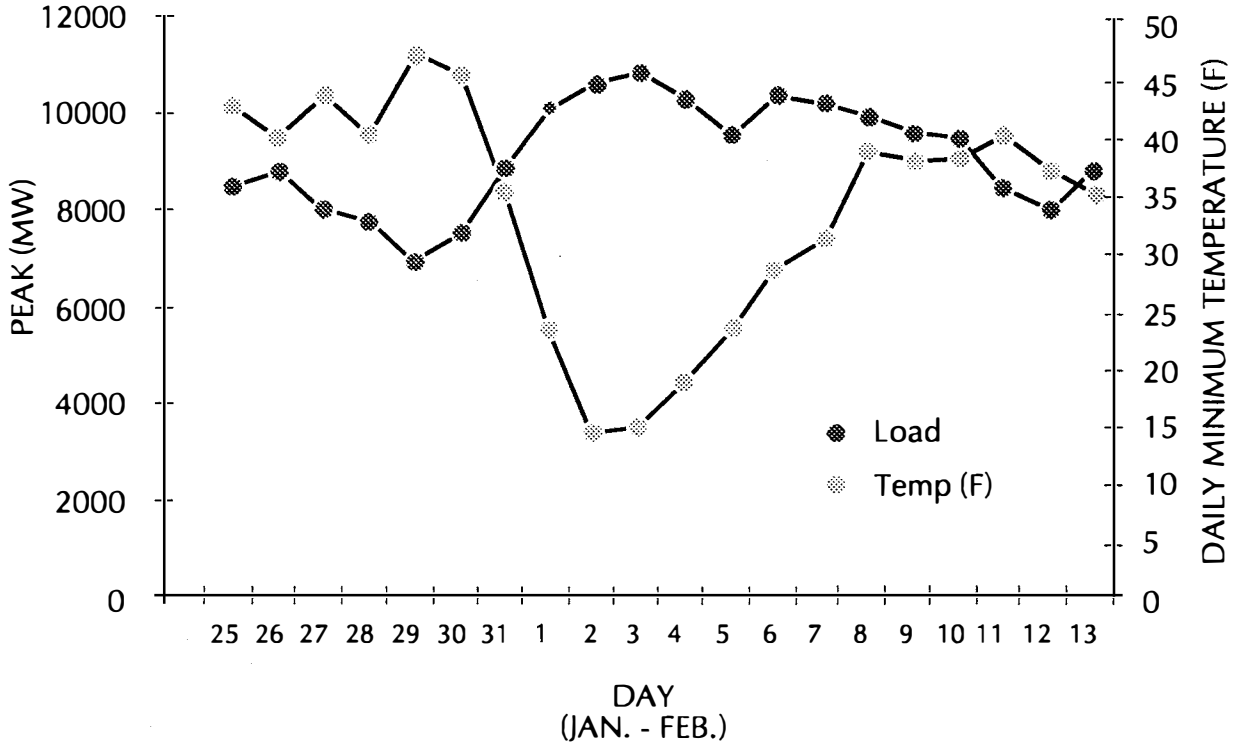
Utility actions already underway or planned will add substation facilities and local generation in 1992 and 1993, bringing system capacity and peak demand back into balance by late 1993. These actions have been covered by other environmental documents and are outside the scope of this EIS. The actions proposed in this EIS will begin to take effect in late 1993, keeping the system in balance as load grows.

1.3 THE PROBLEM

The power system in the Pacific Northwest can transmit the energy to supply the needs in the Puget Sound area under normal conditions. However, the Puget Sound area power system no longer meets BPA published criteria for reliable service during emergencies under periods of peak demand. During winter months, cold weather boosts electricity use for heating. Under peak load conditions, the electric power system is stressed. The system could not meet consumers' demands if a certain transmission line or generators in the Puget Sound area fail during cold weather peak load conditions. Under these conditions, the Puget Sound area could have a brownout or blackout.

How was this discovered? Planning studies done before the winter of 1988-1989 uncovered the possibility of a future problem. When the Puget Sound area had extreme cold temperatures in February of 1989, the highest electricity use ever was recorded and the system was severely stressed. In December 1990, the area again had extreme cold temperatures and record-breaking electricity use. This peak load, defined as the greatest electrical demand over a fifteen minute period, strained the transmission system delivering power to the Puget Sound area and confirmed that peak loads had grown faster than expected. Figure 1-1 shows how the cold affected electricity demand. The colder it was, the higher the demand for electricity.

Figure 1-1.
Daily Peak Load and Temperature
February 1989 Cold Snap



Although the transmission system and local generation sources supplied enough power to the Puget Sound area, if any emergency had occurred such as a transmission line going down, the system may have been unable to meet the power demand. If this happens, voltage on transmission lines can drop below acceptable levels causing a brownout. In extreme cases, automatic devices protect the system by disconnecting lines, which further lowers voltages and causes consumers to be disconnected. This is voltage collapse. If not stopped, it could spread throughout the Puget Sound area, to Portland, Oregon and Vancouver, British Columbia. As electricity use grows, the transmission system is strained more, and the likelihood of a blackout increases.

What might cause this? Three elements contribute to the problem: rapid load growth causing unprecedented peak demand; reliance on transmitting electricity over long distances from outside the area to serve the demand; and limited local generation. These elements combine to jeopardize the reliability of the power system serving the Puget Sound area.

1.4 PLANNING ASSUMPTIONS

In a planning process, analysts make assumptions about the future based on past events and current trends. The objective of planning is to anticipate undesirable conditions in time to take actions to prevent them. Because no one can know the future, assumptions about future conditions are used. These assumptions are the "best guess" planners can make based on their past experience. Key assumptions used by planners for the PSAERP are described below. Other assumptions are provided in the Appendices.

1.4.1 Planning Timeframe

Utility planners focused detailed studies of the problem in the Puget Sound area on the ten-year period from the winter of 1993-94 to the winter of 2002-03. Because the planning process takes several years, and any solutions require lead time to implement, the plan could not begin to take effect before the winter of 1993-94. Planned substation and generation additions already underway are expected to bring the system into balance by late 1993. The 2003 end date reflects the longest time planners believe technological changes, consumption patterns and environmental requirements can be predicted. To capture long-term impacts, the economic analysis was carried through 2010. However, the planning objective is to solve the problem during the ten-year period.

1.4.2 Load Growth

The Puget Sound area energy demand has been growing faster than any metropolitan area in the Northwest. From 1985 to 1989 annual energy consumption grew by about 3 percent per year. Peak demand grows as energy use increases. By the 1989 cold snap, loads had grown to 11,200 megawatts (MW) during the peak period. A megawatt is the amount needed to light 10,000 one hundred watt lightbulbs. On December 21, 1990, extremely cold weather caused even higher electricity use, with peak loads reaching 11,800 MW.

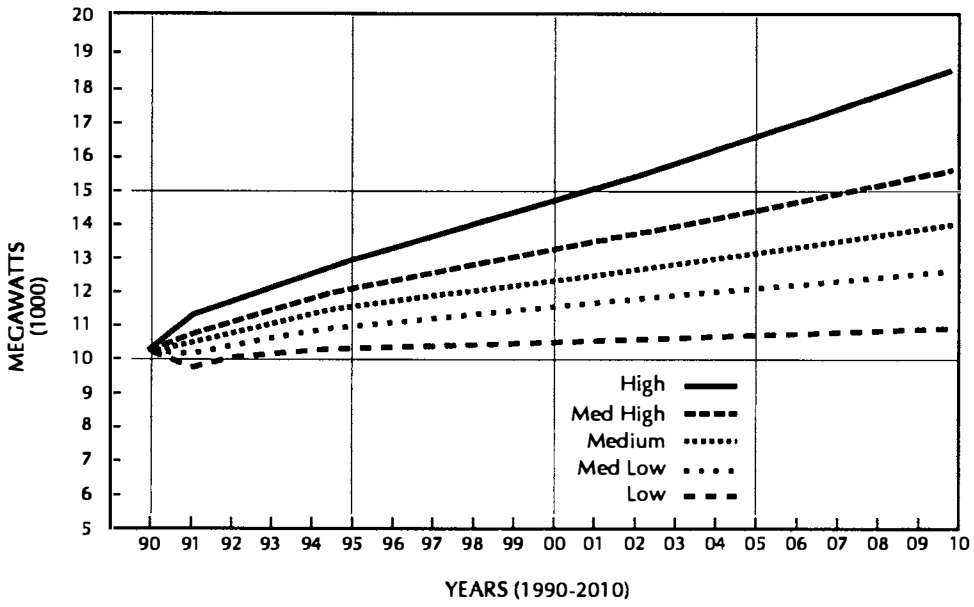
Will electrical use continue to grow? Predicting future load growth is difficult. Because there is uncertainty about the future, forecasters develop not just one load forecast, but five. These forecasts give decision makers a range of possibilities for planning actions by estimating load growth from low to high. Because many homes in the Puget Sound area use electricity for heat, loads in this area are highest during the winter, so forecasters look at normal and extreme weather conditions when predicting load growth. Figure 1-2 charts the peak load forecast under normal and extreme cold weather conditions, and shows the range of possible forecasts from low to high.

Normal weather or a normal year is defined as the lowest daily average temperature which would have a fifty percent chance of being surpassed. That is, one would expect the actual temperature to be colder once every two years. Extreme weather or an extreme year is defined as the lowest daily average temperature that has a five percent chance of being surpassed; one would expect the actual temperature to be colder once every 20 years.

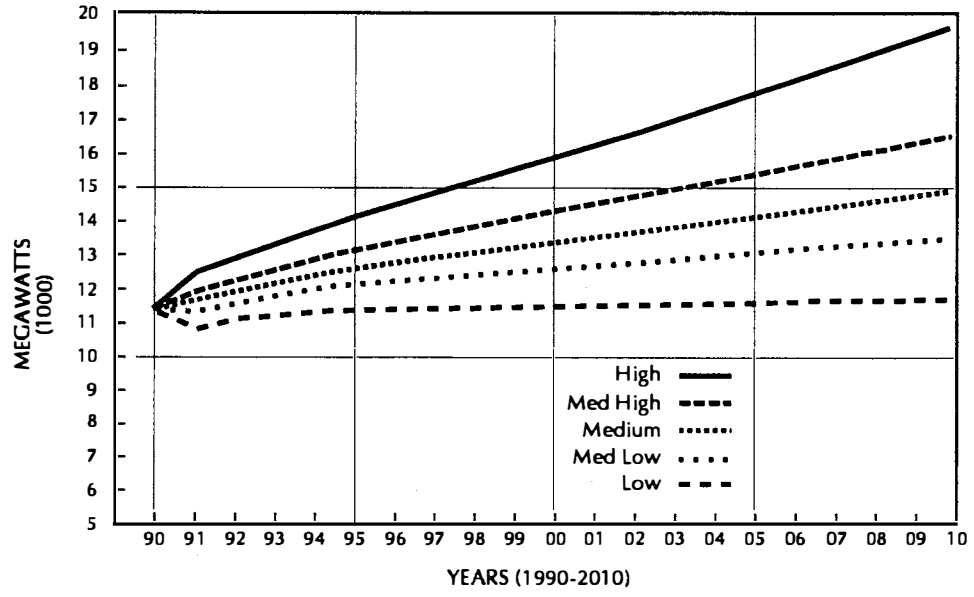
The chance or probability of actual growth being in the range between the medium-high and the medium-low forecasts is 50 percent. The probability that future loads will be between the high and the low forecasts is 90 percent. The middle or medium forecast is used for planning purposes, but decision makers consider how plans would be impacted by higher or lower load growth.

Figure 1-2.
Puget Sound Area
Peak Load Forecast

Normal Cold Weather



Extreme Cold Weather



Assuming medium load growth, Figure 1-2 shows Puget Sound peak loads growing by 200-400 MW each year through 1995. Load growth slows after 1995 due to slower economic growth, increased energy efficiency and increased use of natural gas for space and water heating.

Table 1-1 compares normal peak, extreme peak and average annual energy loads projected for the medium growth forecast. Extreme cold weather peak loads continue to be nearly two times the average annual energy consumption because of the high percentage of space heating load.

Table 1-1.
Normal Peak, Extreme Peak and Average Annual Energy Loads

YEAR	NORMAL (MW)	EXTREME (MW)	AVERAGE ANNUAL ENERGY LOADS (aMW)
1993	11200	12300	6330
1995	11700	12800	6600
1997	11900	13100	6800
1999	12200	13400	7000
2001	12500	13700	7200
2003	12800	14000	7400
2005	13100	14300	7600
2007	13400	14700	7800
2009	13700	15000	8000

Load Forecast Update - Since publishing the Draft EIS, load forecasts in this document have been compared with updated forecasts. The PSAERP peak forecast continues to be valid and no update is needed.

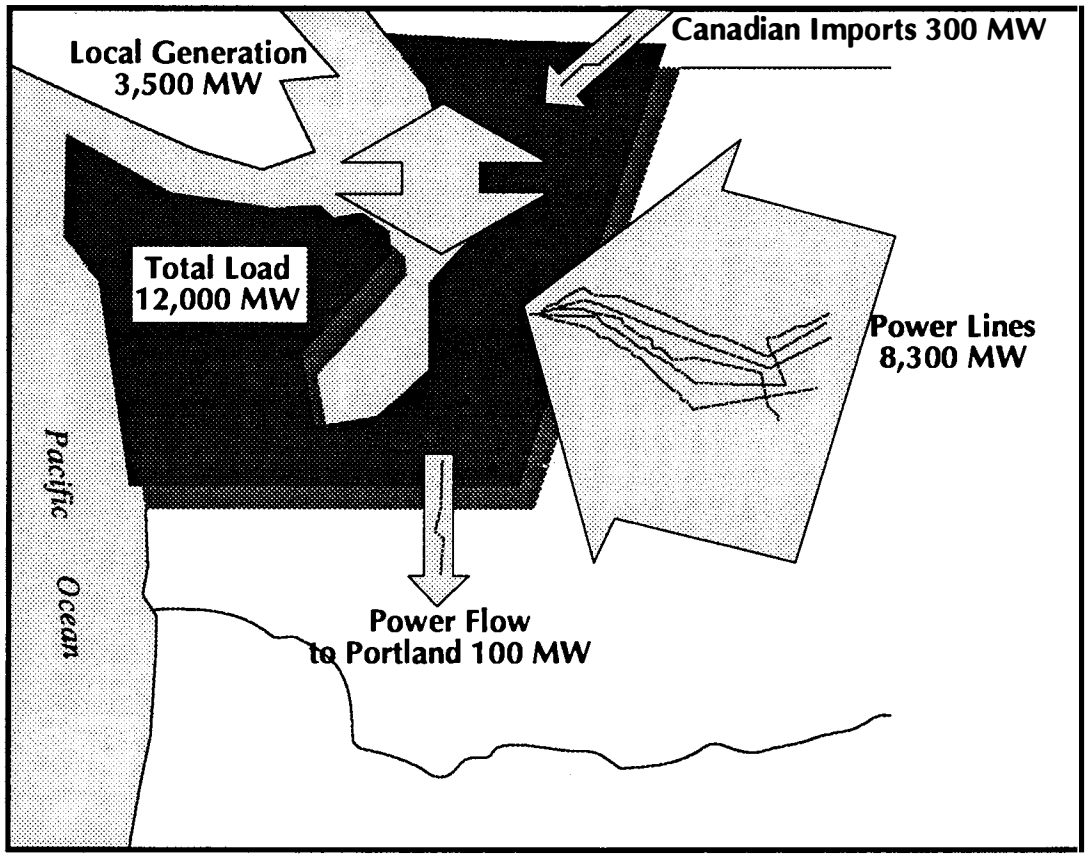
Scoping Report Part B: Preliminary Technical Analyses (BPA, 1990), provides a detailed description of how load growth is forecast, and how system capacity is determined. This report is in Appendix A.

1.4.3 Relying on Long Distance Transmission

BPA owns and operates three-fourths of the transmission grid in the Pacific Northwest. BPA's high-voltage lines transmit power from Federal dams and other sources, including power generated by other utilities, to customers throughout the Pacific Northwest. Individual utilities in the Puget Sound area also own transmission facilities. When power needs in the Puget Sound area are the greatest, local electrical generating resources supply about 30 percent of the power. Hydro and thermal resources east of the Cascade Mountains supply about 70 percent via five 500-

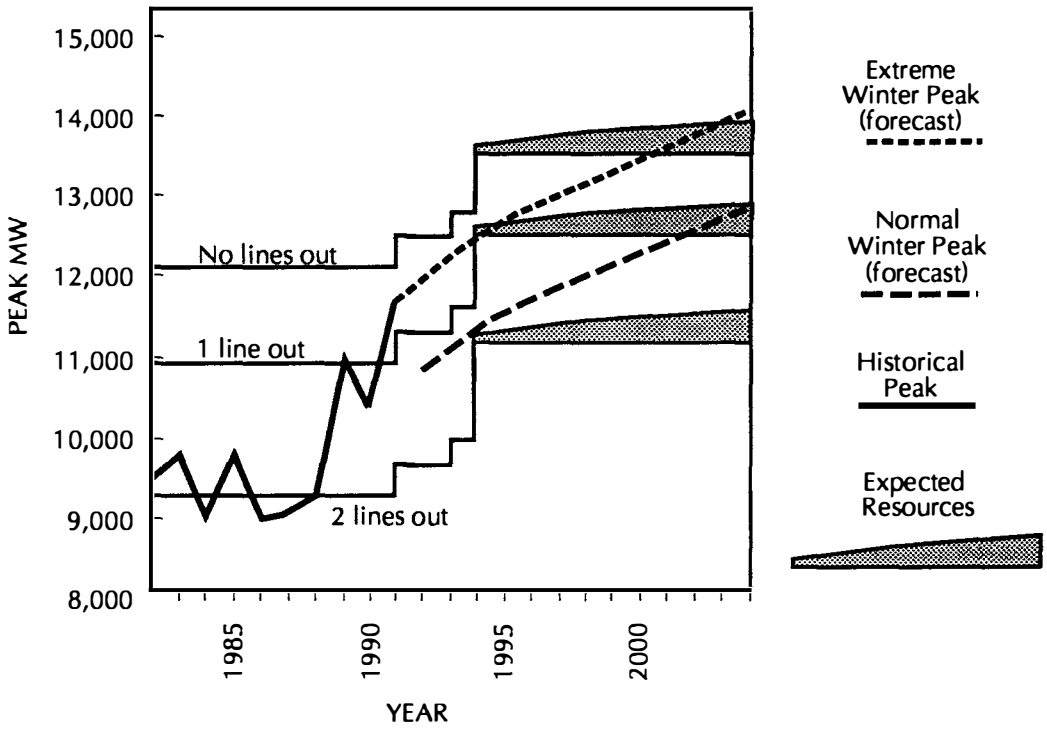
kilovolt (kV) lines and seven lower voltage lines in three corridors. Figure 1-3, based on actual load data from the December 1990 cold spell, shows how the peak load was met by a combination of power generated locally and power transmitted from east of the Cascades and from Canada. Although total demand exceeded the reliable capacity of the transmission system by several hundred megawatts, the system survived because no major lines or generators went out of service. No major transmission additions have been made in the area since 1977. The existing transmission system was designed assuming more local generation would be built in the Puget Sound area.

Figure 1-3.
1990 Sources of Power for the Puget Sound Area



Reliability of the transmission network is critical to the reliability of Puget Sound's power supply. The effect of losing cross-Cascades transmission lines (outages) is shown in Figure 1-4. The horizontal lines are stepped and show system capacity for different outage conditions. The capacity increases between 1991 and 1993 reflect substation improvements and generation additions previously planned by utilities. The capacity increase resulting from energy resource additions after 1993 are shown as "Expected Resources" (Section 1.4.4). Normal and extreme peak forecasts are shown as dashed lines. With no emergencies on the transmission system (no lines out of service), the transmission system will be unable to deliver power to meet an extreme peak demand by 2003. In most of the years shown, we run into difficulties during normal winter peaks with two transmission lines out or with one line out during extreme winter peaks. If load growth exceeds the medium forecast, then these projected deficits will occur sooner and will grow much faster.

Figure 1-4.
Puget Sound Area Peak Loads
Historical, Forecast and System Capacity



Reliability Criteria Assumptions - Utilities strive to provide reliable service at the best value for their customers. Cost-effectiveness is evaluated from the consumer's perspective. Reliability is a measure of the power system's ability to meet customer demands over a certain period. It is measured by how often power outages occur, how long they last, and how many customers are affected. A perfectly reliable system would always satisfy customer demand. Perfect reliability is not technically feasible and even if possible, would be extremely expensive for consumers.

Using rules based on experience, utilities design and operate transmission systems to meet high performance standards that come close to this "perfect" system. These rules, called reliability criteria, set standards to ensure cost-effective, reliable service. A reliable system should provide electrical service under normal and emergency conditions. A transmission line outage caused by wind, ice, lightning or other events; a power plant shutdown; or other major equipment failure are examples of system emergencies. Reliability criteria define acceptable service under these emergencies. BPA's Reliability Criteria, for example, require if one transmission line is out, the system should serve increased electricity use for heating during abnormal cold weather, maintain voltages, and not overload lines. If both a power plant and one transmission line are out, or two transmission lines are out, the system should serve electricity needs for normal (but not extreme) cold weather, maintain voltages, and not overload lines.

Each utility has its own reliability criteria unique to its system characteristics and customer needs. The BPA system is the backbone of the regional transmission grid, and its performance has widespread, regional impacts. For this reason, BPA's Reliability Criteria, updated in September 1989 after public review, set very high performance standards for the bulk power system. The utilities have agreed that BPA's criteria should be the standard for judging the adequacy of potential solutions to the cross-Cascade transmission capacity problem.

1.4.4 Local Generation and Conservation Resources

Energy resources, including conservation, provide the power utilities need to serve their customers' demands. Bonneville Dam on the Columbia River and the Centralia coal-fired generation station are examples of energy resources. Conservation programs are also resources because conserved energy is available to serve consumer demands. Of the 12,000 MW currently needed in the Puget Sound area during peak loads, local generation plants can now supply approximately 3,500 MW.

In the early stages of this planning process, local generation measures were evaluated based only on their technical and economic characteristics. A number of potential generation measures including cogeneration, peaking combustion turbines, small hydro and WNP-3 (Satsop Nuclear Plant) were found to be viable options. Some resources such as cogeneration and WNP-3 are predominantly energy resources. Their high capital cost and operating characteristics require that they be operated on a continuous basis to be economical. Other resources such as simple cycle combustion turbines are considered to be peaking resources. Their lower capital cost and quick start-up capability make them an attractive resource to meet infrequent peak load needs.

Later as the study team began the process of assembling the alternative strategies, it was necessary to determine which of the measures that had passed the technical and economic screening were really implementable as part of a plan to solve the peak load problem. The Steering Committee decided that generating resources developed primarily to meet energy needs would not be included in the plan's alternatives. However, simple cycle combustion turbines which are widely used for meeting peak load were included in the plan's alternatives.

The Steering Committee found that it was not practical or desirable to pre-empt the established process for energy resource decision making. Resource siting decisions cannot be made solely on the basis of transmission capacity constraints. There are many other economic and environmental factors that must be considered and decisions need to be consistent with the Northwest Power Planning Council's Power Plan. Each of the utilities has its own institutional and regulatory framework for making energy resource choices. Decisions to site generating resources in the Puget Sound area to help solve the voltage stability problem could not be made outside this framework.

The study team recognized that some of the resources utilities acquire to meet growing energy needs will be located in the Puget Sound area (Expected Resources). They reviewed each utility's energy plans and conservatively estimated that a minimum of 400 MW of new energy resources would be sited in the Puget Sound area by 2003 to meet energy needs. These resources will have the secondary benefit of reducing peak demand on the east-west transmission system. BPA has evaluated this benefit in its Resource Program (see Section 1.6) These resources are described in Appendix B.

1.4.5 Load/Resource Balance

Load growth, long-distance transmission, and local generation and conservation resources in the Puget Sound area must combine to provide a balance between power demand and power supply. This balance must be maintained to avoid potential regional blackouts and damage to the transmission system. Table 1-2 lists forecasted normal and extreme winter peak loads, by electricity use sector, for 1994 and 2003, the beginning and end of the planning period. It shows how much conservation and market-induced fuel switching has been included in the load forecast. Table 1-3 identifies generating resources and transmission system deliveries that supply power to the Puget Sound area under normal and extreme conditions. Combustion turbines are operated during extreme peaks, therefore their contribution during normal peak is zero. This table also shows the size of the deficit in 1994 and 2003.

While the Puget Sound area faces a deficit of peaking capacity, the Northwest region as a whole has a capacity surplus. Exhibit 6 of the 1991 Pacific Northwest Loads and Resources Study published by BPA estimates that by 2003 the January firm capacity surplus will be 2000 MW for the region and 4000 MW for the Federal system, most from existing generation east of the Cascades. This assumes that peak loads have grown at a medium rate, no new

Table 1-2. Puget Sound Area Winter Peak Load Forecast (1994 and 2003)

WINTER PEAK LOADS (MW)	1994 normal peak	1994 extreme peak	2003 normal peak	2003 extreme peak
RESIDENTIAL LOADS				
ELECTRIC SPACE HEATING	3244	4306	3307	4408
ELECTRIC WATER HEATING	1307	974	1339	991
OTHER	1465	1403	1687	1608
COMMERCIAL / INSTITUTIONAL LOADS				
ELECTRIC SPACE HEATING, VENTILATION & AIR CONDITIONING (HVAC)	1526	1859	2056	2479
ELECTRIC LIGHTING	681	755	788	873
OTHER	341	374	428	467
INDUSTRIAL LOADS				
DIRECT SERVICE INDUSTRIES	755	759	756	760
OTHER INDUSTRIAL	1641	1616	1951	1912
MISCELLANEOUS	440	454	488	502
WINTER PEAK LOAD TOTALS:	11400	12500	12800	14000
LOAD REDUCTION AMOUNTS IN LOAD FORECAST				
RESIDENTIAL CONSERVATION	74	98	188	251
COMMERCIAL CONSERVATION	28	32	90	102
INDUSTRIAL CONSERVATION	15	16	69	70
MARKET-INDUCED FUEL SWITCHING	70	95	274	290

generation is added and stream flows are at historical low levels. Restrictions in hydro system operations caused by actions under the Endangered Species Act are not expected to substantially reduce the winter peaking capacity of the system, because fish runs occur primarily in spring and summer months (April-September.)

Also, during winter months there are substantial amounts of generation reserve in the Southwest that are accessible over the AC and DC Interties lines to California. Table 26 of the Western Systems Coordinating Council Ten-Year Coordinated Plan Summary 1991-2000 estimates that the California - Southern Nevada power area will have 17,800 MW of reserve winter peak capability in January 2001. Over 6000 MW of this will be accessible over the Intertie lines to California. Most of the power imported from the Southwest to serve Puget Sound loads would flow on the cross-Cascade transmission lines.

Table 1-3. Puget Sound Area Resources and Transmission System Capabilities (1994 and 2003)

CAPACITY RESOURCES (MW)	1994 normal peak	1994 extreme peak		2003 normal peak	2003 extreme peak
GENERATING RESOURCES (MW)					
COMBUSTION TURBINES	0	698		0	698
HYDROELECTRIC	1419	1419		1419	1419
COAL	1338	1338		1338	1338
OTHER	43	45		43	45
EXPECTED RESOURCES	60	60		400	400
TOTAL GENERATING RESOURCES	2860	3560		3200	3900
TRANSMISSION SYSTEM DELIVERIES (MW)					
CROSS-CASCADES TRANSMISSION LINES	8100*	8700**		8100*	8700**
CANADIAN IMPORTS MINUS PORTLAND EXPORTS	200	200		200	200
TOTAL TRANSMISSION SYSTEM CAPACITY	8300	8900		8300	8900
TOTAL SYSTEM CAPACITY (MW)	11160	12460		11500	12800
WINTER PEAK LOAD TOTALS (MW)	11400	12500		12800	14000
DEFICIT (MW)	**240**	**40**		**1300**	**1200**

* two transmission lines out of service

** one transmission line out of service

1.4.6 Dealing with Uncertainties

The assumptions used in the analysis are based on the best information planners have available. Over a planning period of ten years, unexpected changes will occur. If the future is different than expected, the assumptions explained above and the predictions made about the future may be wrong. For example, these changes are possible:

- load growth may increase or decrease due to economic, energy price, or other forecast uncertainties
- benefits from Canadian dams on the Columbia River that were sold to the United States (called the Canadian Entitlement) will be returned to Canada when contracts expire beginning in 1998. Depending on the return arrangements agreed to, these deliveries could further stress the cross-Cascade transmission grid by up to 1000 MW.
- expected resources planned may be postponed or not built at all due to new environmental regulations
- new environmental requirements may cause some existing generation plants to shut down
- new technology may increase the efficiency of existing generation or new conservation measures
- public concern over electromagnetic field effects may hinder transmission line construction
- listing salmon as an endangered species may change river operations and limit power production

These uncertainties could affect the problem in the Puget Sound area, either increasing or decreasing the deficit shown in Table 1-3.

Keeping the potential for change in mind, planners continually track current conditions and change their assumptions if changes occur. For safety, they have identified contingency measures that could be done if, for example, load growth suddenly begins to follow the high load growth pattern and the demand for electricity increases sharply. Contingency measures are chosen for their ability to respond quickly to a significant change in circumstances. Chapter 2 identifies contingency measures for each alternative strategy and describes why they would be selected.

1.5 FINDING SOLUTIONS

The peak demand problem in the Puget Sound area is a complex one. When BPA and Puget Sound area utilities became aware of the risk of voltage instability and collapse, they began a process to define the problem and develop ways to solve it. They wanted the process to produce a plan to guide future actions by BPA and Puget Sound area utilities. Figure 1-5 identifies each part of the process. During this process, new information, suggestions, solutions, and ways to look at the problem surfaced. These new ideas and data were incorporated throughout the analysis.

This process was designed to involve the public and meet Federal and State environmental requirements. To fulfill these requirements, BPA decided to do a tiered environmental analysis. This analysis, documented by the EIS, evaluates a plan or framework that guides the region's electric utilities to solve the electric reliability problem. As individual utilities propose projects recommended by the plan, site-specific environmental reviews will be done by the project sponsors. For example, for a combustion turbine a site-specific EIS would be prepared by the utility proposing the CT in accord with appropriate Federal and/or State Environmental Policy Act procedures. If a transmission line appears needed, BPA would prepare a subsequent site-specific EIS prior to making decisions.

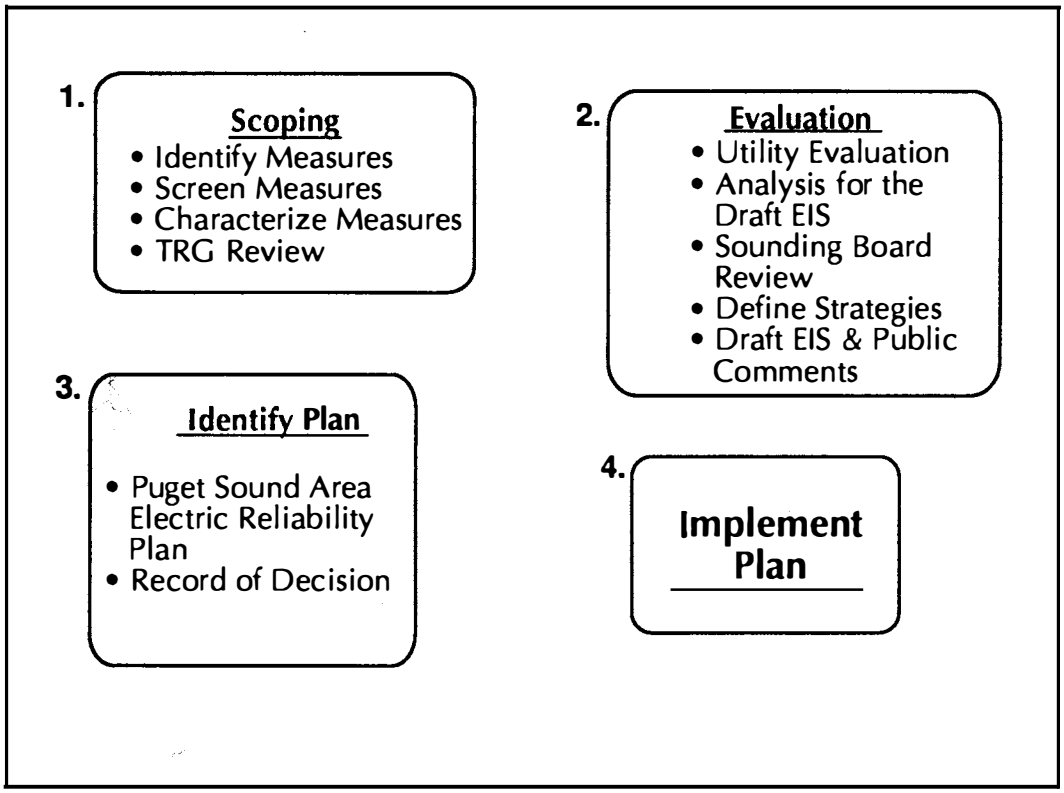
1.5.1 Scoping

A one-year EIS scoping process was conducted beginning in October 1989. In January 1990, two public meetings were held in the Puget Sound area and two were held east of the Cascades in Wenatchee, Washington. Scoping had several objectives:

- confirming the voltage instability problem
- notifying the public of the problem and involving them in developing solutions
- identifying environmental issues to study and consider
- defining the nature and extent of the problem for analysis
- identifying measures that solve the problem
- performing preliminary feasibility studies on identified measures.

A Technical Review Group (TRG) representing state and local government, business and industry, public interest groups, and the public was formed to help identify measures, critique study methods and assumptions, review screening criteria, and provide information on possible solutions. Membership in the TRG was open to anyone. Four TRG meetings were held during scoping.

Figure 1-5. Finding Solutions



Identifying Measures - During scoping, a long list of measures that might solve the problem was identified by members of the public, agencies, utilities, and other interested parties. Measures were divided into four categories:

- demand-side or reduce electric use: conservation, load management, and fuel switching
- local generation
- transmission
- load curtailment

Screening Measures - An evaluation team produced screening criteria to limit the "universe" of measures to the ones most feasible. The criteria developed include market factors, resource characteristics, and environmental

Screening Measures - An evaluation team produced screening criteria to limit the "universe" of measures to the ones most feasible. The criteria developed include market factors, resource characteristics, and environmental concerns. Table 1-4 lists the screening criteria.

Utilities formed study teams representing the four categories and began screening the list of measures. Sub-committees used the criteria as rough guidelines, not absolutes. Applying the screening criteria shortened the list of measures.

Table 1-4. Screening Criteria

Environmental Concerns
Meets state and federal environmental quality laws and requirements (e.g., air quality standards, water quality standards, etc.)
Avoids protected sites and environmentally unique habitats (e.g., the Council's Protected Areas, wetlands, National parks, etc.)
Resource Characteristics
On-line date no later than 1999
Available during cold weather from November through March
Located within the Puget Sound area
Costs should be reasonable relative to the estimated cost of transmission (approximately $100 per kW), the estimated cost of a single cycle combustion turbine (approximately $650 per kW), and the regional energy cost-effectiveness limit of 50 mills per kWh.
Market Factors
Commercially Available Technology
Commercially Proven Technology/Confirmed Resource
Acceptable to the Market

Characterizing Measures - After the initial screening, team members began analyzing the measures that passed the first screen. For each measure, they gathered information about potential for generating or saving power, costs, and impacts to the environment. Measures are listed in Chapter 2 and described in the Appendices.

1.5.2 Evaluation

Utility Evaluation - A methodology to evaluate and compare solutions was developed as described in Sections 4.7 and 4.8. BPA analysts use this methodology to study solutions, and consider new information about loads and resources as it becomes available. BPA and the Puget Sound area utilities constantly review and update their information on loads and resources, and revised numbers are incorporated into the analysis as needed. Still, predicting the future is uncertain, and although estimates reflect current conditions, they are only assumptions used as tools to find solutions.

This study has two relevant time periods. First is the decision period, which extends from 1994-2003. It is during these ten years that utilities must take actions to meet peak loads. Second is the evaluation period which continues beyond 2003 through 2010. This extended period is needed to capture adequately the costs and benefits of actions taken through 2003; some costs and benefits do not occur equally in all years.

Seven evaluation factors cover the range of concerns decision makers may consider. Table 1-5 lists the evaluation factors. Some factors, such as costs, can be quantified, while others such as environmental impacts, can be compared qualitatively only. Since the evaluation factors represent different concerns and are measured differently, the evaluation methodology ranked solutions according to each factor individually rather than using a single score combining ranks from all factors. The methodology does not weigh the relative importance of each evaluation factor. If no solution ranks highest on all factors, trade-offs may be necessary to find the best one. The best solution will balance environmental, economic, and technical factors.

Table 1-5. Evaluation Factors

Environmental
Environmental Impacts
Economic
Present Value of Total System Costs
Sensitivity to Load Growth
Near-Term Revenue Requirements
Long-Term Revenue Requirements
Technical
Reliability
Deliverability in View of Social and Political Factors

the Puget Sound area as if it were served by a single utility.

Economic and technical assumptions used for the evaluation and results of sensitivity studies using different assumptions are in Appendix C.

Analysis for Draft EIS - Because of the nature of the peaking problem in Puget Sound and the characteristics of individual measures, it is unlikely one measure alone will provide a satisfactory solution. Identifying and evaluating individual measures and test cases was the focus of this analysis. The test cases are composed of measures from different measure categories. For example, a test case might include conservation and transmission system additions. The measures used are real solutions, but the test cases only represent possible combinations. Analyzing them provided a way for decision makers and the public to learn how the problem might be solved. Measures were also individually examined to develop a preferred alternative. An individual measure could still be a part of the preferred solution even if the analysis was not favorable towards the test case containing the measure. To help predict environmental consequences and advise decision makers, an analysis of environmental impacts for each feasible measure was conducted. A technical analysis using the economic and technical evaluation factors was also completed for measures and test cases. The test cases presented in this analysis were used by utility teams to develop and test evaluation methodology for the Draft EIS. Appendix C describes test cases in greater detail.

Sounding Board Review - To involve the business community, labor, government agencies, key interest groups and others mostly outside the utility industry, a group called the Sounding Board was created. This group provided opinions and suggestions on elements of the Analysis for the Draft EIS, and the Draft EIS.

Define Strategies - Using the methodology developed and tested during the course of the Analysis for the Draft EIS, measures were put together into four bundles called alternative strategies. The alternative strategies discussed in the Draft EIS and FEIS are considered realistic solutions to the Puget Sound's electric reliability problem. The Preferred Alternative was identified by the utility project Steering Committee using input from the Sounding Board.

Draft EIS and Public Comments - The objective of the DEIS was to identify alternative strategies and a preferred alternative that solve the cross-Cascade transmission capacity problem in the 1994-2003 period, while satisfying the purposes and evaluation factors discussed in this chapter. It provided information on the alternative strategies to allow the public to identify their preference. All comments received were recorded and responses are included in this Final EIS. Public response is an important factor in decision making.

1.5.3 Identify Plan

Bonneville Power Administration, an agency of the U.S. Department of Energy, in accordance with Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act, has prepared a Draft and Final EIS on the Puget Sound Area Electric Reliability Plan (PSAERP). The preferred plan in this Final EIS is unchanged from the Draft EIS. Most public review and comment on the preferred alternative was supportive. Public comments on the Draft EIS and responses are in Chapter 8.

Record of Decision - BPA intends to issue a Record of Decision no sooner than 30 days after filing and distributing the FEIS. BPA anticipates several decisions. The first decision anticipated is a decision to adopt a document termed "The Puget Sound Area Electric Reliability Plan." Second, BPA will decide on its role in implementing the plan. Specifically, BPA proposes to construct the Schultz Substation at Site 3 and add additional voltage support facilities at Echo Lake substation. BPA also expects to decide to accelerate Puget Sound conservation programs, and to begin preparation of an EIS on the contingency cross-Cascades transmission line.

1.5.4 Implement Plan

Following endorsement of the Plan, BPA and/or one or more of the Puget Sound utilities may sponsor individual actions to meet the Plan's objectives. Such decisions will be made in accordance with the utility's normal customs and practices. The PSAERP EIS will, in part, satisfy Federal or State environmental requirements. Site-specific analyses may be required for subsequent proposals.

The utility team will periodically monitor power supply, resource development, and user demands during 1994-2003, to measure progress in accomplishing the Plan. Plan modifications may be required to respond to changing conditions.

1.6 OTHER REGIONAL ENERGY PLANNING PROCESSES

BPA, the Northwest Power Planning Council and utilities in the Pacific Northwest are planning and taking actions to meet the energy needs of the Northwest. The PSAERP EIS addresses the transmission capacity problem in the Puget Sound area. This is different than the need for energy in the rest of the region. However, actions planned by BPA and other utilities to meet energy needs do relate to the activities planned in the Puget Sound area. This section describes other planning processes and how they may or may not impact the Puget Sound area transmission capacity problem.

1.6.1 The Northwest Power Planning Council's 1991 Power Plan

In the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Northwest Power Act), Congress assigned responsibility for developing and adopting a regional conservation and electric power plan to the Council. The Council completed a new Power Plan in 1991. One of the objectives in the Power Plan is to acquire all low-cost resources. This includes acquiring 1,500 aMW of conservation and efficiency improvements in the region by 2000.

The PSAERP EIS includes aggressive conservation in all alternatives considered. Achieving this conservation will help BPA and Puget Sound area utilities meet this objective of the Power Plan.

1.6.2 The BPA Resource Program

The Resource Program is BPA's primary process for deciding how to meet future Federal energy resource needs: how much new energy resource development is needed, which types of resources to acquire and option, how to acquire them, and how much to spend. The Resource Program process uses the Council's Power Plan as a guide for BPA actions.

In January 1992, BPA released the Draft 1992 Resource Program. This Draft Resource Program describes how BPA proposes to meet its part of the Council's regional resource objectives.

The Draft 1992 Resource Program builds on resource actions in the 1990 Resource Program. The Draft 1992 Resource Program recommends that BPA:

- Acquire at least 600 aMW of cost-effective conservation between 1993 and 2003
- Acquire 250 aMW and Option 250 aMW of generating resources

Methods to acquire these resources include accelerated conservation, billing credits, competitive bidding, and exploring intersystem opportunities and other processes.

The Draft 1992 Resource Program includes BPA's part of the accelerated conservation needed to help solve the Puget Sound area voltage stability problem. BPA will finalize the 1992 Resource Program in September 1992.

Conservation Implementation Plan - Both the Power Plan and BPA's Draft 1992 Resource Program place great emphasis on conservation. Acquiring all available cost-effective conservation resources in the region presents major challenges. To identify and resolve issues and barriers to achieving this conservation, BPA issued a draft Conservation Implementation Plan (CIP), and asked for help from the region to develop strategies to meet conservation targets. After the CIP was reviewed and revised, BPA published it as part of the first draft 1992 Resource Program. In the CIP, BPA proposes to implement an Accelerated Path target that greatly increases public power's current overall level of conservation acquisition. This proposal is in tune with the accelerated conservation in the PSAERP EIS. The CIP proposes on a regional level what the PSAERP proposes for the Puget Sound area. BPA is committed to meet this target in partnership with the region.

Resource Supply Expansion Program (RSEP) - One objective of the Council's 1991 Power Plan is to confirm additional conservation and renewable resources. In 1991, BPA established a target of confirming 1,500 aMW of resources by 1995. The Resource Supply Expansion Project (RSEP) is a collaborative process among electric utilities and other interested parties to complete demonstration projects to confirm resources. Many technologies are technically available, but untested in the Northwest. The performance, reliability and market acceptance of these technologies will be tested and confirmed through RSEP. BPA and Puget Sound area utilities will use any new, confirmed technologies that could help solve the Puget Sound area problem if they are cost-effective and meet federal, state and local environmental requirements.

Acquisition Test Programs Underway - Based on the 1990 Resource Program, BPA is testing acquisition methods for these resources:

- 350 aMW through billing credits and all-source competitive bidding
- 120 aMW of energy savings from hydroelectric system and transmission system efficiency improvements
- Optioning 800 aMW through the 1990 Resource Contingency Plan.

These programs contain incentives for resources in the Puget Sound area. These incentives specifically address the need for more resources to help solve the problem in the Puget Sound area. If BPA acquires resources in the Puget Sound area, they may contribute to solving the problem there. The actual number of resources that will be acquired (if any) in the Puget Sound area is very uncertain since the process is ongoing and contracts are not signed. Program or project environmental reviews will be completed before a decision is made to acquire these resources. Lessons learned from these test programs will provide information that can be used in future Resource Programs.

Resource Programs Environmental Impact Statement (RPEIS) - To comply with NEPA in its resource planning activities, BPA is completing the RPEIS. The RPEIS focuses on the environmental tradeoffs among the many resources BPA might acquire including conservation, renewables, combined cycle combustion turbines, nuclear, coal, etc., and the environmental impacts of adding these resources to BPA's system. The RPEIS will be released this spring.

As BPA proposes specific resource acquisitions in future Resource Programs, BPA will use the RPEIS with site-specific environmental documents to evaluate the environmental effects of the proposed resource.

Unlike the PSAERP EIS, the RPEIS is a programmatic document that covers broad issues associated with regional resource acquisitions. The RPEIS is intended to be broad enough to support Records of Decision for several Resource Programs. The PSAERP EIS focuses on a specific problem in the Puget Sound area and does not cover regional resource issues.

Both EIS's, however, used much of the same information about potential load growth and resource impacts.

1.6.3 Puget Sound Utility Resource Planning

Each utility involved in the PSAERP develops a plan to meet its energy needs. In their plans, utilities state which resources they may acquire. Actions that Puget Sound Power and Light Company is taking are summarized below. Some of the resource acquisitions planned by the utilities are assumed in the 400 MW of generation assumed in the PSAERP EIS.

Puget Sound Power and Light Company is working with industry in the Puget Sound area to develop over 650 MW of cogeneration capacity in Skagit and Whatcom counties between now and late 1994. The system studies that defined system capability (Figure 1-4) included 300 MW that Puget has committed to contractually. Puget recently finalized decisions for the remaining 350 MW.

1.6.4 Columbia River Salmon Flow Measures Options Analysis Environmental Impact Statement

The Army Corps of Engineers (Corps) recently completed the Columbia River Salmon Flow Measures Options Analysis EIS. In this EIS the Corps considered measures to increase Columbia River spring and summer flows to revive depressed salmon stocks. Measures include reservoir drawdown in 1992. Available hydropower may be reduced to enhance salmon recovery, but reduced capacity will not impact the transmission capacity problem in the Puget Sound area. Peak power demand in the Puget Sound area occurs during December, January, and February. Any capacity loss for salmon recovery will occur primarily during April through September.

1.6.5 System Operation Review EIS

The Corps, Bureau of Reclamation, and BPA are jointly preparing a System Operation Review (SOR) EIS on Columbia River hydropower system operations. The SOR EIS will include extensive analyses of the effects of alternative hydrosystem operations on the multiple uses of the hydrosystem. Multiple uses include navigation, flood control, recreation, hydropower generation, fish (both resident and anadromous), wildlife, cultural resources and irrigation. This EIS will allow the agencies to make major decisions about river system operations. Some important decisions include developing guidelines for operating the system that considers impacts on all river users (System Operation Strategy); decisions about terms for coordinated river operations for power production (Pacific Northwest Coordination Agreement); and renewal of agreements with Canada for energy from the Columbia River (Canadian Entitlement Allocation Agreements). The SOR EIS will be completed in 1994.

The magnitude of potential changes to the regulated flow of the Columbia and Snake Rivers are unknown. Changes could affect hydropower generation in the spring and summer. It is unlikely that these changes will affect hydropower capacity in the winter months, when peaking capacity is needed in the Puget Sound area. The PSAERP EIS assumes current operating practices and constraints on the hydrosystem for all alternatives.

1.6.6 Bellingham 230-kV Transmission Line Environmental Impact Statement

BPA is proposing to rebuild its single-circuit 230-kV line between Custer Substation and Sedro Woolley to double-circuit using existing right-of-way. BPA is preparing an EIS to evaluate alternatives for this project. This project would make the Bellingham power supply more reliable and would allow increased power capacity on the main transmission system between the Pacific Northwest and Canada. The PSAERP EIS has different purposes and needs.

1.6.7 Other Puget Sound Transmission Reinforcement Projects

Transmission-related problems within the Puget Sound area are not addressed by this plan. These problems, brought on by load growth, development of new generation, and impacts of power exchanges with Canada, are being addressed by the affected utilities under separate plans. These plans do not conflict with the alternative strategies.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes a preferred alternative and four alternative strategies that can solve the peak demand problem in the Puget Sound area. A No Action Alternative is also described.

Each strategy is composed of several measures. The Preferred Alternative is Alternative Strategy 2. To aid in understanding the strategies, three methods of describing each strategy are provided. A chart graphically shows the year measures are taken and the amount that each measure contributes to meeting peak power needs. Tables give a numerical summary of the strategies. Finally, each strategy is described in narrative. Supporting information is provided in the appendices.

The load forecast takes into account planned conservation and market-driven fuel switching. All the strategies account for expected energy resource development within the region as described in Chapter 1. Two measures, accelerated energy conservation and Voltage Support Option 1, are included in all strategies.

While sharing these two measures, each strategy overall represents a different approach to meeting peak power needs. The objective of this chapter is to provide an understanding of the alternative strategies. Chapter 4, Environmental Consequences, provides an evaluation of the strategies showing environmental differences. Economic and technical differences are also shown.

Finally, the success of the alternative strategies is highly dependent on the planning assumptions described in Chapter 1. If higher or lower than expected load growth occurs, the alternative strategies will be modified accordingly. Similarly, if energy resources now planned by Puget Sound utilities are not built, additional measures will be needed. Each strategy discussion ends with Contingency Actions that would be taken if the transmission capacity deficit is more than expected. The No Action Alternative is defined as an unplanned approach, thus no contingency measures are discussed for this alternative.

2.1 PREFERRED ALTERNATIVE

2.1.1 How the Preferred Alternative Was Defined

To hasten improved electric reliability, and focus public discussion on the potential solutions, BPA analysts evaluated the alternatives and made a tentative conclusion about which was "preferred." This was discussed with the five-utility Steering Committee and the Sounding Board, a citizen review panel. This input supported BPA's conclusion. BPA presented this as the "Preferred Alternative" in the EIS.

In choosing a preferred alternative plan, several qualities beyond the normal criteria such as environmental stability, cost, and technical performance were considered. Adaptability in view of uncertainties such as higher than medium load growth, Canadian Entitlement return, local generation development or decommissioning, Endangered Species Act listings, and electromagnetic field health effects was one desired quality. This flexibility was felt best achieved by identifying contingency measures to use if the capacity deficit grows faster than expected.

A second quality was the need to regularly review the electric reliability of Puget Sound and update the plan when changing conditions warrant it.

As a preface to the following discussion, it is important to remember that planned conservation and market-induced conversions to natural gas are included in the load forecast. New energy resources expected to be developed in the Puget Sound area in response to utility energy needs are also included (see Section 1.4.4). In addition, two measures are common to all of the plans. These are: Accelerated Conservation Programs; and Voltage Support Option 1. To avoid repetition, measures common to all plans are discussed within Alternative Strategy 1, and referred to in later discussions.

2.1.2 Measures Proposed in the Preferred Alternative

As stated above, the Preferred Alternative is Alternative Strategy 2. The Preferred Alternative is described here briefly, with detailed information on individual strategy measures given under Alternative Strategy 2.

The Preferred Alternative includes the common elements of all the strategies: accelerated conservation programs in the residential, commercial and industrial sectors, a high-efficiency shower head program, and Voltage Support Option 1. These elements are described in Sections 2.2.1 and 2.2.2 under Alternative Strategy 1. Puget Sound area utilities will ramp up conservation programs to achieve peak reductions by the winter of 1993-94. BPA will complete Voltage Support Option 1 by the fall of 1993, which will provide 600 MW of additional transmission capacity for the winter of 1993-94. Another voltage support element, Voltage Support Option 2, also would be implemented. In Voltage Support Option 2, BPA would develop a 500-kV substation east of the Cascade Mountains that would provide 1000 MW of increased capacity by the winter of 1994-95. This substation, called Schultz Substation, would be located north of Ellensburg, Washington. See Chapter 3 for the preferred site (Site 3) and alternative sites.

2.1.3 Contingency Measures of the Preferred Alternative

Because load growth and resource supply could vary substantially from that assumed in this analysis, each alternative strategy includes contingency measures that could be used to make each strategy flexible and able to respond to unexpected circumstances. Though the Preferred Alternative is forecast to create 600 MW of surplus capacity in 2003, the uncertainties listed in Section 1.4.6 could increase the transmission capacity deficit by several thousand megawatts. The contingency measures included in this alternative deal with these uncertainties. Three elements, a new cross-Cascades transmission line, combustion turbines, and load curtailment are included in the preferred alternative. The first choice contingency measure is a new cross-Cascades transmission line. A subsequent site-specific EIS on this transmission line would begin in late 1992 or early 1993. A transmission line typically requires 7-8 years from the initial planning stage to complete. Starting the EIS will shorten the lead time by 3-4 years. A decision to build would not be necessary until 1996 or 1997, and if the line is unnecessary, it could be deferred at that time.

If building a transmission line is controversial and BPA is unable to build it in time to supply the need for peaking power, one or more combustion turbines could be built. Peaking combustion turbines are the second choice for a contingency action. Combustion turbines are well suited for a contingency action. Simple cycle combustion turbines require a relatively low level of investment (normally $400 - $500/kW for a combustion turbine complete on site and operating) compared to other generating resources. Combustion turbines could be installed in 70 MW increments until Puget Sound area needs are met. Typically, with advanced planning, a combustion turbine can be sited, permitted, and constructed in less than 4 years depending on the location and site conditions. Environmental impact analysis and permitting account for 25 to 30 percent of this time and could be at least partially offset through early completion of those activities. This can shorten the time needed to bring the resource on line by 1 to 1.5 years at a cost of approximately 1 percent of total capital. If the combustion turbine and generator package (including required pollution control equipment) is ordered or acquired early, this can shorten the time to construct to approximately 1 to 1.5 years. If the combustion turbine and generator package is not needed, it may be sold at a future date.

The third choice for a contingency measure is contract curtailment. Contracts to suspend power deliveries during peak demand periods could be used as an interim measure while long-term solutions such as the transmission line or combustion turbines are pursued. Load curtailment has a short lead time, and would only be used during peak loads. For example, BPA has certain curtailment rights in existing power sales contracts with customers. These are described under the No Action Alternative in Section 2.6. Area utilities also have curtailment programs operating

but they are not necessarily designed to operate during peak conditions. Other curtailment options such as contractual and curtailment co-ops could be pursued now to be activated later if needed.

No specific actions to develop combustion turbines or load curtailment options are proposed at this time. Any such actions would require appropriate NEPA analysis. Actions to shorten lead times for these options may be undertaken later if warranted by changing circumstances.

2.1.4 Environmental Impacts of the Preferred Alternative

An overview of environmental impacts for individual strategy measures is included in the following sections. For a more detailed discussion of impacts see Chapter 4.

2.2 ALTERNATIVE STRATEGY 1 - TRANSMISSION LINE

This strategy proposes a new high-voltage transmission line to transmit power from generation resources east of the Cascades to the Puget Sound area. Figure 2-1 illustrates how measures are applied over time to meet the forecasted extreme winter peak load deficit for medium and medium-high loads. The strategy uses accelerated energy conservation measures and Voltage Support Option 1 in early years to meet forecasted peak loads. In 1998, a new line is added providing the large increase in capacity shown in the figure.

Figure 2-1. Alternative Strategy 1

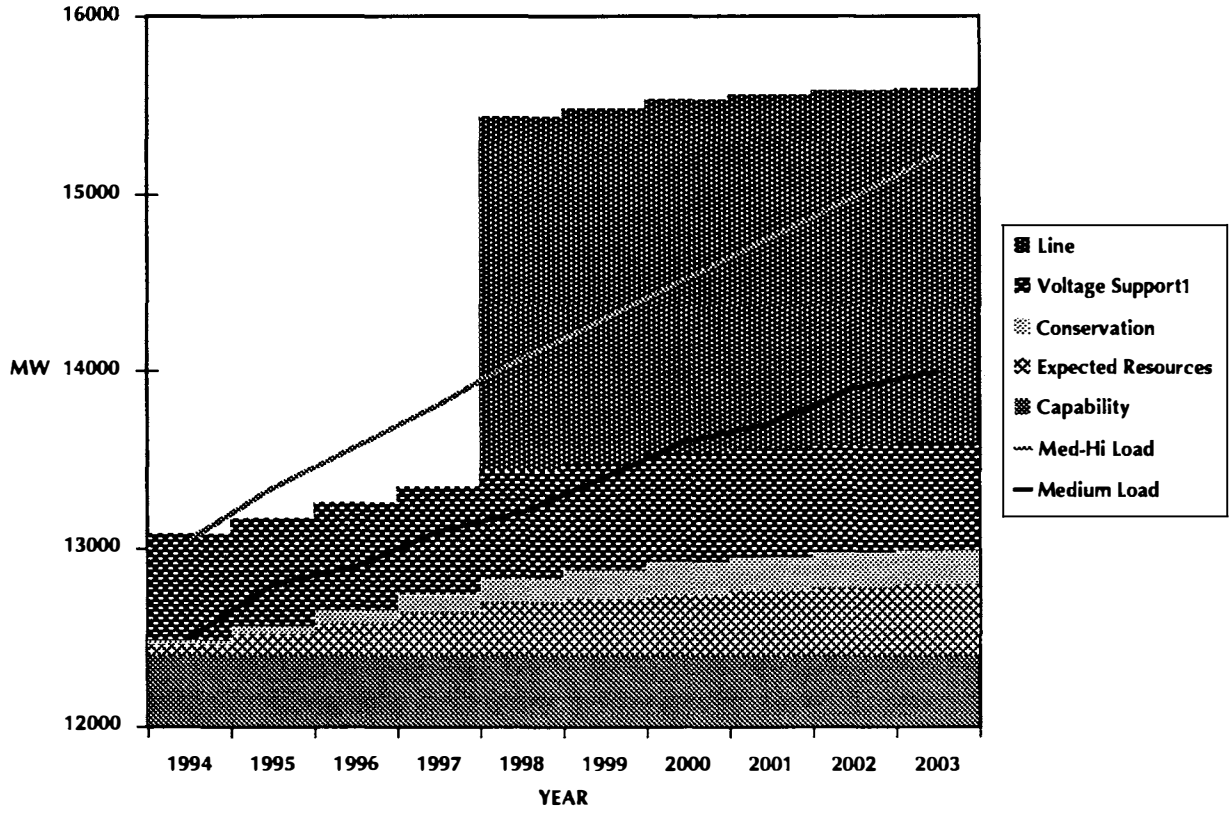


Table 2-1 provides numerical data on each of the measures included in the strategy. Data reflects megawatts available to meet extreme winter peak conditions. Load forecast data follows medium load growth for extreme winter peak. The table shows megawatts of surplus capacity for each year of the planning timeframe. Alternative Strategy 1 provides 1608 megawatts of surplus peaking capacity in Puget Sound in 2003.

Table 2 -1. Alternative Strategy 1 Capacity (MW)

ALTERNATIVE STRATEGY 1: TRANSMISSION LINE										
YEAR	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
CAPABILITY	12400	12400	12400	12400	12400	12400	12400	12400	12400	12400
EXPECTED RESOURCES	60	120	180	240	300	320	340	360	380	400
CONSERVATION	21	48	82	116	148	180	211	214	218	208
VOLTAGE SUPPORT 1	600	600	600	600	600	600	600	600	600	600
NEW LINE	0	0	0	0	2000	2000	2000	2000	2000	2000
TOTAL PLAN CAPACITY	**13081**	**13168**	**13262**	**13356**	**15448**	**15500**	**15551**	**15574**	**15598**	**15608**
LOAD FORECAST (EXTREME PEAK)	**12500**	**12800**	**12900**	**13100**	**13200**	**13400**	**13600**	**13700**	**13900**	**14000**
SURPLUS CAPACITY (PUGET SOUND)	**581**	**368**	**362**	**256**	**2248**	**2100**	**1951**	**1874**	**1698**	**1608**

2.2.1 Conservation Measures

Conservation means using electricity more efficiently. Conservation typically reduces electricity use at all hours and can reduce transmission requirements.

The conservation component of this and all strategies includes an accelerated weatherization program, an accelerated industrial conservation program, a high-efficiency shower head program, and an accelerated commercial retrofit program. All accelerated programs are those funded by BPA. Utilities may have other conservation programs that they implement on their own. These were not considered as part of the acceleration program. The accelerated programs provide savings starting in January 1994. A complete description of the conservation programs is given in Appendix D.

Conservation programs traditionally are programs used to reduce annual energy consumption rather than just energy use during peak hours. Except for the high-efficiency shower head program, the conservation measures are accelerated versions of the programs now being operated by BPA and Puget Sound area utilities. Besides providing peak load reductions, they also provide substantial energy benefits. These programs have not been redesigned to make them more effective in reducing peak loads. The analysis of these programs was done to determine if accelerating traditional programs would significantly reduce peak loads on very cold days.

Table 2-2 shows the costs and savings of the conservation programs. Program levels are levels above a baseline level of savings that includes all currently planned conservation included in the load forecast. Baseline

levels are included in Table 2-2 in parentheses. Savings for some conservation programs seem small because the measure considered accelerates an existing program that is already being operated aggressively. Only modest acceleration is possible and the savings above the baseline level are limited. Savings diminish over time because the extra savings derived from accelerating these programs lessen as the programs approach what would have been their original schedule.

Table 2-2. Costs and Savings of Conservation Programs

	PEAK COST ($/KW) Normal Winter Peak		ENERGY SAVINGS (Average annual megawatts) *				
Conservation	INITIAL COST	ANNUAL COST	1994	1996	1998	2003	2010
Residential Weatherization	$0	$62	2 (17)	7 (26)	12 (32)	11 (43)	0 (54)
Commercial Retrofit	$1420	$0	2 (18)	12 (28)	25 (37)	52 (58)	87 (81)
Industrial Retrofit	$0	$56	4 (15)	11 (26)	17 (38)	25 (67)	0 (92)
High-Efficiency Shower Heads	$335	$0	0	6	11	18	17
TOTALS*			8 (50)	36 (80)	65 (107)	106 (168)	104 (227)

	PEAK SAVINGS NORMAL YEAR (Units are megawatts) *					PEAK SAVINGS EXTREME YEAR (Units are megawatts) *				
Conservation	1994	1996	1998	2003	2010	1994	1996	1998	2003	2010
Residential Weatherization	10 (74)	30 (112)	51 (138)	47 (188)	0 (235)	13 (98)	40 (149)	68 (183)	62 (251)	0 (313)
Commercial Retrofit	4 (28)	18 (44)	39 (58)	81 (90)	138 (126)	4 (32)	21 (50)	44 (65)	91 (102)	157 (143)
Industrial Retrofit	4 (15)	11 (27)	18 (39)	25 (69)	0 (94)	4 (16)	11 (27)	18 (39)	26 (70)	0 (95)
High-Efficiency Shower Heads	0	14	25	41	39	0	10	18	29	28
TOTALS*	18 (117)	73 (183)	133 (235)	194 (347)	177 (455)	21 (146)	82 (226)	148 (287)	208 (423)	185 (551)

Numbers in parentheses are baseline conservation in the load forecast

* Numbers are cumulative

The savings shown in Table 2-2 for all conservation measures are not the maximum savings that are theoretically possible. Instead, they are based on program success estimates. Program accomplishments were assumed based on BPA and area utility experience with conservation programs. Projections of future savings were limited to results that actual programs could be expected to achieve. This means conservation is installed in only a portion of houses or businesses that can actually accommodate this equipment. Savings may be more than assumed here. Costs for the accelerated programs merely reflect the costs of doing projects earlier than planned.

The analysis that produced the estimates in Table 2-2 was limited to estimating peak savings that can be reliably counted on during the extreme events that might cause voltage stability problems. Additional energy conservation potential and peak savings are available but were judged not reliable enough for this plan. In some cases, data were not available to estimate the contribution that some resources would make during peak load hours, and for others, estimates of program performance were unavailable. Also, some conservation programs make no contribution to the peak problem addressed in this analysis. For example, measures that save energy on outdoor lighting make no contribution to peak reduction because the lighting measures only save energy during the night, not during the day when peak loads are the greatest.

Peak savings are shown for normal winter days and extreme winter days assuming the medium load forecast. Separate calculations were needed because most programs have results that are weather sensitive. Some programs, such as residential weatherization, provide more peak savings on extremely cold days while others save less at the hour of peak demand during extreme weather.

Table 2-2 shows that accelerating conservation programs provides savings in a normal and extreme peak year. The peak savings are greatest for 2003 (194 MW normal year, 208 MW extreme year), then decrease by 2010, the time most programs would be completed regardless of this Plan. Energy savings follow this pattern; savings increase to 2003 and then decrease by 2010. All programs provide 104 aMW of energy savings by 2010. If a forecast other than the medium load forecast is assumed, combined savings would be different. More energy would be saved with a higher load forecast, and less would be saved with a lower load forecast.

Residential Weatherization Program - This is an acceleration of the existing weatherization program. Working through utilities, BPA provides funding to weatherize existing homes and apartments. After an energy audit, homeowners and landlords have conservation measures installed in their homes or rental units. Measures installed include adding insulation to ceilings, floors and walls, and weather-stripping and energy-efficient windows to houses and apartments.

The cost of accelerated weatherization is shown in Table 2-2 as an annual finance cost based on a 3% real interest rate. This represents the additional cost of weatherizing homes sooner than originally planned.

Accelerating this program will weatherize all eligible homes or rental units by 2000. Under the baseline, these units would not have been completed until 2010. Savings shown in Table 2-2 increase through 2003 and drop back to zero as the baseline catches up. By 2010 savings are zero because, absent accelerating the program, the same number of dwellings would have been weatherized. For temperature sensitive loads such as residential space heat, peak savings are higher during extremely cold weather than during a normal heating season.

Residential weatherization programs have the potential to affect indoor air quality. Air leakage in homes is reduced when houses are weatherized, and indoor air pollutants may increase. Actual rates are based on the combination of ventilation available and sources of pollution.

Industrial Conservation Program - The industrial sector includes manufacturing firms. Among industries, the pulp and paper, lumber and wood products, and chemical industries consume the most electricity. Among applications, lighting and motors for production lines consume the most electricity. Process heating and refrigeration also consume large amounts of electricity. Industrial conservation is achieved by retrofitting existing facilities to use less energy and by building new facilities for maximum energy efficiency. This could include incentives to conserve energy.

This measure accelerates the existing Energy $avings Plan program currently offered by BPA. This program promotes electric efficiency in both new and existing industrial plants. Under the existing Energy Savings Plan, BPA and utility staff work with industrial firms to find ways to save energy. The industries then submit proposals for energy conservation projects directly to BPA for funding. Any measure that saves energy is eligible. This program includes installing efficient lighting, heating, ventilation, and air conditioning (HVAC) systems, process heating systems, pumps, compressed air, and motors. To reduce the reactive component of power consumed by an industrial load and improve efficiency, BPA provides a power factor incentive in this program. To date, few industries have participated.

Costs, shown in Table 2-2, are annual costs because this program only accelerates expenditures that are already planned. By 2000, this program will complete installation of measures that under present plans would take until 2010. Savings, shown in Table 2-2, first increase and then decline to zero by 2010 because this program only accelerates conservation investments already planned. By 2010 the baseline program would have accomplished everything the accelerated program accomplishes.

There is no significant difference in the savings on a normal winter day and an extreme day because industrial loads are not temperature sensitive. This means the cost/kW saved is about the same for either day.

Industrial conservation measures have minimal environmental effect. Measures involve minor modifications or additions to existing systems.

Accelerating the Commercial Retrofit Program - Based on energy use, the commercial sector is the fastest growing sector in the Pacific Northwest. This sector is divided into ten building types: offices, retail buildings, restaurants, grocery stores, lodging, colleges, schools (primary and secondary), warehouses, health facilities, and miscellaneous. The most energy-intensive uses in the commercial sector are lighting, refrigeration, space heating, water heating, and air conditioning. Office and retail buildings have the largest percentage of use because they have the largest share of commercial building floor space. Restaurants and grocery buildings have substantially higher energy use per square foot than other building types and have great savings potential.

This measure accelerates the commercial retrofit program being developed by BPA and area utilities. This would speed up the rate conservation is acquired in commercial buildings by retrofitting these buildings with more energy-efficient equipment. BPA and utility staff will work with commercial establishments to encourage installing energy conservation measures when buildings are remodeled.

The costs of this program, shown in Table 2-2, are the full cost of the equipment to be installed. The baseline for the commercial sector does not propose to acquire all commercial conservation by 2010, so it is assumed the projects completed by this accelerated program would not have been done before 2010 without the program acceleration.

The commercial retrofit program is modeled as a 10% reduction in load for a portion of commercial buildings in the Puget Sound area. A 10% load reduction is applied to all hours of the day for both the normal winter day and the extreme winter day. Commercial loads are temperature sensitive, resulting in greater peak savings on extremely cold days.

Like residential programs, commercial conservation programs carry the potential to affect indoor air quality and ozone depletion. Another concern is the need for proper disposal of polychlorinated biphenyl (PCB) contained in ballasts in fluorescent light fixtures constructed before 1979. However, an organized program probably increases the chance that these ballasts will be disposed of properly rather than thrown into the solid waste stream one by one as they wear out under normal use.

High-efficiency Shower Head Program - High-efficiency shower heads reduce the amount of hot water required per shower. This means the water heater operates for less time per shower. Because each water heater operates for less time, fewer water heaters throughout the area operate at once. Therefore, total water heater demand is reduced because of greater diversity in operating times.

High-efficiency shower heads are part of a water heater package that includes water heater controls and more efficient tanks. High-efficiency shower heads are in the package to increase consumer acceptance and increase participation because less water will be drawn from the tank and consumers are less likely to experience low water temperatures. High-efficiency shower heads also would be offered free to consumers who do not choose the entire water heater package. This proposed program would install high-efficiency shower heads in 60% of showers by 2002. The cost for each shower head is estimated to be $20. Total costs and savings are shown in Table 2-2.

Other Conservation - The Council's 1991 Power Plan calls for acquiring conservation throughout the region. While accelerated conservation was first proposed in the DEIS before the Council's plan was published, the Council's plan acquires it at a greater rate than that specified in this EIS. BPA is committed to pursuing the conservation in its service area described in the Council's Plan. The accelerated programs in the EIS address the most important conservation programs but do not consider some additional conservation activities expected of BPA by the Council. These additional conservation activities will increase total acquisition levels above those described in Table 2-2.

BPA is actively pursuing the Conservation Implementation Plan (CIP), first described in Section 1.6.2, that will acquire all cost-effective conservation resources in the entire BPA service area by 2003. This plan will acquire conservation potential from the public utilities in the Puget Sound area. This plan is in tune with the accelerated conservation in the PSAERP EIS. The CIP proposes on a regional level what the PSAERP proposes for Puget Sound. Implementation will require BPA to vigorously explain to the public the need for these strenuous conservation efforts now. Puget Sound Power and Light is also aggressively pursuing the conservation potential in its service area so the result will be the aggressive acquisition of the conservation resources in the Puget Sound area including those not described in Table 2-2.

2.2.2 Voltage Support Option 1

The power flowing in and out of storage in magnetic and electric fields is called reactive power. All elements of the power system rely on magnetic and electric fields to generate, transmit, and convert electrical power to work. Reactive power must be in balance for stable voltage on the system. Capacitors are devices that store energy in electric fields and are used to raise voltage on the transmission system.

The voltage support measures solve a portion of the voltage stability problem by adding equipment at existing substations in the area. There are two voltage support measures, Option 1 and Option 2. Voltage Support Option 2 is not a proposed action in Alternative Strategy 1, but is described in Section 2.3.3. Table 2-3 summarizes costs, capacity, and lead time for both voltage support options. Voltage Support Option 1 is included in this and all other strategies. This option would add shunt capacitors at Echo Lake Substation after it is completed in 1993. Shunt capacitors are installed in racks and would require an area of less than one acre. A more detailed description of both options is given in Appendix E.

Table 2-3. Transmission Measures Costs, Loss Savings, and Lead Time

MEASURE	COST (1990 $Millions)	CAPACITY (MW)	LEAD TIME (years)
Transmission line	250	2000	5-6
Voltage Support 1	6	600	2
Voltage Support 2	40	1000	3
LOSS SAVINGS IN THE PACIFIC NORTHWEST (Peak MW)			
MEASURE	**1994**	**1998**	**2003**
Transmission line	[1]	80	105
Voltage Support 1	0	0	0
Voltage Support 2	[1]	9	12
[1] = cannot be energized by winter 1993/1994			

2.2.3 Cross-Cascade 500-kV AC Double Circuit Transmission Line

A new transmission line crossing the Cascade Mountains from eastern Washington to the Puget Sound area is another possible solution. The transmission line would allow power from existing generation resources east of the Cascades to be transmitted to Puget Sound beginning in 1998. Crossing the Cascade Mountains with a transmission line may require:

- right-of-way
- steel structures
- access roads
- improvements at some existing substations
- upgrading some existing lines

These additions could be both in the Puget Sound area and east of the Cascade Mountains. Priority will be given to using existing corridors and replacement options. BPA, the U. S. Forest Service (USFS) and U. S. Bureau of

Land Management (BLM) have studied potential corridors for transmission lines across the Cascade Mountains. The Draft Northern Cascades Corridor Availability Study (BPA, 1990), evaluates public and private land and provides detailed information on existing and potential corridors for most of Washington. Most likely routes for a line would be located between these BPA substations, shown on Map 1:

- Chief Joseph and Echo Lake
- Chief Joseph and Monroe
- Sickler and Echo Lake

There are three possible corridors for a transmission line. They are identified as Alternate Corridors A, B, and C. Each crosses the Cascades. On Map 1, the existing corridors are identified in yellow. Existing BPA transmission lines are in red. New corridors are shaded in black. A new line could be a replacement of an existing line on existing right-of-way. A new line could be built parallel to an existing line by expanding the existing right-of-way. Or, a new line could be built either partially or totally in a new corridor.

These corridors are divided into three parts for analysis: an eastern segment, a central segment, and a western segment. Segments are defined by topography and land use. The boundaries are shown on this map by a green dashed line. These corridors are described in Chapter 3. Within the corridors there are many options for transmission line routes. Potential routes and any impacts associated with individual routes would be discussed in a site-specific environmental impact statement if a transmission line is included in the Plan.

No Cascades crossings are considered north of Stevens Pass, which is about 160 miles south of the Canadian border. Corridor development would be difficult. The terrain is rugged, and large Wilderness areas cover much of the mountain range, blocking potential east-west routes. Crossing the Cascades through North Cascades National Park is difficult because the North Cascades Highway's scenic quality is protected by legislation. The rest of the Park is strictly managed and would be considered only if all other routes were exhausted. Passes to the south exhibit gentler terrain. Corridors A and B contain fewer transmission lines now and because of reliability concerns (having all eggs in one basket) are favored over Corridor C, which contains four 500-kV lines.

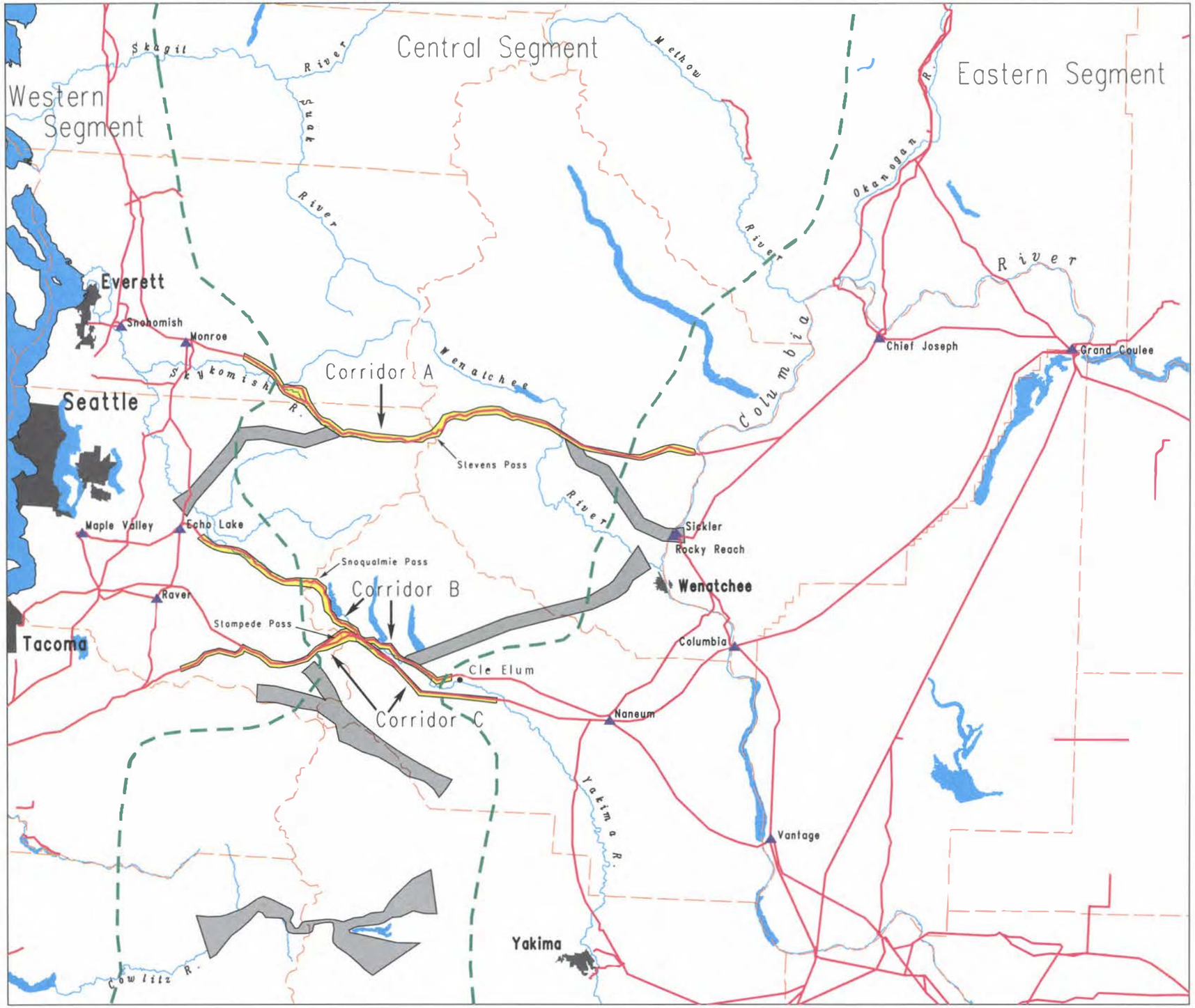
Table 2-3 shows potential costs, capacity, and lead time for a transmission line. This table also includes potential transmission system loss savings. These losses are the results of the heat generated in the line conductors when electrical current flows through the transmission line. If a new transmission line is added, the power flowing through the transmission system is redistributed. The current flowing through each transmission line will typically decrease, so less electrical energy is lost. Since this energy is then free for other uses, fewer resources need to be developed. A more detailed description of these and other characteristics can be found in Appendix E.

2.2.4 Contingency Measures

In Chapter 1, Section 1.4.6 described events that could change the future and the size of the transmission capacity deficit in the Puget Sound area. If load growth is not as predicted, certain steps can be taken to respond to higher or lower load growth. In this strategy, if load growth is less than the medium forecast, or if additional resources in the Puget Sound area are developed, the transmission line could be delayed. If the deficit is larger, Alternative Strategy 1 provides about 1600 MW surplus in 2003 under medium load growth.

Also, common to all strategies is using load curtailment measures for contingencies. Load curtailment restricts electricity consumed by end-users. It limits the electricity available during short periods of system stress. For example, BPA has certain curtailment rights in existing power sales contracts with customers. These are described under the No Action Alternative in Section 2.6. Area utilities also have curtailment programs operating but they are not necessarily designed to operate during peak conditions.

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN

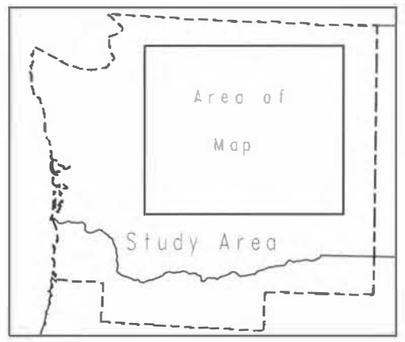


Cross-Cascade Corridors

LEGEND

- Segment Boundary
- Occupied East-West Corridor
- Potential New Corridor
- BPA Transmission Lines
- County Boundary
- BPA Substation

Data Layers from BPA'S Regional Geographic database.



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0 16 32

Map 1

Other curtailment options could be pursued now to be activated later if needed. Two types are described here: contractual, and curtailment coops. These options are over and above what is already obtained through the power sales contracts mentioned above.

Contractual Load Curtailment - Under a curtailment contract, a utility would negotiate contracts with interested commercial and industrial customers in its service area to provide utilities with the right to request specific curtailment. Contracts would specify advance warning, and limits on the frequency and duration of curtailments. When needed, the customer would curtail electricity use and the utility could, for example, compensate the customer with a rate reduction throughout the year.

The utility or customer could manually interrupt use, or the system could automatically curtail use through control devices. The method used would be established in each contract, providing flexibility for individual industry characteristics. Automatic interruption would provide a more responsive resource, but some industries would be unable to allow such interruptions because of safety or other concerns.

There are examples of this kind of contract in the Pacific Northwest. As described as part of the No Action Alternative, existing BPA contracts with DSI's allow interrupting approximately 600 MW of Puget Sound area peak load for 15 minutes, to ensure the stability of the Federal system.

Curtailment Cooperatives (CO-OPS) - Co-ops are groups of commercial and industrial customers joined to provide specific curtailment amounts. Co-op members could be commercial building owners or industrial facilities owners who band together and contract with the utility for a set amount of curtailment. This curtailment would be negotiated between the co-ops and the utility with the co-op members receiving a special rate for the curtailment. The members agree to limit their collective demand to certain levels on request from the serving utility. For example, utilities could contract with commercial customers to operate the energy management systems in their buildings to curtail loads during extreme peak periods. Other utilities across the country have already established these co-ops. For example, utilities such as Boston Edison and Pepco have contracts with members of co-ops. The advantage to the members is that they can shift participation among members to meet the contract. Payment is based on percentage of participation by a commercial or industrial member. The advantages for the utility are that they receive a firm amount of curtailment, and only have one contract to manage.

These additional curtailment programs have some advantages over the existing rights that BPA has with their contracts:

- contract curtailment may be more acceptable than involuntary curtailment during emergencies
- larger loads may be curtailed with fewer impacts
- advance notice may be possible before curtailment begins
- some programs allow for cooperative efforts among consumers
- payments will compensate consumers for curtailment
- programs provide increased flexibility to avoid adverse effects on critical loads

It has been estimated that customers, including larger industrial customers in the Puget Sound area, would be willing to curtail about 800 MW at a cost of twenty dollars per kW-year to protect the system in an emergency. This amount is over and above what is available through the DSI contracts. Technical studies of the power system have found that relying on more than 600 MW of curtailment would lead to unacceptable system performance because the base system is so highly stressed.

An industry's willingness to participate in a load curtailment program is affected by the amount of advance warning, the frequency and duration of curtailments, and the price utilities will pay for curtailment. Advance warning is important for shutting down processes safely and economically. If curtailment is used often and for long periods, fewer industries may judge curtailment economically feasible. The more utilities are willing to pay, the greater the participation. Some industries may not participate despite incentives.

Impacts from curtailment vary by level of compensation for customers and the frequency and duration of the curtailment. Impacts are found in health and safety, and socio-economics. Load Curtailment may have greater impact than the conservation, load management, and fuel switching measures. It may have less impact than some local generation and transmission measures. The complete discussion of environmental impacts is in Chapter 4, and Appendix F.

Load management and fuel switching measures can be used as contingencies as they become available in the marketplace. Direct load control is still in a relatively early stage of development in the Northwest, and information on all aspects of load control is limited. BPA and area utilities are studying these types of programs to gain information on cost, benefits, and availability. A description of programs is given in Sections 2.4.3 and 2.4.4.

2.2.5 Environmental Impacts of Alternative Strategy 1

Accelerating conservation programs have low health and safety impacts. Conservation could increase indoor air pollution. There are adverse impacts related to providing material for conservation products, but these are insignificant compared to raw material used for other measures. Voltage Support Option 1 has minimal impacts contained within existing substations. Transmission line impacts vary. If the line is in new or expanded right-of-way, impacts could be high. If the line is on existing right-of-way or is a rebuild of an existing line, impacts would be low. Detailed information about impacts is in Chapter 4 and Appendix F.

2.3 ALTERNATIVE STRATEGY 2 - VOLTAGE SUPPORT

Alternative Strategy 2 proposes to solve the Puget Sound area problem by using Voltage Support Option 2. It also includes Voltage Support Option 1 and the conservation measures described in Alternative Strategy 1. Figure 2-2 shows how these measures meet the need to serve the forecasted extreme winter peak loads. Voltage Support Option 2 provides additional capacity in late 1994. Table 2-4 provides data on each of the measures included in this strategy. Table 2-4 shows the total capacity of Alternative Strategy 2, the timing and amount of capacity provided by each of the measures included, and the surplus capacity of the strategy. Table 2-3 shows the cost of Voltage Support Option 2. This strategy provides about 600 MW of surplus capacity in 2003.

Figure 2-2. Alternative Strategy 2

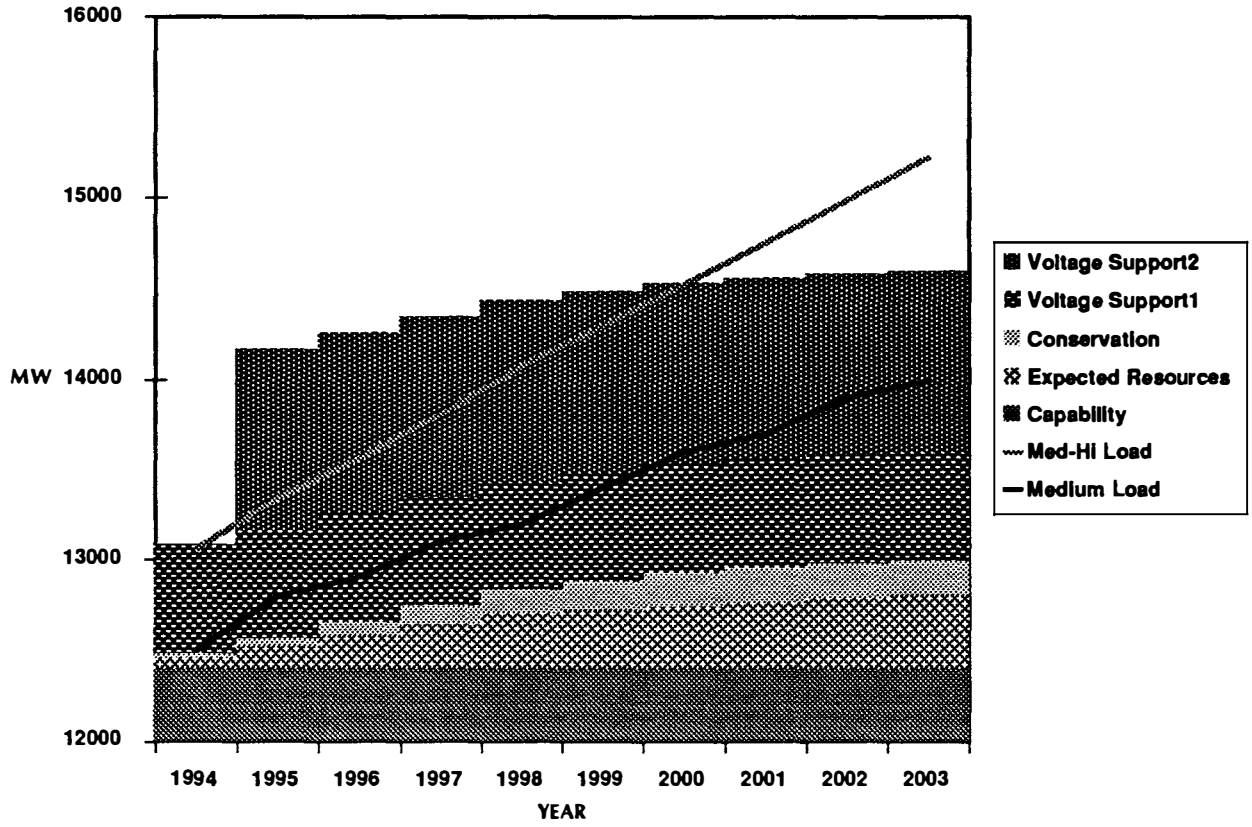


Table 2-4. Alternative Strategy 2 Capacity (MW)

ALTERNATIVE STRATEGY 2: VOLTAGE SUPPORT										
YEAR	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
CAPABILITY	12400	12400	12400	12400	12400	12400	12400	12400	12400	12400
EXPECTED RESOURCES	60	120	180	240	300	320	340	360	380	400
CONSERVATION	21	48	82	116	148	180	211	214	218	208
VOLTAGE SUPPORT 1	600	600	600	600	600	600	600	600	600	600
VOLTAGE SUPPORT 2	0	1000	1000	1000	1000	1000	1000	1000	1000	1000
TOTAL PLAN CAPACITY	**13081**	**14168**	**14262**	**14356**	**14448**	**14500**	**14551**	**14574**	**14598**	**14608**
LOAD FORECAST (EXTREME PEAK)	**12500**	**12800**	**12900**	**13100**	**13200**	**13400**	**13600**	**13700**	**13900**	**14000**
SURPLUS CAPACITY (PUGET SOUND)	**581**	**1368**	**1362**	**1256**	**1248**	**1100**	**951**	**874**	**698**	**608**

2.3.1 Conservation Measures

See description of conservation measures in Section 2.2.1.

2.3.2 Voltage Support Option 1

See Section 2.2.2 for a description of Voltage Support Option 1.

2.3.3 Voltage Support Option 2

This option adds a new 500-kV substation on the existing transmission line corridor approximately ten miles north of Ellensburg, Washington. The proposed substation, called Schultz Substation, would be approximately 130 acres, with 50 acres fenced. Most of the site would be within the existing right-of-way. Four sites including Naneum Substation were considered. Site 3 is the proposed site (see Map 1). All four potential sites are on Map 14. A brief description of the sites is in Sections 3.2.4 and 4.3. This substation would connect all lines in the corridor. Series capacitors would be installed for the two lines from Grand Coulee Dam. The series capacitors would increase the loading on these two newer and more efficient lines while reducing loads on others. They would stabilize voltages on the transmission system. Circuit breakers would be installed to enable power to be redirected in any manner desired. Cost, capacity, lead time, and loss savings are shown in Table 2-3. A detailed technical discussion of this option is given in Appendix E. A detailed environmental description of this option is given in Appendix G.

2.3.4 Contingency Measures

To respond to a deficit that grows faster than expected, measures can be delayed or added. If load growth is lower than expected, Voltage Support Option 2 can be delayed. If high load growth occurs, a transmission line and/or combustion turbines can be built. As in Alternative Strategy 1, load curtailment could also be used on an interim basis until other measures are available.

2.3.5 Environmental Impacts of Alternative Strategy 2

Environmental Impacts of the voltage support additions would be fewer than impacts from a transmission line. Impacts from the conservation programs are equal in all alternative strategies. Impacts are described in Chapter 4 and Appendix F and G.

2.4 ALTERNATIVE STRATEGY 3 - DEMAND REDUCTION

This strategy includes the conservation measures and Voltage Support Option 1 common to all strategies, but also includes load management and fuel switching measures instead of a transmission line or Voltage Support Option 2. Figure 2-3 shows how this strategy supplies power for extreme winter peak loads. The load management and fuel switching measures provide some surplus in each year through 2003.

The numeric values and total conservation savings of Alternative Strategy 3 using the medium load forecast are provided in Table 2-5.

Figure 2-3. Alternative Strategy 3

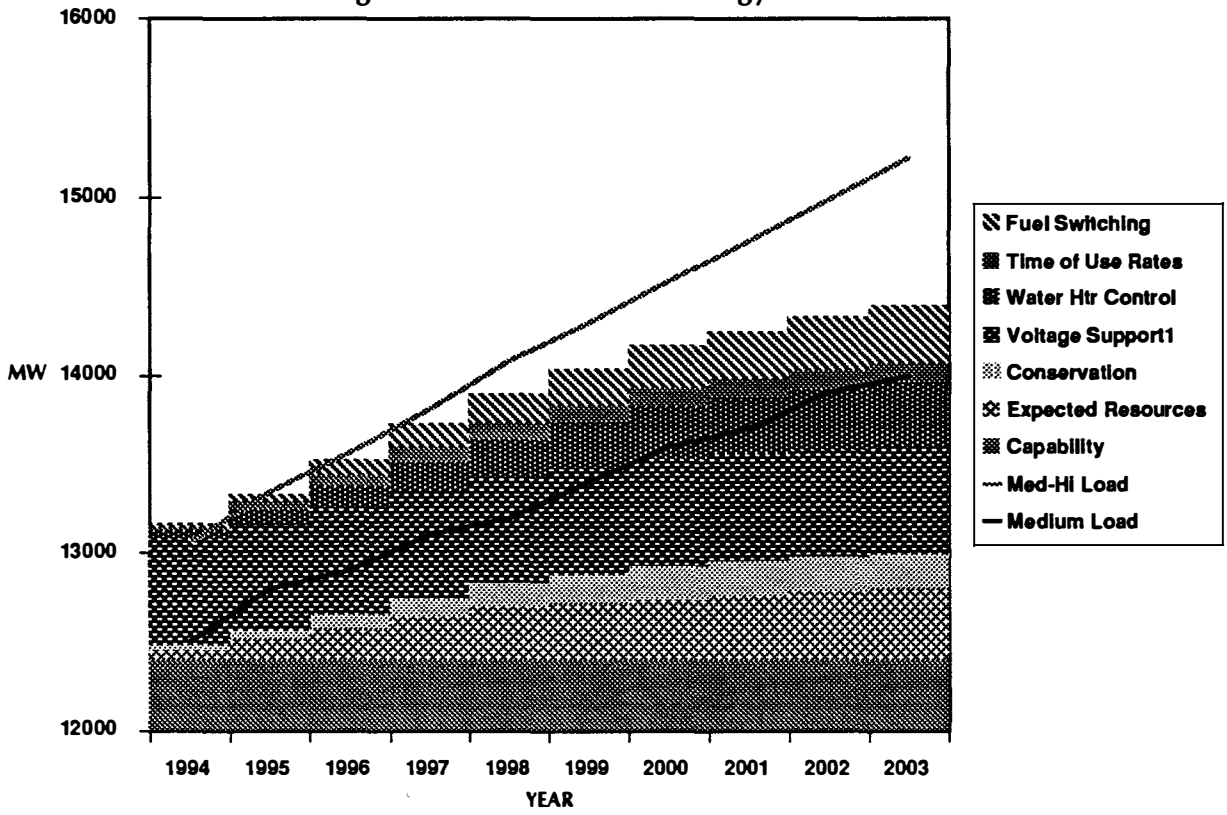


Table 2-5. Alternative Strategy 3 Capacity (MW)

ALTERNATIVE STRATEGY 3: DEMAND REDUCTION										
YEAR	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CAPABILITY	12400	12400	12400	12400	12400	12400	12400	12400	12400	12400
EXPECTED RESOURCES	60	120	180	240	300	320	340	360	380	400
CONSERVATION	21	48	82	116	148	180	211	214	218	208
VOLTAGE SUPPORT 1	600	600	600	600	600	600	600	600	600	600
WATER HEATER CONTROL	22	58	104	143	182	219	256	292	326	356
TIME-OF-USE RATES	20	47	73	99	105	110	116	123	129	129
FUEL SWITCHING	22	43	82	120	159	197	236	262	289	315
TOTAL PLAN CAPACITY	13145	13316	13521	13718	13894	14026	14159	14251	14342	14408
LOAD FORECAST (EXTREME PEAK)	12500	12800	12900	13100	13200	13400	13600	13700	13900	14000
SURPLUS CAPACITY (PUGET SOUND)	645	516	621	618	694	626	559	551	442	408

2.4.1 Conservation Measures

See Section 2.2.1 for a description of conservation measures.

2.4.2 Voltage Support Option 1

See Section 2.2.2 for a description of Voltage Support Option 1.

2.4.3 Load Management Measures

Load management programs cause customers to reschedule electricity use through incentives or direct control. These programs are designed specifically to reduce loads at peak times. Programs that reduce peak load growth could help the problem in the Puget Sound area.

As part of the PSAERP, BPA has joined with the utilities to study two load management programs. The load management measures used in this strategy are a water heater control program and time-of-use rates. These programs could provide peak load reduction by encouraging or controlling electricity use during peak periods. These programs could be implemented by 1994, and could provide 607 MW peak load reduction within ten years during normal years. These programs have a minor impact on annual energy consumption (except for savings from the hot water program from larger, better insulated hot water tanks). Costs for these programs are the full costs of completing a program since they are in addition to existing or planned load management programs. A detailed description of how the following programs were developed and analyzed is given in Appendix D.

Water Heater Control Program - This program would allow direct control by a utility of electric water heaters in houses and apartments. The utility could cycle or shed water heater loads at its discretion from a central location for a period of time previously agreed upon between the utility and homeowners.

A utility operating this program could contact residences and offer a monthly incentive, $5 per month for November, December, January and February in return for an agreement that the utility could be allowed to shut the water heater off for eight to ten hours per day. This allows the utility to shed water heater loads for two four-hour periods. The shut-off periods would be from 7 a.m. to 11 a.m. in the morning and from 5 p.m. to 9 p.m. in the evening. Some agreements could allow the utility to keep some heaters off for an additional one or two hours so that all heaters do not come on at the same time and create a later and possibly larger peak in system loads.

Single family residences could be offered a larger energy-efficient hot water tank that would provide energy savings as well as peak savings. For manufactured houses and multifamily dwellings the program only includes the controls because most of these dwellings do not have sufficient room to fit a larger tank.

The costs of the program include $228 for the equipment for each home and an additional $120 for homes that get larger tanks. In addition, there is a $28 annual cost that covers the $20 annual incentive per home and $8 for administrative costs. These are the full costs of operating this program because the baseline case does not include a water heater control program. Cost per household is converted to cost per kilowatt and displayed in Table 2-6.

The program can recruit participants at the time they are shopping for a new or replacement hot water tank. The program is expected to enroll 60% of consumers replacing electric water heaters in single family homes. 20% of multi-family and manufactured homes are expected to enroll. The number of participating homes increases steadily until 2006 as existing water heaters wear out.

Table 2-6. Cost and Savings of Load Management Programs

	PEAK COST ($/KW) Normal Winter Peak		ENERGY SAVINGS (Average annual megawatts) *				
Load Management	**Initial Cost**	**Annual Cost**	**1994**	**1996**	**1998**	**2003**	**2010**
Hot Water Control SF	$319	$26	0	2	4	9	11
Hot Water Control MF & MH	$344	$42	0	0	0	0	0
Time-of-Use Rates	$249	$48	0	0	0	0	0
TOTALS*			0	2	4	9	11

	PEAK SAVINGS NORMAL YEAR (Units are megawatts) *					PEAK SAVINGS EXTREME YEAR (Units are megawatts) *				
Load Management	**1994**	**1996**	**1998**	**2003**	**2010**	**1994**	**1996**	**1998**	**2003**	**2010**
Hot Water Control SF	23	113	201	404	513	17	81	145	291	370
Hot Water Control MF & MH	8	31	51	89	102	6	23	37	64	74
Time-of-Use Rates	19	66	95	114	116	20	73	105	129	132
TOTALS*	50	210	347	607	731	43	177	287	484	576

Key to abbreviations: SF=Single Family Residences MH=Manufactured Housing

*Numbers are cumulative MF=Multifamily Housing (apartments)

Residential Time-of-Use-Rates - This program could offer new retail electric rates to homeowners that volunteer to participate. These participants could pay electric rates that are twice as high from 7 a.m. to 11 a.m. as they are during the rest of the day. Typical loads that might be shifted include hot water heating loads and electric space heat. Participants who can shift some loads to the off-peak period can expect to reduce their electric bills by $5 per month on average. The utility could install a time-of-use meter at each house.

Peak savings for participating households are expected to be about 15% of the peak prior to program participation. The program is not expected to alter total energy consumption but merely to shift the time when energy is used. The maximum projected enrollment is about 20% of both new and existing single family residences in the Puget Sound area.

Costs per household include $115 for the Time-of-Use meter and a customer incentive of $5 per month during the four winter months. Administrative costs are estimated to be $2 per house per year. Costs per household are divided by kilowatts saved per household to obtain the figures shown in Table 2-6.

Peak savings come only from voluntary behavior changes due to price incentives. The actual performance of this program under extreme cold weather is difficult to predict.

The load management programs supply increasing savings through 2010 (731 MW normal year, 576 MW extreme year). Energy savings increase with time also, and load management provides 11 aMW of energy savings by 2010.

Pilot Programs - Load management programs are relatively new to BPA and Puget Sound area utilities. At the present time, BPA has contracted for over $500,000 of load management demonstration projects. These are implemented through several Puget Sound area utilities and are described in the following paragraphs. It is these demonstration projects and future programs like these that will provide the megawatts available in this strategy.

Snohomish County Public Utility District No. 1 (Snohomish PUD) will be installing 400 dispatchable radio-activated controls on residential hot water systems. Control strategies may vary for family size and water heater tank storage capability. For these households, hot water heating occurs at off-peak times.

Ohop Mutual Light Company will be installing 80 maximum size water heater tanks with electronic timer controls, sensors, and data recorders already attached. These tanks range from 66 to 150 gallons of storage capability. Control strategies have been developed for each type of tank and each household to maximize peak reduction. Utility programmed time switches are used to control loads. Data from this program can be used to refine radio control, two-way radio control, and other pre-programmed "stand alone" control systems.

The town of Steilacoom has begun a program which schedules municipal water and wastewater system pumping at non-peak periods.

Snohomish PUD will design and install a voltage control system at one of their power supply substations. The system will control shunt capacitors and minimize substation voltage but keep it within limits so that acceptable service is always available to customers. It will also supply maximum vars and reduce load to alleviate voltage collapse conditions.

Seattle City Light has designed a pilot program that would reduce peak power demand during winter months. Seattle City Light will implement weatherization measures, efficient shower heads, and a system that controls space heat and water heaters. The direct load control equipment that residents install will allow substation operators to shift operation of participant's water heaters and/or space heaters when peak loads in a specific area reach certain levels. If the budget allows, Seattle City Light also would like to test thermal storage and general load control, and expand the program to commercial customers. Seattle City Light has received $200,000 from BPA to help co-fund this program. Snohomish County PUD also has expressed interest in implementing space-heat control in their service area.

2.4.4 Fuel Switching

BPA and the utility study teams considered and analyzed fuel switching. The results are explained here. A fuel switching program would encourage homeowners to substitute natural gas for electricity for residential space and water heating. Switching to gas reduces both peak loads and overall energy requirements for electricity. Although many new homeowners are already selecting gas, there is a potential to convert the electric space and water heat in existing homes to gas. There is also the potential to expand the gas distribution system to reach homes that would not have access to gas. This analysis looks at fuel switching potential beyond what is expected to occur anyway through market forces because of the generally lower cost of heating with gas. Since no fuel switching program is yet planned, social costs are the full costs to society of the program.

Table 2-7 shows the costs and savings potential from switching some residential customers to natural gas. The fuel switching program would encourage switching from electricity to natural gas for residential space and water heating in single family homes and manufactured homes. Multifamily homes and the commercial and industrial sectors were not included because of the expense and difficulty of implementing fuel switching in these segments. Fuel switching induced by natural market forces is included in the load forecast. This analysis targets both new and existing homes, and for the purposes of developing estimates of the potential load impacts and costs, makes the following assumptions:

1. Most new homeowners will select gas if it is available (those who do not probably would not participate in a fuel switching program). Therefore, fuel switching in new homes requires expanding the gas distribution system.

2. Only central forced air electric space heating systems are included as candidates for fuel switching; zonal (resistance) electric space heat conversion would be too expensive and difficult to market.

3. Homes with electric water heat but gas space heat were not included because it is assumed that homeowners will convert their water heaters to gas.

4. Costs include the cost of replacing electric equipment before it is worn out, any additional cost of replacing with gas instead of electric equipment, and any flue or venting work necessary for gas but not electric equipment. For homes where gas is not available, an additional cost for expanding the gas distribution system is included. For all homes in this analysis, the cost of hooking up the home to gas is included.

The cost of service drop connection for natural gas is $550 and the cost of a typical extension of a gas main for those houses that do not have gas available on the street is an average of $900 per house. The social costs shown in Table 2-7 are the difference between the cost of switching to natural gas and the cost of continuing to use electricity.

Both water heaters and central forced air systems would be converted when the existing electric equipment is close to the end of its useful life. In homes with zonal space heat, water heat conversion only is analyzed. Market penetration rates vary by segment: they are faster and higher for single family than manufactured homes, and for homes where gas is already available at the street. The market segment approach was used because the expected costs and program participation rates are different across market segments.

Fuel switching provides increasing normal and extreme peak savings; up to 403 MW in 2010 of extreme peak savings. Fuel switching could provide 100 aMW of energy savings by 2010.

When conservation, load management, and fuel switching programs are combined, the total savings do not equal the sum of the individual programs. These programs interact and reduce the total. See Appendix D for an explanation of these interactions.

Concern about the impact of fuel switching on utility revenues and the desirability of utilities to pursue programmatic fuel switching is a major hurdle in delivering this resource. No consensus exists about the technical potential of fuel switching or the proper role of BPA and the utilities in altering the result of current market forces. The reluctance of some utilities to pursue fuel switching makes a consensus on implementation of fuel switching impossible. Individual utilities are free to pursue fuel switching within their own service territories. However, BPA's policy is to let existing market forces operate and not fund programmatic fuel switching.

Table 2-7. Costs and Savings Potential of Fuel Switching

	PEAK COST ($/KW) Normal Winter Peak		ENERGY SAVINGS (Units are average annual megawatts) *				
Fuel Switching	**SOCIAL COST**		**1994**	**1996**	**1998**	**2003**	**2010**
Existing SF + CFA + WH, Gas Yes	$503		3	9	18	31	32
Existing SF + CFA + WH, Gas No	$589		0	1	4	13	23
Existing SF WH Only, Gas Yes	$890		3	9	15	25	25
New SF SH + WH, Gas No	$1267		0	1	1	3	8
Existing MH + CFA + WH, Gas Yes	$756		1	2	3	6	6
Existing MH + CFA + WH, Gas No	$938		0	0	1	2	4
New MH SH + WH, Gas No	$867		0	0	0	1	2
TOTALS*			7	22	42	81	100

Key to Abbreviations:

Existing = Existing Units

SF = Single Family Residences

CFA=Central Forced Air Furnaces (Not Baseboards)

SH = Space Heating

Gas Yes = Gas Available Within 1/4 Mile (service drop)

Gas No = Gas Not Available (Main Extension Required)

MH = Manufactured Housing

WH = Water Heaters

* Numbers are cumulative

Table 2-7. Costs and Savings Potential of Fuel Switching (continued)

	PEAK SAVINGS NORMAL YEAR (Units are megawatts) *					PEAK SAVINGS EXTREME YEAR (Units are megawatts) *				
Fuel Switching	**1994**	**1996**	**1998**	**2003**	**2010**	**1994**	**1996**	**1998**	**2003**	**2010**
Existing SF + CFA + WH, Gas Yes	11	40	74	130	135	14	48	89	155	162
Existing SF + CFA + WH, Gas No	0	6	19	56	96	0	7	22	67	115
Existing SF WH Only, Gas Yes	7	20	33	57	57	5	14	24	41	41
New SF SH + WH, Gas No	0	2	3	10	25	0	2	4	12	30
Existing MH + CFA + WH, Gas Yes	2	7	12	21	21	3	9	15	25	26
Existing MH + CFA + WH, Gas No	0	1	4	9	15	0	1	4	11	19
New MH SH + WH, Gas No	0	1	1	4	8	0	1	2	5	10
TOTALS*	20	77	146	287	357	22	82	160	316	403

Key to Abbreviations:

Existing = Existing Units

SF = Single Family Residences

CFA=Central Forced Air Furnaces (Not Baseboards)

SH = Space Heating

Gas Yes = Gas Available Within 1/4 Mile (service drop)

Gas No = Gas Not Available (Main Extension Required)

MH = Manufactured Housing

WH = Water Heaters

* Numbers are cumulative

2.4.5 Contingency Measures

If load growth is not as predicted, measures can be delayed or added. The load management and fuel switching programs can be delayed if load growth is lower than expected. If load growth is higher, Voltage Support Option 2 can be added to the system and load curtailment can be used on an interim basis. This strategy provides almost 400 MW of surplus capacity in 2003.

2.4.6 Environmental Impacts of Alternative Strategy 3

Load management and fuel switching programs do not disturb land use. Load management measures could create some discomfort for individuals in homes and buildings as water temperatures go down while controls are functioning to limit use. Customers who agree to curtail use and receive incentives from the utility may have an economic gain. Load management measures may cause life-style changes more significant than other measures. These socio-economic impacts are considered low. Fuel switching may create low impacts to air quality. Impacts to the physical environment, air, water, land use, and wildlife are all less than for other measures. Overall, this strategy has the fewest environmental impacts. More discussion of environmental consequences of the measures is in Chapter 4 and Appendix F.

2.5 ALTERNATIVE STRATEGY 4 - COMBUSTION TURBINES

This strategy includes the conservation measures, and Voltage Support Option 1 in all other strategies, but adds combustion turbines for winter peak loads. This strategy is shown in Figure 2-4. Table 2-8 provides numeric values of Alternative Strategy 4.

Figure 2-4. Alternative Strategy 4

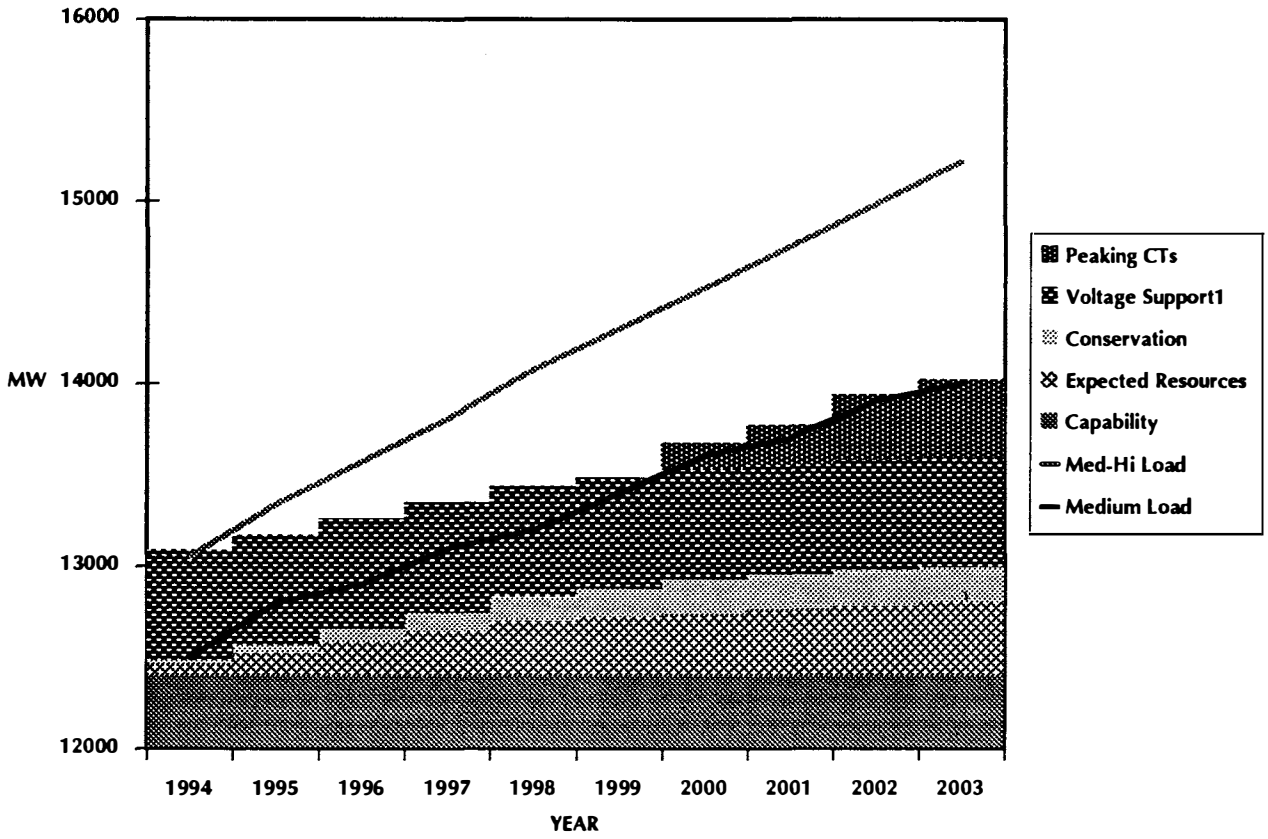


Table 2-8. Alternative Strategy 4 Capacity (MW)

ALTERNATIVE STRATEGY 4: COMBUSTION TURBINES										
YEAR	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
CAPABILITY	12400	12400	12400	12400	12400	12400	12400	12400	12400	12400
EXPECTED RESOURCES	60	120	180	240	300	320	340	360	380	400
CONSERVATION	21	48	82	116	148	180	211	214	218	208
VOLTAGE SUPPORT 1	600	600	600	600	600	600	600	600	600	600
PEAKING CTS	0	0	0	0	0	0	140	210	350	420
TOTAL PLAN CAPACITY	**13081**	**13168**	**13262**	**13356**	**13448**	**13500**	**13691**	**13784**	**13948**	**14028**
LOAD FORECAST (EXTREME PEAK)	**12500**	**12800**	**12900**	**13100**	**13200**	**13400**	**13600**	**13700**	**13900**	**14000**
SURPLUS CAPACITY (PUGET SOUND)	**581**	**368**	**362**	**256**	**248**	**100**	**91**	**84**	**48**	**28**

2.5.1 Conservation Measures

See Section 2.2.1 for a description of the conservation measures.

2.5.2 Voltage Support Option 1

Section 2.2.2 describes Voltage Support Option 1.

2.5.3 Peaking Combustion Turbines

The type of combustion turbine considered for this strategy is built to serve peak loads only. It is a simple cycle 70 MW unit that operates infrequently, about 5% of the year. These turbines have a lower capital cost (normally $400 - $500/kW complete on site and operating) than combined cycle turbines and are easier and faster to start up. Typically, with advanced planning, a combustion turbine can be sited, permitted, and constructed in less than 4 years depending on location and site conditions. They would be able to use gas or oil for fuel, with gas being the preferred fuel used. They are assumed to be located within five miles of an existing natural gas pipeline. Interconnecting pipeline additions would be less than five miles in length. These units are assumed built on

Locating combustion turbines in the Puget Sound area reduces stress on the cross-Cascade transmission lines improving reliability of the system to meet winter peak demand and deferring the need for increased cross-Cascade transmission capacity. However, integration of the output from combustion turbines will require local transmission system modifications. An electrical connection is necessary between the combustion turbine site and the power system. This connection will include some substation development at the point of interconnection and a transmission line from this point to the combustion turbine site. The existing Puget Sound transmission system then will need to be evaluated to determine whether additional local reinforcement will be needed to reliably transfer this power from the point of integration to the load areas. The extent of new transmission and substation facilities required will vary widely depending on location of the combustion turbine.

2.5.4 Contingency Measures

If load growth is not as expected, combustion turbines can be delayed or stopped if unnecessary. This strategy provides 28 MW surplus capacity in 2003, however, Voltage Support Option 2 and additional combustion turbines could be added to the system or load curtailment could be used if loads are high.

2.5.5 Environmental Impacts of Alternative Strategy 4

Combustion turbines have impacts ranging from low to moderate. This strategy is the only strategy with moderate air quality impacts. Combustion creates air pollutants. The turbines would require about four acres. Noise is a concern when combustion turbines operate, though the turbines would operate infrequently. Mitigation measures are available to reduce noise. Transmission lines needed to integrate combustion turbines into the power system may create impacts. Impacts are described in Chapter 4 and Appendix F.

2.6 NO ACTION ALTERNATIVE

EIS's traditionally define the No Action Alternative as a no build measure. Because this EIS will focus on a regional planning decision, this approach is inappropriate. Instead, this alternative assumes individual utilities will undertake some actions to meet their needs. These activities may not be coordinated with other utilities or BPA. This alternative will cause decreasing reliability as loads continue to grow even at a moderate rate. By the end of the decision period in 2003, normal winter peak load will so severely stress the system, even minor disturbances could cause instability and blackout in the Puget Sound area. By 2003, the base system, with all facilities intact, will be unable to meet extreme winter peak loads. Actions already planned by or available to BPA and Puget Sound area utilities are described below.

2.6.1 Winter Operating Plan

As high load growth of the late 1980s pushed winter peak load beyond the reliable capacity of the transmission system, utilities recognized the need for a contingency plan to minimize the risk of total system failure during winter peaks. BPA and the Puget Sound utilities, working through the NW Power Pool, have developed a Winter Operating Plan to coordinate utility response to system emergencies during peak load periods. The plan has been in place each winter since November 1989. The plan defines a set of actions that will minimize the possibility for voltage collapse in the event that a critical line or generator is lost during a cold weather peak load. These actions include maximizing output of local generation, shifting east-side generation patterns, automatic shedding of DSI load, appeals for voluntary load reduction and, as a last resort, involuntary curtailment of firm load. Increasing power transfers from BC Hydro to the Northwest and operating the phase shifting transformer at BC Hydro's Nelway Substation are other actions taken to mitigate the problem.

2.6.2 Undervoltage Load Shedding Scheme

This measure, developed as part of the Winter Operating Plan, minimizes the consequences of a voltage collapse. Utilities have installed equipment to arrest voltage collapse by shedding loads at substations in the Puget Sound area. These devices automatically disconnect a portion of the load if voltages drop precipitously for a specific period of time following the failure of key power system equipment. Shedding loads, if done in time, provides a safety net to prevent a total or partial collapse of the system. However, there is some doubt whether these relays can be set sensitive enough to drop load in time to prevent collapse without being so sensitive that they cause frequent unnecessary load dropping in response to minor disturbances. The load amount dropped depends on the type of emergency. Up to 1800 MW (15% of the Puget Sound load) could be shed.

Until the failed equipment is returned to service, ongoing curtailment of area load would be required. Most outages are very short in duration especially if they are not permanent faults on the line and did not require repairs. However, a line outage can last for days or weeks if extensive repairs were required. Retail utilities set a goal of full restoration in four hours, but service to fringe areas will certainly take longer after a blackout.

2.6.3 Voluntary Load Curtailment

Another measure available and considered part of the No Action Alternative is voluntary load curtailment. Voluntary load curtailment includes curtailment achieved in the residential, commercial and industrial sectors requested by utilities and government agencies only after a critical outage has occurred and curtailment is needed to allow restoration of DSI load. This is curtailment over and above curtailment which exists through contracts with BPA or other utilities. Utilities and/or government agencies notify businesses and the public directly or by radio and television that electricity use needs to be reduced. Up to a 10% reduction may be achieved. Planning and implementation for this kind of program can be done quickly with minimum preparation and cost. Response to requests for curtailment depends on many factors such as weather, request frequency, and market conditions for commercial and industrial sectors. This measure would not prevent a voltage collapse if customers failed to reduce their loads.

2.6.4 Existing BPA Customer Contracts

BPA has various rights in power sales contracts to curtail loads and make other system adjustments in an emergency. Rapidly changing conditions require prompt responses, and contract terms allow operators flexibility to react quickly to maintain service and avoid damage to the system. Initially, BPA would ask customers with resources to operate them to help BPA meet total loads. For example, customers with thermal resources may delay a planned plant outage for maintenance. How much relief could be provided depends on how many utilities in the Puget Sound area would have power plants they were not already operating.

BPA could limit peak deliveries to some utility customers. BPA would notify the affected utilities the day before the limitation. This includes utilities outside the Puget Sound area because the limitation must be applied to these customers proportionately. If utilities could not reduce their load, they would have to find other sources to replace the BPA power.

Each contract also has a mutual obligation provision that provides emergency and breakdown relief if there is a peak demand emergency. The party providing relief has sole discretion to determine if it can do so.

If these arrangements are not enough to decrease or meet peak loads, system operators will resort to "real-time" actions to maintain voltage stability. The Direct Service Industry (DSI) contract provides peak power reserves by permitting BPA to restrict up to 100% of any DSI's Operating Demand for up to 15 minutes. This restriction can be followed immediately by a restriction of up to 50% of Operating Demand for up to 30 minutes. BPA may also

restrict up to 50% of DSI load for up to two hours in any 24-hour period, but this two-hour limit includes restriction periods under the 15-minute and 30-minute provisions above. The total Operating Demand of the DSI's in the Puget Sound area is over 600 MW. BPA also may restrict up to 25% (the "top-quartile") of DSI loads at any time and for any reason to meet load obligations. This restriction must be proportionally distributed among all DSI's throughout the region unless they agree to restrict a limited area only (see DSI contract, section 7(j)(3)). If these measures are not enough, BPA may interrupt service or reduce deliveries to any of its customers to protect the power system from unstable conditions jeopardizing service throughout the system.

Under the Winter Operating Plan, temporarily dropping the 600 MW of aluminum smelter load is done automatically as the first line of defense against voltage collapse.

2.6.5 Resource Acquisitions

BPA's Competitive Acquisition Test Program seeks to acquire 300 MW of new energy resources by 1997. Project sponsors submitted 102 conservation and generation proposals to BPA's request for proposals. On December 10, 1991, BPA announced that 17 conservation and 10 generation projects totaling 1139 MW were selected for the negotiation phase. Four of the 10 generation projects submitted are proposed combustion turbine/ cogeneration projects in the Puget Sound area (440 MW at Tacoma, 210 MW at Chehalis, 142 MW at Satsop, total 792 MW). The other 6 (289 MW) are outside the area. The environmental review and contract negotiations that must precede a final decision will take more than a year to complete. It is possible that up to 240 MW of new generation could be sited in the Puget Sound area by 1997 because of BPA's current energy plans.

Puget Sound Power and Light Company is working with industry in the Puget Sound area to develop over 650 MW of cogeneration capacity in Skagit and Whatcom counties between now and late 1994. The system studies that defined system capability (Fig.1-4) included 300 MW that Puget has committed to contractually. Puget recently finalized plans for the remaining 350 MW. Generation located north of Snohomish County is less effective for solving the voltage collapse problem.

If proposed BPA and Puget generation projects are successfully completed, the 400 MW minimum of new energy resources assumed built in the area could be exceeded by 200 MW. 200 MW is equivalent to about one year of peak load growth. However, there is also a possibility that some existing west-side generation resources could be lost in the future. One example is the Trojan nuclear power plant in the Portland area. Continuing voter initiatives, steam generator problems and escalating operating costs could cause a permanent shutdown. The loss of Trojan's 1130 MW peak capacity would reduce Puget Sound's ability to meet peak loads by 400-500 MW.

As stated in Section 1.4.4, the 400 MW of "expected resources" is a conservative estimate intentionally established at the low end of the probable range. Considering the uncertain regional energy future, BPA believes this is a prudent assumption.

2.6.6 Increased Probability of Voltage Instability and Blackouts

With projected peak loads, the individual actions taken by utilities, including acquiring resources, dropping load, and using other curtailment measures might not be enough for system operators to prevent voltage instability or a blackout. Voltage instability and blackouts could cause direct and indirect impacts to BPA, local utilities, and the local economy. The number of people affected and length of outage depends on the load conditions and the nature of system problems. As loads grow, outage severity increases. In this analysis, blackouts are assumed to last an average of four hours. For example, unstable voltages and blackouts have the following consequences:

- Residential customers lose service causing heat loss in homes, loss of cooking and refrigeration, frozen water pipes, electrical appliance damage, and inconvenience. Schedules are disrupted, schools close, recreation activities are canceled.

- Industrial and commercial customers lose service causing equipment damage, computer dysfunction and records loss, business closures, lost revenue, and lost income for employees. Communications may be interrupted, and banking and other financial services may be unavailable.

- Hospitals lose service, causing them to use emergency generators and limit operations to emergencies.

- Traffic and street lights go out, disrupting transportation, and causing safety and security problems.

- Alarm systems may not function.

2.6.7 No Action Alternative Environmental Impacts

The No Action Alternative does not respond to the increasing likelihood of voltage instability in a planned, coordinated way. It would however, avoid the physical impacts of any of the measures identified for the alternative strategies. Uncoordinated planning might cause more local generation to be developed. If brownouts and blackouts occur, air quality would be degraded if consumers turn to wood for heat. The social and economic impacts listed above and others described in Chapter 4 are significant. This alternative may encourage conservation and lifestyle changes. Detailed information about environmental consequences of this alternative is in Chapter 4 and Appendix F.

2.7 MEASURES CONSIDERED BUT NOT INCLUDED IN ALTERNATIVE STRATEGIES

The screening criteria cut the original list of measures to study. After test cases were developed, and more information was available on individual measures, the list was screened again. The following measures were excluded from further consideration. A complete description of measures and why some were excluded is in Appendix D, Conservation, Load Management, and Fuel Switching Analysis; Appendix B, Local Generation Analysis; and Appendix E, Transmission Reinforcement Analysis.

2.7.1 Conservation and Load Management Measures

These measures were excluded from strategies:

- Residential Space Heat Set-Back Controls
- New Commercial Conservation Programs
- Lighting Efficiency Controls
- Solar Augmentation for Water Heaters (supports reduce-use)
- Portable Diesel/Gasoline Generators (supports reduce-use)
- Gas Back-up for Electric Heat
- Street Lighting Efficiency and Controls
- Dual-Fuel Boilers
- Commercial and Industrial Time-of-Use Rates
- Space Heat Controls
- Storage Water Heating
- Whole House Demand Control
- Thermal Heat Storage

2.7.2 Local Generation Measures

The following local generation measures were not included in any alternative strategies. Some of the local generation measures will likely be built within the Puget Sound area for energy reasons. Local generation as an energy resource is implicitly included in all alternatives as an adjustment of the deficit, as described in Section 1.4.4. Detailed descriptions of all the measures listed below are in Appendix B.

- Oil and Gas Combustion - Steam Plants, non-peaking Combustion Turbines
- Nuclear Fission (Completion of WNP-3)
- Hydroelectric - Large Hydro, Small Hydro, Pumped Storage, Water Supply (Pressure Reduction)
- Cogeneration
- Biomass-Fired Plants - Direct Combustion, Gasification
- Municipal Solid Waste (MSW) - Mass Burn, Refuse Derived Fuel (RDF), Gasification
- Standby Generation
- Coal
- Nuclear Fusion
- Geothermal
- Wind
- Solar Thermal Electric
- Photovoltaics
- Ocean - Energy Conversion
- Hydrogen
- Fuel Cells
- Storage Systems

2.7.3 Transmission Measures

The following transmission options were studied and excluded from further consideration mainly due to cost considerations:

- 765-kV Alternating Current transmission Line
- 500-kV Direct Current Transmission Line
- Many new or rebuilt line options between various substations

Appendix E describes in more detail the transmission options considered including those excluded.

2.7.4 Load Curtailment Measures

Originally, all load curtailment measures discussed in this EIS were considered for solving the peaking problem in Puget Sound. After analyzing the costs and impacts of curtailment, planners decided that depending on curtailment for long-range planning is inappropriate. Load curtailment is considered a contingency interim solution if load growth is higher than expected.

3.0 AFFECTED ENVIRONMENT

This chapter describes environmental features that could be affected by the alternative strategies. The transparent overlay included with this FEIS can be used with the maps in this chapter. The overlay shows the locations of substations, and transmission line corridors so specific information about these locations can be discovered.

3.1 STUDY AREA CHARACTERISTICS

3.1.1 Land Use

Study area land use is shown on Map 2. In the Puget Sound area, land use is determined by nearness to Puget Sound, slope, and population. Residential, commercial, and industrial uses are clustered and defined by the shore of Puget Sound and major rivers. Agricultural land laps up against the steep slopes of the mountains and is mostly between the populated areas, and land unable to sustain crops because of infertile soil or steep slopes. There is little rangeland in the Puget Sound area. Transportation corridors and utilities serve major population centers. Recreation opportunities exist where population is sparse, near water, in or near wildlife areas, and on forest land. Activities range from sailing and fishing in Puget Sound to hiking and mountain climbing on Mt. Rainier.

Outside the population areas surrounding Puget Sound, and the mountainous areas above tree-line, most of the study area is covered by forest, primarily Douglas Fir. About two-thirds is publicly owned and managed. The rest is privately owned.

In the rest of the study area, geography and land use are determined by the Columbia/Snake river systems. The Columbia River Basin includes more than 258,000 square miles of drainage, including most of Washington, Oregon, and Idaho; Montana west of the Rocky Mountains; small areas of Wyoming, Utah, and Nevada; and southeastern British Columbia. Part of this basin is in this portion of the study area.

The study area contains parts of many Pacific Northwest's geographic subregions: the Columbia River and Snake River Plateau, and valley/plains regions (including part of the Willamette Valley) separated by the Coast Range, and the Cascade Mountains. Part of the study area is covered by forest, most dense west of the Cascade Range. Rangeland occupies substantial areas. Agricultural lands are primarily on the Columbia River Plateau, along the Snake River, and in the Willamette Valley. A large part of the land is publicly owned and managed. Land managers include the U. S. Forest Service (USFS), Bureau of Land Management (BLM), Department of Energy, Indian Tribes, Department of Defense, and state and local governments. The rest is privately owned.

The Columbia River passes from the province of British Columbia, Canada, into the State of Washington, dropping steadily for 748 miles to the Pacific Ocean. The Snake River, which begins in southeastern Idaho, flows west and north, forming part of the border between Oregon and Idaho and between Idaho and Washington. In southern Washington, the Snake River joins the Columbia, which flows west to the Pacific Ocean, forming the border between Oregon and Washington. The rivers flow through extensive wilderness, scenic, and recreation areas in the north and east. The rivers then pass through irrigated agricultural areas in the plateau lands east of the Cascade Mountains, and down through the Cascade and coast mountain ranges to the Pacific.

The size of the rivers and the drop in elevation once created spectacular falls and annual flooding as glaciers and snow melted in the mountains. Over the last 50 years, both the Snake and Columbia Rivers have been dammed to control flooding, provide irrigation, improve navigation, and produce electricity.

Federal hydro projects on the Snake and Columbia river systems are operated to provide multiple uses, including power production, irrigation, navigation, flood control, recreation, fisheries, and wildlife. Flood control constraints vary by project and are adjusted by the Corps of Engineers based on projected runoff. Flood control and navigation requirements are met except in emergencies.

Recreation - In the Pacific Northwest, Federal hydroelectric projects provide many opportunities for recreation at the storage reservoirs and the areas downstream. Boating, swimming, water skiing, and fishing are typical water related recreational activities. Other recreation opportunities include camping, picnicking, sight-seeing, hiking, and hunting. Many recreation activities are influenced by changes in reservoir elevation and downstream flows.

A unique recreation area, the Columbia River Gorge National Scenic Area, is in the study area. The Columbia Gorge is world-renowned for windsurfing, and the Gorge provides many opportunities for hiking, climbing, wildlife viewing, and plant study. There are many unique plants that grow only in the Gorge. The Gorge has many waterfalls and picnic areas.

As noted above, cross-Cascade corridors are dominated by land set aside for recreation. The Pacific Crest National Scenic Trail runs along the entire length of the Cascades, crossing all east-west corridors. There are also waterways designated as Wild and Scenic Rivers in the study area.

National forests also provide opportunities for hiking, hunting, sight-seeing, skiing, and other outdoor activities.

Irrigation - Hydro projects provide water and power for irrigation. The largest irrigation project in the Basin is the U. S. Bureau of Reclamation's (BOR) Columbia Basin Project, which is authorized to provide irrigation to over 1 million acres. This project is half finished.

Cultural Resources - Cultural resources are defined as "the nonrenewable evidence of human occupation or activity as reflected in any district, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature that was important in human history at the national, state, or local level." Map 3 shows important cultural resources. Many other resources too small to show on this map are found in the study area.

3.1.2 Natural Resources

Surface Hydrology - The study area includes a variety of water resources. Water resources potentially affected include rivers, streams, reservoirs, lakes, ponds, estuaries, marshes, and the Pacific Ocean. Many of these are shown on the maps included in this chapter.

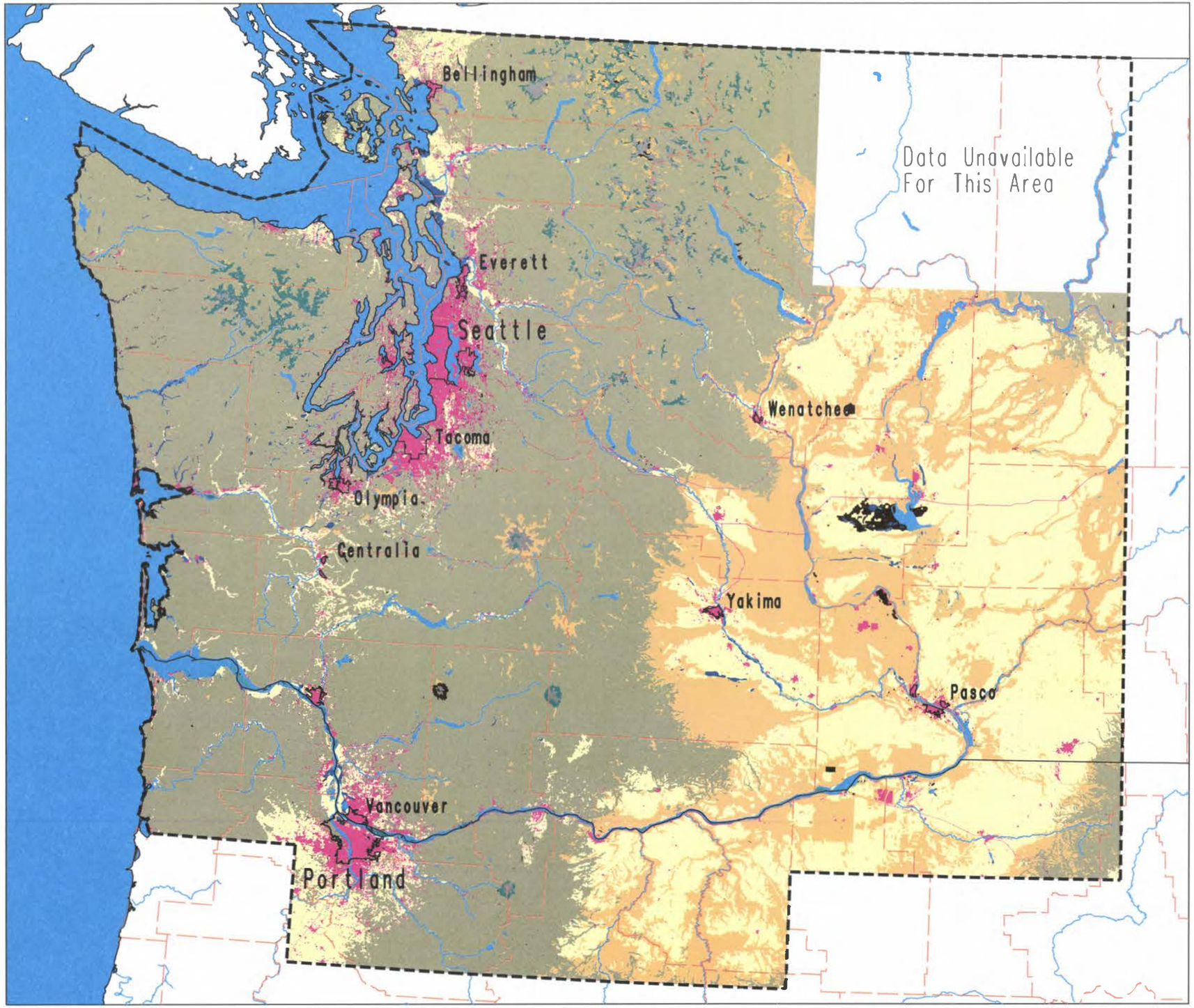
Wildlife and Vegetation - Climate, soil types, moisture, and elevation determine the species, locations and growing habits of the study area's vegetation. Different combinations of geology and growing conditions create site specific diversity in the plant community. Vegetation in this study area falls into four general community types: forest/woodlands, shrublands, grasslands, and riparian/wetland (see Map 4). Each plant community has characteristic wildlife types.

Forest/Woodland and Wildlife - The forest/woodland plant community provides many layers of habitat for wildlife, from the ground into the upper branches of older trees. Most vulnerable to change are older stands of trees of various ages, which may take a century or more to develop and thus cannot be replaced easily.

Large and small mammals, including deer, members of the weasel and skunk family, and rodents such as squirrels and porcupine, are found in forested areas. These mammals prefer a narrowly defined habitat and can be affected by disturbing or removing habitat. The forest community, with its many varieties of trees, houses a large number and variety of birds, depending on the region and composition of the forest, and some of these birds species are very sensitive to habitat disturbance.

Shrubland and Wildlife - Shrublands are in areas too harsh for forests and/or areas subject to repeated natural disturbances such as floods or fires. They may be replaced by grasslands if disturbed. The major shrubland communities in the study area contain mule deer, coyote, black-tailed deer, rabbits, and a variety of birds and small rodents.

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN



Land Cover/Land Use

L E G E N D

- Urban or Built-Up Land
- Agricultural Land
- Rangeland
- Forest Land
- Water
- Wetlands
- Barren Land
- Tundra
- Perennial Snow or Ice
- County Boundary
- Study Area Boundary

Lord Cover/Land Use Data
from 1:250.000 Scale USGS
GIRAS files. 1972 - 1980.

Miles

0 20 40 60

Map 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN

Bellingham
Everett
Seattle
Tacoma
Olympia
Centralia
Wenatchee
Yakima
Pasco
Vancouver
Portland

Cultural Resources

L E G E N D

- National Park Service Historical Register Site
- River Segment with Outstanding or Significant Cultural Features
- County Boundary
- Study Area Boundary

Data from the National Park Service and the Northwest Environmental Database: Washington, 3/89. Data for Oregon not Available.

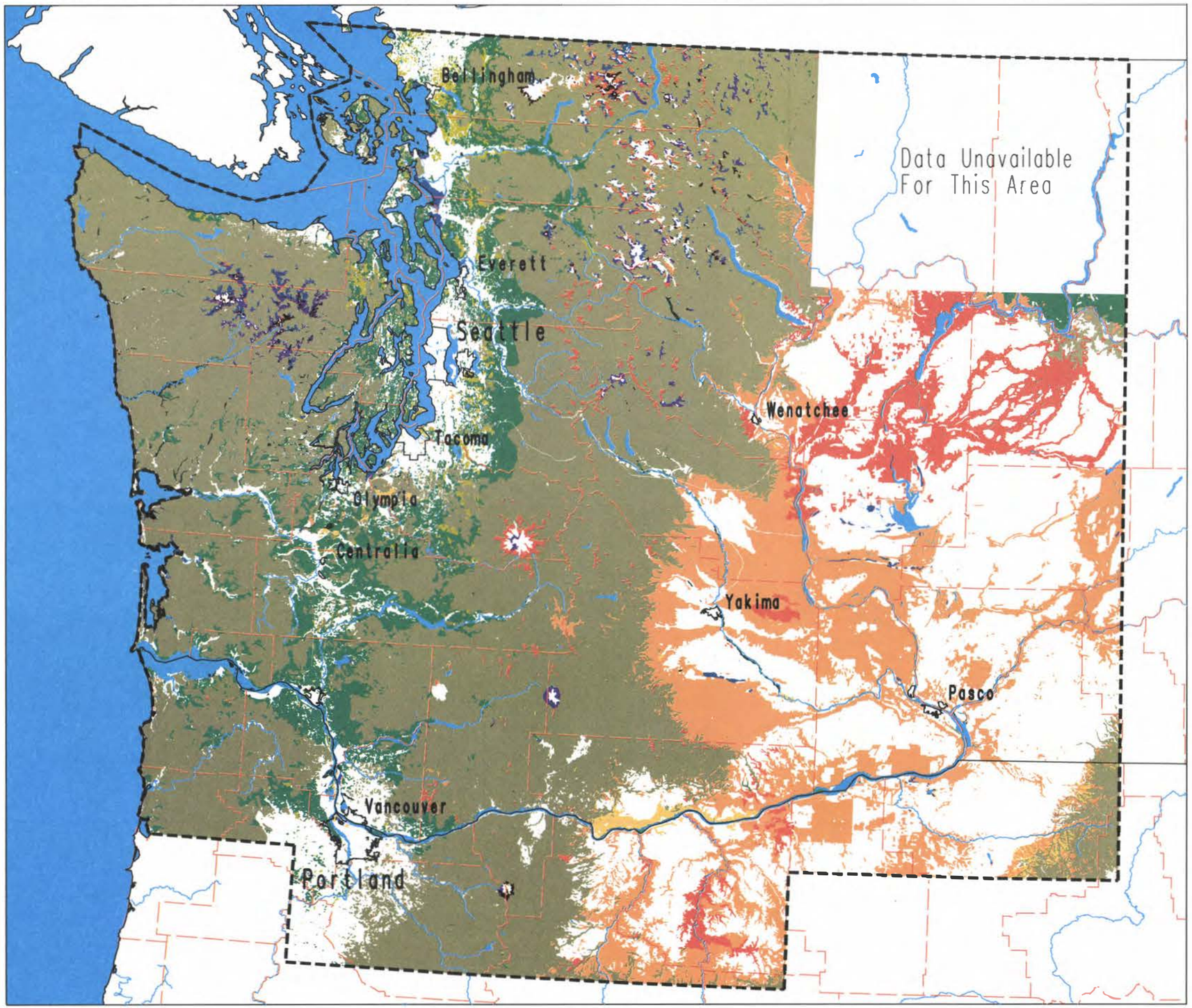
N

Miles

0 20 40 60

Map 3

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN



Vegetation Patterns

LEGEND

- Herbaceous Rangeland
- Shrub and Brush Rangeland
- Mixed Rangeland
- Deciduous Forest Land
- Evergreen Forest Land
- Mixed Forest Land
- Water
- Forested Wetland
- Non-Forested Wetland
- Dry Tundra
- Wet Tundra
- Barren Land
- Developed Land
- County Boundary
- Study Area Boundary

Vegetation Data from 1:250,000
USGS GIRAS files, 1972 - 1980.

N

Miles

0 20 40 60

Map 4

Grasslands and Wildlife - With their tremendous volume of seed-bearing but nonwoody materials, grasslands typically sustain fewer kinds of wildlife, but large numbers of individuals of some species such as rodent (e.g., ground squirrels). These small animals attract predators such as hawks. Mule deer, badger, and coyotes occur here. Grasslands support fewer birds because perching and nesting habitat is sparse.

Riparian/Wetland and Wildlife - Riparian/wetland communities have high vegetation and wildlife value. There is great diversity in this community with habitat types ranging from sand dunes to various types of wetlands. Deer, beaver and other aquatic and terrestrial furbearers, small mammals, waterfowl, upland game birds, reptiles, and amphibians are among the common year-round users of riparian/wetland areas. Wintering elk and deer may use these areas. Riparian and wetland areas are important habitats and nesting areas for numerous bird species. Map 5 shows outstanding and substantial wildlife habitat along rivers designated by the State of Washington.

Threatened and Endangered Species - A number wildlife species which occur in the study area have been identified for protection due to dwindling populations or special habitat needs. Species in danger of extinction are classified as Federal Endangered. Species at risk of becoming endangered are Federal Threatened. Species being considered for listing as Federal endangered or threatened species are listed below as Federal Candidate species. Federal Sensitive is a designation used by the Portland, Oregon office of the U.S. Fish and Wildlife Service for species at risk of becoming threatened because their numbers are small or they require special habitat. The following species are in each of these categories:

Federal Endangered - Peregrine Falcon, Grey Wolf, and Columbian White-tailed Deer

Federal Threatened - Bald Eagle, Northern Spotted Owl, Grizzly Bear, Oregon Silverspot Fritillary (butterflies)

Federal Sensitive - Sandhill Crane, Purple Martin, Common Loon, Lewis Woodpecker, Western Bluebird

Federal Candidate for Listing - Marbled Murrelet, Western Pond Turtle, Bull Trout, Olympic Mud Minnow, Beller's Ground Beetle, Hatch's Click Beetle, and Larch Mountain Salamander.

The State of Washington also maintains lists of wildlife species requiring protection due to reduced populations. The Washington list is considerably longer than the above listing. It contains many of the above species.

The National Marine Fisheries Service has proposed for listing the Snake river spring, summer, and fall Chinook salmon as endangered or threatened species. The Snake river sockeye salmon has been listed as an endangered or threatened species.

Fish - The study area includes a wide variety of fish species. Maps 6 and 7 show the areas where anadromous and resident fish are present. A typical Cascade Mountain stream supports resident fish and anadromous salmonids (Chinook, coho, and chum salmon; steelhead and cutthroat trout).

Many anadromous fish live in Pacific Northwest rivers. Anadromous fish migrate down the rivers to the ocean, then return upstream to spawn. To complete their journey, they must negotiate up to nine dams on the Columbia River. Fish spawning in the Snake River or the Salmon River must pass over eight dams (four on the Columbia; four on the Snake River). Chief Joseph Dam on the Columbia and Hells Canyon Dam on the Snake are the upstream limits of anadromous fish migration.

The tributaries, lakes, and upper portions of the Columbia River system are the major spawning and nursery grounds for anadromous fish. The principal anadromous fish in the Columbia Basin are steelhead trout; three species of salmon (Chinook, coho, and sockeye); and shad. Other anadromous species include white sturgeon, striped bass, eulachon, and Pacific lamprey. Anadromous fish and particularly salmonids, require high-quality water. Water temperature, dissolved oxygen, sediment, and nitrogen supersaturation have created the greatest water quality problems for fisheries in the Columbia River Basin.

The Columbia River and its tributaries contain a variety of resident fish. Resident fish spend their entire life in fresh water, although some migrate through the fresh-water system.

Many resident species are more tolerant of stressful environmental conditions such as high temperature, low concentrations of dissolved oxygen, and small amounts of certain toxic pollutants. Juvenile salmonids are generally more sensitive to many pollutants, temperature, and dissolved oxygen.

Topography and Geology - The landforms of Puget Sound are related to geologic processes. Landforms within the study area are varied. The Northern Cascade Mountains occupy the eastern half of the study area and the Olympic Mountains form the western portion. These mountains were formed by a process called uplift. Rock formations composed of once molten granite and sediments were pushed upward in ancient times to form the basic structure of these mountains. Glacial activity and erosion have modified their form creating what has been termed the most rugged alpine area in America.

Between and along the margins of these two mountainous areas are areas of moderate slope and low elevation. Called the Puget Sound Trough Province, this forms the central portion of the study area. It is within these less mountainous areas that human activity has been extensive. The topography was created by a glacial icecap that pushed into the area from the north. Many lakes and poorly drained depressions are found within the Puget Trough Province. Glacial deposits within Puget Sound consist largely of very porous gravels and sands.

Groundwater - Glacial sedimentary deposits within the Puget Sound Trough provide an important source of groundwater. Terraced lowlands on the western edge of the Olympic Peninsula and the alluvial deposits found along the west trending Chehalis River valley are also important sources of groundwater within the study area. The chemical quality of most groundwater in Washington is satisfactory for municipal, industrial, and agricultural uses, and often is better than necessary to meet limits recommended for drinking water.

Based on dissolved solids, the groundwater of the Puget Sound is classified soft or only moderately hard. The chemical quality of most groundwater is good or excellent. Water from several areas next to Puget Sound contain untreated iron quantities exceeding that recommended for drinking water and some industrial processes.

The groundwater bearing sediments of Puget Sound are replenished by heavy precipitation in the region and by runoff from the less permeable slopes of the adjacent uplands. Shallow well water yield is closely related to precipitation and wells may go dry in the summer during years of inadequate rainfall. Deep wells yield large quantities with little seasonal change in water level.

Air Quality - The Clean Air Act designated air quality classifications to reduce air emissions. Class I areas are the most pristine and little or no degradation of air quality is allowed. These areas are shown on Map 8. Class III or nonattainment areas are where air quality standards are not now being met for ozone, carbon monoxide, and fine suspended particulates. These are much smaller than the pristine areas. Measuring concentrations of pollutants determines if an area meets EPA and State air quality standards.

Climate - The climate in the Puget Sound area is strongly influenced by the Pacific Ocean and the Olympic and Cascade Mountains. The result is a temperate, maritime climate characterized by moderately warm summers and wet, mild winters. Average annual rainfall ranges from 133 inches in the Olympic rainforest to 17 inches in the rain shadow of the Olympics. Seattle's annual rainfall is 35 inches.

As unusually cold winter days pose the greatest threat to electric reliability, winter climatic conditions are of greatest importance. Factors of greatest significance with regard to Puget Sound's winter climate are the position and intensity of semi-permanent high and low pressure centers located over the Pacific Ocean, and the Cascade Mountains.

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN

Wildlife Habitat Along Rivers

LEGEND

- Outstanding and Substantial Wildlife Habitat
- County Boundary
- Study Area Boundary

Data from the Northwest Environmental Database: Washington Rivers Information System, compiled by Washington Department of Wildlife, 3/89, and Oregon Rivers Information System, compiled by Oregon Department of Fish and Wildlife, 10/90.

Miles

0 20 40 60

Map 5

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN

Anadromous Fish Presence

L E G E N D

- River Segment with Anadromous Fish
- County Boundary
- Study Area Boundary

Data from the Northwest Environmental Database: Washington Rivers Information System, compiled by Washington Department of Wildlife, 3/89, and Oregon Rivers Information System, compiled by Oregon Department of Fish and Wildlife, 10/90.

N

Miles

0 20 40 60

Map 6

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN

Resident Fish Habitat

LEGEND

- Outstanding and Substantial Resident Fish Habitat
- County Boundary
- Study Area Boundary

Data from the Northwest Environmental Database: Washington Rivers Information System, compiled by Washington Department of Wildlife, 3/89, and Oregon Rivers Information System, compiled by Oregon Department of Fish and Wildlife, 10/90.

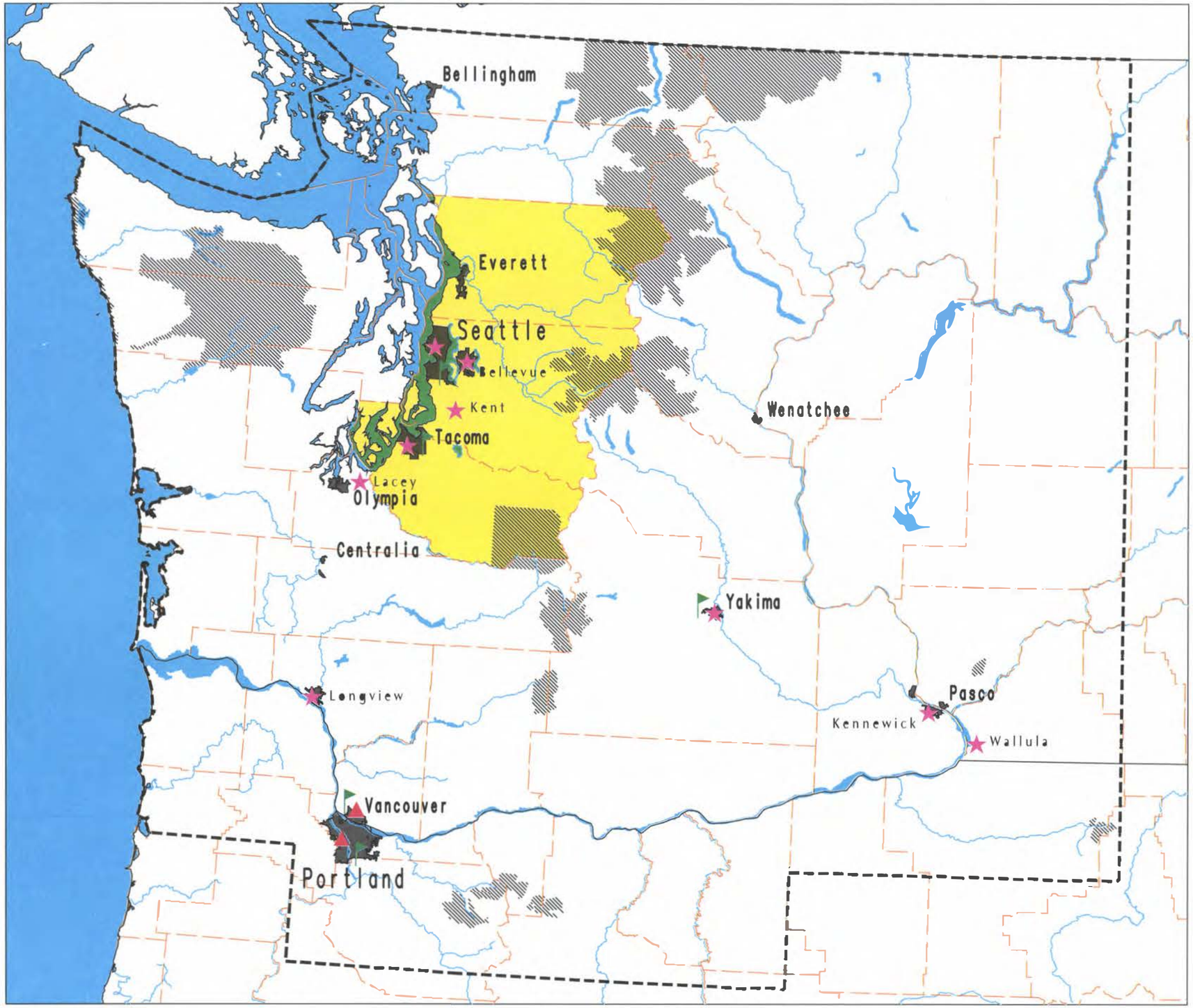
N

Miles

0 20 40 60

Map 7

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN



Air Quality

L E G E N D

- Areas of Pristine Air Quality

Non-Attainment Areas

- Ozone (County Wide)
- Fine Suspended Particulates(PM-10)
- Ozone
- Carbon Monoxide
- County Boundary
- Study Area Boundary

Basemap data from BPA's Regional Geographic database. Air Quality data from the Washington State Department of Ecology Air Program, April, 1991.

Miles

0 20 40 60

Map 8

The Cascades are effective in preventing cold continental air from reaching the Puget Sound lowlands. The typical winter day has high temperatures in the 40's and nighttime temperatures in the 30's. Freezing days in the Seattle area range from 15 to 50 days depending on elevation and distance from Puget Sound.

Under normal winter conditions the distribution of high and low pressure centers brings mild and moist air into the area from the southwest. Clouds and persistent rains during this period (October-mid March) are important factors in holding temperatures above the freezing mark. Occasionally, in the winter season, the pressure distribution will result in a southward flow of colder air from Canada. It is under these conditions that the coldest weather usually occurs. The cold temperatures experienced in February, 1989 (termed the Siberian Express) were caused by a southward flow of cold air.

Environmental Hazards - The geological forces that formed the Cascades and the Olympics created an unusual mix of peaks, slopes, valleys, and waters. This study area starts at sea level and climbs steadily to the top of Mt. Rainier. The complex topography has inherent risk. Earthquakes, volcanic eruptions, flooding, and landslides are possible in the study area. Several environmental hazards are shown on Map 9.

3.1.3 Economy

Major Industries - Much of the industrial manufacturing is based on the natural resources of the region. Forests, farmland, the ocean and rivers provide lumber and wood products, paper, and food. The aerospace industry also is very important in the Puget Sound area. Government and service industries such as communications, utilities, trade, and financial services are a large part of the economy.

The economy of the Puget Sound area has recovered from the recession of the early 1980's. Map 10 shows the average annual actual and projected rate of growth in non-farm employment for Washington for 1987-2008. In the Puget Sound area, only Grays Harbor County may experience less than 1.5% employment growth during this period. Some counties in this area may grow up to 2.4% annually.

The economy of the rest of the study area is heavily resource-based. The extensive forests provide material for lumber, wood products, and pulp and paper. These industries and others, such as chemical and metal (principally aluminum) production, rely heavily on historically low-cost hydroelectric power produced by the water resources of the region. The size and extent of the river systems allow large withdrawals for irrigation, a critical economic factor for agriculture, particularly in central and eastern Washington. The Columbia River Basin supports many anadromous fish stocks, a resource important to the Pacific Northwest for the substantial economic value of sport and commercial fisheries. The river systems are also economically important in providing multiple recreational opportunities (including boating, swimming, fishing, and windsurfing) and scenic tourist attractions, including the nationally valued Columbia River Gorge. The river systems provide economic support for trade, as in transporting goods into the interior of the Pacific Northwest.

High technology manufacturing is an important part of the economy, but employment is dominated by service sectors such as communications, utilities, trade, financial services and government. Unemployment rates usually follow the cyclical nature of the region's economy.

Fisheries - The ocean and rivers provide an important resource to the Puget Sound area, namely the large economic value of the sport and commercial fisheries and the high cultural and religious value to Indian Tribes and others.

Demographics - The population in the Puget Sound area is centered in Seattle and Tacoma. The population of Washington has grown from 4.13 million in 1980 to 4.80 million in 1990, a 16 percent increase. Map 11 shows the annual growth rate for Washington from 1987 to 2008. Population in the rest of the study area is centered in Portland/Vancouver (OR/WA), the Tri-Cities (Richland, Pasco, Kennewick (WA)), and Yakima

(WA). Oregon's population has increased 4.2% in that period (Initial Northwest Power Act Power Sales Contracts DEIS, BPA, 1990).

3.1.4 Public Health and Safety

Power plants and transmission facilities provide electricity for heating, lighting, and other services essential for public health and safety. These same facilities can potentially harm humans. Impacts include injury from contact with transmission lines that can injure birds, people and aircraft, and pollutants produced by power plants and hazardous wastes produced by the normal operation and maintenance of electrical and generating and distribution transmission facilities and the risk of emergency releases of these substances (spills). Studies are underway to find whether exposure to electric and magnetic fields can endanger human health. A more complete description of these impacts is in Chapter 4.

3.1.5 Visual and Aesthetics

The study area is rich in visual beauty. Large mountains and mountain ranges, forests and the expanse of water in Puget Sound dominate the landscape in the Puget Sound area. Contrasting with the natural beauty are the skyline of Seattle and surrounding urban communities, and cultivated fields and pastureland.

The rest of the study area includes diverse landscape characteristics. Part of the study area borders the crest of the Cascade Mountains, with all the scenic values and variety of an alpine environment. The valleys to the east of the mountains are generally flat and bounded on the east, west, and south by rolling hills. Outside the urban centers, valleys exhibit diverse patterns of color and texture that change with the seasons. Vegetation is mainly open pasture or cultivated fields, broken up by groups of trees, mostly deciduous. Moderate-to-steep slopes are covered with Douglas Fir, oak, and pine.

The Columbia Plateau is generally flat. Large cultivated fields are broken up by rolling hills, gullies and scattered trees. Farmsteads are scattered throughout the fields. The land here has more climatic extremes than west of the Cascades, and these affect the vegetation colors and texture of the landscape.

The Columbia and Snake rivers are the dominant water features within the study area. The Columbia Gorge, with steep basalt cliffs, the wide Columbia River, and large mountains in the background dominate the landscape between Washington and Oregon.

3.1.6 Noise

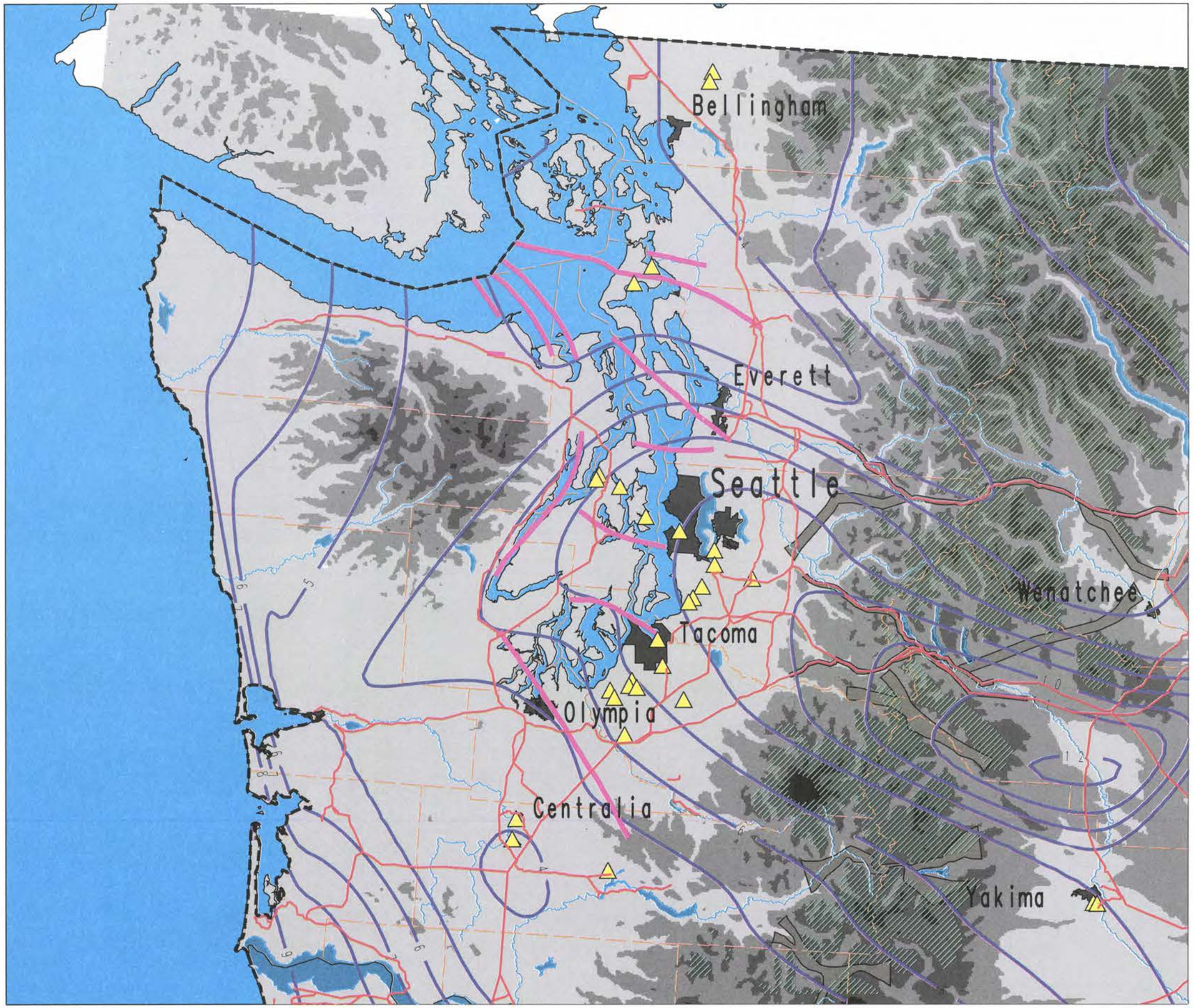
It is difficult to discuss the existing noise environment in this study area because it is site-specific. There are sensitive areas in the study area such as national parks, wildlife areas, and major recreation areas where current low noise levels need to be preserved. Noise from a new power plant or transmission line would need to meet State and Federal standards.

3.1.7 Protected Resources

Map 12 shows protected areas such as wild and scenic rivers, national parks, national forests, Indian reservations, wildlife refuges, and other Federal and State management areas.

This map includes rivers designated by the Northwest Power Planning Council as protected. Based on BPA's

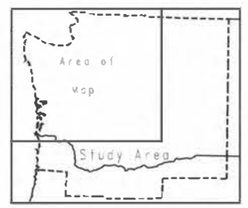
PUGET SOUND AREA ELECTRIC RELIABILITY PLAN



Puget Sound Area Environmental Hazards

L E G E N D

- 0 – 2000 Ft. Elevation
- 2000 – 4000 Ft. Elevation
- 4000 – 6000 Ft. Elevation
- Above 6000 Ft. Elelvation
- Potential 45 – 60 mm Transmission Line Icing
- Inferred Fault Line
- Annual Thunderstorm Frequency
- BPA Transmission Lines
- County Boundary
- Study Area Boundary
- EPA Superfund Hazardous Waste Site
- Cross-Cascades Corridor

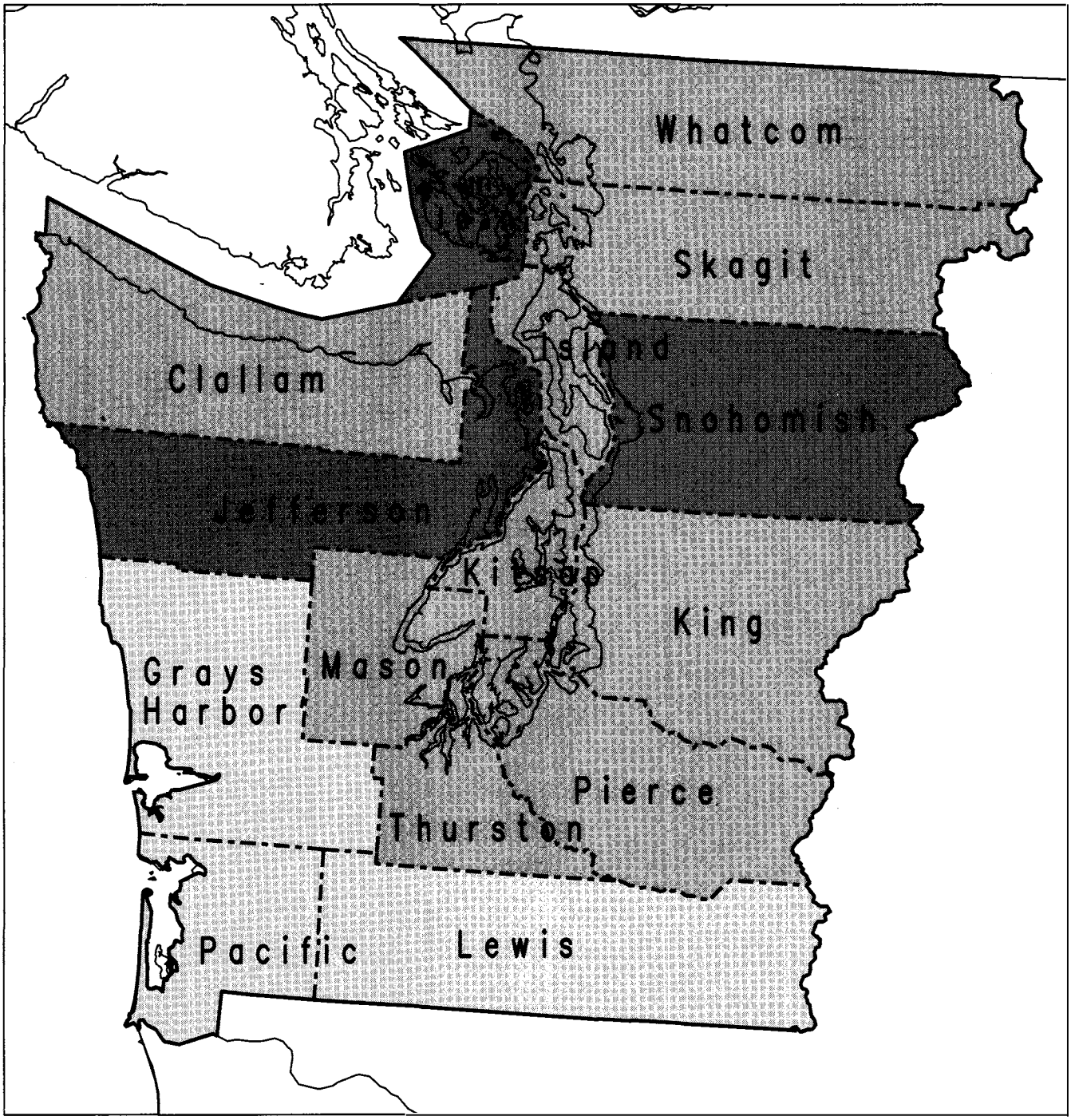


Miles

0 20 40

Map 9

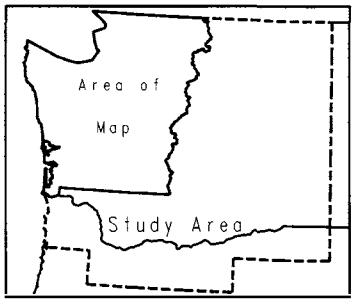
Puget Sound Area Electric Reliability Plan



Projected Employment Growth, 1987-2008 (Non-Farm)

Annual Growth Rates

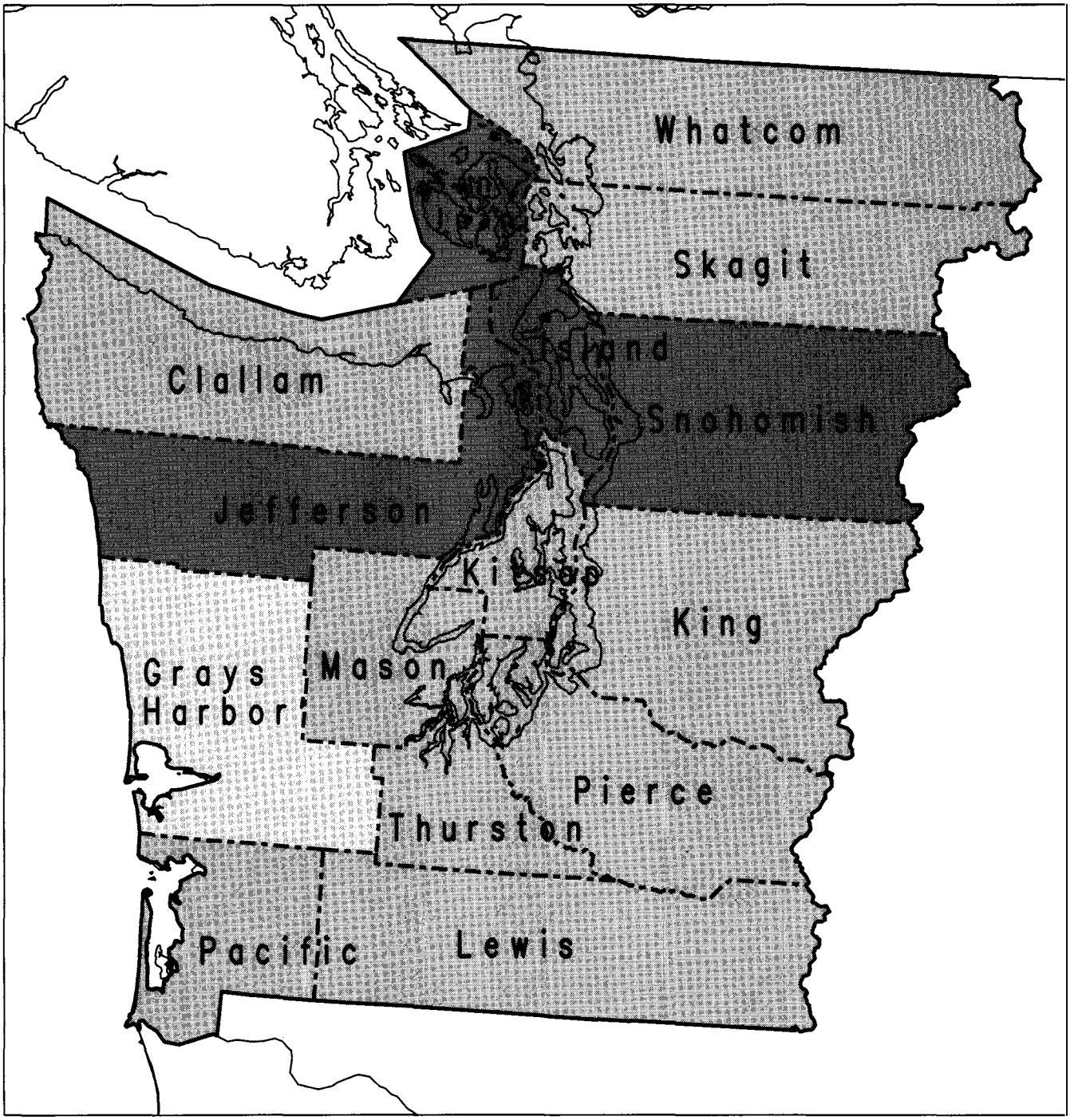
- High (2.01-2.4%)
- Medium (1.61-2.0%)
- Low (1.2-1.6%)



Data from County Employment and Population Projections, report date January, 1990.
Produced by BPA's Economic Analysis Section.

Map 10

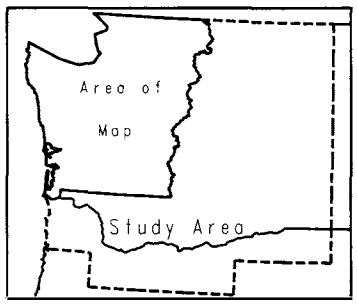
Puget Sound Area Electric Reliability Plan



Projected Population Growth, 1987-2008

Annual Growth Rates

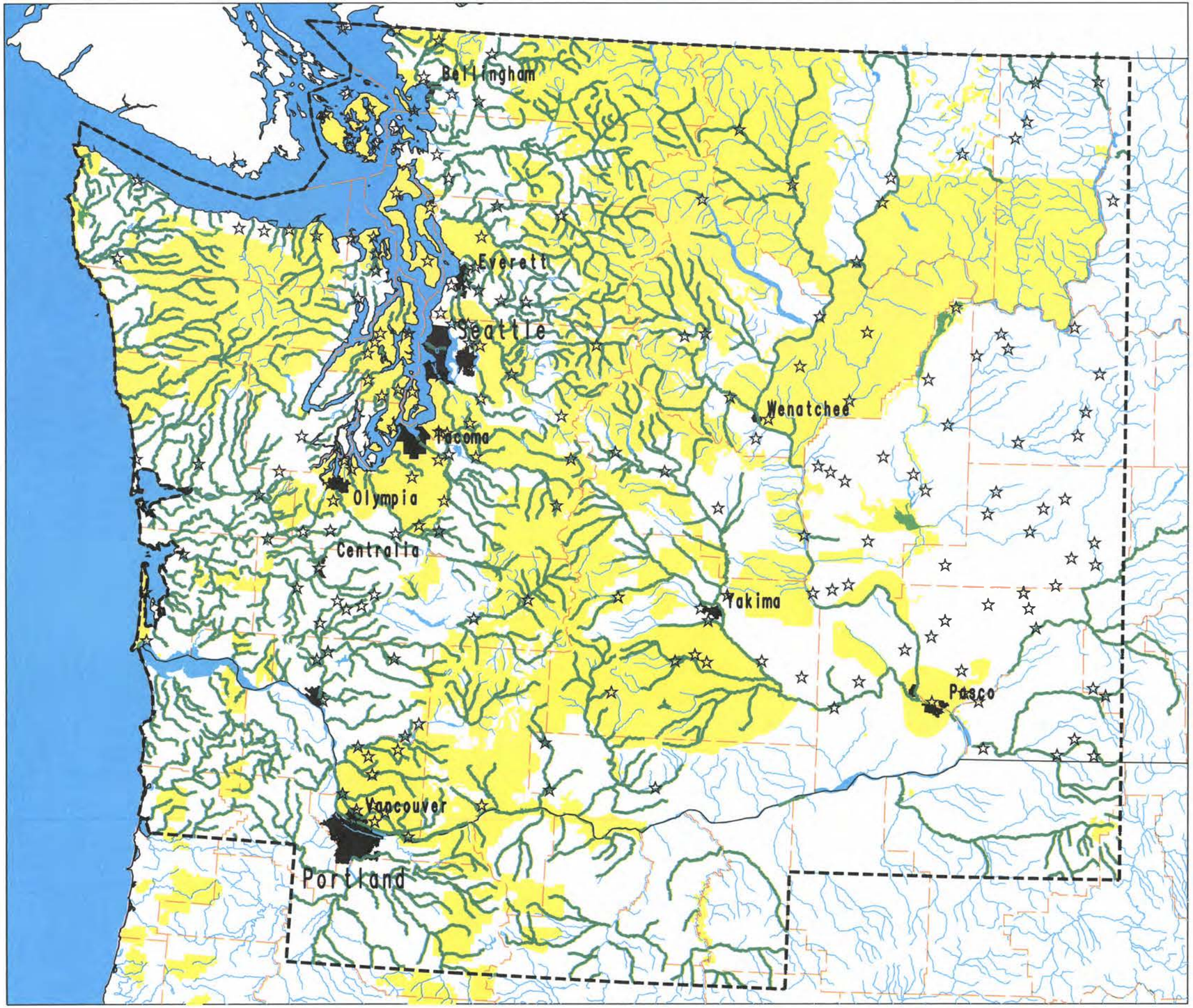
- High (1.41-1.9%)
- Medium (.91-1.4%)
- Low (.4-.9%)



Data from County Employment and Population Projections, report date January, 1990.
Produced by BPA's Economic Analysis Section.

Map 11

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN



Federal and State Protected Areas

L E G E N D

- Protected Area
- Wild, Scenic, or Protected River
- County Boundary
- Study Area Boundary
- ☆ Airport or Controlled Airspace

Protected Areas contain Federal and State land use designations which include Spotted Owl Critical Habitat Areas, Wilderness Areas, National and State Parks, Indian Reservations, Wildlife Refuges, sole source aquifers, groundwater management areas, controlled airspace and other restricted land use areas.

N

Miles

0 20 40 60

Map 12

Pacific Northwest Rivers Study and the Council's Anadromous Fish Study, the Council designated portions of stream reaches and wildlife habitat in the region that should be protected from new hydroelectric development.

3.2 AREAS POTENTIALLY AFFECTED BY VOLTAGE SUPPORT OPTIONS OR A TRANSMISSION LINE

A transmission line or Voltage Support Option 2 suggested in some alternative strategies may, if built, require changing land use in specific locations. These locations are unknown, but a general discussion of the environment that could be affected is beneficial. This section describes possible corridors for a transmission line, and locations of substations where voltage support equipment may be installed. Before a line is built, specific routes and any impacts associated with those routes would be discussed in a site-specific environmental impact statement.

The study area contains an existing transmission grid that brings power from generation resources outside of the Puget Sound area into the area. Potential new or rebuilt transmission lines will most likely be defined by patterns already established by existing transmission lines, and would cross from east of the Cascade Mountains, through a pass to the Puget Sound area. Designated corridors are incorporated into Federal land and resource management plans. BPA, utilities and the USFS and BLM work together to design and plan corridors as part of regular forest and district planning processes.

The Draft Northern Cascades Corridor Availability Study identifies available corridors for utility planning through the Northern Cascades. The study evaluates USFS and BLM land, and private and public lands for corridors. It provides detailed information on constraints and opportunities for existing and potential corridors. Information on potential cross-Cascade corridors for this EIS were developed from this study.

Potential connections to bring power from eastern generation resources to the Puget Sound area are shown on Map 1 and described in the following section. For discussion purposes, these corridors are divided into eastern, central, and western segments.

3.2.1 Alternative Transmission Line Corridor A

A transmission line in Alternative Corridor A could be a new 500-kV line parallel to an existing line, a rebuild of an existing 345-kV line, or a new line on existing and new corridors. This line would be about 125 miles long. The line could begin at BPA's Chief Joseph Substation on the east, cross the Cascades through Stevens Pass, and end at BPA's Monroe or Echo Lake Substations.

Eastern Segment - The eastern segment is mostly cropland/pastureland and rangeland. There is a small amount of forest land, and orchards, vineyards, and nurseries. Map 13 shows that it is both privately and publicly owned. The State of Washington, the USFS, and the BLM manage the publicly owned land. This section contains existing BPA lines. There are airports and historical sites in or near this segment, and two State Wildlife Recreation Areas. This segment includes key big game habitat and crosses the Entiat River which the Pacific Northwest Rivers Study has described as "rivers which should be protected for their resource value." This river has anadromous fish.

Included in the eastern segment of Alternative Corridor A is a potential new corridor from Sickler Substation extending northwest to the existing corridor. This corridor is shown on Map 1. The section from Sickler Substation to the eastern segment boundary includes the following land uses: residential, transportation, other urban or built-up land, cropland/pastureland, orchards, vineyards, nurseries, rangeland, forest land and reservoirs. About twenty percent of this land has been identified as key big game habitat. This corridor also includes Lincoln Rock State Park adjacent to and between Sickler Substation and the Columbia River.

Central Segment -- This corridor contains two BPA transmission lines (double-circuit 345-kV, 500-kV), a Chelan County PUD line (115-kV), and a railroad. The corridor passes through three valleys, which vary from 1/4 mile to 1 mile wide. Map 13 shows that most of this segment is National Forest land. Other public or private land composes the rest of this segment. Of the National Forest land, about one third is classified as avoidance areas, including some "Spotted Owl Habitat," and scenic and recreation areas. An avoidance area has significant resource values which cannot be successfully mitigated and should be avoided for transmission or utility corridors. About one fourth is non-avoidance areas. Non-avoidance areas are suitable for transmission or utility corridors because resources there are of lessor significance than those found in avoidance areas, and impacts can normally be mitigated. Other management areas include potential Wild and Scenic Rivers, waterways identified in the Pacific Northwest Rivers Study as "rivers which should be protected for their resource value," and the Stevens Pass Historic District. The Pacific Crest Trail also crosses this segment. There are two airports along this segment, and two State Parks. Some of these sensitive areas could be avoided. There are also engineering constraints for this segment, including proximity to buildings and residences, rugged terrain with steep slopes, wetlands, and heavy icing in one area.

This central segment includes parts of two new corridors. These corridors are shown on Map 1. The first new corridor is the continuation of the new corridor from Sickler Substation discussed in the eastern segment section. Nearly all of this portion of this new corridor is National Forest land. The remaining land is cropland/pastureland and rangeland. This corridor contains key big game habitat. This corridor also includes scenic areas that should be protected.

The second new corridor begins about 29 miles east of Monroe Substation and heads toward Echo Lake Substation. This, too, is mostly National Forest land. Included in this forest land is wilderness area, scenic areas, Mountain Goat habitat, and mature old growth timber. This new corridor includes some protected rivers where anadromous fish are present, and seven miles of Wild and Scenic river. It also includes outstanding and substantial resident fish habitat. The private or other public land is residential, other urban or built-up land, reservoirs, mines and quarries, or forest land.

Western Segment - The western segment includes using an existing corridor from the central boundary to Monroe Substation, and new corridor from this boundary to Echo Lake Substation. Map 1 shows the boundaries of these corridors in this segment.

Map 13 shows that the existing corridor into Monroe Substation is mostly private land. This private land is residential, cropland/pastureland, forest land, or mines, quarries, and gravel pits. Almost half of the land is owned by the State of Washington, and includes all the same land uses as the private land. National Forest is less than one percent.

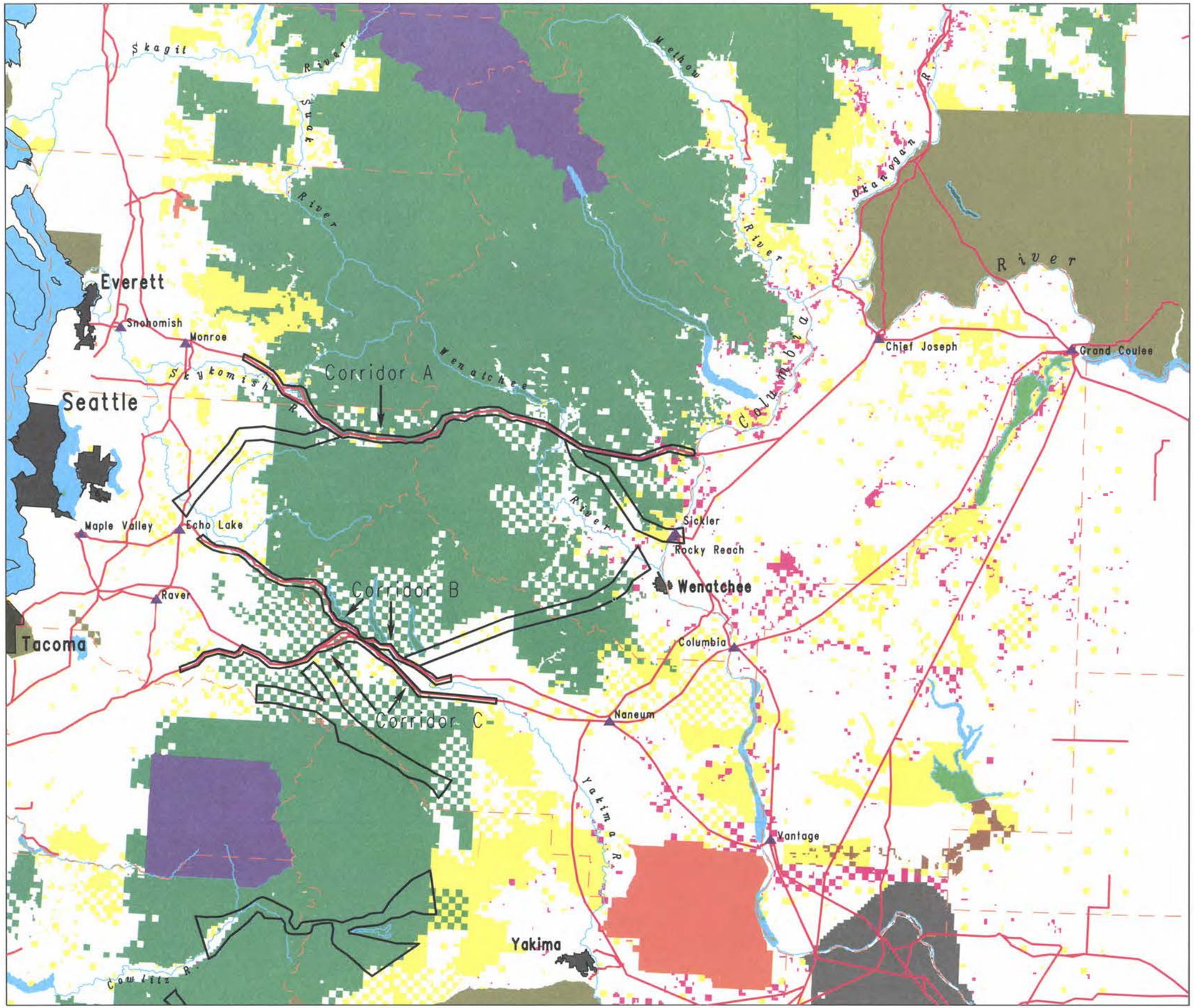
The new corridor into Echo Lake Substation from the central boundary is almost entirely private land. Other land is owned by the State. Land use in this corridor is mostly forest land, with other residential, commercial and industrial, other urban or built-up land, cropland/pastureland and quarries as the other land uses. This portion of the corridor also includes a municipal watershed which serves the Seattle area, some protected rivers where anadromous fish are present, and outstanding and substantial resident fish habitat. About four river miles have significant historical features. One airport is in this corridor.

3.2.2 Alternative Transmission Line Corridor B

Alternative Corridor B is about 25 miles south of Alternative Corridor A (see Map 1). It also could begin at Chief Joseph Substation, then travel southwesterly and cross the Cascades through Snoqualmie Pass. This alternative offers the option of a new line parallel to existing lines, or a rebuild of the existing 345-kV line to 500-kV. An east-west line using Corridor B would be about 130 to 150 miles long, depending on the route.

Eastern Segment - The eastern segment of this line would follow the same route as Alternative Corridor A from Chief Joseph Substation to Sickler Substation. These routes are described under Alternative Corridor A. From Sickler

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN



Land Ownership

L E G E N D

- Department of Defense
- Department of Energy
- Indian Reservations
- National Park Service
- U.S. Forest Service
- Bureau of Land Management
- National Fish and Wildlife Service
- State of Washington
- Private
- BPA Substation
- Occupied East-West Corridor
- Potential New Corridor
- BPA Transmission Lines
- County Boundary

Data Layers from BPA'S
Regional Geographic database.

Miles
0 16 32

Map 13

Substation the line could go two directions: follow existing lines toward Naneum, or follow a new corridor. Following existing lines would cross cropland and rangeland, both publicly and privately owned. Following the new corridor in this segment would cross mostly National Forest land.

Central Segment - This potential corridor through the Cascades is about 45 miles long. This corridor contains a BPA transmission line (345-kV), and a Puget Sound Power and Light transmission line (115-kV). The corridor goes through valleys varying from 1/2 mile to 2 miles wide, with varying moderate to steep slopes. Map 13 shows that about half of this segment crosses National Forest land. About one third of this land is classified as avoidance areas, and includes "Spotted Owl Habitat," and scenic areas. About one fourth is classed non-avoidance areas.

The other half of this segment is other public or private land. It includes some land classed as avoidance areas. These include the Yakima River, which is a "Potential Wild and Scenic River," waterways identified in the Pacific Northwest Rivers Study as "rivers which should be protected for their resource values, " two State Parks, a National Trail, the Pacific Crest National Scenic Trail, and two airports. Mitigation would need to be considered for these avoidance areas, and some areas must be avoided.

A portion of one of the alternatives for a new corridor is in this segment. It is mostly forest land, privately or publicly owned. Map 1 shows the portion on this corridor in this segment.

This segment also has some engineering constraints, including buildings and residences along the corridor in some areas, snow avalanche paths west of Snoqualmie, and wetland areas.

Western Segment - This segment is owned mostly by the State of Washington or private parties. The land use is mostly forest land, with some urban or built-up land.

3.2.3 Alternative Transmission Line Corridor C

Map 1 shows that Alternative Corridor C is located immediately south of Corridor B. From the Puget Sound area, the corridor passes through the Green River and Sunday River valleys, over Stampede Pass, down along the south side of the wide Yakima River Valley, and east past Cle Elum. The corridor carries BPA transmission lines (two single-circuit 500-kV, a 500-kV double circuit, and a 287-kV double circuit), one Puget Sound Power and Light transmission line (230-kV single circuit), and a railroad. An east-west transmission line using Corridor C would be about 150 miles long, depending on the route. The terrain along the corridor tends to be flat to rolling, except through Stampede Pass, where the valley is narrow, with steep side slopes.

Eastern Segment - The land use of this segment is similar to the eastern segment of Corridor B. However, this segment has no new corridor. This segment includes one airport.

Central Segment - Most of this segment crosses National Forest land. The forest land is divided into avoidance or nonavoidance areas. This segment contains some "Spotted Owl Habitat," and "Scenic Travel" areas. The Green River Municipal Watershed is in this segment. It also contains deer and elk winter range. This corridor crosses the Yakima River which is classified as a "Potential Wild and Scenic River." Green River and Sunday Creek are waterways identified as "rivers which should be protected" in the Pacific Northwest Rivers Study. Two historical sites are in this segment, and the Pacific Crest Trail crosses the corridor around Stampede Pass. This segment contains two airports. This segment contains an area of concern for reliability. With so many high-voltage transmission lines in one corridor, a major disaster such as an avalanche or earthquake could knock out more than one line at once.

Western Segment - The western segment is a mix of publicly and privately owned forest land.

3.2.4 Schultz Substation

In 1978, BPA prepared an environmental analysis on a 500-kV switching station called Kittitas Switching Station. At that time, the facility was designed to prevent overloading on the Rocky Reach-Columbia and Columbia-

Vantage 230-kV lines. The station was never built. As described in Section 2.3.3, BPA is again proposing to build a 500-kV substation in the same area as part of Alternative Strategy 2. The new substation would be called Schultz Substation.

The siting area is shown on Map 14. Four locations for the substation were originally proposed in the DEIS. After careful reevaluation of the sites and public comment, two sites (2 and 4) were dropped from consideration. Site 1 and 3 remain under consideration with Site 3 as the preferred site. Both sites are approximately ten miles north of Ellensburg, in Kittitas County, Washington. The site will be approximately 130 acres with 50 acres enclosed within a fence. The site be will located as much as possible within the transmission corridor right-of-way.

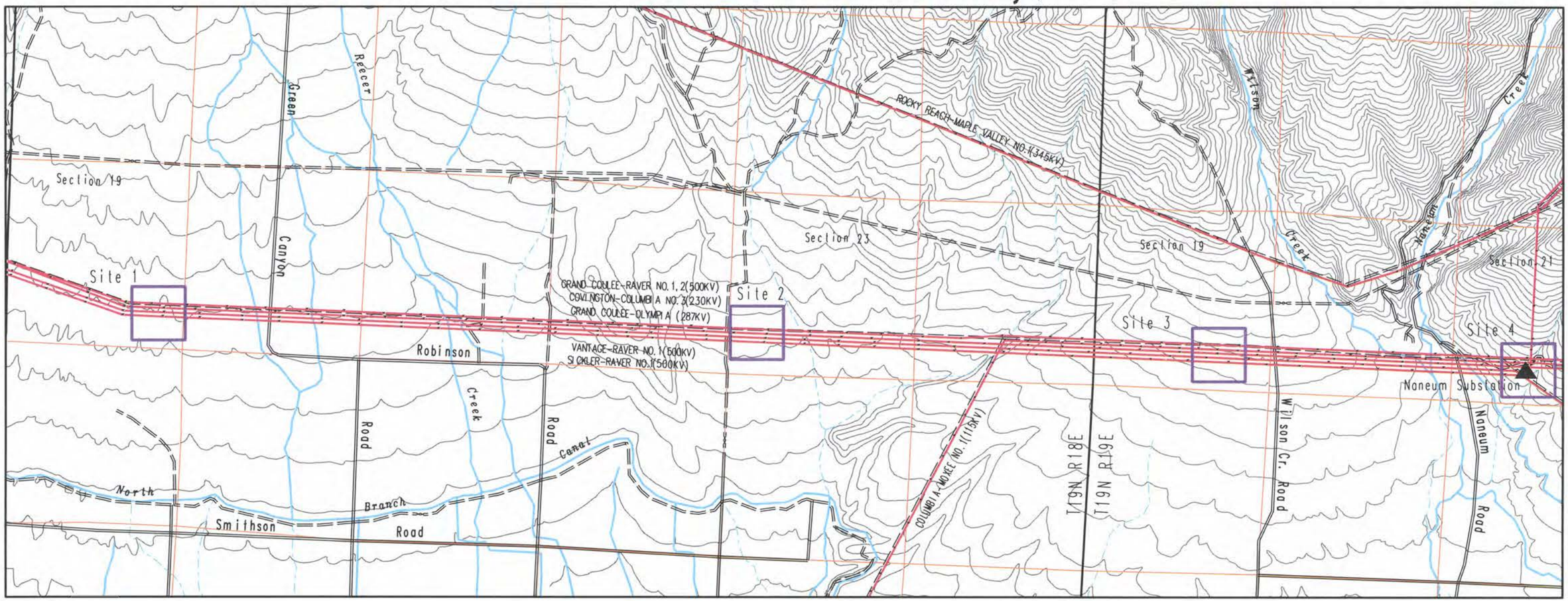
Because of low annual precipitation, the climate is generally considered to be semi-arid. The landscape for the most part is relatively flat with gradual slopes occurring nearer to the creeks. Wilson and Naneum Creeks located closer to the eastern boundary of the siting area run south towards the Yakima River. Both creeks run year around but are quite small. Reecer Creek, located more to the west of the siting area, also runs year around. A canal flows mostly east-west through the siting area and is used for irrigation. Intermittent drainage systems are apparent throughout the siting area.

Land use within the siting area consists mostly of forest land, rangeland and agricultural land. Potential sites are located only on privately-owned rangeland and the transmission right-of-way. Residential land use occurs within the siting area but not within the boundaries of the proposed sites.

Vegetation consists of bunchgrass, sagebrush, rabbitbrush, bitterbrush, and hopsage. Riparian vegetation and any potential for wetlands exists along Wilson or Naneum Creeks to the east, far away from potential sites. The creeks are also home to fish, waterfowl, furbearers, deer and elk. The remaining parts of the siting area are home to upland birds, insects, and snakes.

A more complete description of the affected environment is given in Appendix G.

NEW SUBSTATION SITING AREA - Kittitas County, Wa.



Legend

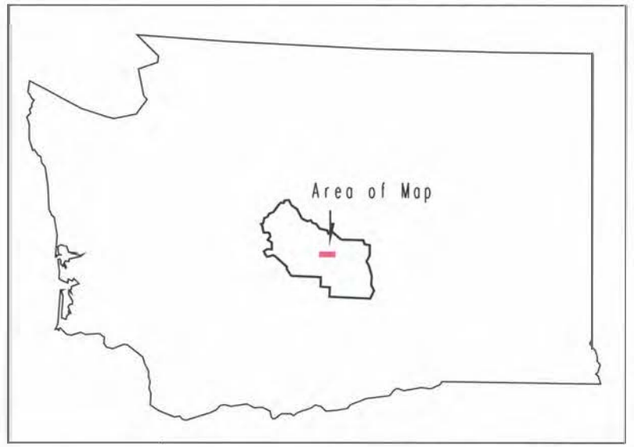
- Paved Road
- Dirt Road
- Section Boundaries
- Surface Hydrology
- 40 Foot Contour Intervals
- BPA Transmission Lines
- Potential Substation Site

NOTE: Alternate Sites 2 & 4 have been eliminated from consideration based on environmental and technical factors

Feet

0 2000 4000 6000

Location Map



Map 14

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter evaluates the environmental, technical and economic qualities of a preferred and alternative strategies to strengthen the reliability of the cross-Cascades transmission system. A No Action Alternative is also evaluated.

To aid in understanding trade-offs among the strategies, consequences are discussed under two headings: Environmental Evaluations; and Economic and Technical Evaluations. Impacts attributed to a strategy can often be mitigated. Mitigation measures are described under the heading, Mitigation Potential. Finally, contingencies are built into the strategies enabling them to expand or contract as conditions demand. The contingencies for each plan vary somewhat depending on what has already been included in the strategy and the lead times required to install a contingency measure. Contingency measures and their likely impacts are discussed under the heading, Contingency Impacts.

The analysis conclusions stated in the following pages were extracted from the Environmental Analysis - Appendix F, and the Economic and Technical Evaluation - Appendix C. Reviewers interested in evaluations for measures not included in strategies are directed to these appendices.

The following discussion explains the study approach and the goal of this decision making phase.

Decision Making Strategy - Early in the planning stage (September 1989), a two-step decision making strategy was established for the PSAERP. The first step (this EIS) evaluates alternative strategies to meet the need. The intent of this step is to evaluate the widest possible range of solutions, and lead to selection of a regional solution plan. The first step considers impacts on a generic level because proposals would not in most instances be site-specific. The second step would be to review measures in the selected plan and determine if follow-up site-specific EIS's or other documents should be prepared. To avoid duplication, follow-up site-specific EIS's or Environmental Assessments (EA's) would be prepared to meet both the requirements of Washington's State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA).

As the study progressed, alternative solutions became more clearly known. When the Steering Committee met to recommend a Preferred Alternative for the Draft EIS in July, 1991, it appeared that the primary component of the preferred alternative (Voltage Support Option 2) would have relatively low environmental impact. For example, new substations typically require Environmental Assessment coverage and yield Findings of No Significant Impact. It was decided to take additional time and provide site-specific environmental coverage on Voltage Support Option 2 reducing the lead time by two years while avoiding unnecessary administrative complexity. Implementing Voltage Support Option 2 two years sooner was desirable because Puget Sound area load growth continues to exceed the medium-high forecast. Thus, site-specific coverage has been provided for Voltage Support Option 2, both within this EIS and within Appendix G. This measure, if a part of the plan recorded in the Record of Decision, would be implemented without supplemental (second step) environmental review.

Environmental Impact Definitions - Analysts evaluated individual measures and alternative strategies using a scale with four impact levels. The high impact level means taking an action would create a significant adverse change in present environmental conditions. A significant adverse change in present environmental conditions would satisfy one or all of these outcomes:

1. Create an effect that cannot be mitigated.
2. Significantly reduce the quantity or quality of a regionally or nationally significant resource.
3. Pose a clear risk to human health or safety.

4. Affect the long-term productivity of the affected environment.
5. Irreversibly or irretrievably damage the environment.
6. Consume significant quantities of non-renewable natural resources.

An action with a moderate impact level would create a significant adverse change in present environmental conditions by one or more of these outcomes:

1. Create an effect that could be mitigated partially.
2. Cause a localized reduction in the quantity or quality of a resource.
3. Create a possible, but unlikely risk to human health or safety.
4. Reduce marginally the productivity of adjacent resources.
5. Removing the facility or stopping the action can partially reverse the impacts.
6. Consume small but not negligible amounts of non-renewable resources.

A low impact action would create a significant adverse change in present environmental conditions by one or more of these results:

1. Create an effect that could be largely mitigated.
2. Reduce the quantity or quality of resources confined to the site of the action.
3. Create a very unlikely health and safety risk.
4. Cause no effect on productivity of adjacent resources.
5. Removing the facility or ceasing the action will reverse the impacts.
6. Consume negligible amounts of non-renewable resources.

A minimal or no impact action creates no or fewer impacts than the low impact level.

Assumptions Drive Evaluations - Analysts used the key assumptions discussed in Chapter 1 for the environmental analysis and the evaluation process. The appendices contain additional assumptions used.

4.1 PREFERRED ALTERNATIVE

To hasten improved electric reliability, and focus public discussion on the potential solutions, BPA analysts evaluated the alternatives and made a tentative conclusion about which was "preferred." This was discussed with the five-utility Plan Steering Committee with advice from the Sounding Board, a citizen review panel. Both agreed with BPA's independent conclusions. Following these steps, BPA presented this as the Preferred Alternative in its NEPA document.

In choosing a preferred alternative several qualities beyond the normal criteria such as environmental suitability, cost, and technical performance were considered. Adaptability in view of uncertainties such as higher than medium load growth, Canadian entitlement return, local generation development or decommissioning, Endangered Species Act listings, and electromagnetic field health effects, was one desired quality. This flexibility was felt best achieved by identifying contingency measures to use if one or more of the above events becomes a certainty.

A second quality was the need to regularly review the electric reliability of Puget Sound and update the plan when conditions warrant it.

Measures Included in the Preferred Alternative - The Preferred Alternative is Alternative Strategy 2. Alternative Strategy 2 ranks first in all evaluation factors except environmental impacts where it ranks a close second. It includes the common elements of all the strategies: accelerated conservation programs in the residential, commercial, and industrial sectors, a high-efficiency shower head program, and Voltage Support Option 1.

The preferred alternative also proposes a second voltage support element, Voltage Support Option 2. Voltage Support Option 2 involves construction of a new substation in the area where four existing 500-kV transmission lines converge near Ellensburg, in Kittitas County, Washington. Refer to discussions within Alternative Strategy 2 for a detailed description of these measures and their impacts. See Chapter 3 for a discussion of the proposed site, Site 3, and alternative sites for the new substation.

While Voltage Support Option 2 is expected to create 600 MW of surplus capacity in 2003, the uncertainties listed in Section 1.4.6 have the potential for increasing the transmission capacity deficit by several thousand megawatts. Thus added contingency measures were defined for the Plan. The first choice contingency action proposed is to begin an EIS and permitting work for a cross-Cascade transmission line in late 1992 or early 1993. Such work would need to begin at this time due to the long lead-time required for a transmission line. If a transmission line cannot be built, the second choice contingency proposed in the preferred alternative is developing peaking combustion turbines. Peaking CTs could be installed in 70 MW increments until Puget Sound area needs are met. Combustion turbines could be built at existing sites or advanced environmental and permitting work could be undertaken at new sites by the region's utilities. Combustion turbines enable a quick response to a sudden increase in the deficit. The third choice contingency measure is load curtailment contracts. An analysis of environmental, economic and technical attributes of the contingency options is provided within discussions for Alternative Strategies 1-4. It is important to keep in mind that contingency actions are provisional proposals which would not be taken unless conditions warrant. In the above contingencies, federal or state site-specific environmental impact statements would be prepared.

4.2 ALTERNATIVE STRATEGY 1 - TRANSMISSION LINE

This strategy uses measures common to all strategies: accelerated conservation, and Voltage Support Option 1. In addition, a new high-voltage transmission line to transmit power from generation resources east of the Cascade Mountains to the Puget Sound area would be built. Individual measures that are part of this strategy are discussed first. Possible mitigation, and impacts of contingency measures follow. Figure 4-1 shows the impact ratings for this strategy.

4.2.1 Environmental Evaluation

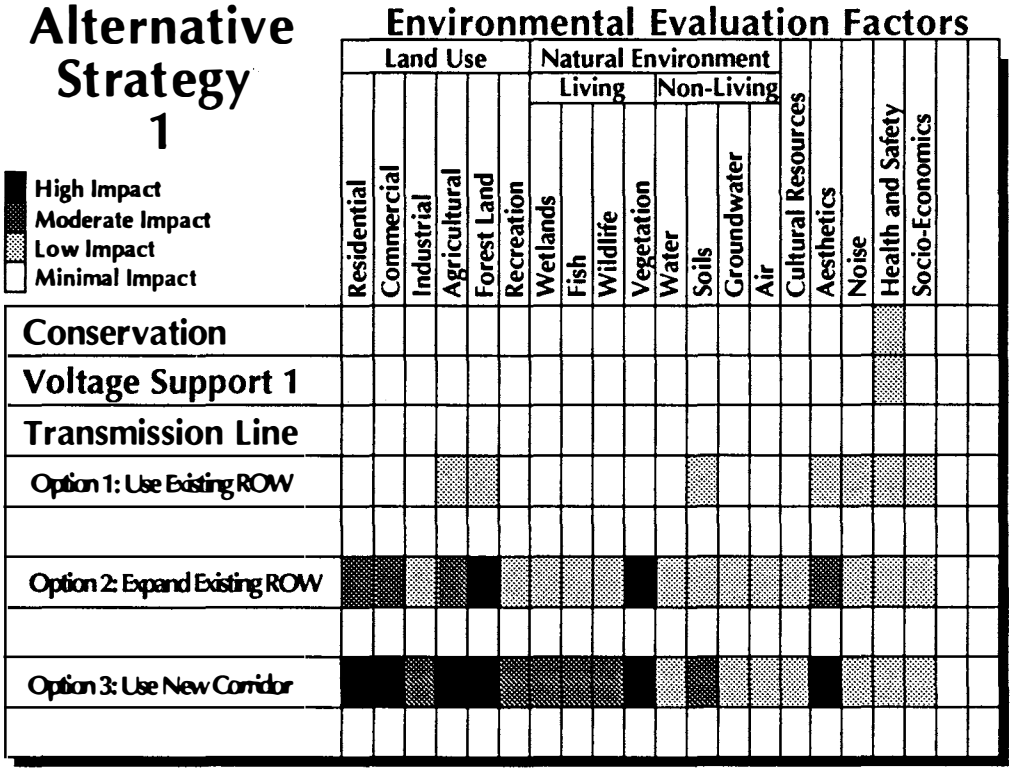
Direct Impacts-Conservation Measures

For this analysis, the conservation considered is from accelerated, voluntary programs. The impacts considered are the additional impacts attributed to these accelerated programs. The residential conservation measures applied are residential weatherization and high-efficiency shower heads. Commercial conservation measures applied are weatherization, and refrigeration and lighting improvements. Industrial conservation measures considered are motor efficiency, lighting, and process efficiency improvements. The impacts of raw material production for, and manufacturing of, conservation products are assumed to be negligible.

Figure 4-1 shows the environmental evaluation factors and individual rankings for conservation measures. Residential and commercial conservation measures have low impacts to health and safety. Industrial conservation measures create minimal impacts.

Figure 4-1.
Environmental Impact Evaluation Matrix - Strategy 1

Impact Evaluation Matrix



Health and Safety Impacts - Conservation measures can lead to negative impacts to indoor air quality. Conservation measures reduce air leakage and prevent warm air from escaping outdoors. As air leakage decreases, indoor air pollutants may increase. Formaldehyde, radon, and combustion by-products are of most concern. Excessive moisture or humidity can stimulate molds and mildew. Inhaling higher than normal concentrations of indoor air pollutants can cause minor health problems such as headaches and sore throats, and major problems such as an increased chance of lung disease. Pollutants can be reduced by avoiding pollutant sources, controlling an existing source, and removing pollutants with ventilation. Some compounds used in insulation may contribute to depleting the ozone layer shielding the earth.

Direct Impacts - Voltage Support Option 1

Shunt capacitors will be added at Echo Lake Substation, now under construction. The impacts of placing a facility at this location were described in a 1974 supplement to BPA's Environmental Statement Fiscal Year 1975 Proposed Program, called "Facility Location Supplement for Maple Valley 500-kV Reinforcement Study Area 75 -14." A recent determination has been made that further environmental analysis is not needed. The Record of Decision is published in Federal Register Vol. 56, No. 92, May 13, 1991.

The substation has adequate space within its fenced yard for the capacitor equipment. No land acquisition or yard expansion will be required. Amounts of materials required for voltage support additions are small. Impacts from producing and manufacturing them are considered negligible.

Health and Safety Impacts - Increasing loads on existing lines may slightly increase magnetic field levels. Electric and magnetic fields are fields of force caused by electric voltage and current respectively. There is controversy about the possible health effects of electric and magnetic fields produced by transmission lines. Other than shocks, no health effects are definitely known to be caused by the fields created by electric power lines, but studies suggest the possibility of adverse effects. BPA is continuing to study these potential health and safety effects.

Groundwater Impacts - Shunt capacitors are comparable in size and shape to the rectangular shaped 5-gallon gas cans attached to recreational vehicles. They are filled with a plastic and metallic material that is soaked with insulating oil (less than five gallons). Large numbers of capacitor units are installed on steel racks and electrically connected to the transmission system. In the event of a capacitor failure, a small amount of insulating oil could spill onto the substation yard. The chance of ground or surface water contamination is considered minimal because the volume of oil is small and BPA design standards require installation of liners below the surface of the substation to collect oil should spills occur. Any capacitors used will not contain materials that if spilled would be classified as dangerous waste under the Washington Administrative Code (WAC).

Direct Impacts - Transmission Line

The decision making strategy for the PSAERP first looked at alternatives in a broad and generic manner. A separate and more detailed NEPA document is planned for site-specific actions such as a transmission line. The discussions which follow are general in nature.

A double-circuit 500-kV transmission line similar to the Grand Coulee-Raver line is assumed for this analysis. Portions of this line that cross mountain passes are assumed to be either built beside existing lines, which would require expanded right-of-way, or, after an existing line or lines are removed, built on existing right-of-way. Remaining portions of the line could require building in new corridors although development of new corridors would be minimized. The eastern and western terminals for a new line would be at existing or planned BPA substations. A list of transmission line and substation components is provided in Table 4-1. These materials are commonly used within the electric power industry and are acquired competitively. The environmental screening factors to avoid protected sites and unique habitats and to meet environmental quality requirements are assumed to be applied to transmission line proposals, which will reduce environmental impacts.

Table 4-1.

Transmission Line Material Requirements	
Transmission Line	**Substation Terminals**
Tower Steel - 24,000 Tons	Substation Dead Ends (steel)
Conductor - 1800 miles (steel and aluminum)	Bus Tubing (aluminum)
Overhead Ground Wire - 300 miles (steel)	Bus Pedestals (steel)
Insulators (glass and porcelain)	Diconnect Switches
Hardware (steel and aluminum)	Power Circuit Breakers
Access Road Surfacing (rock)	Electronic Relays & Controls
	Ground Wire (copper)
	Footings and Supports (concrete and steel)
	Switchyard Surfacing (rock)

Land Use Impacts - Land use impacts are directly related to the amount of new and existing rights-of-way affected. Building a transmission line with new corridor segments could have a high impact to residential, commercial, agricultural, and forest land because new line segments would intrude on existing land use. In residential and commercial areas, noise, electrical interference, and visual impacts would be long term. Agricultural land would be removed from production for tower sites and access roads, and structures could interfere with farming operations. Forest land would be removed from production for the right-of-way and for access roads. Impacts to industrial and recreation land would be moderate. Transmission lines may cross trails and intrude on scenic views. A transmission line may be more compatible with industrial land use.

A transmission line using expanded or existing right-of-way segments would create fewer land use impacts, and is ranked accordingly. Impacts are either moderate, low, or minimal for all land use types, except an expanded right-of-way would have a high impact on forest land.

Wetlands Impacts - New corridor segments create moderate impacts to wetlands. Wetlands may be affected during construction of structures and access roads, and vegetation may be removed. Expanding a right-of-way would have less impact as the habitat close to the existing right-of-way has already been disrupted. Using existing right-of-way decreases potential wetlands impacts.

Fish Impacts - During construction, accelerated runoff can increase sediments in streams and affect fish. These impacts would be temporary. Long-term impacts are minimal to moderate depending on the amount of new right-of-way needed. If a line is replaced, the impacts to fish should not increase. Impacts may increase if the right-of-way is expanded. This depends upon location and placement of towers in proximity to streams. The relative impact of disturbing a pristine environment if a new corridor is built is even higher, depending on the location and placement of towers. Use of pesticides to clear vegetation could also impact fish.

Wildlife Impacts - Impacts to wildlife from new corridors could be moderate. Birds may collide with the new line. Right-of-way clearing changes the habitat for wildlife and increases access for hunters. Expanding existing right-of-way would create low impacts to wildlife during construction and change some habitat permanently. Using existing right-of-way would impact wildlife during construction only.

Vegetation Impacts - Clearing new and expanding existing rights-of-way can create high impacts to vegetation. Existing vegetation is removed, and vegetation composition may change. Vegetation communities also are affected by maintenance, especially if herbicides are used. Disturbed areas can be reseeded; success rates for reseeding vary. If a line uses existing right-of-way, vegetation is disturbed during construction only.

Water Impacts - Clearing new right-of-way, expanding existing right-of-way, and constructing access roads can increase sediments in streams. This increase would be short term. Using existing right-of-way may also cause temporary increases in sedimentation during construction. Access roads would already be in place.

Soil Impacts - If new corridor segments, expanded rights-of-way or existing rights-of-way are in areas with steep slopes and moderate soil erosion potential, as the transmission line is constructed, soil may erode. If erosion is severe, vegetation recovery may be slow, and slumping may occur. Because line maintenance requires using access roads, soil impacts may continue over a long period. Constructing a transmission line in a new corridor would have the greatest soil impact potential, and is rated moderate.

Groundwater Impacts - Herbicides used to control vegetation for all three options could affect groundwater. The chance of potential contamination is considered low.

Air Quality Impacts - Construction vehicles create dust and exhaust emissions. Some construction debris is burned. These impacts are temporary. During operation, the line produces minor amounts of oxidants in the air next to the electrical conductors. These impacts are considered low or minimal.

Cultural Resources Impacts - Using an existing line would create minimal cultural resource impacts. Constructing a new corridor, or expanding an existing right-of-way could disturb cultural resources. Construction may disturb subsurface sites, and the line may intrude visually on cultural resources.

Aesthetics Impacts - A new corridor would create a significant visual impact. A new line could cross a scenic highway, and towers may be out-of-scale with the surrounding landscape. Views would be disrupted for the long term. Expanding or using an existing right-of-way would have low to moderate visual impacts. Impacts would occur during construction, and if taller structures are used.

Noise Impacts - Transmission lines produce noise. Construction activities also create noise. These impacts are considered low for all three options.

Health and Safety Impacts - This section discusses the possible effects of the electrical properties of transmission lines on public health and safety. These effects include electric shocks and potential long-term health effects.

Powerlines, as with electrical wiring, can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize the shock hazard. All BPA lines are designed and constructed in accordance with the National Electrical Safety Code (NESC). NESC specifies the minimum allowable distances between the lines and the ground or other objects. These requirements basically determine the edge of the right-of-way and the height of the line, i.e., the closest point that houses, other buildings, and vehicles are allowed to the line, to limit electric field effects to acceptable levels.

People must also take certain precautions when working or playing near powerlines. It is extremely important that a person not bring anything, such as a TV antenna or irrigation pipe, too close to the lines. BPA provides a free booklet that describes safety precautions for people who live or work near transmission lines. It is entitled, "Living and Working Around High Voltage Power Lines."

Transmission lines can also induce voltages into objects near the lines. This effect can lead to nuisance shocks if a voltage is induced on something like wire fencing which is on wood posts and, therefore, insulated from ground. Usually, however, this becomes a problem only with lines of voltages above 230-kV. Should problems develop with either high- or low-voltage lines, they can be corrected by simple grounding techniques. For 500-kV lines, grounding of certain objects near the lines is a routine part of the construction process.

Electric and Magnetic Fields - Powerlines, like all electrical devices and equipment, produce electric fields and magnetic fields. Current (movement of electrons in a wire) produces the magnetic field. Voltage (the force that drives the current) is the source of the electric field. The strength of these fields also depends on the design of the line and on distance from the line. Field strength decreases rapidly with this distance.

Electric and magnetic fields are found around any electrical wiring, including household wiring and electrical appliances and equipment. Throughout a home, the electric field strength from wiring and appliances is typically less than 0.01 kilovolts per meter (kV/m). However, fields of 0.1 kV/m and higher can be found very close to electrical appliances.

Average magnetic field strength in the home from wiring and electrical appliances is typically less than 1 milligauss (mG). Very close to appliances carrying high current, fields of tens or hundreds of milligauss are present. Unlike electric fields, magnetic fields from outside powerlines are not reduced in strength by trees and building material. So, powerlines can be the major source of magnetic field exposure throughout a home located close to the line. There are no national standards for electric or magnetic fields.

Both electric and magnetic alternating-current (a-c) fields induce currents in conducting objects, including people and animals. These currents, even from the largest powerlines, are too weak to be felt. However, some scientists believe that these currents might be potentially harmful and that long-term exposure should be minimized. Dozens of research projects on electric and magnetic fields have been conducted in the U.S. and other countries. Studies of laboratory animals generally show that these fields have no obvious harmful effects. However, a number of subtle effects of unknown biological significance have been reported in some laboratory studies.

Much attention is focused on several recent reports suggesting that workers in certain electrical occupations and children living close to power lines have an increased risk of leukemia and other cancers. The evidence, however, has not established a cause-and-effect relationship between electric or magnetic fields and cancer.

Of the seven studies involving children, four reported that the cancer cases were around 1.5 to 3 times more likely to have lived near high current powerlines compared to the control children (those without cancer). The magnetic fields produced by the lines were suggested as possible factors influencing this finding. However, statistically significant associations with actual measured magnetic fields were generally not found in these studies.

A 1982 study in Washington state first reported that men in various "electrical occupations" had died more frequently from leukemia than men in other occupations. Several other studies reported similar findings suggesting an increased risk of around 20 to 50 percent. More recent studies have also reported increased risks for brain tumors, and breast cancer in electrical workers. So far, the factor(s) responsible for these results have not been established.

The U.S. Environmental Protection Agency has initiated an extensive review of the research on EMF and cancer. A draft report by that agency is currently receiving extensive scientific review. To date, this review has not found evidence to show that EMF causes cancer in humans. It appears that several more years of research will be needed before questions raised about the possible health effects of EMF can be answered.

Because of scientific uncertainty, and increasing public concern, in 1988 BPA adopted "Guidance for Addressing EMF Concerns." For proposed new transmission projects, practical alternatives are evaluated that will avoid increasing EMF exposures of the public. Such alternatives include different transmission line designs, and locations that would avoid nearby residences. This approach will be used on this project.

More detailed information on the studies discussed above can be found in a publication available free from BPA, titled, "Electrical and Biological Effects of Transmission Lines: A Review."

Socio-Economic Impacts - Population will increase during construction of a transmission line. New access roads may increase access to private land. Operating the line may cause radio and television interference, and individuals living near a transmission line may experience strong negative feelings and many contend that lines reduce the value of their property. A transmission line may disrupt normal farming practices.

Indirect Impacts

Many of the adverse social and economic impacts attributed to blackouts under the No Action Alternative would be avoided if Alternative Strategy 1 is implemented.

The accelerated conservation measures included in the strategies also reduce energy needs at off-peak times which lessens the need for conventional generating resources. As traditional energy resources such as hydroelectric dams, coal-fired plants, and combustion turbines have greater environmental impacts, accelerating conservation also accelerates the environmental benefits of energy conservation.

BPA does not expect a new double-circuit line across the Cascades to cause indirect impacts to fish runs. The line would be constructed for capacity purposes and would help the reliability problem during winter peak periods. Most of the power to meet these winter peak loads is generated by hydro plants and thermal plants east of the Cascades. Winter peak power demand occurs during December, January, and February. The fish runs occur primarily during the spring and summer months and into the fall, April through September.

Building a transmission line would reduce the sense of urgency to solve the peak load problem and could reduce public support for conservation programs.

4.2.2 Mitigation Potential

Impacts attributed to energy conservation are caused by trapping undesirable gases in residences. To preserve indoor air quality, mitigation measures such as controlling and avoiding pollution sources or removing pollution with ventilation can be used. Compounds to replace ones that can deplete the ozone layer are available or are being developed.

Historically, the dominant environmental issue for shunt capacitors was the insulating fluids containing PCBs used in them. This will not be an issue because the new capacitors no longer use fluids containing PCBs.

The greatest opportunity for impact reduction is for the transmission line component of the strategy. As shown in the impact evaluation matrix, rebuilding an existing line or expanding an existing line right-of-way offers opportunities to reduce impacts significantly. In addition, many design and location measures have been used to reduce the visual, land use, clearing and construction impacts of transmission lines.

4.2.3 Contingency Impacts

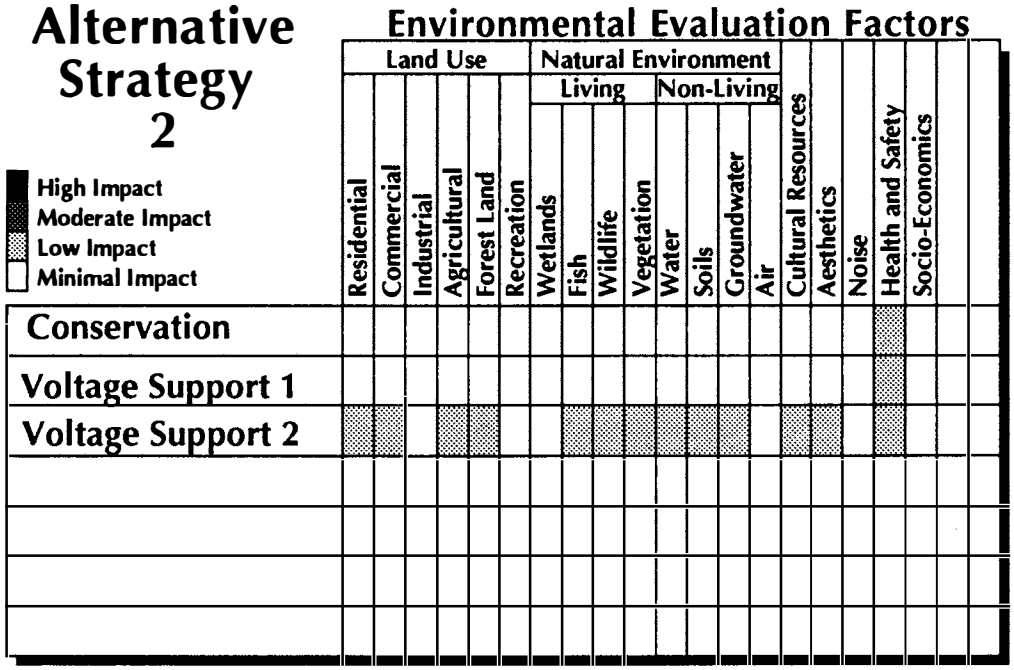
If load growth is not as predicted, or if any of the actions outlined in Chapter 1 occur to change the load/ resource balance, certain steps can be taken to respond to changing conditions. If less peaking capacity than expected is needed, the transmission line in this alternative strategy can be delayed. This would postpone the impacts of the line. If more power is required, Voltage Support Option 2 could be added. Impacts from this measure are discussed under Alternative Strategy 2. Briefly, Voltage Support Option 2 would impact some land use because a new substation would be required.

Load Curtailment measures are a contingency measure for all strategies. Curtailment measures evaluated were contracts with industrial and commercial customers, or cooperatives. The contracts would use reduced power rates in exchange for curtailing power during peak load. Contract curtailment would begin following an outage on the transmission system during winter peak loads. In some cases, advance notification of curtailment may be possible, but in other cases it may not. This creates more socio-economic impacts than would occur were advance notice possible. Residential, institutional, or health and safety-oriented organizations would not be included in contracts. Load curtailment affects health and safety, and has socio-economic impacts. Impacts are similar to, but less severe than, impacts from the No Action Alternative (see Section 4.6.1).

4.3 ALTERNATIVE STRATEGY 2 - VOLTAGE SUPPORT

Alternative Strategy 2 includes accelerated conservation measures and Voltage Support Option 1 described under Alternative Strategy 1. Instead of a transmission line, additional voltage support (termed Voltage Support Option 2) is provided. Voltage Support Option 2 requires construction of a new substation at the point where the four 500-kv transmission lines of the southern transmission corridor first converge (Site 3). Geographically, this area is located about 10 miles north of Ellensburg, Washington (see Map 14 in Chapter 3). Environmental impacts predicted to result from the new substation are summarized graphically in Figure 4-2 and described in the following paragraphs. A comprehensive discussion of environmental impacts for the substation is provided in Appendix G.

Figure 4-2.
Environmental Impact Evaluation Matrix - Strategy 2



4.3.1 Environmental Evaluation

Direct Impacts - Conservation (see 4.2.1)

Direct Impacts - Voltage Support Option 1 (see 4.2.2)

Direct Impacts - Voltage Support Option 2

Description of Schultz Substation - A 130 acre site (about 50 acres fenced) is needed for Schultz Substation. This site would be graded to form a terraced land surface. Gravel would be applied to the ground surface and a chain-link fence would be built around the substation's perimeter to insure safety and security. An existing transmission line access road would be improved from the nearest county road to the site. As heavy equipment is used within substations, access roads are similar to county roads. Four alternate sites were initially considered in the DEIS (see Map 14 which follows page 3-10). After consideration of public comments, Site 2 was dropped from consideration. Site 4 was also dropped. Topography at this site is steep, and because a larger site is needed for a new substation, it is unsuitable. Site 3 is preferred.

Two buildings will be constructed at the substation for control and communication equipment and to accommodate operation and maintenance functions. The added maintenance requirements imposed by the new substation will require additional substation operation and maintenance staff in the Ellensburg area. A maintenance building is planned at the new substation for the new staff.

The electrical equipment planned for the new substation are switches, breakers, series capacitors and a station service transformer. Some of these devices contain oil, but the amount of oil is small and the oil will not contain hazardous substances such as PCBs.

The substation entrance roads are high quality roads for construction, operation and maintenance staff and their equipment to access the site. Some of the electrical equipment installed at the substation is very heavy and construction and maintenance trucks have wide turning radii. Typically, the road surface is 20' wide with a compacted gravel surface. A dirt access road currently follows the existing 500-kV transmission line right-of-way and provides access for transmission line maintenance. This road would likely be realigned and upgraded to become the substation entrance road. Appendix G provides additional information on the design and layout of the new substation.

Land Use Impacts - Sites under consideration for the proposed substation are on an existing transmission line corridor. As currently conceived, most of the substation would lie within the existing rights-of-way, thus most of the land impacted by the substation now serves an electric utility function.

The current land use on sites under consideration is rangeland. This rangeland has low productivity. Removing about 50 acres of rangeland from production is considered a low land use impact. Ranch homes and rural residences are sparsely scattered throughout the area. The proposed substation will not directly impact residences, however it will in some instances be partly visible. Impacts to residential properties are considered low for Sites 1 and 3.

The new substation would have no impact on commercial, industrial, or forest lands. The Soil Conservation Service has confirmed that Prime and Unique Agricultural or Forest land do not exist in the project area.

Wetlands Impacts - Neither of the sites under consideration for the substation would impact a wetland. The U.S. Army Corps of Engineers requires that a Section 404 permit be secured before placing fill in waters of the United States. The wetlands inventory of the U.S. Fish and Wildlife Service was consulted and although wetlands occur in the study area, both sites under consideration are far from these areas and would not be affected by the placement of fill. Fill activity, therefore would not impact any wetlands.

Fish Impacts - Both substation sites are located far enough from Naneum, Wilson and Reecer Creeks, that no fish impacts are expected.

Wildlife Impacts - Both sites under consideration for the new substation are far from riparian zones, which are the most important wildlife habitat type in the area. Small numbers of upland animals now occupying either site would be displaced and adjacent populations temporarily disturbed during construction of the substation. A low level of impact to wildlife is predicted. Consultation with the U.S. Fish and Wildlife Service to determine if rare and or endangered wildlife species are known to occupy the area revealed that wintering bald eagles may occur in the vicinity of the project area from October 1 through March 31. The Northern Spotted Owl may also be in the vicinity. These species most likely inhabit the Wenatchee National Forest to the north. No proposed species for listing have been identified. A biological assessment initiated by a BPA wildlife biologist determined the location of these species and found that building a substation would have "No Affect" on bald eagles or the Northern Spotted Owl. The USF&W Service concurred with this finding.

Vegetation Impacts - Expanding or constructing a new substation would remove about 50 acres of rangeland. Vegetation within the substation would be prohibited to minimize fire hazards; this loss would be permanent. As the existing vegetation types are common throughout the area and the amount lost is minor, a low impact to vegetation is predicted in the vicinity of Site 1. A minimal impact is expected at Site 3 as this site contains fewer vegetation types than exist at Site 1, and water resources that would encourage vegetation growth at Site 3 are especially far from the site. A noxious weed survey of the area will be conducted before construction, and appropriate measures to prevent introducing and stimulating the spread of noxious weeds will be done during construction.

Water, Soil and Groundwater Impacts - Low or minimal impacts to water, soil and groundwater are expected. In comparison to Site 3, Site 1 is relatively flat. Surface drainage patterns reveal seasonal flow that occurs over a wide area and is not constrained by uneven land forms. Construction would most likely interrupt this flow but drainage systems can be designed to reroute this flow around the substation into an existing stream or canal. Impacts

are expected to be low. In the vicinity of Site 1, groundwater is accessed by ranchers, who dig approximately 15 feet below the surface, to get drinking water for their cattle. Grading for a substation may interfere with this subsurface flow causing it to change direction.

Sites 3 does not appear to have the same potential for problems with surface drainage or subsurface flow. Slopes are greater and drainage patterns found at Site 1 were not apparent indicating that significant overland drainage may not occur here. A narrow shallow canal was dug to the east of Site 3 but a culvert will be put in as to not interrupt flow by the access road. There is no evidence that subsurface flow is accessed by ranchers in the vicinity of these sites. It is hard to predict depth to groundwater or whether construction on these sites will interfere with a subsurface flow.

Erosion of soil for Sites 1 and 3 will be low because slopes are not very steep. Grading will occur at the chosen site so the continuity of the soil layers will be disrupted. This will only occur within the boundaries of the substation. Precautions are taken during construction to prevent soils from blowing away.

The oil used in series capacitors and the station service transformer will not contain hazardous substances such as PCB's, and will be in small quantities. However, if oil is accidently spilled it could contaminate the soil, and groundwater. Small spills will be cleaned up in accordance with BPA's Spill Prevention Control and Countermeasures Plan. To protect surface and ground water and adjacent soils from contamination, oil collection membranes would be installed beneath equipment containing large volumes of oil. Use of herbicides in substation areas to prevent vegetation growth could affect soil and ground water.

The proposed substation sites are far enough from Naneum, Wilson and Reecer Creeks, and irrigation canals that no impacts to these surface water features are expected.

Cultural Resources Impacts - The Washington State Historic Preservation Office is consulted to determine if known historic or archeological sites occur in the siting area for the new substation. An environmental review conducted in 1976 revealed no known archaeological or historic sites in the area. BPA routinely conducts archeological surveys for substation sites once their location is known to assure that unknown cultural resources are not inadvertently damaged during construction. An intensive cultural resource survey of Site 3 was conducted for BPA by Eastern Washington University. The site and the intended route of the access road were surveyed. No cultural resources were found.

Aesthetics Impacts - Visual impacts created by the substation would be low to moderate. Both sites under consideration are about 10 miles from Ellensburg and major transportation routes. A good indicator of potential impact is BPA's existing Gas Insulated Cable site called Naneum, which is Site 4. The Naneum site is not visible from Ellensburg or from nearby highways, and it occupies a higher elevation than the other two sites under consideration for the new substation.

Several ridges and knolls lie between Ellensburg and Site 3, further restricting views. Views from the few scattered ranches and rural homes in the area will be impacted by the new substation. In these instances the existing transmission line corridor already impacts visual conditions hence the added impact of the substation is considered low to moderate. The Naneum Substation will be retired once the Schultz Substation is energized. This will constitute a beneficial visual change to rural residents near the existing substation.

Noise Impacts - Construction creates short-term noise. Noise generated by the station service transformer will comply with Washington noise standards. The transmission lines presently make a low frequency crackling noise, which is most noticeable when it rains. Noise levels at the new substation will not be perceptible from that made by the transmission lines.

Health and Safety Impacts - Health and safety impacts associated with the new substation are predicted to have a low impact magnitude.

One safety issue is that electrocution and serious injury including death can occur if individuals contact energized equipment. Historically, substation electrocution hazards have been infrequent.

Adding voltage support at the new substation will change how power flows on transmission lines within the corridor and to a lesser degree on other lines in the transmission grid. Magnetic field levels associated with transmission lines vary proportionately with the level of power flow on the lines. How the power is distributed among the lines that comprise the Northwest power grid depends on a number of factors. Power demand varies daily and seasonally. Generation patterns change in response to economic considerations, maintenance schedules, hydro system water conditions, and power exchanges with Canada and California. Changes to the transmission network, both temporary and long-term, also change how power flows in the grid. Because of this dynamic nature of the power system it is difficult to characterize specifically how any one change impacts magnetic fields throughout the transmission grid.

It is important to note that the fields near substations are typically dominated by the lines entering and leaving the substation. Adding voltage support to the electric power system at the proposed substation will significantly change how electrical loads are distributed between transmission lines in the corridor, particularly those west of the substation. Some lines on the corridor will experience load increases and some will experience load decreases. Quantitative estimates of the change in magnetic field produced by the lines in the vicinity of the new substation are provided in Appendix G. Overall, maximum levels do not change at the edge of the right-of-way. However, the distribution of magnetic fields across the right-of-way will change. Magnetic fields on the southern portion of the right-of-way will decrease. Added loads on the double-circuit 500-kV line, located at the northern edge of the right-of-way, will cause magnetic fields to increase somewhat in the northern portion of the corridor. The substation will not change EMF exposures at any existing residences in the vicinity of the facility.

Generally the new substation will cause a shift of some cross-Cascade power flow from the northern Stevens pass corridor to the southern Stampede Pass corridor. Depending on system conditions, it could also increase power flow on the south to north lines in the Puget Sound Basin. The impact of these load changes are very site-specific depending on electrical and geometrical considerations. There will be both increases and decreases in magnetic fields for various lines due to these power shifts. However, magnetic field levels will be within the range normally associated with transmission lines.

Socio-Economic Impacts - Constructing the new substation would employ at most 30 construction workers from outside the immediate area of the project. The duration of construction is expected to be one year and workers from outside the area are not expected to bring dependents due to the short construction time. Workers from outside the area would likely stay in motels/hotels or rent an apartment for the short time they are in the area. Given the small number of the construction force compared with the population of the area there would be no need for additional housing or community services.

The project would have a low impact on area employment, unemployment and income distribution. A maximum of 20 people would be hired locally to fill short-term jobs. This represents a small number compared to the total local labor force.

Indirect Impacts

Many of the adverse social and economic impacts attributed to blackouts under the No Action Alternative would be avoided if Alternative Strategy 2 is implemented.

The accelerated conservation measures included in the strategies also reduce energy needs at off-peak times which lessens the need for conventional generating resources. As traditional energy resources such as hydroelectric dams, coal fired plants, and combustion turbines have greater environmental impacts, accelerated conservation also speeds the environmental benefits of energy conservation.

To allow the system to operate at the levels needed after the voltage support additions are complete, some transmission system upgrades may be necessary in the Puget Sound area. Specific needs will depend on patterns of load growth and location of new generation resources in the area. These upgrades would probably be reconductoring of existing lines, or adding new lines in existing corridors. Separate environmental work would be done at the time those projects are proposed.

BPA does not expect a new substation east of the Cascades to cause indirect impacts to fish runs. The substation would be constructed for capacity purposes and would especially help the reliability problem during winter peak periods. Most of the power to meet these winter peak loads is generated by hydro plants and thermal plants east of the Cascades. The winter peak power demand occurs during December, January, and February. The fish runs occur primarily during the spring and summer months and into the fall, April through September.

4.3.2 Mitigation Potential

Surveys have been done to rule out areas with cultural resources and wildlife concerns. The substation will be designed to minimize its visual impact.

Mitigation for the conservation measures is in Section 4.2.2.

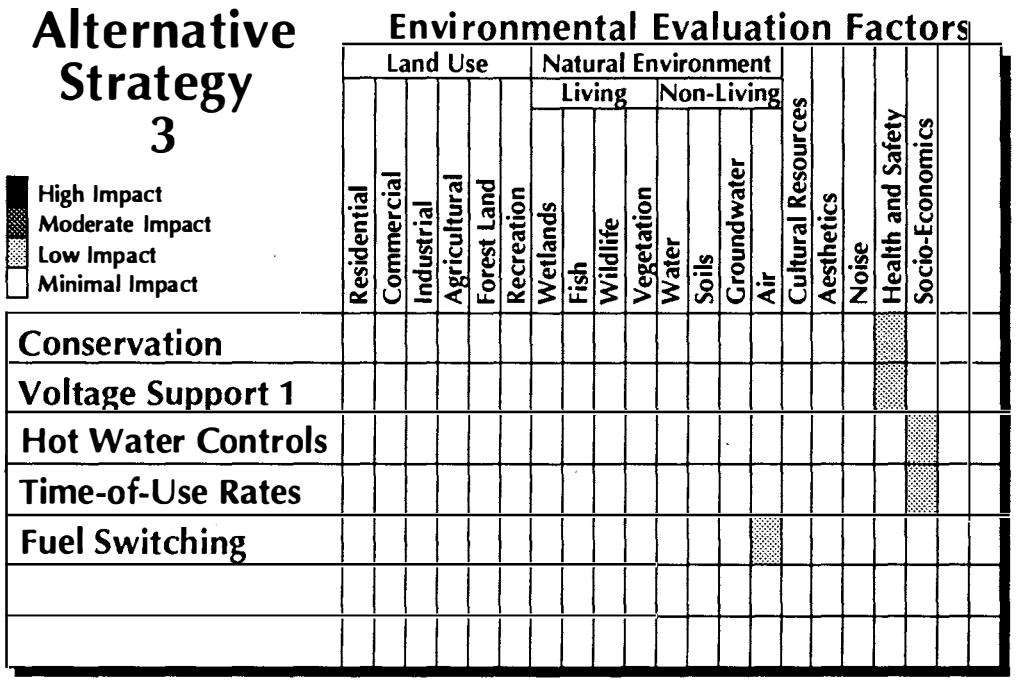
4.3.3 Contingency Impacts

Load curtailment, a transmission line and combustion turbines are contingency measures for this strategy. Load curtailment measures are described in Section 4.6.1, and transmission line impacts are described in Section 4.2.1. Impacts for combustion turbines are described in Section 4.5.1.

4.4 ALTERNATIVE STRATEGY 3 - DEMAND REDUCTION

This strategy includes the conservation measures and Voltage Support Option 1 common to all strategies. Load management and fuel switching measures are added for additional energy needs. Figure 4-3 shows the environmental evaluation factors and predicted impacts for Alternative Strategy 3.

Figure 4-3. Environmental Impact Evaluation Matrix - Strategy 3



4.4.1 Environmental Evaluation

Direct Impacts - Conservation (see 4.2.1)

Direct Impacts - Voltage Support Option 1 (see 4.2.2)

Direct Impacts - Load Management Measures

Load management is achieved using water heater controls and time-of-use price changes. Analysts used reported impacts from utilities using load management programs.

Socio-Economic Impacts - Load management can help utilities reduce costs by reducing or deferring the need for new power plants and transmission/distribution facilities. Fuel costs, and operating and maintenance costs can be reduced, and existing power plants can be run more effectively. Public attitudes toward utilities may improve with time-of-use pricing if customers feel a greater control of utility bills, but may worsen when service is controlled by utilities. Income benefits would likely go to middle-income groups, not disadvantaged customers.

Direct Impacts - Fuel Switching

Fuel switching expected to occur because of market forces is already included in the load forecast. Additional residential fuel switching measures are assumed for this analysis. Water heaters and space heating would be changed from electricity to natural gas. Natural gas service is assumed available, or installed. The supply of natural gas is assumed to be adequate for the demand in the Puget Sound area.

Air Quality Impacts - Air quality impacts are hard to assess as the actual number and location of households switching to natural gas is hard to predict. For the number of households assumed for this study, using more natural gas would not increase CO, HC, and NO_x in significant amounts.

Indirect Impacts

Shifting electricity use through the load management programs could move the peak to a different time. The load management program could foster a new or expanded control equipment industry. The additional impacts from natural gas extraction and delivery are assumed to be negligible. The utilities supplying natural gas will gain new customers and revenue from the fuel switching program. Electric utilities will lose customers and revenues. Since the input of carbon into the atmosphere will be negligible, the contribution to global warming will also be negligible.

4.4.2 Mitigation Potential

Impacts from this strategy are low. Load management programs create impacts that do not require mitigation. Depending on the number and location of households that switch to natural gas, a certain amount of uncontrolled emissions are added to an airshed. Mitigation for conservation measures is in Section 4.2.2.

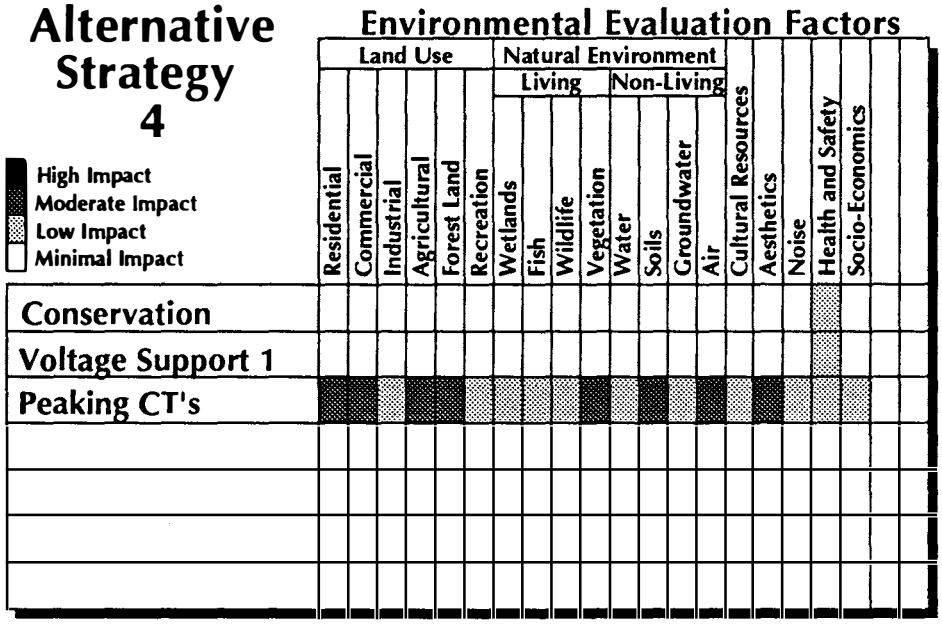
4.4.3 Contingency Impacts

If load growth slows, the load management and fuel switching programs can be delayed. If load growth increases above predictions, Voltage Support Option 2 can be added. Load curtailment measures can also be used. Impacts of Voltage Support Option 2 are in Section 4.3.1. Load curtailment impacts are described in Section 4.6.1.

4.5 ALTERNATIVE STRATEGY 4 - COMBUSTION TURBINES

This strategy also contains the conservation measures and Voltage Support Option 1, but adds combustion turbines to provide power for peak loads. Figure 4-4 shows the expected impacts from this strategy.

Figure 4-4. Environmental Impact Evaluation Matrix - Strategy 4



4.5.1 Environmental Evaluation

Direct Impacts - Conservation (see 4.2.1)

Direct Impacts - Voltage Support Option 1 (see 4.2.1)

Direct Impacts - Combustion Turbines

The type of combustion turbine considered in this alternative strategy is built to serve power for peak loads only. It is a single cycle 70 MW unit that operates infrequently (5% of the year). Combustion turbines are assumed built on industrial or agricultural land. Other land uses would be affected indirectly only.

The preferred fuel for the turbines is intended to be natural gas. Natural gas pipelines would be extended to the combustion turbine sites. During recent cold snaps, natural gas service to existing Puget Sound combustion turbines was curtailed. Thus oil tanks with a two week supply of fuel are planned as a backup fuel source during gas curtailment periods. In recognition of fuel uncertainty, assessments of CT air quality impacts are based on burning oil (SO_2 in addition to NO_2).

Impacts associated with producing and manufacturing material used in combustion turbines, and fuel burned by the turbine, are expected to be minimal. Impacts associated with combustion turbines are ultimately dependent upon where the facility is located. Integration of output from CTs may require transmission system modifications. See Alternative Strategy 1 for a discussion of transmission impacts.

Land Use Impacts - About four acres are required for a combustion turbine site. A combustion turbine may create conflicts with existing land use. Impacts depend on specific location.

Wetlands Impacts - Combustion turbines produce pollutants such as oxides of nitrogen (NO_x) and sulfur (SO_x). NO_2 and SO_2 can react with moisture and form acid rain, which may affect wetland vegetation.

Fish Impacts - NO_2 and SO_2 may form acid rain, enter surface water, and affect fish.

Vegetation Impacts - NO_2 can react with moisture to form nitric acid that can harm vegetation. SO_2 is also toxic to vegetation.

Water Impacts - Surface water pollution from storm runoff and chemical discharges could occur during construction and operation, but are not expected to be significant. Surface water in the vicinity of the site may be affected by NO_2 and SO_2 causing acidification. Water is needed for cooling; returned water may raise the temperature of the water source.

Soil Impacts - Erosion is possible during plant construction. Soil may be contaminated by acid rain created by air pollutants.

Groundwater Impacts - Groundwater may be contaminated during construction and operation of the plant if oil is spilled. The area surrounding oil tanks is usually protected by membranes which catch oil if a spill occurs.

Air Quality Impacts - Compared with other generating technologies used to provide capacity, a natural gas-fired combustion turbine produces relatively low levels and less complex mixtures of air pollutants, particularly with the application of modern, state-of-the-art pollution control technologies. For an oil-fired turbine, the use of low sulfur distillate fuel can minimize air pollution. Burning oil produces more pollutants than burning gas.

The principal air pollutants from oil burned through the combustion turbine process are oxides of nitrogen, sulfur dioxide, carbon dioxide and waste heat. Burning oil (or gas) contributes to greenhouse gases. Nitrogen dioxide and sulfur dioxide irritate mucous membranes and cause coughs, headaches, and shortness of breath. Nitrogen oxides can become nitrates and form ozone. Ozone can damage plants and cause minor eye irritation.

Cultural Resources Impacts - Impacts to cultural resources are expected to be low, and would occur during construction if cultural resources are present.

Aesthetics Impacts - The visual nature of the landscape is changed during plant construction and operation.

Noise Impacts - Noise is a major concern at operating combustion turbine plants. Noise control measures can reduce noise impacts.

Health and Safety Impacts - Plant operations produce pollutants that may affect the health of the public. Acid rain produced from these pollutants is believed to be a carcinogen. Pollutants produced irritate the mucous membranes and cause coughs and headaches.

Socio-Economic Impacts - NO_2 and SO_2 reacts with moisture and forms acid rain that damages buildings and bridges. Combustion turbines produce greenhouse gases that may contribute to global warming.

Indirect Impacts

Additional transmission lines may be needed to reliably connect CTs to the transmission system. Impacts of transmission lines can be found in Section 4.2.1.

4.5.2 Mitigation Potential

The most significant impacts attributed to CTs are related to air emissions, noise and land use disruption. The provisions of the Clear Air Act and following Best Available Control Technology provisions would help assure that emissions would not significantly affect public health. Noise created during operation of the turbines can be partially reduced through careful design, and the use of noise buffers such as mufflers to shield noise sensitive properties. Careful site selection can eliminate many adverse land use effects. For example, if an industrial site is chosen for the CTs land use impacts would be low.

Impacts to soils, vegetation and aesthetics also can be reduced by careful siting and design.

4.5.3 Contingency Impacts

The combustion turbines can be delayed if they are unnecessary. If load grows unexpectedly, Voltage Support Option 2 or more combustion turbines can be added to the system. Load curtailment also can be used. Impacts of Voltage Support Option 2 are in Section 4.3.1. Load curtailment impacts are described in Section 4.6.1 under the No Action Alternative.

4.6 NO ACTION ALTERNATIVE

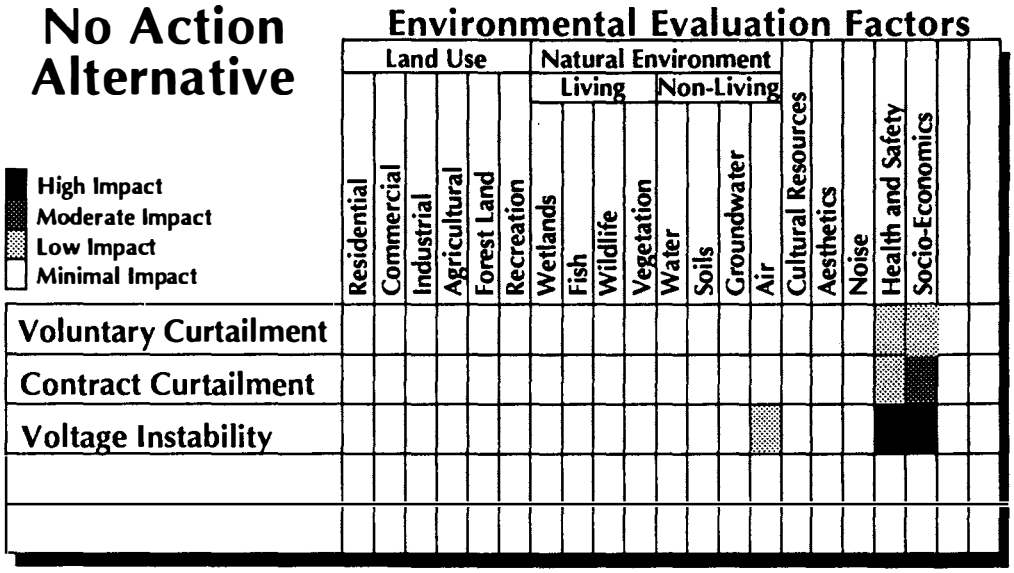
The No Action Alternative is a theoretical alternative defined as individual utilities independently taking actions deemed appropriate considering their customers' needs. It is a "business as usual" alternative where utilities may or may not coordinate planning for projects.

Without a coordinated plan, there is a potential for one or more voltage collapse or partial collapse incidents to occur during the 1994-2003 planning period. The result is a brownout or blackout. Analysts assumed an area-wide blackout will last an average of four hours because restoring service on distribution lines requires additional time. If transmission lines or generators need major repairs, the blackout will last longer. Fewer than one outage in ten extends more than eight hours. The chance that service will be disrupted increases with time as load grows. Commerce and industry are adversely affected as the quality and reliability of power decreases.

The No Action Alternative assumes individual utilities will make resource decisions. Without a coordinated plan for resource acquisition, more local generation may occur. Individual utilities may decide to construct a cross-Cascade transmission line. However, these possibilities are speculative, and estimating the impacts from this speculation is not discussed in this EIS.

Figure 4-5 shows the environmental evaluation factors and the individual ratings for the No Action Alternative. Analysts used reported impacts from blackouts that have occurred elsewhere to make their findings. No Action has high health and safety, and socio-economic impacts, and low air quality impacts.

Figure 4-5.
Environmental Impact Evaluation Matrix - No Action Strategy



4.6.1 Environmental Evaluation

Direct Impacts

Health and Safety Impacts - When a loss of electricity occurs, all services provided by electrical energy cease. Illumination is lost. Lighting used by residential, commercial, industrial and municipal customers for safe locomotion and security is affected. Residential consumers lose heat. Highways experience gridlock where traffic signals fail to operate. Industrial production is halted. Residential, commercial, and industrial customers experience comfort/safety and temperature impacts, increases in smoke and pollen, and changes in humidity, due to loss of ventilation. Mechanical drives stop, causing impacts as elevators, food preparation machines, and appliances for cleaning, hygiene, and grooming are unavailable to residential customers. Commercial and industrial customers also lose service for elevators, food preparation, cleaning, office equipment, heavy equipment, and fuel pumps. Transportation impacts include propulsion loss. Sewage transportation and treatment can be disrupted.

Electricity for cooking and refrigeration is lost. Residential, commercial, and industrial customers cannot prepare or preserve food and perishables. A special problem is the loss of industrial continuous process heat. Electricity loss also affects alarm systems, communication systems, cash registers, and equipment for fire and police departments.

Socio-Economic Impacts - When services provided by electricity described above are lost, there are also socio-economic impacts. Customers incur costs as they turn to alternative energy sources. Hospitals, nursing homes, federal prisons, airports, farms, and others with standby generators and fuel reserves use them. Other effects include increased theft, loss of retail business, loss of production time, reduced tax revenues, damaged equipment, lost data, spoiled products, and additional maintenance costs.

Government agencies experience additional expenses during a blackout. The major expenses are related to overtime payments to fire, police and other personnel, emergency aid payments, and costs incurred to control looting.

Utilities also incur costs from lost revenue, and costs to restore service. New equipment purchased to prevent future incidents requires capital. Responding to legal suits brought against a utility incurs costs.

Long-term economic effects could occur if industry, in general, concludes that the region's power supply system is unreliable and below acceptable standards.

Air Quality Impacts - If home owners burn wood during a blackout, air quality could be degraded. Emergency generators usually burn oil and could increase air pollution locally. This may be offset by decreased industrial air pollutant releases, and reduced automobile exhaust emissions if workers remain home. Impacts would be temporary.

Indirect Impacts

Lacking a coordinated plan for resource acquisition, individual utilities may develop more local generation than otherwise developed. More local generation could increase the level of impacts on land use, air quality, fish and wildlife, and/or other resources. More individuals may participate in conservation programs or conserve on their own than in other alternative strategies. Individuals may change their lifestyles to adapt to the potential for brownouts and blackouts. If power interruptions become frequent, businesses and industries dependent on a reliable power supply may relocate to regions with a more reliable power supply system. This would lead to loss of jobs and economic stability within the region.

4.6.2 Mitigation Potential

Mitigation is not a logical component of the No Action Alternative. Mitigation of adverse impacts is an expected outcome of long-range planning. Uncoordinated planning and hurried problem solving could cause duplication of facilities, and lost impact mitigation opportunities.

4.6.3 Contingency Impacts

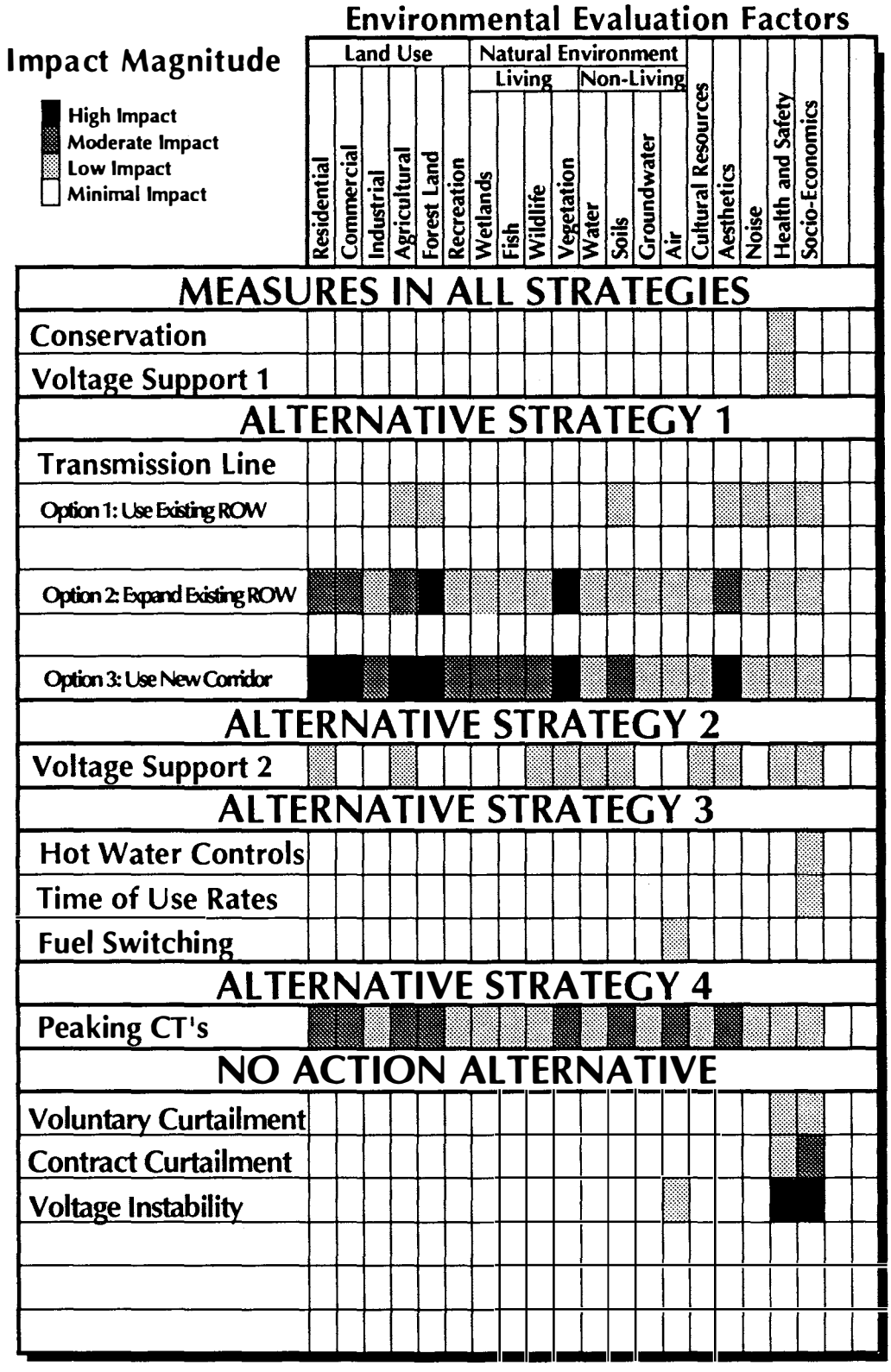
The No Action Alternative is an unplanned strategy and one which, by nature, has no contingency measures to be undertaken if rapidly changing needs occur. System failure, which has high health and safety and socio-economic impacts, would be the default contingency under the No Action Alternative.

4.7 ENVIRONMENTAL COMPARISON OF ALTERNATIVE STRATEGIES AND THE NO ACTION ALTERNATIVE

This section takes the information from the environmental, and economic and technical evaluations about each strategy and uses it to compare the strategies. Each strategy is evaluated against the purposes listed in Chapter 1. The environmental impacts are compared first. A comparison of the projected impacts for the alternative strategies is provided in Figure 4-6. Measures common to all strategies are evaluated first followed by the alternative strategies.

Figure 4-6.

Strategy Impact Comparison Matrix



As explained in Chapter 1, a key purpose for any plan is to meet Federal and State environmental quality requirements. Each strategy will be discussed with this in mind. Individual measures cause impacts to different parts of the environment, both living and non-living. Analysts are reluctant to judge relevance of impacts, e.g., whether an air quality impact is equal to or greater than an impact to fish. The relevance of impacts is not given, just the level of impact.

When composing the strategies, planners eliminated most measures with significant impacts. The remaining measures can, with mitigation, create low and moderate impacts only. The difference among the strategies are minor. Only the transmission line and peaking combustion turbines have the potential to affect many environmental sectors. Other measures only affect a few. The conservation measures and Voltage Support Option 1 are common to all strategies except the No Action Alternative.

Preferred Alternative - The preferred alternative is Alternate Strategy 2. The strategy is second lowest in impact and about equal to Alternate Strategy 3.

Alternative Strategy 1 - The transmission line in this strategy is the only measure that has the potential for high impacts. These impacts could be reduced with careful siting. This strategy has greater impacts than Alternative Strategies 2, 3 and 4.

Alternative Strategy 2 - This strategy has fewer impacts than Alternative Strategies 1 and 4 and the No Action Alternative. It is close in impact to Alternative 3.

Alternative Strategy 3 - This strategy has the fewest impacts.

Alternative Strategy 4 - The combustion turbines in this strategy cause more impacts than the measures in Alternative Strategies 2 and 3, but somewhat lower than Alternative Strategy 1.

No Action Alternative - The No Action Alternative would avoid the physical impacts of the transmission line in Alternative Strategy 1, and the peaking combustion turbines in Alternative Strategy 4. The social and economic impacts of this alternative are greater than any of the strategies.

The procedural provisions for implementing the National Environmental Policy Act ask that comparisons of alternatives discuss: 1) adverse affects that cannot be avoided; 2) the relationship between short-term uses of man's (sic) environment and the maintenance and enhancement of long-term productivity; and 3) any irreversible and irretrievable commitments of resources that would be involved in the proposal should it be implemented. Discussions on these topics are provided below:

Adverse Effects that Cannot be Avoided - In Alternative Strategy 1, the transmission line rights-of-way will unavoidably restrict certain activities. Trees that would interfere with the line, and buildings and similar structures would be prohibited on the right-of-way. Ample site alternatives are normally available for such uses adjacent to rights-of-way.

Short-Term Use of The Environment and Maintenance and Enhancement of Long-Term Productivity - The alternatives under consideration do not pose impacts that would alter the long-term productivity of the affected environment. Were the measures proposed in the alternative strategies removed and the affected areas restored, little change in long-term environmental productivity would have been caused.

Irreversible and Irretrievable Commitment of Resources - Resources committed to the alternative strategies are the materials used in the various measures (transmission line, substation equipment, combustion turbine, gas furnaces installed through fuel switching) and the fuels consumed either during construction or operation of the measures. Alternative Strategies 3 (fuel switching) and (combustion turbines) both use natural gas, a non-renewable resource. There could be loss of habitat with Alternative Strategy 1.

4.8 ECONOMIC AND TECHNICAL EVALUATION

This section explains six economic and technical evaluations that were conducted. Coupled with the preceding environmental analysis, one can judge the relative merits of alternative strategies.

The No Action Alternative by definition is undefined both from the standpoint of what actions would be taken, by whom and when. Conventional economic and technical evaluations for the No Action Alternative thus were not possible. Yet, the cost of No Action can be predicted in less precise terms. For example, the economic consequences of blackouts historically have been high. If No Action leads to a blackout in Puget Sound, economic effects would be high, as would public health and safety impacts. The No Action Alternative is expected to have the greatest long-term economic impact.

As defined, the technical performance of a No Action Alternative (blackouts are likely), provides a level of electrical service that would not comply with utility transmission system reliability criteria. The No Action Alternative ranks lowest from a technical perspective.

More information on the economic and technical evaluation is provided in Appendix C.

4.8.1 Description of Economic and Technical Study Framework

This study assumes that the Puget Sound area is served by a single utility. Therefore, no distinction is made between private and public utilities or load served by BPA and load served by utility-owned generation. Where appropriate, costs incurred by consumers are included as well as utility costs.

This study has two relevant time periods. First is the decision period, which extends from 1994 through 2003. In these ten years, actions are proposed to meet forecast peak loads. The analysis continues beyond 2003 through 2010 to capture adequately the costs and benefits of actions taken through 2003.

Six evaluation factors are used in this study. They provide a measure of how well each of four alternative strategies solve the peak load problem of Puget Sound. Five of these factors are routinely used by utilities in the region for energy planning and have received public review. The last factor "Power System Reliability" is new for this project. Each factor is explained below.

No economic benefit is assigned to solving the reliability problem. While consumers will have fewer outages, no dollar values were included in this analysis. Therefore, the net cost of fixing the problem may be negative.

4.8.2 Minimize Present Value of System Costs

This factor examines the costs and benefits of the measures in each alternative. Results are presented as a net present value (NPV), where costs and benefits occurring in different years are summarized as a single number which recognizes the time value of money. For this study, costs and benefits are analyzed over the study period, 1994 to 2010. This calculation takes a societal perspective including costs and benefits to utilities and consumers.

The capital costs required to build, operate and maintain the measures are estimated and their sum represents the cost of a strategy. The monetary value of power produced or saved is calculated and subtracted to determine the net benefits of a strategy. The balance of the costs and benefits are adjusted by applying a 5% inflation rate and a 3% discount rate to determine the net present value of the strategy. The net present value of the alternatives is provided in Table 4-2. Alternative Strategies 1, 2 and 4 have positive net present values. This indicates that benefits exceed costs. Alternative Strategy 3 has greater costs than benefits. Alternative Strategy 2 provides the greatest net present value.

Table 4-2. Net Present Value

Strategies	1990 $
Alternative Strategy 1	$67,000,000
Alternative Strategy 2 *	**$105,000,000**
Alternative Strategy 3	-$128,000,000
Alternative Strategy 4	$40,000,000

(* Preferred Alternative)

4.8.3 Minimize Sensitivity to Load Growth

The alternative strategies were designed to meet medium load growth. The Minimize Sensitivity to Load Growth factor evaluates the economic impacts of each strategy under different load growth rates. If load growth is slower than predicted, delaying high-cost measures would yield monetary savings. If investments in a measure are made and low growth conditions occur, revenues and costs will be greater than benefits. Conversely, if loads increase rapidly, strategies with surplus capacity may incur no additional costs. Table 4-3 shows how the four alternative strategies perform under different load growth rates.

Table 4-3. Sensitivity to Load Growth

	Present Value 1990 $			
Strategies	Low Growth	Medium Growth	High Growth	Range
Alternative Strategy 1	-$88,000,000	$67,000,000	$109,000,000	$196,000,000
Alternative Strategy 2*	-$21,000,000	$105,000,000	$97,000,000	$126,000,000
Alternative Strategy 3	-$212,000,000	-$128,000,000	-$131,000,000	**$84,000,000**
Alternative Strategy 4	-$35,000,000	$40,000,000	-$63,000,000	$102,000,000

*Preferred Alternative

The analysis assumes that a change in growth begins in 1994 and utilities begin to take actions in 1998. This acknowledges that it takes time to both discover a problem and to take corresponding actions. For low load growth, conservation, load management and fuel switching programs are stopped in 1999. Within the four alternatives, peaking combustion turbines are the only other measures that can be delayed or stopped after 1998, so Alternative Strategy 4 has fewer combustion turbines with low load growth.

For high load growth, contract curtailment is acquired to cover deficits before new measures can be brought on-line. Measures are added to cover the additional peak deficits from high load growth. Alternative Strategy 1 has enough excess capacity to cover the high peaks. Alternative Strategy 2 adds a transmission line in 2002. Alternative Strategies 3 and 4 both add Voltage Support Option 2 in 2001. In addition, Alternative Strategy 4 also adds more combustion turbines from 2001-2003. Alternative Strategy 3, although the highest cost under all three load growth scenarios, has the smallest range, or least sensitivity to load growth.

4.8.4 Minimize Near-Term Revenue Requirements

This factor looks at the annual amount utilities, and indirectly ratepayers, would need to pay to acquire the measures in each alternative strategy. Costs in this analysis factor are termed revenue requirements, as the money required would be gathered through customer paid rates. In contrast to the NPV calculations, this analysis only looks at the dollars utilities would need to pay for the alternatives. It does not include the effects of lost revenues or changes that would occur in system operations. Results reported are average gross impacts on revenue requirements for the years 1996-1998. For a full discussion of assumptions see Appendix C.

Table 4-4 displays the near-term revenue requirements. Notice that revenue requirements are not included for fuel switching in Alternative Strategy 3; it is unclear what electric utilities would pay for this measure (see Appendix D on reduce-use options for discussion on possible costs). Results are expressed in terms of the average yearly revenue requirement between 1996-1998. Alternative Strategies 2 and 4 have the lowest near-term revenue requirements.

Table 4-4. Near-Term Revenue Requirements

Strategies	1990 $
Alternative Strategy 1	$50,000,000
Alternative Strategy 2*	**$25,000,000**
Alternative Strategy 3**	$50,000,000
Alternative Strategy 4	**$20,000,000**

* Preferred Alternative ** Does Not Include the Cost of Fuel Switching

4.8.5 Minimize Long-Term Revenue Requirements

This evaluation factor is the same as minimizing near-term revenue requirements except it looks at the years 2006-2008. Long-term impacts are also important to consider. These are shown in Table 4-5. Alternative Strategy 2 has the lowest long-term revenue requirement.

Table 4-5. Long-Term Revenue Requirements

Strategies	1990 $
Alternative Strategy 1	$75,000,000
Alternative Strategy 2*	**$40,000,000**
Alternative Strategy 3**	$110,000,000
Alternative Strategy 4	$105,000,000

* Preferred Alternative ** Does Not Include the Cost of Fuel Switching

4.8.6 Maximize Deliverability in View of Social and Political Factors

In every decision process, factors other than economic or financial impacts affect the final decision. These influences are largely political and/or social and can strongly affect whether an alternative strategy is practical and achievable, regardless of its economic attractiveness. Certain technologies or actions may be well known and proven, but public acceptance may keep them from occurring. This evaluation factor attempts to assess the impact of factors such as regulatory influences, institutional complexity, and public acceptability on the ability to implement each alternative strategy.

It is likely there will be some overlap with the environmental impacts and other evaluation factors. However, this factor assesses how the perception of environmental impacts affects the feasibility, or deliverability, of a particular alternative. It does not necessarily follow that the alternative with the fewest or most benign environmental impacts will be the most deliverable. Finally, in contrast to other evaluation factors, this factor is largely the result of judgment.

Members of the Sounding Board were asked to rank each measure on a scale ranging from deliverable (1) to undeliverable (4). Rankings of the 19 members present were averaged and are shown in Table 4-6. Only the measures that differ among the alternatives are presented in the table below. We found little difference in deliverability among alternative strategies. Conservation measures, included in all four alternatives, are ranked as deliverable to somewhat deliverable (1.4 to 1.9). For contrast, a nuclear plant was rated as undeliverable (3.7). The No Action alternative was not ranked.

Table 4-6. Deliverability

Strategies	Deliverability
Alternative Strategy 1	**1.6**
Transmission Line	1.6
Alternative Strategy 2*	**1.5**
Voltage Support 2	1.5
Alternative Strategy 3	**2**
Water Heater Control	2
Time-of-Use Rates	not ranked
Fuel Switching	1.8
Alternative Strategy 4	**1.7**
Combustion Turbines	1.7

1= Deliverable 2=Somewhat Deliverable 3=Somewhat Undeliverable 4=Undeliverable
*Preferred Alternative

4.8.7 Maximize Power System Reliability

Reliability is a measure of the capability of the power system to meet consumer demands over a period of time. It is typically measured in terms of unreliability, such as how often outages occur, how long they last, and how much load is affected. The goal is to maximize reliability to the extent economically justifiable.

Planners use a set of rules, such as the BPA Reliability Criteria, to establish reliability requirements for the power system. All proposed alternatives must meet the tests specified in the Criteria. However, even after meeting the tests, each alternative may provide a different level of reliability. For example, two transmission circuits on the same tower pose a greater risk than two transmission circuits on separate rights-of-way.

Existing transmission reliability models are not capable of examining the Puget Sound area peak load problem because of the complexity of the system and the difficulty of detecting voltage collapse. Therefore, a simplified analysis was performed that qualitatively ranks the alternatives according to their respective reliability. The results of the analysis are illustrated in Table 4-7.

Table 4-7. Reliability

Strategies	Reliability
Alternative Strategy 1	**2**
Transmission Line	2
Alternative Strategy 2*	**2**
Voltage Support 2	2
Alternative Strategy 3	**2**
Water Heater Control	2
Time-of-Use Rates	2
Fuel Switching	1
Alternative Strategy 4	**2**
Combustion Turbines	2

1= Highly Reliable 2=Reliable 3=Somewhat Reliable 4=Not Very Reliable
*Preferred Alternative

The following factors were considered:

- Number of units (100,000 water heaters vs. two transmission circuits)
- Failure rate (based on experience, how often it is unavailable)
- Common mode outages (loss of one tower with two transmission circuits)

All of the measures were ranked on a scale of highly reliable (1) to not very reliable (4). Of the measures that are different among the alternatives, only fuel switching stands out as highly reliable (1). This is because an appliance, such as an electric water heater, is removed, and cannot add to the peak load problem. At the other extreme, a nuclear plant, with a lot of eggs in one large basket, was ranked as not very reliable (4). We cannot differentiate among the alternatives based on measure reliability.

4.8.8 Surplus Capacity

One factor which is not captured by the evaluation is the potential benefits of surplus capacity provided by each alternative. Some alternatives, such as the transmission line, provide more capacity than needed during the decision period. Table 4-8 gives the surplus capacity that exists for each strategy in 2003.

Table 4-8. Surplus Capacity of the Strategies

Strategies	Excess Capacity (MW)
Alternative Strategy 1	1,608
Alternative Strategy 2*	608
Alternative Strategy 3	408
Alternative Strategy 4	28

* Preferred Alternative

These margins provide for additional reliability throughout the decision period should the deficit increase due to higher load growth or a delay in expected generation or conservation. In addition, the margin can serve load growth beyond the decision period without requiring further investment.

4.8.9 Summary

Findings for the six economic and technical evaluation factors are tabulated below. The alternative which ranks highest, or group of high ranking alternatives, are shown in **bold**.

Table 4-9. Economic and Technical Evaluation Summary

	ALTERNATIVE STRATEGIES			
EVALUATION FACTORS	**Strategy 1**	**Strategy 2***	**Strategy 3**	**Strategy 4**
Net Present Value	$67,000,000	**$105,000,000**	-$128,000,000	$39,000,000
Sensitivity to Load Growth	$196,000,000	$126,000,000	**$84,000,000**	$102,000,000
Near Term Revenue Requirements	$50,000,000	**$25,000,000**	$50,000,000	**$20,000,000**
Long Term Revenue Requirements	$75,000,000	**$40,000,000**	$110,000,000	$105,000,000
Deliverability (1=Hi, 4=Low)	**1.6**	**1.5**	**2.0**	**1.7**
Reliability (1=Hi, 4=Low)	**2.0**	**2.0**	**2.0**	**2.0**

* Preferred Alternative

5.0 ENVIRONMENTAL CONSULTATION, REVIEW, AND PERMIT REQUIREMENTS

Several Federal laws and administrative procedures must be met depending on the actions contained in the selected Plan. This section lists and briefly describes requirements that may need to be met by a specific project. Some of the requirements listed relate to site-specific impacts beyond the scope of this FEIS. These will be addressed through any site-specific EIS's. Since all measures are not part of the alternative strategies, some of the requirements listed will not apply. This is noted. Table 5-1 shows which measure must meet which requirement. For example, if a new transmission line is in the Plan, a checkmark shows which requirement must be met. If BPA proposes an action, all requirements of NEPA will be met. All requirements of the Washington State Environmental Policy Act (SEPA) will be met by participating utilities proposing an action.

5.1 NATIONAL ENVIRONMENTAL POLICY ACT

This FEIS is prepared according to NEPA (42 USC 4321 et seq.). BPA will take into account potential environmental consequences and will take action to protect, restore, and enhance the environment.

5.2 ENDANGERED AND THREATENED SPECIES

The Endangered Species Act (16 USC 1536) provides for conserving endangered and threatened species of fish, wildlife and plants. Federal agencies must ensure proposed actions do not jeopardize the continued existence of any endangered or threatened species, or cause the destruction or adverse modification of their habitat. When conducting any environmental impact analysis for specific projects, agencies must identify practicable alternatives to conserve or enhance such species.

A consultation letter was sent to the U.S. Fish and Wildlife Service requesting a list of endangered and threatened species in the siting area. Listed species include wintering bald eagles that may occur in the vicinity of the project area from October 1 through March 31. The Northern Spotted Owl also may be in the vicinity. No proposed species for listing have been identified. A biological assessment, completed by a BPA wildlife biologist determined that the building of a substation would have "No Affect" on bald eagles or the Northern Spotted Owl. The U.S. Fish and Wildlife Service concurred with this conclusion.

5.3 FISH AND WILDLIFE CONSERVATION

The Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.) encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. The Northwest Power Planning Council's Protected Areas, intended to protect, mitigate, and enhance fish and wildlife of the Columbia River and its tributaries, are part of the screening criteria used to eliminate alternatives from this Plan. Other identified critical areas are precluded from development because it would cause significant adverse effects to fish and wildlife. The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires Federal agencies undertaking projects affecting water resources to consult with the U. S. Fish and Wildlife Service to conserve or improve wildlife resources. As projects are proposed, BPA will consult with the U.S. Fish and Wildlife Service to conserve and improve wildlife resources.

Water resources that promote fish and wildlife habitat have been identified in the siting area. Both Site 1 and Site 3, the preferred site, are far enough away from water resources that they do not interfere with surface flow or riparian vegetation.

5.4 HERITAGE CONSERVATION

Congress has passed many Federal laws to protect the nation's historical, cultural, and prehistoric resources. These include the National Historic Preservation Act, the Archeological Resources Protection Act, the American Indian Religious Freedom Act, the National Landmarks Program, and the World Heritage List. Preserving cultural resources allows Americans to have an understanding and appreciation of their origins and history. A cultural resource is an object, structure, building, site or district that provides irreplaceable evidence of natural or human history of national, state or local significance. Cultural resources include National Landmarks, Natural Landmarks, archeological sites, and properties listed (or eligible for listing) on the National Register of Historic Places.

Table 5-1.

Environmental Consultation Review, and Permit Requirements Matrix

✓ Possible Consultation, Review and Permit Requirement

Requirements List	Measures: No Action	Conservation	Load Management	Load Curtailment	Residential Fuel Switching	Combustion Turbines	Cross-Cascades 500-kV Line	Voltage Support
National Environmental Policy Act	✓	✓	✓	✓	✓	✓	✓	✓
Endangered and Threatened Species						✓	✓	✓
Fish and Wildlife Conservation						✓	✓	✓
Heritage Conservation		✓				✓	✓	✓
State, Areawide, and Local Plan and Program Consistency		✓				✓	✓	✓
Farmland Protection						✓	✓	✓
Recreation Resources						✓	✓	✓
Floodplains						✓	✓	✓
Wetlands						✓	✓	✓
Global Warming						✓		
Coastal Zone Management Consistency						✓	✓	✓
Energy Conservation at Federal Facilities		✓	✓		✓			✓
Pollution Control at Federal Facilities							✓	✓
Noise Control						✓		✓
Nuclear Regulatory Commission Licensing								
FERC Licensing of Hydroelectric Facilities								
Certification to DOE - Powerplant and Industrial Fuel Act							✓	
Emission Permits under the Clean Air Act						✓		
Discharge Permits under the Clean Water Act						✓		
Underground Injection under the Safe Drinking Water Act								
Rivers and Harbors Act							✓	
Clean Water Act						✓	✓	✓
Geothermal Resource Development on Federal Land								
Leases and Permits for Using Federal Land for a Power Plant						✓		
Easement for Transmission Line Across Federal Lands							✓	
Notice to Federal Aviation Administration							✓	
Permits Under the Resource Conservation and Recovery Act							✓	✓

Any energy conservation and load management measures that would be undertaken as part of the Plan would follow the procedures in the 1983 Programmatic Memorandum of Agreement for BPA's energy conservation programs, prepared in accordance with Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR Part 800. Heritage conservation consultation requirements are therefore fully satisfied for energy conservation and load management measures.

Construction and operation of transmission measures may affect historic properties and other cultural resources. A consultation letter was sent to the Washington State Historic Preservation Office requesting a list of resources that are located in the siting area for the new substation. They responded that "No National Register or eligible properties are known to exist within the area of the undertaking's potential environmental impact, but it is highly possible that the area contains undiscovered historic sites of potential significance. Therefore, a cultural resources field survey is required." BPA has conducted an intense cultural resources survey for Site 3, the preferred site for Schultz Substation, and the intended route of the access road. No cultural resources were found.

Load Curtailment undertakings would not alter existing properties and therefore historic or cultural resources would be unaffected.

5.5 STATE, AREAWIDE, AND LOCAL PLAN AND PROGRAM CONSISTENCY

BPA and the Puget Sound area utilities will coordinate distribution of this plan with clearinghouses for State and local agency review and consultation as required by Executive Order 12372. BPA will follow each State's permit process and will be consistent with land use plans. Individual projects would be coordinated with state and local government agencies to ensure all requirements are met.

The Kittitas Planning Department was contacted regarding land use consistency for Schultz Substation. Siting of transmission facilities on Forest/Rangeland will require a plan amendment. It is BPA policy to coordinate actions with the local planning department.

5.6 FARMLAND PROTECTION

The Farmland Protection Policy Act (7 USC 4201 et seq.) directs Federal agencies to identify and quantify adverse impacts of Federal programs on farmlands. The Act's purpose is to minimize the amount Federal programs contribute to unnecessary and irreversible conversion of agricultural land to non-agricultural uses. As individual projects or actions are proposed, local Soil Conservation Service maps will be used to decide whether any prime or unique farmland or additional land of local importance is affected.

A letter was sent to the Soil Conservation Service requesting identification of any proposed substation sites as prime agricultural or forest land. None were identified in the siting area.

5.7 RECREATION RESOURCES

Recreation resources are areas designated by the Wild and Scenic Rivers Act, the National Trails System Act, the Wilderness Act, or parklands, and other ecologically sensitive areas. These areas are excluded from development in this Plan as part of the screening factors for alternatives, and would therefore not be affected by any of the alternatives.

The Washington Department of Natural Resources was contacted regarding recreational use within the substation siting area. Hunting is very popular in the canyon areas surrounding Wilson and Naneum Creeks to the north of the siting area. The creek areas are a popular weekend destination for the people of Ellensburg. As potential sites are located away from creek habitats, no interference with recreational uses is anticipated.

5.8 FLOODPLAINS

Floodplains are the lowlands adjoining inland and coastal waters, and flat areas and flood-prone areas of offshore islands. Under Executive Order 11988, floodplain development is discouraged whenever there is a practicable alternative. If specific projects are proposed that might cause development in a floodplain, alternatives to developing in the floodplain will be considered.

Inspection of floodplain maps reveal Site 1 and 3 are far from both Wilson and Naneum Creeks, both of which flow through the siting area.

5.9 WETLANDS

Areas inundated by surface or groundwater sufficient to support vegetative or aquatic life requiring saturated or seasonally saturated soil conditions for growth and reproduction are known as "wetlands." Examples include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow areas, and mudflats. Under Executive Order 11990, construction in wetlands is discouraged whenever there is a practicable alternative. For specific projects other regulations also may apply:

- Section 404 of the Clean Water Act
- Section 10 of the Rivers and Harbors Act of 1899
- National Environmental Policy Act
- Fish and Wildlife Coordination Act
- Emergency Wetlands Act of 1985
- state statutes

If a permit is needed for a specific project, permitting agencies must find that the project's public values exceed the resource's public values, and that there are no other practicable alternatives.

U.S. Fish and Wildlife maps were inspected for evidence of wetlands in the siting area. All wetlands are confined to areas bordering the creeks. As Site 1 and 3 are far from riparian habitats, no interference with wetlands will occur.

5.10 GLOBAL WARMING

No global warming impacts were identified for Voltage Support Option 1 and 2. If contingency actions are needed, further review of global warming impacts will be done in a site-specific EIS.

5.11 COASTAL ZONE MANAGEMENT CONSISTENCY

The Coastal Zone Management Act of 1972 requires federal actions be consistent, to the maximum extent practicable, with approved state Coastal Zone Management Programs. If proposed projects could affect the coastal zone, BPA will consult with the state and ensure consistency with state programs.

Site 1 and 3 are located away from creeks in the siting area and will not come under the jurisdiction of the Coastal Zone Management Act.

5.12 ENERGY CONSERVATION AT FEDERAL FACILITIES

This will be addressed if any project involves constructing new or retrofitting existing federal facilities. Construction of the control house for Schultz Substation will comply with energy conservation standards for federal facilities. Any other proposals involving federal facilities will also need to follow these standards.

5.13 POLLUTION CONTROL AT FEDERAL FACILITIES

Several pollution control acts apply to federal facilities. If this Plan leads to new federal facilities (Schultz Substation included), BPA will comply with the following statutes:

- Clean Air Act
- Resource Conservation and Recovery Act
- Toxic Substances Control Act
- Federal Insecticide, Fungicide and Rodenticide Act
- Noise Control Act

5.14 NOISE CONTROL

In Washington state, the Noise Control Act of 1974, amended by the 1987 legislature, gives authority to enforce noise codes to local governments. Operation of Schultz Substation will comply with local noise standards. For other specific projects, BPA will consult with local government and comply with local noise standards.

5.15 FEDERAL LICENSING AND PERMIT REQUIREMENTS FOR NEW POWER RESOURCES

This section describes licensing and permit requirements for new power resources. Information on mitigating environmental impacts in the legislation requiring licenses or permits, or references to appropriate regulations covering mitigation, are included in the discussion. The focus here is licensing and permit requirements needed at the generation site. The required permits for fuel procurement, e.g., coal mining, and transportation to the generation site, are also important topics, but are outside the scope of this document. Peaking combustion turbines are the only new power resources considered in any of the alternative strategies. Therefore, the following two federal licensing requirements do not apply:

- Nuclear Regulatory Commission (NRC) Licensing
- Federal Energy Regulatory Commission Licensing of Hydroelectric Facilities

5.15.1 Certification to DOE under the Powerplant and Industrial Fuel Use Act

The Powerplant and Industrial Fuel Use Act of 1978, amended in 1981 and 1987, requires that baseload power plants with natural gas or petroleum as the primary energy source must have the capability to use coal or another alternative fuel as its primary energy source in lieu of natural gas or petroleum. Certification is submitted to DOE prior to constructing a new powerplant or converting an existing power plant to baseload operation.

5.15.2 Emission Permits under the Clean Air Act

The basic statute for regulating air quality in the U.S. is the Clean Air Act. Four Clean Air Act-related permits described here could apply to a new or modified power resource.

State Emission Permit - State emission permit programs ensure new or modified sources will not violate federal or state ambient air standards.

Nonattainment Permit - Nonattainment permits are required for new or modified major stationary emission sources in nonattainment areas. Nonattainment areas are areas where ambient air quality standards are not being met. A major stationary source has the potential to emit 100 tons per year (tpy) or more of any pollutant subject to regulation under the Clean Air Act. The new source must meet the offset requirements of Section 173 of the Clean Air Act, which effectively require that the source provides a net improvement in air quality results.

Prevention of Significant Deterioration (PSD) - The PSD permit program applies to specific pollutants in geographic areas designated as meeting ambient air standards, i.e., attainment areas, and in unclassified areas. It is designed to prevent deterioration of air quality in these areas. Under the PSD program, new major stationary emission sources or major modifications to such sources must obtain a PSD permit setting emission limitations. The term "major emitting facilities" is defined to include certain specifically designated stationary sources with the potential to emit 100 tons per year (tpy) of any air pollutant and all other sources with the potential to emit 250 tpy of any pollutant.

Construction Approval - Construction approval is required for those new power resources subject to EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP). Standards have been issued for certain types of facilities and specified pollutants including asbestos, arsenic, benzene, beryllium, mercury, radionuclides, and vinyl chloride.

5.16 DISCHARGE PERMITS UNDER THE CLEAN WATER ACT

The Clean Water Act (CWA) is the principal federal law governing water pollution control. The Act was passed in 1972 and amended in 1977 and 1987. It authorizes federal and state control of discharges into waters of the United States and municipal sewer systems. A person responsible for discharging pollutants into any waters of the United States from a point source must obtain and comply with a permit issued under the National Pollution Discharge Elimination System (NPDES) established under Section 402 of the Act. Permits are issued by EPA or by a state with an EPA-approved permit system. Montana, Oregon, and Washington have authority delegated by EPA to issue NPDES permits. Permits in Idaho are issued by the EPA Region 10 office in Seattle.

5.17 UNDERGROUND INJECTION PERMITS UNDER THE SAFE DRINKING WATER ACT

The principal federal program applicable to intentional discharges to groundwater is the Underground Injection Control (UIC) Program established by Section 1421 of the Safe Drinking Water Act. The UIC program is administered directly by states whose program has been approved by EPA. In the Northwest, UIC permits are issued by state agencies in Idaho, Oregon, and Washington. In Montana, UIC permits are issued by the EPA Region 8 office. Injections except as authorized by permit or rule issued under the UIC program are prohibited.

5.18 PERMITS FROM THE ARMY CORPS OF ENGINEERS

The U.S. Army Corps of Engineers administers several permit programs that may apply to certain new power resource projects.

5.18.1 Rivers and Harbors Act

A permit from the Corps is needed under Section 9 of the Rivers and Harbors Act of 1899 for constructing a dam or dike in navigable waters. The term "navigable waters" generally covers waters subject to the ebb and flow of the tide and/or waters usable for commerce transportation.

For hydroelectric projects licensed by FERC, the Corps normally recommends appropriate provisions to include in the FERC license rather than issuing a separate permit under Section 9. A permit from the Corps will be needed for hydroelectric projects on navigable waters exempt from the FERC licensing process.

A permit from the Corps is also required under Section 10 of the Rivers and Harbors Act for constructing structures or work in or affecting navigable waters. Constructing a cooling water intake structure in navigable waters, for example, would require a permit under these regulations. Building electric power transmission lines across navigable waters would require a permit unless the lines are part of a water power project subject to FERC regulation.

5.18.2 Clean Water Act

Discharging dredged or fill materials into waters of the United States requires a permit from the Corps issued under the authority of Section 404 of the Clean Water Act. The term "waters of the United States" is defined very broadly and includes almost every surface body of water in the United States including wetlands. Permits are issued only after the state where the dredge or fill activity is to be located certifies under Section 401 of the CWA that existing water quality standards will not be violated if the permit is issued. Permits also must be consistent with the environmental guidelines established by EPA under Section 404(b) of the CWA. The EPA can veto permits authorized by the Corps if EPA finds that the discharge will have an unacceptable adverse effect on the environment.

A consultation letter was sent to the Corps of Engineers requesting that they review construction of Schultz Substation for permit requirements. They confirmed that a permit would be needed if dredge or fill activities occur in waters of the United States located in the siting area. As Sites 1 and 3 are far from these surface flows, a Section 404 permit will not be required.

5.19 GEOTHERMAL RESOURCE DEVELOPMENT ON FEDERAL LANDS

Several permits and approvals are needed to develop geothermal resources on federal lands. Under the Geothermal Steam Act of 1970, as amended, the Department of the Interior (DOI) is given authority to execute leases for developing geothermal resources on lands it administers, lands administered by the U.S. Department of Agriculture with that Department's consent, and on lands for which the United States has mineral rights. Competitive leasing is required for land located within any known geothermal resources area. A permit is required for exploration activities prior to executing a lease. Since developing geothermal resources failed the initial screening criteria, this requirement does not apply.

5.20 LEASES AND PERMITS FOR USING FEDERAL LANDS FOR A POWER PLANT

Constructing a power resource facility on federal lands requires approval of the agency administering the lands. The approval may be a special use permit or authorization, a lease, or an exchange of lands with the developer.

5.21 EASEMENT FOR TRANSMISSION LINES ACROSS FEDERAL LANDS

Building an electric power transmission line across federally owned lands requires the approval of the federal agency administering the lands. The approval may be an easement, a right-of-way authorization, a lease, a special use authorization, or a permit.

5.22 NOTICE TO THE FEDERAL AVIATION ADMINISTRATION

Building certain tall facilities such as a cooling tower at a power generation site may require notice to the Federal Aviation Administration (FAA). Specifically, building any facility 200 ft. or more above ground level requires notice to the FAA.

5.23 PERMITS UNDER THE RESOURCE CONSERVATION AND RECOVERY ACT

The Resource Conservation and Recovery Act (RCRA), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on generators and transporters of this waste, and on owners and operators of treatment, storage, and disposal (TSD) facilities. Each TSD facility owner or operator is required to have a permit issued by EPA or the state. Construction and maintenance activities in BPA's experience have generated small amounts of hazardous waste. These typically include: solvents, pesticides, paint products, motor and lubricating oils, and cleaners. Under EPA and Washington Department of Ecology regulations, the amounts of these wastes would fall within the definition for a "small quantity generator." BPA has a hazardous waste management program in place to assure compliance with Federal and State hazardous waste requirements.

6.0 LIST OF PREPARERS

DENNIS AMONSEN, P.E., Electrical Engineer. Responsible for: Develop and review load curtailment measures. Education: B.S. Electrical Engineering. Experience: area engineering, system protection maintenance, power management; with BPA since 1972.

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KEN BARNHART, Project Environmental Coordinator. Responsible for: Coordination and completion of environmental requirements. Education: B.S. Landscape Architecture. Experience: Environmental analysis, energy facility planning and location, landscape architecture, appearance planning for substations and transmission lines; with BPA since 1971.

MIKE BERGER, P.E., Electrical Engineer. Responsible for: Generating resource supply forecast. Education: M.B.A.; B.S. Electrical Engineering. Experience: generating resources, project evaluation, quality control; with BPA since 1973.

MARK BOND, P.E., Chief, Project Studies Section. Responsible for: Project studies, transmission planning. Education: B.S. electrical engineering. Experience: system planning, area engineering, construction and maintenance; with BPA since 1974.

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MAUREEN CONNER, P.E., Electrical Engineer. Responsible for: Writing and editing load management material. Education: B.S. Electrical Engineering. With BPA as a consultant from1989-1990.

KATHLEEN CONCANNON, Writer. Responsible for: Writing and editing the EIS. Education: B.S. Geology. Experience: environmental analysis, NEPA process, resource planning; with BPA since 1980 (as a consultant since June 1990).

ALAN L. COURTS, P.E., Project Manager. Responsible for: Overall project management, management of Puget Sound utility study team. Education: Graduate study electrical engineering; B.S. Electrical Engineering. Experience: high voltage transmission engineering, research and development; transmission planning; engineering management; with BPA since 1973.

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ELIZABETH EVANS, Public Utility Specialist. Responsible for: Economic evaluation of proposed test cases. Education: PhD. Population Biology; M.S. Urban Planning; B.S. Biology. Experience: Resource Planning and policy analysis; with BPA since 1986.

CHUCK FORMAN, Chief, Residential and Commercial Forecasting Section. Responsible for: Identifying load characteristics and producing load forecasts. Education: M.S. Public Administration; B.S. Economics. Experience: 9 years load forecasting; with BPA since 1981.

RICH GILLMAN, Section Chief. Responsible for: Supervising various primary demand-side data collection efforts including surveys and direct metering, research and analysis of data collected, computerization of data. Education: M.S. Economics; B.S. Economics. Experience: supervision, project management, peak and load shape analysis, forecasting, rate development; with BPA since 1981.

JON HIRSCH, Industry Economist. Responsible for: Developing load factors for extreme and normal peaks. Education: M.B.A.; B.A. Economics. Experience: power forecasting; with BPA since 1983.

DIANE HOLLISTER, Industry Economist. Responsible for: Conservation and load management analysis. Education: M.A. Economics, B.A. Business Administration. Experience: rate design, NEPA analysis for rate cases, economic analysis of conservation options; with BPA since 1985.

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ERIC B. LOWRANCE, Geographic Information Specialist (GIS). Responsible for: GIS database design, analysis, and cartographic output. Education: Graduate study in geography, B.S. Geology. Experience: GIS database design, analysis and cartographic output; with BPA as a consultant since 1987.

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GEORGE REICH, Area Power Manager. Responsible for: Development and review of load curtailment measures. Education: M.S. Electrical Engineering; B.S. Electrical Engineering. Experience: system engineering, customer service, contracts; with BPA since 1972.

HAIG REVITCH, Public Utilities Specialist. Responsible for: Cost allocation and rate design. Education: M.B.A. Finance and Investment; B.S. Business Administration. Experience: cost allocation and rate design; with BPA since 1981.

LEROY P. SANCHEZ, Visual Information Specialist. Responsible for: Graphics support relating to transmission facilities, environmental impact and assessment analysis. Education: Graphic Design. Experience: GIS mapping, including federal transmission EIS; with BPA since 1978.

RONALD SANDS, Economist. Responsible for: Hourly modeling of conservation, load management, and fuel switching programs. Education: Ph.D. Economics; B.S. Electrical Engineering. Experience: simulation models, load shape analysis; with BPA as a consultant since 1986.

STEPHEN D. SHERER, Geographer, Geographic Information Systems Manager. Responsible for: GIS management. Education: B.S. Geography. Experience: 15 years GIS/image processing related to transmission facilities; environmental impact analysis; with BPA since 1975.

BRIAN SILVERSTEIN, P.E., Chief, Advanced Planning Staff. Responsible for: Economic evaluation of test cases and proposed alternative strategies. Education: M. Eng. electrical engineering; B. Eng. electrical engineering. Experience: transmission reliability analysis, rate design, policy development; with BPA since 1979.

PHILIP SMITH, GIS Specialist. Responsible for: GIS database design and geographic analysis. Education: M.S. soil science; B.S. Agronomy. Experience: GIS/image processing experience; soils, agriculture and water analysis; with BPA as a consultant since 1981.

ARNOLD VINNARD, Industry Economist. Responsible for: Conservation and load management analysis. Education: M.A. Economics, B.A. Philosophy. Experience: economic and financial analysis, policy making; with BPA since 1983.

WENDY WHEELER, Economist. Responsible for: Load forecasting, analyzing historical load forecasts, review forecast projections. Education: B.A. Economics. Experience: same as above; with BPA since 1990.

ROBERT G. WHITE, GIS Specialist. Responsible for: GIS database design and analysis. Education: M.S. natural resource management; B.A. psychology. Experience: 9 years GIS/image processing experience related to natural resources; with BPA as a consultant since 1986.

THOMAS J. WHITE, Writer/Editor. Responsible for: Writing and editing. Education: M.S. mechanical engineering; B.S. mechanical engineering; B.A. biological sciences. Experience: technical writer, documentation of software applications, development of training materials, load analysis, conservation and generation program development; project mechanical engineer for BPA since 1981; with BPA as a consultant since 1989.

SCOTT WILSON, Industry Economist. Responsible for: Economic evaluation of test cases and proposed alternative strategies. Education: B.A. Economics. Experience: resource planning, and policy analysis; with BPA since 1989.

NANCY A. WITTPENN, Environmental Planner. Responsible for: Environmental data collection and analysis, coordination for the EIS. Education: M.S. marine geophysics; B.S. geology. Experience: resource management, environmental analysis; with BPA as a consultant since 1989.

DON WOLFE, Public Utilities Specialist. Responsible for: Evaluating existing curtailment impacts and rights. Education: J.D.; B.A. Psychology. Experience: environmental analysis, resource planning, power marketing, contract negotiations; with BPA 1976-1982; 1988 to present.

JOHN M. ZIMMERLY, Geographer. Responsible for: GIS database automation, geographic analysis and cartographic output. Education: Graduate study in GIS; B.S. Biology. Experience: GIS database automation, geographic analysis and cartographic output; with BPA as a consultant since 1988.

PROJECT MANAGEMENT TEAM

A project management team has been appointed to oversee project activities and provide project review. The following utility representatives participated in the PSAERP planning study.

SCL - SEATTLE CITY LIGHT
SNPD - SNOHOMISH PUD
PSP&L - PUGET SOUND POWER & LIGHT
TPU - TACOMA PUBLIC UTILITIES
WPUDA - WASHINGTON PUBLIC UTILITY DISTRICT ASSOCIATION

STEERING COMMITTEE
- CHUCK CLARK, BPA
- STEVE KLEIN, TPU
- JERRY GARMAN, SCL
- BILL FINNEGAN, PSP&L
- CHARLES EARL, SNPD

PROJECT MANAGEMENT COMMITTEE
- ALAN COURTS, BPA
- ARNIE TOMAC, PSP&L
- TED COATES, SCL
- GEORGE WHITENER, TPU
- DOUG RIGG, SNPD
- PAT MCGARY, WPUDA

ENVIRONMENT
- KEN BARNHART, BPA
- LYNN BEST, SCL
- CATHERINE LEONE, TPU
- HIL HORNUNG, SNPD
- JOHN THIELKE, PSP&L
- BOB CLUBB, PSP&L

CONSERVATION / LOAD MANAGEMENT
- RICH GILLMAN, BPA
- ARNOLD VINNARD, BPA
- TODD CURRIER, TPU
- MARY SMITH, PSP&L
- STEVE LUSH, SCL
- BOB NICHOLAS, SNPD

LOAD FORECASTING
- CHUCK FORMAN, BPA
- CARL LIAN, PSP&L
- AL WILSON, SCL
- MIKE MCMAHON, SNPD
- ANDY EVANCHO, TPU

TRANSMISSION
- DENNIS PORTER, BPA
- MIKE SHEEHAN, PSP&L
- DARRYL LAROCHE, TPU
- DENNIS GRAY, SCL
- DOUG RIGG, SNPD

LOCAL GENERATION
- MIKE BERGER, BPA
- MARTIN HATSCHER, SNPD
- RICH LAUCKHART, PSP&L
- DENNIS PARRISH, SCL
- J. JAY JACOBSEN, TPU

EVALUATION
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- SCOTT WILSON, BPA
- JOHN THIELKE, PSP&L
- CARL LIAN, PSP&L
- STEPHEN LAND, TPU
- DOUG ROUGH, SCL
- DOUG RIGG, SNPD

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- MAY GERSTLE, SCL
- JUDE NOLAND, PSP&L
- HIL HORNUNG, SNPD

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- GEORGE WHITENER, TPU
- RAY NELSON, SCL
- BOB BANISTER, PSP&L

A special thanks is extended to all those who participated as members of the Technical Review Group and the Sounding Board. Your input on process and decision making was invaluable and greatly appreciated.

7.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE EIS ARE SENT

FEDERAL AGENCIES

US Environmental Protection Agency, Region X, Seattle, WA
US Army Corps of Engineers, Seattle, WA
USDOE Federal Energy Regulatory Commission, Portland, OR
US Army Corps of Engineers, Seattle, WA
USDA Forest Service, Seattle, WA
USDA Soil Conservation Service, Portland, OR
USDOC National Oceanic and Atmospheric Administration, Seattle, WA
USDOE, Richland, WA
USDOI Bureau of Indian Affairs, Portland, OR
USDOI Bureau of Land Management, Portland, OR
USDOI Bureau of Reclamation, Yakima, WA
USDOI Fish and Wildlife Service, Olympia, WA
USDOI National Park Service, Seattle, WA
USDOT Federal Aviation Administration, Seattle, WA
US Housing and Urban Development, Seattle, WA

TRIBAL ORGANIZATIONS

OREGON

Affiliated Tribes of Northwest Indians, Portland
Columbia River Intertribal Fish Commission, Portland

WASHINGTON

Northwest Indian Fisheries Commission, Olympia, WA
Confederated Tribes of Colville Reservation, Nespelem
Muckleshoot Tribe, Auburn
Port Gamble Klallam Tribe, Kingston
Swinomish Tribal Community, La Conner
Yakima Indian Nation Tribal Council, Toppenish
Nooksack Tribe, Deming
Tulalip Tribe, Marysville
Small Tribes of Western Washington, Taholah

WASHINGTON STATE AGENCIES

Department of Community Development, Olympia
Department of Fisheries, Olympia
Utilities and Transportation Commission, Olympia

Department of Natural Resources, Olympia
Office of Archeology and Historic Preservation, Olympia
Office of Energy, Olympia
Department of Ecology, Olympia
Department of Wildlife
Energy Facility Site Evaluation Council

WASHINGTON LOCAL/COUNTY AGENCIES

City of Olympia
City of Seattle
City of Tacoma
City of Wenatchee
City of Port Angeles
City of Richland
City of Bellevue
City of Everett
County of Benton and Franklin Governmental Conference, Richland
County of Whatcom, Council of Governments, Bellingham
County of Chelan, Governmental Conference, Wenatchee
County of Lewis, Board of Commissioners, Chehalis
County of Clallam
County of Douglas
County of Grant
County of Grays Harbor
County of Island
County of Jefferson
County of King
County of Kitsap
County of Kittitas
County of Lewis
County of Mason
County of Okanogan
County of Pierce
County of San Juan
County of Skagit
County of Snohomish
County of Thurston
County of Yakima
Cowlitz Wahkiakum Governmental Conference, Kelso
Douglas Regional Planning Commission, East Wenatchee
Grays Harbor Regional Planning Commission, Aberdeen
Jefferson Port Townsend Regional Council, Port Townsend
Puget Sound Council of Governments, Seattle
Skagit Council of Governments, Sedro Woolley
Thurston Regional Planning Council, Olympia

INTEREST GROUPS

Clearing Up, Seattle, WA
Northwest Steelheaders, Milwaukie, OR
Columbia Basin Fish & Wildlife Authority, Portland, OR
Common Cause, Olympia, WA
Fair Electric Rates Now, Olympia, WA
Friends of the Earth, Seattle, WA
Nature Conservancy, Seattle, WA
Northwest Conservation Act Coalition, Seattle, WA
Audubon Society, Seattle, WA
Sierra Club, Seattle, WA
Washington Wilderness Coalition, Seattle, WA
Elder Citizens Coalition of Washington, Seattle, WA
Fair Use of Snohomish Energy, Snohomish, WA
Fuse Ratepayer, Everett, WA
Northwest Steelheaders, Vancouver, WA
Washington Environmental Council, Seattle, WA

WASHINGTON CLEARINGHOUSES

Chelan County Governmental Conference, Wenatchee
County of Clallam Intergovernmental Clearinghouse, Port Angeles
County of Clark District Clearinghouse, Vancouver
County of Lewis District Clearinghouse, Chehalis
County of Whatcom District Clearinghouse, Bellingham
Department of Ecology, Olympia
Douglas Regional Planning Commission District Clearinghouse, East Wenatchee
Grays Harbor Regional Planning Commission District Clearinghouse, Aberdeen
Jefferson Port Townsend Regional Council District Clearinghouse, Port Townsend
Thurston Regional Planning Council District Clearinghouse, Olympia
Trico Economic Development District Clearinghouse, Colville
Washington Association of Counties, Olympia

WASHINGTON CONGRESSIONAL REPRESENTATIVES

Brock Adams, Senator, Seattle
Slade Gorton, Senator, Seattle
John Miller, Representative, Edmonds
Al Swift, Representative, Bellingham and Everett
Jolene Unsoeld, Representative, Olympia and Vancouver
Sid Morrison, Representative, Yakima and the Tri Cities
Norman D. Dicks, Representative, Tacoma and Bremerton
Jim McDermott, Representative, Seattle
Rod Chandler, Representative, Bellevue

STATE GOVERNOR

Governor of Washington, Olympia

WASHINGTON STATE LEGISLATORS

Dean Sutherland, Senator, Vancouver
Leo Thorseness, Senator, Renton
Bill Grant, Representative, Walla Walla
Fred May, Representative, Mercer Island

DEPOSITORY LIBRARIES

OREGON

Bonneville Power Administration Library, Portland
Oregon State Library, Salem

WASHINGTON

Western Washington University, Bellingham
Central Washington University Library, Ellensburg
Everett Public Library, Everett
Evergreen State College, Olympia
Washington State Library, Olympia
North Olympic Library System, Port Angeles
Seattle Public Library, Seattle
University of Washington Libraries, Seattle
University of Washington Marion Gould Gallagher Law Library, Seattle
U.S. Court of Appeals, Seattle
Tacoma Public Library, Tacoma
University of Puget Sound Collins Memorial Library, Tacoma
University of Puget Sound School of Law Library, Tacoma
Fort Vancouver Regional Library, Vancouver

UTILITY & UTILITY ASSOCIATIONS

City of Port Angeles, Department of Light, Port Angeles WA
City of Tacoma, Department of Public Utilities Power Management, Tacoma WA
Chelan County PUD NO 1, Wenatchee WA
Clallam County PUD NO 1, Port Angeles WA
Clark County PUD NO 1, Vancouver WA
Cowlitz County PUD NO 1, Longview, WA
Douglas County PUD, Wenatchee, WA
Douglas County PUD NO 1, East Wenatchee WA
Grays Harbor County PUD, Aberdeen WA
Industrial Customers of Northwest Utilities, Portland OR
Lewis County PUD, Chehalis WA
Mason County PUD NO 3, Shelton WA
Northwest Natural Gas Company, Portland OR

Northwest Power Pool, Portland OR
Northwest Utilities, Tacoma WA
OHOP Mutual Light Company, Eatonville WA
Pacific Northwest Utilities Conference Committee, Portland OR
Puget Sound Power & Light Company, Seattle WA
Seattle City Light, Seattle WA
Snohomish County PUD NO 1, Everett WA
Tacoma Public Utilities, Tacoma WA
Wahkiakum County PUD NO 1, Cathlamet WA
Washington Public Power Supply System, Richland WA
Washington PUD Association, Seattle WA
Western Washington PUD Corp., Mill Creek WA
Whatcom County PUD, Ferndale WA

BUSINESSES

Pacificorp Electric Operations Group, Portland OR
Multipoint Control Systems Inc., Everett WA
Boeing Company, Seattle WA
GH Bowers Engineering, Seattle WA
Heatways, Federal Way WA
Boeing Commercial Appliances, Kent WA
Kaiser Aluminum & Chemical Corporation, Portland OR
EBASCO, Bellevue WA
Energy Saving Services, Bellevue WA
Branch Richards Anderson & Company, Seattle WA
Earle M. Jorgensen Company, Seattle WA
Economic & Engineering Services Inc., Bellevue WA
United Industries, Bellevue WA
Intalco Aluminum Corporation, Ferndale WA
Insul Tray Inc., Redmond WA

CANADA

BC Utilities Commission, Vancouver, BC
BC Hydro & Power Authority, Vancouver, BC
Canadian Consulate General, Seattle, WA
Department of Fisheries and Oceans, Vancouver BC
Ministry of Energy, Policy Development Branch, Victoria BC

OTHERS

Northwest Power Planning Council

INDIVIDUALS

Project mailing lists were started at the beginning of the scoping process and updated as the project progressed. BPA will send the Final EIS to each individual on the project mailing list.

8.0 PUBLIC COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

BPA sent the Draft EIS to the public for comments on the proposed actions. This chapter contains the written comments from letters and oral comments from public meetings. They are organized by topic. BPA and participating utilities prepared responses, which follow each comment or group of comments.

8.1 PUBLIC INVOLVEMENT OPPORTUNITIES

BPA published a notice of availability to review the DEIS in the October 25, 1991 FEDERAL REGISTER. This established a 60-day public review period, with comments due on December 24, 1991.

BPA mailed the DEIS on October 18, 1991 to more than 1000 agencies, groups, and individuals (see Chapter 7.0). Commenters could send or give comments to BPA's Puget Sound Area Manager, Upper Columbia Area Manager, Wenatchee District Manager, Environmental Team Leader or Public Involvement Office in Portland, Oregon. BPA provided toll-free numbers for commenters.

BPA sponsored seven public meetings, held in various locations east and west of the Cascades. At these meetings, commenters could give oral or written comments, or fill in a form and send it to BPA later.

8.2 PUBLIC MEETINGS

BPA held seven evening meetings so the public could listen to information about the DEIS and ask questions. Bill's Recording Service recorded each meeting to capture all comments. Transcripts were produced for comment analysis and can be purchased at a nominal copying fee. BPA accepted formal comments and explained how the public could phone or send in comments. BPA personnel attended each meeting and provided copies of the DEIS and other information. All attendees were asked to sign in as they arrived.

Each meeting used a similar format: greetings and introductions first; problem explanation; overview of alternative solutions; question and answer period; and an opportunity to give formal comments last. Summaries of the seven meetings follow.

Seattle Public Meeting - Eighteen members of the public attended this meeting held November 6, 1991 at the Mountaineers Club. The BPA Deputy Area Manager welcomed attendees and introduced members of the project committees, study groups, and the Sounding Board. The BPA Project Manager presented slides that explained the problem, why the problem exists and the four alternatives developed to solve it. The five utility effort and the role of the Sounding Board were also explained. Members of the Sounding Board attending spoke about their involvement. The public asked many questions and gave comments A facilitator conducted the comment/response portion of the meeting. The slide presentation used at this meeting was used at following meetings.

Comments and/or questions during the presentation focused on transmission, load curtailment, and local generation. After the presentation, questions continued about local generation cost and siting, environmental impacts, and accompanying transmission needed for local generation. One commenter asked who would be paying for each of the measures in an alternative. Someone wondered who really needs this energy, the residential sector, or business. Someone needed a clarification of impact terms and how certain resources were rated. Also, clarification of the definition of capacity and the conditions that exist when the system is at capacity was requested. Interruptibility was discussed. One commenter felt that the EIS was deficient in the way it

presented the problem, its consideration of the impacts of alternatives, and the costs. Another commenter felt the EIS had done an adequate job of presenting the problem and the alternatives, and was in favor of the preferred alternative. Also, commenters felt more conservation planning was needed; society needed financial incentives; and an inverted block rate structure should be used.

Four attendees gave formal comments. The meeting ended at 8:36 p.m.

Shelton Meeting - Fourteen members of the public attended this meeting held November 7, 1991 at the Mason County Public Utility District Office. The Area State and Local Government Coordinator and a Mason County PUD Commissioner welcomed attendees. Two members of the Sounding Board attended and explained their role.

A commenter asked for clarification about voltage support. Another asked how the Northwest Power Planning Council's figures for conservation are factored into the plan. Concern was expressed about BPA's ability to put in a cross-mountain line given the trouble Puget Sound Power and LIght had in Whatcom County. Commenters acknowledged that load curtailment is not a very popular contingency but that contractual arrangements would be the preferred method of dropping load for a contingency, not the curtailment outlined in the Winter Operating Plan. Local generating resources and their future availability in the region, and resources such as combustion turbines, small hydro, and the Trojan Nuclear Plant were discussed. A commenter talked about the return of the Canadian power entitlements and asked how that energy would be replaced. A commenter urged BPA to begin EIS work on the transmission line. Others did not trust that a transmission line would solve the problem and urged that resources be built on the west side of the mountains.

Two attendees gave formal comment. Commenters complimented BPA on the EIS document and the way that BPA involved all interested communities. The meeting ended at 8:35 p.m.

Wenatchee Meeting - This meeting was held November 12, 1991 at the Red Lion Inn. Four members of the public attended. The BPA District Manager gave opening and welcoming remarks. The presentation proceeded with only a few questions about other utilities' load curtailment plans, impacts from disposing water heaters, and present capacity in the existing system.

One person gave formal comment addressing his concerns about the lack of consideration for outdoor lighting in the conservation measures; the continued use of low electric rates; lack of detail in the environmental impacts section; and the make-up of the Sounding Board. The meeting ended at 8:24 p.m.

Ellensburg Meeting. - Five members of the public attended this meeting. The meeting was held November 13, 1991 at Central Washington University, Samuelson Union Building Theater. The District Manager opened the meeting. People asked several questions before the presentation. Everyone was familiar with the project. The questions concerned building a substation in Ellensburg, and the project schedule. There also were questions about building a transmission line. A member of the Sounding Board explained his experience working with BPA through the process. Near the end of the meeting, attendees asked that BPA present a short description of some of the specific analyses of the substation sites and the trade-offs involved. This was the only formal presentation of the evening.

Besides the questions asked, no one gave formal comment. The meeting ended at 7:59 p.m.

Tacoma Meeting -This meeting was held at the La Quinta Inn on November 14, 1991. Nineteen members of the public attended. The Area State and Local Government Coordinator opened the meeting. Three members of the Sounding Board explained their experience working with BPA and the utilities. The slide presentation proceeded without questions. Several questions were asked after the presentation.

Commenters requested BPA to clarify accelerated conservation, i.e., which measures would be used, where they would be used, and how they would be implemented. A commenter noted that, in terms of cost, as electricity goes up, consumption will usually fall off. Several people talked about saving electricity through water tank switches or a system that uses wood heat to heat both the house and the water. Others expressed interest in using combustion turbines or burning tires for electricity. These aspects of building a transmission line also were discussed: its cost; the probability that it will be needed; the ability to energize it in 1997; and expanding rights-of-way. A commenter noted the possible impact of the Endangered and Threatened Species Act. Several people talked about load growth and asked why something was not done sooner. A question about generating resources developed in the recent past started a discussion about nuclear power's future.

One person gave formal comment. BPA interpreted most questions as comments. The meeting ended at 8:50 p.m.

Bellevue Meeting - Nineteen members of the public attended the Bellevue meeting held at the Bellevue Concourse on November 18, 1991. A facilitator presided over the meeting. The Area Manager offered welcoming remarks and introduced staff and others.

The Project Manager proceeded through the presentation without anyone asking questions. Then the facilitator asked for comments.

Commenters asked BPA to clarify voltage support and asked what the new substation will do to help the system. There was an extended conversation on energy codes, meters in the home, and rate structure. Further discussion on conservation included verification of numbers, load forecasting, and a request to establish a hierarchy of value of conservation measures. Several people talked about power factor correction and using combustion turbines to obtain it. People wondered about starting up Satsop and agreed that local generation was a good idea. One suggestion was to use Satsop as a synchronous condenser. A commenter asked, if Trojan is unavailable in the future, would the alternatives still do the job? Some felt that cogeneration was a good idea. Some thought the timeframe for the project was not long enough. A few comments were submitted on upgrading the transmission lines.

Two people gave formal comments. Questions were considered comments. The meeting ended at 8:30 p.m.

Everett Meeting - The meeting was held at the West Coast Everett Pacific Hotel on November 19, 1991. Six members of the public attended. The Area State and Local Government Coordinator welcomed people to the meeting. Several people from other utilities involved with the project were introduced. The slide presentation was given and people asked questions and gave comments throughout.

Comments and/or questions during the presentation focused on the availability of Trojan and Centralia to supply power; the ability of BPA to get a line energized by 1997; and how the alternatives conform to the Northwest Power Planning Council's plan, especially in terms of conservation goals for the region. A commenter observed that the DEIS numbers seemed lower than the Council's expectations for conservation. Concern was also expressed for the need to invest in training energy managers to implement these conservation programs. The cost and the continued ability to use load curtailment as a contingency was discussed in some detail. One commenter proposed that uncertainties exist in all aspects of this effort and the feasibility that any of the alternatives can be implemented will be based on how these uncertainties unfold. A commenter suggested that if the ability to provide electricity is not there in the future, local or state government might respond by limiting new economic growth or development. Another commenter questioned the planning horizon and supported expanding beyond the 10-year time frame.

Two people gave formal comment. The meeting ended at 8:30 p.m.

BPA environmental personnel reviewed the transcripts of each meeting. Sixty-eight comments were coded by topic. Responses to each are provided at the end of this Chapter (Section 8.5). They are organized by subject.

8.3 COMMENT PERIOD

The 60-day public review period continued after the public meetings until December 24, 1991. Letters were sent to BPA's Public Involvement Office. Several letters came in after the comment period closed. Thirty-two letters were received and staff coded 218 comments. The letters are displayed beginning on page 8-82. Comments are underlined and coded. The method for coding is explained in Section 8.4.

8.4 CODING METHOD

Comments from the public meetings and from letters were coded. Letters were given a sequential number in the order they were received, e.g., 001, 002, 003, ... 032. Each comment within a letter was given a sequential number in the order it was made, e.g., 001-1, 002-1, ... 032-1. A letter could have one or several comments, e.g., 001-1, 001-2, 001-3.

Comments identified from the public meetings transcripts were coded similarly. Instead of using a number to identify a public meeting, letters were used to identify the meeting, e.g., TPM was used for Tacoma public meeting, and SHPM was used for Shelton public meeting, etc. As with the letters, a comment was given a sequential number in the order it was made, e.g., TPM-1, TPM-2, SHPM-1, SHPM-2.

Both letter and meeting comments fit into categories based on their topic or subject. The following outline shows the categories that the public commented on. In Section 8.5, both the comments and their responses are displayed by these categories. New comment categories are highlighted by a larger and bold type style.

1. Process
2. Decision making
   - A. Recommendations
   - B. Timing
   - C. Who Will Do What
3. Need For Action
   - A. Load Forecast
   - B. Reliability
   - C. Puget Sound Resources
   - D. Transmission Capabilities
4. Study Methods and Assumptions
5. Alternatives
   - A. Preferred Alternative
   - B. Alternative Strategy 1
   - C. Alternative Strategy 2
   - D. Alternative Strategy 3
   - E. Alternative Strategy 4
   - F. No Action Alternative
6. Alterantive Measures
   - A. Conservation
   - B. Load Management
   - C. Fuel Switching
   - D. Transmission Line
   - E. Voltage Support
   - F. Local Generation
   - G. Load Curtailment
   - H. Rates
7. Environmental Impacts
   - A. Conservation
   - B. Load Management
   - C. Fuel Switching
   - D. Transmission Line
   - E. Voltage Support
   - F. Local Generation
   - G. Load Curtailment
   - H. New Substation
8. Economics
9. Appendices
   - A. Appendix A
   - B. Appendix B
   - C. Appendix C
   - D. Appendix D
   - E. Appendix E
   - F. Appendix F
   - G. Appendix G
10. Relationship to Other Energy Issues
11. Miscellaneous

A comment /response index is provided at the end of this chapter.

8.5 COMMENTS AND RESPONSES

The following pages contain individual comments and responses arranged according to the comment categories shown above. Responses directly follow each comment. Many commenters expressed similar thoughts. In those cases, similar comments were grouped together with one response included after the last comment in the group.

Copies of all comment letters are enclosed after the comments and responses. Readers are urged to consult the comment/response index to locate specific comments.

Code	Comments/Responses
	1.0 PROCESS COMMENTS
018-1 Malcolm J. Macdonald Seattle City Light	**COMMENT:** We wish to commend Bonneville for the open and inclusive process you used in the development of this DEIS. Throughout the two year process, Bonneville has made extensive efforts to seek and incorporate input from involved utilities, the public and from technical panels that were set up specifically for this issue. Seattle has participated through the Steering Committee and various technical committees. We appreciate having had the opportunity to provide input over time into the alternatives proposed in this DEIS. **RESPONSE:** From the beginning the participating utilities recognized the need to work closely together on the reliability problem. The analysis required unprecedented information sharing by the affected utilities. Measures such as conservation that involve end users could only be implemented by the retail utilities. The utilities also made a strong commitment to involve the public at all stages of the analysis, planning and decision making.
018-2 Malcolm J. Macdonald Seattle City Light	**COMMENT:** The document you have produced is very readable with excellent graphics and could be considered a model for other Environmental Impact Statements covering complex technical issues. The maps, especially, are a very useful part of the report. **RESPONSE:** Thank you. Many people contributed to this document. Compliments are rare for EIS's; we appreciate those expressed.
019-1 K.C. Golden Northwest Conservation Act Coalition	**COMMENT:** We commend Bonneville and the participating utilities for an exceptionally strong public involvement effort in the development of this plan. We hope the Sounding Board model will be used to promote active public (not just customer) deliberation about other crucial decisions before Bonneville. **RESPONSE:** The Sounding Board proved to be an extremely valuable component of the public involvement effort. Groups such as the Sounding Board have been used to involve the public in other important decisions by BPA and other utilities.
012-3 Donald Axtell None Stated	**COMMENT:** The make-up of your "steering committee" is skewed and is your biggest fault; only electric-power people (and one lone "user") make up the group. Nowhere represented are those from other power sources (natural gas for instance), or voices from co-generation, or other sources, nuclear, or "alternative" sources. Why not? **RESPONSE:** The Steering Committee was set up with one executive level manager from each of the utilities participating in the project. Participating utilities were those who had responsibility for reliability of the power system in the Puget Sound area. The purpose of the Steering Committee is to provide organizational support to utility study teams who were completing studies addressing the voltage instability problem, analyzing alternatives, conducting environmental analysis, and coordinating public involvement efforts. Other interests did participate in the technical analysis of the Steering Committee, including

Code	Comments/Responses
	1.0 Process Comments - Continued
	representatives from the natural gas industry through a public involvement group named the Sounding Board. BPA has also made every effort to involve the public in the overall NEPA process.
024-19 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** BPA has in the past presented an EIS which stated project construction would be contingent on specific events. However, when those events did not happen, BPA constructed the project anyway by hiding behind the 90 day limit to bring challenges to its actions. (16 USC 839)
SEPM-7 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** I was talking with Stuart, he was saying that there will be a future complete EIS on the transmission line. However, I do not believe the courts will allow you to bring up subjects in an EIS that's already been resolved, such as the need for the project. A siting EIS is not a planning EIS, and if you want to challenge the planning, not the siting, I think 90 days after April 1st or whenever they publish the ROD, you're out of business forever. So, I plan on challenging it (EIS), primarily because I believe an EIS should be done accurately and honestly — well, not that it's not honest. I believe these are honorable men. But it should include all costs and accurately project the picture, and if you don't do that, the EIS process is for naught. **RESPONSE:** Any person that desires to challenge the PSAERP must do so within 90 days following publishing of the Record of Decision in the Federal Register. With respect to a new cross-Cascades transmission line, BPA would prepare a separate EIS on a decision to construct such a project The reliability plan responds to the uncertainty inherent in predicting future electrical conditions by proposing to monitor electrical conditions so adjustments to the plan can be made if changes occur. Actions that could be taken to respond to changed requirements (increases or decreases) are termed "contingency actions;" however a contingency such as a new cross-Cascades transmission line would require separate NEPA documentation. The problem or need the PSAERP focuses on is solved once accelerated conservation, and Voltage Support 1 and 2 are in place. The preferred alternative identifies a new cross-Cascades transmission line as a contingency measure for higher than forecast needs. Contingency measures, by definition, are measures that are unnecessary under present or expected conditions. The plan proposes to begin environmental work on a transmission line contingency to shorten the lead time for a line should electrical needs change. How will a decision on a future transmission line be made? Much the same way the decisions on the electric reliability plans are being made. The transmission line EIS will have a "Purpose and Need" chapter, and alternatives will be evaluated in a Draft EIS. BPA will request public comment in accordance with CEQ and DOE regulations.

Code	Comments/Responses
	1.0 Process Comments - Continued
024-20 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** The inadequacies of this draft EIS analysis were pointed out to BPA early in the process. DOE chose to present the deficient EIS. **RESPONSE:** The content of the PSAERP Draft EIS is explained in the response to question 24-18. Comments about technical shortcomings of the EIS have been carefully considered, and the document has been revised where appropriate. If a comment contained a misunderstanding or erroneous conclusions, an explanation is provided.
028-1 Ronald A. Lee, Chief EPA Region 10	**COMMENT:** We recommend that the final EIS commit to NEPA documentation for the site-specific environmental coverage. **RESPONSE:** BPA has made this commitment in several places throughout the Final EIS. Section 1.5, Finding Solutions, is the first place it is mentioned. BPA will make this commitment in the Record of Decision. BPA always intended to use a tiered environmental analysis approach for this study. BPA chose to look at a broad range of alternatives, include extensive public involvement in the analysis, and establish a framework for actions that assure reliable electric service in Puget Sound. Follow-up EIS's and EA's were expected for actions recommended in the plan. BPA still plans to use this environmental approach with one exception, the new substation proposed near Ellensburg, Washington. Voltage Support Option 2 emerged as a viable alternative rather late in the planning process. It was a product of intensive technical study efforts by the utilities. This solution requires a new substation at the midpoint of the existing transmission corridor between Grand Coulee and Raver (near Kent, Washington). This solution is attractive both environmentally and economically. Because of continuing high load growth and the deepening deficit, BPA decided to deviate from the tiering plan in this case and provide sufficient site-specific environmental coverage for the new proposed substation in the Final EIS to hasten solution of the reliability problem. Appendix G, which contains specific information about this option, was circulated with the Draft EIS. An updated version is included in this Final EIS. Impacts predicted for the new substation are reported in Chapter 4 - Environmental Consequences. BPA plans to assume a lead agency role to prepare an EIS on the contingency transmission line. Combustion turbine sponsors will provide appropriate environmental coverage for their projects.
028-2 Ronald A. Lee, Chief EPA Region 10	**COMMENT:** Based on our review, we are rating this draft EIS EC-2 (Environmental Concerns - Insufficient Information). Our environmental concerns are based on the fact that the contingency actions in the preferred alternative will cause the greatest environmental consequences.

Code	Comments/Responses
	1.0 Process Comments - Continued
	EC - Environmental Concerns The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA intends to work with the lead agency to reduce these impacts. Category 2 - Insufficient Information The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.
028-3 Ronald A. Lee, Chief EPA Region 10	**COMMENT:** The preferred alternative represents a balance between the environmental, economic, and technical issues only if it commits to NEPA documentation of the future contingency actions.
028-4 Ronald A. Lee, Chief EPA Region 10	**COMMENT:** The final EIS should clarify what is meant by supplemental site-specific environmental coverage. **RESPONSE:** BPA contacted EPA regarding their EC-2 rating of the PSAERP Draft EIS. Sally Brough, who made this rating, explained that the basis for EPA's concern was the manner in which contingency elements of the preferred action were covered in the Draft EIS. EPA was concerned that a more clear commitment to separate NEPA documentation for the contingency measures be made in the FEIS. This would remove EPA's concern. BPA explained that it intended to complete an EIS for the contingency transmission line, and that this commitment would be made succinctly in the FEIS. Pages in the FEIS where this intention is stated are as follows: 2-2, 2-3, 3-7, 4-3, 4-5, 8-7, 8-8, 8-9, 8-19, 8-26, 8-40, and 8-64.
031-1 Joe Whalen none stated	**COMMENT:** In contrast to other writers on this subject, it is concise, readable, and invites participation.
026-1 Paul C. Juhasz, P.E. Washington Society of Professional Engineers	**COMMENT:** Members of our Executive Committee have reviewed the Environmental Impact Statement and believe it is very complete, does a good job of defining the problem and offering a choice of alternative solutions.
027-1 D. Dean Bibles Oregon State Director USDOI Bureau of Land Management	**COMMENT:** We are impressed with the diversity of opportunities to solve the Puget Sound area problem and your staff's efforts to describe the problem and potential solutions in clear and understandable text, tables, graphs and figures.

Code	Comments/Responses
	1.0 Process Comments - Continued
018-3 Malcom J. Macdonald Seattle City Light	**COMMENT:** We are pleased to see that you have incorporated many of the suggestions Seattle made on your Preliminary Environmental Analysis, including separating transmission lines into existing and new corridors for the purposes of analysis. We are pleased to see this change since the environmental impacts will vary greatly between these cases. The overall rating given to each of the resources now looks appropriate to us. You have also developed a least environmental impact alternative that combines conservation, load management and voltage support options, as we suggested. **RESPONSE:** Comments noted.
	2.0 DECISION MAKING
	2A. Recommendations
011-3 John H. Wolch none stated	**COMMENT:** Those responsible for providing adequate power have to start building for the future and not be totally stymied by no growth advocates. **RESPONSE:** The PSAERP is just such an effort. The five largest electric utilities serving Puget Sound have cooperatively developed this plan. Once the Final EIS, and a Record of Decision have been prepared, construction will begin. The preferred alternative will meet peak electrical demands in Puget Sound through 2005 if load grows as predicted. Contingency measures in the plan can be activated if load grows faster than expected.
019-11 K.C. Golden Northwest Conservation Act Coalition	**COMMENT:** The Puget Sound electric reliability problem adds some immediacy to the regional resource situation, but it is fundamentally part and parcel of the same challenge. That challenge is to deliver on the promise of the Regional Act, a promise of efficient use of environmentally responsible energy resources. We have identified those resources. Now, it is up to all of us to acquire them. We urge you not to shrink from that challenge by acquiring "cheap" fossil resources or investing too heavily in "options" and "contingencies," when an adequate investment in preferred resources will do the job.
019-12 K.C. Golden Northwest Conservation Act Coalition	**COMMENT:** We are reaching diminishing returns on the least-cost planning process. We now must shift - actively and aggressively - into least-cost action. Our prospects for implementing these plans are entirely dependent on the extent to which Bonneville is prepared to lead the way. **RESPONSE:** The problem addressed in this EIS is fundamentally a problem of inadequate transmission capacity. There are existing generation resources east of the Cascades to meet Puget Sound's peak power needs for many years to come. It is not appropriate for a plan that addresses a problem of such narrow scope to be held accountable for regional energy resource planning. The EIS does not propose to invest heavily in options or contingencies. The cost of completing the preliminary design, planning, and siting studies and environmental process for the transmission line contingency is around $10 million or less than 5 percent of the project's cost.

Code	Comments/Responses
	2.0 Decision making - 2A. Recommendations Continued
SEPM-8 Shawn Cantrell Friends of the Earth	**COMMENT:** On behalf of Friends of the Earth, I would comment in favor of the preferred alternative as an appropriate means of addressing the problem. We would encourage fuel switching as an opportunity that is not in the preferred alternative. It is addressed in I think Alternative 3, but we think that it is an option that should be incorporated in the costs, but as a whole, we feel that the EIS has done an adequate evaluation of what the options are and feel that the conservation measures within the preferred alternative in particular are probably the strongest suit within the alternative. **RESPONSE:** We are encouraged by your comments in favor of the preferred alternative and the conservation measures we propose. Northwest utilities are divided about fuel switching. While market driven fuel switching is now occurring, BPA sponsorship of fuel switching is unlikely in the near future. Electric utilities will formulate policies about fuel switching in upcoming years. Friends of the Earth's support for fuel switching has been brought to the attention of managers in the five participating utilities.
SHPM-1 George Tyler none stated	**COMMENT:** Based on the statements that were given in here, it's my belief that Bonneville should proceed on preparing an Environmental Impact Statement for the corridor, (a), of the transmission lines like you mentioned up there -(Stevens Pass)- I believe that's a more feasible corridor — with possibly the two alternative legs that were shown; and get the Impact Statements out and possibly the engineering preliminary designs which we don't have to expend too much money until we get up to that point in 1996, I believe you said. **RESPONSE:** The Plan proposes that a site-specific EIS for a transmission line be initiated so that a line could be completed by 2000 if needed. Combustion turbines are another contingency measure. Utilities will monitor loads, progress on conservation and energy resource siting.
SHPM-3 Paul W. Locke none stated	**COMMENT:** I think we should be looking for ways to get power on this side of the mountains, because weather conditions in those mountains can change within seconds. What you'd have to do is to have conversion — nice warm weather coming in from the south and nice cold weather coming in from the north. You could close down; you could freeze those lines; they would be dropped; and we have nothing. I'd like to see that we develop power for this side. **RESPONSE:** BPA designs lines in the mountains to operate in the severe weather conditions that occur there. However, outages are unavoidable. Therefore, when we plan the transmission system we allow for certain outages of these lines during severe winter storms. We recognize the advantage of siting resources west of the mountains. However, we also realize that not all new resources can be constructed there. We have available resources east of the mountains today and if we want to use them fully, additional transmission reinforcement across the mountains is needed.

Code	Comments/Responses
	2.0 Decision making - 2B. Timing
BPM-25 Leonard E. Sanderson, Mayor City of Milton	**COMMENT:** Why do I have the perception that all of these things that are conservation and improvement of capacity and things, are just winding a little tighter? Everything except adding more capacity just seems to say that if anything happens, it's going to be worse, because you're more concentrated on things; you have less flexibility in the system because you've cranked it up to closer to the ultimate capacity of your resources. **RESPONSE:** All alternatives meet BPA's Reliability Criteria. The reliability evaluation factor, discussed in Section 4.8.7, considers the risk of putting all of our eggs in one basket. As shown in Table 4-7, we found little difference between the alternatives in terms of reliability. Individual measures are compared in Appendix C, Table 2.6-1, where there is somewhat greater variability. **For More Recommendations see:** **Category Number 5 - Alternatives** **2B. Decision Making - Timing**
017-1 Sherilyn Wells Bellingham League of Women Voters	**COMMENT:** It appears to be a characteristic of our planning process that we consistently use short-range time frames and resources. Though we acknowledge that this DEIS is to address a perceived immediate threat to peak demand capacity, it is nonetheless part of a larger picture dealing with how we will supply all energy needs far into our future. **RESPONSE:** The choice of a ten-year planning horizon is constrained in part by the availability of information. Load forecasters and resource planners typically use a 20-year period. Resources are identified by technology, e.g., commercial conservation or gas turbines. However, beyond a five to ten-year period, they are not tied down to specific sites. Without a location, transmission planning is difficult. Several broad locations such as west or east of the Cascades, might be considered. This might tell us how much more severe the problem is beyond our ten-year horizon. Assuming we extended the planning period, we then ask what impacts the additional information would have on our decision. All measures common to the four alternatives (accelerated conservation, high efficiency shower heads and Voltage Support 1) are cost-effective; have low environmental impacts; and are somewhat deliverable (Appendix C, Section 3.0). We would not change them. Voltage Support 2, the prime component of the preferred alternative, is compatible with both a new line and additional resources, or demand reduction in the Puget Sound area. The lead time required for site-specific environmental analysis and transmission line construction makes it unlikely that it could be completed before 2000. Therefore, even if this proved to be the only feasible solution beyond the ten-year period, it would be unwise to defer other measures and attempt to accelerate the line. The preferred alternative gives the system adequate capacity for several years beyond the

Code	Comments/Responses
	2.0 Decision making - 2B. Timing Continued
	decision period under medium load growth (Appendix C, Section 2.7). With contingency measures such as combustion turbines, this could be extended. We have adequate time to re-examine the system over the next ten years and respond to changes. Our analysis shows our preferred alternative would be the same with a longer planning horizon. Also, environmental analysis has a limited shelf-life, and may not support major actions more than several years after the Record of Decision. Broader growth management issues are being examined in Washington State under the Growth Management Act. BPA and Puget Sound area utilities are participating in this effort to consider interactions between growth and the need to provide utility services. This is an appropriate place to examine longer-term scenarios.
TPM-5 none stated	**COMMENT:** To go back to this question earlier about how all of this kind of came to pass in 1989, where you got together with the utilities and discovered you had a problem or something like that. Now, in California, isn't it the case that the California Energy Commission takes a much more active role in understanding what's going on within the state, vis-a-vis demand and supply...but it sounds like maybe the growth patterns were occurring in the 1980s and people sort of tended to put things off and you now are sort of doing a catch-up game here. This whole process could have gone on five years ago, it sounds like. **RESPONSE:** Several factors contributed to the rather sudden emergence of the peak capacity deficit in late 1988. The transmission system was planned on the assumption that there would be substantial thermal generation added to the system west of the Cascades. Major nuclear generation projects in the Puget Sound area were never completed. The last major cross-Cascade transmission line into the Puget Sound area was completed in 1977. As loads continued to grow at a moderate pace between 1977 and 1985, the capacity margins grew smaller and dependence on cross-Cascade transmission to serve winter peak load steadily increased. The surge of economic growth in the Puget Sound area in the last half of the 1980s was much stronger and lasted much longer than expected. These factors coupled with the obscurity of voltage instability led to the problem getting ahead of the utilities and the need to "catch-up." The phenomenon of voltage instability, which is what limits the capacity of the transmission system serving the Puget Sound, has only recently been recognized by the utility industry as a factor that needed to be considered in reliability studies. The analytical tools necessary to model the voltage stability of a large complex power system are just now becoming available. The technical studies by BPA and the Puget Sound utilities to better understand the Puget Sound problem have been watched closely by the utility industry. This pioneering work has been a major contribution to the development of analytical tools and planning methods to deal with this threat to reliability.

Code	Comments/Responses
	2.0 Decision making - 2B. Timing continued
EPM-7 Roy Metzger Everett Public Works Dept.	**COMMENT:** Let me offer a suggestion, it would be an institutional arrangement that might be utilized... an enactment either at the local government level or at the State level to say, "Unless you can guarantee" (electric power supply)...the local or state government will not issue a permit for a building... now, this is the way it is under Section 63 of Water Resources...if you do not have water, the Department of Health will not issue a permit. There's really no difference if you don't have electricity. And that's one way that you could reduce your load temporarily if it has any significant socio-economic consequences. **RESPONSE:** The Northwest has historically had abundant electric supplies and development permits have not been denied due to the lack of a guaranteed power supply. Another reason this has happened is because utilities are required to provide service upon request. We think the process you describe would be controversial. Public comments during EIS scoping were consistently critical of limiting or cutting back on electric service (curtailment). Because peak load demands occur infrequently, we believe denying building permits is unwarranted. This would be an appropriate issue to discuss under the Washington State Growth Management Act.
	2C. Decision Making - Who Will Do What?
EPM-5 Roy Metzger Everett Public Works Dept.	**COMMENT:** ...how will the implementation strategy be allocated among the participating utilities besides BPA, or how would that be arrived at? In other words, part of the strategies are dependent upon the utilities making a contribution. How is that going to be determined or allocated other than self-interest? ... Take combustion turbines, for example. Do you have preferred sites for those now? The thrust of my question or comment and your response is... (the) implementability of this. **RESPONSE:** Utilities will participate in individual measures of the Plan based on needs and benefits to their systems. Examples of successful cooperative ventures between utilities abound, such as the Centralia Steam Plant (PP&L, PSPL, WWP, PGE, SPUD, TPU, SCL), Northwest-Southwest AC Intertie (BPA, PP&L, PGE, with the potential for others under 3rd AC Participation). In the conservation arena, BPA served as an intermediary for conservation transfers to PSPL from Snohomish PUD, Lewis County PUD, and Mason County PUD #3, while the Washington PUD Association has recently formed Conservation and Renewable Energy Services (CARES). We believe the preferred alternative can be implemented. See Section 2.1.3 for a discussion of combustion turbine siting.

Code	Comments/Responses
	3.0 NEED FOR ACTION
	3A. Load Forecast
BPM-13 Don Rempe none stated	**COMMENT:** What has happened in the area to cause the load growth to drop 3 percent, to a compound rate of approximately 1.17 percent as shown on Table 1-1, on Page1-8? **RESPONSE:** The slower growth in the Puget Sound area was caused by three factors besides the national recession. First, Boeing has reached capacity and does not forecast increases in employment equal to increases that occurred in the 1980s. Second, the rapid population growth of the area relative to the nation led to an increasing cost structure in the area, slowing in-migration and construction. Third, the dollar has stopped declining as fast relative to foreign currencies, and this has slowed the export industries in the area. Also, load growth is expected to be slowed because of increased conservation and competition from natural gas. The Washington State Energy Code became effective in 1991. This will significantly reduce electric consumption in new residential housing. In addition, as the regional electric power surplus disappears, increased conservation activity is expected. Gas prices are forecast to remain competitive with electric prices. This will continue to induce fuel switching in existing buildings and decrease the electric market share in new buildings.
BPM-14 Don Rempe none stated	**COMMENT:** If the Region has experienced a load growth of 3 percent, why is the high growth rate, as extrapolated from Figure 1-2 on Page 1-4 only approximately 2.3 percent, compound growth rate? My main concern is that politically correct load forecasts will result in a preventable blackout during a cold winter, and resulting loss of life. **RESPONSE:** Recently, the region experienced a strong load growth expansion. Long-term forecast growth rates, which include both load growth expansion and contraction, are expected to be lower than the recent past. The near-term forecast predicted the current slowdown in the economy. The PSAERP forecast has been compared to current weather adjusted actual data available. On a temperature adjusted basis, the actual average energy usage for the Puget Sound area for the twelve months ending September 1991 was 6006 aMW. This is 1.3 percent below the energy forecast, 6085 aMW, used in the PSAERP for calendar year 1991. The most recent energy forecasts are approximately 1.4 percent less than the PSAERP forecast in 1992 and 2.2 percent less in 2010. An updated peak forecast would be about 4.2 percent less than the peak forecast in 1992. This difference would decline to approximately 1.4 percent in 2010.

Code	Comments/Responses
	3.0 Need for Action - 3A. Load Forecast continued The PSAERP forecast is tracking actual data well. It is less than two percent lower than current actual data. A full update to the end-use peak forecast would not change the current PSAERP forecast significantly. The underlying assumptions in the near term have been verified by current experience. No significant change to the assumptions affecting long-term load growth would be made. Therefore, no update to the PSAERP forecast is necessary. **3B. Reliability** **COMMENT:**
BPM-20/21 Don Rempe none stated	My main concern is that politically correct load forecasts will result in preventable blackout during a cold winter, and resulting loss of life. Prior to the eighties, the attitude within BPA was that because the results of a BPA outage would be so bad for the region, BPA's reliability had to be better than any other area utility's reliability criteria. Unfortunately, that philosophy seems to have been abandoned. **RESPONSE:** The BPA system is the backbone of the regional transmission grid, and its performance has widespread, regional impacts. For this reason, BPA reliability criteria set very high performance standards for the bulk power system. These criteria, first put in place in 1968, have been refined over the years but have not reduced the required level of reliability for the bulk power system. BPA and Puget Sound utilities are firmly committed to reliably serving the electric power needs of the Puget Sound area, and the actions proposed in this EIS reflect that commitment. **3C. Puget Sound Resources** **COMMENT:**
024-7 G.H. Bowers G.H. Bowers Engineering	The EIS's removal of "most generating resources from the list of solutions for this problem" (p. 1-7) misses the essential point that generating resources must be built if loads grow. The only question is as to where these resources will be built. The EIS's rationale that generation costs "10 times more" than transmission is irrelevant. The cost of building resources west of the Cascades rather than east of the Cascades is the issue at hand, and it is not ten times more costly to build resources in one area versus another. In fact, considering transmission losses and the cost of building the line, the cost of building west of the Cascades would likely be lower than that of building in the east. When all costs are considered (including the capital cost and operating costs of power plants located east of the Cascades), acquiring resources west of the Cascades is indeed a solution to this problem.
SEPM-5 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** The problem with not doing a full analysis of all the costs is that it creates an unequal playing field when you start to consider future (energy) alternatives, because the cost for this line should be considered as a cost of getting resources from eastern Washington. It shouldn't be a sub-cost which it will be as soon as BPA builds it. It won't be part of the analysis. So, if we want to compare conservation in western Washington versus a coal plant in Yakima, the correct way to do it is to include the cost of building the line to Yakima to get that coal plant.

Code	Comments/Responses
024-4 G.H. Bowers G.H. Bowers Engineering	**3.0 Need for Action - 3C. Puget Sound Resources Continued** **COMMENT:** DOE's construction of transmission to east of the Cascades to facilitate unanalyzed large thermal plant construction, inappropriately skews economic analyses so as to favor the construction of the large central plant. **RESPONSE:** The DEIS recognizes in Sections 1.4.4 and 2.6.4 that new energy resources will be acquired to meet growing Puget Sound energy needs. Locating all new energy resources needed to meet this growth in the Puget Sound area will not meet the projected winter peak capacity needs of the area. Energy resource measures were implicitly included in all alternatives through the assumption that a minimum of 400 MW of new energy resources would be sited in the Puget Sound area. Arbitrarily limiting resource location to the Puget Sound area as a solution to the transmission problem is not practical or desirable. Resource siting decisions cannot be made solely on the basis of transmission capacity considerations. There are many other economic costs and environmental factors that must be considered and decisions need to be consistent with the Northwest Power Planning Council's Power Plan and each utility's institutional and regulatory environment. The increasing use of competitive bidding to acquire resources from independent power producers is another factor that diminishes utility control over siting decisions. The proper approach to integrating resource and transmission planning is to include the economic costs and environmental factors of transmission in the evaluation of resource options. As decisions are made on specific resource projects, transmission plans can be adjusted if necessary. BPA is using this approach in its current competitive acquisition test program where proposal evaluation includes location credits and debits for the system benefits of locating resources near load. The following excerpt from the Draft Generation Resource Supply Document illustrates how transmission costs are incorporated in the ranking of resource alternatives for BPA's Draft 1992 Resource Program: > Transmission Adjustment - The capital cost of resources is adjusted to reflect their location. These adjustments are based on the distance of the assumed site from the west side load centers. Where specific sites are identified, an adjustment is made that is based on the distance from the site to the Puget Sound area. Where specific sites are not identified, an adjustment is made based on which zone the resource is assumed to be located. For generic resources located west of the Cascades, no adjustment is made. For resources located between the Cascades and the eastern edge of the grid an increment of 128 $/kW is added to the capital cost. For resources located east of the grid a 438 $/kW adder is used. These zonal factors are generic and are based on Bonneville estimates for construction of new transmission lines. These costs range from 4 to 15 percent of the total capital cost of generation alternatives depending on the generation technology and its distance from the Puget Sound area.

Code	Comments/Responses
	3.0 Need for Action - 3C. Puget Sound Resources Continued
SEPM-3 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** As Alan Courts pointed out, there's 1200 MW of energy this region must obtain which is not part of the analysis. And if it is built in the West, it takes care of the problem — Western Washington. In other words, if we meet our load growth, we've solved the capacity problem. And I don't believe you can separate meeting energy and meeting capacity when it will happen automatically if you meet energy. **RESPONSE:** See the previous response for a discussion of how energy resources built in Puget Sound were considered in the PSAERP. The 1200 MW you refer to is not the energy deficit of Puget Sound but the peak or capacity deficit during extreme winter peak loads. We forecast a deficit of 1600 MW of peaking capacity in Puget Sound in 2003 if the load forecast proves correct. Assuming that 400 MW of energy resources are built in Puget Sound within this period, a 1200 MW net deficit in peak capacity remains.
024-1 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** The Puget Sound Area's need for capacity and the area's need for energy can not be separately analyzed. If the area's energy needs are met by resources located north, south or west of the Cascades, the capacity needs analyzed in the EIS will also be met. Meeting capacity needs, however, does not assure that energy needs are met. **RESPONSE:** Meeting energy needs of the Puget Sound area with local resources will not meet capacity needs of the area. The energy needs of the Puget Sound area are projected to increase 1000 MW between 1993 and 2003 under the medium load growth scenario. During the same period, capacity needs to meet extreme cold winter peak loads are expected to grow by 1700 MW. By 2003, average energy needs will reach 7400 aMW while capacity needs to meet winter peaks will reach 14,000 MW. Restricting all future Puget Sound energy resources to sites in the Puget Sound area would still not meet the area's capacity needs. Some generating resources have a higher capacity than their average annual energy rating. For example, a nuclear plant may be rated 1000 MW generating capacity but may be capable of providing 650 MW average energy because nuclear plants are typically available only 65 percent of the year. Hydro generation usually has substantially higher peaking capacity than average energy output because of wide fluctuations in water availability. One might argue that a megawatt of new energy capability means more than a megawatt of capacity. However, most new generation resources proposed for the Puget Sound area are either natural gas-fired cogeneration or combined cycle combustion turbines designed to run almost continuously with little maintenance down time. So, their energy rating and peak capacity are nearly equal. Moreover, unless these plants have on-site backup fuel, their availability during severe cold weather is not guaranteed because of potential natural gas supply problems. New generation located west of the Cascades but north or south of the Puget Sound area is not as effective in meeting capacity needs as generation in the Puget Sound area. To be most effective, the generation should be in Pierce, King or Snohomish counties. Studies examining how completing the Satsop nuclear plant would contribute to solving the transmission reliability problem found only 60 percent of the plant's output contributed to meeting Puget Sound capacity needs. Because of its location at the southern edge of the Puget Sound area, 40 percent of its output would flow toward Portland.

Code	Comments/Responses
24-2 G.H. Bowers G.H. Bowers Engineering	**3.0 Need for Action - 3C. Puget Sound Resources Continued** **COMMENT:** The EIS's assumption that at least 400 MW of new energy resources will be developed in the Puget Sound basin by 2003 (p. 1-7) fails to address (or even inform the reviewer) that another 1200 MW of energy resources must also be obtained. **RESPONSE:** Table 1-1 has been added to Chapter 1 to show the relationship between Puget Sound energy needs and peak winter capacity requirements. Under the medium load growth forecast, Puget Sound energy needs will grow by 1000 MW between 1993 and 2003. Thus the amount of additional resources to be acquired over and above the 400 MW assumed sited in the Puget Sound area is 600 MW rather than 1200 MW. BPA's Competitive Acquisition Test Program seeks to acquire 300 MW of new energy resources by 1997. Project sponsors submitted 102 conservation and generation proposals to BPA's request for proposals. On December 10, 1991, BPA announced that 17 conservation and 10 generation projects totaling 1139 MW were selected for the negotiation phase. Four of the 10 generation projects submitted are proposed combustion turbine/cogeneration projects in the Puget Sound area (440 MW at Tacoma, 210 MW at Chehalis, 142 MW at Satsop, total 792 MW). The other 6 (289 MW) are outside the area. The environmental review and contract negotiations that must precede a final decision will take more than a year to complete. It is possible that up to 240 MW of new generation could be sited in the Puget Sound area by 1997. Puget Sound Power and Light Company is working with industry in the Puget Sound area to develop over 650 MW of cogeneration capacity in Skagit and Whatcom counties between now and late 1994. The system studies that defined system capability (Fig.1-4 in the DEIS) included 300 MW that Puget has committed to contractually. Puget recently firmed commitments for the remaining 350 MW. As noted in the response to your comment 024-1, generation located north of Snohomish County is less effective for solving the voltage collapse problem. If proposed BPA and Puget generation projects are successfully completed, the 400 MW minimum of new energy resources assumed built in the area could be exceeded by 200 MW. 200 MW is equivalent to about one year of peak load growth. However, there is also a possibility that some existing west-side generation resources could be lost in the future. One example is the Trojan nuclear power plant in the Portland area. Continuing voter initiatives, steam generator problems and escalating operating costs could cause a permanent shutdown. The loss of Trojan's 1130 MW peak capacity would reduce Puget Sound's ability to meet peak loads by 400-500 MW. As stated in Section 1.4.4 of the DEIS, the 400 MW of "expected resources" is a conservative estimate intentionally established at the low end of the probable range. Considering the uncertain regional energy future, BPA believes this is a prudent assumption.

Code	Comments/Responses
	3.0 Need for Action - 3C. Puget Sound Resources Continued
24-3 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** Double the 400 MW of new regional resources assumed in the EIS has already been announced (BPA 12/10/91). This highlights the potential waste caused by building powerlines to eastern Washington without knowing if resources will be located there or elsewhere. This mindless construction is in no way justified since, if it is decided to build additional large generating plants east of the Cascade, new transmission capability, if needed, can be added far faster than the new powerplants can be built. **RESPONSE:** See response to your comment 24-2 which discusses BPA's December 10, 1991 announcement. The ability of additional cross-Cascade transmission capacity to meet Puget Sound peak power needs does not depend on constructing new power plants in eastern Washington. Exhibit 6 of the 1991 Pacific Northwest Loads and Resources Study published by BPA estimates the federal system will have a January firm capacity surplus of over 4000 MW by 2003, most from existing generation east of the Cascades. This assumes federal peak loads grow at a medium rate and stream flows are at historical low levels. Restrictions in hydro system operations because of the Endangered Species Act are not expected to substantially reduce the January peaking capacity of the system. During winter months there are substantial amounts of generation reserve in the Southwest accessible over the AC and DC Intertie lines to California. Table 26 of the Western Systems Coordinating Council (WSCC) Ten-Year Coordinated Plan Summary 1991-2000 estimates the California - Southern Nevada power area will have 17,800 MW of reserve winter peak capability in January 2001. Over 6000 MW will be accessible over the intertie lines to California. Most of the power imported from the Southwest to serve Puget Sound loads would flow on the cross-Cascade lines. However, in any event, these are the exact issues that will be discussed in detail in the future cross-Cascade transmission line EIS.
24-6 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** Table 1-2 is inaccurate. Regional energy capabilities are far less than the values BPA lists in this table. **RESPONSE:** Table 1-2, which is now Table 1-3 in the FEIS, was changed and now refers to "Capacity Resources" rather than "Energy Resources."
24-11 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** In contrast to DOE's unsupported allegation that exports to California will be decreased, extreme power demands in the Pacific Northwest and interruptible exports do not generally coincide. 50 year-analyses alone show that in many winters no optional export occurs. Nor are there resources available east of the Cascades to provide western Washington's firm energy needs. DOE's failure to address the issue and acknowledge impacts is clear. **RESPONSE:** Decisions on regional energy supply are outside the scope of this EIS. Meeting infrequent, short duration peak capacity demand of the Puget Sound region with Northwest generating resources alone will not impact California's environment.

Code	Comments/Responses
	3.0 Need for Action - 3C. Puget Sound Resources Continued
24-13 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** The EIS states that where the region builds future resources "is speculative, and estimating the impacts from this speculation is not discussed in this EIS" (p. 4-19). However, when the EIS chooses to "speculate" about CTs in western Washington as an alternative to a powerline, it then includes the impacts from the alternative. The EIS omits impacts that reflect badly on the preferred alternative. **RESPONSE:** The statement from Section 4.6 pertained to the no action alternative and was intended to address how utilities might behave individually in the absence of a coordinated plan for dealing with the commonly shared voltage stability problem, not the lack of a "coordinated plan for resource acquisition." The Northwest Power Planning Council's Power Plan is the regional coordinating plan for energy resource acquisition. This section was changed to correct the inappropriate reference to resource planning. The discussion of indirect impacts of the no action alternative in Section 4.6.1 does discuss the potential impacts of more local generation in the Puget Sound area. The discussion of the preferred alternative refers to the impacts of CTs under contingency measure impacts. Future decisions on CTs, as decisions about a transmission line, will require separate environmental evaluations.
	3D. Transmission Capabilities
BPM-24 unknown	**COMMENT:** Is this really an ongoing process where the transmission line probably is going to be looked at no matter what alternative you select, because it will have to come sometime? **RESPONSE:** The Plan proposes a site-specific EIS for a transmission line be started so a line could be completed by 2000 if needed. Combustion turbines are another contingency measure. Utilities will constantly monitor loads, conservation and resources. A decision will be needed by 1996 or 1997 to either complete or delay a line. No decision has been made.
	4.0 STUDY METHODS AND ASSUMPTIONS
018-4 Malcolm J. Macdonald Seattle City Light	**COMMENT:** Seattle agrees with you in your general approach of developing alternatives that combine several different strategies, thus avoiding the risks of depending too heavily on any single solution. We also approve of your approach of developing contingencies for each alternative, and of planning intermittent checks on the forecasts in order to react to changing situations in the region. We believe this is a reasonable plan for dealing with the problem at hand. **RESPONSE:** Comment noted.

Code	Comments/Responses
	4.0 Study Methods and Assumptions Continued
EPM-8 Marvin Klinger	**COMMENT:** I am somewhat disappointed in the fact that what's been developed here is a 10-year plan, when the group that was pulled together had the capability of expanding its horizons... beyond the 10-year timeframe, approximately; and look at least 20 years out and perhaps as long as 50 years... I would urge you to consider whether or not this 10-year plan ought to be expanded to a much longer-range plan with the elements put together which are probably combinations of alternatives which you've already identified. **RESPONSE:** The choice of a ten-year planning horizon is constrained in part by the availability of information. Load forecasters and resource planners typically use a 20-year period. Resources are identified by technology, e.g., commercial conservation or gas turbines. However, beyond a five to ten-year period, they are not tied down to specific sites. Without a location, transmission planning is difficult. Several broad locations such as west or east of the Cascades, might be considered. This might tell us how much more severe the problem is beyond our ten-year horizon. Assuming we extended the planning period, we then ask what impacts the additional information would have on our decision. All measures common to the four alternatives (accelerated conservation, high efficiency shower heads and Voltage Support 1) are cost-effective; have low environmental impacts; and are somewhat deliverable (Appendix C, Section 3.0). We would not change them. Voltage Support 2, the prime component of the preferred alternative, is compatible with both a new line and additional resources, or demand reduction in the Puget Sound area. The lead time required for site-specific environmental analysis and transmission line construction makes it unlikely that it could be completed before 2000. Therefore, even if this proved to be the only feasible solution beyond the ten-year period, it would be unwise to defer other measures and attempt to accelerate the line. The preferred alternative gives the system adequate capacity for several years beyond the decision period under medium load growth (Appendix C, Section 2.7). With contingency measures such as combustion turbines, this could be extended. We have adequate time to reexamine the system over the next ten years and respond to changes. Our analysis shows our preferred alternative would be the same with a longer planning horizon. Also, environmental analysis has a limited shelf-life, and may not support major actions more than several years after the Record of Decision. Broader growth management issues are being examined in Washington State under the Growth Management Act. BPA and Puget Sound area utilities are participating in this effort to consider interactions between growth and the need to provide utility services. This is an appropriate place to examine longer-term scenarios.
BPM-9 unknown	**COMMENT:** I don't think your timeframe is long enough. You're looking at a real short time frame up there, in discussing growth in the area. I think you should be looking a lot further down the line. All of these things are going to have to happen eventually. Don't just look at it

Code	Comments/Responses
	4.0 Study Methods and Assumptions Continued
	from a ten-year period here and then think you're going to walk away from it. That's not going to happen. All these things are going to happen and come into play because the area's just going to continue to grow. **RESPONSE:** See previous response.
BPM-15 Don Rempe not stated	**COMMENT:** There are three and a half pages devoted to conservation -- much more than any other item. Yet, in the year 2003, contributes only 208 megawatts to a system capacity of 15,608 megawatts. That's Table 2-1. This is only 1.3 percent of the system or capacity. I believe that a more balanced discussion of meaningful measures to solve the problem is required. **RESPONSE:** Brevity and readability were goals in writing this EIS. Space was allocated not on the basis on how great a contribution a measure would make. The amount of space devoted to individual EIS topics was kept to the minimum practical. The appendices were prepared so that long and detailed discussions could be omitted from the main document. Maps, diagrams and tables were used to reduce long narrative explanations. The wide variety of conservation techniques under consideration required several pages.
	5.0 ALTERNATIVES
	5A. Preferred Alternative (Alternative Strategy 2)
004-1 James J. Coover none stated	**COMMENT:** I am in favor of Alternative Strategy 2.
005-1 Gail M. Jensen none stated	**COMMENT:** I support Alternate Strategy 2 as an alternative for providing the additional power needed in this greater Washington area. ... I guess that it is still necessary to add power generation and transmission and I feel as stated above that Alt... 2 is the best plan because of its low cost and environmental impact.
018-5 Malcolm J. Macdonald Seattle City Light	**COMMENT:** Seattle supports the Preferred Alternative recommended in the EIS. This alternative is the most cost-effective and has very low environmental impacts. It uses several of the best elements of the other alternatives by combining accelerated conservation, voltage support as well as pilot programs for direct load control (such as Seattle's Highline Project). If these measures prove inadequate, a cross-Cascade transmission line and combustion turbines in Western Washington are included as contingencies.
022-1 Charles C. Raines None Stated	**COMMENT:** For the ten year planning period, the preferred alternative attempts to address the problem of voltage stability in the Puget Sound basin. It provides a workable framework for making a decision. The most readily available construction options are the voltage support proposals #1 and #2. With relatively little impact they increase voltage stability and appear reasonable.

Code	Comments/Responses
	5.0 Alternatives - 5A. Preferred Alternative (Alternative Strategy 2) Continued
	RESPONSE: Comments Noted.
023-6 David F. Dietzman Washington Department of Natural Resources	**COMMENT:** Alternative No. 2 appears that it would have the least impact on Department of Natural Resources managed land. **RESPONSE:** The preferred alternative, Strategy 2, requires a new switching station centered on an existing transmission line right-of-way near Ellensburg, Washington. The preferred site (3) is on private land. A parcel of Washington State land lies 500-feet west of the proposed site, but will not be impacted. A new or upgraded cross-Cascades transmission line is a contingency measure that would be used if electrical conditions change dramatically during the ten-year planning period. BPA plans to begin a transmission line EIS in the winter of 1993. BPA will coordinate its activities with the State of Washington through the Energy Facility Site Evaluation Council.
006-1 W.C. Riley none stated	**COMMENT:** Seems to me as if Alternative Strategies #1 Transmission Line, and also #2 Voltage Support Options, are at the most "stop gap" measures for Western Washington. **RESPONSE:** The preferred strategy both in the Draft and Final EIS recommends the Alternative Strategy 2 (Voltage Support Option 2). Alternative Strategy 1 relies on a new cross-Cascades transmission line as its primary measure. It has both higher costs and potentially higher environmental impacts, therefore Strategy 2 is preferred. The line is a contingency measure that would be pursued should either electric demands increase more rapidly than expected or energy resource availability be dramatically reduced.
011-1 John H. Wolch none stated	**COMMENT:** Alternative Strategy 2 is preferable to doing nothing. However, my personal choice would be to do a combination of Alternative Strategy 1 and Alternative Strategy 2. I also advocate building firm generating facilities in western Washington. **RESPONSE:** Utilities are closely watched with respect to power rates and fiscal responsibility. As a result, we defer expenditures whenever possible and take actions that we must. For the 1993-2003 period, Alternative Strategy 2 solves the problem, provided nothing unexpected happens. We plan to begin environmental studies and other activities so if conditions change a transmission line can be built quickly. There are an increasing number of generating proposals in Puget Sound. Puget Sound Power & Light is proposing several new cogeneration plants. Besides energy benefits, these plants would reduce dependency on the cross-Cascades transmission system during winter peak periods.
012-1 Donald Axtell none stated	**COMMENT:** I agree that of the options offered, your choice of #2 makes the most cost-effective sense. It doesn't do anything to resolve long-term solutions, but rather gives us some breathing room for 10-20 years. OK, since long-term thought is not our strong suit, run with it.

Code	Comments/Responses
	5.0 Alternatives - 5A. Preferred Alternative (Alternative Strategy 2) Continued
	RESPONSE: Comment noted. For response on planning horizon see EPM-8.
019-2 K.C. Golden NW Conservation Act Coalition	**COMMENT:** NCAC supports accelerated conservation as a judicious partial solution to the looming transmission capacity constraint. We also believe that the voltage support investments contemplated in the preferred alternative are probably a sensible approach. But these measures appear to be offered as a "medium-term" solution, while the implicit long-term default solution is adding transmission capacity and combustion turbines.
019-3 K.C. Golden NW Conservation Act Coalition	**COMMENT** The preferred alternative calls for preliminary planning for a new cross-Cascade transmission line to begin soon--almost as soon as it would have occurred had you chosen transmission as the preferred alternative. Yet the analysis explicitly rejects that option (Alternative 1) in favor of more cost-effective and environmentally benign solutions. If and when demand growth outpaces the solutions embodied in the preferred alternative, we will have a range of alternatives to choose from, just as we do now. ... We believe superior alternatives to a new cross-Cascade line and fossil fuel-fired generation will probably be available then, just as they are now. **RESPONSE:** The Plan proposes that a site-specific EIS for a transmission line be started so a line could be built by 2000 if needed. Combustion turbines are another contingency measure. Utilities will monitor loads, conservation and resources.
019-8 K.C. Golden NW Conservation Act Coalition	**COMMENT:** On numerous occasions, we asked whether the analysts were operating under the implicit assumption that transmission was ultimately the most desirable, or only, solution. We were assured that this was not the case. Yet, when the analysis indicated that transmission additions were in fact not the most desirable alternative, an alternative was chosen and the process of "optioning" transmission is apparently to begin anyway. Choosing transmission and combustion turbines as "contingencies" looks to us like an attempt to test the waters for options that proved too costly and controversial to be chosen outright. **RESPONSE:** The transmission line and combustion turbine contingency elements will be constructed only if the proposed conservation and voltage support actions are not sufficient to preserve reliability of electrical supply to the Puget Sound area.
019-9 K.C. Golden NW Conservation Act Coalition	**COMMENT:** NCAC has no desire to see the Puget Sound sub-region experience transmission failures. We believe that prudent planning to provide an adequate margin of safety for the transmission system is entirely appropriate. But we also believe that superior alternatives to increased transmission and combustion turbines exist in quantities significantly greater than your analysis suggests. **RESPONSE:** Comment noted.

Code	Comments/Responses
	5A. Preferred Alternative - continued
019-10 K.C. Golden NW Conservation Act Coalition	**COMMENT:** We suspect that you would agree that the technical potential for cost-effective conservation, renewable resources, high-efficiency cogeneration, and efficient direct application of gas and renewables greatly exceeds the amount of these resources that appears in your analysis. The question is not whether these resources exist, but whether we will successfully mobilize the region's resources to acquire them. Our primary concern is that, instead of embarking on a focused and determined effort to acquire these superior alternatives, Bonneville appears to be squandering its resources on hedging its bets and acquiring gas-fired generation. **RESPONSE:** Comment Noted.
021-1 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** The preferred alternative attempts to address the problem and provides a workable framework for making a decision. However, we cannot support it as currently configured, because it relies on two contingencies—construction of a new transmission corridor and combustion turbines—rather than additional conservation. **RESPONSE:** The transmission line and combustion turbine contingency elements will be constructed only if the proposed conservation and voltage support actions are not sufficient to preserve reliability of electrical supply to the Puget Sound and only after satisfaction of all NEPA requirements.
021-2 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** The pilot program for these additional conservation measures is not an adequate effort. Those programs should be pursued aggressively before additional generation or new transmission construction projects are started. We support the following to be included in a final preferred alternative: •Top priority should be conservation. Before generation options are implemented, BPA should explore those options not fully considered in this DEIS (section 2.7.1, Conservation and Load Management Measures). Enhanced conservation will have many other benefits for the region's environment, not the least of which will be to obviate the need for additional generating plants as well as transmission facilities. BPA has the opportunity to work with local utilities to further the mutual goals of maximizing conservation. •Second Priority should be upgrading existing lines to 500 or 750kV. •Only if conservation and voltage support options are not sufficient should BPA consider adding additional lines. Additional lines should be placed only in existing corridors, with Stevens Pass as lowest priority. **RESPONSE:** The preferred option proposes to accelerate conservation programs in the Puget Sound area to achieve an additional 200 MW of peak load reduction by 2003. This represents a 60 percent increase over existing conservation plans. The utilities are committed to aggressively pursue conservation. However, if it is not enough we need to be prepared to move ahead with the contingency options. We desire to work with the Sierra Club in

Code	Comments/Responses
	5A. Preferred Alternative - continued
	the forthcoming NEPA process, in selecting an environmentally acceptable location and design for the contingency transmission line.
027-4 D. Dean Bibles U.S. Department of the Interior Bureau of Land Management	**COMMENT:** We realize there are many possible solutions to the Puget Sound problem and additional corridors are only a small part. It does appear appropriate, however, to continue the analysis and secure rights-of-way to allow both additional capacity and greater reliability to the entire transmission grid. **RESPONSE:** BPA wants the Bureau of Land Management to participate in an analysis of environmentally acceptable locations and designs for the contingency transmission line. As soon as planning for the contingency transmission line EIS begins, we will initiate discussions with BLM to determine how we might cooperate in this undertaking.
031-2 Joe Whalen none stated	**COMMENT:** ... your choice for Preferred Alternative seems logical and required, even though us illogical ratepayers shudder at the cost. **RESPONSE:** Comment noted.
	5B. Alternative Strategy 1 (Transmission Line)
031-3, 4 Joe Whalen none stated	**COMMENT:** Sometime in the future we might need this extra transmission from west to east, if only due to sabotage elsewhere, misfortune, or Chicago sales. Diversity of location in generating and transmission is essential. Safety is in quantity and dispersal. Clumsy large generating facilities and overcrowded transmission corridors cannot be adequately maintained, financed, or guarded. **RESPONSE:** Additional transmission capacity across the Cascades would have little value for sending power to the east. The existing transmission capacity is more than adequate to support power sales from Puget Sound eastward. You are correct that additional transmission capacity would reduce line loss vulnerability, but the vulnerability is during heavy power flows from east to west across the Cascades. You are correct that diversity increases security and reliability. Evaluation of corridor options for new transmission lines must consider this factor.
004-3 James J. Coover none stated	**COMMENT:** I am sure that a new transmission line across the Cascades will be necessary soon.
006-1 W.G. Riley none stated	**COMMENT:** Seems to me as if Alternative Strategies — #1 Transmission Line, and also #2 Voltage Support Options, are at the most "stop gap" measures for Western Washington.
010-1 Harry L. Brunsden none stated	**COMMENT:** Alternative One, Cross Cascade Transmission Line should be followed. The cost may be a bit more, but the benefits are there and we are in need of a new cross-Cascade transmission line, so why procrastinate?

Code	Comments/Responses
	5B. Strategy 1 (transmission line) - continued
SHPM-1 George Tyler none stated	**COMMENT:** Based on the statements that were given in here, it's my belief that Bonneville should proceed on preparing an Environmental Impact Statement for the corridor, (a), of the transmission lines like you mentioned up there -(Stevens Pass)- I believe that's a more feasible corridor — with possibly the two alternative legs that were shown; and get the Impact Statements out and possibly the engineering preliminary designs which we don't have to expend too much money until we get up to that point in 1996, I believe you said. **RESPONSE:** The preferred strategy both in the Draft and Final EIS is Alternative Strategy 2 (Voltage Support Option 2). Alternative Strategy 1, which relies on a new cross-Cascades transmission line, had both higher costs and potentially higher environmental impacts than Strategy 2. Provided nothing unexpected happens, both the costs and impacts are deferred by the proposed plan. We are planning to begin environmental studies on the transmission line contingency, so if conditions change, the lead-time for building a new cross-Cascades transmission line will be less. However, the transmission line contingency will be used only if the proposed conservation and voltage support actions are insufficient to preserve reliability of electrical supply to the Puget Sound area.
SHPM-5 Paul W. Locke none stated	**COMMENT:** I'm not convinced that building another powerline across the mountains is going to solve our problem on this side. Maybe I'm just too skeptical or something, but I don't see it solving our problem. **RESPONSE:** Comment noted.
	5C. Alternative Strategy 2 (See Preferred Alternative)
	5D. Alternative Strategy 3 (Load Management &Fuel Switching)
004-2 James J Coover none stated	**COMMENT:** I do not believe that people will respond to the load management measures in sufficient numbers to make Strategy 3 effective. **RESPONSE:** Estimates on the rate that utilities can persuade consumers to implement load management measures were based on experiences from utilities in other parts of the country that have successfully implemented similar programs. Some utilities have enjoyed widespread adoption of their programs and have reduced peak loads significantly. The estimates provided here are consistent with the experiences of other utilities.
014-1 Roderick Malcolm Muckleshoot Indian Tribe Fisheries Department	**COMMENT:** The Muckleshoot Indian Tribal Fisheries Department would favor modifying Alternative Strategy 3 Demand Reduction. We would request that the option be modified so that the contingent additional transmission line and voltage support measures are eliminated.

Code	Comments/Responses
	5D. Strategy 3 (Load Management/Fuel Switching) - continued **RESPONSE:** Alternative 3, Demand Reduction, includes load management, time-of-use rates, fuel switching, conservation and Voltage Support Option 1. Voltage Support Option 2 and load curtailment are included as contingency measures, but this alternative does not include a transmission line contingency element. Removing Voltage Support Option 1 would remove 600 MW of capacity rendering the alternative incapable of meeting peak load needs beyond 1999. Combustion turbines could be substituted for Voltage Support Option 2 as the contingency measure, but at a significantly higher cost. For these reasons we do not believe the changes you suggest will improve the viability of Alternative 3, nor will they change the preference for Alternative 2. **5E. Alternative Strategy 4 (Peaking Combustion Turbines)** **COMMENT:**
SHPM-3 Paul W. Locke none stated	I think we should be looking for ways to get power on this side of the mountains, because weather conditions in those mountains can change within seconds. What you'd have to do is to have conversion — nice warm weather coming in from the south and nice cold weather coming in from the north. You could close down; you could freeze those lines; they would be dropped; and we have nothing. I'd like to see that we develop power for this side. **RESPONSE:** BPA designs lines in the mountains to operate in the severe weather conditions that occur there. However, outages are unavoidable. Therefore, when we plan the transmission system we allow for certain outages of these lines during severe winter storms. We recognize the advantage of siting resources west of the mountains. However, we also realize that not all new resources can be constructed there. We have available resources east of the mountains today and if we want to use them fully, additional transmission reinforcement across the mountains is needed. **5F. No Action Alternative** **COMMENT:**
024-14 G.H. Bowers G.H. Bowers Engineering	Impacts in the no-action alternative are overstated in that load shedding schemes, new resources, and line support are now in place or under development. **RESPONSE:** The undervoltage load shedding scheme described in Section 2.6.2 was recently installed by the Puget Sound utilities as an emergency response to deal with the existing 1000 MW capacity deficit shown in Fig. 1-4. As stated, it is uncertain whether this will successfully arrest a voltage collapse. BPA's Reliability Criteria do not permit load shedding for the contingencies and conditions addressed by the DEIS. The utilities and the public were nearly unanimously opposed to load curtailment, either voluntary or involuntary, as part of a long-term solution to the transmission capacity problem. The primary purpose of load curtailment is to provide enough time after voltage collapse occurs to start idle local generation, primarily combustion turbines, so that these plants are not operated uneconomically in anticipation of a problem that may not occur. The appropriate role for load curtailment is as a short-term remedy until longer-term measures are developed.

Code	Comments/Responses
	5E. Strategy 4 (Peaking Combustion Turbines) - continued Voltage support and local generation projects being developed were included to determine the deficit (see Fig. 1-4). These actions will just bring the system into balance by fall 1993. This long-range plan will begin to take effect after 1993. New local generation proposals are addressed in Section 2.6.5. **6.0 ALTERNATIVE MEASURES** **6A Conservation**
003-1 G.V. Christoffers none stated	**COMMENT:** Short Term: Ration consumption of electricity, at least to residential customers. Allowed use should be based on number of persons, use of electricity for heating and cooking, and special needs. Apartment dwellers should need less than those in detached units. I applaud your encouragement of conservation. **RESPONSE:** The definition we use for conservation is to make current uses of electricity more efficient, not reduce or restrict its use. The term curtailment is used to describe actions that restrict or reduce electricity use. Not many commenters favor placing restrictions on electricity use (rationing). The proposed plan recommends curtailment as a short-term contingency measure that could be used while long-term solutions are put in place. The objective of this project is to develop a plan to provide reliable electric service to all customers on the Puget Sound area without restricting their electricity use.
005-2 Gail M. Jensen none stated	**COMMENT:** I am saying that conservation is an important way of life that should always be advertised, encouraged, and used. I believe that fuel switching is important since natural gas is an available natural resource and the system for its harvesting and use is in place. **RESPONSE:** Many commenters share your views on conservation. Congress passed the Pacific Northwest Electric Power Planning and Conservation Act in 1980. This law establishes conservation as the preferred resource in the Pacific Northwest. Electric utility industry policies vary about fuel switching. The contribution of fuel switching to reduce electric demands may be significant. Market factors are now causing many consumers to switch to natural gas for space and water heating.
012-2 Donald Axtell none stated	**COMMENT:** Conservation is a good thing, and pays. But your emphasis is on private homeowners and our very limited "heavy" industry. But it does not even address the bulk - the commercial users whose signs and lights make our skyline spectacular, but waste thousands of kilowatts lighting unoccupied buildings. Conservation should be even-handed.

Code	Comments/Responses
	6.0 Alternate Measures - 6A. Conservation - continued
	RESPONSE: The utilities in the Puget Sound area are pursuing conservation efforts for commercial buildings with equal enthusiasm as conservation for residential and industrial users. However, conservation or curtailment of the nighttime lighting that illuminates the Seattle skyline would not lessen the peaking problem because peak loads that place stress on the transmission system occur in the daytime.
016-2 Alan Souders none stated	**COMMENT:** While residential weatherization is addressed as a conservation measure, I note that military bases offer a special opportunity for this. Certainly at Naval Air Station Whidbey Island there are a sizeable number of housing units with electric heat under the cognizance of a single authority. This offers the opportunity for affecting a substantial block of houses at one time.
	RESPONSE: The present residential weatherization programs funded by BPA and operated by regional utilities plan to weatherize homes on military installations.
019-7 K.C. Golden Northwest Conservation Act Coalition	**COMMENT:** Significantly higher levels of conservation than even the "accelerated" approach in the draft EIS are available and cost-effective now. Over the course of the planning period, even more will become available. We suspect that even the "accelerated" conservation is substantially less than what is called for in the Power Planning Council's regional conservation plan. Assuming that Bonneville is planning to develop new resources consistent with the Plan, the Plan's conservation targets should form the baseline for the analysis. "Accelerated" conservation would then consist of efficiency improvements above and beyond those in the Plan. In our comments on the 1990 Resource Program and on the Council's Draft Plan, we documented potential savings well in excess of those in the current Council Plan. We strongly believe that an ambitious, determined effort to capture all cost-effective conservation will yield savings well in excess of those in the DEIS, and will go a long way towards obviating the need for new transmission capacity for the foreseeable future.
007-1,2,& 3 Jane Johnson Citizens Conservation Committee Seattle City Light	**COMMENT:** We support the emphasis in all the Environmental Impact Statement alternatives on accelerated conservation as part of the strategy for easing the transmission capacity constraint. While we support the emphasis on accelerated conservation, we believe that efficiency opportunities appreciably beyond those identified even in the "accelerated" scenario are available and cost-effective. Thus, although we support the emphasis on accelerated conservation, we urge BPA to consider conservation levels more in keeping with the Regional Power Plan and estimates of conservation potential as a viable alternative to planning new transmission capacity.
017-4 Sherilyn Wells Bellingham League of Women Voters	**COMMENT:** With a growing array of implementation examples and technical resources for a genuine commitment to conservation, all we need is the corporate will to pursue them. Look at the diagnostic techniques used by the tiny Osage, Iowa utility to enhance the effectiveness of their weatherization program: infrared photography to identify specific heat leak problems. Where is that "more than generic" approach to diagnosis in our region? The utilities should be knocking on doors, not waiting for the customer to contact them. They should be willing to commit more capital to incentive programs to make them more accessible to everyone, but especially to low-income families (e.g., would anyone

Code	Comments/Responses
	6.0 Alternate Measures - 6A. Conservation - continued
	seriously consider replacing their inefficient, but working, refrigerator for a $30.00 rebate offered by Puget Power?) Innovative pay back options might include maintaining electrical bills at their pre-purchase level until the loan for the more efficient appliance is repaid. What about solar pre-heating of water so that electric water heaters do less work? There are recent passive solar breakthroughs in this area that could be utilized by our region, or, instead of promoting this comparatively inefficient system of electric tanks, what about using tankless water heaters for future construction and retrofits? What about tapping into computer models such as ELFIN and into "advanced electrical efficiency information services" such as COMPETITEK to seriously utilize conservation and renewables potential in planning and analysis? Significantly higher levels of conservation than even the "accelerated" approach in the draft EIS are available and cost-effective now. Over the course of the planning period, even more will become available. We suspect that even the "accelerated" conservation is substantially less than what is called for in the Power Planning Council's regional conservation plan. Assuming that Bonneville is planning to develop new resources consistent with the Plan, the Plan's conservation targets should form the baseline for the analysis. "Accelerated" conservation would then consist of efficiency improvements above and beyond those in the Plan. In our comments on the 1990 Resource Program and on the Council's Draft Plan, we documented potential savings well in excess of those in the current Council Plan. We strongly believe that an ambitious, determined effort to capture all cost-effective conservation will yield savings well in excess of those in the DEIS, and will go a long way towards obviating the need for new transmission capacity for the foreseeable future. **RESPONSE:** See the addition to the EIS in Section 2.2.1 that describes the conservation analysis for this EIS, and the conservation efforts that will occur through the Council's Power Plan compared to those described in this EIS.
017-3 Sherilyn Wells Bellingham League of Women Voters	**COMMENT:** The approach to conservation is analogous to our answers for transportation needs: we build more roads versus promoting more efficient ways of moving people. We still seem to favoring supply solutions instead of maximizing the efficiency of what already exists. There are efforts to scratch the surface (the voltage support options, conservation, load management, etc.) and these are positive steps, but the potential for this approach is far greater than acknowledged in the DEIS. **RESPONSE:** Comment noted.
022-2 Charles C. Raines none stated	**COMMENT:** Conservation, of course, should be a primary method to address the voltage situation. By reducing the demand and peaks it can significantly lessen the need for cross state transmission or new generation. It is essential that a comprehensive energy conservation program be initiated before other construction options are implemented. **RESPONSE:** Comment noted.

Code	Comments/Responses
	6.0 Alternate Measures - 6A. Conservation - continued
024-5 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** DOE's analysis fails to give preference to conservation. **RESPONSE:** After reviewing the PSAERP analysis, BPA and Puget Sound area utilities decided all "cost effective" conservation programs identified for Puget Sound should be accelerated so that the benefits could be captured in 10 years instead of 20 years. Accelerated conservation is included in all alternatives. We believe this clearly indicates that a preference was given to conservation.
SEPM-10 Frank Schumann none stated	**COMMENT:** I encourage more devotion towards conservation plans.... I think that the emphasis needs to shift now in all conservation programs, from voluntary programs ... What society needs is incentive...we need to ... provide financial incentives for society, the residential sector and the commercial sector, to be energy efficient. Perhaps more tiers in the rate structure of electricity utilities so that people with a high end of use, residential and commercial, do pay a higher rate. And it could be structured in such a way that people who are kind of average utilizers are not penalized. **RESPONSE:** One of the load management programs analyzed was residential time-of-use rates. The price of electricity during times of peak consumption was assumed to be double the off-peak rate. However, this was a voluntary program and time-of-use rates were not imposed on unwilling customers. A mandatory program would accomplish more than the program characterized in this EIS. However, the rates-based program we did consider was too expensive and it is expected that the same result would apply to a mandatory program. See also WPM-5.
EPM-4 Peter C. Held none stated	**COMMENT:** Your accelerated conservation plans — I'm hoping you looked at the availability of trained energy managers to implement these programs. Coming from energy management school, when I graduated probably 90 to 95 percent of the students were working. I would say now I can think of 2 out of 15 that are actually in the energy management field. They've moved on to other careers. Are they going to start the schools back up? Where are you going to get these trained people? **RESPONSE:** We did not specifically study whether trained energy managers are available. However, the program penetration estimates reflected the thinking of utility conservation managers in the Puget Sound area about how fast they could staff up to meet the rising demand.
WPM-2 Vladimir Steblina none stated	**COMMENT:** I think your conservation program is somewhat lacking since it really doesn't address the issue of outdoor lighting. I see that you consider street lights but you really don't consider the entire scope of outdoor lighting. I do not think that the public believes that we have an energy shortage or an energy crisis or a reliability problem in the Northwest because they actually see no evidence of that.... Control of outdoor lighting can highlight to the public that there is an energy crisis with regards to electricity in the Northwest...and there's a need to conserve. By controlling outdoor lighting, I think you can hammer home that message to the public, that we do need to do something about conserving energy, and it will make it easier to sell the other facets of your program such as the electric water heaters, home weatherization and the other programs.

Code	Comments/Responses
	6.0 Alternate Measures - 6A. Conservation - continued
WPM-3 Vladimir Steblina none stated	**COMMENT:** I propose some conservation programs with regard to outdoor lighting, the first of which is to replace all mercury vapor and high-pressure sodium lights with full cut-off, low-pressure sodium lights by the end of 1992. Do it quick, do it immediately, so that the public sees an impact. Step No. 2 require that all outdoor security lighting, or insecurity lighting, as I prefer to call it, be fully shielded and connected to motion detectors; therefore, the lights will come on only when needed when someone's in the area. I notice now that Puget Sound's actually giving a rebate for people to install the motion detectors. That will have the benefit of increasing not only security, but again, it's a visible item that people can say, "Hey, we do have a problem." The last one is a proposal to require that all businesses shut off all advertising lights by 10:00 p.m. or the close of business, whatever's later, again getting back to that point. And the last point would be to follow the lead of communities in Arizona and the Southwest, and that's ban the sale of both mercury vapor lights and high-pressure sodium lights (for use in) in outdoor facilities. **RESPONSE:** The PSAERP considered conservation and load management programs that would reduce electricity consumption at the time of system peak, between 8:00 a.m. and 9:00 a.m. Most outdoor lighting would already be off at that time. Improving the efficiency of outdoor lighting can be an effective conservation resource. Savings from such a program, however, are not available during daylight hours.
WPM-4 Vladimir Steblina none stated	**COMMENT:** I think BPA and the Puget Sound power companies need to pursue a program of aggressively explaining to the public the need for the conservation program ... send a very direct message to the public that we do need to do something with regard to conservation resources right now. **RESPONSE:** Comment noted.
SHPM-2 Paul W. Locke none stated	**COMMENT:** I don't believe that conservation is a resource...the answers I got from people when I asked them the question "Well, are the people's light bills actually going down?" was "a little" or "not very much." So, conservation is just not doing it. .... And conservation definitely is not solving anything. That's just like me driving my car down the road and I go a little easier on the gas pedal and I get an extra 20 miles out of a tank. I don't have another source to fill the tank. **RESPONSE:** Cost-effective conservation is a valuable resource. The Puget Sound area is experiencing rapid electricity load growth, and even with conservation, total electricity consumption will continue to grow. Load growth will be slower than it would have been without conservation and electric bills will be lower than they would be absent conservation efforts.
BPM-10 & 11 J.M. Reilly none stated	**COMMENT:** Conservation — somebody had better get to the architects.... Here's a typical example of a kitchen. It's got almost two kw of lighting in the kitchen. There's eleven 150-watt reflector bulbs in this thing. Now, the builders and the architects aren't getting the message. The average consumer would like to convert over to low-wattage lights, but none of them will fit your fixtures. Plus they're expensive. I think there ought to be support for the average consumer in purchasing some of these things.

Code	Comments/Responses
	6.0 Alternate Measures - 6A. Conservation - continued
	RESPONSE: BPA is working on getting energy savings from conservation efforts in residential lighting. The new Long-Term Super Good Cents program offers rebates for lighting measures in kitchens and bathrooms for new homes. A program is also being offered for lighting improvements in multi-family dwellings. BPA is looking for cost-effective ideas for acquiring residential lighting conservation from existing single family homes. Also, BPA and other utilities are funding a lighting design lab in Seattle where designers and builders can simulate artificial and daylighting designs to develop new designs that use less energy. This lighting lab was established for builders and architects.
BPM-17 Don Rempe none stated	**COMMENT:** If the costs in Question 3 (Comment No. BPM-16) are correct, considering that the large majority of conservation measures discussed in the Draft EIS save energy during periods of the day or week or year, how can the comments on Page 2-28 in Paragraph 2-7-3, called "Transmission Measures" where it says that many new or rebuilt line options between various substations are too expensive to be valid when the energy saved in a transmission system pretty much are 24 hours a day, 365 days a year? **RESPONSE:** In evaluating the cost-effectiveness of all transmission options, their benefits in terms of reduced losses were considered. See for example, Appendix C, Table 2.1-1, Sheet 2, Section 4. A 500-kV line reduces losses by 24.6 average MW, valued at over $7 million per year. The statement in Section 2.7.3 about excluded transmission options, "Many new or rebuilt line options between various substations" refers to alternatives to a major cross mountain transmission line. This is not a comparison between transmission loss savings projects in general and the other conservation measures selected for analysis in the Plan.
	6B Load Management
013-2 Susan Sanchez City of Bellevue Design and Development Office	**COMMENT:** Load management ... should be seriously considered as part of the conservation component of any alternative chosen and not limited to Alternative 3. With those additional strategies incorporated, we believe Alternative 2 would contain a reasonable balance of conservation efforts and development of relatively low impact facilities. **RESPONSE:** Load management was one of the highest cost measures, compared with conservation, which was more cost effective. Thus, it was not made a part of the proposal.
TPM-1 Louise Batchelor none stated	**COMMENT:** Somebody mentioned something about a switch on a water tank so that you can shut them off. I would suggest that the switches be manufactured on the water tanks in the first place. Sometimes there is more than one thing on the electric switch box panel and a lot of people wouldn't even know which one to shut off to turn off the water tank .... If it was directly on the water tank it might be convenient for a lot of people to flip the switch as they're going and when they come back.... We might conserve some.

Code	Comments/Responses
	6.0 Alternate Measures - 6B. Load Management - continued
	RESPONSE: Switching a water heater off during times when the home is vacant would save the standby energy required to keep hot water at the preferred temperature. Standby losses for water heat in a sample of metered homes in the Pacific Northwest are approximately 1,100 kilowatt-hours per year. This is equivalent to a 125 watt light bulb left on all year.
026-2 Paul C. Juhasz Washington Society of Professional Engineers	**COMMENT:** The Washington State Building Code Council (BCC) is in the process of amending the non-residential portion of the Washington State Energy Code. They are asking for written comments through January 30, 1992. The BCC should be advised that the Energy Code should include provisions that would encourage the use of demand control and power factor controls, even if they increased the total off peak energy consumption.
BPM-1 Robert Johnson Washington Society of Professional Engineers	**COMMENT:** We've got to have a change in how Bonneville's set of programs are structured so that we can get in these time-of-day, peak-shaving, power factor corrections.
BPM-2 Robert Johnson	**COMMENT:** We've got to have a change in how our codes are written so that we can get in these time-of-day, peak-shaving, power factor corrections.
BPM-5 Robert Johnson	**COMMENT:** I don't know why they don't describe power factor in this report because in every electrical commercial rate, there's a power factor correction put in there. So, you have to know the problem. You have to know it. And there's a difference in how you correct a line which is resistance voltage drop, or kvr, reactive voltage drop. Now, the thing that you missed in your report is that you can buy this correction. The combustion turbines can correct many times their generating capacity in kvr, in power factor correction.
026-3 Paul C. Juhasz	**COMMENT:** BPA, in their energy grants and energy incentive programs, have not recognized the costs and benefits of off demand control and power factor correction. This should be incorporated into the existing programs. Most present programs penalize the use of controls to control peak demand.
	RESPONSE: The above comments all urge changes in codes or programs to obtain power peak load savings. Comment on the term "power factor" is also made. The following responds to these comments collectively. BPA's traditional energy management programs have only targeted energy savings and have not attempted to reduce demand. BPA provides a power factor incentive in the Energy Savings Plan (ESP), an industrial conservation program. Participation in this program to date has been small. The Northwest's hydropower system, with its abundant and variable rainfall, has always been rich in capacity and constrained only in energy, so there has been no need for demand management programs or rates. The low demand rates and lack of emphasis on demand limits correctly reflects the low value of demand savings to the regional power system. The benefits of demand savings for the PSAERP are limited to the transmission costs that can be avoided because generation capacity savings are of marginal value to the regional power grid. For this reason, the load management programs were not identified as cost-effective elements of a preferred alternative.

Code	Comments/Responses
	6.0 Alternate Measures - 6B. Load Management - continued
	We have no evidence that your proposal to encourage the use of demand control through building codes would be cost effective or significantly reduce aggregate Puget Sound demand enough to defer any of the actions proposed in the EIS. From a bulk power perspective, the cost of meeting peak demand is generally much less than the marginal cost of energy. The Northwest is facing a growing energy deficit but has a surplus of peaking capacity that is expected to last to 2003 or longer. Any actions to reduce demand that would increase energy consumption must be examined critically to determine cost effectiveness and environmental consequences. The term "power factor correction" generally refers to actions taken to reduce the reactive component of power consumed by a load. By bringing voltage and current more closely in phase the power factor is increased closer to unity, the point at which net reactive power is zero. The reactive correction is typically done close to the load at distribution voltage levels. Efforts to improve power factor of loads will usually improve both energy efficiency and reactive power balance. However, system studies found that improving load power factor did not significantly improve voltage stability margin for the bulk power system. The reactive power losses that cause voltage instability are predominantly contributed by the heavily loaded transmission lines. The terms "boosting" and "bucking" are commonly used by power engineers to describe the use of reactive power to control transmission voltages. Large, high voltage capacitor banks are connected directly to substation buses to "boost" voltage. High voltage shunt reactor banks are similarly used to "buck," or reduce, transmission voltage. Generating plants can be used to either "boost" or "buck" transmission voltages by controlling machine excitation. In many cases the desired voltage level is achieved by making the power factor at the substation bus lower than it was. **6C. Fuel Switching**
013-2 Susan Sanchez City of Bellevue Design and Development Office	**COMMENT:** I believe that fuel switching is important since natural gas is an available natural resource and the system for its harvesting and use is in place.
005-2 Gail M. Jensen none stated	**COMMENT:** ... fuel switching strategies should be seriously considered as part of the conservation component of any alternative chosen and not limited to Alternative 3. With (load management and fuel switching) incorporated, we believe Alternative 2 would contain a reasonable balance of conservation efforts and development of relatively low impact facilities.
SHPM-4 Paul W. Locke none stated	**COMMENT:** Depend upon some other fuel to solve the problem — by getting them to convert to gas — Conversions on your water heaters — they recommend that you put in the gas system, but you leave your electric system in place that could be used as a standby in case the gas is curtailed.

Code	Comments/Responses
	6.0 Alternate Measures - 6C. Fuel Switching - continued
019-5 K.C. Golden Northwest Conservation Act Coalition	**COMMENT:** Efficient direct application of natural gas: The fuel switching analysis in the Draft EIS is wanting. Despite repeated urging from virtually the entire Sounding Board to include fuel switching in other alternatives, the analytic team insisted on lumping it into the Alternative 3 grab bag, where its cost-effectiveness was undermined by other measures. The DEIS suggests that the "measures used in Strategy 3 were felt less deliverable than those used in other strategies." The only obstacle to delivery of efficient direct application of natural gas that we can see is the utilities unwillingness to deliver it. The "analysis" of fuel switching appears to be nothing more than a reiteration of electric utilities' disinclination to treat direct application of natural gas as a resource, but that discussion is rendered moot if the utilities refuse to acquire it, regardless of its cost-effectiveness. You are making a policy judgement here about the desirability of this resource. ... We find it analytically disingenuous to pass that judgement off as the product of analysis.
019-6 K.C. Golden Northwest Conservation Act Coalition	**COMMENT:** Finally, now that it is clear that Bonneville is planning to acquire large amounts of gas-fired generation, the analysis of fuel-switching should be straightforward; it is simply a matter of determining the most efficient and cost-effective use of the gas resource. If you are unwilling to contemplate direct application of natural gas because of its adverse effects on electric utilities' finances, then we offer to work with you to find a way to minimize or adapt to those effects. But we feel that choosing a resource, or failing to, because of its effect on the utility rather than its total cost to society is bad public policy, and entirely inconsistent with the Regional Act. **RESPONSE:** Concern about the impact of fuel switching on utility revenues and the desirability of utilities to pursue programmatic fuel switching is a major hurdle in delivering this resource. The PSAERP preferred solution was intended to be a consensus solution. No consensus existed on the technical potential of fuel switching or the proper role of BPA and utilities in altering the result of current market forces. The reluctance of some utilities to pursue fuel switching made a consensus on implementation of fuel switching impossible. Individual utilities are free to pursue fuel switching within their own service territories. However, BPA's policy is to let existing market forces operate and not to fund programmatic fuel switching.
	6D. Transmission Line
003-3 & 4 G.V. Christoffers none stated	**COMMENT:** Look into research being done on more efficient means of transmission, including wireless. If possible, do small scale experimentation or co-operate with those doing it. Continue to work on storage to be used in "time of plenty." Investigate expansion in this area. **RESPONSE:** BPA has historically been a leader in the development of high voltage power transmission technology. BPA's research and development program places a high priority on

Code	Comments/Responses
	6.0 Alternate Measures - 6D. Transmission Line - continued
	improving the efficiency and reliability of the Northwest transmission grid. BPA works closely with other Northwest utilities and the Electric Power Research Institute (EPRI) to sponsor development and demonstration projects. We are not aware of any schemes for terrestrial wireless transmission. Pumped storage hydro, which is commercially available, was looked at as a potential source to meet Puget Sound peak loads. It was found to be unacceptable because of substantial energy losses in the conversion and storage process. The utility industry is investigating some promising storage technologies including batteries and superconducting magnetic storage. However, these are only suitable for short duration storage and are not capable of storing enough energy to be practical for serving winter peak load. BPA is continuing to study hydrogen storage, where surplus hydro power generation could be used to electrolyze water with the resulting hydrogen stored in underground aquifers. The stored hydrogen could be withdrawn and used to fuel a combustion turbine during peak loads. This technology has not yet developed to where it could be considered for Puget Sound.
013-1 Susan Sanchez City of Bellevue Design and Development Office	**COMMENT:** While the City of Bellevue generally supports maximizing conservation efforts, we recognize that adding facilities to the electrical transmission/distribution network may be necessary to ensure reliable service. **RESPONSE:** Comment noted.
021-6 Mark Lawler Sierra Club Cascade Chapter 022-4 Charles C. Raines none stated	**COMMENT:** Only if conservation and voltage support measures are not sufficient should BPA consider adding additional lines. Additional lines should be placed only in existing corridors, with Stevens Pass as lowest priority. **COMMENT:** It is preferable to upgrade existing lines to 500 or 750 kV. After that, adding additional lines in existing corridors could be considered, with Steven Pass as lowest priority. **RESPONSE:** After Voltage Support Option 2 is added, further voltage support options and other system optimizations are difficult. Additional cost-effective conservation will always be considered to alleviate problems caused by load growth. BPA recognizes the environmental preference to replace existing lines, use or widen existing transmission corridors versus opening new corridors. Although the Stevens Pass corridor may have the lowest priority with respect to environmental considerations, the transmission system performance is best with additional lines in this corridor. All these factors will be considered in a site-specific EIS.

Code	Comments/Responses
	6.0 Alternate Measures - 6D.Transmission Line -continued
022-4 Charles C. Raines none stated	**COMMENT:** Prior to any transmission projects a full review of the cross-Cascades corridors needs to be done in light of recent listing of wildlife species as threatened.
030-1,2, & 3 J.D. MacWilliams Mt. Baker/Snoqualmie National Forest U.S. Dept. of Agriculture	**COMMENT:** The primary concern for National Forest System lands is the proposed new Cross-Cascade Transmission Line. Management direction for the Mt. Baker-Snoqualmie National Forest is provided by the Land and Resource Management Plan issued in June of 1990. ... Enclosed you will find excerpts of the plan from (1) the Forest Wide standards and guidelines for Land Uses and for (2) Management Area 25A, Utility Corridors. These will be helpful in guiding the route selection process. The draft EIS proposes a planning period of 1992 to 1996 for the new transmission line. The Forest would like to have a representative on the planning team from the beginning of the process. **RESPONSE:** BPA plans to begin scoping for an EIS on the transmission line contingency in late 1992 or early 1993. Siting a new cross-Cascades transmission line will require a thorough and time-consuming environmental review. We expect that the U.S. Forest Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the State of Washington will work with BPA to prepare this EIS.
TPM-6 Louise Batchelor none stated	**COMMENT:** If you've got a 500-feet strip (of transmission line right-of-way) across there, why not make it six, before you really have to have it and before any more development goes onto it, driving up the prices and making it more unaffordable? **RESPONSE:** Transmission line right-of-way costs are a relatively small portion of the total cost of a new line. We plan to start environmental studies for a new transmission line across the Cascades in late 1992 or early 1993, after this EIS is completed. If future conditions demand more transmission line capacity, these studies would speed line construction.
EPM-9 Marvin Klinger none stated	**COMMENT:** I would also submit that there is more flexibility to the scheduling of a transmission line than has been represented in the EIS. And you have a great deal of flexibility in the time that you start construction. By "start construction," I mean start design, start procurement and start actual construction. In each of those points, you have the ability to delay it from whatever schedule it is initially set up for. And even in the midst of those events, you have the flexibility to delay them in midstream, or even terminate them, recognizing that both of those may come at some financial cost. **RESPONSE:** We agree that the EIS has not analyzed a transmission line project in sufficient detail to fully characterize the range of flexibility in all of the various phases, including construction. However, we believe the flexibility represented in the EIS, particularly in the discussion of the transmission line as a contingency element, is appropriate for the comparison of alternatives at a planning level.

Code	Comments/Responses
	6.0 Alternate Measures - 6D.Transmission Line - continued
BPM-22 Leonard E. Sanderson Mayor City of Milton	**COMMENT:** I've got a question relative to upgrading the transmission line. When you do that, is that a complete reloading of the total line from the towers on, re-engineering the whole thing, or can you salvage existing low-capacity line towers and put high-capacity lines on them just like putting new lines and reconductoring them? **RESPONSE:** Upgrading a transmission line as discussed in the EIS generally refers to removing the entire existing line and building a new, higher capacity line in its place. One option considered was an upgrade where the footings and tower body would remain and a new top and additional conductors are added. It is uncertain at this time whether this type of upgrade is technically possible or economical.
	6E. Voltage Support
013-3 & 4 Susan Sanchez City of Bellevue Design and Development Office	**COMMENT:** The City's primary concern at this point regards what you refer to as "Transmission Line Voltage Support-Option 1," a component that is common to all of the alternatives analyzed. The "Transmission Reinforcement Analysis" contained in Appendix E contains eight possible options for this "Transmission Line Voltage Support" system. Six of these eight options appear to be based on an assumption that the existing 115 kV lines between the Maple Valley and Lakeside substations will be upgraded to 230 kV and that the Lakeside Substation will be upgraded to be able to accommodate these higher voltage lines. It is important for BPA to understand that no permits have yet been issued for this transmission line upgrade and not all necessary permits have been issued for the substation upgrade that would be needed before the transmission line could be upgraded. Both of these upgrades are currently before the City of Bellevue and an EIS is being prepared for these actions. Given the status of these two proposed upgrades, at this time we cannot support any action that would be dependent on upgrades to these facilities, or any action that would preclude those options that are not dependent on these facilities. **RESPONSE:** None of the options analyzed in Appendix E "depend" on upgrading Lakeside Substation or the Maple Valley - Lakeside line to 230-kV. The 115-kV system serving the Lakeside vicinity is being strained by load growth in that area. To address this local problem, Puget Power has proposed an upgrade of its Lakeside substation to 230-kV. To supply the substation with 230-kV power, Puget has proposed upgrading the Talbot-Lakeside and the Sammamish-Lakeside 115-kV lines to 230-kV. When studying performance of the bulk power system, it is necessary to make assumptions about how local subtransmission system problems will be solved and reflect this in system models. The models used in Appendix E assumed that Lakeside Substation would be connected to the unused Seattle City Light 230-kV line from Maple Valley to Sno-King. Future studies will reflect Puget's most recent proposal as stated above. Nevertheless, the viability of the transmission alternatives analyzed in Appendix E is independent of how the Lakeside area needs are met.

Code	Comments/Responses
	6.0 Alternate Measures - 6E. Voltage Support - continued
018-12 Malcolm J. Macdonald Seattle City Light	**COMMENT:** Page 2-17 mentions "vars," a term that should be added to the Glossary or explained in the text. **RESPONSE:** The term was added to the Glossary as suggested.
026-4 Paul C. Juhasz, P.E. Washington Society of Professional Engineers	**COMMENT:** The proposed substation and capacitors appear to be justified from a line maintenance and a reduction in line losses quite independent of the critical power transmission requirements. Capacitors correct power factor or reduce reactive power requirements. They do not raise voltage, although this may be a result of their use. Please properly describe the use of capacitors so the engineering community will understand the report. **RESPONSE:** The proposed substation has benefits as stated, but this would not justify the entire project by itself. See response to your comment 026-3 for a discussion of power factor.
026-5 Paul C. Juhasz, P.E. Washington Society of Professional Engineers	**COMMENT:** Combustion turbines, discussed in another alternate, and large synchronous motors can be equipped to act as condensers, and support voltage on the system. This should be considered as part of the voltage support package. Power factor or voltage support requirements of a transmission line could at times justify the idling operation of combustion turbines or motors to stabilize live voltage.
BPM-8 Robert Johnson Washington Society of Professional Engineers	**COMMENT:** I don't know if you've looked at another thing at Satsop. You can take the generator which was there and disconnect it from the turbine and run it as a synchronous condenser and it would be a major power factor. **RESPONSE:** We agree that combustion turbines and large synchronous motors can be equipped to act as condensers and support voltage on the system. The studies that included new combustion turbines included this capability in the analysis. The idling operation mentioned for combustion turbines is probably not economic. We have found that the benefit of additional local generation of real power (MW) reduces the system demand for reactive power much more than the available reactive power output of the combustion turbine. In 1990 BPA and WPPSS studied the feasibility of converting the Satsop WNP-3 generator to produce reactive power operating as a synchronous condenser. The study found that the conversion was not cost effective compared to other voltage support alternatives.

Code	Comments/Responses
	6F. Local Generation
001-1 Richard W. Rosenberg OHOP Mutual Light Company	**COMMENT:** The analysis, to a high degree, lacked detail. I believe this indicates insufficient knowledge and expertise in the subject of diesel peaking plants. This is probably a natural result since BPA staff hasn't been exposed to either the economics or the technology before. **RESPONSE:** The objective of the analysis of diesel generators was to determine whether they should be planned as the contingency resource. This review concluded that a combination of factors, including cost effectiveness, interconnection, communications, and dispatching complexities associated with adding a substantial number of small units, cause diesel peaking plants to be considered a second choice when compared to combustion turbines. We acknowledge that any local generation resource that reduces peak demand during worst case conditions alleviates the east-west transmission problem. It is likely that there are specific sites and applications where it makes economic and operational sense to develop a contractual arrangement between the generator owner and the local utility. Such an installation should be pursued by the owner and the utility for potential integration.
001-2 Richard W. Rosenberg OHOP Mutual Light Company	**COMMENT:** The proposal did offer two basic thrusts: (1) would BPA sanction the use of a diesel peaking plant for peak shaving? **RESPONSE:** 20 MW of standby generation was initially identified as potentially available in the Puget Sound area. However, a combination of factors including cost effectiveness, interconnection, communications, and dispatching complexities associated with adding a substantial number of small units cause diesel peaking plants to be considered a second choice as a contingency resource. To assure capacity is available, there must be a contractual relationship between the generation facility and the utility. This contract would define how much capacity, under what conditions, could be delivered by the standby unit. Integration and coordination, especially at a moment's notice, of so many varied and dispersed power generation resources presents some problems including reliable communications. It is also likely that under extraordinary conditions, such as power outages or natural disasters, when peak demand would require standby generation, the standby generators may already be in service. Most existing standby generators are designed to switch on and provide power to the facility independently from the utility. They are not connected to the utility system. Interconnection to permit the generators to provide power to the utility's distribution system would require additional protection and communication equipment. It is possible that a larger standby generator may make sense on a site-specific basis. Such an installation should be pursued by the owner and the utility for potential integration. A large number of small generators, however, is complex enough to make substantial acquisition levels unlikely in the near to mid-term planning horizon. Consequently, BPA concluded that diesels and other small resources should not be planned as the primary contingency resource.

Code	Comments/Responses
	Alternative Measures - 6F. Local Generation - continued
001-3 Richard W. Rosenberg OHOP Mutual Light Company	**COMMENT:** The proposal did offer two basic thrusts: ...(2) would BPA show an interest in purchasing availability? **RESPONSE:** BPA is not interested in acquiring small capacity resources, such as you propose, at this time. This does not mean acquisitions will not be made in the future. Purchasing availability (capacity) from a diesel powered generator as you propose is much the same as purchasing output from a peaking combustion turbine(s). Combustion turbines however are sized at 70 MW while the unit you propose is 1 MW. There has been concern over the difficulty of dispatching many small generators. Historically BPA has not acquired capacity resources because the hydro system has had surplus capacity. While BPA is not acquiring capacity resources, it is investigating small size dispersed generation resources. This review is in its early stages, and not likely to make a contribution within the timeframe for the PSAERP.
002-2 Charles E. Gruhl none stated	**COMMENT:** I understand the PUD is considering purchasing peak/emergency power units. I would like to suggest that PUD assist me in installing an oversized standby generator unit of one megawatt (1000 kw) or more. I would maintain the equipment in good working order, make the unit available to PUD inspectors, provide 24-hour coverage after an alert, and cooperate with PUD to provide power into the grid when needed.
002-1 Charles E. Gruhl none stated	**COMMENT:** There are many broiler farmers, egg ranches, dairies, fish farms and other industries that need 24-hour power coverage. It is possible that your entire regional needs could be supplied by thousands of small (1000 kw) generators located throughout the PUD supply area.
016-3 Alan Souders none stated	**COMMENT:** Many industrial facilities have back-up emergency generators for use during power outages; it may be possible to reduce peak loading by offering payment to these facilities for operating generators on an on-call basis. This would take advantage of some generating capacity which already exists.
BPM-27 Robert Johnson Washington Society of Professional Engineers	**COMMENT:** I know of some hospitals now have almost a megawatt of standby power within a hospital; and when there's a period of potentially unstable conditions, there would be a reason for them to get on their emergency generators. Has that been looked into? **RESPONSE:** 20 MW of standby generation was initially identified as potentially available in the Puget Sound area. However, a combination of factors including cost effectiveness, interconnection, communications, and dispatching complexities associated with adding a substantial number of small units cause standby generation to be a second choice as a contingency resource. Also see the response to Ohop Mutual Light.
003-2 G.V. Christoffers none stated	**COMMENT:** Longer Term: Explore unused sources of energy. There are strong winds in WA state. There is a great deal of sunshine, too. Support research in this realm, or at least stay informed of research being done.

Code	Comments/Responses
	Alternative Measures - 6F. Local Generation - continued
017-2 Sherilyn Wells Bellingham League of Women Voters	**COMMENT:** The League's position, supported by repeated polls of the general populace, is that conservation and renewables are the preferred routes for dealing with this emerging crisis of demand and supply. Investment NOW in research on renewable strategies appropriate to the Northwest may yield application breakthroughs in time for implementation in our hour of need, but continuing to ignore investment needs in this area only extends the time by which we could be factoring in the benefits of renewable resources ... an "always the bridesmaid, never the bride" situation for the only true answers to long-term energy requirements. If solar is not applicable year-round, it is still available for a large percentage of the year. The options for wind and tidal power generation have been only minimally explored in this region, yet would be at least partial answers to energy deficits. These would often lend themselves to more local generation facilities, which would render the system less vulnerable to the massive failure described in the DEIS as well. **RESPONSE:** BPA's Office of Energy Resources strives to keep informed of promising energy resources. BPA publishes a report every two years titled the "Resource Program." BPA's Draft 1992 Resource Program was issued in January 1992. This document describes solar, wind and other renewable energy resources. The technical characteristics, costs, environmental characteristics, and a forecast of supply amounts for each of these resources are presented in the Resource Program. See Appendix B.
003-5 G.V. Christoffers none stated	**COMMENT:** I am glad that serious planning for the future is under way. I hope that nuclear power plants are being phased out. They were a huge mistake.
012-5 Donald Axtell none stated	**COMMENT:** Even though its political suicide, no one is looking at nuclear power. We of the Puget Sound basin need power, and 3 good local sources are sitting in mothballs right here! Even with enhanced voltage boosting and/or a back-up transmission line from the east, we will be dependent on the efficiency of your "grid." Wrong! The Puget Sound area, and hence the rest of the grid members, should not be held hostage from single-source conceptualizing.
006-2,3, & 4 W.G. Riley none stated	**COMMENT:** No more studies. Do it NOW!! Spend the $s. Complete the nearly finished Satsop Electric Generating Power Plant, and then, do the rest of the construction to complete the adjacent power plant, and get it also generating the needed electric energy! [Finishing Satsop and adjacent power plant equals] a plus (+) supply of electricity, at least for the present. Perhaps this would attract industry, sorely needed in the Grays Harbor area of Washington state.
TPM-4 Unstated	**COMMENT:** I'm still concerned about the nuclear — the money that was put in, and it had to have raised the rates. What's the plans for that, in the future? ... [Are they going] to write it off or going to finish it or —

Code	Comments/Responses
	Alternative Measures - 6F. Local Generation -continued
BPM-6 Peter Farnham Washington Society of Professional Engineers	**COMMENT:** I wondered if there had been any consideration (given) to reactivation of Satsop. **RESPONSE:** WNP-3 at Satsop was considered because of the effect that this plant would have on the operation of the transmission system. It was not considered as an alternative solution, however, because the decision to build any large generation source would be driven by regional energy needs and not just peaking problems. The construction of a large generation resource, such as WNP-3, would require a regional decision that is outside the scope of the PSAERP EIS. We also found that the Satsop plant could not be completed within the 1993-2003 period of the electric reliability plan. As a result of public input that BPA received during the review of its draft 1990 Resource Program, BPA recommended deferral of a new comprehensive study of the future of WNP-1 & -3, until significant information becomes available or conditions change sufficiently to warrant a new study. Both cost-to-complete and Operation & Maintenance cost assumptions would be reviewed as part of a study. The 1990 Resource Program indicated that a new study would be deferred at least until 1991. The scoping process for the 1992 Resource Program determined that WNP-1 & -3 would be treated as available resources for planning purposes. This is the same assumption that was used in BPA's 1990 Resource Program. Prior to a decision to take specific action about either WNP-1 or WNP-3, BPA anticipates that a complete review of cost data will be completed and that a regional consensus will be developed through a public involvement process.
BPM-6 Peter Farnham WA Society of Professional Engineers	**COMMENT:** We have a beautiful cogeneration plant in Seattle. It's called Seattle Steam. I'd like to see that being used. Cogeneration, I think, would solve a lot of those problems that you're having. We need some sort of generation source on this side of the mountains. **RESPONSE** Utilities are currently negotiating with Seattle Steam to develop a cogeneration plant with 30 MW output. See responses to comments 024-2 and 019-4 for further discussion of westside generation development.
026-6 Paul C. Juhasz, P.E. Washington Society of Professional Engineers	**COMMENT:** The combustion turbine analysis is done on the basis that the resources East of the Cascades are infinite. This EIS limits their use to 5% of the year. Other studies by BPA are proposing the use of combustion turbines on a more continuous basis. Combustion turbines used with heat recovery (much as cogeneration or combined cycle generation) can show thermal efficiencies that would justify long periods of operation. **RESPONSE:** The PSAERP addresses unique needs different than other related regional planning processes. This Plan's scope is to solve the peak load reliability problem caused by growth in demand in the Puget Sound area while most generation resources are east of the Cascades. Existing transmission capacity limits how much power can be imported from the east to Puget Sound. The PSAERP considers combustion turbines as one of the measures that can be taken to meet the peaking needs of the Puget Sound area. Combustion turbines are treated as a contingency measure in the Preferred Alternative and Alternative Strategies 1,2, and 3, and

Code	Comments/Responses
	Alternative Measures - 6F. Local Generation - continued as the proposed action in Alternative Strategy 4. By suggesting a combustion turbine used to supply peaking energy as a contingency measure in the preferred alternative, we do not categorically reject combustion turbines in other parts of the region or in other operation modes. There are many ways to use combustion turbines. They can be used as peaking units, baseload units, or in conjunction with displaceable resources or contracts. The peaking combustion turbine, which is the application considered for the Puget Sound peaking problem, would operate only when necessary to meet peak demand. A combustion turbine, operated differently than for peaking, may be an appropriate resource choice to respond to energy needs of a particular utility. Plans for new resources are typically outlined in each utility's least-cost plan. Analysts have conservatively estimated that 400 MW of new energy resources will be developed in the Puget Sound area by 2003 to meet the energy needs of utilities. The PSAERP assumes some of the resources utilities acquire to meet energy needs will be in the Puget Sound area. These resources will have a secondary benefit of reducing peak demand on the east-west transmission system. The resources offered to BPA in its competitive acquisition test solicitation respond to the energy needs of BPA. These needs were anticipated in BPA's 1990 Resource Program and are again addressed in the Draft 1992 Resource Program. The process of developing the Resource Program includes completing an EIS that addresses the impacts of several resources. In addition, the competitive acquisition test solicitation contains adjustments for air emissions and system costs.
026-7 Paul C. Juhasz, P.E. Washington Society of Professional Engineers	**COMMENT:** The EIS should credit combustion turbines with their ability to correct power factor and stabilize power line conditions. This EIS implies that transmission lines will be required to connect them to the system. Normally, the reverse is true. Turbines are installed at points of high power demand eliminating the need for a new transmission line. **RESPONSE:** A discussion of transmission system additions required to integrate the output of combustion turbines has been added to Section 2.5.3.

Code	Comments/Responses
	Alternative Measures - 6F. Local Generation - continued
011-2 John H. Wolch none stated	**COMMENT:** I also advocate building firm generating facilities in western Washington. **RESPONSE:** Comment noted.
TPM-2 Louise Batchelor none stated	**COMMENT:** Down in Modesto, they have a system that was put together by, I believe, General Electric and a company over in Germany. That system burns whole tires. You don't have to do anything to them; they just throw the whole thing in and you're done...we have a goodly supply of them from Ft. Lewis — I'm sure they'd let us burn their tires and so forth. That is a system that would not necessarily require all of the ecology reports, since they have actually already been done. The system is in operation and the only thing that they wish they had done was to put a fluidized bed in. **RESPONSE:** The Northwest Power Planning Council and Northwest utilities have not identified this technology as a significant potential energy resource for the region. Even if it had significant potential, the PSAERP is not the appropriate forum to decide how to meet the region's energy needs as noted in Section 1.4.4 of the DEIS. See response to comment 024-7.
031-5 Joe Whalen none stated	**COMMENT:** We should rely on "nuclear," hydrogen fuel cells, or some other innovation; to be buried in transmission corridors that can be self-regulating and attended yearly. Compact Nuclear Power Source (used on Dew line, Arctic) and unfinished Organic Rankine Cycle, generating 100 KW, good for 20 years underground, unattended, placed where transmission corridors cross Federal land, can be considered. Consider $1 million grant to University of Missouri by [Department of] Energy for using nuclear gases to generate electricity, called nuclear lightbulbs. Hundreds of ideas are out there awaiting discovery; and cost-effectiveness must include everything from ideas to waste and effects thereon. **RESPONSE:** We find your proposal to locate advanced technology generation on transmission corridors interesting. However, we believe there are insurmountable technical and environmental problems that would make it impractical as a solution to the Puget Sound voltage problem. For generation to be an effective remedy, it must be located in the load area. Locating remotely on transmission corridors would make the voltage problem worse by imposing more load on the lines. The utility industry, the Electric Power Research Institute and the Department of Energy provide considerable financial support for advanced energy technology research.
	6G. Curtailment
024-15 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** The EIS does not put the problem in context. Power outages to the average Puget Power customer in the last ten years, for example, have averaged 3 hours and 45 minutes. None of these outages was due to transmission constraints such as DOE proposes in the

Code	Comments/Responses
024-16 G.H. Bowers G.H. Bowers Engineering	**Alternative Measures - 6G. Curtailment - continued** EIS to prevent. DOE is addressing the simultaneous occurrence of severe cold weather and a major equipment failure. Each of these is a rare event. The frequency with which they occur simultaneously is extremely low. Under the current plans, should such an event occur (and there is no guarantee that it would happen in our lifetime) a few large industries would voluntarily be cut back for brief (15 minute) interruptions to various customer segments would occur. **COMMENT:** What DOE is asking the consumer to do in this EIS is to spend up to hundreds of millions of dollars (for substations, powerlines and powerplants) and create environmental damage, so that the consumer's average annual power outage does not grow from 3 hours and 45 minutes to 3 hours, 45 minutes, and twenty seconds. The short, schedulable nature of the increased outage lessens its impact. An EIS on this proposal must provide this data to the public and congress so that they may have some input as to whether the economic and environmental costs are worth it. **RESPONSE:** Distribution outages, which constitute most customer interruptions, usually affect only a few households or businesses, or perhaps a feeder serving several MW of load. However, a voltage collapse event would have a much wider scope, potentially extending from Vancouver, British Columbia to Portland, Oregon. Reducing average annual outage time by tens of seconds (commenter's estimate) does not capture the benefits of fixing the problem. While unlikely, the outage consequences to the region would be far greater than the sum of damages to individual consumers. It is difficult to compare the expected impact, considering both likelihood and consequence, to the more common distribution outages. Guided by BPA's Reliability Criteria, we plan to serve normal peak load if two lines or one line and one generator are out of service. Overlapping non-momentary outages of two lines on the same right-of-way or terminating at the same station occur with a frequency of 0.088 per year per line-pair. Four of the 500-kV lines into the Puget Sound area are on the same right-of-way and terminate at the Raver Substation, so we expect about one overlapping outage every other year. Overlapping outages of a line and a generator might occur once a year. We expect normal peak loads to occur once every two years, usually extending from several days to a week. Extreme cold weather, which produces loads about ten percent higher than normal cold (Appendix A, Table II-2), recurs once every 20 years. The Reliability Criteria requires acceptable performance for outage of one line (1.8/year) or two generators (0.33/year). Overall, the likelihood of a critical outage during stressed conditions is low but plausible. During BPA's public review of the Reliability Criteria, there was a consensus among commenters that the level of reliability provided is appropriate. If an outage occurs, voltage collapse would follow in a matter of minutes if no remedial actions are taken. Tripping the 600 MW aluminum smelter load must happen immediately. In accordance with agreements with BPA, 75% of the load must be restored in 20 minutes to prevent potlines from freezing. About 40 percent of outages are longer than 15 minutes. For outages more than 15 minutes, rotating outages of other customers must be made to prevent collapse. The average outage lasts about four hours, but could be much longer if major line repairs are needed. See also the following response.

Code	Comments/Responses
	Alternative Measures - 6G. Curtailment - continued
	As loads in the Puget Sound area increase, we will need to rely more and more on a safety net of automatic undervoltage load shedding.
SEPM-9 Unknown	**COMMENT:** One of the alleged reasons for the new substation is that in the event of an emergency there is not a blackout. Is not the purpose of the interruptibility of the DSI's to prevent that from happening? Or does that interruptibility not allow that?
BPM-26 unknown	**COMMENT:** Other than the aluminum plants, what other option do you have of cutting down demand in the peak time? **RESPONSE:** Section 2.6.4 explains curtailment provisions in DSI contracts. BPA has the right to drop 100 percent of this load for emergencies that threaten the power system. One of the emergency actions under the Northwest Power Pool Winter Operating Plan is for BPA to automatically drop the Kaiser and Intalco loads, over 600 MW, if a critical cross-Cascade line is lost during heavy winter load conditions. However, 75 percent of this load must be restored after 20 minutes to prevent potline freeze up. DSI load curtailment would provide 160 MW of peak load relief that would delay the need for other action by less than one year. Load curtailment is limited to an interim contingency role in the long-term plan.
EPM-2,3 Marvin Klinger none stated	**COMMENT:** Given the fact that load curtailment can be pretty expensive to society, a pretty expensive method of operation, why wasn't load management and fuel switching identified as a contingency in the preferred plan? My comment would be that I question this viability (curtailment) as a contingency, because, presumably, it's as you've already described. If you have to use it once, it may not be available the second time you'd have to use it. **RESPONSE:** Load Curtailment is not viable as a long term solution to the peak load problem. However we believe that it has a role as a short term remedy until longer term measures can be developed. Since it would be in place only a few years, the likelihood of actually having to curtail load would be quite small. Its short lead time and low cost complement the longer term contingency measures. Once longer lead time contingency elements are completed, curtailment contracts can be cancelled. Load management and fuel switching, on the other hand, require high initial investments to achieve any sizable reduction in peak load and their annual costs are higher than load curtailment. As a contingency element, load curtailment has much greater flexibility in implementation.
BPM-23 Leonard E. Sanderson Mayor, City of Milton	**COMMENT:** I believe all of the utilities now are in the process of developing a contingency plan for reduction of commercial and business type requirements in the case of shortage. Is that factored into this at all, or is that just another thing that's going on? **RESPONSE:** Your are referring to the winter operating plans that have been followed for the past few years. A description of this contingency plan has been added to Section 2.6.1.

Code	Comments/Responses
	6H. Rates
WPM-5 Vladimir Steblina none stated	**COMMENT:** Federal agencies are required to vigorously explore and objectively evaluate all reasonable alternatives. Each one of your alternatives has a base, the conservation program. The most effective means of really encouraging a conservation program is price, and the last two administrations have really urged BPA to significantly increase their electrical power rates; and I think this Puget Sound Reliability Study offers another opportunity... increasing wintertime rates within the Puget Sound, would again show a direct message to the public to encourage conservation, and will help that program a lot. **RESPONSE:** We agree that inverted block rates and seasonally differentiated rates would provide additional conservation incentives. However, conservation projects require homeowners and businesses to make substantial up-front investments they are often reluctant or too cash-short to do, even with additional incentives provided by improved retail rate design. Revised rate designs provide mandatory incentives for conservation but the investment in conservation measures is still voluntary. For that reason, BPA has generally found that large up-front cash incentives are more effective than rate increases to persuade users to invest in conservation. The conservation programs considered in the EIS accelerate programs proven effective. The BPA wholesale power rates are set to recover embedded costs and are of postage stamp design. An average cost, region-wide, electric power rate schedule is a poor tool to remedy location-specific reliability problems. A rate design that reflects the marginal costs of power could encourage more efficient choices at the wholesale level. Currently, the Priority Firm energy rate is seasonally differentiated to be higher in the winter months.
012-6 Donald Axtell none stated	**COMMENT:** Sure, we individual rate-payers know we will bear all the costs and then some! — in our utility bills — already unreadable and arcane. And while we enjoy cheap electricity by national comparison, we don't want to be sold down the river by the all-powerful BPA and have brown-outs to boot. I applaud your efforts to at least ask us what we think. It probably will do no good though, because we don't have power, only the monthly bills. But some of us do think, believe it or not. **RESPONSE:** Comment noted.
BPM-3 Robert Johnson Washington Society of Professional Engineers 026-8 Paul C. Juhasz, P.E. Washington Society of Professional Engineers	**COMMENT:** We need a shift in rate structure. We've got to have our demand rates up. I think you should look more at demand charges. Time-of-day rates. **COMMENT:** Rate changes are required to obtain the desired reduction of demand peak and to improve the power factor. This area of the country has not only low energy rates, but compared to other regions very low power demand rates. Power factor metering and penalties are either absent or very low.

Code	Comments/Responses
	Alternative Measures - 6H. Rates - continued Present practice has demand meters in all large and most medium industrial and commercial loads. Demand reduction can be obtained by increasing the demand rates with no capital cost. Time of day rates, as mentioned, would require a new set of meters to obtain the same results. **RESPONSE:** A transmission capacity surcharge, specific to areas with high location-specific marginal transmission costs, could be used to send a peak-demand-reducing price signal to the retail utilities. This, however, would be a major policy issue in a rate case because it moves away from the established postage stamp rate concept (same price of electricity regardless of location). A retail time-of-use rate design was included as part of Alternative Strategy #3. This rate design was not part of the recommended strategy because of high cost. See responses to comments WPM-5 and 026-3 for more on demand reduction through rates. **6I. Other Measures** **COMMENT:** Alternatives to the proposed actions include a vast array of means to decrease customer outage (i.e. reinforcement of the distribution system, etc.). Such alternatives, if presented, would likely offer greater improvements to service, lower environmental impacts and lower cost.
024-17 G.H. Bowers G.H. Bowers Engineering	**RESPONSE:** Distribution outages, which constitute most customer interruptions, usually affect only a few households or businesses, or perhaps a feeder serving several MW of load. However, a voltage collapse event would have a much wider scope, potentially extending from Vancouver, B.C. to Portland, Oregon. Actions to improve the distribution system in Puget Sound thus are too narrow and do not meet the underlying need to which the PSAERP is directed.

Code	Comments/Responses
	7.0 ENVIRONMENTAL IMPACTS
	7.A Conservation (No Comments)
	7.B Load Management Impacts
WPM-1 unknown	**COMMENT:** So, you would have a negative impact of having to dispose of 200,000 (hot water tanks) to landfills? **RESPONSE:** In Alternative Strategy 3, the fuel switching measure replaces electric hot water tanks with natural gas hot water tanks. As you point out, the electric hot water tanks must be disposed of. In many communities, recycling programs accept hot water tanks, which would reduce landfill impacts. Utilities could design their replacement programs so they either require or provide an incentive to recycle used tanks. It is likely that some of the old tanks will end up in landfills. Disposal impacts would not be a direct result of this program because it replaces tanks as they wear out. They would need to be disposed of with or without the program.
	7.C Fuel Switching Impacts (No Comments)
	7.D Transmission Line Impacts
018-6 Malcolm J. Macdonald Seattle City Light	**COMMENT:** If the Contingency Plan is required, we recommend using existing corridors, if possible, since the environmental analysis shows that using or widening existing corridors is preferable to building new ones. When analyzing proposed routes for any new transmission lines we urge you to avoid designated sensitive areas and critical habitat for endangered and threatened species. This includes minimizing impacts on "areas of concern" designated for the Northern Spotted Owl by the U.S. Fish and Wildlife Service. We also encourage you to avoid roadless areas and areas with high scenic and recreational values. With all these environmental constraints, if indeed a new corridor is needed, the final route may not be the shortest, but may end up being constructed over areas that have already been heavily logged. We understand that if new transmission lines are needed, a site-specific EIS will be prepared. We expect to be involved at that time. **RESPONSE:** BPA recognizes the environmental preference to use or widen existing transmission corridors. For system performance, it is preferable to add entirely new circuits rather than replacing existing ones with higher capacity. In the site-specific EIS for a transmission line, both perspectives will be considered. We will encourage wide involvement in the process.
018-15 Malcolm J. Macdonald Seattle City Light	**COMMENT:** Page 4-8 paragraph 5 should be revised to say that EMF studies on laboratory animals to date have been inconclusive. **RESPONSE:** We agree. The discussion in Section 4.2.1 expresses this in a different words, but expresses the same conclusion.

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued
018-16 Malcolm J. Macdonald Seattle City Light	**COMMENT:** Page 4-12 paragraph 6 says that the transformer oil will not be toxic. Since oil is toxic, this should be revised to say that the oil will not contain hazardous substances such as PCBs. **RESPONSE:** The recommended wording is used in the Final EIS.
018-17 Malcolm J. Macdonald Seattle City Light	**COMMENT:** On page 4-22 paragraph 2, we suggest deleting the two sentences that weaken the discussion and add a statement that only expanding or building a new transmission line is likely to result in high environmental impacts. **RESPONSE:** The topic of the paragraph was to inform the reader that interim analyses eliminated high impact solutions and summarize essential differences among the remaining strategies. The sentence on transmission lines and combustion turbines, considering site variations, was intended to indicate that such projects could pose a fairly wide range of environmental issues and impacts. Thus alerted, the reader would be able to understand the primary basis for our conclusion that alternatives that do not involve these types of measures are considered to be lower in overall impact (Alternatives 2 and 3).
021-4 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** The maps of river resources in the DEIS should be updated to display all rivers recognized by the U.S. Forest Service as eligible or suitable for Congressional designation as Wild, Scenic, or Recreational Rivers. The Forest Service came to its recommendations after years of public input and after considering all resources of the rivers, including scenery, recreation, wildlife, fish, cultural, and geological values. Relevant information is contained in Appendix E of the forest plan EIS for each national forest. The Forest Service will generally not support projects which have the potential to harm outstandingly remarkable values for which such rivers have been recognized. BPA should analyze these river recommendations upon transmission corridor routing. **RESPONSE:** Maps in the Draft EIS were produced from data files in BPA's Geographic Information System. The Federal and State Protected Areas Map (12), as you point out, does not indicate as "Protected," rivers recognized by the U.S. Forest Service as eligible or suitable for designation as Wild, Scenic or Recreational Rivers. The Draft EIS included only enough information to make a decision among alternate methods of correcting the electric reliability problem. For example, Alternative Strategy 1, which relies primarily on a new transmission line, was judged to have higher impact than other strategies. Strategy 2 was selected as the preferred action in part due to its lesser environmental impact. A transmission line could still be needed if demands on the power system change dramatically in the next few years. Greater than anticipated load growth, unanticipated losses of generating capabilities or other similar events could occur. As a precaution against such events, several contingency actions were identified to assure reliable electric service. A contingency for the proposed alternative is a new cross-Cascades transmission line. A new line would take perhaps 6-8 years to plan, design and build. We intend to begin

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued
	work on an EIS addressing the transmission line contingency in late 1992 or early 1993, so that this option is available should a need exist. We spoke with both the Mount Baker/Snoqualmie and Wenatchee National Forests and they will be actively involved in the EIS for the transmission line contingency. This EIS will be much more detailed and will look not only at currently protected rivers but those eligible for protection.
021-5 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** Priority (Second) should be upgrading existing lines to 500 or 750 kV. **RESPONSE:** If a line is needed, priority will be given to using existing corridors and utilizing replacement options (see Section 4.2.1). This would include upgrading a lower voltage line to 500-kV. The additional expense of constructing a new line at 765-kV was not justified, since it did not perform significantly better than 500-kV (see Appendix E, Table 302).
021-7 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** If new corridors are needed, they should avoid critical wildlife habitat, roadless areas, and valleys currently without transmission lines. The Naches Pass corridor would traverse an "area of concern" delineated by the U.S. Fish and Wildlife Service for the northern spotted owl. This should be the last place to locate such a line due to its impact on critical habitat of the northern spotted owl. This route would also cause significant degradation of the scenic and recreational resources of the Little Naches Valley. The White Pass corridor also has critical habitat for the spotted owl, as well as extremely important recreational and visual values. Thus, we urge you to drop the White Pass and Little Naches/Greenwater River corridors from further consideration.
021-8 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** The Cle Elum to Wenatchee corridor could have severe impacts on spotted owl critical habitat, scenery, and recreation, and could be in conflict with the management guidelines of the Wenatchee National Forest's forest plan. The present routing is unacceptable. Many old-growth forests and rare plant associations are found in the general vicinity of Swauk Pass and should be given wide berth by any powerline. A route entirely around the national forest land between Wenatchee and Cle Elum will be at lower elevation—and less subject to winter storm damage—and will have much less environmental impact.
021-9 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** The western part of the Skykomish-Echo Lake corridor should be changed to use Proctor Creek (just west of Index) instead of Money Creek. The Forest Service's Alpine Lakes Management Plan has set aside much of the upper Tolt River and Money Creek watersheds for dispersed recreational uses. This Dispersed Recreation management allocation prohibits construction of roads and has other provisions generally prohibiting development. Construction of a transmission line in Money Creek or the upper Tolt River on national forest land is therefore unacceptable. (ALMP p.6.)
021-10 Mark Lawler Sierra Club, Cascade Chapter	**COMMENT:** The corridor over the Cascade Crest at Midway near Mt. Adams also has problems, as it passes through important forest, recreational, and scenic areas in the Gifford Pinchot National Forest. **COMMENT:** If at some future date, after other options have been exhausted, another corridor across

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued
021-11 Mark Lawler Sierra Club, Cascade Chapter	the Cascades is needed, locations could be found south of Stampede Pass but staying out of the Little Naches and Greenwater valleys and avoiding the Kelly Butte roadless area (a roadless area omitted from Forest Service inventories) and the Quartz roadless area. A corridor near Tacoma Pass that avoids roadless areas and spotted owl critical habitat could be considered. This would increase reliability with less impact to virgin forests and other valuable public resources than the other corridors, especially if it is routed principally through the heavily cut-over private lands. **COMMENT:** If any forest is removed to accommodate new or wider existing rights-of-way for a powerline, the forest should be replaced in kind by acquiring existing old-growth forest on private lands. By selecting such lands in the intermingled ownerships in the I-90 corridor, they could easily be transferred to the jurisdiction of the U.S. Forest Service. Other options to reduce environmental impacts and winter icing problems include placing portions of the line underground. Any new route would need to be carefully sited, not using merely the shortest, straightest route as seems to be the case with most of the mapped corridors in the draft EIS. In any event we agree (Section 2.2.3) that a full site-specific EIS must be done for any transmission line project.
021-12 Mark Lawler Sierra Club, Cascade Chapter	**RESPONSE:** As indicated in earlier responses, EIS scoping for the transmission line contingency will begin in late 1992 or early 1993. Your information and comments will be used as a starting point in scoping this EIS. Scoping meetings would typically be held in several locations along the existing transmission line corridors. We will let you know of these meetings and we hope you will be able to attend.
021-3 Mark Lawler Sierra Club Cascade Chapter and also 022-3 Charles C. Raines none stated	**COMMENT:** Prior to any transmission projects a full review of the cross-Cascades corridors needs to be done in light of recent listing of wildlife species as threatened. **RESPONSE:** We plan to begin scoping for an EIS on the transmission line contingency in late 1992 or early 1993. We have already contacted the U.S. Forest Service and they will certainly be a cooperating agency for preparing the EIS. The U.S. Fish and Wildlife Service and BPA are currently discussing how listing of the Northern Spotted Owl will affect operation and maintenance of existing transmission facilities. We will ask them to cooperate in preparing the transmission line EIS.
022-5 Charles C. Raines none stated	**COMMENT:** If new corridors are needed BPA should avoid critical habitat, roadless areas and valleys currently without transmission lines. The Naches Pass corridor should be dropped as it would cross critical habitat in an "area of concern" for the northern spotted owl (USFWS August 1991). It also crosses roadless areas and traverses two major valley that are currently free of powerlines. **RESPONSE:** If a line is needed, priority will be given to using existing corridors and utilizing replacement options (see Section 4.2.1). This would include upgrading a lower voltage line to 500-kV. If a right-of-way is expanded or new corridor is needed, critical habitat for the spotted owl will be considered. Areas of concern have been incorporated into the GIS database.

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued A full EIS will be completed before construction of a transmission line. All comments concerning transmission corridors or segments of corridors discussed in the Draft Northern Cascades Corridor Study have been noted and will be addressed in the transmission EIS.
022-6 Charles C. Raines none stated	**COMMENT:** BPA should also drop consideration of the White Pass corridor for similar reasons. The Cle Elum to Wenatchee corridor would have likely have some impacts on these resources but routing may avoid the most severe.
022-7 Charles C. Raines none stated	**COMMENT:** The Skykomish-Echo Lake segment should be changed to use Proctor Creek (near Index) instead of Money Creek. Again, the Money Creek route would cross important forests habitat, roadless areas and scenic recreation areas.
022-8 Charles C. Raines none stated	**COMMENT:** The corridor over Midway north of Mt. Adams also has problems with forest habitat, recreation and scenic quality.
022-9 Charles C. Raines none stated	**COMMENT:** If, at some time in the future, another corridor across the Cascades is needed, a location might be found south of Stampede Pass but staying out of the Little Naches and Greenwater valleys. A route over Tacoma Pass would provide an alternate from south of Easton up Cabin Creek to an intersection with the existing lines on Sunday Creek (vicinity of Section 9). It could then follow Smay Creek west to the Puget Sound grid. If the ROW took advantage of the heavily cutover private lands, it would increase reliability while causing far less impact to forests and other resources than the currently proposed routes.
022-10 Charles C. Raines none stated	**COMMENT:** If any forest is removed to accommodate new or wider existing rights-of-way the forest should be replaced in kind by acquiring existing old-growth forest on private lands. By selecting such lands in the intermingled ownerships in the I-90 corridor, it would easily be transferred to the jurisdiction of the Forest Service.
022-11 Charles C. Raines none stated	**COMMENT:** Any new route would need to be carefully sited, to minimize impacts, not just the shortest or straightest route. Placing all or part of transmission lines underground should also be evaluated in any project specific EIS. **RESPONSE:** The above comments address topics that will be considered during scoping for the Transmission Line Environmental Impact Statement, scheduled to begin in late 1992 or early 1993. See also response to Mark Lawler.
022-12 Charles C. Raines none stated	**COMMENT:** While the maps were very helpful in understanding the issues I noted a few instances where corrections may be warranted. Vegetative Patterns (Map 4) seems to be in error as i shows developed farmland, glaciers and urban areas as "developed land." The data also is 10 years old during which a significant amount of forest land has been developed in the Puget Sound basin.
022-13 Charles C. Raines none stated and 018-7 Macdonald, Malcom Seattle City Light	**COMMENT:** The Anadromous Fish Map (#6) appears to have some errors. We do not believe there are anadromous fish above Gorge Dam on the Skagit River, above Snoqualmie Falls on the Snoqualmie River, above the debris dam on the Toutle River, above the falls on the Green River (Mt. St. Helens National Monument) or on the Stehekin River.

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued
022-14 Charles C. Raines none stated	**COMMENT:** The Land Ownership Map (#13) on the Wenatchee National Forest is out of date. The Protected Areas Map (#12) is so broad as to be misleading. There is tremendous variation in the amount of "protection" each area is afforded. At least, national parks, wilderness, spotted owl critical habitat units (CHU) and Habitat Conservation Areas (HCA) should be delineated. **RESPONSE:** Maps in the Draft EIS were produced from GIRAS (Geographic Information Retrieval and Analysis System, USGS) data residing in BPA's geographic information system. GIRAS data is routinely used by BPA to display regional land use patterns and is appropriate for this EIS. It is BPA's intent to complete a transmission line EIS to analyze the impacts of a cross-Cascade transmission line. Land use data will be updated at that time using up-to-date aerial photography. Developed land was meant to refer to agricultural and urban areas. Glaciers will be added to the barren land category. We will verify the information provided and update Maps 6 & 13.
023-1 Robert G. Waldo Energy Facility Site Evaluation Council	**COMMENT:** If BPA were to choose to build or upgrade a transmission line, EFSEC would expect BPA to work with EFSEC under the July 7, 1983 Memorandum of Understanding and the November 17, 1983 Memorandum of Agreement for Transmission Facility Siting. The Memorandum of Agreement calls for undertaking activities to achieve compliance with applicable federal and state statutes. In line with the BPA/EFSEC MOA and the Model Process. EFSEC would expect to review any proposed line for determination of siting alternatives and compliance with substantive state standards. The Council's environmental review responsibility should be specifically mentioned in Section 5, Environmental Consultation, Review, and Permit Requirements and listed in Table 5-1 on page 5-2 of the draft EIS. **RESPONSE:** We agree that EFSEC will play a significant role (cooperating agency) in the transmission line EIS. Following completion of this EIS, BPA and EFSEC should begin discussions on how both Washington and Federal environmental responsibilities and standards would best be integrated.
023-2 Jerry B. Schultz WA Department of Transportation	**COMMENT:** Impacts to the transportation system resulting from the implementation of the alternatives were not discussed in the DEIS at all. We realize that certain components of each alternative will have no transportation impacts, but those alternatives that include transmission line improvements should be evaluated for transportation impacts.
023-3 Jerry B. Schultz WA Department of Transportation	**COMMENT:** For those alternatives involving construction activities, we would be interested in reviewing a discussion addressing issues such as: • access to and from construction site. • volume and characteristics of construction related traffic. • encroachment into or across highway rights of way. • modification of franchise agreements or permits, if needed. • haul routes for materials delivery. • traffic hazards associated with construction activities.

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued
	RESPONSE: An expanded discussion of transportation has been included in Appendix G, which discusses the proposed switching station near Ellensburg. Construction equipment and material requirements for switching stations are not particularly great. Construction equipment and materials would be delivered to the Ellensburg area via Interstate and State Highways. Restrictions normal to these roads would be adhered to. If other than normal transport means are required such would be closely coordinated with the Washington Department of Transportation and appropriate permits would be obtained. The proposed site for the new switching station would be accessed from Wilson Creek Road, a Kittitas County road. BPA will build a new access road from Wilson Creek Road for a distance of about 2000 feet to the switching station. The road would be built to a standard quite similar to that of a county road. Power transformers and other such heavy devices that are sometimes used in substations are not planned at this switching station. Discussions with county road departments typically reveal a fairly standard set of concerns. Road weight restrictions are imposed during spring thaw. Occasionally width and weight limitations are also imposed for bridges.
023-4,5, & 7 David F Dietzman WA Department of Natural Resources	**COMMENT:** In general, the maps included in the draft environmental impact statement are too broad to specifically detail impacts to state trustland managed by the Department of Natural Resources. It should be assumed that easements from the Department of Natural Resources for this project would be required for any of the alternatives. We also encourage that BPA avoids alternatives that necessitate construction of new transmission corridors in forested areas. Transmission corridors destroy forest/wildlife habitat and the ability to market forest products from the corridor indefinitely. **RESPONSE:** Public comments during EIS preparation and on the Draft favored rebuilding existing lines or using existing transmission line corridors. In both cases the rights-of-way are already cleared of trees. One of these two options may be favored should a new cross-Cascades line be needed.
024-8 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** DOE's inexcusable failure to consider where energy is going to come from once transmission capability is built to eastern Washington is a failure of the highest order. In a document meant to bring environmental impacts to the attention of Congress, the executive branch, the public, and decisions makers at DOE, the inclusion of such information is critical. **RESPONSE:** The EIS explained where the energy is coming from to meet forecast peak loads, however Section 1.4.5 in the DEIS has been expanded to more completely define the sources of peaking capacity as requested. In summary, 400 MW of forecast growth in peak load demand (between 1993 and 2003) will be supplied by resources within the Puget Sound Basin. The remaining 1200 MW of forecast growth in peak load demand will come from existing generating facilities located east of the Cascades. These assumptions have been made in several locations within the document and its appendices.

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued
024-10 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** DOE has stated sales to California will be cut back to provide energy over a new powerline. Were this accurate, environmental damage caused in California would then need to be considered. **RESPONSE:** Decisions on federal energy supply are outside the scope of this EIS. Meeting infrequent, short duration peak capacity demand of the Puget Sound region with Northwest generating resources, by itself, will have virtually no impact on the environment in California. Energy supply alternatives are addressed in the Resource Program Draft EIS planned to be released this spring.
027-2 D. Dean Bibles U.S. Dept. of Interior, Bureau of Land Management	**COMMENT:** Your description on page 2-9 of potential transmission line corridors reflects earlier input by Bureau staff. The description of land ownership and current uses by corridor options in section 3.2, beginning on page 3-7, appears consistent with earlier input by BLM.
027-3 D. Dean Bibles U.S. Dept. of Interior, Bureau of Land Management	**COMMENT:** In conclusion, our current best available data and proposed management direction is consistent with all of your alternatives and your analysis of direct inputs described in Chapter 4 beginning on page 4-5. **RESPONSE:** Comments noted.
029-2 Leonard T. Garfield Preservation Programs Coordinator WA Dept. of Community Development, Office of Archeology and Historic Preservation	**COMMENT:** Because construction and operation of transmission lines may effect significant cultural resources, we concur with your decision to conduct a cultural resource survey. It is my understanding that survey results will be included in the Final Environmental Impact Statement. **RESPONSE:** Since publishing the Draft EIS, Eastern Washington University has conducted an on the ground survey of cultural resources along the route of the access road and within the boundaries of the proposed substation (Site 3). Their survey found no cultural resource sites in the area.
SEPM-1 Joseph Calmes NUWBEL	**COMMENT:** There's a discussion of EMF on pages 4.8 and 4.9 that indicates that EMF is a largely unknown risk, but certainly a possible risk to human health. Yet all the different strategies, the alternatives list health and safety as having a low impact — It would seem by your very own definition that any time there's an increase in the current — significant increase in the current through any of these transmission lines, you have any EMF increase situation which by the definition would be a moderate impact. Why is it listed as a low impact instead of some of these being moderate? **RESPONSE:** Utilities are concerned about electric field effects and support an open-minded scientific inquiry into this matter. To date, no health effects are definitely known to be caused by the fields created by electric power lines, but studies suggest the possibility. Studies on this topic are continuing. The impact magnitude definitions cited in your comment provided a framework for expressing environmental conclusions, but the experience and judgment of the environ-

Code	Comments/Responses
	7.0 Environmental Impacts - 7D. Transmission Line Impacts - continued mental team members also had a role. This was particularly true for the low impact rating assigned to transmission line health and safety impacts. Several other impacts such as electrical hazards due to line failures, and incidental contacts with transmission lines were also identified health and safety impacts (see Appendix F pages 30-35). However, the rating was mostly based on EMF effects. The following paragraphs summarizes the dialogue among utility environmental staff that led to this rating. This rating was discussed in two meetings of the environmental study team. This rating received more discussion than any other impact rating. The assignment of a low impact magnitude was thoughtfully made. The impact rating scale (minimal, low, moderate or high) provided the discussion framework, however other factors were certainly involved. The rating that resulted was influenced by tradition as much as the impact definitions. The utility industry has traditionally taken the position that while electro-magnetic fields are created by electrical devices, these fields have no adverse health impact (no impact). In light of recent research findings the consensus was that a low impact rating and its definition best expressed the health and safety impact of transmission line caused fields. This rating was not at the bottom of the impact scale, implying no possible impact, but as research findings are not conclusive it seemed inappropriate to assign a moderate impact rating. We have reviewed the definition for low impact and the word "insignificant" in the health and safety instance gives a wrong impression. This word has been removed from the definition.
SEPM-2 Joseph Calmes NUWBEL	**COMMENT:** It would be my recommendation that — and I haven't seen Appendix G — I understand there is some rating in Appendix G, some estimate of the levels of the milligauss that will be experienced within the right-of-ways of the transmission lines. And certainly that should be there as a baseline. **RESPONSE:** Yes, magnetic field level projections in milligauss both with and without the new switching station are provided in Appendix G. The discussion of impacts for the new substation (Section 4.3.1) summarizes conclusions and technical data provided in Appendix G. In the interest of brevity and readability, detailed information has been confined to technical appendices and are written to a more technical audience. A copy of Appendix G is being distributed with the Final EIS.
SEPM-6 Greg Bowers G.H. Bowers Engineering	**COMMENT:** I can see why the utilities — Snohomish and whatnot — want to have the line built. It gives them lots of options. And there's something to be said for that, but it's something that should be acknowledged in the EIS that this is why we're doing it, and these are the impacts of doing that. **RESPONSE:** The Proposed Alternative, if study assumptions prove correct, postpones the need for a new transmission line for about ten years. A transmission line contingency was added to the proposed alternative as a means of dealing with greater than expected needs. We expect that a new line will require a thorough and time-consuming environmental review. To get a headstart on transmission line siting, and thereby establish a line as a viable contingency, BPA plans to begin work on a transmission line EIS in late 1992 or early 1993. This EIS will address transmission line impacts in a more detailed manner.

Code	Comments/Responses
	7E. Voltage Support Impacts
029-1 Leonard T. Garfield Preservation Programs Coordinator WA Dept. of Community Development, Office of Archeology and Historic Preservation	**COMMENT:** We concur with the comments in Section 5.4 of the Draft EIS that specific construction measures undertaken as part of the plan will be reviewed according to the provisions of the 1983 Programmatic Memorandum of Agreement. **RESPONSE:** Since publishing the Draft EIS, Eastern Washington University has conducted an on the ground survey of cultural resources along the route of the access road and within the boundaries of the proposed substation (site 3). Their survey found no cultural resource sites in the area.
	7F. Local Generation Impacts
009-2 James L. Nolan Compliance Director, Puget Sound Air Pollution Control Agency	**COMMENT:** The U.S. Environmental Protection Agency's designated the Federal Aid Urban Areas in Snohomish, King, and Pierce Counties as "nonattainment" for carbon monoxide, and these entire counties as nonattainment for ozone. As a result, the construction of a combustion turbine capable of emitting over 100 tons per year of carbon monoxide, volatile organic compounds or nitrogen oxides now requires approval of a "new source review" permit pursuant to Section 6.08 of Puget Sound Air Pollution Control Agency Regulation I. **RESPONSE:** The Proposed Action identifies peaking combustion turbines as a contingency measure that could be used if unforeseen conditions create larger than anticipated peak demands. Several commenters requested more information about combustion turbines and the conditions under which combustion turbines might be needed. An expanded discussion on the combustion turbine contingency is provided in Section 2.1.1. Your comments on air quality regulations in Snohomish, King, Pierce and Kitsap Counties were incorporated into this discussion (see Section 5.15.2). The combustion turbine contingency is second in preference to the transmission line contingency. Either of these contingencies would only be proposed if electric loads increase more rapidly than expected or if other unforeseen events cause the electric reliability problem to be larger than expected. We expect that the study planning assumptions will prove to be valid and that the contingency measures will not be needed. Site-specific environmental evaluations for the contingency measures (such as combustion turbines) have not been completed. The PSAERP EIS is a tiered analysis. This EIS will establish a plan or framework that will guide the region's electric utilities to solve the electric reliability problem. As individual utilities propose projects recommended by the plan, site-specific environmental reviews will be done by the project sponsors. In the case of a combustion turbine, a second EIS would be prepared in accord with Federal and/or State Environmental Policy Act procedures. One topic that would be addressed through this review would be the air quality permit requirements pointed out in your letter. The Puget Sound Air Pollution Control Authority would be involved in an EIS for a peaking combustion turbine (if proposed in the above mentioned counties).

Code	Comments/Responses
	7.0 Environmental Impacts - 7F. Local Generation Impacts - continued
009-3 James L. Nolan Compliance Director, Puget Sound Air Pollution Control Agency	**COMMENT:** If the construction of a combustion turbine is to be seriously considered, it will be necessary to evaluate the impact of such a facility relative to the alternative of converting homes to natural gas (or other fuels) for space and water heating. From an energy policy standpoint, the fuel switching approach would have more than double the efficiency of fuel energy utilization. Combustion turbines are capable of converting only about one third of the energy of the fuel into electricity, whereas residential natural gas furnaces and hot water heaters are capable of achieving up to 95% thermal efficiency. ... If local generation becomes preferable, an alternatives analysis similar to that outlined above will be a prerequisite. **RESPONSE:** The response above explains that additional environmental analysis would be needed if a combustion turbine(s) is proposed. Fuel efficiency would normally be discussed in such a review.
009-4 James L. Nolan Compliance Director, Puget Sound Air Pollution Control Agency	**COMMENT:** A combustion turbine would be required to meet the "lowest achievable emission rate" obtained anywhere in the country by such a facility and would [be] required to obtain "emission offsets" equivalent to 110% of the emissions from the new source. Since no emission reduction credits are currently banked with the Agency, these reductions would need to be obtained from other emission sources with the nonattainment areas in accordance with the requirements of Section 6.08. **RESPONSE:** Comment noted.
017-7 Sherilyn Wells Bellingham League of Women Voters	**COMMENT:** Please consider providing for mitigation of environmental impacts in ways similar to the Dutch solution of reforesting huge tracts of Central America to offset the emissions of a coal-fired plant, a stance that goes beyond merely complying with existing environmental legislation. **RESPONSE:** The objective of planting trees in Central America would be to sequester carbon by removing carbon-dioxide from the global airshed. Carbon-dioxide is reported to be a major contributor to global warming. The proposed action will not create carbon dioxide air emissions, unless the combustion turbine contingency is needed. The transmission line is the primary contingency measure, thus, the probability of needing CTs to meet peak load is very low. However, before such facilities could be built and operated, additional site-specific environmental coverage would be needed. Air emissions and mitigation techniques would be major issues in this review.
024-12 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** Energy sources which a powerline to eastern Washington would tap would be primarily coal fired. Air pollutant emissions from a coal resource would likely be at least 20 fold greater than the emission from any resource developed in western Washington. The EIS omits such basic facts.

Code	Comments/Responses
	7.0 Environmental Impacts - 7F. Local Generation Impacts - continued **RESPONSE:** We assumed winter peak loads of Puget Sound will be supplied by existing generation facilities located east of the Cascades where surplus capacity is available for the foreseeable future. Output form either existing hydroelectric or existing thermal resources (or both) would be delivered to Puget Sound over the transmission system. The proposed alternative expands the transmission capacity through voltage support additions. These existing generating resources we also assumed would operate in compliance with all environmental standards as well as their operating licenses. The decision to license, build and operate these facilities was made long ago, presumedly with benefit of environmental input. To the extent the status quo would be altered, if at all, the future transmission line EIS would analyze such impacts. The environmental impacts of new energy resource decisions are being analyzed in the Resource Program EIS. The addition of cross-Cascade transmission capacity does not rely on new generation east of the Cascades to be effective (see response to comment 024-3).
SEPM-4 Greg Bowers G.H. Bowers Engineering	**COMMENT:** The other apples and oranges problem I have with the EIS is that it compares putting a CT in western Washington with building a transmission line, and a transmission line doesn't get you anything. It's just a line. It gets you access to something. An so the EIS didn't consider the air quality analysis or the impacts to eastern Washington or wherever the energy and capacity is going to come from. And Alan pointed out that there may be a capacity surplus. Even if there were, it would cost a certain amount of money to buy that capacity from somebody, and that sort of cost wasn't part of the analysis. **RESPONSE:** The value of capacity was considered in the analysis. The alternatives differ only incrementally in how the capacity needs of the Puget Sound area are met. Most of the required capacity will continue to be supplied by existing generation resources both in the load area and east of the Cascades. It is not necessary to account for this component of capacity supply common to all alternatives. Each of the measures considered in the analysis have energy and capacity benefits. Accelerated conservation produces both energy and capacity. Combustion turbines produce mostly capacity benefits. The transmission line reduces system losses and therefore contributes both energy and capacity. These measures increase the region's supply of energy and capacity which has a value. This value was included in the net present value analysis. Those measures which increase access to the existing surplus firm and non-firm capacity of the existing hydro system will in general provide the lowest cost capacity to meet Puget Sound's peak needs.
	7G. Curtailment Impacts
018-10 Malcolm J. Macdonald Seattle City Light	**COMMENT:** In Table S-2 and in Figure 4-6 the socio-economic effects of Curtailment contracts should be Moderate, not High. **RESPONSE:** You are correct. The environmental study team concluded that socio-economic impacts were Moderate. In the Draft EIS this rating was mistakenly changed to High. The figures cited are revised in the Final EIS.

Code	Comments/Responses
	7H. New Substation Impacts
008-1 Gary Brown and Jan Gordon Brown Sun East Property Owners	**COMMENT:** We find statements regarding Site 2 which are incorrect. We also believe the environmental impact of Site 2 has been substantially understated, as explained in the following comments ...
008-2 Gary Brown and Jan Gordon Brown	**COMMENT:** Our comments to the DEIS and Appendix G follow: 1.0 DEIS, September 1991: 1.1 Elk, badger, rabbits, birds of prey and upland game birds should be included in the "shrubland and wildlife" section of 3.1.2, page 3-2.
008-3 Gary Brown and Jan Gordon Brown	**COMMENT:** Elk, rabbits, falcons, owls and eagles should be included in the "grasslands and wildlife" description of 3.1.2, page 3-3.
008-4 Gary Brown and Jan Gordon Brown	**COMMENT:** Currier Creek is a designated wetland as stated on page 9 of Appendix G and should be referenced in the second paragraph on page 3-10 as adjacent to Site 2. A tributary of Currier Creek runs from late winter to early summer and runs through the center of proposed Site 2.
008-5 Gary Brown and Jan Gordon Brown	**COMMENT:** The first sentence of the third paragraph on page 3-10 should be revised to read " ... agricultural land, except Site 2 which is located within the Sun East residential development." Site 2 is substantially more residential than site 1,3, and 4. Sun East sites are existing residential and future residential sites, not exclusively "rangeland."
008-6 Gary Brown and Jan Gordon Brown Sun East Property Owners	**COMMENT:** The fourth paragraph of page 3-10 specifically excludes reference to Currier Creek, a designated wetland which does contain vegetation consistent with riparian areas. The remaining parts of the site areas are also home to furbearers, deer, elk, game birds and birds of prey. These animals and birds do not confine themselves to riparian zones but rely on the vegetation on the remaining parts of the site areas as critical winter habitat. Hundreds of elk and band of mule deer have been witnessed feeding during winter months on the proposed Site 2. Bitterbrush is a valued and preferred food for the Rocky Mountain mule deer and is important as winter forage food and cover. There are large areas of the proposed sites which do not contain bitterbrush. Please note that Site 2 however, due to the proximity to Currier Creek, is approximately 50 percent bitterbrush and clearing this site would have a greater effect on wildlife than either Site 1 or 3.
008-7 Gary Brown and Jan Gordon Brown	**COMMENT:** Figure 4-2, page 4-10, lists impacts to residential, wildlife, vegetation, water, soils, groundwater and aesthetics as low. A high impacts as defined on pages 4-1 and 4-2 would create a significant adverse change in present environmental conditions. Site 2 has significant amounts of new and mature bitterbrush as well as grasses as shown in your aerial photographs. The narrow band of critical winter habitat between the Wenatchee Mountains and the developed agricultural land is a major factor in determining the population of local deer and elk herds that summer in the Wenatchee Mountains. Permanent removal of 50 acres of this critical winter habitat would satisfy items 4 and 5, and possibly 6, of the listed outcomes under the high impact definition, and would require that the impacts be listed as "high."

Code	Comments/Responses
	7.0 Environmental Impacts - 7H. New Substation Impacts - continued
	... The rangeland referenced is critical winter habitat for deer and elk and 50 acres lost forever is not a low impact when you are considering big game's critical winter habitat.
008-8 Gary Brown and Jan Gordon Brown	**COMMENT:** Description of New Substation, page 4-11. Level grading would require building up of the southern end of the station approximately 50 feet. With Site 2 within 150 feet of Currier Creek, how is this grading proposed to be accomplished without permanent change to Currier Creek? How will the tributary from Currier Creek which runs through the center of the site be handled? How will the 50-foot high fill be handled adjacent to the Sun East access road, since the road is adjacent to the site?
008-9 Gary Brown and Jan Gordon Brown	**COMMENT:** Rather than considering the closeness of road "A" to the proposed site as an advantage, grading the proposed Site 2 would raise the level up to 50 feet at the southwest corner adjacent to road "A." Prevailing west winds and snow in the winter months would cause severe drifting and accumulation of snow over road "A," blocking ingress and egress of residents through Sun East. Since Currier Creek prevents movement of the site to the east, what is your proposed solution to this problem? Please note that the existing three-foot-high shoulder on the east side of road "A" has caused 8-foot snow drifts over the road in past winters, necessitating considerable plowing.
008-10 Gary Brown and Jan Gordon Brown	**COMMENT:** In the second paragraph under "Land Use Impacts," page 4-11, the current use of land around Site 2 in Sun East properties is residential. ... Choosing Site 2 would require purchase of four subdivided lots as shown when correcting the overlay of the affected lots per the attached marked up copy as evidenced by a survey performed in May 1991 on lot 10. Lots 12, 13, 14 and 15 all lie within the proposed Site 2. The 500-foot spatial buffer zone around the fenced area would also include Currier Creek, access road "A," and portions of lots 5,6,7 and possibly 18. With regard to use of land in and around Site 2 as rangeland, lot 12 has a well and a residence is planned about 1997. Lot 11 was bought by us in April 1991 and we have already built a small cabin on the property, with retirement residence planned in 1997. Lot 10 was purchased in March of 1991 and was surveyed this summer as two 10-acre home sites. Lot 5 completed construction of a new residence this fall and lot 7 also has a residence which does not show on your aerial photo but has been there for several years. The proposed Site 2 would directly impact residences as the site would be wholly, not partly, visible by nearly all residences of Sun East which now number approximately 20 year-round families.
008-11 Gary Brown and Jan Gordon Brown Sun East Property Owners	**COMMENT:** View of the lower Kittitas Valley and the city lights at night would be wholly blocked from the residences in the lower areas of Sun East. Accompanying photos taken from lot 11 show the magnitude of this visual impact. The impact is such that we could no longer consider our property as a potential site for out retirement home. Impact to residential properties of Sun East is high.
008-12 Gary Brown and Jan Gordon Brown	**COMMENT:** Wetland Impacts, page 4-11. Currier Creek is a designated wetland and is within 200 feet of Site 2, with a tributary of Currier Creek running through the center of the proposed site from late winter to early summer. With the site elevation dropping approximately 50 feet from north to south and additional substantial drop from west to east as the site approaches Currier Creek, all grading activity to develop 50+ level acres adjacent to the

Code	Comments/Responses
	7.0 Environmental Impacts - 7H. New Substation Impacts - continued
	creek could affect the creek and its tributary. A Section 404 permit should be required to assure protection of Currier Creek, since its consideration was erroneously omitted from this paragraph.
	COMMENT:
008-13 Gary Brown and Jan Gordon Brown	Wildlife Impacts, page 4-11. Correct the statement to show Site 2 as near riparian zone (Currier Creek). Also, riparian zones are not the most important for wildlife habitat in the area. The proposed four sites are predominately sage, bitterbrush and various bunchgrasses. Hundreds of elk and groups of mule deer use this habitat as critical winter forage.
	COMMENT:
008-14 Gary Brown and Jan Gordon Brown	Vegetation Impacts, page 4-12. Permanent loss of 50+ acres of critical winter habitat is not minor. Bitterbrush in the eastern half of site 2 is up to seven feet high and approximately one hundred years old, providing valuable forage and cover for mule deer and elk. Reasoning that the vegetation is common throughout the area is not correct, since many of the areas are void of bitterbrush, as evidenced by your aerial photos. Further reasoning that vegetation being common throughout the area means that the loss is a low impact is also not correct. Available critical winter habitat establishes the size of the deer and elk herds in the Wenatchee Mountains and loss of 50 acres means a reduction in the size of these herds forever.
	COMMENT:
008-15 Gary Brown and Jan Gordon Brown	Water, Soil and Groundwater Impacts, page 4-12. The statement that there is no evidence that subsurface flow is accessed by ranchers in the vicinity of these sites in incorrect. There are residential wells on lots 5, 7, and 12 around the proposed Site 2. These wells are a matter of public record, but the records apparently were not investigated. Continuity of the soil layers will be disturbed in the spatial buffer zone around the sites, as well as the site itself, due to the slope of the terrain. This could result in a disturbed area of up to 100 acres. ... The last sentence excludes addressing Currier Creek. The proximity of Site 2 to Currier Creek should be addressed. Grading and rerouting of tributary and surface runoff could impact Currier Creek.
	COMMENT:
008-16 Gary Brown and Jan Gordon Brown Sun East Property Owners	It is stated that use of herbicides in substation areas to prevent vegetation growth could affect soil and ground water. How will protection of the existing residential wells and Currier Creek be assured.
	COMMENT:
008-17 Gary Brown and Jan Gordon Brown	Aesthetics Impacts, page 4-12. The Naneum site is substantially smaller than the proposed new substation and is located against a hillside. It is not placed among residences nor does it block residential views of Ellensburg and the Kittitas Valley, as would the proposed site 2. It may be an indicator for sites 1 and 3 but it is not a good indicator for site 2. Site 2 is also visible from west Interstate 90 and Ellensburg, since it does not have any hills blocking it as do the other sites. The plateau north of Ellensburg ends east of site 2, creating a depression between site 2 and Ellensburg, allowing visibility of the site. Considering existing site 4 as a good indicator of aesthetics for Site 2 is a substantial understatement. The statement that several ridges and knolls lie between Ellensburg and Site 2 is misleading. While some land features lie between Site 2 and northeast Ellensburg, there are no

Code	Comments/Responses
	7.0 Environmental Impacts - 7H. New Substation Impacts - continued
	ridges or knolls between site 2 and west Ellensburg. There are also more than a few scattered rural homes in the vicinity of Site 2. Views from approximately 14 rural homes around site 2 in Sun East will be directly and substantially impacted and several homes will have their entire view of Ellensburg and adjacent Kittitas Valley totally blocked. Comparing the existing transmission line visual impact to a 1500-foot-wide substation on 0-50 feet of fill and with dense capacitor banks adding 35 feet more in elevation and taller dead-end towers is a gross understatement to the aesthetic impact on the residents of Sun East. The accompanying photographs show the magnitude of this impact. Would the authors of this document consider it a low impact if they had to stare at it from their residence.
008-18 Gary Brown and Jan Gordon Brown	**COMMENT:** Health and Safety Impacts, page 4-13. The statement should be qualified by explaining that the impact at site 2 would be greater than at sites 1, 3 or 4 due to the proximity of Sun East residents. The statement that the substation would not change EMF exposures at any existing residences in the vicinity of the facility may not be correct, since some of the residences closest to the site are not shown on the aerial photograph or the population density chart. Information used in evaluating the proposed site 2 seems to be several years old, which questions the validity of the information. Also, because of the proximity of the Sun East access road, residents will be required to drive by the site several times daily.
008-19 Gary Brown and Jan Gordon Brown	**COMMENT:** Mitigation Potential, page 4-14. Sun East residential properties and the designated wetland Currier Creek should be considered as incompatible with the use of site 2 as a potential substation site and its consideration should be excluded from the plan.
008-20 Gary Brown and Jan Gordon Brown Sun East Property Owners	**COMMENT:** Figure 4-6, page 4-21. Impacts for alternative strategy 2 should be higher as long as site 2 remains a consideration in the plan. (See comment 1.6.)
008-21 Gary Brown and Jan Gordon Brown	**COMMENT:** Fish and Wildlife Conservation, page 5-1. Currier Creek is an avenue of deer and elk migration from the Wenatchee Mountains to site 2 and surrounding areas between the mountains and the fenced agricultural land. Hundreds of elk have been observed using the area. Contrary to no interference being anticipated, loss of 50+ acres will displace native wildlife permanently from the site. The Department of Wildlife will have to address this also.
008-22 Gary Brown and Jan Gordon Brown	**COMMENT:** Recreation Resources, page 5-3. The last sentence should be amended to identify site 2 as close to Currier Creek.
008-23 Gary Brown and Jan Gordon Brown	**COMMENT:** Wetlands, page 5-4. The last statement should be corrected to identify site 2 as adjacent to Currier Creek, a designated wetland.
008-24 Gary Brown and Jan Gordon Brown	**COMMENT:** Coastal Zone Management Consistency, page 5-4. The statement should be corrected to reflect site 2 as adjacent to Currier Creek.
008-25 Gary Brown and Jan Gordon Brown	**COMMENT:** Clean Water Act, page 5-7. The last paragraph is incorrect. Site 2 is adjacent to Currier Creek and the amount of grading that will be required to level the site requires a permit from the Corps issued under the authority of Section 404 of the Clean Water Act to protect Currier Creek.

Code	Comments/Responses
	7.0 Environmental Impacts - 7H. New Substation Impacts - continued
008-26 Gary Brown and Jan Gordon Brown Sun East Property Owners	**COMMENT:** Location, second and third paragraphs, page 1. Site 2 is adjacent to Currier Creek, a wetland stream. Site 2 is Sun East residential properties, not rangeland. Site 2 is contained by road "A" (Evans Road) and Currier Creek, and cannot shift east or west.
008-27 Gary Brown and Jan Gordon Brown	**COMMENT:** 2.0 Alternatives, Site 2, page 4. The closeness of road "A" to the west side of proposed site 2 is actually a disadvantage. Grading of the site will cause considerable ramp-up adjacent to road "A" at the south end of the site which will cause sever snow drifting. See comment 1.7, second paragraph. Access into the south end of the site where the maintenance buildings are located (due to lower EMF levels) would require ramping up of your access road between road "A" and the site proper, due to the elevation change and the closeness of road "A." Road "A" is also private access for Sun East residents and is owned and maintained with yearly dues from association members. This will generate perpetual administrative costs and possibly litigation between BPA and Sun East with regard to maintenance and cost responsibilities. The proximity of road "A" to Currier Creek also restricts location and size flexibility of the proposed site 2. Regarding use of the site as rangeland, please see comment 1.8, third paragraph. There are approximately 14 Sun East residences within a one mile radius of proposed site 2. Half of these residences are within a half mile radius of the site.
008-47 Gary Brown and Jan Gordon Brown	**COMMENT:** In summary, we believe that the population density around the proposed site 2, with regard to safety and aesthetics, the proximity to Currier Creek and its associated wildlife habitat, and the visibility of the site to west Ellensburg and Interstate 90 should preclude it from consideration as an alternate site for the proposed substation. **RESPONSE:** We have carefully considered your comments and find them very convincing. We agree that the population density around site 2, the proximity of Currier creek (and associated wildlife habitat), together with several undesirable engineering qualities make it an infeasible site. The site has been dropped from consideration.
020-1 Art and Alice Manz none stated	**COMMENT:** We are in full agreement with the correspondence that was sent to you on November 6, 1991, by Gary and Jan Brown who are landowners in Sun East Development area as we are. The majority of the people that we have talked to feel the same way.
020-2 Art and Alice Manz none stated	**COMMENT:** We feel that this substation, which is your alternative #2, would be detrimental to our development and area.
020-3 Art and Alice Mary none stated	**COMMENT:** We have up to 300 head of elk that travel through that area in a year. Also that area is home to a great number of quail, pheasants, Hungarian partridge, and other wildlife.
025-1 David and Caroline Woodcock none stated	**COMMENT:** We have not seen the DEIS, but have seen a copy of the response directed to you by Gary L. and Jan Gordon Brown. Judging by the map enclosed with said correspondence, our primary residence is 2/3 mile from alternate site #2. This is distressing.

Code	Comments/Responses
	7.0 Environmental Impacts - 7H. New Substation Impacts - continued
025-2 David and Caroline Woodcock none stated	We have concerns about living so close to said site. With the uncertain data regarding EMF exposures, we question the residential futures of our property. **COMMENT:** Agreeing with the summary of the Gordon's response, "we believe that the population density around proposed site 2, with regard to safety and aesthetics, the proximity to Currier Creek and its associated wildlife habitat ... should preclude it from consideration as an alternate site for the proposed substation." **RESPONSE:** We have considered your comments, together with letters from other Sun East owners. BPA agrees that the population density around Site 2, the proximity of Currier Creek (and associated wildlife habitat), together with several undesirable engineering qualities make it an infeasible site. The site has been dropped from consideration.
	7I. Other Environmental Impacts
014-2 Roderick Malcom Muckleshoot Indian Tribe, Fisheries Department	**COMMENT:** We note that alternatives which would increase energy exports to the west side of the Cascades from the east side may result in additional impacts to east side fisheries resources. We cannot support any alternative which results in additional impacts to fisheries resources. **RESPONSE:** Electrical use peaks occur in December, January, and February. Peak use periods last several hours each day and may occur for a week or two when Arctic high pressure zones move south and hold over the Puget Sound Basin. The power delivered to Puget Sound by the transmission system is generated both at hydroelectric and thermal generating facilities. Hydro generation in these months and for these durations is not expected to have an adverse impact to fishery resources (refer to comment 24-9). This is now mentioned in Sections 4.2.1 and 4.3.1.
017-6 Sherilyn Wells Bellingham League of Women Voters	**COMMENT:** You list environmental externalities, but retreat when confronted with the drastic potential of such threats as global warming from a strategy that would truly deal with such threats. Must this be another instance of showing that we only reverse course when faced by catastrophe, or can we pursue actions that will yield benefits, both economic and environmental, whether or not the "worst case scenario" unfolds environmentally? **RESPONSE:** While it may appear that an environmental retreat has taken place, we would not agree that this is so. The type of problem that exists in Puget Sound has been traditionally been solved by building more transmission lines. In view of public concerns over new transmission lines, a wide range of non-traditional solutions were looked at. Some fairly noteworthy results can be claimed: 1) A plan to avert possible power blackouts in Puget Sound has been formulated with both low environmental impacts and low economic costs; 2) For the first time in our knowledge conservation, fuel switching, and load management were fully evaluated as possible solutions to what, in essence, is a transmission problem; 3) As a direct result of this effort, existing conservation programs throughout Puget Sound will be rapidly accelerated; and 4) Construction of a new cross-Cascaded transmission line has been averted for possibly ten years.

Code	Comments/Responses
	7.0 Environmental Impacts - 71. Other Environmental Impacts - continued The proposed action is not expected to increase the atmospheric pollutants thought to contribute to global warming.
018-8 Malcolm J. Macdonald Seattle City Light	**COMMENT:** Maps #10 and #11: the names of high-growth counties are difficult to read. **RESPONSE:** These maps have been revised in the Final EIS. We trust they are now more readable.
018-9 Malcolm J. Macdonald Seattle City Light	**COMMENT:** On pages S-1 and 1-1, please add one more purpose: "The plan should meet or exceed participating utilities' environmental protection criteria." **RESPONSE:** To our knowledge only the City of Seattle has established environmental protection criteria. To accommodate the City's comment the second stated purpose has been modified as follows: Federal, State and local governmental environmental quality requirements should be met.
024-18 Greg Bower G.H. Bower Engineering	**COMMENT:** The draft EIS is totally lacking any meaningful substance. It must be redone. It does not define the issue, the need, or the existing environment. The EIS omits alternatives and does not credibly evaluate the alternatives offered. **RESPONSE:** We do not agree with these opinions. Perhaps an explanation of the tiered decision making as applied to the PSAERP will help explain the level of detail presented in the PSAERP EIS . The first tier of analysis was broadly focused to enable consideration of such a wide range of solutions. While EIS's for transmission reliability problems typically discuss transmission line solutions, the scope of the PSAERP EIS was broadened to encompass such options as conservation, curtailment, fuel switching, load management and local generation. Considering the size and complexity of project EIS's for any one of these measures, it is clear that evaluating environmental trade-offs between such alternatives demands an aggregated level of information. An example would be the use of impact information reported in EIS's and technical journals to make comparisons between reliability plan alternatives. Once the plan was in place and site-specific actions are proposed, more detailed environmental analyses would be conducted. For example, a site-specific EIS on the transmission line contingency will begin in 1992 or early 1993. The level of detail in this EIS will be much more refined. Further description of the environmental study process and the environmental data used is provided in Appendix F. In response to your comment that the EIS does not define "the issue and the need," Chapter 1 of the Draft EIS which is titled "Purpose and Need for Action" addresses both of these topics. Additional information is contained in the Appendices A, C and E. The existing environment is described in Chapter 3.0 titled "Affected Environment."

Code	Comments/Responses
	7.0 Environmental Impacts - 7I. Other Environmental Impacts - continued Numerous alternatives were identified through a year-long scoping effort. Public scoping meetings were held and a technical review group looked into possible solutions to the problem. A wide list of possible solutions was narrowed to the most feasible alternatives by using "screening criteria." The screening criteria are listed in Table 1-4 in the FEIS. Additional discussion on why certain measures were not considered feasible alternatives is provided in Appendices A, B, D, and E. No alternatives identified through scoping were omitted from consideration; some were found to be infeasible. **8.0 ECONOMICS** **COMMENT:**
018-11 Malcolm J. Macdonald Seattle City Light	Table 2-2 is rather confusing since cumulative numbers are diminishing over time. Perhaps a note to encourage the reader to see the text for a full explanation would suffice. **RESPONSE:** A note has been added to Table 2-2.
BPM-4 Robert Johnson WA Society of Professional Engineers	**COMMENT:** You mentioned water heaters and the cost of getting involved. The meter on my house still has a clock on it. And I think all the houses around here have it. There's no mention here of reactivating meters that were put in the forties and fifties that still had clocks on them. **RESPONSE:** A more detailed look at residential time-of-use meters installed in older homes might reduce the costs slightly. However, the preliminary evaluation for this EIS suggests that modest changes in relative costs would be insufficient to move load management programs into a preferred alternative.
BPM-16 Don Rempe none stated	**COMMENT:** On Table 2-2, costs and savings of conservation programs on Page 2-5 have costs in dollars per kilowatt, while every other table is in megawatts. Is this an honest error, or is this done deliberately? If deliberate, I'm disappointed since it reflects negatively on the integrity of BPA. Is it true that a megawatt of savings of commercial retrofit costs $1,420,000, or that a megawatt of high-efficiency shower heads will cost $335,000? **RESPONSE:** The amounts of $1,420,000 per MW for commercial retrofit and $335,000 for high-efficiency shower heads are correct. Units of dollars per kilowatt are used for conservation and load management analysis because many of these programs are administered at the household level. Electricity demand per household is much easier to work with in units of kilowatts. Other programs in the PSAERP are administered at the system level where megawatts are the preferred units.
BPM-17 Don Rempe none stated	**COMMENT:** If the costs in Question 3 (Comment No. BPM-16) are correct, considering that the large majority of conservation measures discussed in the Draft EIS save energy during periods of

Code	Comments/Responses
	8.0 Economics - continued the day or week or year, how can the comments on Page 2-28 in Paragraph 2-7-3, called "Transmission Measures" where it says that many new or rebuilt line options between various substations are too expensive to be valid when the energy saved in a transmission system pretty much are 24 hours a day, 365 days a year? **RESPONSE:** In evaluating the cost-effectiveness of all transmission options, their benefits in reduced losses were considered. For example, see Appendix C, Table 2.1-1, Sheet 2, Section 4. A 500-kV line reduces losses by 24.6 average MW, valued at over $7 million per year. The statement in Section 2.7.3 regarding excluded transmission options, "Many new or rebuilt line options between various substations" refers to alternatives to a major cross mountain transmission line. This is not a comparison between transmission loss savings projects in general and the other conservation measures selected for analysis in the PSAERP.
BPM-18 Don Rempe none stated	**COMMENT:** It would seem that a hierarchy of value of conservation measures should be established with goals that save energy when needed, and for the largest part of the year, would have a higher value than others. **RESPONSE:** We established a hierarchy of values to rank conservation programs. This hierarchy considered costs as well as energy and demand benefits from these measures. The measures were then ranked from least cost to most expensive and the least cost alternatives were preferred to the more expensive ones. Since the value of demand savings that occur at peak hours was explicitly considered, extra credit was given to measures that save energy when it is needed the most. One of the load management programs analyzed was residential time-of-use rates. The price of electricity during times of peak consumption was assumed to be double the off-peak rate. This is one example of programs that vary the price of electricity to reflect varying replacement costs at different times of the day or year.

Code	Comments/Responses
	9.0 APPENDICES **9A. Appendix A - No Comments** **9B. Appendix B - No Comments** **9C. Appendix C - No Comments** **9D. Appendix D - No Comments** **9E. Appendix E - No Comments** **9F. Appendix F - No Comments** **9G. Appendix G Comments**
008-26 Gary Brown and Jan Gordon Brown, Sun East Property Owners	COMMENT: Location, second and third paragraphs, page 1. Site 2 is adjacent to Currier Creek, a wetland stream. Site 2 is Sun East residential properties, not rangeland. Site 2 is contained by road "A" (Evans Road) and Currier Creek, and cannot shift east or west.
008-27 Gary Brown and Jan Gordon Brown	COMMENT: 2.0 Alternatives, Site 2, page 4. The closeness of road "A" to the west side of proposed site 2 is actually a disadvantage. Grading of the site will cause considerable ramp-up adjacent to road "A" at the south end of the site which will cause sever snow drifting. See comment 1.7, second paragraph. Access into the south end of the site where the maintenance buildings are located (due to lower EMF levels) would require ramping up of your access road between road "A" and the site proper, due to the elevation change and the closeness of road "A." Road "A" is also private access for Sun East residents and is owned and maintained with yearly dues from association members. This will generate perpetual administrative costs and possibly litigation between BPA and Sun East with regard to maintenance and cost responsibilities. The proximity of road "A" to Currier Creek also restricts location and size flexibility of the proposed site 2. Regarding use of the site as rangeland, please see comment 1.8, third paragraph. There are approximately 14 Sun East residences within a one mile radius of proposed site 2. Half of these residences are within a half mile radius of the site.
008-28 Gary Brown and Jan Gordon Brown	COMMENT: 3.0 Affected Environment, Land Use Study Area, page 5. Dominant land use around site 2 in Sun East can be considered residential due to the number of existing homes as well as proposed residences. Please see the marked-up copy of your map 2 which does not show all of the existing residences. Recreational use of the land is not restricted to the riparian zones. I witnessed dozens of people hunting the area around site 2 this fall and they did not confine themselves to the creek areas.
008-29 Gary Brown and Jan Gordon Brown	COMMENT: Aesthetics, page 6. Site 2 is not isolated from inhabited areas and visual impacts are an important issue to the residents of Sun East. Please see comment 1.8, fourth paragraph, and comment 1.13.
008-30 Gary Brown and Jan Gordon Brown	COMMENT: The existing towers are aesthetically distracting but are nowhere near the measure of impact of a 50-acre substation. A 50-acre substation located at the proposed site 2 would impact views from west Ellensburg and major transportation routes.

Code	Comments/Responses
	9G Appendix G Comments - continued
	... The Ellensburg Airport, lying several miles north of Ellensburg, is not a good indicator of the visual exposure of site 2 to west Ellensburg.
008-31 Gary Brown and Jan Gordon Brown	**COMMENT:** Soils, page 8. There is a two-foot depth of deposited topsoil in the area of proposed site 2 and there is good productivity on this soil when irrigated. There is agricultural use of the land above and below site 2.
008-32 Gary Brown and Jan Gordon Brown	**COMMENT:** Water resources, page 8. Yes, there are wells on record in the study area. I contacted the Department of Ecology this spring and inquired about wells in the area of lot 11 which is very near the proposed site 2. They cited several wells in the area. Your information regarding site 2 appears outdated and incomplete.
008-33 Gary Brown and Jan Gordon Brown	**COMMENT:** 4.0 Environmental Consequences, Land Use Impacts, page 8. Again, please see comment 1.8 regarding site 2.
008-34 Gary Brown and Jan Gordon Brown	**COMMENT:** Second paragraph, page 9. Please see all preceding comments regarding the aesthetic impact of site 2. Impact would be high.
008-35 Gary Brown and Jan Gordon Brown	**COMMENT:** Fourth paragraph, page 9. Use of site 2 would have future impact on residential use and big game critical winter habitat, and should have been addressed in the statement.
008-36 Gary Brown and Jan Gordon Brown	**COMMENT:** Wetland Impacts, page 9. Please see comments 1.7 and 1.9, and other related comments.
008-37 Gary Brown and Jan Gordon Brown	**COMMENT:** Wildlife Impacts, page 10. Please see all previous comments regarding the Currier Creek riparian zone adjacent to site 2 and impact to wildlife due to the abundance of bitterbrush and riparian vegetation at site 2.
008-38 Gary Brown and Jan Gordon Brown	**COMMENT:** Vegetation Impacts, page 10. Same comments as 2.12 above.
008-39 Gary Brown and Jan Gordon Brown	**COMMENT:** Water, Soil, and Groundwater Impacts, page 10. Please see comment 1.12.
008-40 Gary Brown and Jan Gordon Brown	**COMMENT:** Aesthetic Impacts, page 11. Please see comments 1.8, 1.13, and 2.4.
008-41 Gary Brown and Jan Gordon Brown	**COMMENT:** Health and Safety Impacts, page 11. This statement should include oil spills adjacent to Currier Creek and herbicide spread as well as possible groundwater contamination due to the residential density around site 2.
008-42 Gary Brown and Jan Gordon Brown	**COMMENT:** Fifth paragraph, page 15. Sun East is a continuously developing residential area as described in previous comment 1.8, third and fourth paragraphs. Development of a 50-acre substation in the center of Sun East would effectively end the expanding development of Sun East as a residential community and loss of resultant residential tax revenues to Kittitas County would be substantial. There are no such planned or expanding residential uses around proposed sites 1 or 3.
008-43 Gary Brown and Jan Gordon Brown	**COMMENT:** Fish and Wildlife Conservation, page 16. Please see all previous comments regarding proximity of site 2 to Currier Creek, the riparian existence at Currier Creek, and the wildlife effects of site 2 as compared to sites 1 and 3 due to the increased amount of food and cover vegetation at site 2.

Code	Comments/Responses
	9G Appendix G Comments - continued
008-44 Gary Brown and Jan Gordon Brown	**COMMENT:** Recreational Resources, page 17. Please see previous comment 2.3.
008-45 Gary Brown and Jan Gordon Brown	**COMMENT:** Wetlands, page 18. Site 2 is close to the wetlands of Currier Creek and required grading is close enough to Currier Creek that it needs consideration. Please see previous comments 1.5, 1.7, 1.9, and all other associated comments.
008-46 Gary Brown and Jan Gordon Brown	**COMMENT:** First paragraph, page 20. Please see previous comment 1.9.
008-47 Gary Brown and Jan Gordon Brown	**COMMENT:** In summary, we believe that the population density around the proposed site 2, with regard to safety and aesthetics, the proximity to Currier Creek and its associated wildlife habitat, and the visibility of the site to west Ellensburg and Interstate 90 should preclude it from consideration as an alternate site for the proposed substation. **RESPONSE:** We have considered your comments and find them convincing. We agree that the population density around Site 2, the proximity of Currier creek (and associated wildlife habitat), together with several undesirable engineering qualities make it infeasible. The site has been dropped from consideration.
	10.0 RELATIONSHIP TO OTHER ENERGY ISSUES
012-4 Donald Axtell none stated	**COMMENT:** Have you given any thought to what the snail-darter did to the TVA? What happens if sockeye salmon or spotted owls or some yet undetected rate tsetse fly shuts your operations down? It could happen. **RESPONSE:** Utilities are keenly aware of recent Endangered Species Act listings. Each of the five utilities participating in this project have environmental staff who work closely with the Federal and State agencies who implement the Endangered Species Act. Some electric utility practices may change in coming years in an effort to help restore these species. Our conversations with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration (marine fish and wildlife) do not lead us to think that existing utility facilities will be shut down or severely altered due to the Endangered Species Act. See discussion above.
016-1 Alan Souders none stated	**COMMENT:** The option of purchasing power from Canada (BC Hydro) was not addressed in any detail, so it's difficult to see if this offers any promise as part of the problem solution. **RESPONSE:** In measuring the deficit, we assumed limited imports from Canada (B.C. Hydro), as depicted in Figure 1-3. This represents current firm import obligations. The B.C. Hydro system has similar transmission constraints into the Lower Mainland (Vancouver area), with the potential for voltage collapse. No major expansion of transmission capacity into the Lower Mainland is expected until the end of the decade.

Code	Comments/Responses
	10.0 Relationship to Other Energy Issues - continued To the extent that resources are developed in the Lower Mainland and committed to long-term firm export to the United States, the Puget Sound area deficit will be reduced. As discussed in Section 1.4.4, the contribution of local resources toward fixing the problem was recognized, but not included as specific elements of the Plan.
017-5 Sherilyn Wells Bellingham League of Women Voters	**COMMENT:** We fail to recognize that, as a nation, our strongest economic competitors are two to three times more efficient in their use of energy. It would have a profound impact on our ability to compete in world markets were we to look past the high initial costs of serious conservation efforts into the quick pay back. The research paper "Energy and Jobs " (March 1983) produced by the Coalition of Northeastern Governor's Policy Research Center is a dramatic demonstration of the positive economic impact a conservation vs. resource acquisition strategy could have on a region. **RESPONSE:** Comment noted.
019-4 K.C. Golden Northwest Conservation Act Coalition	**COMMENT:** West side generation: Several large gas-fired projects have made Bonneville's "short list" in the competitive bidding process. Accepting these bids would severely undermine the credibility of the Electric Reliability Plan, which considered the alternative of combustion turbines and explicitly rejected it except as a contingency. We understand that Bonneville's resource solicitation addresses the regional resource situation rather than the Puget Sound transmission capacity constraint. However, the analysis for the PSAERP cannot be conducted in a vacuum. We argued repeatedly and strenuously that, although it rendered the analysis more complicated, ERP was intimately connected to the larger regional resource situation and should be analyzed as such. While we commend Bonneville for the inclusiveness of this process, we note that you are on the verge of choosing to go forward with an alternative that this analysis explicitly rejects. Doing so will irreparably damage the credibility of this process. **RESPONSE:** Analysts have estimated that at least 400 megawatts of new generating resources will be developed by 2003 to meet the energy needs of Puget Sound area utilities. The PSAERP assumes at least some of these new resources will be located in the Puget Sound area. If BPA acquires one of the "short list" resources with a Puget Sound location offered through BPA's acquisition test process, the resource will have a secondary benefit of reducing peak demand on the east-west transmission system. It is not correct to suggest that BPA may be on the verge of choosing to go forward with an alternative that the PSAERP explicitly rejected. The PSAERP considers simple cycle combustion turbines as one of the measures that can be taken in the Puget Sound area to reduce peak load pressures on the transmission system. Simple cycle combustion turbines are treated as a contingency measure in the Preferred Alternative and Alternative Strategies 1,2, and 3 and as the primary action in Alternative Strategy 4. Simple cycle CTs were chosen as a contingency alternative because they have the lowest capital cost per installed megawatt of any local area generation option.

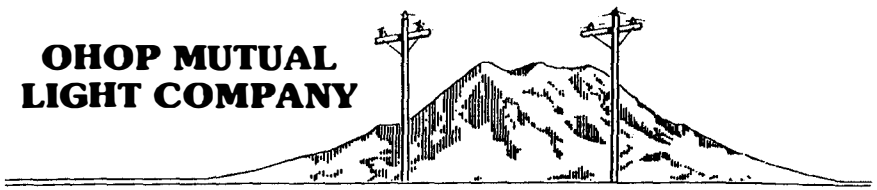
Code	Comments/Responses
	10.0 Relationship to Other Energy Issues - continued The aforementioned projects proposed in BPA's competitive bid process, although gas-fired, are materially different generating resources than the CT alternative examined in the PSAERP. They are high efficiency combined cycle generating resources of 200-240 mega-watts in size, with capital costs almost twice as high per installed megawatt as simple cycle CTs. This fact alone would make these resources significantly less attractive as an option in the PSAERP than the simple cycle alternative considered. The resources offered to BPA in its test acquisition program respond to the energy needs of BPA. These needs were anticipated in BPA's 1990 Resource Program and are again addressed in the Draft 1992 Resource Program. BPA would only acquire one of these combined cycle CTs if it is BPA's most appropriate alternative for meeting customer electric loads taking into account all criteria BPA uses when evaluating and selecting resources for acquisition. These criteria include explicit consideration of the distance of any resource from load centers west of the Cascades.
009-1 James L. Nolan Compliance Director, Puget Sound Air Pollution Control Agency	**COMMENT:** However, the final selection of an alternative is likely to be influenced by the recent listing of certain salmon runs as endangered species by the U.S. Department of the Interior. ... Given the potential restrictions imposed on Columbia River power generation and the problems associated with electric transmission systems, the choice of an alternative to meet forecasted peak power loads may now be under reconsideration.
024-9 G.H. Bowers G.H. Bowers Engineering	**COMMENT:** The EIS totally omits that use of the Columbia River to meet western Washington peak loads may not be possible and, if possible, would impact the riparian and aquatic habitats. **RESPONSE:** Peak capacity surplus described in the response to comment 024-3 is based on all existing hydro system operating constraints, including those added to the system in support of the Northwest Power Planning Council's fish flow program. Further constraints may result from the System Operation Review, amendments to the Council's plan or Endangered Species Act recovery plans. The impacts on hydro operations are unknown at this time. However, hydro system peaking capacity during the critical winter months is not expected to be significantly reduced. The hydro system is not the only source of peaking capacity available. There are substantial winter generation resources throughout the western states that can be brought into the BPA grid over interegional interties under short-term purchase arrangements. A discussion on the impact of operating the Columbia and Snake River hydroelectric systems to serve Puget Sound peak loads has been provided in Chapter 4.0 of the FEIS. Considering the infrequency and short duration of winter peaks, together with their occurrence during winter months when water availability is not normally critical, use of the hydro-system for Puget Sound peak loads is not expected to impact on riparian and aquatic habitats. The System Operation Review Draft Environmental Impact Statement is being prepared. It will analyze the environmental impacts of existing and alternative hydro system operating strategies.

Code	Comments/Responses
	10.0 Relationship to Other Energy Issues - continued
EPM-1 Marvin Klinger none stated	**COMMENT:** How do you perceive these alternatives conform to the Power Planning Council's plan?...(re:conservation) It would seem to me that the level of conservation identified in the alternatives are minus compared to what is in the Council's plan. **RESPONSE:** See the additional text in Section 2.2.1 of the FEIS.
EPM-11 Marvin Klinger none stated	**COMMENT:** Is there perceived to be any impact on Centralia to the Clean Air Act? ...is that an uncertainty within the plan?
BPM-19 Don Rempe none stated	**COMMENT:** With the probable loss of the 1,000 megawatts of generation due to the Trojan problems, are the measures described in this Draft EIS still sufficient? **RESPONSE:** Although the Centralia facility is not specifically identified as an uncertainty, the potential that new environmental requirements may cause some existing generation plants to shut down is one of several uncertainties that were identified. To handle these uncertainties, contingency measures were identified which could respond quickly to a significant change in circumstances. Chapter 2 of the DEIS identifies contingency measures for each alternative strategy and describes the circumstances when they would be selected.
EPM-6 Roy Metzger Everett Public Works Dept.	**COMMENT:** A suggestion that should be in your Final EIS....you have to meet a schedule and you had to do this in a certain timeframe, but events ongoing now are overtaking you that have significant implications... identify (their) implications are to this plan, such as Trojan (Nuclear Plant). Trojan's critical because it happens to be on the west side as well as being in a significant generating resource. What are the implications? Obviously, it reduces your existing resources. That obviously then compresses your timeframe in terms of when you're getting into serious situations. The same thing due to T&E Endangered Species.
EPM-10 Roy Metzger Everett Public Works Dept.	**COMMENT:** With the implications of Trojan and the Endangered Species Act, with respect to the existing resources, what implications to your alternatives might that have? Is there a possibility of shifting between your present preferred one to, say, Alternative 1 instead, in terms of what you're talking about with the resources that would be provided as well as your capability? ...I wasn't advocating anything, but it seemed to me that was the implication, that you would want to think about that pretty seriously because of — if, in fact, Trojan does go out, that you'd be looking to that **RESPONSE:** Section 1.4.6 of the EIS identifies assumptions that we have made that may turn out to be incorrect. While loss of Trojan is not explicitly identified, the fourth bullet recognizes that some existing generating plants may be shut down. If an extended outage of Trojan occurs during a period of high demand, such as the winter of 1991-92, the Beaver combustion turbine will probably be operating to offset some of the lost generation.

Code	Comments/Responses
	10.0 Relationship to Other Energy Issues - continued The Plan will respond to changes in load and resources using contingency measures as identified in Sections 2.1.1, 2.2.4, 2.3.4, 2.4.5 and 2.5.4. If we are faced with a short lead time to respond to a larger than expected deficit, contractual load curtailment or curtailment cooperatives will likely be our interim response. Adequate measures are available to meet medium-high load growth, or loss of Trojan, throughout the planning horizon. We don't expect that listing Columbia and Snake River fish species as endangered will influence decisions on the PSAERP. Surplus winter peaking capacity remains available from existing generation east of the Cascades and in the southwest. Furthermore, as winter is a non-critical time from the standpoint of hydrosystem operations, we don't expect winter operation of the river to change much. The preferred alternative includes a transmission line as a contingency element to cover the uncertainties you mention.
BPM-23 Leonard E. Sanderson, Mayor, City of Milton	**COMMENT:** I believe all of the utilities now are in the process of developing a contingency plan for reduction of commercial and business type requirements in the case of shortage. Is that factored into this at all, or is that just another thing that's going on? **RESPONSE:** You refer to winter operating plans completed in the past few years. These plans define actions to be taken if electric demands outstrip system capabilities in the two or three years before the PSAERP is implemented. See Section 2.6.1.
	11. MISCELLANEOUS COMMENTS
004-4 James J. Coover none stated	**COMMENT:** I appreciate the time and effort expended by your Sounding Board members. It appears to me that many issues have been brought forth and discussed at length, judging by your newsletter. **RESPONSE:** We too are very grateful for their generous contributions. Their role was substantial, and is an excellent example of citizens shaping the future through pubic participation.
006-5 W.G. Riley none stated	**COMMENT:** And, with sufficient electricity, there just might be enough left over, to turn illumination back on, freeways, and also their off/on ramps; also the overhead directional information signs, that have been so long darkened in this state. **RESPONSE:** There is enough electricity to light up freeway signs and ramps. The state and local highway agencies do not darken ramps and signs due to a shortage of electricity, but to save money. The utilities in the Puget Sound area have enough electricity for these signs and ramps and will meet all loads placed on them by these agencies.
006-6 W.G. Riley none stated	**COMMENT:** Let's get that positive + thinking GO - GO - GROW spirit moving again!! **RESPONSE:** Comment noted.

Code	Comments/Responses
	11.0 Miscellaneous Comments - continued
TPM-3 John Johnstone none stated	**COMMENT:** I'd like to thank you gentlemen for coming out tonight. You've been very informative, and you've been very patient with the questions, and you've been very willing to share. So, if you'd like to comment on that in your record, thank you very much. **RESPONSE:** Thank you.
WPM-8 Vladmir Steblina none stated	**COMMENT:** And the last point of concern is somewhat related to the previous concerns just raised, is the Sounding Board, which is really an advisory board, and it appears to have played a rather significant role in the development of the EIS. It's composed primarily of Puget Sound residents....I think that composition of the advisory board should be changed to reflect the entire BPA region, including Montana, Idaho, eastern Washington and western Washington, and that issue examined from a regional perspective rather than from a Puget Sound perspective.
WPM-8 Vladmir Steblina none stated	**COMMENTS:** And I'm not too sure about this, but I believe there's been some Federal Court cases recently on the role of Federal advisory boards which I consider the Sounding Board to be one, and how they function in an Environmental Statement process. I'm not sure where you fit in within those decisions, but it might be worth examining. **RESPONSE:** The Sounding Board was set up to obtain a broad range of views during the search for solutions to the electric reliability problem. We believe that the composition of the Sounding Board was appropriate given the nature of this problem. Several of the Sounding Board members represent regional or statewide interests. Numerous contacts with organizations and individuals outside Puget Sound were made during completion of the study. For example, we met with the Northwest Power Planning Council, east side PUD's, the U.S. Forest Service and City of Ellensburg and Kittitas County officials on several occasions. The Washington Energy Facility Site Evaluation Council coordinated state input. We do not agree that the Sounding Board is a Federal Advisory Board. The Sounding Board was structured in a way that it would not be, nor function as a Federal Advisory Board.
032-1 Charles S. Polityka Regional Environmental Officer U.S. Dept. of Interior Office of Environmental Affairs	**COMMENT:** The Department has no comments to offer. **RESPONSE:** Comment noted.

OHOP MUTUAL LIGHT COMPANY



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October 28, 1991

Public Involvement Manager
Bonneville Power Administration
P.O. Box 12999
Portland, OR 97212

RE: Puget Sound Area Electric Reliability Plan - DEIS

Gentlemen:

Ohop Mutual Light Co. requests to enter comments to the Puget Sound Area Electric Reliability Plan - Draft Environmental Impact Statement. The comments refer to "Local Area Generation " and in particular Appendix B.

Enclosed is a cover letter to George Reich, Puget Sound Area Power Manager, and a discussion paper. The letter and paper concern a proposal by Ohop Mutual Light Co. to provide both peaking capacity and availability. The remarks in the discussion paper apply to the section titled "Standby Generation" in appendix B.

Thank you for the opportunity to comment.

Sincerely,

Richard W. Rosenberg

encl.

OHOP MUTUAL LIGHT COMPANY
34014 MOUNTAIN HIGHWAY EAST, EATONVILLE, WASH. 98328 — PHONE 832-3222 847-4363

OHOP MUTUAL LIGHT COMPANY

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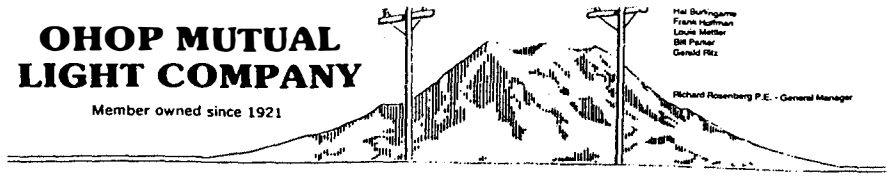


October 25, 1991

Mr. George Reich
Area Power Manager
Bonneville Power Administration
P.O. Box C-19030
Seattle, WA 98109-1030 TC

Dear George:

I have reviewed the analysis performed by the Puget Sound Area Electric Reliability Plan's local generation team (PSAERP team). The analysis covered the Ohop proposal for peaking capacity by means of high speed diesel generators.

George, although I am writing a reply to you, my concern is with the PSAERP team.

The analysis, to a high degree, lacked detail. I believe this indicates insufficient knowledge and expertise in the subject area of diesel peaking plants. This is probably a natural result since BPA staff hasn't been exposed to either the economics or the technology before. 001-1

The very simplistic analysis omitted both fundamental concepts and detail. The result is not an analysis at all. The implications are not true.

The proposal contained information for the purpose of staff familarity and to indicate potential. Much of that information was not understood.

The proposal did offer two basic thrusts: (1) would BPA sanction the use of a diesel peaking plant for peak shaving. (2) would BPA show an interest in purchasing Availability. I am asking BPA to respond. 001-2 001-3

Enclosed is a short response to the PSAERP team's analysis which, I hope, will be informative.

George, thank you for your time and assistance.

Sincerely,

Richard W. Rosenberg

encl.

34014 Mtn. Hwy. East Eatonville, WA 98328 Phone 832-3222 847-4363

Comment Letters

SEPTEMBER 1,1991

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
P.O. BOX 3621
PORTLAND, OREGON 97208-3621

ATTENTION: ALAN L. COURTS

DEAR ALAN:

I AM WRITING YOU CONCERNING CONSERVATION/ LOAD MANAGEMENT OF ELECTRICAL POWER FROM PUD. I AM A CHICKEN FARMER RAISING 54,000 BROILERS IN WA. AND RELY ON CONTINUOUS ELECTRICAL POWER FOR THE SURVIVAL OF ALL THE BIRDS ON OUR RANCH. THIS IS A 24-HOUR SEVEN-DAY-A-WEEK JOB. I DO HAVE SEVERAL STANDBY GENERATORS FROM 4 TO 30 KW TO USE IN CASE OF A POWER OUTAGE.

I UNDERSTAND PUD IS CONSIDERING PURCHASING PEAK/EMERGENCY POWER UNITS. I WOULD LIKE TO SUGGEST THAT PUD ASSIST ME IN INSTALLING AN OVERSIZED STANDBY GENERATOR UNIT OF ONE MEGAWATT (1000KW) OR MORE. I WOULD MAINTAIN THE EQUIPMENT IN GOOD WORKING ORDER, MAKE THE UNIT AVAILABLE TO UD INSPECTORS, PROVIDE 24-HOUR COVERAGE AFTER AN ALERT, AND COOPERATE WITH PUD TO PROVIDE POWER INTO THE GRID WHEN NEEDED. 002-

THERE ARE MANY BROILER FARMERS, EGG RANCHES, DAIRIES, FISH FARMS AND OTHER INDUSTRIES THAT NEED 24-HOUR POWER COVERAGE. IT IS POSSIBLE THAT YOUR ENTIRE REGIONAL NEEDS COULD BE SUPPLIED BY THOUSANDS OF SMALL (1000KW) GENERATORS LOCATED THROUGHOUT THE PUD SUPPLY AREA. 002-1

THE PURCHASE AND INSTALLATION WOULD BE THE BIGGEST EXPENSE; THE MAINTENANCE COULD BE SHARED WITH THE FARMER. PUD MIGHT WANT TO MAKE SURE EACH UNIT WAS AVAILABLE (IE A FIELD MAN/MAINTENANCE TRUCK). IF THE UNITS WERE TO BE REPLACED AFTER 20 OR 30 YEARS, THE OLD UNITS COULD GO TO LESS THAN 24-HOUR FARMS AND STILL PROVIDE POWER WHEN NEEDED AS A SECONDARY SUPPLY. THE FIELD MAN OR NEARBY FARMER MIGHT ENERGIZE THOSE SECONDARY UNITS.

SINCERELY,

Charles E. Gruhl.

CHARLES E. GRUHL
103 CLASSE ROAD
WINLOCK, WA. 98596

206-978-4707

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PS/ERS-91-00
RECEIPT DATE:
OCT 2 4 1991
AREA: DISTRICT

8-83

6302 39th Ave. S.W.
Seattle, Wa. 98136
18 Oct. 1991

PS-91-003

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: [redacted]
RECEIPT DATE:
OCT 2 4 1991
AREA: DISTRICT

Dear Dept. of Energy:

Thank you for Newsletter No. 3, Electric Reliability Plan.

I have some suggestions:

Short Term

Ration consumption of electricity, at least to residential customers. Allowed use should be based on number of persons, use of elec. for heating and cooking, and special needs. Apartment dwellers should need less than those in detached units. 003-1

I applaud your encouragement of conservation.

Longer Term

Explore unused sources of energy. There are strong winds in Wa. state. There is a great deal of sunshine, too. Support research in this realm, or at least stay informed of resarch being donge. 003-2

Look into research being done on more efficient means of transmission, including wireless. If possible, do small scale experimentation or co-operate with those doing it. 003-3

Continue to work on storage to be used in "time of plenty". Investigate expansion in this area. 003-4

Co-generation.

I am glad that serious planning for the future is under way. I hope that nuclear power plants are being phased out. They were a huge mixstake. 003-5

I thank you again.

Sincerely,

G. V. Christoffers

G. V. Christoffers

Re: ALP

November 1, 1991

Dear Friends,

I am writing about your Puget Sound Area Electric Reliability Plan. I am in favor of Alternative Strategy 2. 004-1

I plan to attend one of your public meetings to learn more about your alternative strategies, as well as more about the conservative measures we can adopt at home. I do not believe that people will respond to the load management measures in sufficient numbers to make Strategy 3 effective. We have seen too much indifference to water conservation suggestions. I am sure that a new transmission line across the Cascades will be necessary soon. 004-2 004-3

I sincerely appreciate the opportunity to comment upon your Draft Environmental Impact Statement, and I appreciate the time and effort expended by your Governing Board members. It appears to me that many issues have been brought forth and discussed at length, judging by your newsletters. 004-4

Thank you.

James Roover
10634-34th Ave SW
Seattle, WA. 98146

PSDEIS 01-005

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #:
RECEIPT DATE:
NOV 16 1991
AREA: DISTRICT

November 11, 1991

BPA Public Involvement Office
PO Box 12999
Portland, OR 97212

For The Record:

I am a resident of Seattle, Washington and I support Alternate Strategy 2 as an alternative for providing the additional power needed in this greater Washington area. 005-1

However, I am first in favor of Accelarated Conservation followed by Demand Reduction which includes Fuel Switching.

This may seem contrary. I am saying that conservation is an important way of life that should always be advertised, encouraged, and used. I believe that fuel switching is important since natural gas is an available natural resource and the sytsem for its' harvesting and use is in place. 005-2

While these measures should be constantly addressed, I guess that it is still necessary to add power generation and transmission and I feel as stated above that Alt 2 is the best plan because of its' low cost and environmental impact. 005-1

Gail M. Jensen
920 Sixth Avenue North #1
Seattle, Washington 98109

Enumclaw, Washington
November 14, 1991.

Public Involvement Office
Bonneville Power Administration
Portland, Oregon

Gentlemen,
The Puget Sound Area Electric Reliability Plan Newsletter was forwarded to me at the new address.
I read in the newsletter #3, October 1991, about the growing risk of not enough electrical power in extreme weather, and need for additional power, as area population, and hopefully manufacturing requirements will also demand more electrical energy.

006-1 Seems to me as if Alternative Strategies --- #1 Transmission Line, and also #2 Voltage Support Options, are at the most "stop-gap" measures for Western Washington. There will still be that big % of power that will come from Eastern Washington, via lines over the Cascade Mountains, and as the items on the front page of Newsletter #3 state - A possibility of downed lines/voltage collapse.

006-2 No more studies. Do it NOW!! Spend the $s & Complete the nearly finished Satsop Electric Generating Power Plant, and then do the rest of

006-3 the construction to complete the adjacent power plant, and get it also generating needed electrical energy!

006-4 = Generators on the West side of the mountains, and, a plus (+) supply of electricity, at least for the present. Perhaps this would attract industry, sorely needed in the Grays Harbor area of Washington State, with nearby power readily available.

006-5 And, with sufficient electricity, there just might be enough left over, to turn the illumination back on, on Freeways, and also their off/on ramps; also the overhead directional information signs, that have been so long darkened in this State.

006-6 This is the U.S. of A. - Let's get that positive + thinking GO - GO - GROW spirit moving again!

Yours truly,
W. G. Riley

W. G. Riley
3010 Edith Avenue
Enumclaw, Washington
98022-8478

PSDEIS-01-006

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #:
RECEIPT DATE:
NOV 18 1991
AREA: DISTRICT

Citizens Conservation Committee

Citizens Making a Difference

Community Relations Division

1015 3rd Ave. Room 809 Seattle, WA 98104

(206) 684-3112

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PS DEIS-91-0067
RECEIPT DATE:
NOV 2 8 1991
AREA: DISTRICT

November 15, 1991

Joanne Scott
Public Involvement Manager
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208-3621

Re: Comments on Draft Environmental Impact Statement for Puget Sound Electric Reliability Plan

The Seattle City Light Citizen's Conservation Committee, a panel of Seattle citizens appointed by the City's Mayor to advise the City on conservation issues, appreciates the opportunity to comment on the Puget Sound Electric Reliability Plan. While the Plan nominally addresses a transmission capacity constraint, we believe that it also has important implications for energy and capacity planning in general. The present transmission capacity issue is closely related to the need for new energy resources in the Northwest.

007-1 We support the emphasis in all the Environmental Impact Statement alternatives on accelerated conservation as part of the strategy for easing the transmission capacity constraint. We also note that "winter-peaking" conservation measures such as weatherization have capacity benefits beyond their energy benefits; conservation measures that reduce heating loads are working hardest when we need them most, during severe winter conditions.

007-2 While we support the emphasis on accelerated conservation, we believe that efficiency opportunities appreciably beyond those identified even in the "accelerated" scenario are available and cost-effective. Our committee will soon recommend conservation levels roughly in line with the Northwest Power Planning Council's 1991 regional plan, and substantially higher than the accelerated conservation in the draft Environmental Impact Statement. We believe that these higher goals are consistent with cautious estimates of energy efficiency potential, and within the reach of utilities that are determined to acquire conservation resources.

007-3 Thus, although we support the emphasis on accelerated conservation, we urge BPA to consider conservation levels more in keeping with the Regional Power Plan and estimates of conservation potential as a viable alternative to planning new transmission capacity.

Sincerely,

Jane Johnson
Chair

KCG:JJ:hg

cc: Norman B. Rice, Mayor of Seattle
Sam Smith, Seattle City Council
M. J. Macdonald, Acting Superintendent, Seattle City Light

Seattle City Light

November 26, 1991

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: ERPDEIS-91-0067
RECEIPT DATE:
DEC 02 1991
AREA: DISTRICT

Bonneville Power Administration
P.O. Box 12999
Portland, Oregon 97212

ATTENTION: Public Involvement Office

SUBJECT: Comments to the Draft Environmental Impact Statement (DEIS) for the Puget Sound Area Electric Reliability Plan (PSAERP)

Gentlemen:

Thank you for your prompt response in providing us with copies of the DEIS and Appendices A through G. We are property owners located in the proximity of the alternate site number 2 for the proposed new substation referenced in the DEIS and further described in Appendix G.

8-1 In reading through the information pertaining to the substation sites, we find statements regarding site 2 which are incorrect. We also believe the environmental impact of site number 2 has been substantially understated, as explained in the following comments and shown in the accompanying photographs.

Our comments to the DEIS and Appendix G follow:

1.0 (DEIS,) September 1991

8-2 1.1 Elk, badger, rabbits, birds of prey and upland game birds should be included in the "shrubland and wildlife" section of 3.1.2, page 3-2.

8-3 1.2 Elk, rabbits, falcons, owls and eagles should be included in the "grasslands and wildlife" description of 3.1.2, page 3-3.

8-4 1.3 Currier Creek is a designated wetland as stated on page 9 of Appendix G and should be referenced in the second paragraph on page 3-10 as adjacent to site 2. A tributary of Currier Creek runs from late winter to early summer and runs through the center of proposed site 2.

1.4 The first sentence of the third paragraph on page 3-10 should be revised to read " . . . agricultural land, except site 2 which is located within the Sun East residential development." Site 2 is substantially more residential than site 1, 3, and 4. Sun East sites are existing residential and future residential sites, not exclusively "rangeland."

8-5

1.5 The fourth paragraph of page 3-10 specifically excludes reference to Currier Creek, a designated wetland which does contain vegetation consistent with riparian areas. The remaining parts of the site areas are also home to furbearers, deer, elk, game birds and birds of prey. These animals and birds do not confine themselves to riparian zones but rely on the vegetation on the remaining parts of the site areas as critical winter habitat. Hundreds of elk and bands of mule deer have been witnessed feeding during winter months on the proposed site 2.

8-6

Bitterbrush is a valued and preferred food for the Rocky Mountain mule deer and is important as winter forage food and cover. There are large areas of the proposed sites which do not contain bitterbrush. Please note that site 2 however, due to the proximity to Currier Creek, is approximately 50 percent bitterbrush and clearing this site would have a greater effect on wildlife than either site 1 or 3.

1.6 Figure 4-2, page 4-10, lists impacts to residential, wildlife, vegetation, water, soils, groundwater and aesthetics as low. A high impact, as defined on pages 4-1 and 4-2 would create a significant adverse change in present environmental conditions. Site 2 has significant amounts of new and mature bitterbrush as well as grasses as shown in your aerial photographs. The narrow band of critical winter habitat between the Wenatchee Mountains and the developed agricultural land is a major factor in determining the population of local deer and elk herds that summer in the Wenatchee Mountains. Permanent removal of 50 acres of this critical winter habitat would satisfy items 4 and 5, and possibly 6, of the listed outcomes under the high impact definition, and would require that the impact be listed as "high."

8-7

description of New Substation, page 4-11. Level grading would require building up of the southern end of the station approximately 50 feet. With site 2 within 150 feet of Currier Creek, how is this grading proposed to be accomplished without permanent change to Currier Creek? How will the tributary from Currier Creek which runs through the center of the site be handled? How will the 50-foot high fill be handled adjacent to the Sun East access road, since the road is adjacent to the site?

8-8

Rather than considering the closeness of road "A" to the proposed site as an advantage, grading the proposed site 2 would raise the site level up to 50 feet at the southwest corner adjacent to road "A." Prevailing west winds and snow in the winter months would cause severe drifting and accumulation of snow over road "A," blocking ingress and egress of residents through Sun East. Since Currier Creek prevents movement of the site to the east, what is your proposed solution to this problem? Please note that the existing three-foot-high shoulder on the east side of road "A" has caused 8-foot snow drifts over the road in past winters, necessitating considerable plowing.

8-9

1.8 In the second paragraph under "Land Use Impacts," page 4-11, the current use of land around site 2 in Sun East properties is residential. The rangeland referenced is critical winter habitat for deer and elk and 50 acres lost forever is not a low impact when you are considering big game's critical winter habitat.

8-10

8-7

Choosing site 2 would require purchase of four subdivided lots as shown when correcting the overlay of the affected lots per the attached marked up copy as evidenced by a survey performed in May 1991 on lot 10. Lots 12, 13, 14 and 15 all lie within the proposed site 2. The 500-foot spatial buffer zone around the fenced area would also include Currier Creek, access road "A," and portions of lots 5, 6, 7, and possibly 18.

8-10

With regard to use of land in and around site 2 as rangeland, lot 12 has a well and a residence is planned about 1997. Lot 11 was bought by us in April 1991 and we have already built a small cabin on the property, with retirement residence planned in 1997. Lot 10 was purchased in March of 1991 and was surveyed this summer as two 10-acre home sites. Lot 5 completed construction of

a new residence this fall and lot 7 also has a residence which does not show on your aerial photo but has been there for several years.

8-10

The proposed site 2 would directly impact residences as the site would be wholly, not partly, visible by nearly all residences of Sun East which now number approximately 20 year-round families. View of the lower Kittitas Valley and the city lights at night would be wholly blocked from the residences in the lower areas of Sun East. Accompanying photos taken from lot 11 show the magnitude of this visual impact. The impact is such that we could no longer consider our property as a potential site for our retirement home. Impact to residential properties of Sun East is high.

8-11

1.9 Wetlands Impacts, page 4-11. Currier Creek is a designated wetland and is within 200 feet of site 2, with a tributary of Currier Creek running through the center of the proposed site from late winter to early summer. With the site elevation dropping approximately 50 feet from north to south and additional substantial drop from west to east as the site approaches Currier Creek, all grading activity to develop 50+ level acres adjacent to the creek could affect the creek and its tributary. A Section 404 permit should be required to assure protection of Currier Creek, since its consideration was erroneously omitted from this paragraph.

8-12

1.10 Wildlife Impacts, page 4-11. Correct the statement to show site 2 as near riparian zone (Currier Creek). Also, riparian zones are not the most important for the wildlife habitat in the area. The proposed four sites are predominantly sage, bitterbrush and various bunchgrasses. Hundreds of elk and groups of mule deer use this habitat as critical winter forage.

8-13

1.11 Vegetation Impacts, page 4-12. Permanent loss of 50+ acres of critical winter habitat is not minor. Bitterbrush in the eastern half of site 2 is up to seven feet high and approximately one hundred years old, providing valuable forage and cover for mule deer and elk. Reasoning that the vegetation is common throughout the area is not correct, since many of the areas are void of bitterbrush, as evidenced by your aerial photos. Further reasoning that vegetation being common throughout the area means that the loss is a low impact is also not correct. Available critical

8-14

winter habitat establishes the size of the deer and elk herds in the Wenatchee Mountains and loss of 50 acres means a reduction in the size of these herds forever.

8-14

1.12 Water, Soil and Groundwater Impacts, page 4-12. The statement that there is no evidence that subsurface flow is accessed by ranchers in the vicinity of these sites is incorrect. There are residential wells on lots 5, 7 and 12 around the proposed site 2. These wells are a matter of public record, but the records apparently were not investigated.

8-15

Continuity of the soil layers will be disturbed in the spatial buffer zone around the sites, as well as the site itself, due to the slope of the terrain. This could result in a disturbed area of up to 100 acres.

It is stated that use of herbicides in substation areas to prevent vegetation growth could affect soil and ground water. How will protection of the existing residential wells and Currier Creek be assured?

8-16

The last sentence excludes addressing Currier Creek. The proximity of site 2 to Currier Creek should be addressed. Grading and rerouting of tributary and surface runoff could impact Currier Creek.

8-15

1.13 Aesthetic Impacts, page 4-12. The Naneum site is substantially smaller than the proposed new substation and is located against a hillside. It is not placed among residences nor does it block residential views of Ellensburg and the Kittitas Valley, as would the proposed site 2. It may be an indicator for sites 1 and 3 but it is not a good indicator for site 2. Site 2 is also visible from west Interstate 90 and Ellensburg, since it does not have any hills blocking it as do the other sites. The plateau north of Ellensburg ends east of site 2, creating a depression between site 2 and Ellensburg, allowing visibility of the site. Considering existing site 4 as a good indicator of aesthetics for site 2 is a substantial understatement.

8-17

The statement that several ridges and knolls lie between Ellensburg and site 2 is misleading. While some land features lie between site 2 and northeast Ellensburg, there are no ridges or knolls between site 2 and west Ellensburg. There

are also more than a few scattered rural homes in the vicinity of site 2. Views from approximately 14 rural homes around site 2 in Sun East will be directly and substantially impacted and several homes will have their entire view of Ellensburg and adjacent Kittitas Valley totally blocked. Comparing the existing transmission line visual impact to a 1,500-foot-wide substation on 0-50 feet of fill and with dense capacitor banks adding 35 feet more in elevation and taller dead-end towers is a gross understatement to the aesthetic impact on the residents of Sun East. The accompanying photographs show the magnitude of this impact. Would the authors of this document consider it a low impact if they had to stare at it from their residence? 8-17

1.14 Health and Safety Impacts, page 4-13. The statement should be qualified by explaining that the impact at site 2 would be greater than at sites 1, 3 or 4 due to the proximity of Sun East residents. The statement that the substation would not change EMF exposures at any existing residences in the vicinity of the facility may not be correct, since some of the residences closest to the site are not shown on the aerial photograph or the population density chart. Information used in evaluating the proposed site 2 seems to be several years old, which questions the validity of the information. Also, because of the proximity of the Sun East access road, residents will be required to drive by the site several times daily. 8-18

1.15 Mitigation Potential, page 4-14. Sun East residential properties and the designated wetland Currier Creek should be considered as incompatible with the use of site 2 as a potential substation site and its consideration should be excluded from the plan. 8-19

1.16 Figure 4-6, page 4-21. Impacts for alternative strategy 2 should be higher as long as site 2 remains a consideration in the plan. (See comment 1.6.) 8-20

1.17 Fish and Wildlife Conservation, page 5-1. Currier Creek is an avenue of deer and elk migration from the Wenatchee Mountains to site 2 and surrounding areas between the mountains and the fenced agricultural land. Hundreds of elk have been observed using the area. Contrary to no interference being anticipated, loss of 50+ acres will displace native wildlife permanently from the site. The Department of Wildlife will have to address this also. 8-21

1.18 Recreation Resources, page 5-3. The last sentence should be amended to identify site 2 as close to Currier Creek. 8-22

1.19 Wetlands, page 5-4. The last statement should be corrected to identify site 2 as adjacent to Currier Creek, a designated wetland. 8-23

1.20 Coastal Zone Management Consistency, page 5-4. The statement should be corrected to reflect site 2 as adjacent to Currier Creek. 8-24

1.21 Clean Water Act, page 5-7. The last paragraph is incorrect. Site 2 is adjacent to Currier Creek and the amount of grading that will be required to level the site requires a permit from the Corps issued under the authority of Section 404 of the Clean Water Act to protect Currier Creek. 8-25

2.0 APPENDIX G, September 1991

2.1 Location, second and third paragraphs, page 1. Site 2 is adjacent to Currier Creek, a wetland stream. Site 2 is Sun East residential properties, not rangeland. Site 2 is contained by road "A" (Evans Road) and Currier Creek, and cannot shift east or west. 8-26

2.2 2.0 Alternatives, Site 2, page 4. The closeness of road "A" to the west side of proposed site 2 is actually a disadvantage. Grading of the site will cause considerable ramp-up adjacent to road "A" at the south end of the site which will cause severe snow drifting. See comment 1.7, second paragraph. Access into the south end of the site where the maintenance buildings are located (due to lower EMF levels) would require ramping up of your access road between road "A" and the site proper, due to the elevation change and the closeness of road "A."

Road "A" is also private access for Sun East residents and is owned and maintained with yearly dues from association members. This will generate perpetual administrative costs and possibly litigation between BPA and Sun East with regard to maintenance and cost responsibilities. 8-27

The proximity of road "A" to Currier Creek also restricts location and size flexibility of the proposed site 2.

8-27 Regarding use of the site as rangeland, please see comment 1.8, third paragraph. There are approximately 14 Sun East residences within a one mile radius of proposed site 2. Half of these residences are within a half mile radius of the site.

2.3 3.0 Affected Environment, Land Use Study Area, page 5. Dominant land use around site 2 in Sun East can be considered residential due to the number of existing homes as well as proposed residences. Please see the marked-up copy of your map 2 which does not show all of the existing residences. Recreational use of the land is not restricted to the riparian zones. I witnessed dozens of people hunting the area around site 2 this fall and they did not confine themselves to the creek areas.

8-28

We will be sending a copy of this letter to the Kittitas County Planning Department and will be discussing the proposed site locations with them to preclude consideration of site 2 as a viable alternative.

2.4 Aesthetics, page 6. Site 2 is not isolated from inhabited areas and visual impacts are an important issue to the residents of Sun East. Please see comment 1.8, fourth paragraph, and comment 1.13.

8-29

Also note the approximate "before and after" effect which has been drawn on the enclosed photographs taken this summer from the center of lot 11, our planned residence location. The existing towers are aesthetically distracting but are nowhere near the measure of impact of a 50-acre substation. A 50-acre substation located at the proposed site 2 would impact views from west Ellensburg and major transportation routes. The enclosed photograph of Sun East was taken from Highway 10, eight miles from the proposed site 2, and clearly shows residences in the area. The night photograph was taken from the center of lot 11 and shows that Ellensburg residences would indeed be able to see the proposed site 2. We have been able to distinguish individual residences of Sun East from Interstate 90. The Ellensburg Airport, lying several miles north of Ellensburg, is not a good indicator of the visual

8-29

8-90

8-29 exposure of site 2 to west Ellensburg. Again, there are 14 Sun East residences within a one mile distance of the proposed site 2, not four.

2.5 Vegetation, page 7. Riparian vegetation also occurs along Currier Creek as evidenced by the enclosed photographs taken on lot 11 this spring. There is irrigated land within Sun East and in the proximity of the proposed site 2. Productivity of the land around site 2 is excellent, if irrigated.

8-30

2.6 Soils, page 8. There is a two-foot depth of deposited topsoil in the area of proposed site 2 and there is good productivity on this soil when irrigated. There is agricultural use of the land above and below site 2.

8-31

2.7 Water Resources, page 8. Yes, there are wells on record in the study area. I contacted the Department of Ecology this spring and inquired about wells in the area of lot 11 which is very near the proposed site 2. They cited several wells in the area. Your information regarding site 2 appears outdated and incomplete.

8-32

2.8 4.0 Environmental Consequences, Land Use Impacts, page 8. Again, please see comment 1.8 regarding site 2.

8-33

2.9 Second paragraph, page 9. Please see all preceding comments regarding the aesthetic impact of site 2. Impact would be high.

8-34

2.10 Fourth paragraph, page 9. Use of site 2 would have future impact on residential use and big game critical winter habitat, and should have been addressed in the statement.

8-35

8-36 2.11 Wetland Impacts, page 9. Please see comments 1.7 and 1.9, and other related comments.

2.12 Wildlife Impacts, page 10. Please see all previous comments regarding the Currier Creek riparian zone adjacent to site 2 and impact to wildlife due to the abundance of bitterbrush and riparian vegetation at site 2.

8-37

8-38 2.13 Vegetation Impacts, page 10. Same comments as 2.12 above.

8-39 2.14 Water, Soil, and Groundwater Impacts, page 10. Please see comment 1.12.

8-40 2.15 Aesthetic Impacts, page 11. Please see comments 1.8, 1.13, and 2.4.

8-41 2.16 Health and Safety Impacts, page 11. This statement should include oil spills adjacent to Currier Creek and herbicide spread as well as possible groundwater contamination due to the residential density around site 2.

8-42 2.17 Fifth paragraph, page 15. Sun East is a continuously developing residential area as described in previous comment 1.8, third and fourth paragraphs. Development of a 50-acre substation in the center of Sun East would effectively end the expanding development of Sun East as a residential community and loss of resultant residential tax revenues to Kittitas County would be substantial. There are no such planned or expanding residential uses around proposed sites 1 or 3.

8-43 2.18 Fish and Wildlife Conservation, page 16. Please see all previous comments regarding proximity of site 2 to Currier Creek, the riparian existence at Currier Creek, and the wildlife effects of site 2 as compared to sites 1 and 3 due to the increased amount of food and cover vegetation at site 2.

8-44 2.19 Recreational Resources, page 17. Please see previous comment 2.3.

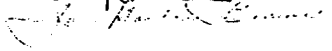
8-45 2.20 Wetlands, page 18. Site 2 is close to the wetlands of Currier Creek and required grading is close enough to Currier Creek that it needs consideration. Please see previous comments 1.5, 1.7, 1.9, and all other associated comments.

8-46 2.21 First paragraph, page 20. Please see previous comment 1.9.

8-47 In summary, we believe that the population density around the proposed site 2, with regard to safety and aesthetics, the proximity to Currier Creek and its associated wildlife habitat, and the visibility of the site to west Ellensburg and Interstate 90 should preclude it from consideration as an alternate site for the proposed substation.

Sincerely,

Gary L. Brown
Jan Gordon Brown



Sun East Property Owners
7202 226th Place S.W.
Mountlake Terrace, Washington 98043
(206) 778-0841

GLB/jgb
Enclosures
cc: Kittitas County Planning Department
Sun East Property Owners Association

PUGET SOUND AIR POLLUTION CONTROL AGENCY

November 26, 1991

Public Involvement Office
Bonneville Power Administration
P.O. Box 12999-0999
Portland, Oregon 97212

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: ERPDEIS-91-
RECEIPT DATE:
DEC 02 1991
AREA: DISTRICT

Dear Sir or Madam:

Puget Sound Electric Reliability Plan DEIS

The DEIS presents four basic alternatives including transmission reinforcement, conservation and load management, load curtailment, and local generation. The "preferred alternative" is stated to be a modified version of the conservation and load management approach. However, the final selection of an alternative is likely to be influenced by the recent listing of certain salmon runs as endangered species by the U.S. Department of the Interior. 009-1

In another recent decision, the U.S. Environmental Protection Agency's designated the Federal Aid Urban Areas in Snohomish, King, and Pierce Counties as "nonattainment" for carbon monoxide, and these entire counties as nonattainment for ozone. As a result, the construction of a combustion turbine capable of emitting over 100 tons per year of carbon monoxide, volatile organic compounds or nitrogen oxides now requires approval of a "new source review" permit pursuant to Section 6.08 of Puget Sound Air Pollution Control Agency Regulation I. 009-2

Among the specific new source review provisions is the requirement for an analysis of alternative sites and production processes for the proposed new source. If the construction of a combustion turbine is to be seriously considered, it will be necessary to evaluate the impact of such a facility relative to the alternative of converting homes to natural gas (or other fuels) for space and water heating.

From an energy policy standpoint, the fuel switching approach would have more than double the efficiency of fuel energy utilization. Combustion turbines are capable of converting only about one third of the energy of the fuel into electricity, whereas residential natural gas furnaces and hot water heaters are capable of achieving up to 95% thermal efficiency. 009-3

200 West Mercer, Room 205, Seattle, Washington 98119-4058 (206) 296-7330 (800) 552-3565 FAX (206) 296-7351

A combustion turbine would be required to meet the "lowest achievable emission rate" obtained anywhere in the country by such a facility and would required to obtain "emission offsets" equivalent to 110% of the emissions from the new source. Since no emission reduction credits are currently banked with the Agency, these reductions would need to be obtained from other emission sources with the nonattainment areas in accordance with the requirements of Section 6.08. 009-4

Given the potential restrictions imposed on Columbia River power generation and the problems associated with electric transmission systems, the choice of an alternative to meet forecasted peak power loads may now be under reconsideration. 009-1 Cont.

If local generation becomes preferable, an alternatives analysis similar to that outlined above will be a prerequisite. 009-3

Sincerely,

James L. Nolan
Compliance Director

JLN:ls

Oct. 30, 1091
Harry L. Brunsden
901 So. Wright
Tacoma, Wash. 98408

Sounding Board
BPA Public Involvement
Portland, Ore. 97212

Dear Members:

In my opinion, Alternative one, Cross Cascade Transmission Line should be followed.

The cost may be a bit more, but the benefits are there and we are in need of a new cross cascade transmission line, so why procrastinate?

010-1

Sincerely,

Harry L. Brunsden

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-01-10
RECEIPT DATE:
NOV 4 1991
AREA: DISTRICT

November 19, 1991

BPA Public Involvement Office
P.O. Box 12999
Portland, OR 97212

Dear Sir:

I attended the Public Meeting in Bellevue on November 18th and have reviewed the material that was distributed. I agree that the Alternative Strategy 2 is preferable to doing nothing. However, my personal choice would be to do a combination of Alternative Strategy 1 and Alterative Strategy 2. I also advocate building firm generating facilities in western Washington. 011-1 011-2

The Pacific Northwest is one of the best places to live in the nation and many more people are sure to come to live here. Those responsible for providing adequate power have to start building for the future and not be totally stymied by no growth advocates. 011-3

Yours truly,

John H. Wolch

John H. Wolch
12526 SE 25th Place
Bellevue, WA 98005

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-01-11
RECEIPT DATE:
NOV 27 1991
AREA: DISTRICT

Comment Letters

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-91-013
RECEIPT DATE:
NOV 27 1991
AREA: DISTRICT

DONALD R. AXTELL
2051 - 28 AVE NE #408
SEATTLE WA 98125

BPA PUBLIC INVOLVEMENT OFFICE
P.O. BOX 12999
PORTLAND OR 97212

11/17/91

RE: THE "ELECTRIC RELIABILITY" PLAN

HAVING READ YOUR PUBLIC REPORTS AND DIGESTED WHAT I COULD, AND CERTAINLY CONCURRING WITH THE NEEDS PURPORTED THEREIN, I WISH TO MAKE THE FOLLOWING INPUT FOR RECORD.

(1) I AGREE THAT OF THE OPTIONS OFFERED, YOUR CHOICE OF #2 MAKES THE MOST COST-EFFECTIVE SENSE. IT DOESN'T DO ANYTHING TO RESOLVE LONG-TERM SOLUTIONS, BUT RATHER GIVES US SOME BREATHING ROOM FOR 10-20 YEARS. OK, SINCE LONG-TERM THOUGHT IS NOT OUR STRONG SUITE, RUN WITH IT. 12-1, 12-2

(2) CONSERVATION IS A GOOD THING, AND PAYS. BUT YOUR EMPHASIS IS ON PRIVATE HOMEOWNERS AND OUR VERY LIMITED "HEAVY" INDUSTRY. BUT IT DOESN'T EVEN ADDRESS THE BULK - THE COMMERCIAL USERS WHOSE SIGNS AND LIGHTS MAKE OUR SKYLINE SPECTACULAR, BUT WASTE THOUSANDS OF KILOWATTS LIGHTING UNOCCUPIED BUILDINGS. CONSERVATION SHOULD BE EVEN-HANDED. 12-1, 12-2

(3) THE MAKE-UP OF YOUR "STEERING COMMITTEE" IS SKEWED AND IS YOUR BIGGEST FAULT: ONLY ELECTRIC-POWER PEOPLE (AND ONE LONE "USER") MAKE THE GROUP. NOWHERE REPRESENTED ARE THOSE FROM OTHER POWER SOURCES (NATURAL GAS, FOR INSTANCE), OR VOICES FROM CO-GENERATION, OTHER SOURCES, NUCLEAR, OR "ALTERNATIVE" SOURCES. WHY NOT? 12-3

(4) HAVE YOU GIVEN ANY THOUGHT TO WHAT THE SNAIL-DARTER DID TO THE TVA? WHAT HAPPENS IF SOCKEYE SALMON OR SPOTTED OWLS OR SOME YET-UNDETECTED RARE TSETSE FLY SHUTS YOUR OPERATIONS DOWN? IT COULD HAPPEN. 12-4

(5) EVEN THOUGH IT'S POLITICAL SUICIDE, NOONE IS LOOKING AT NUCLEAR POWER. WE OF THE PUGET SOUND BASIN NEED POWER, AND 3 GOOD LOCAL SOURCES ARE SITTING IN MOTHBALLS RIGHT HERE! EVEN WITH ENHANCED VOLTAGE-BOOSTING AND/OR A BACK-UP EMISSION LINE FROM THE EAST, WE WILL BE DEPENDENT ON THE EFFICACY OF YOUR "GRID". WRONG! THE PUGET SOUND AREA, AND HENCE THE REST OF THE GRID-MEMBERS, SHOULD NOT BE HELD HOSTAGE FROM SINGLE-SOURCE CONCEPTUALIZATION. 12-5

SURE, WE INDIVIDUAL RATE-PAYERS KNOW WE WILL BEAR ALL THE COSTS — AND THEN SOME! — IN OUR UTILITY BILLS — ALREADY UNREADABLE AND ARCANE, AND WHILE WE ENJOY CHEAP ELECTRICITY BY NATIONAL COMPARISON, WE DON'T WANT TO BE "SOLD DOWN THE RIVER" BY THE ALL-POWERFUL BPA AND HAVE NO WAYS TO BOOT.

12-6 I'M SURE YOUR EFFORTS TO AT LEAST ASK US WHAT WE THINK, IT PROBABLY WILL DO NO GOOD, THOUGH, BECAUSE WE DON'T HAVE POWER, ONLY FIRE MONTHLY BILLS, BUT SOME OF US DO THINK, BELIEVE IT OR NOT.

RESPECTFULLY SUBMITTED,

Donald R. Axtell

City of Bellevue
Design and Development Department 455-6864 • FAX 637-5225
Post Office Box 90012 • Bellevue, Washington • 98009-9012

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-91-013
RECEIPT DATE:
DEC 09 1991
AREA: DISTRICT

December 4, 1991

BPA Public Involvement Office
PO Box 12999
Portland, OR 97212

To: Environmental Official

Re: Comments on Draft Environmental Impact Statement for the Puget Sound Area Electric Reliability Plan

Thank you for the opportunity to comment on the above referenced Draft EIS. While the City of Bellevue generally supports maximizing conservation efforts, we recognize that adding facilities to the electrical transmission / distribution network may be necessary to ensure reliable service. We believe that load management and fuel switching strategies should be seriously considered as part of the conservation component of *any* alternative chosen and not limited to Alternative 3. With those additional strategies incorporated, we believe Alternative 2 would contain a reasonable balance of conservation efforts and development of relatively low impact facilities. 13-1, 13-2

The City's primary concern at this point regards what you refer to as "Transmission Line Voltage Support - Option 1", a component that is common to all of the alternatives analyzed. The "Transmission Reinforcement Analysis" contained in Appendix E contains eight possible options for this "Transmission Line Voltage Support" system. Six of these eight options appear to be based on an assumption that the existing 115kV lines between the Maple Valley and Lakeside substations will be upgraded to 230kV and that the Lakeside Substation will be upgraded to be able to accommodate these higher voltage lines. It is important for BPA to understand that no permits have yet been issued for this transmission line upgrade and not all necessary permits have been issued for the substation upgrade that would be needed before the transmission line could be upgraded. Both of these upgrades are currently before the City of Bellevue and an EIS is being prepared for these actions. 13-3

Given the status of these two proposed upgrades, at this time we cannot support any action that would be dependent on upgrades to these facilities, or any action that would preclude those options that are not dependent on these facilities. 13-4

If you have any questions, please contact Ray Sachs, Senior Environmental Planner, at 462-2739.

Sincerely,

Susan Sánchez
Environmental Coordinator

SS:RS

City of Bellevue offices are located at Main Street and 116th Avenue SE

MUCKLESHOOT INDIAN TRIBE
FISHERIES DEPARTMENT

0405 AUBURN-ENUMCLAW ROAD - AUBURN, WASHINGTON 98002
(206) 825-7030 - FAX # (206) 825-9027

6 December, 1991

Mr. Alan Courts
Public Involvement Manager
Bonneville Power Administration
P.O. Box 12999
Portland
Oregon, 97212

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-01-014
RECEIPT DATE:
DEC 10 1991
AREA: DISTRICT

RE: Draft Environmental Impact Statement
Puget Sound Area Electric Reliability Plan

Dear Mr. Courts:

We have reviewed the Draft Environmental Impact Statement for the above project. The following comments are forwarded in order to protect the fisheries and fisheries habitat in the Usual and Accustomed (U and A) Areas of fishing of the Muckleshoot Tribe.

Given the information in the Draft Environmental Impact Statement, the Muckleshoot Indian Tribal Fisheries Department would favor modifying Alternative Strategy 3 Demand Reduction. We would request that the option be modified so that the contingent additional transmission line and voltage support measures are eliminated. 14-1

We note that alternatives which would increase energy exports to the west side of the Cascades from the east side may result in additional impacts to east side fisheries resources. We can not support any alternative which results in additional impacts to fisheries resources. 14-2

Thank you for your attention to these comments. Please direct any questions to me at 825-7030.

Sincerely,

Rod Malcom

Roderick Malcom
Habitat Specialist

cc: Yakima Indian Nation
BIA

1812 Island View Place
Anacortes, Washington 98221

December 9, 1991

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-02-016
RECEIPT DATE:
DEC 16 1991
AREA: DISTRICT

Public Involvement Office
Bonneville Power Administration
Post Office Box 12999
Portland, Oregon 97212

Gentlemen:

My comments on the Draft Environmental Impact Statement for the Puget Sound Area Electric Reliability Plan are:

(1) The option of purchasing power from Canada (BC Hydro) was not addressed in any detail, so it's difficult to see if this offers any promise as part of the problem solution; 16-1

(2) While residential weatherization is addressed as a conservation measure, I note that military bases offer a special opportunity for this. Certainly at Naval Air Station Whidbey Island there are a sizeable number of housing units with electric heat under the cognizance of a single authority. This offers the opportunity for affecting a substantial block of houses at one time; 16-2

(3) Many industrial facilities have back-up emergency generators for use during power outages; it may be possible to reduce peak loading by offering payment to these facilities for operating generators on an on-call basis. This would take advantage of some generating capacity which already exists. 16-3

Alan Souders

Alan Souders

Bonneville Power Administration
Public Involvement—ALP
P.O. Box 3621
Portland, Oregon 97208-3621

Decomber 16, 1991

League of Women Voters
Bellingham, Washington Chapter
1026 North Forest
Bellingham, Washington 98225

Re: Puget Sound Area Electric Reliability Plan/Draft Environmental Impact Statement

Dear Sir/Madam,

17-1 It appears to be a characteristic of our planning process that we consistently use short-range time frames and resources. Though we acknowledge that this DEIS is to address a perceived immediate threat to peak demand capacity, it is nonetheless part of a larger picture dealing with how we will supply all energy needs far into our future.

The League's position, supported by repeated polls of the general populace, is that conservation and renewables are the preferred routes for dealing with this emerging crisis of demand and supply. Investment NOW in research on renewable strategies appropriate to the Northwest may yield application breakthroughs in time for implementation in our hour of need, but continuing to ignore investment needs in this area only extends the time by which we could be factoring in the benefits of renewable resources...an "always the bridesmaid, never the bride" situation for the only true answers to long-term energy requirements.

17-2 If solar is not applicable year-round, it is still available for a large percentage of the year. The options for wind and tidal power generation have been only minimally explored in this region, yet would be at least partial answers to energy deficits. These would often lend themselves to more local generation facilities, which would render the system less vulnerable to the massive failure described in the DEIS as well.

17-3 The approach to conservation is analogous to our answers for transportation needs: we build more roads versus promoting more efficient ways of moving people. We still seem to be favoring supply solutions instead of maximizing the efficiency of what already exists. There are the efforts to scratch the surface (the voltage support options, conservation, load management, etc.) and these are positive steps, but the potential for this approach is far greater than acknowledged in the DEIS. We have our proverbial toe in the water, but seem unwilling to jump in and swim.

17-4 A far more aggressive conservation strategy would yield significantly greater returns than those quantified in the report. With a growing array of implementation examples

and technical resources for a genuine commitment to conservation, all we need is the corporate will to pursue them. Look at the diagnostic techniques used by the tiny Osage, Iowa, utility to enhance the effectiveness of their weatherization program; infrared photography to identify specific heat leak problems. Where is that "more than generic" approach to diagnosis in our region? The utilities should be knocking on doors, not waiting for the customer to contact them. They should be willing to commit more capital to incentive programs to make them more accessible to everyone, but especially to low-income families (e.g. would anyone seriously consider replacing

17-4 their inefficient, but working, refrigerator for a $30.00 rebate offered by Puget Power?). Innovative payback options might include maintaining electrical bills at their pre-purchase level until the loan for the more efficient appliance is repaid. What about solar pre-heating of water so that electric water heaters do less work? There are recent passive solar breakthroughs in this area that could be utilized by our region, or, instead of promoting this comparatively inefficient system of electric tanks, what about using tankless water heaters for future construction and retrofits? What about tapping into computer models such as ELFIN and into "advanced electrical efficiency information services" such as COMPETITEK to seriously utilize conservation and renewables potential in planning and analysis?

We fail to recognize that, as a nation, our strongest economic competitors are two to three times more efficient in their use of energy. It would have a profound impact on our ability to compete in world markets were we to look past the high initial

17-5 costs of serious conservation efforts into the quick payback. The research paper "Energy and Jobs" (March 1983) produced by the Coalition of Northeastern Governors' Policy Research Center is a dramatic demonstration of the positive economic impact a conservation vs. resource acquisition strategy could have on a region.

You list environmental externalities, but retreat when confronted with the drastic potential of such threats as global warming from a strategy that would truly deal with such threats. Must this be another instance of showing that we only

17-6 reverse course when faced by catastrophe, or can we pursue actions that will yield benefits, both economic and environmental, whether or not the "worst case scenario" unfolds environmentally?

Please consider providing for mitigation of environmental impacts in ways

17-7 similar to the Dutch solution of reforesting huge tracts of Central America to offset the emissions of a coal-fired plant, a stance that goes beyond merely complying with existing environmental legislation.

Thank you for this opportunity to comment on the DEIS.

Seattle City Light

M. J. Macdonald, Acting Superintendent
Norman B. Rice, Mayor

December 16, 1991

Alan Courts
Public Involvement Office
Bonneville Power Administration
P.O. Box 12999
Portland, OR 97212

Dear Mr. Courts:

Comments on BPA's Draft Environmental Impact Statement (DEIS) for the Puget Sound Area Electric Reliability Plan (PSAERP).

Seattle City Light has reviewed the Draft PSAERP EIS and has the following comments and suggestions:

18-1 We wish to commend Bonneville for the open and inclusive process you used in the development of this DEIS. Throughout the two year process, Bonneville has made extensive efforts to seek and incorporate input from involved utilities, the public and from technical panels that were set up specifically for this issue. Seattle has participated through the Steering Committee and various technical committees. We appreciate having had the opportunity to provide input over time into the alternatives proposed in this DEIS.

18-2 The document you have produced is very readable with excellent graphics and could be considered a model for other Environmental Impact Statements covering complex technical issues. The maps, especially, are a very useful part of the report.

18-3 We are pleased to see that you have incorporated many of the suggestions Seattle made on your Preliminary Environmental Analysis, including separating transmission lines into existing and new corridors for the purposes of analysis. We are pleased to see this change since the environmental impacts will vary greatly between these cases. The overall rating given to each of the resources now looks appropriate to us. You have also developed a least environmental impact alternative that combines conservation, load management and voltage support options, as we suggested.

18-4 Seattle agrees with you in your general approach of developing alternatives that combine several different strategies, thus avoiding the risks of depending too heavily on any single solution. We also approve of your approach of developing contingencies for each alternative, and of planning intermittent checks on the forecasts in order to react to changing situations in the region. We believe this is a reasonable plan for dealing with the problem at hand.

18-5 Seattle supports the Preferred Alternative recommended in the EIS. This alternative is the most cost-effective and has very low environmental impacts. It uses several of the best elements of the other alternatives by combining accelerated conservation, voltage support as well as pilot programs for direct load control (such as Seattle's Highline Project). If these measures prove inadequate, a cross-Cascade transmission line and combustion turbines in Western Washington are included as contingencies.

18-6 If the Contingency Plan is required, we recommend using existing corridors, if possible, since the environmental analysis shows that using or widening existing corridors is preferable to building new ones. When analyzing proposed routes for any new transmission lines we urge you to avoid designated sensitive areas and critical habitat for endanger and threatened species. This includes minimizing impacts on "areas of concern" designated for the Spotted Owl by the U.S. Fish and Wildlife Service. We also encourage you to avoid roadless areas and areas with high scenic and recreational values. With all these environmental constraints, if indeed a new corridor is needed, the final route may not be the shortest, but may end up being constructed over areas that have already been heavily logged. We understand that if new transmission lines are needed, a site-specific EIS will be prepared. We expect to be involved at that time.

Lastly, a few editorial comments on your document:

18-7 Map #6, which identifies river segments with anadromous fish, should be corrected to reflect the fact that there are no anadromous fish runs above the Gorge Dam on the Skagit River.

18-8 Maps #10 and #11: the names of high-growth counties are difficult to read.

18-9 On pages S-1 and 1-1, please add one more purpose: "The plan should meet or exceed participating utilities' environmental protection criteria."

18-10 In Table S-2 and in Figure 4-6 the socio-economic effects of Curtailment contracts should be Moderate, not High.

18-11 Table 2-2 is rather confusing since cumulative numbers are diminishing over time. Perhaps a note encouraging the reader to see the text for a full explanation would suffice.

18-12 Page 2-17 mentions "vars", a term that should be added to the Glossary or explained in the text.

18-13 Make the statement on page S-1 paragraph 2, regarding the need for the action consistent with the one on page 1-1. In fact, the latter ("At certain times...can reliably supply") is a truer statement and should be used instead of the existing line on S-1.

18-14 It would be helpful in some of the tables (e.g. Table 4-8) if numbers were rounded to the nearest ten, and in other tables (e.g. Table 4-2) if the title said "millions of $$" to avoid the long strings of zeroes. We also suggest that you graph the data presented in Tables 4-2 and 4-3.

18-15 Page 4-8 paragraph 5 should be revised to say that EMF studies on laboratory animals to date have been inconclusive.

18-16 Page 4-12 paragraph 6 says that the transformer oil will not be toxic. Since oil is toxic, this should be revised to say that the oil will not contain hazardous substances such as PCBs.

18-17 On page 4-22 paragraph 2, we suggest deleting the two sentences that weaken the discussion and add a statement that only expanding or building a new transmission line is likely to result in high environmental impacts.

18-18 Page 4-22 paragraph 10, to the list of impacts for Alternative Strategy 1 add aesthetics, land use, wildlife, etc. and for Alternative 2 add air quality impacts.

18-19 Copies of pages with minor typographical and other suggested changes are attached to clarify our comments.

Again, thank you for the opportunity to review this Draft EIS. We hope our comments have been useful.

Sincerely,

Malcolm J. Macdonald
Acting Superintendent

MJM:ee

Attachment

NORTHWEST CONSERVATION ACT COALITION
6532 Phinney Avenue North • Suite 15 • Seattle, WA 98103
206/784-4585 • FAX: 206/784-4577

December 16. 1991

Joanne Scott
Public Involvement Manager
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Re: NCAC Comments on Draft EIS for Puget Sound Electric Reliability Plan

Dear Joanne:

19-1 Thank you for the opportunity to comment on the Draft EIS for the Puget Sound Electric Reliability Plan. We commend Bonneville and the participating utilities for an exceptionally strong public involvement effort in the development of this plan. We hope the Sounding Board model will be used to promote active public (not just customer) deliberation about other crucial decisions before Bonneville.

19-2 NCAC supports accelerated conservation as a judicious partial solution to the looming transmission capacity constraint. We also believe that the voltage support investments contemplated in the preferred alternative are probably a sensible approach. But these measures appear to be offered as a "medium-term" solution, while the implicit long-term default solution is adding transmission capacity and combustion turbines.

19-3 The preferred alternative calls for preliminary planning for a new cross-Cascade transmission line to begin soon - almost as soon as it would have occurred had you chosen transmission as the preferred alternative. Yet the analysis explicitly relects that option (Alternative 1) in favor of more cost-effective and environmentally benign solutions.

If and when demand growth outpaces the solutions embodied in the preferred alternative, we will have a range of alternatives to choose from, just as we do now. At that time, additional transmission and combustion turbines will be two among several possible approaches, just as they are now. And we believe superior alternatives to a new cross-Cascade line and fossil fuel-fired generation will probably be available then, just as they are now.

Some of those alternatives are suggested by the following comments, which address the substance of the analysis in the DEIS:

19-4 - West side generation: Several large gas-fired projects have made Bonneville's "short list" in the competitive bidding process. Accepting these bids would severely undermine the credibility of the Electric Reliability Plan, which considered the alternative of combustion turbines and explicitly rejected it except as a contingency. We understand that Bonneville's resource solicitation addresses the regional resource situation rather than the Puget Sound transmission capacity constraint. However, the analysis for the PSERP cannot be conducted in a vacuum. We argued repeatedly and strenuously that, although it rendered the analysis more complicated, ERP was intimately connected to the larger regional resource situation and should be analyzed as such. While we commend Bonneville for the inclusiveness of this process, we note that you are on the verge of choosing to go forward with an alternative that this analysis explicitly rejects. Doing so will irreparably damage the credibility of this process.

19-5 - Efficient direct application of natural gas: The fuel switching analysis in the Draft EIS is wanting. Despite repeated urgings from virtually the entire Sounding Board to include fuel switching in other alternatives, the analytic team insisted on lumping it into the Alternative 3 grab bag, where its cost-effectiveness was undermined by other measures. The DEIS suggests that the "measures used in Strategy 3 were felt less deliverable than those used in other strategies." The only obstacle to delivery of efficient direct application of natural gas that we can see is the utilities' unwillingness to deliver it.

The "analysis" of fuel-switching appears to be nothing more than a reiteration of electric utilities' disinclination to treat direct application of natural gas as a resource. We can and should argue about whether it is indeed a least-cost resource, but that discussion is rendered moot if the utilities refuse to acquire it, regardless of its cost-effectiveness. You are making a policy judgment here about the desirability of this resource. Entirely apart from the merits of the judgment, we find it analytically disingenuous to pass that judgment off as the product of "analysis."

19-6 Finally, now that it is clear that Bonneville is planning to acquire large amounts of gas-fired generation, the analysis of fuel-switching should be straightforward: it is simply a matter of determining the most efficient and cost-effective use of the gas resource. If you are unwilling to contemplate direct application of natural gas because of its adverse effects on electric utilities' finances, then we offer to work with you to find a way to minimize or adapt to those effects. But we feel that choosing a resource, or failing to, because of its effect on the utility rather than its total cost to society is bad public policy, and entirely inconsistent with the Regional Act.

19-7 - Significantly higher levels of conservation than even the "accelerated" approach in the draft EIS are available and cost-effective now. Over the course of the planning period, even more will become available. We suspect that even the "accelerated" conservation is substantially less than what is called for in the Power Planning Council's regional conservation plan. Assuming that Bonneville is planning to develop new resources consistent with the Plan, the Plan's conservation targets should form the baseline for the analysis. "Accelerated" conservation would then consist of efficiency improvements above and beyond those in the Plan. In our comments on the 1990 Resource Program and on the Council's Draft Plan, we documented potential savings well in excess of those in the current Council Plan. We strongly believe that an ambitious, determined effort to capture all cost-effective conservation will yield savings well in excess of those in the DEIS, and will go a long way towards obviating the need for new transmission capacity for the foreseeable future.

19-8 When the Sounding Board process was announced, we praised Bonneville for the quality of the process and the agency's willingness to take an even-handed look at all of the alternatives. On numerous occasions, we asked whether the analysts were operating under the implicit assumption that transmission was ultimately the most desirable, or only, solution. We were assured that this was not the case.

Yet, when the analysis indicated that transmission additions were in fact not the most desirable alternative, an alternative was chosen and the process of "optioning" transmission is apparently to begin anyway. Choosing transmission and combustion turbines as "contingencies" looks to us like an attempt to test the waters for options that proved too costly and controversial to be chosen outright.

19-9 NCAC has no desire to see the Puget Sound sub-region experience transmission failures. We believe that prudent planning to provide an adequate margin of safety for the transmission system is entirely appropriate. But we also believe that superior alternatives to increased transmission and combustion turbines exist in quantities significantly greater than your analysis suggests.

19-10 We suspect that you would agree that the technical potential for cost-effective conservation, renewable resources, high-efficiency cogeneration, and efficient direct application of gas and renewables greatly exceeds the amount of these resources that appears in your analysis. The question is not whether these resources exist, but **whether we will successfully mobilize the region's resources to acquire them**. Our primary concern is that, instead of embarking on a focused and determined effort to acquire these superior alternatives, Bonneville appears to be squandering its resources on hedging its bets and acquiring gas-fired generation.

bets and acquiring gas-fired generation.

We are fortunate in this region to have the most carefully reasoned and far-sighted electric energy plan in the country. But we are reaching diminishing returns on the least-cost planning process. We now must shift - actively and aggressively - into least-cost **action**. Our prospects for implementing these plans are entirely dependent on the extent to which Bonneville is prepared to lead the way.

19-11

The Puget Sound electric reliability problem adds some immediacy to the regional resource situation, but it is fundamentally part and parcel of the same challenge. That challenge is to **deliver** on the promise of the Regional Act, a promise of efficient use of environmentally responsible energy resources. We have identified those resources. Now, it is up to all of us to acquire them. We urge you not to shrink from that challenge by acquiring "cheap" fossil resources or investing too heavily in "options" and "contingencies," when an adequate investment in preferred resources will do the job.

19-12

Sincerely,

K.C. Golden
Director

Dec. 7, 1991

Bonneville Power Administration
P. O. Box 12999
Portland, Oregon 97212

Attn: Public Involvement Office
Subj:

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDECS-02-020
RECEIPT DATE:
DEC 16 1991
AREA: DISTRICT

Gentlemen:

We are in full agreement with the correspondence that was sent to you on November 6, 1991, by Gary & Jan Brown who are landowners in Sun Coast Development area as we are. The Majority of the people that we have talked to feel the same way.

20-1

We feel that this substation, which is your alternate #2 + would be detrimental to our development + area.

20-2

We have up to 300 [illegible] Road of Elk that travel through the area in a years also that area is home to a great number of quail, pheasants, Hungarian Huns and other wildlife.

20-3

Sincerely
Art & Alice Mary
[illegible] Box 316 A Elkton, Ore. 97436

→ A. Courts

SIERRA CLUB
Cascade Chapter

1516 Melrose Avenue
Seattle, WA 98122
December 13, 1991

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-02-21
RECEIPT DATE:
DEC 19 '91
AREA: DISTRICT

Charles F. Clark
Assistant Administrator for Engineering
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Mr. Clark:

We have reviewed the Draft Environmental Impact Statement (DEIS) on the Puget Sound Area Electric Reliability Plan and offer the following comments on this ten-year plan.

21-1 The preferred alternative attempts to address the problem and provides a workable framework for making a decision. However, we cannot support it as currently configured, because it relies on two contingencies—construction of a new transmission corridor and combustion turbines—rather than additional conservation. The pilot program for these additional conservation measures is not an

21-2 adequate effort. Those programs should be pursued aggressively before additional generation or new transmission construction projects are started.

21-3 Furthermore, prior to construction of any transmission projects, a full review of the possible cross-Cascades corridors needs to be done in light of listing of additional wildlife species as threatened since the draft Northern Cascades Corridor Availability Study was written.

21-4 The maps of river resources in the DEIS should be updated to display all rivers recognized by the U.S. Forest Service as eligible or suitable for Congressional designation as Wild, Scenic, or Recreational Rivers. The Forest Service came to its recommendations after years of public input and after considering all resources of the rivers, including scenery, recreation, wildlife, fish, cultural, and geological values. Relevant information is contained in Appendix E of the forest plan EIS for each national forest. The Forest Service will generally not support projects which have the potential to harm the outstandingly remarkable values for which such rivers have been recognized. BPA should analyze these river recommendations upon transmission corridor routing.

In addition to the Voltage Support Options 1 and 2, we support the following to be included in a final preferred alternative:

21-2 •Top priority should be conservation. Before generation options are implemented, BPA should explore those options not fully considered in this DEIS (section 2.7.1, Conservation and Load Management Measures). Enhanced conservation will have many other benefits for the region's environment, not the least of which will be to obviate the need for additional generating plants as well as transmission facilities. BPA has the opportunity to work with local utilities to further the mutual goals of maximizing conservation.

21-5 •Second priority should be upgrading existing lines to 500 or 750 kV.

21-6 •Only if conservation and voltage support measures are not sufficient should BPA consider adding additional lines. Additional lines should be placed only in existing corridors, with Stevens Pass as lowest priority.

21-1 If new corridors are needed, they should avoid critical wildlife habitat, roadless areas, and valleys currently without transmission lines. The Naches Pass corridor would traverse an "area of concern" delineated by the U.S. Fish and Wildlife Service for the northern spotted owl. This should be the last place to locate such a line due to its impact on critical habitat of the northern spotted owl. This route would also cause significant degradation of the scenic and recreational resources of the Little Naches Valley. The White Pass corridor also has critical habitat for the spotted owl, as well as extremely important recreational and visual values. Thus, we urge you to drop the White Pass and Little Naches/Greenwater River corridors from further consideration.

21-8 The Cle Elum to Wenatchee corridor could have severe impacts on spotted owl critical habitat, scenery, and recreation, and could be in conflict with the management guidelines of the Wenatchee National Forest's forest plan. The present routing is unacceptable. Many old-growth forests and rare plant associations are found in the general vicinity of Swauk Pass and should be given wide berth by any powerline. A route entirely around the national forest land between Wenatchee and Cle Elum will be at lower elevation—and less subject to winter storm damage—and will have much less environmental impact.

21-9 The western part of the Skykomish-Echo Lake corridor should be changed to use Proctor Creek (just west of Index) instead of Money Creek. The Forest Service's Alpine Lakes Management Plan has set aside much of the upper Tolt River and Money Creek watersheds for dispersed recreational uses. This Dispersed Recreation management allocation prohibits construction of roads and has other provisions generally prohibiting development. Construction of a transmission line in Money Creek or the upper Tolt River on national forest land is therefore unacceptable. (ALMP p. 6.)

21-10 The corridor over the Cascade Crest at Midway near Mt. Adams also has problems, as it passes through important forest, recreational, and scenic areas in the Gifford Pinchot National Forest.

21-11 If at some future date, after other options have been exhausted, another corridor across the Cascades is needed, locations could be found south of Stampede Pass but staying east of the Little Naches and Greenwater valleys and avoiding the Kelly Buttes roadless area (a roadless area excluded from Forest Service inventories) and the Quartz roadless area. A corridor near Tacoma Pass that avoids roadless areas and spotted owl critical habitat could be considered. This would increase reliability with less impact to virgin forests and other valuable public resources than the other corridors, especially if it is routed principally through the heavily cultured private lands.

21-12 If any forest is removed to accommodate new or wider existing rights-of way for a powerline, the forest should be replaced in kind by acquiring existing old-growth forest on private lands. By selecting such lands in the intermingled ownerships in the I-90 corridor, they could easily be transferred to the jurisdiction of the U.S. Forest Service. Other options to reduce environmental impacts and winter icing problems include placing portions of the line underground. Any new route would need to be carefully sited, not using merely the shortest, straightest route as seems to be the case with most of the mapped corridors in the draft EIS. In any event we agree (see p. 2-9) that a full site-specific EIS must be done for any transmission line project.

Thank you for this opportunity to comment on the Reliability Plan. Please send us a copy of the Final EIS when it is published. Please also send us a copy of the Draft Northern Cascades Corridor Availability Study (BPA, 1990).

Sincerely,

Mark Lawler

Mark Lawler, Conservation Chair

9004 - 20th Ave NE
Seattle, Washington 98115

December 12, 1991

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-02-2
RECEIPT DATE:
DEC 19 1991
AREA: DISTRICT

Charles F. Clark
Assistant Administrator for Engineering
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Mr. Clark,

After reviewing the Draft EIS on the Puget Sound Area Electric Reliability Plan I would like to offer a few comments.

22-1 For the ten year planning period, the preferred alternative attempts to address the problem of voltage stability in the Puget Sound basin. It provides a workable framework for making a decision. The most readily available construction options are the voltage support proposals #1 and #2. With relatively little impact they increase voltage stability and appear reasonable.

22-2 Conservation, of course, should be a primary method to address the voltage situation. By reducing the demand and peaks it can significantly lessen the need for cross state transmission or new generation. It is essential that a comprehensive energy conservation program be initiated before other construction options are implemented.

22-3 Prior to any transmission projects a full review of the cross-Cascades corridors needs to be done in light of recent listing of wildlife species as threatened. Please send me a copy of the Draft Northern Cascades Corridor Availability Study (BPA, 1990).

22-4 It is preferable to upgrade existing lines to 500 or 750 kV. After that, adding additional lines in existing corridors could be considered, with Steven Pass as lowest priority.

22-5 If new corridors are needed BPA should avoid critical habitat, roadless areas and valleys currently without transmission lines. The Naches Pass corridor should be dropped as it would cross critical habitat in an "area of concern" for the northern spotted owl (USFWS August 1991). It also crosses roadless areas and traverses two major valley that are currently free of powerlines.

22-6 BPA should also drop consideration of the White Pass corridor for similar reasons. The Cle Elum to Wenatchee corridor would have likely have some impacts on these resources but routing may avoid the most severe.

22-7 The Skykomish-Echo Lake segment should be changed to use Proctor Creek (near Index) instead of Money Creek. Again, the Money Creek route would cross important forests habitat, roadless areas and scenic recreation areas.

22-8 The corridor over Midway north of Mt. Adams also has problems with forest habitat, recreation and scenic quality.

22-9 If, at some time in the future, another corridor across the Cascades is needed, a location might be found south of Stampede Pass but staying out of the Little Naches and Greenwater valleys. A route over Tacoma Pass would provide an alternate from south of Easton up Cabin Creek to an intersection with the existing lines on Sunday Creek (vicinity of Section 9). It could then following Smay Creek west to the Puget Sound grid. If the ROW took advantage of the heavily cutover private lands, it would increase reliability while causing far less impact to forests and other resources than the currently proposed routes.

22-10 If any forest is removed to accommodate new or wider existing rights-of way the forest should be replaced in kind by acquiring existing old-growth forest on private lands. By selecting such lands in the intermingled ownerships in the I-90 corridor, it could easily be transferred to the jurisdiction of the Forest Service.

22-11 Any new route would need to be carefully sited, to minimize impacts, not just the shortest or straightest route. Placing all or part of transmission lines underground should also be evaluated in any project specific EIS.

22-12 While the maps were very helpful in understanding the issues I noted a few instances where corrections may be warranted. Vegetative Patterns (Map 4) seems to be in error as it shows developed farmland, glaciers and urban areas as "developed land". The data also is 10 years old during which a significant amount of forest land has been developed in the Puget Sound basin.

22-13 The Anadromous Fish Map (#6) appears to have some errors. I do not believe there is any anadromous fish use above Gorge Dam on the Skagit River, above Snoqualmie Falls on the Snoqualmie River, above the debris dam on the Toutle River, above the falls on the Green River (Mt. St. Helens National Monument) or on the Stehekin River.

22-14 The Land Ownership Map (#13) on the Wenatchee National Forest is out of date. The Protected Areas Map (#12) is so broad as to be misleading. There is tremendous variation in the amount of "protection" each area is afforded. At least, national parks, wilderness, spotted owl critical habitat units (CHU) and Habitat Conservation Areas (HCA) should be delineated.

Thank you for this opportunity to comment on the Reliability Plan. Please send me a copy of the Final EIS when it is published.

Sincerely,

Charles C. Raines

ROBERT G. WALDO
Chairman

STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL
809 Legion Way S.E., FA-11 • Olympia, Washington 98504-1211

December 10, 1991

Mr. Alan Courts
Project Manager
Bonneville Power Administration
P.O. Box 12999
Portland, Oregon 97212-0999

Re: Washington State Comments to the Puget Sound Area Electric Reliability Plan Draft EIS

Dear Mr. Courts:

Under the 1983 Memorandum of Understanding and the 1990 Intergovernmental Agreement No. DE-BI79-90BP 05371 between the Bonneville Power Administration and Energy Facility Site Evaluation Council (EFSEC), EFSEC has assembled the comments of Washington State agencies on the Puget Sound Area Electric Reliability Plan Draft Environmental Impact Statement. In addition, the Council has some comments of its own on the draft EIS.

Attached you will find copies of comments on the draft EIS from the state Departments of Transportation (DOT) and Natural Resources (DNR). The Department of Transportation believes that the draft EIS ignores the effects of various alternatives on the state transportation system. Impacts to the transportation system resulting from implementation of the alternatives were not discussed at all. DOT is also interested in reviewing BPA's plans regarding several specific items relating to site access, traffic hazards, right-of-way encroachment, permits and haul routes.

The Department of Natural Resources felt the maps in the draft EIS were too broad to detail impacts to state trust lands and that Alternative No. 2 would have the least impact on DNR managed lands. DNR also encourages BPA to avoid alternatives which necessitate construction of new transmission corridors in forested areas.

The Washington State Energy Office (WSEO) will not be submitting a formal comment on the draft EIS. Dick Watson, the director of WSEO was on the project steering committee and provided input throughout the process.

023-1 EFSEC has reviewed the draft EIS and has comments only in regard to the proposed Cross Cascade Transmission Line of Alternative 1 and contingency for the Preferred Alternative 2. If BPA were to choose to build or upgrade a transmission line, EFSEC would expect BPA to work with EFSEC under the July 7, 1983 *Memorandum of Understanding* and the November 17, 1983 *Memorandum of Agreement* for Transmission Facility Siting.

(206) 956-2000 or SCAN 494-2000 Telefax (206) 753-2897

023-1 The Memorandum of Agreement calls for undertaking activities to achieve compliance with applicable federal and state statutes. In line with the BPA/EFSEC MOA and the Model Process, EFSEC would expect to review any proposed line for determination of siting alternatives and compliance with substantive state standards. The Council's environmental review responsibility should be specifically mentioned in Section 5, Environmental Consultation, Review, and Permit Requirements and listed in Table 5-1 on page 5-2 of the draft EIS.

Thank you for this opportunity to comment.

Sincerely,

Robert G. Waldo
Chairman

RGW/AJF/jk
C-L28-06

Enclosures

Washington State Department of Transportation
District 1
15325 S.E. 30th Place
Bellevue, Washington 98007-6538
(206) 562-4000

Duane Berentson
Secretary of Transportation

November 22, 1991

Mr. Allen Fiksdal, EFS Specialist
Energy Facility Site Evaluation Council
809 Legion Way SE
Olympia, WA 98504-1211

Puget Sound Area Electric
Reliability Plan DEIS
Review Comments

Dear Mr. Fiksdal:

The Department of Ecology NEPA Coordinator, Barbara Ritchie, has requested that our comments on the Puget Sound Area Electric Reliability Plan Draft Environmental Impact Statement (DEIS) be submitted to you for coordination with comments from other state agencies. The Bonneville Power Administration (BPA) has developed a plan in conjunction with the principal power purveyors in the Puget Sound region to solve the peak load reliability problem whose root cause is the growth in demand for electrical power. The peak demand occurs during the winter months when unusually cold weather increases electricity use for heating. Under this peak load conditions, the power system could not meet consumer's demands if a certain transmission line or generators in the Puget Sound area fail. The Puget Sound area could have a brownout or blackout under such conditions.

Our comments on the DEIS are as follows:

023-2 1. Impacts to the transportation system resulting from the implementation of the alternatives were not discussed in the DEIS at all. We realize that certain components of each alternative will have no transportation impacts, but those alternatives that include transmission line improvements should be evaluated for transportation impacts.

023-3 2. For those alternatives involving construction activities, we would be interested in reviewing a discussion addressing issues such as:

023-4

- access to and from the construction site.
- volume and characteristics of construction related traffic.
- encroachment into or across highway rights of way.
- modification of franchise agreements or permits, if needed.
- haul routes for materials delivery.
- traffic hazards associated with construction activities.

We appreciate having an opportunity to comment on the DEIS for the Puget Sound Area Electric Reliability Plan.

If you have any questions or need clarification of these remarks, please contact Mr. David Oberg of my staff at 562-4106 (SCAN) or (206) 562-4106.

Sincerely,

for JERRY B. SCHUTZ
Assistant Manager for
Route Planning

DAO:em
44/dopugsnd

FROM: DNR L&M LAND MGT TO: 295 DEC 4, 1991 3:08PM #259 P.02

WASHINGTON STATE DEPARTMENT OF
Natural Resources

BRIAN BOYLE
Commissioner of Public Lands

Division of Lands & Minerals, I B-13
Olympia, Washington 98504
(206) 586-6382, FAX (206) 586-5646

December 4, 1991

Allen Fiksdal
Washington State Energy Office
MS: FA-11
Olympia, WA 98504

RE: PUGET SOUND AREA ELECTRIC RELIABILITY PLAN

023-4 Thank you for the opportunity to comment. In general, the maps included in the draft environmental impact statement are too broad to specifically detail impacts to state-owned land managed by the Department of Natural Resources. It should be

023-5 assumed that easements from the Department of Natural Resources for this project would be required for any of the alternatives.

023-6 Alternative No. 2 appears that it would have the least impact on Department of Natural Resources managed land. We also encourage that BPA avoids alternatives that necessitate construction of new transmission corridors in forested areas.

023-7 Transmission corridors destroy forest/wildlife habitat and the ability to market forest products from the corridor indefinitely.

If you have questions about these comments, please do not hesitate to contact me at (206)586-6382.

Sincerely,

David F. Dietzman

David F. Dietzman
SEPA Center Manager

Equal Opportunity/Affirmative Action Employer

PSDEIS-02-024
RECEIVED BY BPA
PUBLIC INVOLVEMENT
RECEIPT DATE:
DEC 27 1991
AREA: DISTRICT

G.H. BOWERS ENGINEERING
Consultations on Power System Planning

1930 North 122nd Street, Seattle, Washington 98133 Telephone (206) 361-0461

December 13, 1991

Public Involvement Office
Bonneville Power Administration
P.O. Box 12999
Portland, Oregon 97212

RE: COMMENTS ON PSAERP DEIS

024-1 The Puget Sound Area's need for capacity and the area's need for energy can not be separately analyzed. If the area's energy needs are met by resources located north, south or west of the Cascades, the capacity needs analyzed in the EIS will also be met. Meeting capacity needs, however, does not assure that energy needs are met.

024-2 The EIS's assumption that at least 400 MW of new energy resources will be developed in the Puget Sound basin by 2003 (p. 1-7) fails to address (or even inform the reviewer) that another 1200 MW of energy resources must also be obtained.

024-3 Double the 400 MW of new regional resources assumed in the EIS has already been announced (BPA 12/10/91). This highlights the potential waste caused by building powerlines to eastern Washington without knowing if resources will be located there or elsewhere. This mindless construction is in no way justified since, if it is decided to build additional large generating plants east of the Cascade, new transmission capability, if needed, can be added far faster than the new powerplants can be built.

024-4 DOE's construction of transmission to east of the Cascades to facilitate unanalyzed large thermal plant construction, inappropriately skews economic analyses so as to favor the construction of the large central plant.

024-5 DOE's analysis fails to give preference to conservation.

024-6 Table 1-2 is inaccurate. Regional energy capabilities are far less than the values BPA lists in this table.

024-7 The EIS's removal of "most generating resources from the list of solutions for this problem" (p.1-7) misses the essential point that generating resources must be built if loads grow. The only question is as to where these resources will be built. The EIS's rationale that generation costs "10 times more" than transmission is irrelevant. The cost of building resources west of the Cascades rather than east of the Cascades is the issue at hand, and it is not ten times more costly to build resources in one area versus another. In fact, considering transmission losses and the cost of building the line, the cost of building

Bowers's Comments on PSAERP DEIS - Page 1 -

west of the Cascades would likely be lower than that of building in the east. When all costs are considered (including the capital cost and operating costs of power plants located east of the Cascades), acquiring resources west of the Cascades is indeed a solution to this problem. 024-7

DOE's inexcusable failure to consider where energy is going to come from once transmission capability is built to eastern Washington is a failure of the highest order. In a document meant to bring environmental impacts to the attention of Congress, the executive branch, the public, and decision makers at DOE, the inclusion of such information is critical. 024-8

The EIS totally omits that use of the Columbia River to meet western Washington peak loads may not be possible and, if possible, would impact the riparian and aquatic habitats. 024-9

DOE, has stated sales to California will be cut back to provide energy over a new powerline. Were this accurate, environmental damage caused in California would then need to be considered. 024-10

In contrast to DOE's unsupported allegation that exports to California will be decreased, extreme power demands in the Pacific Northwest and interruptable exports do not generally coincide. 50 year-analyses alone show that in many winters no optional export occurs. Nor are there resources available east of the Cascades to provide western Washington's firm energy needs. DOE's failure to address the issue and acknowledge impacts is clear. 024-11

Energy sources which a powerline to eastern Washington would tap would be primarily coal fired. Air pollutant emissions from a coal resource would likely be at least 20 fold greater than the emission from any resource developed in western Washington. The EIS omits such basic facts. 024-12

The EIS states that where the region builds future resources "is speculative, and estimating the impacts from this speculation is not discussed in this EIS." (p.4-19) However, when the EIS chooses to "speculate" about CTs in western Washington as an alternative to a powerline, it then includes the impacts from the alternative. The EIS omits impacts that reflect badly on the prefered alternative. 024-13

Impacts in the no-action alternative are overstated in that load shedding schemes, new resources, and line support are now in place or under development. 024-14

The EIS does not put the problem in context. Power outages to the average Puget Power customer in the last ten years, for example, have averaged 3 hours and 45 minutes. None of these outages was do to transmission constraints such as DOE proposes in the EIS to prevent. DOE is addressing the simultaneous occurrence of severe cold weather and a major equipment failure. Each of these is a rare event. The frequency with which they occur simultaneously is extremely low. Under current plans, should such 024-15

an event occur (and there is no guarantee that it would happen in our lifetime) a few large industries would voluntarily be cut back or brief (15 minute) interruptions to various customer segments would occur. 024-15

What DOE is asking the consumer to do in this EIS is to spend up to hundreds of millions of dollars (for substations, powerlines and powerplants) and create environmental damage, so that the consumer's average annual power outage does not grow from 3 hours and 45 minutes to 3 hours, 45 minutes, and twenty seconds. The short, schedulable nature of the increased outage lessens its impact. An EIS on this proposal must provide this data to the public and congress so that they may have some input as to whether the economic and environmental costs are worth it. 024-16

Alternatives to the proposed actions include a vast array of means to decrease customer outages (i.e. reinforcement of the distribution system, etc.). Such alternatives, if presented, would likely offer greater improvements to service, lower environmental impacts and lower cost. 024-17

The draft EIS is totally lacking any meaningful substance. It must be redone. It does not define the issue, the need, or the existing environment. The EIS omits alternatives and does not credibly evaluate the alternatives offered. 024-18

BPA has in the past presented an EIS which stated project construction would be contingent on specific events. However, when those events did not happen, BPA constructed the project anyway by hiding behind the 90 day limit to bring challenges to its actions. (16 USC 839) 024-19

The inadequacies of this draft EIS analysis were pointed out to BPA early in the process. DOE chose to present the deficient EIS. 024-20

Should BPA issue a final EIS based on this illegitimate draft EIS, anyone who prefers an open government and the environmental protection offered by the National Environmental Protection Act, should immediately file suit in the Ninth Circuit Court.

Sincerely,

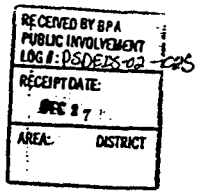
Gregory H. Bowers

Gregory H. Bowers

Comment Letters

Woodcock
Rt. 4 Box 215
Ellensburg, Wa
98926
12/12/91

Bonneville Power Administration
P.O. Box 12999
Portland, Oregon 97212



Attention: Public Involvement Office
Subject: Comments to the Draft Environmental Impact Statement (DEIS) for the Puget Sound Area Electric Reliability Plan (PSAERP)

Gentlemen:

We were informed yesterday of the "site 2" location for your proposed substation in Kittitas County. We are property owners located in the immediate proximity of the alternate site #2. We have not seen the DEIS, but have seen a copy of the response directed to you by Gary L. and Jan Gordon Brown. Judging by the map enclosed with said correspondence, our primary residence is 2/3 mile from alternate site #2. This is distressing.

025-1 We have concerns about living so close to said site. With the uncertain data regarding EMF exposures, we question the residential futures of our property.

025-2 Agreeing with the summary of the Gordon's response, "we believe that the population density around proposed site 2, with regard to safety and aesthetics, the proximity to Currier Creek and its associated wildlife habitat... should preclude it from consideration as an alternate site for the proposed substation."

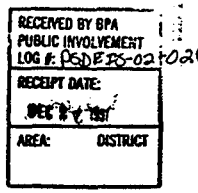
If a mailing list concerning the site selection exists, please add our names at the above address.

Sincerely,
David Woodcock
Caroline Woodcock
David Woodcock
Caroline Woodcock

WASHINGTON SOCIETY OF PROFESSIONAL ENGINEERS

Address reply to:
Charles P. Farnham, P.E.
WSPE Energy Committee Chairman
135 Mt. Olympus N.W.
Issaquah, WA 98027

December 12, 1991



BPA Public Involvement Office
P.O. Box 12999
Portland, OR 97212

Subject: Puget Sound Area Electric Reliability Plan

Dear sir:

The Washington Society of Professional Engineers (WSPE) is a 750+ member non-profit organization and is a member state society of the National Society of Professional Engineers (NSPE). The membership is composed of engineers of all disciplines and areas of engineering practice.

Service to the Public and Service to the Profession are the foundation of our charter. It is in this area of Service to the Public that many of our members have been active through our Public Affairs Committee. Members of our Energy Committee have brought to the attention of our Executive Committee their concern about the reliability of the electric power supply to the Puget Sound Area. We believe the Puget Sound Area does not have a power system with adequate reserves, redundancies and reliability at this time and this situation is critical.

026-1 Members of our Executive Committee have reviewed the Environmental Impact Statement and believe it is very complete, does a good job of defining the problem and offering a choice of alternative solutions. While we are in general agreement with the proposed recommendations, we would like make the following comments from an engineering standpoint.

Section 2.2.1 Conservation

026-2 A. The Washington State Building Code Council (BCC) is in the process of amending the non-residential portion of the Washington State Energy Code. They are asking for

12828 NORTHUP WAY SUITE 300
BELLEVUE, WA 98005

PHONE: 206-885-2660
FAX: 206-861-0609

written comments through January 30, 1992. The BCC should be advised that the Energy Code should include provisions that would encourage the use of demand control and power factor controls, even if they increased the total off peak energy consumption. 26-2

B. BPA, in their energy grants and energy incentive programs, have not recognized the costs and benefits of off demand control and power factor correction. This should be incorporated into the existing programs. Most present programs penalize the use of controls to control peak demand. 26-3

Section 2.2 Voltage Support

A. The proposed substation and capacitors appear to be justified from a line maintenance and a reduction in line losses quite independent of the critical power transmission requirements. Capacitors correct power factor or reduce reactive power requirements. They do not raise voltage, although this may be a result of their use. Please properly describe the use of capacitors so the engineering community will understand the report. 26-4

B. Combustion turbines, discussed in another alternate, and large synchronous motors can be equipped to act as condensers, and support voltage on the system. This should be considered as part of the voltage support package. Power factor or voltage support requirements of a transmission line could at times justify the idling operation of combustion turbine or motors to stabilize live voltage. 26-5

Combustion Turbines, Alternate Strategy 4

The combustion turbine analysis is done on the basis that the resources East of the Cascades are infinite. This EIS limits their use to 5% of the year. Other studies by BPA are proposing the use of combustion turbines on a more continuous basis. Combustion turbines used with heat recovery (much as cogeneration or combined cycle generation) can show thermal efficiencies that would justify long periods of operation. 26-6

The EIS should credit combustion turbines with their ability to correct power and stabilize power line conditions. This EIS implies that transmission lines will be required to connect them to the system. Normally, the reverse is true. Turbines are installed at points of high power demand eliminating the need for a new transmission line. 26-7

Rates Alternative Strategy 3

Rate changes are required to obtain the desired reduction of demand peak and to improve the power factor. This area of the country has not only low energy rates, but compared to other regions very low power demand rates. Power factor metering and penalties are either absent or very low. 26-8

Present practice has demand meters in all large and most medium industrial and commercial loads. Demand reduction can be obtained by increasing the demand rates with no capital cost. Time of day rates, as mentioned, would require a new set of meters to obtain the same results. 0268

The Washington Society of Professional Engineers would like to be actively involved in future energy and environmental programs and review any requests for comments. We hope that you will consider us as a technical resource for this EIS and other studies.

Sincerely yours,

Paul C. Juhasz, P.E.
WSPE President

cc: Charles P. Farnham, P.E.
Robert Johnson, P.E.

PCJ:cy

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965 (1300 N.E. 44th Avenue)
Portland, Oregon 97208

TAKE PRIDE IN AMERICA

IN REPLY REFER TO

1795 (935)

December 16, 1991

RSDEIS-02-027

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #:
RECEIPT DATE:
DEC 30 1991
AREA: DISTRICT

U.S. Department of Energy
Bonneville Power Administration
Attn: Alan Courts
Public Involvement Office
P.O. Box 12999
Portland, Oregon 97212-0999

Dear Mr. Courts:

Bureau of Land Management staff have reviewed your Puget Sound Area Electric Reliability Plan and associated draft environmental impact statement. We are reasonably familiar with the project and participated in the 1990 Draft Northern Cascades Corridor Availability Study. We are impressed with the diversity of opportunities to solve the Puget Sound area problem and your staff's efforts to describe the problem and potential solutions in clear and understandable text, tables, graphs and figures. Our only direct interest is in the potential for additional cross-Cascade transmission lines. 027-1

Your description on page 2-9 of potential transmission line corridors reflects earlier input by Bureau staff. The description of land ownership and current uses by corridor options in section 3.2, beginning on page 3-7, appears consistent with earlier input by BLM. The October 18, 1991 BLM Spokane District Draft Resources Management Plan Amendment/Environmental Impact Statement addresses changes in fluid minerals management and leasing and adjusts proposed management for Areas of Critical Environmental Concern (ACEC). A copy was mailed to you earlier as part of our standard distribution. Although the draft plan amendment identifies four proposed new ACECs which should be considered utility corridor avoidance areas, none are in the immediate vicinity of your potential new corridors or corridor expansions. The Spokane plan also recommends changes in off-road-vehicle use restrictions, but again, these appear to have no effect on your proposal. 027-2

In conclusion, our current best available data and proposed management direction is consistent with all of your alternatives and your analysis of direct inputs described in Chapter 4 beginning on page 4-5. 027-3

We realize there are many possible solutions to the Puget Sound problem and additional corridors are only a small part. It does appear appropriate, however, to continue the analysis and secure rights-of-way to allow both additional capacity and greater reliability to the entire transmission grid. Our Spokane District and (detached) Wenatchee Resource Area staff are available to work with your staff as your corridor preferences become more specific. We appreciate the opportunity to participate in the northern Cascades study and comment on the reliability plan and EIS. 027-4

Sincerely,

Elaine Y. Zielinski

D. Dean Bibles
State Director

cc: DM, Spokane
Wenatchee RA
Regional Environmental Officer

United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

EPA

DEC 23 1991

REPLY TO
ATTN OF: WD-126

PSDEIS-02-028
RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #:
RECEIPT DATE:
DEC 30 1991
AREA: DISTRICT

Charles F. Clark
Assistant Administrator for Engineering
Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Mr. Clark:

The Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for the **Puget Sound Area Electric Reliability Plan** in Washington State. This draft EIS was developed by the Bonneville Power Administration (BPA) and several Puget Sound utilities (Puget Sound Power & Light, Seattle City Light, Snohomish County Public Utility District No. 1, and Tacoma City Light). Our review was conducted in accordance with the National Environmental Policy Act (NEPA) and our responsibilities under Section 309 of the Clean Air Act.

This draft EIS evaluates the environmental consequences of the no action alternative, four action Alternative Strategies, and a preferred alternative (modification of Alternative Strategy 2) for dealing with operating problems on the power system for Puget Sound during peak demand. The Alternative Strategies strive to solve peak load reliability problems. The Alternative Strategies were developed in response to issues identified during the project planning and scoping process. The Alternative Strategies contain elements that will be pursued and contingency actions that may be pursued but only if needed.

The BPA has identified a preferred alternative in the draft EIS. The preferred alternative would include the following elements: a new substation near Ellensburg, Washington; accelerated conservation program; shunt capacitors at the Echo Lake substation; and monitoring of demonstration load management and fuel switching programs. These elements compare favorably, from an environmental consequences perspective, to the elements in other Alternative Strategies. The elements of the preferred alternative will have low to minimal environmental consequences on land use, the natural environment (living and non-living) and the human environment.

The draft EIS concludes that the elements in the preferred alternative will have less environmental impacts than the elements in Alternative Strategy 1 which includes a transmission line and Alternative Strategy 4 which includes construction of combustion turbines. Alternative Strategies 1 and 4 could potentially result in a number of moderate and high levels of impact.

However, the preferred alternative also includes several contingency actions that include: a new transmission line, combustion turbines, and curtailment. The contingency actions are selected to provide flexibility to the Alternative Strategies in unexpected circumstances. These contingency actions may be needed to deal with the uncertainty involved in estimating future load growth and resource supply. The contingency actions in the preferred alternative are no different than the major elements in Alternative Strategies 1 and 4 and will result in a number of moderate and high impacts. The draft EIS states that the contingency actions would be subject to "supplemental site-specific environmental coverage". We recommend that the final EIS commit to NEPA documentation for the site-specific environmental coverage. 028-1

Based on our review, we are rating this draft EIS EC-2 (Environmental Concerns - Insufficient Information). Our environmental concerns are based on the fact that the contingency actions in the preferred alternative will cause the greatest environmental consequences. The preferred alternative represents a balance between the environmental, economic, and technical issues only if it commits to NEPA documentation of the future contingency actions. 028-2 028-3 The elements in the preferred alternative rank high in economic and technical evaluation factors and will result in low levels of environmental impact. The contingency actions in the preferred alternative will result in moderate to high impacts. The final EIS should clarify what is meant by supplemental site-specific environmental coverage. An explanation of the EPA rating system for draft EISs is enclosed for your reference. This rating and a summary of these comments will be published in the Federal Register. 028-4

We appreciate the opportunity to review and provide comments on this draft EIS. If you have any questions about our comments you may contact Sally Brough in our Environmental Evaluation Branch at (206) 553-4012 or (FTS) 399-4012.

Sincerely,

Ronald A. Lee

Ronald A. Lee, Chief
Environmental Evaluation Branch

Enclosure

Comment Letters

SUMMARY OF THE EPA RATING SYSTEM
FOR DRAFT ENVIRONMENTAL IMPACT STATEMENTS:
DEFINITIONS AND FOLLOW-UP ACTION *

Environmental Impact of the Action

LO--Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns

028-2

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA intends to work with the lead agency to reduce these impacts.

EO--Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information

028-2

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment

February, 1987

CHUCK CLARKE
Director

STATE OF WASHINGTON
DEPARTMENT OF COMMUNITY DEVELOPMENT
OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION

111 West Twenty-first Avenue, KL-11 • Olympia, Washington 98504-5411 • (206) 753-4011 • SCAN 234-4011

December 26, 1991

RECEIVED BY BPA
PUBLIC INVOLVEMENT
LOG #: PSDEIS-07-029
RECEIPT DATE: 1/2/92
AREA: DISTRICT

Department of Energy
Bonneville Power Administration
Public Involvement
P.O. Box 12999
Portland, OR 97212-0999

Log Reference: 1822-F-BPA-09
Re: Puget Sound Area Electric
Reliability Plan Plan, DEIS

Dear Sir:

029-1

029-2

We have completed a review of the Draft Environmental Impact Statement for the Puget Sound Area Electric Reliability Plan. We concur with the comments in section 5.4 of the Draft EIS that specific conservation measures undertaken as part of the plan will be reviewed according to the provisions of the 1983 Programmatic Memorandum of Agreement. In addition, because construction and operation of transmission lines may effect significant cultural resources, we concur with your decision to conduct a cultural resource survey. It is my understanding that survey results will be included in the Final Environmental Impact Statement.

If I can be of assistance, please call me at (206) 586-2901.

Sincerely,

Leonard T. Garfield
Preservation Programs Coordinator

dmo

United States Department of Agriculture
Forest Service
Mt. Baker-Snoqualmie National Forest
21905 - 64th Avenue West
Mountlake Terrace, WA 98043

Reply to: 2700

Date: December 24, 1991

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Puget Sound Area Electric Reliability Plan
Draft EIS

Dear Project Coordinator,

30-1 Thank you for the opportunity to comment on the Draft EIS for the Puget Sound Electric Reliability Plan. The primary concern for National Forest System lands is the proposed new Cross-Cascade Transmission Line.

30-2 Management direction for the Mt. Baker-Snoqualmie National Forest is provided by the Land and Resource Management Plan issued in June of 1990. Since a specific transmission line route has not been selected, our comments are general. Enclosed you will find excerpts of the plan from (1) the Forest Wide standards and guidelines for Land Uses and for (2) Management Area 25A, Utility Corridors. These will be helpful in guiding the route selection process. If you would like a copy of the Forest Plan, EIS, or appendices, please contact us.

30-3 The draft EIS proposes a planning period of 1992 to 1996 for the new transmission line. The Forest would like to have a representative on the planning team from the beginning of the process. We look forward to working with you in the planning for a new transmission line.

Sincerely,

Dennis Weingardt

J. D. MacWILLIAMS

Forest Supervisor

cc FS, L.Freedman, R6 Lands
FS, T.Lewis, WRRD
FS, R.Edwards, NBRD
FS, D.Harkenrider, SRD

Caring for the Land and Serving People

FS-6200-28 (7-82)

Land Uses
Forest-wide S&G

4. Grant access to private property in accordance with Federal rules, regulations and standards.

Landlines - Survey and mark boundaries to accomplish the following priorities: (1) protect present corners or references when the possibility of disturbance exists, (2) resolve or prevent encroachment, (3) assist forest users in identifying public lands, and (4) to help assure full utilization of National Forest resources.

Utility and Transportation Corridors

1. Future memoranda of understandings, project maintenance and construction plan will meet Forest Standards and Guidelines and Management Area 25 management direction.

2. When applications for rights-of-way for utilities and highways are received, the Forests' first priority will be to utilize residual capacity (within or contiguous) in existing corridors. The corridors will be planned and located to minimize ground and air disturbance.

3. The Forest will consider only that area between Pyramid Peak and Tacoma Pass as a potential new major cross Cascade utility corridor. This corridor will only be considered after the existing corridors have been utilized to their maximum.

4. Potential utility and transportation rights-of-way will be examined in relation to issues and concerns and resource management objectives.

5. Routes through wilderness are excluded from consideration as utility or transportation corridors. Routes through Management Areas 1A, 1B, 1C, 3A, 3C, 3D, 4, 5A, 5B, 5C, 7, 11, 12, 13D, 15, and 18 shall be avoided during consideration of utility or transportation corridors.

Other Uses - Applications for licenses or grants associated with dams and reservoirs shall be recommended for approval when they are consistent with the Management Area goals and objectives.

25A

	c.	Rehabilitation needs should be evaluated for all sites of fires.
2. Treatment of Activity Fuels	a.	No more than 20% of the activity area may be exposed to mineral soil and at least 80% of the streams surface within the area should be shaded.
3. Forest Pest Management	a.	Integrated pest management is permitted except where use of pesticides conflicts with water quality objectives.

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25 SPECIAL USES

Goal: Provide and manage for effective and economical transmission facilities with least impact on the natural resources involved.

Description of Lands Where Prescription Applicable: The prescription applies to existing and potential sites and corridors for such purposes as communication, signal relay, other electronic sites, canals, penstocks, pipelines, and power transmission lines. It includes the land directly under and adjacent to the corridor (clearing limits). Compatible facilities are combined within the same corridor when possible.

Desired Future Condition: Common to all intensities.

Signs of human activities are dominant. Buildings, antennas, pipelines, high voltage powerlines, and similar structures will be visible. There are few, if any, large trees at sites or in the corridors; ground cover is in small conifers, shrubs and forbs. Vegetation partially screens smaller sites from distant view and provides edge habitat for wildlife. Recreational opportunities may be available for operating off-road vehicles, viewing distant scenery, gathering miscellaneous Forest products, and hunting.

Intensities in this Management Prescription:

25A. Utility Corridors
25B. Electronic Sites

INTENSITY 25A: Utility Corridors

Program Element		Standards and Guidelines
A. Recreation	a.	Meet Forest-wide Standards and Guidelines.
1. Visual Quality	a.	Meet a Visual Quality Objective of foreground retention and middleground partial retention in priority viewsheds. Meet a VQO of Partial Retention in secondary viewsheds foreground and modification in secondary viewsheds middleground.
2. American Indian Religious and Cultural Use	a.	Meet Forest-wide Standards and Guidelines.
B. Wilderness	a.	Not applicable.
C. Wildlife and Fish	a.	Meet Forest-wide Standards and Guidelines.

25A
25B

D. Range	a.	Not applicable.
E. Timber		
1. Timber Management Planning	a.	No scheduled timber harvest activities. Commercial products, eg. Christmas trees, may be grown within a utility corridor as long as the prescriptions contained in the corridor management plan are met.
	b.	Vegetation maintenance salvage activities will be encouraged for safety purposes.
	c.	Brush control within corridors shall be accomplished by manual or mechanical methods unless specific approval is obtained for the use of herbicides.
F. Water, Soil, and Air	a.	Meet Forest-wide Standards and Guidelines.
G. Minerals and Geology	a.	Operating plans must include appropriate measures for protecting the existing facilities.
H. Rural Community and Human Resources	a.	Meet Forest-wide Standards and Guidelines.
J. Lands		
1. Special Use Management	a.	Other linear rights-of-way within the corridors will be encouraged. Special use permits for uses other than the preceding will be discouraged.
2. Rights-of-Way Grants	a.	Meet Forest-wide Standards and Guidelines.
3. FERC Licenses and Permits	a.	New development will be encouraged within existing utility corridors when activities are compatible.
4. Land Ownership Planning	a.	Group III - Retain, Acquire, or Dispose.
L. Facilities	a.	Meet Forest-wide Standards and Guidelines.
P. Protection		
1. Fire Management Planning	a.	Forest-wide Fire Protection Group A applies.
2. Forest Pest Management	a.	Meet Forest-wide Standards and Guidelines.

INTENSITY 25B: Electronic Sites

Program Element		Standards and Guidelines
A. Recreation		
1. Recreation Planning	a.	Recreation use is not encouraged.
2. Visual Quality	a.	Meet Forest-wide Standards and Guidelines.

January 19, 1992

Department of Energy
Bonneville Power Administration
Public Involvement
P.O. Box 12999
Portland, OR 97212-0999

Ref. ALP

Gentlemen:

031-1 Thanks for sending a copy of Puget Sound Area Electric Reliability Plan, DEIS, dated September 1991. In contrast to other writers on this subject it is concise, readable, and invites participation. We regret being unable to meet the deadline for response.

031-2 In the Reliability Plan your choice for Preferred Alternative seems logical and required, even though us illogical ratepayers shudder at the cost.

031-3 Sometime in the future we might need this extra transmission from west to east, if only due to sabotage elsewhere, misfortune, or Chicago sales.

031-4 Diversity of location in generating and transmission is essential. Safety is in quantity and dispersal. Clumsy large generating facilities and overcrowded transmission corridors cannot be adequately maintained, financed, or guarded. Imagine long, multiple blackouts in Puget Sound.

In the Reliability Plan you are to be complemented for only once (page 2-28) using the word "nuclear". Department of energy is good with Doublespeak; mask and veil to the media any reference to naughty nuclear. Since running-out of hydro, and solar, wind, and geothermal are presently inefficient. and coal, oil, natural gas are environmental obstacles, we should therefor rely on "nuclear", hydrogen fuel cells, or some other innovation; to be buried in transmission corridors that can be self-regulating and attended yearly.

031-5 Compact Nuclear Power Source (used on Dew line, Artic) and unfinished Organic Rankine Cycle, generating 100 KW , good for 20 years underground unattended placed where transmission corridors cross federal land can be considered.

Consider $1 million grant to Univ. Missouri by Energy for using nuclear gases to generate electricity, called nuclear lightbulbs. Hundreds of ideas are out there awaiting discovery; and cost-effectiveness must include everything from ideas to waste and effects thereon.

I hope you will keep me on your mailing list for similar publications. Would appreciate a copy of your draft 1992 Resource Plan, your latest Annual Report, and June 1989 "Electrical and Biological Effects of Transmission Lines"

Respectfully
Joe Whalen
3633 7th Ave. SW #27
Olympia, WA 98502

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Affairs
500 NE Multnomah Street, Suite 600
Portland, Oregon 97232-2036

TAKE PRIDE IN AMERICA

January 23, 1992

ER 91/1161

Ms. JoAnne Scott, Public Involvement Manager
Bonneville Power Administration
P.O. Box 12999
Portland, Oregon 97212

Dear Ms. Scott:

032-1 The Department of the Interior (Department) reviewed the Draft Environmental Impact Statement for the Puget Sound Area Electric Reliability Plan, Washington. The Department has no comments to offer.

We appreciate the opportunity to comment.

Sincerely,

For Charles S. Polityka
Regional Environmental Officer

Comment/Response Index

A

B

C

Comment Index Continued

Comment Index Continued

Comment Index Continued

9.0 REFERENCES

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10.0 GLOSSARY/ACRONYMS

AC - (see alternating current)

Alternating Current (AC) - An electric current or voltage that reverses its direction of flow at regular intervals and has alternately positive and negative values. In the United States 60 cycles are completed each second.

aMW - (see average megawatt)

Anadromous - Fish species that spawn and initially rear in fresh water, migrate and mature in the ocean and return to fresh water as adults.

Aquifer - Any geological formation containing water, especially one that supplies water to wells, springs, etc.

Average annual megawatt - A unit of energy output over a year equivalent to the energy produced by the continuous operation of one megawatt of capacity over a period of one year (equivalent to 8,760,000 kilowatthours).

Average megawatts (aMW) - The average amount of energy (number of megawatts) supplied or demanded over a specified period of time

Avoidance areas - an area that has significant resource values for which impacts cannot be successfully mitigated; it should be avoided in locating transmission or utility corridors. Can be management or resource areas identified by the U.S. Forest Service or Bureau of Land Management, or specially designated areas or other private and public land.

Baseload - In a demand sense, a load that varies only slightly in level over a specified time. In a supply sense, a plant that operates most efficiently at a relatively constant level of generation.

Biomass - Industrial organic waste products such as agricultural field crops, and noncommercial and urban wood residues used as fuel.

Blackout - The disconnection of the source of electricity from all the electrical loads in a certain geographical area brought about by an emergency or forced outage or other fault in the generation/transmission/distribution system servicing the area. A blackout could also be caused by intentional rotational load drops if adequate generation is not available to meet load.

BLM - U. S. Bureau of Land Management

BOR - U. S. Bureau of Reclamation

BPA - Bonneville Power Administration

Brownout - A partial reduction of electrical voltages that results in lights dimming and motor driven devices losing efficiency.

Capacitor - A device to store an electrical charge. It is usually made of two or more conductors separated by an insulator such as plastic film and oil. Series capacitors are used to compensate for voltage drop along a transmission line. Shunt capacitors are generally located in substations and used to increase the voltage at the end of a line.

Capacity - The maximum amount of power that can be produced by a generator or carried by a transmission facility at any instant. Equivalent terms: peak capacity, peak generation, carrying capacity.

Capital costs - The costs to construct a facility, including the costs of materials, permits, and interest on borrowing.

Cogeneration - The generation of power with (usually) an industrial process, using waste heat from one process to fuel the other.

Combustion turbine - A generator that burns a mixture of a gaseous or liquid fuel and outside air. As the gas burns it expands and drives the turbine.

Conductor - The wire cable strung between transmission towers through which the electric current flows.

Conservation - Making the most efficient use of energy over the long term.

Corridor - A linear passageway over or through an area of land, water, or air, which has been identified by law, Secretarial Order, land use planning, or other management decision process as being suitable to accommodate one or more facilities requiring a right-of-way. Corridors are categorized as occupied, unoccupied, or designated.

CT - (see combustion turbine)

Cubic feet per second (cfs) - a unit of measure pertaining to the flow of water. One cfs is equal to 449 gallons per minute.

Cultural resources - The nonrenewable evidence of human occupation or activity as seen in any district, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature that was important in human history at the national, state, or local level.

Current - The flow of electrical charge through a conductor, measured in amps.

Curtailment - A reduction in the use of electricity during emergency conditions.

CWA - Clean Water Act

DEIS - Draft Environmental Impact Statement

Deliverability - Measure of how acceptable a resource is to the public and hence the probability it can be built.

Demand - The amount of electricity that will be purchased at a particular point in time.

Demand-side - Refers to customer's use of energy use (i.e., on the customer's side of the meter).

Direct service industry (DSIs) - Industrial customers (primarily aluminum companies) that purchase energy directly from BPA.

Direct current (DC) - An electric current or voltage that does not reverse direction at regular intervals.

DOE - U. S. Department of Energy

DOI - U. S. Department of Interior

Double-circuit - The placing of two separate electrical circuits on the same row of towers. For alternating current, each circuit consists of three separate conductors or bundles of conductors.

Drawdown - The distance that the water surface of a reservoir is lowered from a given elevation as water is released from the reservoir (drafted).

Effluents - A discharge or emission of a liquid or gas, usually waste material.

EIS - Environmental Impact Statement - A document prepared by a Federal agency on the environmental impact of its proposals for legislation and/or other major actions significantly affecting the quality of the human environment. Environmental impact statements are used as tools for decision making and are required by the National Environmental Policy Act of 1969.

Electric field - The invisible lines of electrical force caused by voltage on a conductor.

Electric and magnetic fields (E/MF) - The two kinds of fields produced around the electric wire or conductor, when an electric transmission line or any electrical wiring is in operation.

Endangered species - A plant or animal species that is in danger of extinction through all or a significant portion of its range because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of exploitation, disease, predation, or other factors; federally endangered species are officially designated by the U. S. Fish and Wildlife Service and published in the Federal Register.

Energy - The capability of doing work over a period of time. In electrical systems energy is expressed in kilowatt-hours. See POWER.

Energy deficit - A condition in which a utility system cannot supply energy demanded.

Energy surplus - A condition in which a utility system can supply more energy than is demanded; the energy may be non-firm, due to water conditions, or firm, due to excess generating capability.

EPA - Environmental Protection Agency

Exclusion areas - Where facilities cannot be built (legislatively excluded).

FERC - Federal Energy Regulatory Commission (FERC) - A federal agency that reviews hydroelectric projects and submitted applications for operating licenses.

Firm Energy - Guaranteed energy.

Firm power - Power that is guaranteed or assured.

Fossil fuel - A combustible, carbonaceous material formed from the remains of ancient plants and animals. Common fossil fuels include coal, natural gas, and derivatives of petroleum such as fuel oil and gasoline.

FSP - Fine suspended particulates.

Fuel switching - Customers using one fuel switch to another fuel. For example, electricity to natural gas.

Gasification - In a fuel plant, mixing fuel, air, oxygen and moisture to produce a gas to burn in a boiler and produce electricity.

Geothermal energy - The heat energy available in the rocks, hot water, and steam in the earth's subsurface.

GIS - Geographical Information System

Groundwater - The supply of fresh water under the earth's surface in an aquifer or soil.

High efficiency shower heads - A device installed at the shower head to reduce the amount of hot water required per shower so the hot water heater operates for less time for each shower.

High-voltage - Used to describe transmission lines which transport bulk power over longer distances from large generation centers.

HVAC - Heating, ventilation and air conditioning.

Hydraulic head - The vertical distance between the surface of the reservoir and the surface immediately downstream of the turbine and dam.

Hydrocarbons - Chemical compounds containing hydrogen and carbon. Some hydrocarbons may become air pollutants. Some hydrocarbon air pollutants are carcinogenic, and some react with other air pollutants to form photochemical smog.

Hydroelectric - With reference to a power system, the production of electric power through use of the gravitational force of falling water.

Impoundment - The accumulation of water in a reservoir.

INPAPSC - Initial Northwest Power Act Power Sales Contract

Kilovolt - 1000 volts

Kilowatt (kW) - The common unit of electric power equal to 1000 watts.

Kilowatt-hour (kWh) - The common unit of electric energy equal to 1 kilowatt of power supplied to or taken from an electric circuit for 1 hour. A kilowatt equals 1,000 watts.

kV - (see Kilovolt)

kW - (see Kilowatt)

Least Cost Plan - A plan which develops a strategy for supplying future loads using resources that will have the least cost impact on customers.

Levelized - The method of calculating equal, periodic payments or receipts from unequal cost data for the same time period, considering the time value of money.

Load - The amount of electric power or energy delivered or required at any specified point or points on a system. Load originates primarily at the energy-consuming equipment of the customers.

Load growth - Increase in demand for electricity.

Load/resource balance - The point at which the demand for electricity matches or balances the amount and type of resources available to serve that demand.

Load management - Influencing the level and shape of the demand for electrical energy so that it matches resources available and long-run objectives and constraints.

Load shedding - A method whereby loads in isolated areas are dropped by automatic relays to provide protection for the bulk power system.

Magnetic field - Invisible lines of magnetic force produced by current flows in transmission lines and common household appliances.

Effluents - A discharge or emission of a liquid or gas, usually waste material.

EIS - Environmental Impact Statement - A document prepared by a Federal agency on the environmental impact of its proposals for legislation and/or other major actions significantly affecting the quality of the human environment. Environmental impact statements are used as tools for decision making and are required by the National Environmental Policy Act of 1969.

Electric field - The invisible lines of electrical force caused by voltage on a conductor.

Electric and magnetic fields (E/MF) - The two kinds of fields produced around the electric wire or conductor, when an electric transmission line or any electrical wiring is in operation.

Endangered species - A plant or animal species that is in danger of extinction through all or a significant portion of its range because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of exploitation, disease, predation, or other factors; federally endangered species are officially designated by the U. S. Fish and Wildlife Service and published in the Federal Register.

Energy - The capability of doing work over a period of time. In electrical systems energy is expressed in kilowatt-hours. See POWER.

Energy deficit - A condition in which a utility system cannot supply energy demanded.

Energy surplus - A condition in which a utility system can supply more energy than is demanded; the energy may be non-firm, due to water conditions, or firm, due to excess generating capability.

EPA - Environmental Protection Agency

Exclusion areas - Where facilities cannot be built (legislatively excluded).

FERC - Federal Energy Regulatory Commission (FERC) - A federal agency that reviews hydroelectric projects and submitted applications for operating licenses.

Firm Energy - Guaranteed energy.

Firm power - Power that is guaranteed or assured.

Fossil fuel - A combustible, carbonaceous material formed from the remains of ancient plants and animals. Common fossil fuels include coal, natural gas, and derivatives of petroleum such as fuel oil and gasoline.

FSP - Fine suspended particulates.

Fuel switching - Customers using one fuel switch to another fuel. For example, electricity to natural gas.

Gasification - In a fuel plant, mixing fuel, air, oxygen and moisture to produce a gas to burn in a boiler and produce electricity.

Geothermal energy - The heat energy available in the rocks, hot water, and steam in the earth's subsurface.

GIS - Geographical Information System

Groundwater - The supply of fresh water under the earth's surface in an aquifer or soil.

High efficiency shower heads - A device installed at the shower head to reduce the amount of hot water required per shower so the hot water heater operates for less time for each shower.

High-voltage - Used to describe transmission lines which transport bulk power over longer distances from large generation centers.

HVAC - Heating, ventilation and air conditioning.

Hydraulic head - The vertical distance between the surface of the reservoir and the surface immediately downstream of the turbine and dam.

Hydrocarbons - Chemical compounds containing hydrogen and carbon. Some hydrocarbons may become air pollutants. Some hydrocarbon air pollutants are carcinogenic, and some react with other air pollutants to form photochemical smog.

Hydroelectric - With reference to a power system, the production of electric power through use of the gravitational force of falling water.

Impoundment - The accumulation of water in a reservoir.

INPAPSC - Initial Northwest Power Act Power Sales Contract

Kilovolt - 1000 volts

Kilowatt (kW) - The common unit of electric power equal to 1000 watts.

Kilowatt-hour (kWh) - The common unit of electric energy equal to 1 kilowatt of power supplied to or taken from an electric circuit for 1 hour. A kilowatt equals 1,000 watts.

kV - (see Kilovolt)

kW - (see Kilowatt)

Least Cost Plan - A plan which develops a strategy for supplying future loads using resources that will have the least cost impact on customers.

Levelized - The method of calculating equal, periodic payments or receipts from unequal cost data for the same time period, considering the time value of money.

Load - The amount of electric power or energy delivered or required at any specified point or points on a system. Load originates primarily at the energy-consuming equipment of the customers.

Load growth - Increase in demand for electricity.

Load/resource balance - The point at which the demand for electricity matches or balances the amount and type of resources available to serve that demand.

Load management - Influencing the level and shape of the demand for electrical energy so that it matches resources available and long-run objectives and constraints.

Load shedding - A method whereby loads in isolated areas are dropped by automatic relays to provide protection for the bulk power system.

Magnetic field - Invisible lines of magnetic force produced by current flows in transmission lines and common household appliances.

Megawatt (MW) - A megawatt is one million watts, or one thousand kilowatts; an electrical unit of power.

MSW - (see Municipal Solid Waste)

MW - (see megawatt)

NEPA - National Environmental Policy Act

NESHAPS - National Emission Standards for Hazardous Air Pollutants

Net present value - The economic value, in today's dollars. Present and future costs and benefits are adjusted for the time value of money.

Nitrogen Oxides (NO_x) - Compounds produced by combustion, particularly when there is an excess of air or when combustion temperatures are very high. NO_x are primary air pollutants.

Non-avoidance area - An area considered suitable for transmission or utility corridor location. Resource impacts can normally be mitigated.

Non-firm energy - Energy available due to better than planned for water conditions. This energy is sold on an interruptible (nonguaranteed) basis.

Nonattainment areas - Those areas which continue to fail to meet primary national Ambient Air Quality Standards. Evaluation and designation is carried out by the EPA.

NO_x - (see Nitrogen oxides)

NPDES - National Pollution Discharge Elimination System

NRC - Nuclear Regulatory Commission

NWPPC - Northwest Power Planning Council

Off-peak - Period of relatively low system demand for electrical energy, as specified by the supplier (such as the middle of the night).

Outage - In a power system, the state of a component (such as a transmission line) when it is not available to perform its function due to some event such as an avalanche.

Ozone (O_3) - A pungent, colorless, toxic gas. Ozone is associated with the corona discharge of high-voltage transmission lines, and with incomplete combustion.

Pacific Northwest (PNW) - For this EIS, the States of Washington, Oregon, and Idaho; the portion of Montana west of the Continental Divide; and areas in Montana, Nevada, and Wyoming surrounding coal plants that serve the PNW.

Particulates - Finely divided solid or liquid particles in the air or in an emission. Particulates include dust, smoke, fumes, mist, spray, and fog.

PCBs - (see Polychlorinated biphenyls)

Peak - (see peak load)

Peak load - The maximum electrical demand in a stated period of time. It may be the maximum instantaneous load or the maximum average load within a designated interval such as 15 minutes.

PNW - Pacific Northwest

Polychlorinated biphenyls (PCB's) - A group of noncombustible synthetic insulating/dielectric fluids used in certain electrical equipment found to be very persistent in the environment and strongly suspected of having carcinogenic effects.

Power - The time rate of transferring or transforming energy. Electrically power is expressed in watts, which are the product of applied voltage and current.

Power Sales Contracts (PSC) - Contracts that establish the terms and conditions of BPA's power sales.

Power system - A group of one or more generating sources and connecting transmission lines operated under common management or supervision to supply load.

ppm - parts per million

PSC - (see Power Sales Contract)

PSD - Prevention of significant deterioration increment - Any one of several incremental changes in ambient total suspended particulate or sulfur dioxide concentrations established by the Environmental Protection Agency to protect existing air quality from being degraded significantly through new developments, such as construction and operation of a new air pollution source.

Public Utilities Regulatory Policy Act (PURPA) - Enacted in 1978, it is the Federal legislation that requires utilities to purchase electricity from qualified independent power producers at a price that reflects what the utilities would otherwise have to pay for the construction of new generating resources. This legislation does not apply to BPA.

Pumped storage - An arrangement whereby electric power may be generated during peak load periods by hydroelectric plants using water previously pumped into a storage reservoir during off-peak periods.

PURPA - (see Public Utilities Regulatory Policy Act)

Raptors - Birds of prey.

RCRA - Resource Conservation and Recovery Act

RDF - (Refused derived fuel) - Fuel consisting of waste that is cleaned of non-combustibles and hazardous wastes, and is then used as a supplemental fuel.

Record of Decision (ROD) - The document notifying the public of a decision taken on a Federal action, together with the reasons for the choices entering into that decision. The Record of Decision is published in the Federal Register.

Reliability - For a power system, a measure of the ability of the power system to meet customer demands over a specified period of time.

Reliability Criteria - Rules for designing and operating power systems to insure reliable electrical service.

Renewable resource - A resource for energy that is continually replenished. Water, for instance, is a renewable resource, while coal which is converted into carbon dioxide, water, and ash when burned, is not.

Resident fish - Fish species that reside in fresh water during their entire life cycle.

Retrofit - To weatherize an existing structure.

Revenue requirement - The amount of money a utility needs to recover from rates paid by customers to pay the costs of resource and transmission actions.

Right-of-way - An easement for a certain purpose over the land of another, such as the strip of land used for a road, electric transmission line, ditch, pipeline, etc.

Rolling blackout - Controlled intentional disconnection of the source of electricity from electrical loads in an area brought about by an emergency forced outage. Outages are rotated from one area to another.

Salmonids - Fish belonging to the family of salmonidae, including salmon, trout, whitefish, and allied freshwater and anadromous fish.

Scoping - The definition of the range of issues requiring examination in studying the environmental effects of a proposed action. Scoping generally takes place through public consultation with interested individuals and groups, as well as with agencies with jurisdictions over parts of the project area or resources in that area. Scoping is mandated by the Council of Environmental Quality regulations.

SEPA - State Environmental Policy Act

Series Capacitors - An electrical device used to compensate for voltage drop along a transmission line. See CAPACITOR.

Shunt Capacitors - An electrical device used to increase the voltage at the end of a line. See CAPACITOR.

Small hydro - Generating resources that use running water to generate electric energy, but which are small in generating capacity. BPA generally considers small hydro projects to be those capable of producing 25 average MW or less.

SO_x - (see Sulfur Oxides)

Storage reservoirs - Reservoirs maintained behind dams for the purpose of retaining excess water readily available during springtime flows as snow melts. Retained water is then released, as necessary, during periods of lower flow in order to maintain necessary levels of power production. (Water may also be released for other purposes, such as navigation, irrigation, and maintenance of life support for fish.)

Sulfur Oxides - Sulfur containing compounds produced by combustion and pulp and paper processes. Considered hazardous to human health, plants, and buildings.

Surplus energy - Generally energy generated that is beyond the immediate needs of the producing system. Specifically for BPA, firm or non-firm electric energy generated at Federal hydroelectric projects that would otherwise be wasted if there was not a market for the energy.

Surplus capacity - The difference between assured system capacity and the system peak load for a specified period.

Thermal resources - Generating plants that convert heat energy into electric energy. Coal, oil, and gas-fired power plants and nuclear power plants are common thermal resources.

Threatened species - Those species, as determined by the U. S. Fish and Wildlife Service, that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Top-quartile - The top twenty-five percent of DSI load which can be interrupted at any time for any reason to meet BPA's load obligations.

TPY - Tons per year.

Transmission grid - An interconnected system of electrical transmission lines and associated equipment for the transfer of electric energy in bulk between points of supply and points of demand.

TRG - Technical Review Group

TSD - Treatment, Storage, and Disposal

UIC - Underground Injection Control

Undervoltage - A condition in which the voltage of the system is unacceptably low, usually 90 percent of nominal.

VAR - (Volt Amperes Reactive), A unit of measurement for reactive power in a circuit. Also kvar = kilovar, var x 1000; mvar = megavar, var x 1,000,000.

Volt - The unit of voltage or potential difference.

Voltage Instability - A condition under which transmission lines serving areas become too heavily loaded and voltage begins to drop or fluctuate uncontrollably.

Voltage support - Applying electrical devices to a transmission system in order to boost the voltage.

Voltage collapse - A condition which occurs when voltages at substations fall below a certain point, causing affected power lines to shut down; this in turn causes other lines to overload and disconnect in domino fashion. Electrical service can be interrupted by either the low voltages or the disconnection of power lines.

Watt - The electrical unit of power or rate of doing work. One horsepower is equivalent to approximately 746 watts.

Weatherize - The act of installing conservation measures to the shell of a building; weatherization measures include storm doors, storm windows, weather-stripping, caulking, and wall insulation.

Winter Operating Plan - A contingency plan to minimize the possibility for voltage collapse in the event that a critical line or generator is lost during a cold weather peak load.

WNP-3 - Washington Nuclear Plant #3 at Satsop, Washington.

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