ALTERNATIVES INCLUDING THE PROPOSED ACTIONS

Chapter 2

ALTERNATIVES INCLUDING THE PROPOSED ACTIONS

The DSI Options Study process served as the principal process to select alternatives for the Environmental Impact Statement (EIS). The DSI Options Study identified two options that seemed to meet BPA's needs for revenue and load stability while offering both the DSIs and BPA's regional utility customers potential economic benefits. These were the Variable rate option with a plateau rate in effect over a range of aluminum prices, and a Con/Mod program. The two options were selected as the basis for development of alternatives to be analyzed in the EIS and other technical and economic studies. In addition, development of a detailed proposal and alternatives for establishing a long-term relationship between the IP and PF rates (IP-PF rate link) was also undertaken. A specific proposal made by the DSIs in the 1985 rate proceeding, and comments received during the DSI Options Study gave further support for BPA proceeding with the development of such a long-term link. The IP-PF rate link alternatives are topics of this EIS as well.

BPA believes these options in some form offers a good possibility of a more stable, predictable, and competitive DSI operation. For BPA, this could mean a higher and more stable DSI demand for power than has existed in recent years. This would give BPA greater ability to plan for power needs and help to maintain its relatively strong financial position during this current period of power surplus, enhancing BPA's ability to repay the U.S. Treasury. In turn, BPA rates to other customers would stabilize.

This EIS specifically addresses the three types of actions being considered, i.e., an IP-PF rate link, an aluminum smelter Con/Mod program, and a Variable rate for aluminum smelters. The three types of actions are <u>not</u> alternatives to each other since each could be implemented independently. Questions of cumulative effects of the alternatives, however, may be pertinent to the decision of which, if any, is implemented.

2.1 NO ACTION ALTERNATIVE

The no action alternative occurs if BPA chooses not to implement (1) an IP-PF rate link; (2) a Variable rate for the aluminum smelters; and (3) an aluminum smelter Con/Mod program. Selection of the no action alternative does not preclude BPA from reinvestigating options related to the DSIs and implementing some action or actions regarding them at some future time in a separate decisionmaking process.

In order to evaluate the no action alternative, it is necessary to project how the values of a number of variables may change in the future. Some of these variables are future aluminum prices, BPA's future load growth and costs of resources to meet it, and the availability of water to operate the Federal dams in the Northwest.

The DSI Options Study performed sensitivity analyses for the no action alternative to test different assumptions such as the continued availability

of short-term Incentive rates, the renewal of DSI contracts in the year 2001, and a customer charge (i.e., a fixed component of the DSI rate).

For purposes of analysis for this EIS, the design of the DSI (i.e., IP) rate maintains features in the IP-85 rate schedule over the course of the study period; only the level of the rate changes. Rate provisions which are not in the current IP-85 rate schedule, such as a customer charge or other take-or-pay provisions, are assumed not to be implemented in future rate cases.

Second, for the purpose of study, the DSI Incentive rate (discussed in section 1.1.3) is also assumed to continue to be offered on a short-term basis when aluminum prices are low. These assumptions are consistent with the concept of no action.

Third, no assumption is made with respect to renewal of the DSI contracts when the current contracts expire in 2001. It is premature to analyze the issue of DSI contract renewal; analysis of a decision to renew the DSI contracts is not within the scope of this EIS. While the model runs (see section 4.1) for the analyses were carried out for a period extending beyond 2001, the EIS reports impacts only through Fiscal Year (FY) 2000. The Variable rate and the aluminum smelter Con/Mod program are proposed to terminate prior to DSI contract expiration; the rate link would last no longer than the current contracts; and the payback period in which aluminum companies would plan on recovering investment costs in Con/Mod is less than the remaining term of the DSI contracts. Therefore, the aluminum companies' decisions with respect to any options ultimately offered would not be dependent on their Power Sales Contracts being renewed. The issue of DSI Power Sales Contract renewal is therefore not relevant to this EIS.

Finally, the no action alternative assumes that uncertainties perceived by the aluminum companies regarding future aluminum prices and electricity prices are too great to justify substantial investments in Con/Mod by the high cost Northwest smelters without some external incentives.

2.2 VARIABLE RATE

The Variable rate ties the price of BPA's power for aluminum smelter DSIs to the U.S. aluminum ingot price. Establishing a tie between input price (electricity) and output price (aluminum) will enhance the ability of aluminum producers to operate over the entire business cycle. When the price of aluminum decreases (increases) so will the price of power, within certain limits. When aluminum prices are low, decreasing the price of power should encourage higher production levels than if a higher fixed rate were in place. This in turn should serve to reduce the cyclical nature of smelter operations. The increased price of power during prosperous aluminum markets is intended to offset the decrease in BPA's revenues when the lower rate and lower smelter operations occur.

A variable rate is needed for aluminum smelters partially because the Incentive rate provisions currently available provide only a short-term

response to low and fluctuating aluminum smelter loads. Implementation of the Incentive rate contains a degree of uncertainty, which detracts from the long-term viability of PNW smelters. The Incentive rate procedures do not necessarily guarantee that a particular Incentive rate will be offered whenever aluminum prices are low, because an offer depends on streamflow conditions and BPA's expectations of the electricity prices that could be obtained in alternative markets, especially California. Furthermore, the Incentive rate implementation procedures require a lag between the onset of low aluminum prices and an Incentive rate offer. This lag increases the risks both to the DSIs and to BPA. A company's cash flow situation may require actions to reduce operating costs before an Incentive rate offer could be implemented. Also, BPA faces the risk that aluminum price expectations and/or other conditions can change significantly between initial consideration of an Incentive rate and final offer. The Incentive rate is designed to address short-term problems. Some of the problems facing the Northwest plants require longer term solutions. The Variable rate addresses the industry's problems over a longer period (i.e., 10 years). The Variable rate significantly reduces, but does not completely eliminate, power cost uncertainty because the Variable rate formula provides for an automatic change in monthly power rates based on market aluminum prices.

The DSIs have indicated that the uncertainty inherent in the Incentive rate inhibits long-term planning. The rate certainty provided by the Variable rate should reduce somewhat the risk associated with long-term investment decisions and facilitate long-term planning. Further, because the Variable rate formula provides for automatic adjustments to the rate, the lag associated with the Incentive rate will be eliminated.

As the proposed Variable rate is a function of the price of aluminum, this option would be available on a voluntary basis only to aluminum smelters. Other aluminum operations (e.g., aluminum fabrication) and all nonaluminum DSI customers would be ineligible to purchase power at the proposed Variable rate, and so would continue to purchase power at the IP-85 rate and its successor rate schedules. The Variable rate schedule is proposed to be available for 10 years beginning in summer 1986.

For this EIS, only Variable rate designs having a plateau (see Figure 1) are considered as alternatives. The single pivot point rate design was excluded because of the risk in selecting a long-range projected average aluminum price at which the pivot point would be set since BPA revenues could be harmed if this price were selected too high, and since the aluminum smelters could close or operate at low levels if the price is set too low.

The plateau rate design has a number of elements (see Figure 1) which could be varied to form alternatives. The elements are the positions of the upper and lower pivot points, the upper and lower slopes, the maximum and minimum rates, duration of the rate, and how the rate elements might vary as a function of time. The plateau rate is proposed to be equal to the IP Standard rate, now 22.8 mills/kWh. The IP Standard rate is set in rate proceedings independent of the Variable rate process, and is therefore not an issue for this EIS.

BPA has identified the following goals for the Variable rate. The proposed Variable rate design attempts to balance these goals. The goals are:

1. Discourage aluminum plant closures during the short run, 1 to 3 years. The Variable rate is not intended to forestall closure of plants that are not economic over the medium to long term at the IP Standard rate.

2. Encourage high aluminum plant operating rates and discourage aluminum smelter swing operations at times of low aluminum market prices during BPA's surplus power period.

3. Increase BPA's total revenues over the revenues anticipated if the IP Standard rate to the DSIs were to remain in effect. If possible, the average rate forecasted under the Variable rate option should equal the IP Standard rate.

Based on the above goals, three plateau-type Variable rates, including the proposal, were formulated and analyzed as alternatives. The actual rates formulated for the three alternatives and used for the analysis in this EIS are specified in Figure 2 and Table 2.

The design of the proposed Variable rate attempts to balance the three goals discussed earlier. These goals, although not mutually exclusive, do contain a degree of conflict. For example, the rate design that encourages high DSI operations and discourages plant closure may not yield the IP Standard rate on average. This EIS examines alternatives to the Variable rate proposal that highlight this conflict and emphasize one goal to the exclusion of the other goals in order to provide a range of impacts.

One alternative to the proposed Variable rate proposal emphasizes the goal of protecting BPA's revenues year by year and achieving the IP Standard rate on average over the entire period. The other focuses on the goals of encouraging high smelter operations and discouraging aluminum plant closures.

2.2.1 Proposed Variable Rate

2.2.1.1 Rate Plateau

The plateau rate is equal to the average IP-85 Standard rate of 22.8 mills/kWh. The initial plateau rate would not change when aluminum prices are between 61.0 cent per pound (¢/lb.) and 72.0 ¢/lb. The plateau rate would be adjusted concurrently with adjustments to BPA's other wholesale power rates.

Figure 2

DSI VARIABLE RATE
Alternative Proposals

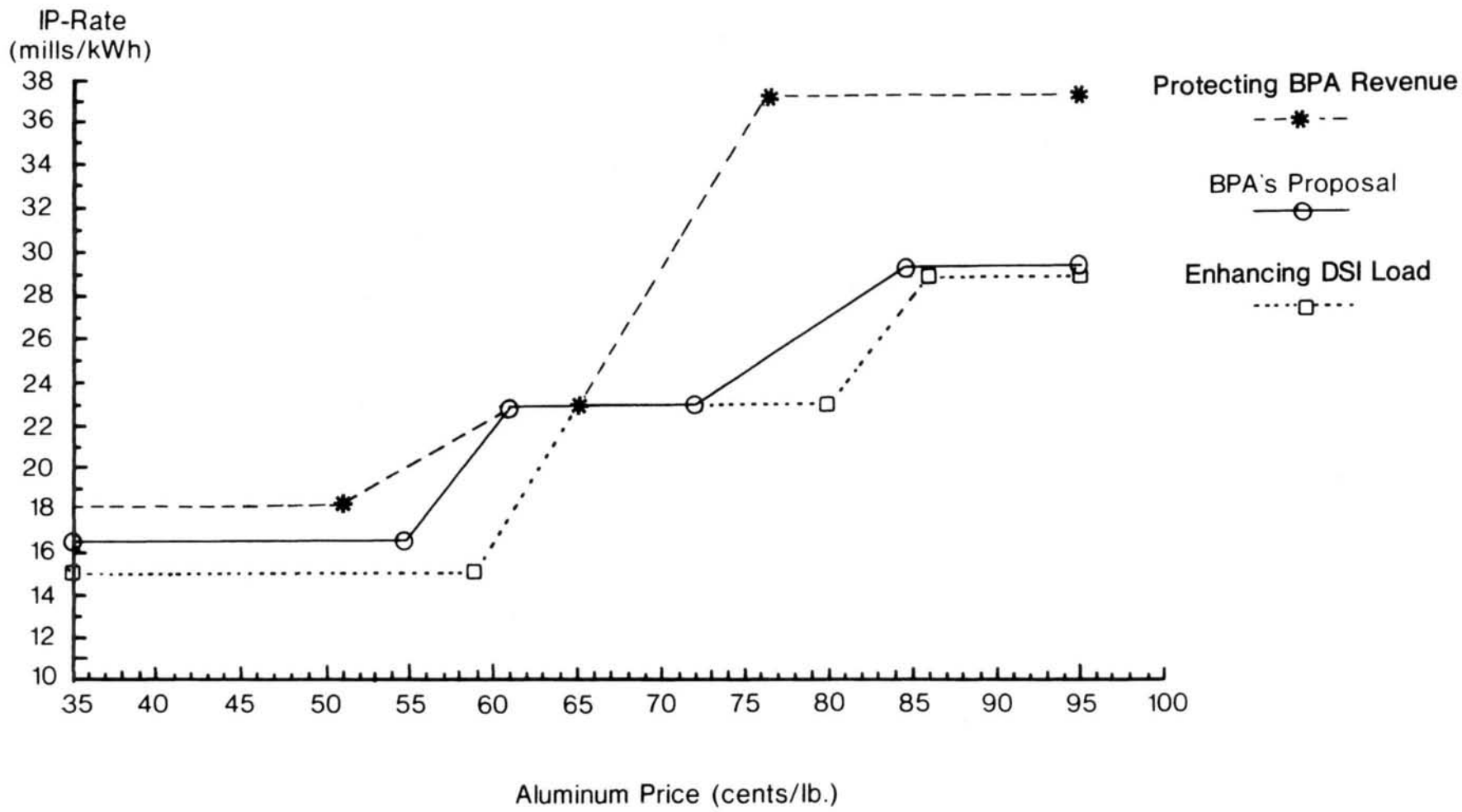

Table 2

VARIABLE RATE DESIGN ALTERNATIVES

	Revenue Protection Alternative	BPA's Proposal	DSI Load Maintenance Alternative
Rate Components:			
1. Lower Pivot Point	59 ¢/lb.	61 ¢/lb.	65 ¢/lb.
2. Lower Slope	0.5	1.00	1.00
3. Lower Rate Limit	18.1 mills/kWh 1/	2/	15.0 mills/kWh
4. Upper Pivot Point	65 ¢/lb.	72 ¢/lb.	80 ¢/lb.
5. Upper Slope	1.25	0.5	1.00
6. Upper Rate Limit	37.0 mills/kWh	29.1 mills/kWh	28.7 mills/kWh

1/ NF-85 contract rate.
2/ 13.8 mills/kWh for March through July and 18.8 mills/kWh for August through February.
3/ Three times the difference between the average NF-85 contract rate and IP-85 standard rates.
4/ SP-85 contract rate.

2.2.1.2 Lower Rate Components

The lower pivot point, the lower slope, and the lower rate limit constitute the lower rate components. The lower rate components define the parameters for rate reductions from the plateau.

The lower pivot point is the point on the plateau below which a further decrease in the market price of aluminum would result in a decrease in the electricity rate. This point is initially defined so that when the market price of aluminum falls below the production costs (variable costs) at the region's highest-cost smelter the electricity rate decreases. BPA has estimated the current short-run variable cost at the highest cost smelter to be 61¢/lb. This estimate is based on the costs that a smelter can avoid if production is reduced or suspended. Short-run variable costs include all electricity costs and a portion of alumina, labor, transportation, and other raw materials.

The rate of change in the price of electricity due to a change in the market aluminum price below the lower pivot point is the lower slope, equal to 1. Thus, for every 1¢/lb. decrease in the market price of aluminum below the lower pivot point (61¢/lb.), the electricity rate would decrease 1 mill/kWh. The lower rate limit is seasonally differentiated to recognize that BPA's revenues in alternative markets vary by season, primarily because of streamflow conditions. In March through July, the lower rate limit is initially 13.8 mills/kWh. In August through February, the lower rate limit is initially 18.8 mills/kWh. The lower rate limits were established to balance recognition of BPA's alternative markets and enhancement of DSI loads.

2.2.1.3 Upper Rate Components

The upper rate components are the upper pivot point, the upper slope, and the upper rate limit. These components establish the increase in the rate from the plateau, enabling BPA to offset the revenue decrease on the lower portion of the rate.

The point above which a further increase in the aluminum market price results in an increase in the electricity price is the upper pivot point. This point is set at the long-run variable cost of the region's highest cost smelter. The long-run variable cost includes alumina, labor, electricity, and other costs; it does not include a return to equity, nor interest, depreciation, and amortization associated with plant investment in place at the time the rate is offered. BPA has estimated the current long-run variable cost of the highest cost smelter to be 72 ¢/lb.

The upper slope is set so that a 1¢/lb. increase in the market price of aluminum above 72¢/lb. causes the electricity rate to increase one-half mill/kWh. The upper rate limit is initially 29.1 mills/kWh, equal to the difference in mills/kWh between the plateau rate and the weighted average lower rate limit.

The upper portion of the rate is designed not only to collect the BPA revenues lost when the lower portion of the rate is in effect, but to allow the DSIs to retain some of the benefits of better aluminum markets.

2.2.1.4 Annual Adjustments

The upper and lower pivot aluminum prices are proposed to be adjusted annually on the anniversary date of the rate, July 1. During the first 5 years of the rate, the aluminum prices which define pivot points will be adjusted annually for inflation. The proposed inflation adjustment is based on a weighted average of changes in (1) U.S. producer costs for intermediate materials, excluding food and electricity, and (2) the regional cost of electricity to the DSIs. In the last 5 years of the rate, August 1, 1991 through July 30, 1996, the pivot point aluminum prices are adjusted annually to reflect both inflation and the average real aluminum prices that occurred during the previous 5 years the rate was in effect. As a result of this last adjustment, the size of the plateau may change. If low aluminum prices were to persist over the first 5 years, the plateau could collapse, creating a single point for both rate increases and decreases. In this case, the upper and lower pivot points would be the same. However, the single pivot point may not go below 55¢/lb. as adjusted for inflation.

2.2.2 Revenue Protection Alternative

To ensure that revenue from a Variable rate achieves on average the revenue expected from the IP Standard rate the responsiveness of the electricity rate to low aluminum prices may be constrained and/or the revenue recovery when aluminum markets begin to improve may be accelerated.

This alternative sets the lower pivot point at 59¢/lb. The price of electricity remains constant until the market price of aluminum is below the current short-run variable costs of the two highest-cost regional smelters. The lower pivot point equals the average variable cost of the five regional smelters with the highest short-run production costs. The lower pivot point recognizes the revenue tradeoff between the load reduction at the highest cost smelters and the revenue loss from the lower-cost smelters which would tend to operate without the discount. The lower pivot point also corresponds to the average intermediate-term variable cost of the regional smelters.

The electricity rate decreases gradually in response to low aluminum prices. For every 1¢/lb. decrease in the market price of aluminum below the lower pivot point, the electricity rate decreases 0.5 mills/kWh (i.e., the slope is equal to 0.5). The lower rate limit is set at 18.1 mills/kWh, which is equal to BPA's NF-85 Nonfirm Contract rate. The lower rate limit recognizes the average revenues BPA could obtain in alternative markets. This results in the lowest possible rate for the DSIs under the Variable rate being approximately equal to the rate projected on average in the nonfirm energy market. In addition, the lower rate limit of 18.1 mills/kWh is only slightly below the current Incentive rate offer, and as such the lower rate limit recognizes BPA's recent experience with the IP Incentive rate.

The upper pivot point for this alternative is set so the price of electricity increases when the market price of aluminum exceeds the intermediate-term variable cost at the region's highest cost smelter. The intermediate-term variable cost consists of the total alumina, labor, and electricity costs of production, but only a portion of other costs. BPA estimated the current intermediate variable cost at the highest cost smelter to be approximately 65¢/lb. This corresponds to the Resource Strategies, Incorporated, October 1985 (see Appendix H, Table 1, column C) average aluminum price projection for the 10-year period in which the Variable rate would be in effect, and to BPA's projection of average aluminum prices for the first 5 years of the rate published in its July 1985 Forecast of Loads and Resources. The probability of quickly recovering revenue losses increases when the upper pivot point is set equal to the expected average aluminum price during the period the rate is effective.

Every 1¢/lb. increase in the market price of aluminum above the upper pivot point increases the electricity rate 1.25 mills/kWh. Given the current average production efficiencies of the regional aluminum smelters, the rate of increase results in production costs on average following aluminum prices. That is, a penny increase in the price of aluminum leads to a penny increase in the average costs of production. Therefore, the smelters do not receive the benefits of higher aluminum prices until the upper rate limit is reached. The upper rate limit is 37.0 mills/kWh. The distance from the upper pivot point to the upper rate limit is not the same as the distance from the lower pivot point to the lower rate limit. Extending the upper rate limit further ensures sufficient revenue collection during periods of high aluminum prices to recover BPA revenues lost during periods of low aluminum prices.

This alternative also includes the same adjustment mechanisms as incorporated into the proposed Variable rate (see section 2.2.1.4).

2.2.3 DSI Load Maintenance Alternative

An aluminum company's decisions regarding its level of regional operations depend on a number of factors. Labor, alumina, and transportation costs are major factors, besides electric power rates, entering into a company's operating decisions. In the short run, if the market price of aluminum exceeds the variable costs of production, a smelter is better off operating. Other things being equal, it will tend to operate at a fairly high level of operation. Over time, however, the relationship between fixed and variable cost of production may change. A smelter may seek to increase the share of variable cost and decrease the fixed component of production cost. The alternative rate design described in this section allows the smelters to recover most of their production cost (both fixed and variable) at all levels of aluminum prices. The expectation is higher smelter operating levels in the short run.

The lower portion of the rate is set so that the price of electricity decreases when the market price of aluminum falls below the current intermediate-term variable costs at the highest-cost regional smelter. The

lower pivot point is 65¢/lb., which is the intermediate-term variable cost at the region's highest cost smelter.

The lower slope is set at 1. That is, for every 1¢/lb. decrease in the market price of aluminum below the lower pivot point, the electricity rate decreases 1 mill/kWh. The lower rate limit is set at 15.0 mills/kWh, which is approximately equal to the worldwide average electricity rate to aluminum smelters. The lower rate limit will thus allow the Northwest smelters to produce aluminum economically during periods of low aluminum prices, thereby enhancing their competitiveness.

In this alternative, the upper pivot point is set so the price of electricity increases after the market price of aluminum is above the total cost at the region's highest cost smelter, including a return on capital. BPA has estimated total production cost at the highest cost smelter to be 72¢/lb. The upper pivot point was set at 80¢/lb. to allow a return on equity.

The upper slope is also equal to 1. Because the smelters may be receiving a return on capital prior to the rate increase, an upper slope of 1 allows BPA to recover losses more quickly when aluminum prices increase, while the smelters continue to receive the benefits of higher aluminum prices. The upper rate limit is set at 28.7 mills/kWh, which corresponds to BPA's current Surplus Firm Power Contract rate. The upper rate limit recognizes BPA's recent experiences in selling short-term surplus firm power by not attempting to extract a higher rate from the DSIs than BPA has been able to obtain in the surplus firm market.

This alternative does not include the adjustments of the pivot points during the last 5 years of the rate. It includes annual adjustment for inflation throughout the duration of the rate.

2.2.4 Alternatives to the Proposed Adjustment Mechanism

The aluminum price adjustment mechanism included as part of BPA's proposed Variable rate serves to lessen but not eliminate the possibility of nonrecovery of the IP Standard rate on average over the 10-year period of the rate. In BPA's proposal, this adjustment occurs in the last 5 years of the Variable rate. The lower pivot point cannot fall below 55¢/lb., which would be the variable cost at the highest-cost smelter if it undertook measures to modernize and conserve energy and secured labor concessions. BPA anticipates that the high-cost smelters may also undertake other measures to reduce their variable costs. The proposed Variable rate provides 5 years for the smelters to achieve cost reduction measures in the face of continuing low aluminum prices. Alternatives to the adjustment mechanisms proposed as part of the Variable rate design are discussed below.

2.2.4.1 No Revenue Protection Provisions

The upper and lower pivot points are adjusted only for inflation. Actual revenue under- or overrecoveries would be handled in BPA's general wholesale

rate adjustments. Under- or overrecoveries resulting from the Variable rate will affect future rates in the same way as under- or overrecoveries resulting from other causes.

2.2.4.2 Aluminum Price Adjusted To Reflect Current Variable Costs

Another alternative adjustment would be to adjust the pivot points over time to account for aluminum smelter cost of production changes (e.g., labor cost changes, alumina price changes) beyond those changes reflected in the above inflation adjustment. An adjustment to the pivot points could be made either before or after an efficiency or production cost change occurs at the smelters to reflect plant closures and/or to reflect changes in operating costs at the least-efficient plant.

Another variation would be to constrain any downward movement of the lower pivot point to the current variable cost of the highest-cost smelter. That is, the Variable rate would be subject to an adjustment for inflation and, in the last 5 years, for historical aluminum prices. The aluminum price adjustment could result in the lower and upper pivot points converging, but the convergence would occur at 61¢/lb. instead of BPA's proposed 55¢/lb. In this alternative, high smelter operating levels would be encouraged without other cost reduction measures such as the renegotiation of labor contracts or securing lower cost supplies of alumina.

2.2.4.3 Revenue Accounting Mechanisms

An alternative to the adjustment mechanism would be some form of "truing up," or revenue accounting, arrangement. This mechanism would ensure recovery of the IP Standard rate under all market conditions. A balancing account would accumulate the monthly difference between the revenue received with the Variable rate and the revenue which would have been collected at the IP Standard rate with the same DSI load. The account would accrue this difference with interest at the applicable U.S. Treasury borrowing rate. Upon termination of a smelter's operations or the Variable rate, the amount contained in the balancing account would become payable in the form of a surcharge or credit to the DSI. The obligation could be spread over a number of years but would not exceed the duration of the current DSI contracts (i.e., 5 years from expiration of the Variable rate). Billing adjustments would apply until the account obligation was satisfied.

2.2.4.4 Take-or-Pay Provision

Another alternative adjustment mechanism suggested, if a revenue accounting mechanism is not adopted, is a take-or-pay provision. A take-or-pay provision would require an aluminum company to pay for some minimum amount of power whether it used it or not. The take-or-pay minimum load could be set at the average of each smelter's commitments during the past three Incentive rate offers, or could be determined some other way.

2.2.4.5 Shorter Term

A shorter term for the Variable rate has been suggested as an alternative to an adjustment mechanism to reduce risk of a Variable rate. A shorter term

would lack the longer-term rate certainty that aluminum companies would need to commit to capital investment in their plants.

2.3 CON/MOD PROGRAM

A reduction in the overall cost per pound of aluminum production should improve the likelihood of the plants continuing to operate in the region and at higher production levels.

Plant efficiency improvements could result in more stable BPA system loads and revenues in the near term and could also secure load reductions in the long term as the region approaches need for new power resources. The objectives of a Con/Mod Program are twofold.

1. Near-term objective: To provide an incentive to encourage the aluminum companies to modernize the region's smelters, thereby maintaining BPA revenues and stabilizing loads on the region's electric power system.

2. Long-term objective: To provide additional power to the region when it is needed.

The Con/Mod would not be solely a conservation program. It has an important near-term objective that sets it apart from other BPA conservation programs. The purpose in offering conservation/modernization during a period of energy surplus is to maintain the revenues BPA receives from the energy intensive aluminum industry and to stabilize the system loads by encouraging the plants to operate a high production levels.

The term "conservation/modernization" suggests that BPA is equally interested in acquiring both the near-term and the long-term benefits through implementation of the program. Accomplishing the near-term objective, to maintain revenues to BPA, will also help to keep rates low for other BPA power purchasers. Acquiring conservation in the long term will provide energy savings that might otherwise require expensive new generation facilities.

While providing incentives, the Con/Mod program will also be designed to: (1) guarantee that conservation savings are available to BPA when needed; (2) enhance BPA total power revenues; (3) ensure that any BPA financial contribution will not be lost; and (4) limit BPA's annual costs to cost-effective levels.

The Con/Mod program will be limited to onsite modifications and/or retrofits of existing aluminum smelter facilities. These range from minor changes such as conversion to more energy-efficient lighting and motors to more substantial changes to improve process and production efficiency. Most activity will probably focus on potline improvements. Estimated total costs for these changes are $360 million. These retrofits could save as much as 300 MW. To encourage retrofitting, BPA will offer incentives; the greater the incentive the more participation expected. BPA intends to base its incentive payments on the amount of energy saved per project.

The level of incentive payment for aluminum smelter conservation/modernization is the principal variable addressed as alternatives in this EIS. Alternatives to other features of the Con/Mod program exist.

One alternative to BPA's proposed Con/Mod program is to offer the program initially as a pilot program and expand it to other aluminum smelters, other DSIs, and industrial customers of utilities purchasing from BPA at a later time when the workability of the program could be proven. This alternative could allow BPA to offer somewhat higher initial incentive levels for potential conservation/modernization actions. The pilot program would initially target one or two plants that offer the greatest savings at the least cost or the oldest, least efficient plants with incentive levels based on a "win-win" criterion. This pilot program would have a budget limitation of less than the proposed amount of $10 million per year and cover a payment period of less than 10-15 years.

Other alternatives to the proposed Con/Mod program relate to ways in which the program could be limited other than through a pilot program, or expanded. This could be through different total budgets, longer or shorter duration of the program, or establishing some other conditions.

Other possible alternatives to the proposed Con/Mod program could require the aluminum smelters to reduce their operating demand based on the energy efficiency improvements made under the Con/Mod program instead of their contract demand, or to require both reduction in operating demand and contract demand.

Some other alternatives have been discussed in the program development process, such as various means of guaranteeing confidentiality of certain data which may be required of the aluminum companies, but as long as something workable is developed, these other alternatives would not be environmentally relevant.

Throughout the world, aluminum metal is smelted almost exclusively by the Hall-Heroult electrolytic reduction process. Three principal production systems are available to accomplish this process: (1) prebake; (2) horizontal stud Soderberg; and (3) vertical stud Soderberg. The Northwest's 10 aluminum smelters have been grouped into 4 basic production categories (Resource Strategies, Inc., May 1985):

1. Old Prebake Smelters. These plants use prebake technology and were constructed during World War II from an identical set of engineering specifications. They are the Alcoa plant at Vancouver, the Kaiser plant at Mead, and the Reynolds plant at Troutdale.

2. Modern/Upgraded Prebake Smelters: Two smelters use prebake technology but either were constructed more recently or have been upgraded to modern standards. These are Alcoa's plant at Wenatchee (only partially served by BPA) and the Intalco plant at Ferndale.

3. Horizontal Stud Soderberg. This category includes two plants, the Kaiser plant at Tacoma and the Reynolds plant at Longview.

4. Vertical Stud Soderberg. This category includes three plants; all have been upgraded primarily for pollution control reasons. They are the Columbia Falls Aluminum Company's plant at Columbia Falls, Montana; the Commonwealth plant at Goldendale, and Martin Marietta's plant at The Dalles.

In general, modern prebake plants are viewed as the most efficient and as having the most desirable process. Although this process requires greater capital costs, energy and labor requirements are considerably less per unit produced than in the Soderberg processes. However, converting Soderberg plants to prebake technology is unlikely since the cost for major equipment change-outs would be prohibitive.

While major conversions do not seem likely, it is probable that most plants can improve efficiency within their existing production systems. Old prebake plants seem to offer the greatest opportunities for improvement; the modern prebake plant may have the least.

Most plants, when evaluating areas where process efficiency can be achieved, will most likely focus on design modifications of the following types:

1. Increasing the size of the anodes to the maximum extent possible, given the physical cell limitations.

2. Lowering the current density at which the cells are operated.

3. Installing computerized process control systems.

4. Installing continuous alumina feeding systems.

5. Installing new, more energy-efficient cathodes, which have been developed to an experimental stage.

6. Improving cell lining.

Old prebake facilities may also consider the option of rebuilding pot rooms with very large cells and state-of-the-art technology. This type of renovation could result in a complete site rebuild. At a minimum, new prebake potlines with larger capacity would require a new anode preparation facility.

2.4 IP-PF RATE LINK

A general relationship between the rate charged BPA's preference customers (currently the PF rate) and the DSI rates after June 30, 1985, is defined by section 7(c) of the Pacific Northwest Power Act. This relationship can be stated as:

$$IP = AWR + M - V$$

where

IP is the Industrial Firm Power rate charged the DSIs;

AWR is derived from the Applicable Wholesale Rate that BPA charges public agencies. This currently is the PF rate. The AWR is computed by adjusting wholesale rates to public agencies for DSI load shape. If new large single loads (NLSL) were to be served, the AWR would be based on a combination of the PF and New Resources Firm Power (NR) rates;

M is the typical margin above wholesale power cost included by public agencies in their industrial retail rates, subject to adjustments as defined by section 7(c)(2) of the Pacific Northwest Power Act; and

V is the value of DSI power system reserves provided by BPA's contractual right to restrict their load.

A predetermined fixed relationship over time between the IP and PF rates (IP-PF rate link) was suggested by the DSIs during the 1985 rate proceeding as a way to improve long-term predictability in their rates. A method fixing the link between the IP and PF rates is attractive to BPA in that issues relating to the relationship between the two rates will not be matters of contention in each future general rate proceeding. Unlike the Variable rate or Con/Mod program, an IP-PF rate link will apply to all DSIs, not just aluminum smelters.

Whether or not the IP-PF rate link is implemented, BPA will continue to determine the DSI rate following its statutory requirements. The link does not address the determination of the AWR since it is based on BPA's wholesale rates to public agencies. Rather, the link addresses the uncertainty of the other two components, M and V, in future rate cases. Even if BPA were to continue to use the same methodologies to compute M and V in future rate cases as were used in the 1985 rate case, the values of M and V will still be subject to changes in forecast data. To implement the IP-PF rate link, a relationship between M and V will be determined and this relationship will be fixed over time. The proposed IP-PF rate link is a mathematical relationship based on differences between the forecast margins and the value of reserves credit (i.e., M-V). The resulting formula prescribes an amount to be added to the applicable wholesale rate in subsequent BPA rate cases for determining the DSI rates. The link will not impact current DSI rates. The earliest the link could be utilized is for the BPA wholesale rates that supercede the current wholesale rates.

From the standpoint of the DSIs, foreknowledge of the values of M and V over an extended period will enhance rate stability and will expose the DSIs to a less uncertain future for corporate planning. Environmental consequences of the proposed rate link, therefore, depend on the degree to which a perception of increased rate stability helps to maintain long-term DSI operating levels.

Rate level is not an issue for the rate link. The PF, New Resource (NR), and IP rates will remain subject to periodic revisions through rate proceedings conducted in accordance with section 7(i) of the Pacific Northwest Power Act. IP-PF rate alternatives examined in this EIS relate to alternative levels of planning certainty for the DSIs. The potential environmental consequences of the alternatives vary depending on the levels of planning certainty provided under each alternative. The level of planning certainty depends in part on the duration of the IP-PF link. The IP-PF rate link could extend only through FY 1991, the 5-year duration alternative. Or the link could last through any specified date prior to or the same as the date the DSI contracts expire, June 30, 2001. The 5-year duration alternative provides more rate certainty to the DSIs than under the no action case. The DSIs may regard a 5 year duration as providing significantly less certainty than if the specified IP-PF link would remain in effect, absent any action by the Administrator, for a much longer time, such as to contract expiration.

Another factor affecting the planning certainty pertains to the manner in which the rate link is implemented. Under one alternative, the IP-PF rate link could be implemented contractually, the contract modification alternative. Or, the IP-PF rate link could be implemented in a long-term policy, the policy alternative. A rate link policy could be subject to changes following ratemaking procedures provided by section 7(i) of the Pacific Northwest Power Act. Changes to a contract amendment could be made if all the DSIs agreed to the changes but, as such, a contract modification would be more difficult to change than a policy. Relative to the policy alternative, the contract modification alternative would provide greater planning certainty to the DSIs.

2.5 ENVIRONMENTAL CONSEQUENCES SUMMARY

The alternatives discussed in this EIS and the combinations of those alternatives result in impacts in three environmental categories: smelter operations, resource operations and development, and socioeconomics.

Changes in smelter operation affect production levels, energy and materials consumption, pollution levels, and socioeconomic conditions. Impacts resulting from changes in electrical energy consumption and load shape affect primarily operations of the Federal Columbia River Power System and the timing of acquisition of new resources. Socioeconomic impacts are related to production levels which in turn can affect employment, and, therefore, general socioeconomic conditions in smelter communities, and electricity rates to BPA's customers.

Table 3 summarizes the impacts in each category of the no action alternative, the proposed Variable rate and its alternatives, the Con/Mod alternatives, and selected combinations of the Variable rate and Con/Mod. The combinations of the alternatives display cumulative impacts. The alternatives and combinations are compared to the no action alternative and show differences among them.

An IP-PF rate link provides a future mathematical relationship between the IP and PF rates which the DSIs perceive as increasing the predictability of their

Table 3

SUMMARY OF ENVIRONMENTAL IMPACTS OF ALTERNATIVES COMPARED TO NO ACTION ALTERNATIVE

Alternative	Smelter Operations		Resource Impacts		Socioeconomic Impacts		
	Operating Levels	Total Pollutants 1/	River Operations	Resource Acquisition	Smelter Jobs	Regional Employ-ment	Retail Rates
1. No Action	decreased from hist-oric levels	less than permitted	more spill than histor. levels	unchanged	5,091 2/	not affected 3/	possible increase
Variable Rate:							
2. Proposal	similar to (1)	similar to (1)	similar to (1)	same as (1)	slightly less than (1)	not affected	no major impact
3. Revenue Protection	lower than (1)	lower than (1)	more than (1)	delayed	less than (1)	not affected	no major impact
4. Load Maintenance	higher than (1)	higher than (1)	less spill than (1)	same as (1)	more than (1)	not affected	no major impact
Con/Mod:							
5. 3 Mills/kWh	similar to (1)	similar to (1)	similar to (1)	same as (1)	slightly less than (1)	not affected	no major impact
6. 5 Mills/kWh	slightly higher than (1)	slightly higher than (1)	slightly less than (1)	possible delay	same as (1)	not affected	no major impact
7. 10 Mills/kWh	higher than (6)	higher than (6)	less than (1)	possible delay	more than (1)	not affected	no major impact
Selected Combinations of Alternatives:							
8. Revenue Protection w/ 3 Mills Con/Mod	similar to (3)	similar to (3)	similar to (3)	possible delay	similar to (3)	not affected	no major impact
9. Proposal w/ 5 Mills Con/Mod	slightly higher than (2)	slightly higher than (2)	slightly less than (2)	possible delay	slightly more than (1)	not affected	no major impact
10. Load Maintenance w/ 10 Mills Con/Mod	higher than (4)	higher than (4)	less than (4)	possible delay	similar to (4)	not affected	no major impact

1/ Pollutants are considered as being proportional to smelter operating levels. Emissions above those allowed in plant permits would not be a consequence of any alternative or combination.
2/ For the period FY 1987-1991 at a long-run aluminum price of 70¢/lb.
3/ "Not affected" means changes are numerically insignificant.

future rates and thereby improving their ability to make long-term plans. The environmental impacts are not included in Table 3 since implementing the IP-PF link alone (i.e., in the absence of a Variable rate or Con/Mod program) would not fundamentally change the economics of any DSI plant and is likely to have only small effects. For this reason it is also expected to have little effect on the nonaluminum DSIs since a Variable rate and the Con/Mod program are not applicable to them.

The increased planning certainty that the IP-PF rate link provides for the aluminum companies would be expected to slightly augment the effects of any of the Variable rates, Con/Mod program, or combinations thereof which were analyzed. A contractual rate link agreement rather than a policy statement by the Administrator would provide a still greater degree of certainty as perceived by the DSIs. It, therefore, may further augment the effects of a Variable rate, a Con/Mod program, or any combinations.

To the extent that an IP-PF rate link provides increased planning certainty to the DSIs, and they respond by increasing production levels over what they would be otherwise, pollutant levels at DSI plants, as well as direct DSI employment, would be increased. Impacts of generation of electric power would also be correspondingly increased. However, the rate link alternatives would not be expected to have a substantial effect on resource acquisition or on total regional employment. Nor would impacts to retail rates be expected with the rate link alternatives involving policy implementation. There is a slight risk of some adverse impacts to retail rates if the contract modification alternative was adopted, due to the Administrator's reduced flexibility to respond to adverse rate effects of the rate link.