Endangered Species Act requirements, higher power costs to consumers, and higher potential for blackouts.

In addition, given this scenario, even with all existing transmission lines in the Grand Coulee-Bell corridor transferring power, the congestion is so high that BPA would be unable to continue to meet its present and future obligations in a reliable manner.

If BPA does not take action, it is theoretically possible that another entity might propose to do so. It was suggested during scoping that other entities could take action to solve the problem, and that proposals existed to do so. BPA is not aware, however, of any current proposals by other entities that address the problem as described in Chapter 1. The section entitled "Actions by Other Entities" briefly describes proposals by Avista, a utility with part ownership in the West of Hatwai path and with facilities in the area, and the problems those proposals would solve.

No Action could also result in adverse socioeconomic impacts. Reduced capacity and reliability could lead to higher energy costs for industry and consumers. This would tend to lower productivity and efficiency for industries and areas that are affected, making them less competitive with other industries and areas. The consequences of this would be lower employment and income levels than would otherwise be the case, reduced levels of economic activity, and reduced governmental tax revenues and the services they support.

The quality and reliability of electrical power has been a key to economic growth and improving industrial productivity levels. With structural economic change, particularly with the new digital economy, power quality and reliability requirements have increased markedly. [For instance, the "old industrial economy" used less sophisticated electro-mechanical devises that were sensitive to long outages, but not sensitive to voltage sags. New digital economy equipment and processes are very sensitive to voltage sags.] To the extent that transmission capacity deficiencies reduce power reliability and quality, regional businesses and industries would be affected by costly process disruptions.

Maintenance activities would continue within the corridor under the No Action Alternative. Vegetation clearing, maintenance vehicle traffic, and human presence could adversely affect water quality, vegetation, wildlife, fish, and wetland resources.

Alternatives Considered but Eliminated from Detailed Study

The actions described in the following subsections were not evaluated in detail because, although technically feasible, they do not solve the problem and do not achieve one or more of the purposes. See Chapter 1 for a discussion of the need and purposes and the beginning of this chapter for a brief description of how the alternatives were developed.

Actions by Other Entities

In a letter dated November 21, 2001, Avista outlined a transmission plan it believed to be less expensive and would provide the region with needed additional capacity on the West of Hatwai path. In response to this letter, BPA began discussions with Avista and agreed to perform a joint transmission study with them to identify the best plan. The study was performed by the Northwest Power Pool Transmission Planning Committee (NWPP TPC). Following completion of these studies, the NWPP TPC concluded that the best one utility plan was to build the Grand Coulee-Bell 500-kV line to reinforce the West of Hatwai path and for Avista to reinforce its system to handle growing loads in the Spokane and Lewiston areas. The following summarizes the plan Avista proposed to build to improve its system.

Avista plans a number of projects that would improve their area's 230-kV transmission system. They would remove a bottleneck that exists between the generation in northern Idaho and western Montana and Avista's Spokane/Coeur d'Alene load, as well as a bottleneck between Spokane/Coeur d'Alene and the southern portion of Avista's system. In addition, projects in the Lewiston area would relieve constraints that occur during heavy flows to Idaho. They would also improve the reliability of the local area load service. While these projects would remove some bottlenecks within Avista's system, without improvements to the transmission system west of Spokane, they would not meet the need as described in Chapter 1 -- to provide adequate capacity to transfer generation from Montana, northern Idaho, and northeastern Washington to load centers in western Washington and Oregon. Therefore, they are not considered reasonable alternatives to the proposed action.

System Improvements

BPA and Avista have implemented a number of system improvements and remedial actions for increasing the power transfer capability of the system as far as is technically prudent without significant new line construction. Improvements that have been implemented or are currently in progress include:

- Upgrade of the existing Grand Coulee-Bell 230-kV lines to maximum capability at 100 degrees Celsius operation (BPA).
- Upgrade of other 230-kV and 115-kV lines in the area, including Lancaster-Bell 230-kV, Bell-Boundary 230-kV, and North Lewiston-Walla Walla 115-kV lines (BPA).
- Reconfiguration of the 230-kV bus at Bell Substation to reduce impacts to Avista's parallel 115-kV system for 230-kV line outages (BPA).
- Curtailment of generation at Dworshak and Libby dams, Lancaster Substation, and Colstrip coal-fired plants for certain line outages at high transfer levels (BPA).
- A thermal protection scheme that monitors loading on the Benewah-Moscow 230-kV line and trips the line if it overloads following an outage of the parallel 500-kV line (Avista).

- A thermal protection scheme that monitors loading on the Noxon-Pine Creek 230-kV line and reduces generation at Noxon as necessary to prevent overloads during certain 230-kV or 500-kV line outages (Avista).
- Operation of much of Avista's 115-kV system sectionalized to avoid overloads when parallel 230-kV or 500-kV lines are out of service (Avista).

While these system improvements have increased capacity, they do not fully address the problem identified in Chapter 1. BPA does not know of any other system improvements or upgrades that could be undertaken to solve the problem identified in Chapter 1.

Design Alternatives

These alternatives would use different kinds of structures than the proposed and alternative action, but in the same location.

Burying the Transmission Line Underground

During the scoping process, some people suggested burying the transmission line.

Transmission line cables are highly complex when compared to overhead transmission lines and to lower voltage distribution line cables used to deliver power to individual homes. For this 500-kV line, six individual cables would have to be manufactured and installed at a total cost of 10 to 15 times the cost of an overhead design.

Because costs are so high, BPA uses underground cable only in limited situations. Underground cables are considered where an overhead route is not appropriate, such as for long water crossings (e.g., in the San Juan Islands) or in highly developed urban areas.

Underground transmission cables used by BPA are short in comparison to typical overhead transmission lines. BPA's longest underground transmission cable is a submarine cable 9 miles long in the San Juan Islands. It also is 115-kV, a relatively low transmission voltage. The Bureau of Reclamation operates two 500-kV underground cable circuits at Grand Coulee Dam. These circuits are only about 6,000 feet long.

In addition to significantly higher construction costs, installation and maintenance of underground transmission cables also result in significantly higher maintenance costs and environmental impacts that are typically the same or greater than impacts associated with an overhead line. Installation of underground cable would require the use of large excavators and other heavy equipment to dig a continuous cable trench a minimum of ten feet wide and six feet deep to install the cables. All trees and brush would need to be cleared along this construction corridor. This construction activity would cause significant surface and subsurface disturbance, soil erosion potential, and noise and air quality impacts along the transmission line route. In areas where bedrock is near the surface, construction would also require blasting, which would result in significant noise and air quality impacts. In areas where the cables would cross waterbodies such as the Spokane River, construction activities could result in significant impacts to wetlands and riparian areas that could largely be avoided with an overhead transmission line.

Once the cables are installed, a permanent right-of-way approximately 50 feet in width would be required with a continuous parallel access road along the undergrounded transmission line route to allow necessary maintenance and repair of the cables. Repair activities would require continual excavation along the affected reach when these activities are needed. The cables that would be installed likely would be oil filled cables. These cables would require above-ground termination and oil storage equipment at several locations along the line. This equipment would result in visual impacts. Because the cables would be underground, the cables would be more susceptible to damage and failure due to geological hazards such as seismic activity, landslides, and soil erosion. Failures also can result from aging of the cables, heat stress, and a variety of other external and internal causes. In addition, because the cables would be buried, it would be much more difficult to locate failed or damaged cables occur, restoration of service likely would take weeks or months as compared to hours or days for restoration of service on an overhead line. The reliability and life expectancy of an underground system also could be less than an overhead system.

Underground cable remains a tool available for special situations, but because of its high cost and environmental impacts, it is not considered a reasonable alternative to solve the problem identified in Chapter 1. It therefore was eliminated from detailed evaluation.

Replace Existing Grand Coulee-Bell Line with a Double-Circuit Line

As an alternative to removing one of its existing lines from the transmission corridor and constructing the Grand-Coulee-Bell 500-kV line as described in the alternatives evaluated in detail, BPA could instead replace the existing line from the Grand Coulee Switchyard to the Bell Substation for its entire length with towers that could accommodate two lines—double-circuit towers.

Although BPA considered this alternative in the mid-1990s, it was eliminated primarily due to excessive costs and to public concerns about visual impacts. The transmission towers for a double-circuit line would cost approximately twice as much as for a single-circuit line (significantly heavier towers would be needed to carry the double-circuit conductors). In addition, double circuiting would not be expected to result in any significant reduction in the level of environmental impact as compared to the proposed action. Tower removal and construction as well as access road enhancements would still disturb the ground; thus the alternative would have at least as much potential for land use disturbance, vegetation removal, and erosion potential as the proposed action. This alternative would also have greater visual effects than the proposed action because it would require 175-foot towers along the entire corridor, which would be more visible than the 125-foot-tall towers used for single-circuit lines. Because this alternative would not meet the purpose of minimizing project costs and would not reduce expected environmental impacts, it was considered but eliminated from detailed study in this EIS.

Transmission Line Route Alternatives

These alternatives considered locations other than use of the existing right-of-way as proposed.

Rerouting Lines in the Spokane Area

During the scoping process, many people suggested considering other locations for a new transmission line.

When locating new transmission lines, BPA tries either to replace existing lines, or to use or parallel an existing transmission right-of-way. Adding a transmission line on existing right-of-way next to an existing one can cause fewer visual, land use, and ground disturbance-related impacts than a new, totally separate line, and the need for new access roads can be kept to a minimum by using existing access roads. Using an existing corridor also avoids the impact of having to clear miles of new 150-foot wide right-of-way. Following this right-of-way practice can greatly reduce costs and environmental impacts.

BPA studied the area around Spokane for possible corridor routes. Studies found no routes near Spokane for a new transmission corridor, and no suitable alternative existing utility corridor, that would accommodate the transmission towers with less environmental impact or for less cost than the proposal.

Other Transmission Line Alternatives

Two alternatives to the Grand Coulee-Bell 500-kV line project were considered and eliminated from detailed study. These alternatives are:

1. **Bell-Ashe 500-kV Line**

    - This line would be approximately 145 miles long, all on new right-of-way between Bell Substation in Spokane, and Ashe Substation on the Hanford Reservation, north of Richland, Washington.
    - The other components of the project would be the same as for the Grand Coulee-Bell 500-kV project.
    - The project would cost about $95 million more than the Grand Coulee-Bell 500-kV project, due in part to the requirement for new right-of-way and because it is 60 miles longer.
    - Although the Bell-Ashe 500-kV line provides a slightly greater benefit in reducing the loading on parallel paths, the benefit to system stability during disturbances is significantly less than for the Grand Coulee-Bell 500-kV line.

- To meet Western Electricity Coordinating Council (WECC) reliability criteria, the Bell-Ashe 500-kV line alternative could potentially require fewer remedial actions (such as automatic generator tripping following a line outage) than a Grand Coulee-Bell 500-kV line because it is not located on right-of-way parallel to the existing Grand Coulee-Bell 230-kV lines.
- The need for new right-of-way would delay completion by at least 2 years compared to the Grand Coulee-Bell 500-kV line because of negotiations required to obtain easements.
- Construction of this alternative on 145 miles of new right-of-way would be expected to result in greater amounts of ground disturbance than the proposed action and thus the potential for greater effects to vegetation, wildlife habitat, wetlands, land uses, and recreation.
- Because this alternative would involve constructing 145 miles of new transmission line in a new transmission corridor rather than in an existing corridor with existing lines, this alternative would be expected to have greater visual impacts than the proposed action, and the potential for greater avian impacts than the proposed action.

This alternative was eliminated because, although it is technically feasible and meets reliability standards better than the proposal, it does not achieve at least three other purposes: its costs are excessive compared to other alternatives, it would take at least two years longer to implement, and it would cause substantially greater environmental impacts due to its location on new right-of-way that is nearly double the length of the proposed line.

2. Taft-Lower Granite 500-kV Line

- This line would be approximately 150 miles long, all on new right-of-way between Taft Substation near the continental divide in western Montana and Lower Granite Substation adjacent to the Snake River in southeastern Washington.
- The other components of the project would be the same as for the Grand Coulee-Bell 500-kV project, except that a series capacitor would be located at Lower Granite Substation instead of at Bell Substation.
- This project would also require building a third 500-kV line from Lower Granite Substation to Lower Monumental Substation near the Lower Monumental Dam on the Snake River, near Kahlotus, Washington, a distance of approximately 57 miles. Without this additional line, the full capacity of the West of Hatwai path could not be used because of how lines in the area must be operated.
- The project would cost about $105 million more than the Grand Coulee-Bell 500-kV project, not including the cost of the Lower Granite-Lower Monumental line.
- To meet WECC reliability requirements, this new line could not be constructed adjacent to the existing 500-kV line and provide a significant increase in allowed transfer capability. In this case, two 500-kV lines would be parallel to each other. If both went out of service, there are no other lines to assume part of the load, as is the case in the Grand Coulee-Bell corridor. In addition, if two lines were out of service

in the Grand Coulee-Bell corridor, only one would be 500-kV, so less load would need to be transferred over other lines than under this alternative.

- The requirement for new right-of-way would delay completion by at least 2 years compared to the Grand Coulee-Bell 500-kV line due to negotiations required to obtain easements.
- Construction of this alternative on 150 miles of new right-of-way would be expected to result in greater amounts of ground disturbance than the proposed action and thus the potential for greater effects to vegetation, wildlife habitat, wetlands, land uses, and recreation.
- Because this alternative would involving constructing 150 miles of new transmission line in a new transmission corridor rather than in an existing corridor with existing lines, this alternative would be expected to have greater visual impacts than the proposed action, and the potential for greater avian impacts than the proposed action.

This alternative was eliminated because, although it is technically feasible, it does not achieve at least three purposes: like Bell-Ashe, its costs are excessive compared to other alternatives, it would take at least two years longer to implement, and it would cause substantially greater environmental impacts, for the same reasons as Bell-Ashe, even without the additional line between Lower Granite and Lower Monumental dams.

Non-Transmission Alternatives

These alternatives examined ways to meet the need that would not require a new transmission line.

As explained in Chapter 1, BPA owns and operates a system of transmission lines that move electricity from generation sources in Montana, northern Idaho, and northeastern Washington to load centers to the west. Since the mid-1990s, the portion of the system west of Spokane has grown increasingly constrained. During spring and early summer months, the amount of power that needs to move through this area at times could exceed the carrying capacity of the existing transmission lines. The problem was exacerbated in 2001 when two aluminum smelters closed that were located east of the West of Hatwai ***cutplane*** (the West of Hatwai cutplane is the point just west of Spokane where insufficient transmission capacity exists to transmit all available power any farther to the west).

To meet the need described in Chapter 1, BPA considered non-transmission alternatives, including energy conservation and demand reduction measures to reduce overload on the transmission system, as well as load and generation curtailment during outage conditions. As part of this effort, BPA used the results of a report entitled "Expansion of BPA Transmission Planning Capabilities," which has been incorporated by reference in this EIS (Energy and Environmental Economics, Nov. 2001). This report was prepared for BPA by outside consultants to recommend how BPA might more effectively plan to meet transmission needs. The report also provided a preliminary screening of various transmission improvement projects (including the Proposed Action) to determine whether non-transmission alternatives to them would be viable. The conclusions summarized below confirmed BPA's earlier assessment that non-transmission alternatives were not reasonable alternatives to meet the need as described in Chapter 1.

Conservation and Demand Management Alternatives

Conservation that reduces load from the Spokane area to the east will only make the problem worse by increasing the amount of generation that must cross the cutplane. Other alternatives such as fuel switching (from electric to gas) or curtailing load will cause the problem to worsen because they reduce area load, thereby increasing the generation that must flow across the constrained path. New generation additions in the area east of the cutplane will exacerbate the congestion problem, similar to what happened when the aluminum smelters closed, causing a decrease in load (see Chapter 1).

West of the cutplane, conservation, generation additions, fuel switching or curtailing load will not improve the problem unless existing generation east of the cutplane is shut down. Curtailing generation at some hydroelectric projects would lead to spill conditions that violate Endangered Species Act requirements (see Chapter 1).

In sum, these non-transmission alternatives would likely exacerbate, not solve, the problem described in Chapter 1.

Pricing Alternatives

Currently, BPA, like all utilities in the Northwest, charges for transmission services using a fixed price for each megawatt of power delivered. The price is determined in a formal process known as a rate case. Alternatives such as ***locational pricing*** and ***time-of-use rates*** provide price signals to encourage parties to use limited transmission capability more efficiently. Most ***Regional Transmission Organizations (RTOs)*** essentially change the price of transmission when the grid becomes constrained, an approach called ***congestion pricing***.

BPA considered these alternative pricing structures in the rate case that determined the transmission rates currently in effect. Rate case participants argued that these pricing approaches were best developed in a region-wide RTO environment, and should be deferred until the ***proposed RTO West*** is operational. BPA's current rates expire on September 30, 2003. BPA will assess the situation and examine alternative rate constructs in the next rate case.

Congestion pricing works to reduce congestion by allowing generation on the surplus side of the constraint (east of the cutplane) to shut down and purchase replacement power (or controllable demand) on the deficit (west) side. This approach is effective when there are competitive markets for generation or controllable demand on both sides of the transmission constraint.

The east side of the West of Hatwai cutplane has a significant generation surplus, much of which is hydro that cannot readily be redispatched during the summer because the water would be spilled. Spilling water at several dams would violate ESA conditions. At a minimum, the value of the energy (spilled water) would be lost. Other generation on the east side of the cutplane comes from coal plants in Montana. This generation has relatively low fuel costs, so that the plant operators would not be willing to pay very much for replacement generation west of the cutplane.

Hydro, nuclear and coal resources west of the cutplane tend to run close at their maximum output to serve regional needs and compete in the California market at this time of year. Remaining natural gas resources, if any, are likely to be much more expensive than the coal on the east side. Congestion on paths such as West of Hatwai contributed to overall higher prices and volatility that plagued the western energy markets in 2001. This is not a good candidate for congestion pricing, especially given the magnitude of the constraint.

Therefore, because the alternative would not solve the problem without violating ESA conditions or significantly increase costs to consumers, it is not considered a reasonable alternative and was eliminated from detailed study.

Comparison of Alternatives

Table 2-1 compares the Agency Proposed Action and alternatives, including the No Action Alternative, to the purposes of the project described in Chapter 1. Table 2-2 provides a summary of the environmental impacts and mitigation for the alternatives.