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Final Environmental Impact Statement



**BONNEVILLE POWER
ADMINISTRATION**

Alumax Environmental Impact Statement

U.S. DEPARTMENT OF ENERGY

MAY 1981

Final Environmental Impact Statement



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Responsible Official

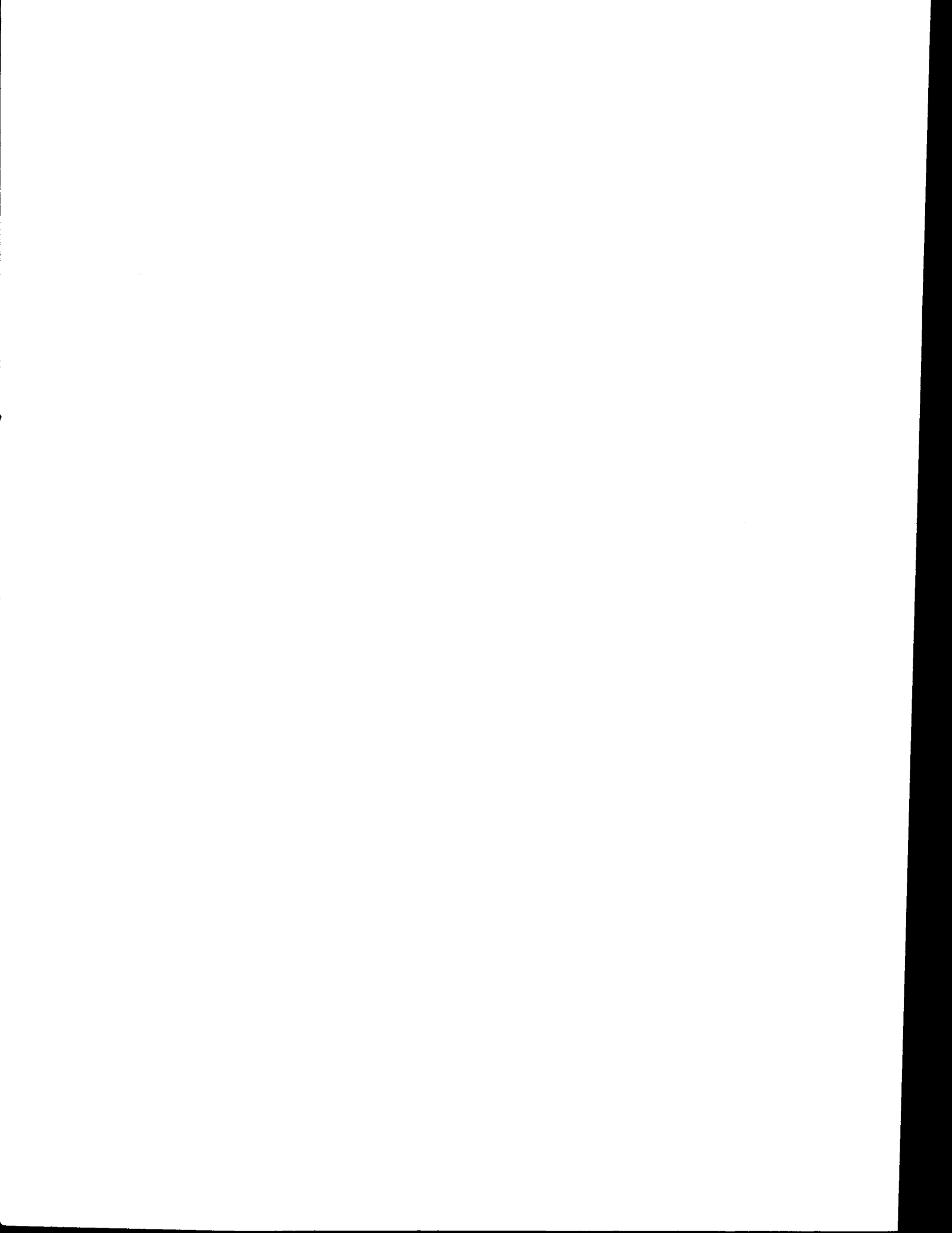
Barton R. House
BARTON R. HOUSE

Acting Assistant Secretary for
Environmental Protection, Safety,
and Emergency Preparedness

U.S. DEPARTMENT OF ENERGY

Washington, D.C. 20545

MAY 1981

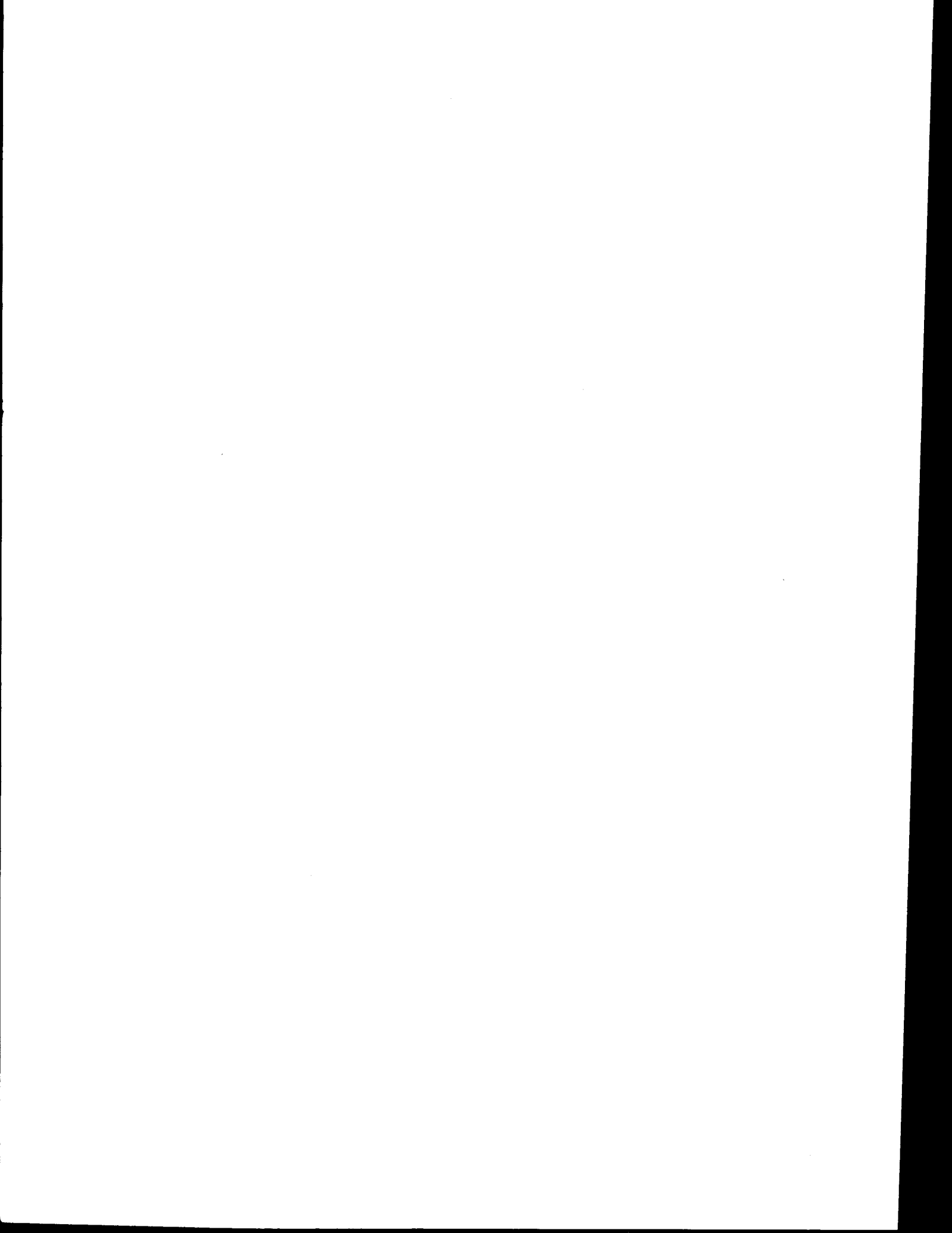


Preface

The final Alumax Environmental Impact Statement has been prepared pursuant to the National Environmental Policy Act (NEPA) of 1969. The document will assist the Bonneville Power Administration (BPA) in assessing the impacts of serving the proposed Alumax Pacific Corporation primary aluminum reduction facility at Umatilla, Oregon. Because of their interrelationship, the filing of the Alumax final EIS was delayed until after BPA's final Role EIS (DOE/EIS-0066) was filed with the Environmental Protection Agency (January 23, 1981).

This EIS was prepared before the enactment of the Pacific Northwest Power Planning and Conservation Act (P.L. 96-501) on December 5, 1980. Among other things, the new Act provides for continued service to the existing direct-service industries, including Alumax. However, the proposal contained in this EIS did not anticipate continued service to Alumax beyond the 1986 contract expiration date. Nevertheless, the analysis contained herein is not constrained by the 1986 expiration. Accordingly, the conclusions presented in the document would still be valid should Alumax decide to build the plant and require service from BPA beyond 1986.

This EIS is also being released now to satisfy the U.S. Department of Energy obligations in connection with Port of Astoria vs. Hodel, 12 ERC 2044 (9th Cir. 1979). The court ordered that BPA prepare and finalize an EIS covering the impacts of the proposed Alumax facility.



COVER SHEET

Responsible Agency: Department of Energy, Bonneville Power Administration

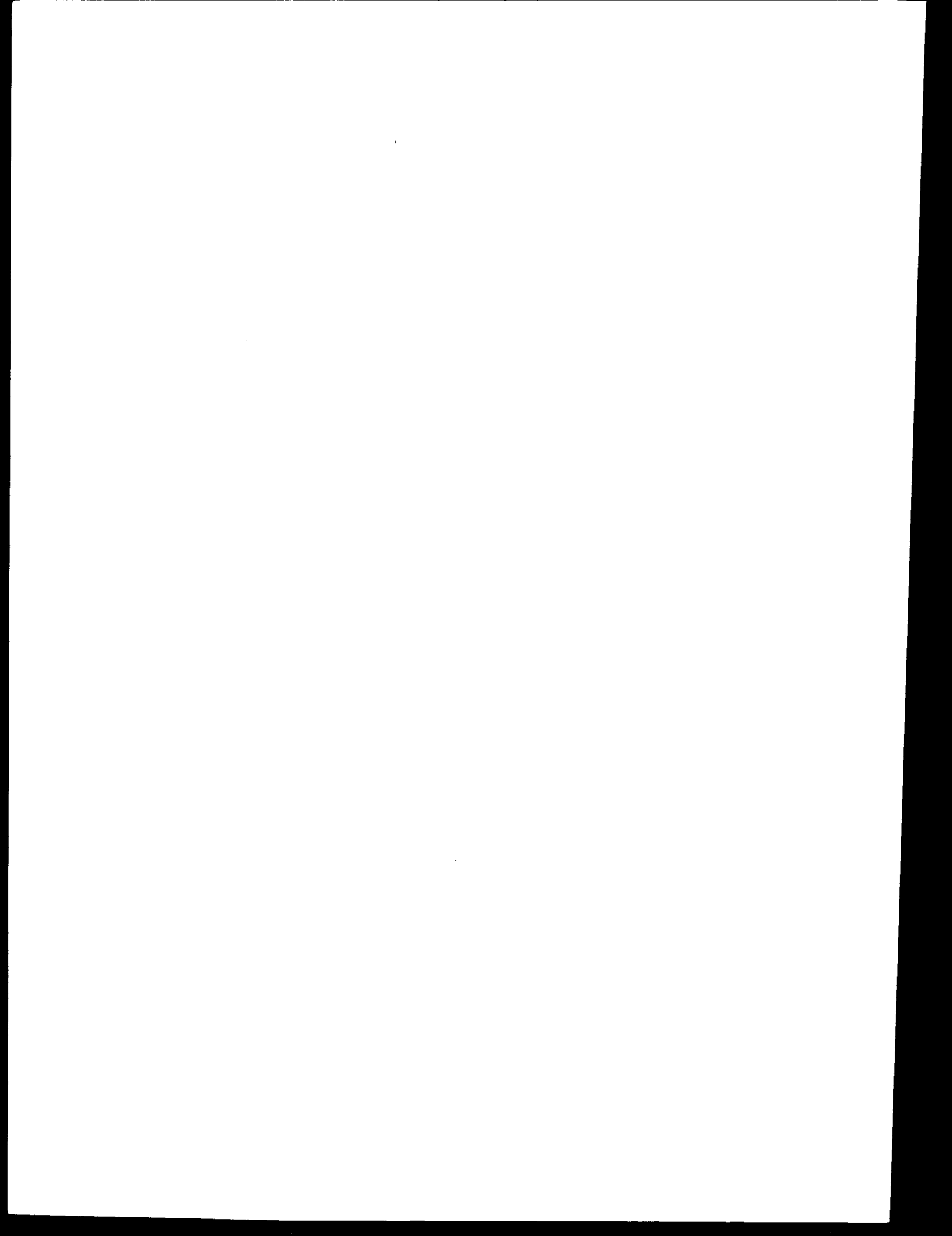
Title of Proposed Action: Alumax Environmental Impact Statement

States and Counties Involved: Oregon - Umatilla and Morrow; Washington - Benton and Franklin

Abstract: Construction and operation of the proposed Alumax-Pacific Corporation, primary aluminum reduction plant and associated transmission and substation facilities would result in degradation of air quality as related to particulates, sulfur oxides and fluorides. Increased population in adjacent local communities would require significant amounts of new land development, and cause overcrowding in certain school districts. The increased tax base will allow for mitigation of these problems.

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SUMMARY

INTRODUCTION

In early 1976, BPA began preparation of an environmental impact statement (EIS) analyzing the Alumax-Pacific aluminum reduction facility proposed for Umatilla, Oregon. The statement was prepared in response to an August 1975 U.S. District Court decision in which District Judge Skopil ruled a power sales contract between BPA and Alumax was valid but unenforceable pending the preparation and acceptance of a final EIS on the plant and related facilities. BPA had signed a new contract with Alumax after the location of the proposed plant was changed from a site in northwestern Oregon to Umatilla.

In accordance with the court decision, BPA proceeded with the development of an EIS on BPA service to the Alumax facility and a related EIS "The Role of Bonneville Power Administration in the Pacific Northwest Power Supply System, Including its Participation In A Hydro-Thermal Power Program" (Role EIS).

On July 25, 1977, the draft Alumax and Role EIS's were filed with the Council on Environmental Quality and made available on September 15, 1977, for public review and comment. In response to the comments received, the draft Alumax statement was revised where appropriate and a final statement developed. Modifications to the Role EIS were extensive and the decision was made to issue a revised draft. The revised draft was filed on April 7, 1980 and reissued for public review and comment.

On March 5, 1979, the Ninth Circuit Court of Appeals affirmed the August 1975 U.S. District Court decision, Port of Astoria v. Hodel, 12 ERC 2044 (9th Cir. 1979).

BACKGROUND

The site of the proposed aluminum plant has changed on several occasions since the original contract was drafted in 1966 with Northwest Alloys for service to a site near Port Angeles, Washington. On June 28, 1967, the contract was amended to provide service to a site near Warrenton, Oregon.

On July 1, 1974, Northwest Aluminum sold its interests in the project to the Amax-Pacific Corporation, later renamed Alumax-Pacific. In the latter part of 1974, the Oregon Environmental Quality Commission proposed that an aluminum plant located on the Columbia River estuary might have to provide for zero fluoride emissions. Technology is not currently available for such a plant; therefore, after consultation with officials of the State of Oregon, Alumax-Pacific concluded they would investigate locating the plant in eastern Oregon where previously adopted standards would prevail.

BPA then signed a new contract providing that Alumax receive a new lower grade of industrial firm power at a site near Umatilla, Oregon. This contract will terminate on July 20, 1986, consistent with the original contract.

Since the Skopil judgment was rendered, Alumax has indefinitely postponed further planning and engineering work on the project beyond those activities necessary to assist BPA in the preparation of the EIS.

The company has retained its options on the Umatilla site. However, the Warrenton site has been donated to the YMCA of San Francisco in the interim. Alumax has also proceeded with the development of new smelting capacity in other areas, most notably South Carolina and Australia.

DESCRIPTION OF THE PROPOSAL

Grade and Quantities of Power. BPA proposes to serve the planned Alumax plant near Umatilla with 320 megawatts of industrial firm power until termination of the existing contract in 1986. Beyond that time, BPA does not have a proposal for continued service to Alumax or any of the direct service industries. Future service will be covered in the allocations process or potentially under regional legislation.

Industrial firm power sales agreements contain provisions of interruptibility which provide BPA with a part of the systems reserves. By restricting the delivery of power to the direct service industries, BPA is able to maintain the reliability of service to firm power customers.

The proposal in the final varies from that in the draft in that the draft called for service to the Alumax plant until 1994. However, regional events occurring since the development of the draft preclude the extension of the contract's expiration date.

Facilities to be Constructed

The Proposed Alumax Plant. Alumax-Pacific Corporation proposes to construct and operate a primary aluminum reduction plant at the Port of Umatilla, Oregon. Fifty percent of the proposed plant would be owned by Mitsui & Co., a Japanese firm which also owns 45 percent of the Alumax-Pacific Corporation. The proposed plant is to be located within a 4,100-acre tract in the Port of Umatilla industrial area. The tract consists of two options: Option A has 3,000 acres and Option B 1,100 acres. The plant site would occupy approximately 165 acres in the west end of the property.

The proposed Alumax reduction plant would be a two-potline plant producing primary aluminum by the Hall-Heroult process using prebake carbon anodes. The major raw materials utilized by the Alumax plant would be alumina, petroleum coke, pitch, and fluoride products. The annual capacity output of aluminum ingot would be 187,300 short tons. Under normal conditions the plant will operate at full capacity.

In addition to the power which would be purchased directly from BPA for the aluminum reduction process, Alumax would purchase approximately 22 megawatts of power from the local electric utility (Umatilla Electric Cooperative, a preference customer of BPA) for lighting and wheelturning power (i.e., environmental control, process pumps, motors, etc.).

Transmission Facilities. Service to Alumax will require the construction of 230-kV transmission lines and a substation near the plant. To minimize transmission losses, the 13,800 volt lines to the plant must be as short as possible. This requirement limits feasible alternative locations for the proposed substation. The proposed plan of service consists of: (1) installation of two 230-kV line terminals at McNary Substation, (2) construction of a new 230/13.8-kV Miller Substation adjacent to the proposed Alumax plant, and (3) construction of two single-circuit 230-kV transmission lines from BPA's existing McNary Substation to the proposed Miller Substation. The two 230-kV lines would parallel existing lines in the area. Approximately 6 acres of land would be required for the Alumax portion of the substation; an additional two acres will be used for other facilities.

BPA has an existing 500-kV transmission line running east to west across this area south of Highway 730, and three existing transmission lines enter McNary Substation from the south. The most feasible routing for transmission lines to serve Alumax is along these established corridors.

Construction Programs. Alumax officials estimate a 32-month construction schedule. The first potline would be completed 27 months from commencement of construction and the second potline completed 4 months later, with an additional month following completion of the second potline required for completion of ancillary facilities, landscaping, and finishing detail.

IMPACTS OF THE PROPOSAL

The study area for the analysis was identified as Benton and Franklin Counties in Washington, and Morrow and Umatilla Counties in Oregon. Significant impacts were generally limited to Umatilla and Morrow Counties. Physical impacts were often limited to smaller areas yet.

Physical and Biological Impacts

The environmental analysis identified two areas of the physical environment which will be significantly impacted by plant development: air quality and land use.

During the construction period, ambient air quality standards for particulates will likely be exceeded at times in areas adjacent to the plant site. These conditions would, however, be temporary in nature and could be limited through the use of various construction techniques.

Plant operations and related traffic and development would degrade air quality but not significantly enough to violate ambient air quality standards nor to exceed EPA Significant Deterioration Limits. During operation, emissions of primary concern include fluorides, sulfur dioxide (SO_2), and particulate matter.

Annual average SO_2 concentrations over part of the community of McNary would increase by 2 to $5 \mu\text{g}/\text{m}^3$ (micrograms per cubic meter). Except for strips immediately along either side of the river used for public

recreation and by wildlife, areas in which average annual SO_2 concentrations would be increased by more than $5 \mu\text{g}/\text{m}^3$ are either on the plant property, over the river, or vacant scrubland. Existing annual average SO_2 concentrations are about $13 \mu\text{g}/\text{m}^3$. Ambient SO_2 standards would not be exceeded by the plant.

Increases in particulate concentration at Umatilla would be very low and, at McNary, would range between $0.2 \mu\text{g}/\text{m}^3$ and $1 \mu\text{g}/\text{m}^3$ depending on time of year and location. Ambient particulate concentrations in the Umatilla area sometimes exceed standards during dust storms. Excluding these times, annual geometric mean concentration is about $40 \mu\text{g}/\text{m}^3$. Contributions of the proposed plant to ambient particulate concentrations are not great enough to result in violations of standards.

Background fluoride levels can be considered to be negligible since there are no significant fluoride sources in the area. McNary would be exposed to less than $0.02 \mu\text{g}/\text{m}^3$ gaseous fluoride as an annual average, although monthly average concentrations of gaseous fluorides may approach $0.05 \mu\text{g}/\text{m}^3$ in December. Ambient concentrations of total fluorides would be between 0.02 and $0.05 \mu\text{g}/\text{m}^3$ at McNary on an average annual basis, although parts of the town would be exposed to monthly average total fluoride concentrations between 0.05 and $0.1 \mu\text{g}/\text{m}^3$ part of the time.

Areas exposed to more than $0.2 \mu\text{g}/\text{m}^3$ (annual or monthly average) of total fluoride and areas exposed to more than $0.1 \mu\text{g}/\text{m}^3$ (annual or monthly average) of gaseous fluoride are over the plant property, the river, and the land between.

Air pollution control devices to be installed at the plant have been reviewed by the Oregon Department of Environmental Quality. The Department concluded Alumax would apply "highest and best practicable treatment technology" to control air emissions.

In the area of land use, between 90 and 95 percent of Alumax-related growth would be expected to locate in northeastern Morrow and northwestern Umatilla Counties. Undeveloped land would be needed to meet projected residential, commercial, recreational, and public facility requirements of additional population generated by Alumax. Conversion of agricultural land, primarily grazing land, to urban land uses would occur in order to accommodate Alumax-generated population.

Alumax-related population is estimated to generate a demand for about 660 acres of additional land by 1995. About 83 percent of Alumax-generated development would be for residential land. Alumax-induced development would be expected to contribute about 20 percent of additional development by 1980 and 9 percent by 1995.

Social and Economic Impacts

The social environmental impacts of the plant may be considered either harmful or beneficial, depending on the focus of the analysis. Population impacts were assumed to be adverse if they could not be accommodated by the existing plans for a particular service (e.g., schools). Adverse impacts in one area may be offset by beneficial impacts in another area.

Population impacts from the proposed plant would consist of the construction force, operational personnel, and secondary employment. Population impacts would reach an intermediate peak in the 22 months of construction when the combination of construction personnel with operational and secondary employees would generate a particularly heavy impact. Following a temporary decline due to the departure of the construction force, a maximum impact of 4,650 would be reached.

The greatest number of Alumax-related persons would settle in the cities of Hermiston and Umatilla. A substantial percentage of the population of Umatilla would be composed of Alumax-related individuals after construction is initiated. Approximately one-third of Umatilla's population would ultimately be associated either directly or indirectly with Alumax.

The regional school systems will be substantially impacted in some locations. The most overburdened systems, even without Alumax, would be the secondary schools of Boardman and Umatilla where non-Alumax enrollments would equal projected classroom capacities.

Local communities would receive positive impacts from the proposed plant in jobs and increased tax revenues. Construction employment would reach a peak of about 1,400, approximately 22 months after the beginning of construction.

Thereafter, the construction work force is expected to decline until construction is completed after 32 months. It is assumed that during the construction period Alumax will hire most of the unemployed construction workers in Umatilla and Morrow Counties and about 14 percent of the unemployed construction workers in the Tri-Cities area. This means that as many as 375 current residents of Umatilla and Morrow Counties may be hired to help construct the plant.

Alumax projects that the proposed plant would begin startup procedures with about 50 employees, but would reach full capacity of 800 employees during the last year of the construction period. Permanent hiring from the Hermiston and Umatilla areas may range from 50 to 200 persons. Another 100 persons may be hired from other parts of the four-county impact region, so total regional hiring of plant employees may range from approximately 150 to 300. It is Alumax policy to hire as many people locally as possible, so a successful recruiting effort could push these figures considerably higher. For each job created directly by Alumax, an estimated 1.25 secondary jobs would be created.

Alumax plant and property would increase the total assessed valuation in Umatilla County by about \$250 million (1976 dollars) if constructed. In addition to this \$250 million, it is estimated that Alumax-related residential and commercial increases will amount to \$63 million for a total increase of \$313 million. Using the same per capita tax base as was present in 1976, Alumax would pay about \$8.7 million annually in property taxes. Alumax's construction, operation, and secondary employment would also generate Oregon personal income tax payments. It is projected annual personal income tax revenue during operation would be about one million dollars annually.

Power System Impacts

The Alumax contract of 320 MW of industrial firm power represents 80 MW of interruptible power; 80 MW of system reserves, and 160 MW of firm power. When totalled with the 22 MW of wheelturning power to be supplied by Umatilla Electric Coop., the 342 MW of total service to the plant represents an increase in system energy requirements of 2 percent.

As the Alumax contract was signed to utilize power made available through provisions of the 1964 Canadian Treaty; no new generating facilities were developed to serve the plant for the duration of the contract. If long-term service is provided, the 240 MW of firm power served the plant represents 27.4 percent of the output of a 1,250 MW nuclear plant or 49 percent of a 700 MW coal plant. Both figures are based on a 70 percent capacity factor.

Due to projected firm energy deficits, not serving the plant will not allow BPA to sign additional power sales contracts but rather would reduce the amount of energy BPA or its preference customers would be required to obtain from other sources during critical or near critical water conditions. During periods of surplus water, the amount of secondary energy available to private utilities and other DSIs would increase without Alumax.

The fact that the Alumax plant would operate at a 95 to 100 percent load factor would mean that generation at Federal hydroelectric plants would be consistently greater, but that daily fluctuations in that generation would be slightly reduced from present levels (due to a Federal system load factor increase of approximately 0.5 percent). The same would be true for flows discharged from the hydroelectric plants. The Alumax power load would help reduce the spilling of water during periods of low load or high spring runoff.

The fact that the Alumax load would be interruptible for various reasons, including forced outage of generating facilities, means that existing generating plants could be operated at closer to their maximum capability, with less generating capacity held as reserves. Because the quantity of power produced with any given set of generating facilities would be greater, the average cost per unit would be less. In turn,

because BPA and the region's utilities set their rates according to average costs, rates paid by all customers would be lower than an alternative load of the same magnitude, but without the interruptibility feature.

ALTERNATIVES

The only viable alternative to the proposal identified in the final EIS is not to provide service to the plant. This would in effect negate the impacts of the proposal. If BPA did not supply power to the plant, this would not release any power for use by other customers but would only serve to reduce forecasted firm energy deficits.

Two sources of energy other than BPA are potentially available to Alumax for the proposed Umatilla smelter: self-generation, either at the site or in centralized generating facilities in conjunction with other power users (such as other aluminum companies, public and private utilities, etc.), or the purchase of power from alternative sources outside or inside the region.

Self-generation could be undertaken as either a joint-industry or utility endeavor or by Alumax alone. With either option, the limiting factor for the alternative is economic cost. Power produced by industry is projected to cost over six times the current BPA rate when total financing is figured in. Assuming the ability to raise the necessary capital for self-generation, a more favorable balance of total costs would result if the plant were sited closer to the product market in order to reduce transportation costs, which are significantly higher in the Pacific Northwest than in other regions of the country.

The option of purchasing other power is limited in the Pacific Northwest due to lack of power available for purchase inside the region. Public and private utilities have similar capital and environmental problems to industry in financing and building generating plants. Furthermore, there are no reliable energy sources outside the Pacific Northwest with power for sale.

In summary, currently there appears to be no viable power source for the Alumax plant outside of BPA due to economic, environmental, and availability limitations. If BPA is unable to supply power, it is unlikely the plant will be built.

The major alternative covered in the draft EIS was the resiting of the plant at Warrenton, Oregon. This alternative was evaluated at the instruction of Judge Skopil even though Alumax officials have stated that under no circumstances will the plant be returned to Warrenton. Consistent with this position, the Warrenton plant property was deeded by the company to the San Francisco YMCA in 1979.

The plant evaluated at Warrenton was basically the same as that proposed for Umatilla. Some changes due to site characteristics were made but these were minor. The transmission facilities required to serve Warrenton were, however, significantly more extensive than those proposed for Umatilla. In order to serve the requirements of the Alumax

site at Warrenton, the following facilities or system additions were proposed by BPA: (1) a 500,000 volt, 47.5-mile transmission line between BPA's existing Allston and new Skipanon Substations with terminal facilities at Allston and a 500,000/230,000-volt transformation at Skipanon; (2) a 2.4-mile, 230,000-volt transmission line between the Skipanon Substation and a new Miller Substation; and (3) a 7-mile, 230,000-volt line between Clatsop Substation and Miller Substation.

The Umatilla site has several climatic and topographic characteristics which make it more favorable for development including more resistant vegetation types, relatively low humidity and rainfall, and level topography. The Warrenton site provides a local ecosystem of far greater diversity and is, therefore, more interdependent and vulnerable. No physical impacts were identified, i.e., violations of standards, which would have precluded the building of the plant at the Warrenton site. However the air pollutant emission limitations imposed by the Oregon Environmental Quality Commission for the Warrenton site would prohibit the plant's operation with existing technology.

From a social standpoint, it is estimated that the Alumax-induced population would be 50 percent greater at the Umatilla site than at the Warrenton site. It is expected that the rates of local hiring for operational and secondary employees would be much higher at the Warrenton site, thus reducing immigration and associated impacts. Economic impacts would be greater at the Warrenton site, due to higher levels of unemployment and a generally lower level of economic growth than is present at the Umatilla area.

Reproduced in the final EIS are several non-viable alternatives contained in the draft EIS. These are provided for reader information and address alternate technologies, sites, and contract expiration dates.

SUMMARY

In conclusion, the Alumax environmental impact statement, while identifying several areas of significant impact of the proposed Umatilla plant, does not determine that any of these impacts would disallow the construction and operation of the plant at the Umatilla site. Alternative plant technologies and methods of operation were examined with the subsequent finding that the proposed plant would be operating at efficient levels of energy consumption and with acceptable levels of environmental impacts.

ALUMAX ENVIRONMENTAL IMPACT STATEMENT

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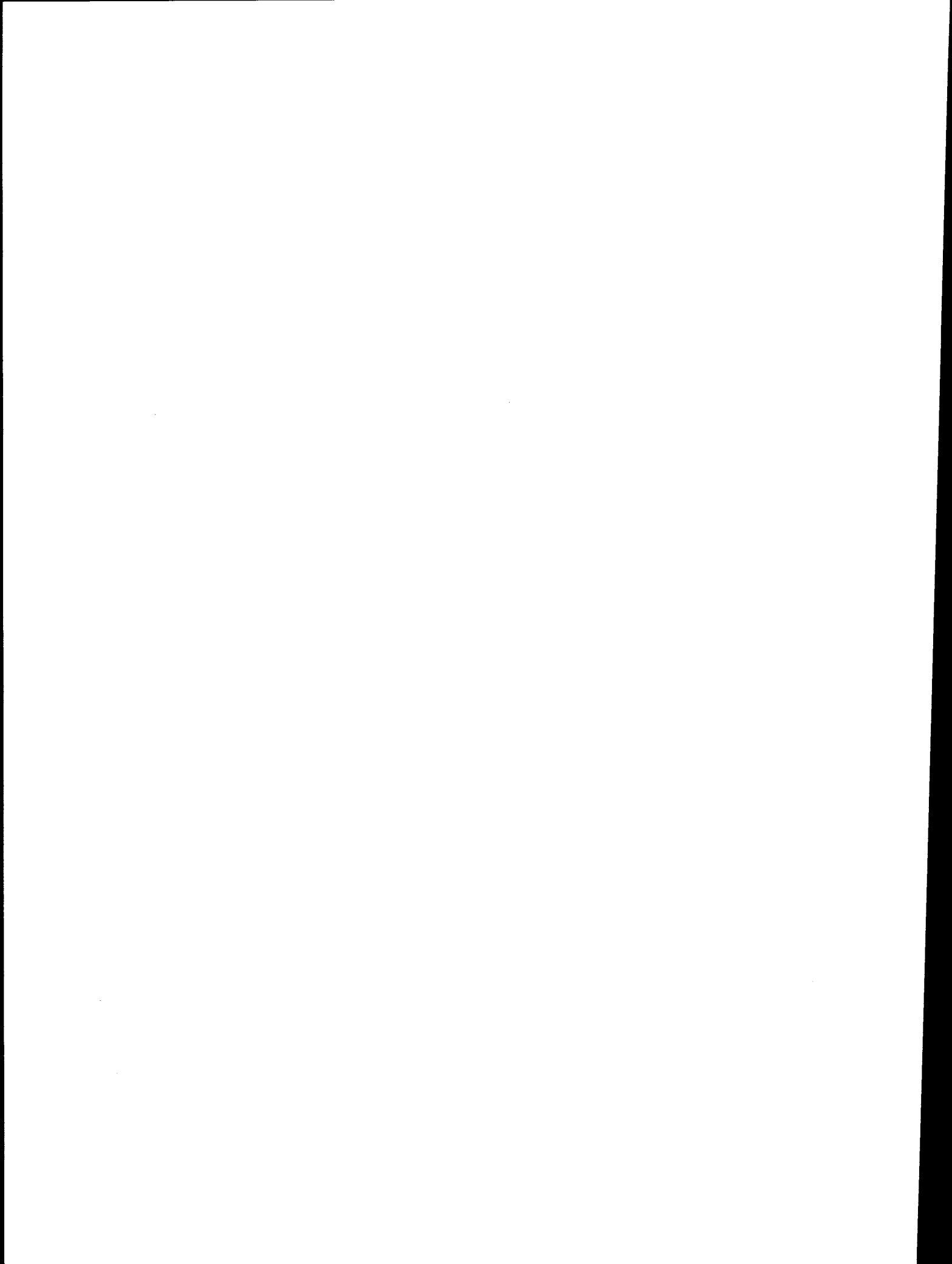
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INTRODUCTION

the 1990s, the number of people in the world who are under 15 years of age is expected to increase from 1.1 billion to 1.5 billion.

As the world's population grows, the demand for food and other resources will increase. This will put pressure on the environment and on the world's food supply. It is important that we find ways to meet this demand without harming the environment.

One way to do this is to use sustainable agriculture. This means using farming methods that do not harm the environment and that can be continued for a long time. Sustainable agriculture can help us to meet the world's growing demand for food without harming the environment.

Another way to do this is to use renewable resources. These are resources that can be replaced naturally, such as wind, water, and solar energy. Using renewable resources can help us to meet the world's growing demand for energy without harming the environment.

Finally, we can help to meet the world's growing demand for food and other resources by using resources more efficiently. This means using less of everything we need, such as food, water, and energy. Using resources more efficiently can help us to meet the world's growing demand for food and other resources without harming the environment.

There are many other ways to help meet the world's growing demand for food and other resources without harming the environment. We need to find all the ways we can to do this, so that we can all have a better future.

One of the most important things we can do is to make sure that we are all using resources responsibly. This means using resources in a way that does not harm the environment and that can be continued for a long time. We need to make sure that we are all doing this, so that we can all have a better future.

Another important thing we can do is to make sure that we are all using resources fairly. This means making sure that everyone has access to the resources they need to live a good life. We need to make sure that we are all doing this, so that we can all have a better future.

Finally, we need to make sure that we are all working together to meet the world's growing demand for food and other resources without harming the environment. This means working together to find ways to use resources more efficiently, to use renewable resources, and to use sustainable agriculture. We need to make sure that we are all doing this, so that we can all have a better future.

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I. INTRODUCTION

On April 17, 1975, suit was filed in United States District Court for the District of Oregon which has come to be known as the "Alumax Case." On April 17, 1975, BPA signed a new contract, which replaced a 20-year contract signed in 1966, after the location of the proposed plant was changed from a site at Warrenton in northwestern Oregon to a site in northeastern Oregon near Umatilla; the new contract retained the termination date of the original contract unless new contracts were also executed by other direct-service industrial customers. In an August 26, 1975, decision, the court ruled that a new power sales contract to serve the Alumax Pacific Corporation's proposed primary aluminum reduction plant in the Hermiston-Umatilla area of eastern Oregon is valid but unenforceable pending the preparation and acceptance of an adequate final EIS (Port of Astoria v. Hodel, 8 ERC 1156 (D. Or., 1975)). The court ruled that execution of the new contract was a major Federal action significantly affecting the quality of the human environment and BPA must prepare an EIS assessing the primary, or direct environmental impact of the proposed plant as well as the socioeconomic impact of the proposed plant on the local eastern Oregon community in addition to the effects of BPA's construction of transmission facilities to serve the proposed plant. Further, the court ruled that the statement to be prepared should include a consideration of the Phase 2 aspects of the contract with Alumax. On March 5, 1979 the Ninth Circuit Court of Appeals affirmed the decision, Port of Astoria v. Hodel, 12 ERC 2044 (9th Cir. 1979).

Following the Circuit Court decision, BPA elected to expand on an EIS then under production to encompass all of BPA's actions as well as the impacts of these actions, alternative functions and courses of action for BPA, and the participation of BPA in the regional power system. This programmatic EIS is entitled "The Role of BPA in the Pacific Northwest Power Supply System, Including Its Participation in the Hydro-Thermal Power Program: A Program Environmental Statement and Planning Report" (Role EIS). The Role EIS is intended to provide the base environmental information for future BPA decisions such as service to Alumax.

Initially the Alumax EIS was developed as a supplement to the Power Marketing Appendix of the Role Statement. It was later separated in order to clarify the divergent focus of the two statements. However, it is essential for the Alumax EIS to be reviewed in conjunction with the Role EIS as the Alumax EIS incorporates by reference all of the material in the Role EIS.

In July of 1977 both the draft Role EIS and draft Alumax Statement were filed with the Council on Environmental Quality and released for public review and comment. During the 180-day comment period more than 500 comment letters were received on the two documents. In response to these comments and changes in the regional energy picture the draft Role EIS was revised and when filed by the Department of Energy will be reissued for public review and comment.

Regional changes have also impacted the development of the ALUMAX project. The demise of Phase 2 of the hydrothermal power program left the region without a regional program for planning, financing, and developing future power resources. Delays in thermal plant construction and other resource development have increased projected energy deficits for the 1980's. In response to this BPA has been required to notify its preference customers it will be unable to serve their total load growth requirements after 1983 and to inform the direct service industries, including Alumax, their contracts will not be renewed upon expiration. This action has resulted in a change in BPA's proposal to serve Alumax. Whereas in the Draft BPA anticipated continuing to serve the plant after 1986, that is no longer the case. BPA now proposes to serve the plant directly only until contract expiration on July 20, 1986. After that time other provisions for power supply will be required. Future service may come as a result of the BPA policy for future allocation of Federal power now being developed or, potentially as the result of Regional Legislation currently in Congress. The Draft BPA Allocation Policy would allow for continued service to the plant through the local utility, Umatilla Electric Co-op. The Senate passed version of the Regional Legislation (S885) would also provide service to the plant beyond the existing or contract expiration date.

It is too early at this point to speculate on what the outcome of these alternatives will be or where future power supplies will come from or under what conditions they will be provided. Future impacts on the power system will change with these variables. Therefore, consistent with the Role EIS this document analyzes the Alumax contract's impact on the power system until expiration of the current contract. Proposals for service beyond that date may require additional environmental analysis at the appropriate time.

The site specific environmental and socioeconomic impacts of the plant's construction and operation are projected until 1995 based on the assumption that once the plant is built it is likely to continue operating and the impacts would stay constant.

A. Overview of BPA Power Sales to Direct-Service Industrial Customers.

Since 1940 when service was initiated to the ALCOA aluminum plant in Longview, Washington, BPA's direct-service industrial (DSI) customers have played a fundamental role in the development of the regional power system. In the early days of multi-use dam development on the Columbia River and its major tributaries, the DSIs utilized large blocks of power from the hydro facilities which were excess to regional utility needs. This resulted in the dams becoming cost-effective at an earlier date, reduced capital investment, increased regional revenues, and lowered overall regional rates. The DSIs also provided a market for secondary energy not usable by utility customers due to its unpredictable availability.

In 1965 when BPA no longer had adequate firm hydro capability to meet DSI demand and the region was beginning the transition to a mixed hydrothermal system, the DSIs signed the first modified firm (MF)

power contracts. Under these contracts BPA had restriction rights on certain amounts of DSI contract demand. At this time the DSIs assumed the responsibility for providing a portion of the region's power reserves.

Beginning in Fiscal Year 1967-68, BPA entered into an Interruptible Replacement Energy (IRE) Trust Agreement with its industrial customers. The fundamental purpose of the agreement was to establish a method by which BPA could acquire energy from non-Federal sources for industrial customers at their expense during periods when the interruptible portion of Federal power energy had to be curtailed for reasons of poor streamflow conditions or peaking capacity limitations. All industrial customers signed the agreement, but not all of them necessarily participated in the purchase of non-Federal energy during any given curtailment period.

In 1973, as Phase 2 of the Hydro-Thermal Power Program (HTPP) was being developed, BPA adopted a new industrial sales policy embracing the principles of industrial firm (IF) power. This industrial sales policy was an essential element of Phase 2 of the Hydro-Thermal Power Program; it provided a basis for planned execution of new contracts between BPA and DSIs and between BPA and the preference customers. Under this policy, BPA received additional rights to restrict service to provide for increased BPA and regional reserves. In exchange, the DSIs were to receive long term power contracts in an era of decreasing power availability. In early 1975 BPA signed interim agreements with the DSIs for the sale of IF power. The agreements utilized for the first time the quartile arrangements for interrupting service. When adopted as new long term contracts the interim agreements were designed to replace the MF contracts, and to extend the term of service to 1994.

A court challenge to Phase 2 of HTPP, however, halted the subsequent signing of the new 20-year IF contracts until completion of the Role EIS. Since that time, BPA has been operating under the interim agreements which can be terminated by either party with 30-days' advance notice. If the IF contracts were terminated, service would be continued under the MF contracts.

At the present time, BPA does not have a proposal for long-term service to the DSIs. The companies were notified that their contracts would not be renewed upon expiration of their modified firm power sales contracts due to lack of resources to meet load. BPA anticipates continuing to operate under the interim agreements, allowing service to each company to terminate on the expiration date of their modified firm power contract. These dates as well as each company's contract demand are presented in Table I-1.

At the present time BPA sells power directly to 15 industrial corporations with a total of 21 plants. Six plants are in Oregon, 13 are in Washington, and two are in Montana. Ten of the plants produce primary aluminum metal and account for approximately 90 percent of the direct-service industrial load. As of March 1, 1979, the DSIs had a contract demand of approximately 3,600-MW of IF-1 power.

TABLE I-1

BPA INDUSTRIAL CUSTOMERS

<u>DSI</u>	<u>Contract Expiration</u>	Industrial Firm Power <u>Contract Demand</u> ^{1/} (MW)
Union Carbide Corp.	5/81	20.3
Crown Zellerbach	8/83	13.2
Georgia-Pacific Corp.	7/84	20.3
Intalco Aluminum Co.	10/84	422.4
Carborundum Co.	12/85	29.7
Penwalt Corp.	12/85	45.7
Alumax - Pacific	7/86	320.0
Kaiser Aluminum - Spokane	10/86	499.6
Kaiser Aluminum - Tacoma	10/86	152.0
Kaiser Aluminum - Trentwood	10/86	62.1
Reynolds - Longview	12/86	414.0
Reynolds - Troutdale	12/86	271.6
Alcoa - Vancouver	6/87	238.5
Alcoa - Wenatchee	6/87	213.1
Alcoa - Addy	6/87	53.2
Anaconda Aluminum Co.	8/87	337.8
Martin Marietta - The Dalles	2/88	168.0
Martin Marietta - Goldendale	2/88	210.0
Stauffer Chemical Works	4/88	61.3
Ormet	5/88	3.4
Hanna Nickel Smelting Co.	6/90	114.0
Pacific Carbide & Alloys Co.	9/91	9.0

^{1/} Contract demand is the specific number of megawatts that the customer agrees to purchase and BPA agrees to sell under the conditions of a contract.

B. History of Contract Developments with Alumax.

Developments in Delivery, Location, Grade, and Quantity of Power. As a consequence of the 1964 Columbia River Treaty with Canada, the load carrying capability of the Federal and non-Federal hydroelectric systems in the Pacific Northwest was increased by about 1,400 megawatts of firm peak capability, and an average of about 750 megawatts of firm energy capability, plus another 750 megawatts of firm peak capability and 192 megawatts firm energy capability at site and downstream from construction of Libby Dam. BPA determined that, to utilize this and other planned additional power most effectively, up to approximately 1,000 megawatts could be sold for industrial expansion.

As soon as it became known that BPA had power available as a result of the Treaty, both existing industrial customers served by BPA and new customers expressed interest. In the latter part of 1965 and early 1966, two groups proposed to build new aluminum plants in the region. One group was headed by Rio Tinto Zinc and Bell Intercontinental Corporation. A second group was comprised of Texas Aluminum, a fabricator located in Rockwall, Texas; Yawata Econ Steel Company of Japan; and Showa Denko, also of Japan. The two groups recognized the difficulty of proceeding competitively and, as a result, they formed a new group. It was proposed that when the merger was executed, 5/13 of the stock would be assigned to Yawata, 4/13 to Bell, and 4/13 to Texas Aluminum. This would have given the Japanese 38 percent interest.

The Bell group originally was interested in sites near Bellingham, Washington, and Reedsport or Warrenton, Oregon. The Texas Aluminum group was studying sites at Port Angeles and Guemes Island, both in Washington. After the two groups formed into a single group, they optioned the site near Bellingham and pursued a site near Port Angeles. The first contract BPA drafted with the group, dated April 15, 1966, was for the Port Angeles site.

BPA never signed the contract for the Port Angeles site. Shortly after the new corporation, called Northwest Aluminum, signed the contract, it became obvious that difficulties would be encountered at the Port Angeles site, and Northwest Aluminum asked BPA not to sign. The firm then took options on the Guemes Island site near Anacortes. One of the reasons for the selection of the Guemes site was that the Economic Development Administration would have provided a loan of 10 percent of the total capital requirements, since Skagit County was classified as a depressed area. The initial BPA-Northwest Aluminum 20-year contract, for 240 megawatts of firm power with provision for a possible increase for an additional potline, was executed on July 20, 1966.

Soon after selection of the Guemes Island site, there were protests, particularly from people who had summer homes on the island. As a result, the proposed site was zoned for residential use, forcing Northwest Aluminum to look for another site. In March 1967 it informed BPA that it would purchase the Atlas Powder site at Nesqually near Olympia. But while Northwest Aluminum was studying new sites, interests

in Oregon persuaded them to take the Warrenton site with an understanding that the Oregon legislature would enact a bill to permit financing of industrial revenue bonds by the Port of Astoria to construct the project.

Northwest Aluminum asked BPA to amend its contract to put the Warrenton site in place of the Guemes Island site. On June 28, 1967, a contract amendment provided for the Warrenton site.

In early 1968 Northwest Aluminum was having difficulty financing the project and Mitsui and Company agreed to participate. By the end of 1968, however, all three of the Japanese firms dropped out because they could not secure approval of the Japanese government to invest the substantial amount of money required for the Warrenton plant. Northwest Aluminum attempted to secure other partners, but was unable to do so. Their ability to attract partners was further hindered when access to financing with industrial revenue bonds through the Port of Astoria expired as a result of the Industrial Revenue Bond Act passed by the U.S. Congress.

After efforts to secure a partner failed, Northwest agreed to sell out to Amax Pacific Corporation, a subsidiary of American Metal Climax, Inc. Northwest Aluminum had agreed to sell the site, its designs, and plans for an aluminum plant to Amax Pacific Corporation for \$3 million; Amax agreed to buy providing BPA would assign the contract to Amax. An alternative discussed by the two companies was Amax's purchase of Northwest Aluminum, which would have made an assignment from BPA unnecessary.

At the time the contract was assigned to Amax Pacific Corporation the grade of power sold was changed from firm to modified firm. Under modified firm power contract terms BPA received additional restriction rights designed to increase BPA's forced outage reserves.

On January 30, 1974, Mitsui and Company, Ltd., purchased 50 percent interest in Amax Pacific. Later, Mitsui purchased 50 percent of the proposed Umatilla plant from Alumax Pacific.

BPA attempted several times to terminate its contract with Northwest Aluminum and later with Amax. BPA discussed cancellation of the contract with Northwest Aluminum on several occasions and, prior to the assignment of the contract from Northwest to Amax, the Regional Solicitor provided the BPA Administrator with an opinion stating that BPA had no right to cancel the contract because it was a valid contract which did not provide for unilateral termination by BPA.

In the latter part of 1974, the Oregon Environmental Quality Commission proposed that an aluminum plant located in the Columbia River estuary might have to provide for zero fluoride emissions. Technology is not available for such a plant. After Alumax Pacific, which had changed its name from Amax Pacific February 14, 1975, consulted with officials of the State of Oregon, its representatives concluded that they would investigate locating the plant in eastern Oregon where

previously adopted standards of one pound of total fluoride per ton of aluminum would probably prevail.

Provisions of the contract would not allow BPA to serve the plant without State environmental approval. What is more, there appeared to be a strong political and public preference for the Umatilla site, as evidenced by polls and by public statements made by the Governor. Also the transmission system additions needed to serve the plant at Umatilla would be substantially less than for the Warrenton site. It was felt that BPA should proceed with a new contract which would include the change in point of delivery from Warrenton to Umatilla County.

BPA therefore signed a new contract providing that Alumax receive a new, lower grade of industrial firm power; that the new contract terminate July 20, 1986, unless one or more other BPA industrial customers accept new 20-year contracts for industrial firm power, where upon the proposed contract with Alumax would continue in effect for a similar term; that power be delivered to a site "near Umatilla," and that Alumax pay BPA \$2.4 million for the government's unusable investment in facilities, designed, purchased or constructed to deliver power to Warrenton.

In addition, the new contract provided that if by June 30, 1976, Alumax had not obtained such permits and approvals as were necessary to commence plant construction, the contract would terminate upon 30-days written notice from the BPA Administrator. Exceptions to this date were provided for "uncontrollable forces" limited only to legal actions. All permits were obtained within the time allowed and have been maintained.

1. History of Work Already Performed.

- a. Preliminary Work Performed by Alumax and Predecessors.

When Alumax purchased the assets of Northwest Aluminum in September of 1970, included was a plant site of some 726 acres, of which 240 acres have been cleared and rough graded. This site, partially within and adjacent to the city of Warrenton, was zoned for heavy industrial use. At that time, Alumax contacted appropriate State and local officials and agencies and commenced preliminary planning for a proposed aluminum reduction plant. However, in the spring of 1971, the combination of conditions in the national economy and existing levels of supply and demand in the domestic primary aluminum industry prompted an Alumax decision to postpone further action on this project.

Alumax periodically analyzed their Oregon project and, in the spring of 1973, planning for the project commenced again. Necessary permit applications for the Alumax plant were filed with the Oregon Department of Environmental Quality (DEQ) in November 1973. Later that month, however, the State Environmental Quality Commission promulgated emission standards for new primary aluminum plants within the State of Oregon. These standards set emission limits below those projected by Alumax on their permit applications and effectively canceled their applications.

In response, Alumax undertook testing of existing plants to determine whether or not the Oregon emissions standards could, in fact, be realized by an operating aluminum reduction plant. As a result, it was concluded that the proposed plant could meet Oregon requirements, and revised permit applications were filed in June 1974.

The DEQ issued a staff report on the Alumax plant in October of 1974. This report confirmed that the proposed plant could comply with the regulation for new aluminum reduction plants and stated the Department's intention to proceed with drafting proposed permits, pending final resolution of some unresolved questions; however, in December 1974, the Environmental Quality Commission proposed that the Alumax plant site at Warrenton and surrounding area be designated a "Special Problem Area" with a fluoride emission of zero.

Subsequent to this action, both the Governor and Governor-elect suggested that Alumax consider a relocation of the plant. Alumax responded to these requests and commenced evaluating potential alternate sites. Alumax confirmed the selection of an alternate site at the Port of Umatilla in March 1975, and property options were obtained. Permit applications relative to the new site were filed in April 1975.

Alumax continued its efforts to obtain permits and, in May 1975, it received clearances from the County of Umatilla; in July 1975, it received the necessary permits from DEQ; and in September 1975, it received clearances from the EPA.

Since the Skopil judgment was rendered, Alumax has indefinitely postponed further planning and engineering work on the project beyond those activities necessary to assist BPA in the preparation of this EIS.

Alumax has made total expenditures on this project in excess of \$13 million. The expenditures include costs of property, technology and engineering, power carrying costs, salaries, expenses and fees. Of this amount, approximately \$2.4 million was paid to BPA for costs incurred in planning and procurement for transmission facilities to serve the Warrenton site (see below). To date, Alumax has not made any expenditures for procurement of capital equipment for the proposed plant.

b. Work Performed by BPA as a Result of the Alumax Contract. Except for administrative costs and overhead, BPA did not perform any work or expend any funds attributable to service to the Northwest Aluminum Company at either the proposed Port Angeles site or the Guemes Island site. Significant expenditures were made, however, in anticipation of serving Northwest Aluminum (later, Amax) at Warrenton.

To serve the proposed plant at Warrenton, BPA planned to construct a 47-mile, 500,000-volt transmission line between its existing Allston and Clatsop substations, terminal facilities at Allston, a 5-mile, 230,000-volt line between Clatsop and new Skipanon substations, a new 230-kV/13.8-kV Miller substation, and a 2-mile,

230,000-volt line between Skipanon and Miller substations. The facilities, originally scheduled for energization in April 1970, were to be constructed in phases. The first phase, Miller substation and the line between Miller and Skipanon, was rescheduled for energization in October 1974. The second phase, the transmission lines from Allston to Skipanon, were rescheduled for energization in stages. The first stage, the lines from Clatsop to Skipanon and a 26-mile section of the line to Clatsop from Allston, was to be completed first, operating initially at 230,000 volts with power from Driscoll substation. The second stage, the remainder of the line, from Allston to Driscoll, was to be completed later, at which time the operation of the line would be increased to 500,000 volts. Energization of the complete line was scheduled for September 1977.

In order to meet its contractual obligations with Amax, BPA proceeded with location, design, and procurement of materials and land. When it became obvious that the plant would not be built on schedule, BPA ceased work on the project and began charging Amax an amount to defray the costs incurred in carrying capital investment in facilities that would not be used as rapidly as intended. These payments for BPA's investment carrying costs reached in excess of \$35,000 per month for the period from October 1974 until April 1975, when BPA closed its work orders for the project and ceased charging Amax.

As of the end of April 1975, a total of approximately \$6,750,000 had been charged to various construction work orders associated with the Alumax project. BPA received a total of approximately \$2,400,000 from Alumax for overhead, interest, labor, and other costs (not including materials or stores) included in those charges. Of the remaining amount, most of the charges were for materials useful elsewhere on the BPA system, or are additions to facilities in the northwest Oregon area which will eventually be required despite the absence of the Alumax plant.

Since 1975 BPA has been working on both the Alumax EIS and the related Role EIS. To date approximately \$3.5 million has been spent on the projects.

2. Interaction Between Alumax and Government Agencies Other than BPA. The major interaction between Alumax and State agencies has been with the Oregon Department of Environmental Quality (DEQ). Although considerable interaction with this agency took place during the period between mid-1973 and December 1974, regarding the proposed plant at Warrenton, the proposed Umatilla plant itself did not come under discussion until April 1975. Discussions with, and submission of information to, DEQ culminated in a public hearing in Hermiston on July 15, 1975, and the issuance of permits to Alumax shortly thereafter.

Alumax has also met with the State Department of Commerce, both in Pendleton and in Salem, regarding the construction of the proposed plant and the procedural requirements for obtaining necessary building permits.

In addition to its contracts with appropriate State agencies, Alumax appeared before the Umatilla Planning Commission on May 30, 1975, to request a conditional use permit for the proposed plant. This permit was granted on May 7, 1975, and renewed a year later. Alumax has also had informal discussions with local governments and school boards in Hermiston and Umatilla, concerning both the potential impacts of the proposed plant in the area and the procedures or alternatives available to it which could alleviate these impacts, and has participated with county agencies in attempts to resolve the existing water supply problem in the northwest area of the county.

Alumax also applied to the U.S. Environmental Protection Agency for approval to construct the plant at Umatilla pursuant to requirements of the Federal regulation for prevention of significant air quality deterioration (40 CFR Part 52-21). EPA granted such approval in September 1975.

The proposed plant has been determined to be in compliance with all present Federal, State, and local government requirements. All permits required of Alumax to allow commencement of site preparation and construction have been obtained. For further information refer to:

Department of Environmental Quality, Staff Report	7/14/75
Air Containment Discharge Permit	7/22/75
EPA Determination, (Ref. 40 CFR 52-21)	9/24/75
Umatilla County Planning Commission Conditional Use Permit	5/7/75; 5/7/76
Water Permit	7/21/75

3. Past Public Involvement with Proposed Alumax Plant. A total of seven public meetings concerning the proposed Alumax plant have been held in Umatilla County:

1. Pendleton, April 2, 1975, County Planning Commission: considered zoning change of approximately 800 acres under option to Alumax.
2. Pendleton, April 8, 1975, County Commissioners: granted approval to rezone approximately 802 acres as heavy industrial.
3. Hermiston, April 30, 1975, County Planning Commission: considered conditional use permit for Alumax.
4. Pendleton, May 7, 1975, County Planning Commission: granted conditional use permit to Alumax.
5. Hermiston, July 15, 1975, Oregon Environmental Quality Commission: held hearing on proposed permits for Alumax.

6. Hermiston, April 7, 1976, County Planning Commission: granted extension of conditional use permit.
7. Hermiston, November 22, 1976, BPA public response meeting on draft EIS.

The public meetings held in Hermiston April 30, and July 15, 1975, were both attended by over 200 people. Representatives of all local governments, school boards, service clubs, other organizations and citizens expressed support for Alumax.

At the April 30th meeting, Alumax presented a number of consultants to discuss impacts of the proposed plant. This consultant group responded to questions from both the Planning Commission and attendees at the meeting. Public response was weighted in favor of the Alumax plant; a petition with about 3,600 signatures expressing support for the plant was submitted to the EQC. At each meeting the question of the use of electrical energy for aluminum reduction was raised.

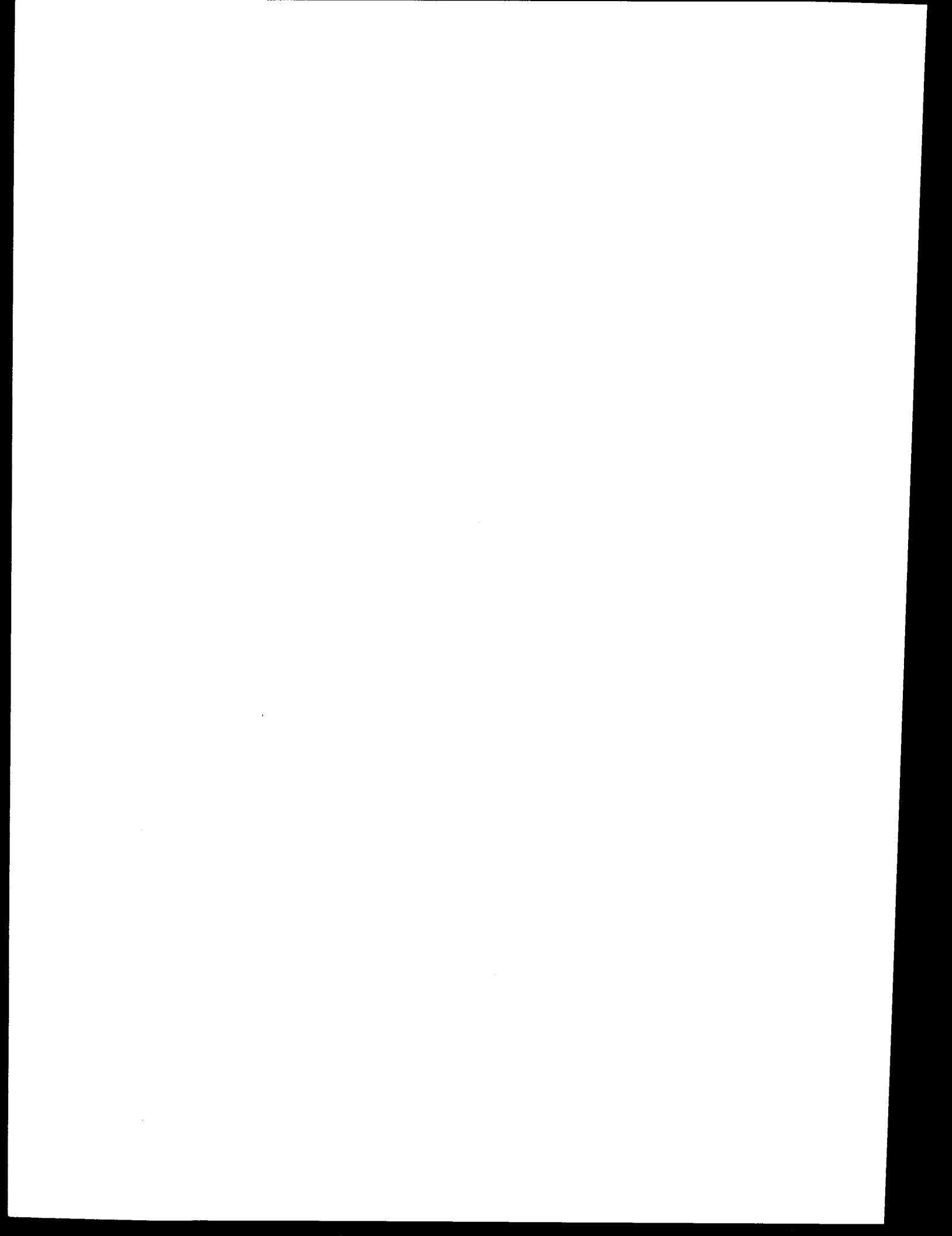
At the November 22 meeting 34 members of the public testified regarding the plant.

Transcriptions of these meetings are available from the Planning Commission (April 30, 1975), DEQ (July 15, 1975), and BPA (November 22, 1976).

BIBLIOGRAPHY

Bonneville Power Administration, 1977: draft Role EIS, 3400 pp.

DESCRIPTION OF THE PROPOSAL



II. DESCRIPTION OF THE PROPOSAL

A. Power to be Delivered by BPA to Alumax.

BPA proposes to serve the planned Alumax plant near Umatilla with "Industrial Firm" (IF) power, the same grade of power now being purchased under interim agreements by the other industrial customers served directly by BPA. The Alumax contract amount for power is 320 megawatts.

Industrial firm power divides DSI contract demand into quartiles, with each quartile containing different conditions under which service can be interrupted.

The top quartile of demand can be interrupted at any time for any reason, with BPA giving as much notice as possible. As this quartile is served from secondary energy available only on an intermittent basis, generally when streamflows are above levels needed to serve firm loads, it is subject to frequent interruption. When prudent operation dictates the top quartile of the IF load be interrupted to ensure service to BPA firm loads, BPA attempts to make available advance energy. This energy is sold with the agreement the DSIs will return equal energy at a later time if BPA needs it to meet firm loads. If under prevailing conditions, BPA cannot serve the top quartile, it acts as a trust agent for the DSIs in the purchase of power from other sources, when available at a cost acceptable to the industries, and schedules the delivery of this power to them.

BPA can interrupt the second quartile to the extent it is otherwise unable to meet its firm power obligations because of delays in commercial operation of new generating units or the inability to operate any new unit at design capability. BPA must give notice by June 1 of any year in which this is invoked, and provide as much notice as possible of actual restrictions.

In addition BPA can interrupt second quartile service to the extent necessary to minimize restrictions of firm power as a result of system stability problems or forced outages of Federal system facilities; this includes transmission facilities, Federal generating plants, or generating plants from which BPA acquires power. No notice is required. Total restriction for forced outages in kWh under this category in any calendar year shall not exceed 375 multiplied by the Contract Demand. For the proposed Alumax plant, the maximum would be 120,000 kWh.

The second quartile is considered a part of BPA's firm energy load. To date, it has been interrupted only in times of system emergency (forced outages). However, as regional loads grow and thermal plants continue to be delayed, without the development of new regional resource programs, service under this quartile is placed in jeopardy.

It currently appears that it will be necessary to give notice of interruption for the 1980-81 through 1983-84 operating years for restriction of up to the full quartile.

The third quartile is subject to interruption to the extent and for the period that the industry is offered the opportunity to purchase part of the output of a generating plant to provide regional reserves against plant delays and the industry elects to permit restriction instead of such a purchase. This quartile is also part of BPA's firm energy load. The arrangements were designed to provide the region with both reserves against plant delays and additional financing capability for regional resource development. In the amount of time left on the DSI contracts until expiration it would not be possible to implement this quartile due to the 10 to 12-year lead times required for the construction of thermal generation. In addition, all of the DSIs except Alumax are receiving power under interim agreements which either party may terminate on 30-day notice. If the interim agreements are terminated, service is provided under the conditions of modified firm power which does not incorporate this restriction right. If BPA attempted to implement the third quartile it is likely the industries would terminate the interim agreements. It would be impractical to implement these provisions only for Alumax. Therefore this quartile can be considered firm power for the remainder of the contract term, except for the short term restrictions to protect system stability discussed below.

The fourth quartile of IF power is firm power subject to interruption only for system reliability.

Under the same conditions of system stability as identified under the second quartile, BPA can interrupt without notice:

- (1) All the load except that required for plant security for up to 5 minutes to maintain stability.
- (2) One-half the load for up to 2 hours in any day. Total restriction in kWh under this category in any calendar year shall not exceed 50 multiplied by the Contract Demand.

Like interim agreements with other industrial customers, BPA's proposed contract with Alumax includes a provision for "authorized increase" to the contract demand. An authorized increase is an amount of power in excess of contract demand required by an industrial customer for purposes other than plant expansion. Authorized increases will be provided only if BPA determines that it has the power available, and will be subject to total or partial restriction at any time. In the case of Alumax, authorized increases would be requested, if at all, only for technological changes or additional requirements for pollution control equipment, since authorized increases cannot be used for expansion of plant production. Such a request is not anticipated because the proposed plant already is planned to incorporate the most efficient up-to-date production and pollution control technology.

Any actual restrictions of power to Alumax would result in billing credits. BPA has the option, however, of making deliveries of "advance energy" in lieu of restricting delivery. Advance energy is energy made available by BPA obtaining additional water releases from Federal reservoirs when they are on storage control with water elevations at or near those needed to serve firm loads, and full use of storage releases can be made at Federal generating plants. Advance energy is subject to replacement by the purchaser when and if the Administrator determines that BPA will not have sufficient energy to meet firm commitments. The total quantity of advance energy BPA will make available to all customers will not exceed 2 billion kilowatthours or the amount which, when a "replacement correction factor" is added, is the maximum that industries could replace by curtailing loads up to 75 percent of contract demand. BPA can require replacement of all or some part of the advance energy delivered, plus the replacement correction factor, if the Administrator determines that, as a result of the delivery of the advance energy, BPA will not have sufficient power to supply the requirements of preference customers and firm commitments made prior to the delivery of advance energy.

The proposed contract calls for one-half the contract demand (160,000 kilowatts) to be purchased for operation of the first potline approximately 28 months after the Final Environmental Statement has been filed, and the full contract demand (320,000 kilowatts) to be purchased beginning after the completion of the second potline, approximately 4 months later. If either or both of the potlines use less power than is provided in the contract demand, or if one of the potlines is not constructed or operated, the contract demand would be reduced accordingly, and Alumax would have to reimburse BPA for any facilities which were installed to meet the original contract demand. In addition, if construction of the Alumax plant is delayed for reasons other than legal actions or requirements, strikes or work stoppages, acts of nature, or other uncontrollable forces, the contract would be terminated.

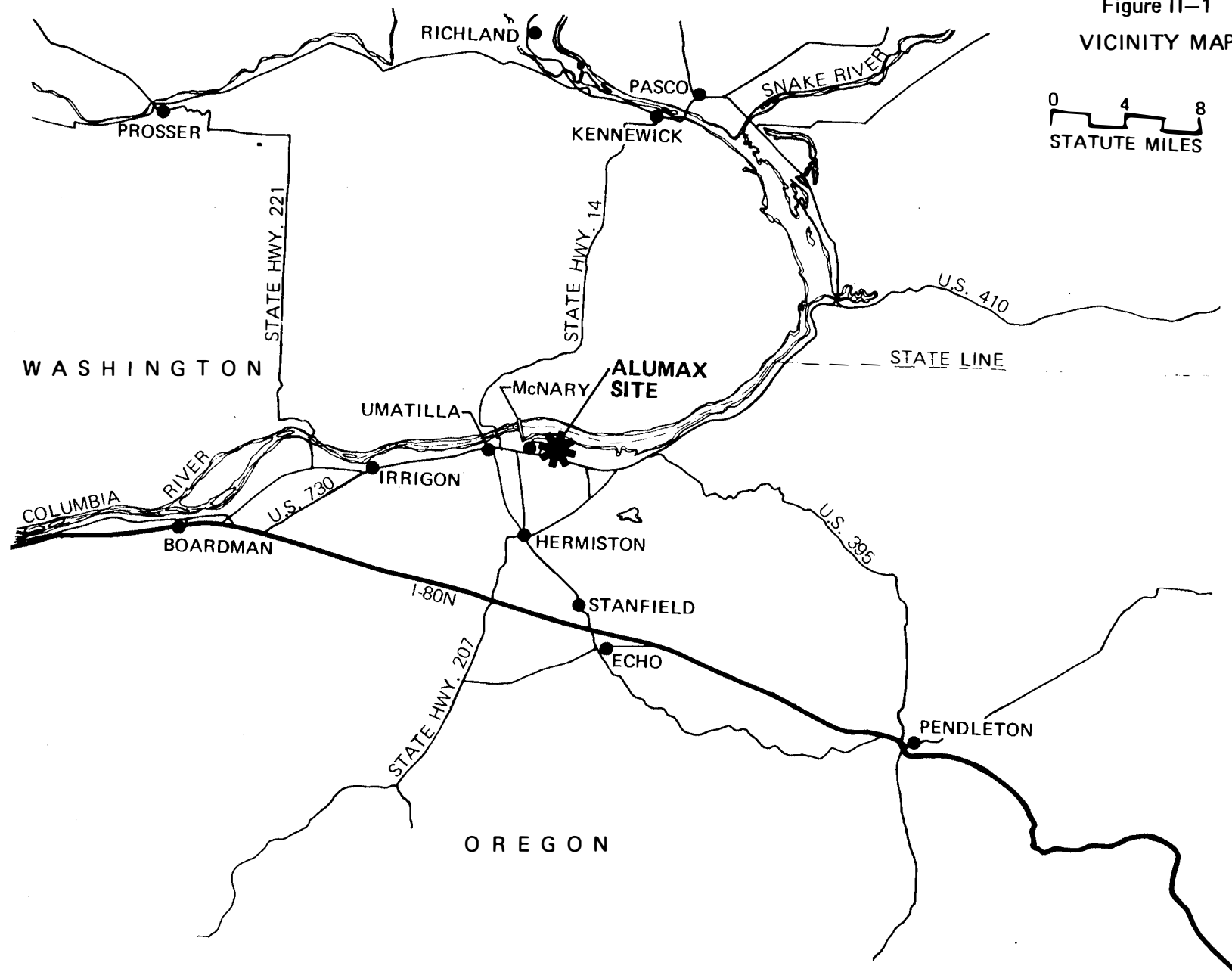
B. Facilities to be Constructed.

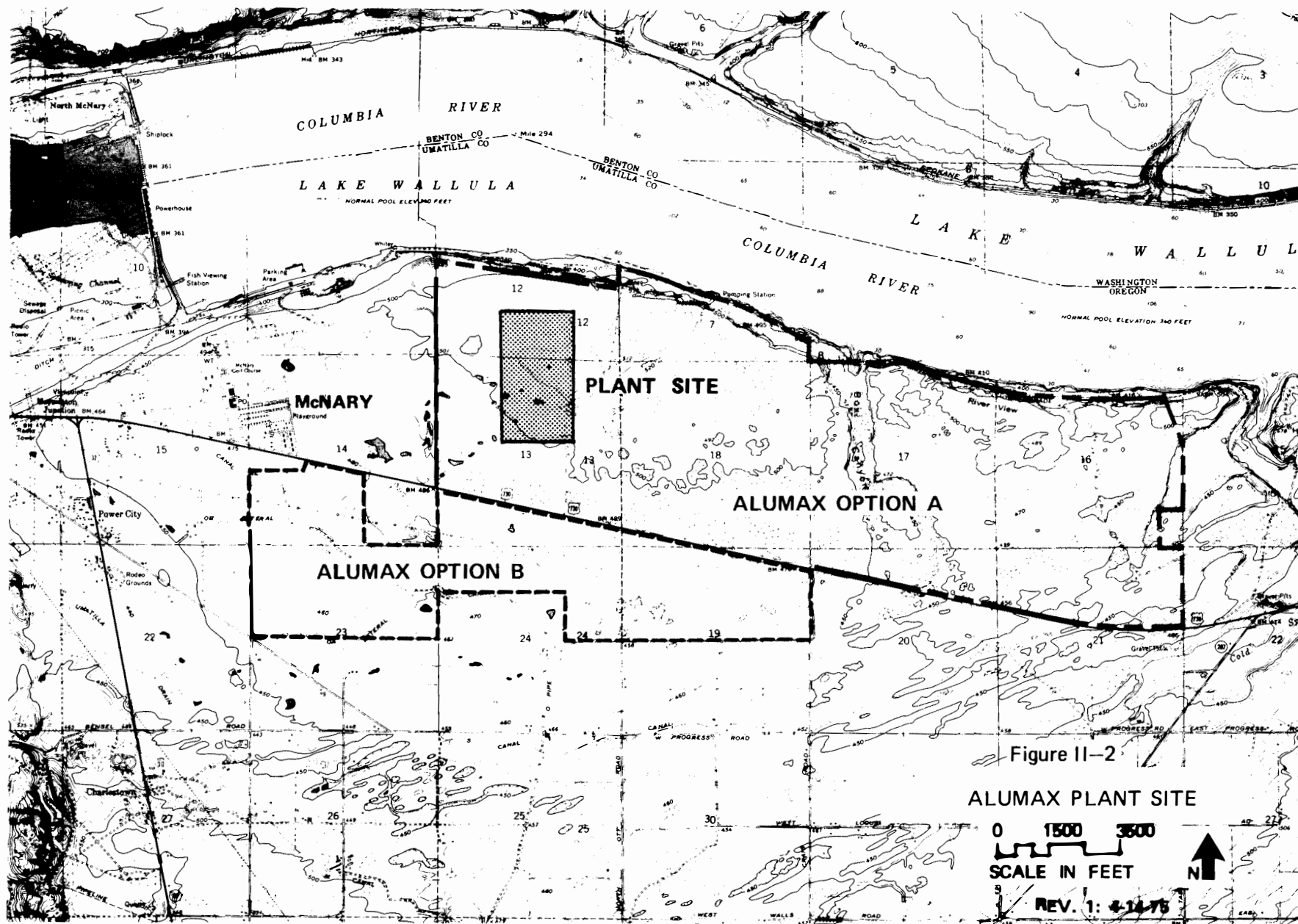
1. The Proposed Alumax Plant. Alumax Pacific Corporation (Alumax) proposes to construct and operate a primary aluminum reduction plant at the Port of Umatilla, Oregon. Fifty percent of the proposed plant would be owned by Mitsui & Co., a Japanese firm which also owns 45 percent of the Alumax Corporation. The proposed plant is to be located within a 4,100-acre tract in the Port of Umatilla industrial area in the northwest corner of Umatilla county. The location of the plant site is shown in Figure II-1. This site begins three-fourths of a mile east of the town of McNary and the Port of Umatilla docks. The tract consists of two options: Option A has 3,000 acres and Option B 1,100 acres. A map of the plant site is shown as Figure II-2.

a. Description of Physical Plant. The proposed Alumax plant would occupy approximately 165 acres in the west end of the plant site. Approximately one-half of this developed area would be occupied by buildings, courtyards, storage facilities, electric power substations, roads and rail facilities, and a parking lot. Open areas of the

Figure II-1
VICINITY MAP

II-4





developed portion of the plant site would be landscaped after completion of construction, in accordance with requirements of the use permit issued by the county.

The remaining acreage of the plant site property would initially remain in its present natural state; however, Option A, zoned for industrial use, would be available through the Port of Umatilla if compatible industries wanted to locate in the area.

The dominant physical feature of the proposed plant would be the four parallel buildings known as "potrooms" where the reduction process is to take place. Each building would be aligned in a north-south direction and would be approximately 2,000-feet long, 70-feet wide, and 50-feet high.

Other prominent structures of the proposed plant include large alumina storage silos and an emission-control center with a 150-foot stack to the north of the plant; the 122-foot high anode manufacturing building; and the metal service building at the center of the plant area.

Rail access to the proposed plant would be provided by an extension of an existing Union Pacific spur serving the Port of Umatilla industrial area. This spur would enter the plant area at the northwest. Road access to the plant site would be from Highway 730. The plant site has no direct access to the Columbia River.

b. Plant Operation. The proposed Alumax reduction plant would be a two-potline plant producing primary aluminum by the Hall Heroult process using prebaked carbon anodes. A pictorial flow diagram of the aluminum reduction process is shown in Figure II-3.

(1) Raw Materials Handling. Calcined petroleum coke (primarily carbon), pitch (a petroleum refinery byproduct) and alumina (aluminum oxide) are the raw materials which would be handled in greatest quantities at the plantsite. Powdered alumina would be unloaded from bottom-dump closed rail hopper cars directly into covered bins at the north end of the plant. Chunks of coke and liquid pitch would also arrive by rail. Closed silos or storage tanks would be used to store these raw materials on-site. Conveyor systems would be used to transport the raw materials within the plantsite. Other chemicals and raw materials would arrive by truck or rail. These materials would be transported within the plant site by lift truck and buckets moved by crane.

(2) Green Carbon Plant. This is the first stage in the production of carbon anode blocks from petroleum coke, pitch, and recycled anodes. After further processing, carbon anodes would be used in electrolytic cells or "pots" to produce aluminum. The "green carbon" plant in the northeast corner of the plant area would contain crushing, grinding, and screening equipment to reduce petroleum coke and spent anodes into various size fractions. The resultant fractions would be

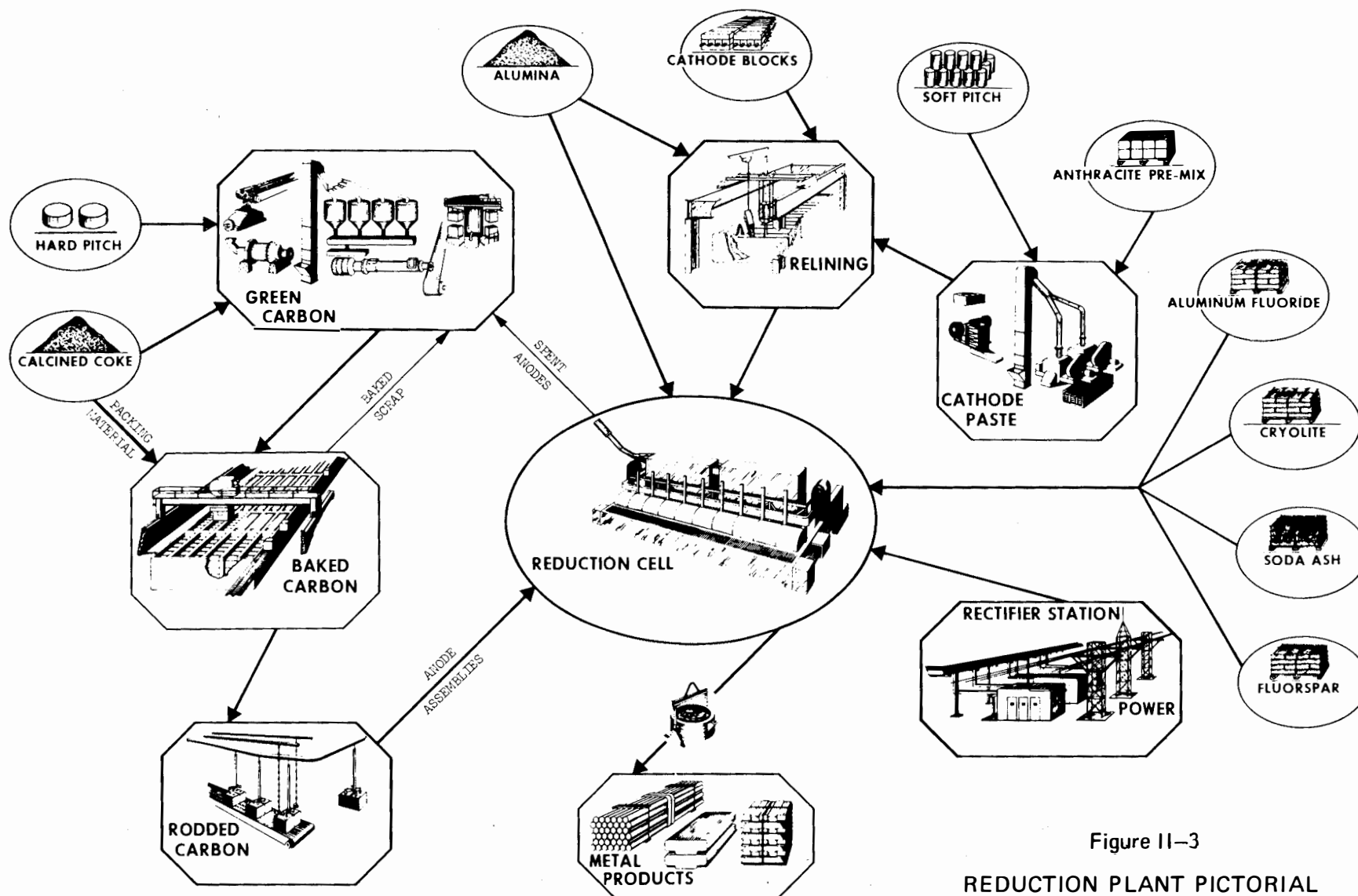


Figure II-3
REDUCTION PLANT PICTORIAL
FLOW DIAGRAM

heated by oil-fired furnaces and mixed with pitch to produce what is called "anode paste." The hot anode paste would then be formed into blocks to be conveyed to the baking furnace.

(3) Carbon Baking. "Green" anode blocks received from the green carbon plant would be placed in oil-fired refractory pits in the carbon baking area and heated to high temperatures (baked) to produce the hard and highly electrically conductive blocks required by the reduction process. Baked carbon blocks removed from the refractory pits after suitable cooling would then be transported by conveyor to the rodding room.

(4) Carbon Rodding. Baked carbon blocks would be mated with aluminum rods in the carbon rodding facility just west of the green carbon plant. The rods would be used to hold the blocks within the reduction cells as well as to conduct electricity to the blocks. Each rod and block would be joined together with molten cast iron melted in electrical inductiontype furnaces. Complete anode assemblies would be transported from the rodding room to the potroom on pallets.

The carbon blocks would not be entirely consumed during the electrolytic reduction process. Spent anode assemblies, or "butts," would be returned to the rodding room where the carbon would be cleaned, removed from the rod, crushed, and returned to the green carbon plant for recycling. The cast iron would be removed, remelted, and reused.

(5) Potrooms. The electrolytic reduction cells, commonly called "pots," in which alumina would be reduced to aluminum metal, would be located in buildings called potrooms. Two potrooms form a "potline." Each potroom of the proposed plant would contain 107 pots, and there would be four potrooms (2 potlines), with a total of 428 pots.

The actual reduction of aluminum would take place in the steel pots, which are lined with carbon. Figure II-4 shows a schematic representation of a reduction cell. In the cell, alumina (Al_2O_3), a fine white sandy powder, is fed into a molten bath of cryolite, sodium-aluminum fluoride (Na_3AlF_6), which serves both as an electrolyte and as a solvent for the alumina. Other fluorides such as fluorspar (calcium fluoride, CaF_2) and aluminum fluoride (AlF_3) are added to the bath to lower the melting point of the solution. Suspended into the molten bath are prebaked carbon anodes attached to metal conducting rods. There would be 18 such anodes per cell in the proposed plant.

Entering through the carbon anodes, current passes through the bath, carried predominantly by the Na^+ ions from the cryolite, and to the cathode at the bottom of the pot. Originally, the carbon lining of the pot serves as the cathode, but as a layer of aluminum builds up on the bottom, the molten aluminum becomes the true cathode. Steel collector bars in the bottom carbon lining collect the current and distribute it to the cathode bus system. From there it flows into the next pot. As the pots are operated at low voltages

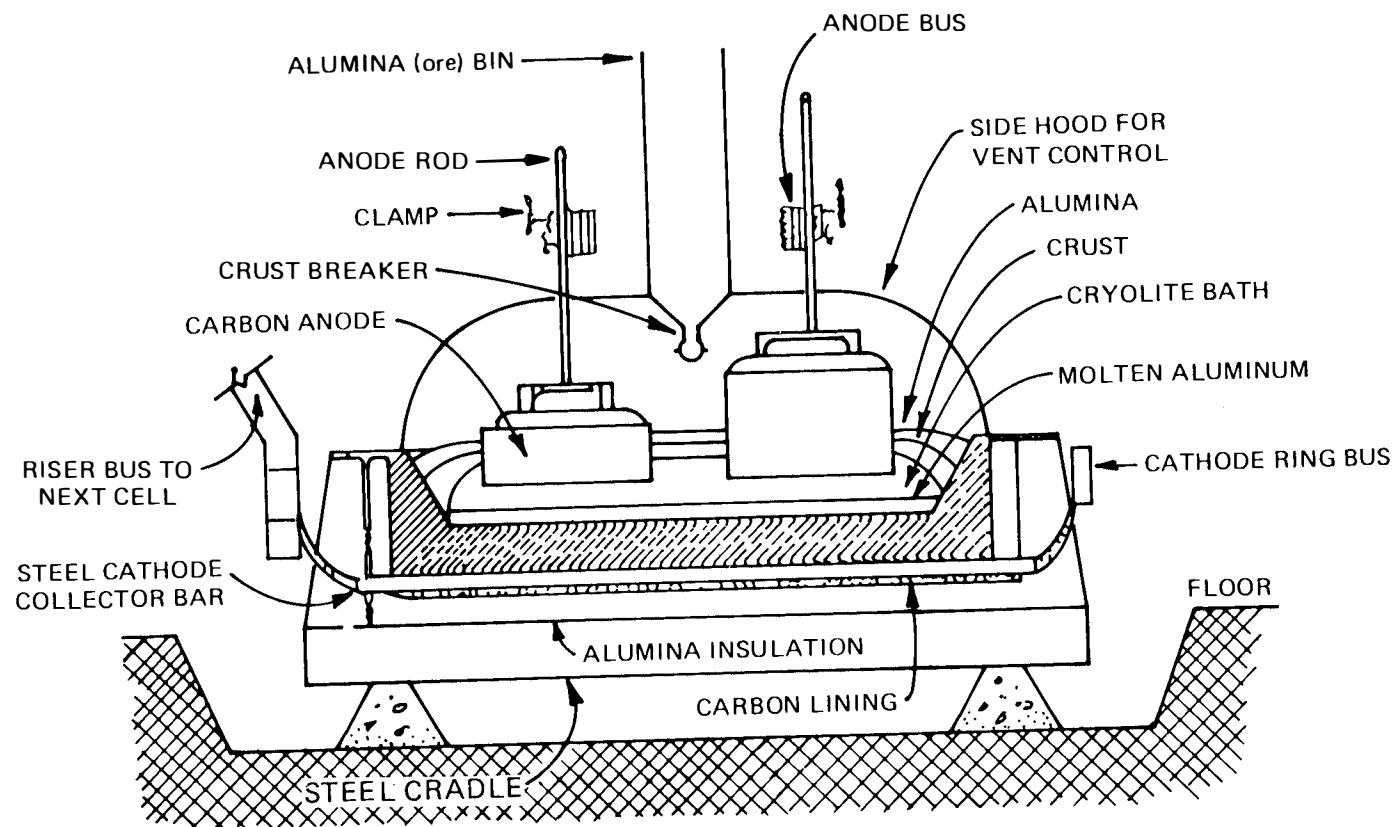


Figure II-4

SCHEMATIC ARRANGEMENT
PREBAKE REDUCTION CELL

(approximately 4.5 volts or less), pots are connected in series electrically for operation at higher voltages (900 to 1000 volts). The a-c electric power which would be delivered to the site would have to be converted to d-c before it could be used in the process. This conversion would be accomplished by silicon rectifiers located in the rectifier yard at the south end of the potrooms.

The electric current electrolytically decomposes the alumina (Al_2O_3) into its components, aluminum and oxygen. The aluminum, heavier than the molten bath, sinks to the bottom of the cell. The liberated oxygen combines with carbon from the anodes to form carbon dioxide gas (CO_2) which escapes from the cells. Studies indicate that some carbon monoxide (CO) is formed in a secondary reaction between the carbon dioxide as it leaves the cell and unpolarized anode carbon, and some is also formed through the reaction between the carbon dioxide and some reduced elements in the electrolyte (Hampel, 1964, p. 33).

The solution is maintained in its molten state by the high temperatures generated due to the resistance to the electric current. Operating temperature is approximately 970°C . Loss of heat from the electrolyte results in the formation of a crust on the top and sides of the molten bath. This crust must be mechanically broken when the pot is fed to enable the alumina to enter the molten bath. Alumina content is normally in the range of 5 percent of the cryolite bath. If it falls to the 2 percent range, the electrolyte ceases to wet the anode, and a poorly conducting film covers the anode. There is then a rise in cell voltage which causes a situation which is known as an anode effect. When this occurs, more alumina is fed into the system.

As the process proceeds, anodes are consumed and must be adjusted in height in order to maintain the proper distance between the anode and metal layer at the bottom. This is accomplished by physically lowering the anode assembly in the solution. Once the anode is consumed beyond a certain amount, it is removed and replaced by a new anode assembly.

Periodically, molten aluminum is siphoned off the bottom of the cell into crucibles. It is then transferred to holding furnaces in the casting area. The cryolite is essentially unaffected; however, because of some volatilization that occurs, the bath is replenished routinely through the addition of cryolite, other fluorides, and soda ash (sodium carbonate, Na_2CO_3).

The pots in the proposed plant would be fully hooded. Fumes developed in the process would be withdrawn to dry scrubbers which would remove particulate and fluorides. A portion of the pot hoods would be removed at periodic intervals to change anodes, to withdraw molten metal, or to maintain the pots. At these times, the pots would emit a small quantity of fumes to the potrooms. All potroom building air would be treated in secondary wet scrubbers before discharge to the atmosphere. Hooding and pot ducting for the primary air control system are evident in the photograph.

Periodically, the pots would have to be taken out of service, repaired, and relined. After having metal collector bars inserted in them, the bottom cathode liners (purchased carbon blocks) would be seated on an insulating bed of alumina in the pot. The sides of the pot would similarly be lined with carbon blocks bound with cathode paste (soft pitch and anthracite premix).

(6) Metal Services. Molten aluminum would be removed from the pots and transferred in crucibles to oil-fired holding furnaces in the metal service facility. Alloying elements such as iron, silicon, magnesium, and manganese would be added to the aluminum melts to produce the alloy compositions required by customers.

Operations in the cast house of the proposed plant would not include any fluxing of furnace melts. Ingot casting procedures would utilize degassing during molten metal transfer, by a method developed at the Intalco Aluminum Corporation Plant in Ferndale, Washington.

The Intalco system embodies an external diffuser installed as an integral part of the metal transfer trough system between the furnaces and the casting machine.

During casting, a minimum quantity of a chlorine-nitrogen gas mixture is injected into the molten aluminum flowing through the degassing box. The injection of this gas mixture through porous graphite diffuser plugs introduces fine bubbles of gas into the melt, creating maximum surface area of the injected gas bubbles with accompanying enhancement of the degassing processes and maximum utilization of the gaseous agent. The usual gas mixture is 20 percent Cl_2 and 80 percent N_2 , with flow rates of 15 CFH and 60 CFH, respectively.

A fume collection hood is placed over the degassing unit during operation, and fumes generated are drawn into the holding furnace stack. The furnace stack emission level experienced at the Intalco cast house does not indicate a requirement for additional emission control equipment for this equipment in the proposed plant.

Molten aluminum would be cast into various shapes, such as extrusion billets and rolling ingots, which would then be shipped to aluminum fabricators.

c. Air Pollution Control Equipment. Air pollution control devices to be installed at the proposed Alumax plant have been reviewed by the Oregon Department of Environmental Quality. The Department concluded that Alumax would apply "highest and best practical treatment technology" to control air emissions. An air contaminant discharge permit for the plant was issued on July 22, 1975.

(1) Carbon Baking. The carbon baking furnace air control would consist of underground flues extended to a battery of dry scrubbers with dust collectors arranged in parallel, for the removal of fluorine components, condensible tars, and particulates generated during the baking process.

The dry scrubbing system for carbon baking would be similar to the primary system at the potlines. (See below.)

(2) Potlines. Two air control systems that have proven reliable in the aluminum industry would be employed for the potlines; one connected to the reduction cell hooding for the treatment of higher concentration effluent in cell exhaust gases (primary system), and the other to treat the diluted air emanating from the potrooms themselves (secondary system).

The quantity of air flow in the two systems would be based upon the process heat to be dissipated, the temperatures required to maintain a working environment around the reduction cells, and the temperatures that can be tolerated by the treatment equipment.

The arrangement for the primary system is depicted schematically in Figure II-5. The system consists of a duct-work connected to each of the hooded reduction cells through balancing dampers, one manifold for each of the four potrooms.

The gases and particulates flow into a dry scrubber unit, consisting of a chamber containing fluidized alumina (injected with air so that the particulate takes on the flow properties of a fluid) through which the cell emission gases flow. The fluorine ions are absorbed into the fluidized alumina. All of the alumina from the primary system, including collected fluorides and particulates, would be conveyed to the potrooms for reintroduction to the reduction cells. After passing through the alumina, any particulate carried upward by the flow of exhaust gases would be caught by a series of bags in a standard baghouse dust collector configuration.

Exhaust gases from the dry scrubbing units would be manifolded into a common stack.

The arrangement for the secondary system is depicted schematically in Figure II-6. The system employs concurrent wet scrubbers, each rated at approximately 100,000 cfm. A continual recirculation of liquid would occur through the scrubber, with continual treatment to maintain the proper pH range to capture fluorine ions most efficiently. Water from the scrubbers would be treated and recirculated back to the wet scrubbing system.

Approximately 8,000,000 cfm would be removed from the two potrooms by 80 wet scrubbing units.

Figure II- 5

PRIMARY GAS CLEANING SYSTEM

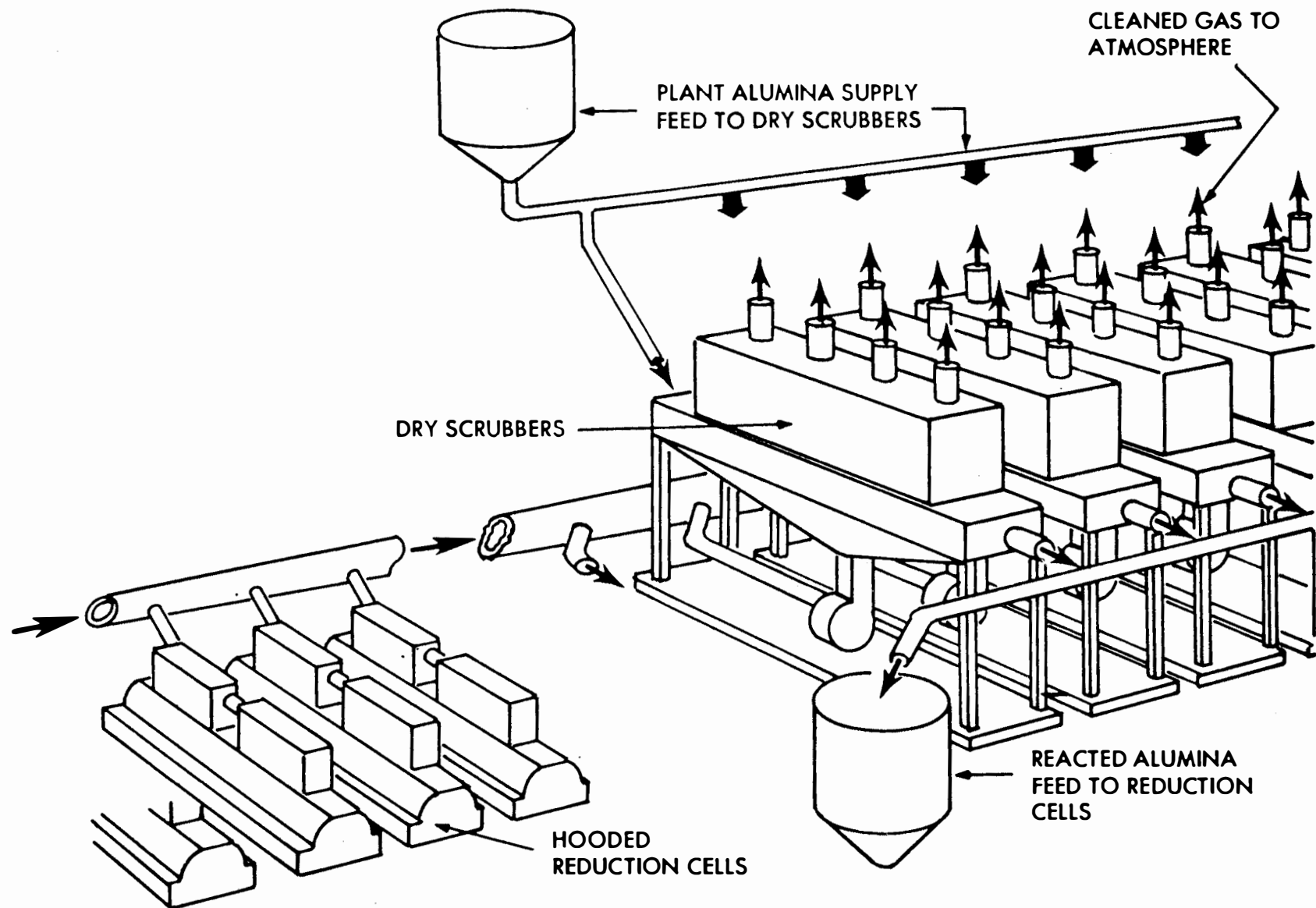
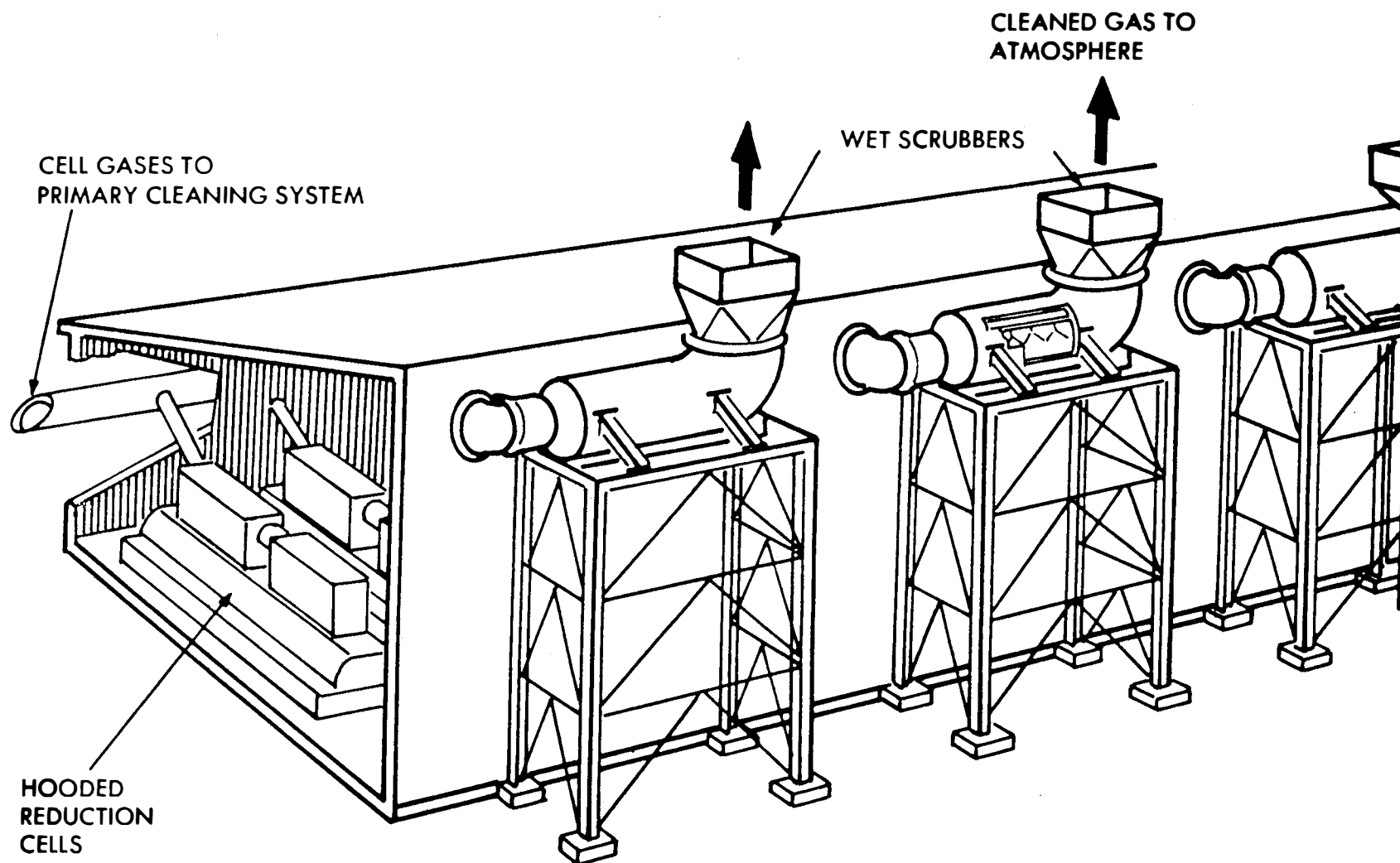


Figure II- 6

SECONDARY GAS CLEANING SYSTEM



(3) General. Throughout the plant, wherever alumina, carbon, or other process materials would be conveyed, treated, or stored, and where particulate emissions could be generated, effective dust collection equipment, including baghouses, would be installed.

d. Water Pollution Control Equipment. Alumax would not discharge any wastewater to the environment. Wastewater from cooling and wet-type air pollution control equipment would be completely recycled through filtration, settling, and chemical control on-site. Sanitary wastewater would be discharged directly to the City of Umatilla sewage treatment facilities.

Stormwater runoff from the developed area of the plant site would be collected and carried to evaporation ponds where the solids would be settled out and the water disposed of through evaporation.

e. Noise Control. Noise control technology has been applied in plant design to bring the proposed plant into conformance with DEQ noise regulations. A consulting firm has been engaged to assist in the application of noise control technology during the engineering, equipment purchasing, and construction of the project.

f. Plant Inputs.

(1) Raw Materials. The annual consumption of major raw materials at capacity operation of the Alumax plant would be as follows:

Alumina (aluminum oxide, Al_2O_3)	360,000 tons per year
Petroleum coke (primarily carbon, approximately 2 percent sulfur)	77,000 tons per year
Pitch (various organic compounds, primarily carbon)	20,000 tons per year
Fluoride products: aluminum fluoride (AlF_3), cryolite (sodium-aluminum fluoride, Na_3AlF_6), and fluorspar (calcium fluoride, CaF_2)	4,300 tons per year
Other raw materials and chemicals: Soda ash (sodium carbonate, Na_2CO_3), lime (calcium oxide, CaO), nitrogen, chlorine, and caustic (NaOH)	600 tons per year

The alumina would be imported from Australia where it would be refined from bauxite ore. It would probably be unloaded from ships at a freshwater seaport on the Columbia River downstream from Umatilla, and transported to the proposed plant by rail in

large closed hopper cars. Pitch and coke would also arrive by rail directly from petroleum refineries located probably in the Puget Sound area, California, or the southern Rocky Mountain States.

Other raw materials and chemicals would arrive at the proposed plant by rail or truck. Fluoride products would probably be obtained from sources in the southwestern United States or overseas. Most of the other raw materials and chemicals, including several metals in various forms for alloying, would probably come from suppliers in the Pacific Northwest.

(2) Energy. In addition to the power which would be purchased directly from BPA for the aluminum reduction process, Alumax would also purchase approximately 22,000 kilowatts of power from the local electric utility (Umatilla Electric Cooperative, a preference customer of BPA) for lighting and wheel-turning power (i.e., environmental control, process pumps, motors, etc.). Alumax would also consume approximately 6.9 million gallons of fuel oil annually. The fuel oil would probably be transported to the plant by rail tank car from refineries in the Puget Sound area. Facilities and procedures for oil storage and handling will not be identified until closer to the initiation of plant construction. This is because of uncertainties surrounding equipment and fuel availability, pollution control requirements, etc. Department of Environmental Quality review and approval of the facilities and of any oil spill contingency plans which may be necessary is required prior to construction to assure all applicable environmental standards and limitations are met.

(3) Operating Labor. Employment at the proposed plant would total approximately 800 persons during full operation. Of this number, 185 would be clerical, supervisory, and management personnel. The remainder would be production workers, of whom 220 would be maintenance tradesmen.

g. Plant Output.

(1) Product. The marketable output from the plant would be in the form of aluminum ingot. The ingot would be produced in a variety of physical forms and chemical compositions to serve the aluminum fabricating industry.

The annual capacity output of aluminum ingot would be 187,300 short tons. Capacity operation of the plant would be considered normal operation; however, variations from normal operation could occur due to events beyond the control of Alumax, i.e., energy curtailment, adverse economic conditions, etc.

Ingot production would be shipped by rail or truck to domestic markets or ports of departure.

Alumax, Inc., the parent company of Alumax Pacific Corporation, operates aluminum ingot fabrication and processing plants in 14 States, Canada, and 5 European countries. A major portion

of the ingot production from the Umatilla plant is expected to serve the domestic plants of Alumax. The balance of production would be sold in other domestic markets, or foreign markets in Europe or Asia. Half the output of the proposed plant would be controlled by Mitsui & Co., the Japanese firm which owns half the plant.

(2) Byproducts. The Alumax plant would not produce any significant marketable byproducts. Alumina and some electrolytic materials recovered from plant control and recovery systems would be recycled into the process. Aluminum saw-chips and other aluminum scrap generated in metal service operations would also be recycled at the plant.

An estimated 2,300 tons per year of dross (skim from top of molten aluminum) would be sold to a third party for reprocessing, and up to 7,000 tons per year of waste cathode material generated in cell rebuilding operations would also be sold for reprocessing.

(3) Solid Wastes. Solid waste generated and collected in the plant operation, but not disposed of by recycling to plant process or by sale to others, would be disposed of in approved landfills in Umatilla County.

h. Costs. The estimated cost in 1976 dollars of the Alumax plant is \$340 million; \$135 million of this would be for capital equipment. Approximately \$55 million of the total cost (16 percent) would be for purchase and installation of pollution control equipment.

i. Utilities Required for Operation.

(1) Sewage. The sanitary water system on the plant site would be used exclusively to supply lavatories, drinking fountains, washbasins, and showers. The runoff from these sources would be collected in the plant sanitary sewer system.

Floor drains would also be a source of runoff. Such drains would be used to collect water from floor cleaning and similar occurrences only; none would be used as process or process machinery drains.

The proposed plant sanitary sewer system would carry an estimated 32,000 gallons per day of domestic waste to the City of Umatilla system.

(2) Water. Total daily requirement for domestic usage and process water is estimated at 645,000 gallons, which would be supplied to the proposed plant by the Port of Umatilla.

2. Transmission Facilities. The proposed Alumax plant site is approximately 3 miles east of BPA's McNary Substation, which connects the U.S. Corps of Engineers' McNary Dam (1,127,000 kWh generating capa-

city) with the BPA main transmission grid. McNary Substation is presently directly interconnected with the Big Eddy, Ross, Santiam, Roundup, Franklin, and Richland Substations, as well as Pacific Power & Light Company's substation at Walla Walla, and already has sufficient capacity to serve the Alumax plant.

Service to Alumax will require the construction of new 230-kV transmission lines and additional substation facilities, including a new substation to be built near the plant. The aluminum production process requires powerlines between the substation and the plant to operate at 13,800 volts. To minimize electric losses, the 13,800-volt lines to the plant must be as short as possible. This requirement limits feasible alternative locations for the proposed substation. Specifically, the proposed plan of service consists of: (1) installation of two 230-kV line terminals at McNary Substation; (2) construction of a new 230/13.8-kV Miller Substation adjacent to the proposed Alumax plant; and (3) construction of two single-circuit 230-kV transmission lines from BPA's existing McNary Substation to the proposed Miller Substation. The two 230-kV lines would parallel existing lines in the area. The new substation would include five 83,000-kVA, 230/13.8-kV transformers, power system control, and protective equipment for which approximately 6 acres of land would be required for a site. (A terminal for future service to BPA's Hat Rock Substation and a terminal to serve Umatilla Electric Cooperative would require approximately two additional acres.)

a. Transmission Lines. Routing for the proposed transmission lines was selected on the basis of meeting the requirements for the plan of service with the least environmental impacts. The route crosses lands least suited to industrial, residential, or agricultural expansion. The areas north of U.S. Highway 730, where the transmission lines would be located, encompass the McNary Dam and power complex, McNary Townsite, and Port of Umatilla industrial area, and the Alumax aluminum plantsite. The land south of U.S. Highway 730 on which the lines would be located is primarily semiarid brushcovered range interspersed with farms and dwellings.

BPA has an existing 500-kV transmission line running east to west across this area south of Highway 730, and three existing transmission lines enter McNary Substation from the south. The most feasible routing for transmission lines to serve Alumax is along these established corridors.

The proposed route originates at the BPA McNary Substation and follows a southerly course over existing rights-of-way for approximately 1 mile, then turns abruptly east. This segment of the route lies between the existing McNary-Santiam Nos. 1 and 2 transmission lines, which cross U.S. Highway 730. After turning east, the proposed route continues on the north side of, and parallel with, the Lower Monumental-John Day 500-kV transmission line for an additional 2.8 miles. It then turns north, recrossing Highway 730 and continuing to the proposed Miller Substation and the Alumax plantsite. Each line would be approximately 4 miles long, and 2.2 miles of new right-of-way would be required. Extra right-of-way width is being considered to

provide for future lines along this segment. Figure II-7 includes routing and right-of-way requirements for the proposed transmission lines.

Access planned by BPA includes existing road systems and those roads requiring design on or off rights-of-way. Since the route for Alumax service is primarily over existing rights-of-way or flat terrain, access would be developed to each tower over rights-of-way with a limited planned road system. Approximately 500 feet of access is estimated off rights-of-way to avoid potholes.

The proposed transmission lines would consist of aluminum conductor, (steel reinforced--ACSR), approximately five supporting towers per mile, and insulators and attachment hardware. Single-circuit towers are planned for Alumax service. Towers would be of varying heights to accommodate highway crossings, differences in terrain, and technical requirements. Larger "dead end" towers would be used to relieve tension on the conductors at each end of the line and at the two points south of Highway 730 where the line would make right-angle turns.

b. New Substation Facilities. As indicated above, the proposed Miller Substation must be near the Alumax plant to minimize electric losses in the 13,800-volt lines into the plant. Because of this requirement, only one potential site has been identified, that shown in Figure II-7.

The substation would contain five 83-MVA, 230/13.8-kV transformers, and power system control and protective equipment. Harmonic filters would be installed to prevent electrical noise impacts on communication facilities. Terminals for future service to Hat Rock and for service to Umatilla Electric Cooperative (UEC) would be installed when required. The Alumax Pacific Corporation would grade the site to a 1-2 percent gradient and would construct the substation access road.

The proposed new substation site occupies about 8 acres of land 2,500 feet north of U.S. Highway 730 and 1 mile south of Lake Wallula. The site is on nearly level irrigated pastureland.

c. Costs. Total costs for the BPA facilities to serve Alumax at Umatilla would be approximately \$5.9 million. Of this total, \$3.37 million would be for the new Miller Substation, \$1.5 million would be for the two transmission lines, and \$640,000 would be for the additional facilities at McNary Substation. The remaining \$370,000 would be for power system control facilities, design, and preliminary engineering.

Cost estimates for the transmission lines are based on using steel purchased for Clatsop-Miller line when Amax was planned in Clatsop County. This steel is in stock and reduces current cost estimates for Alumax service.

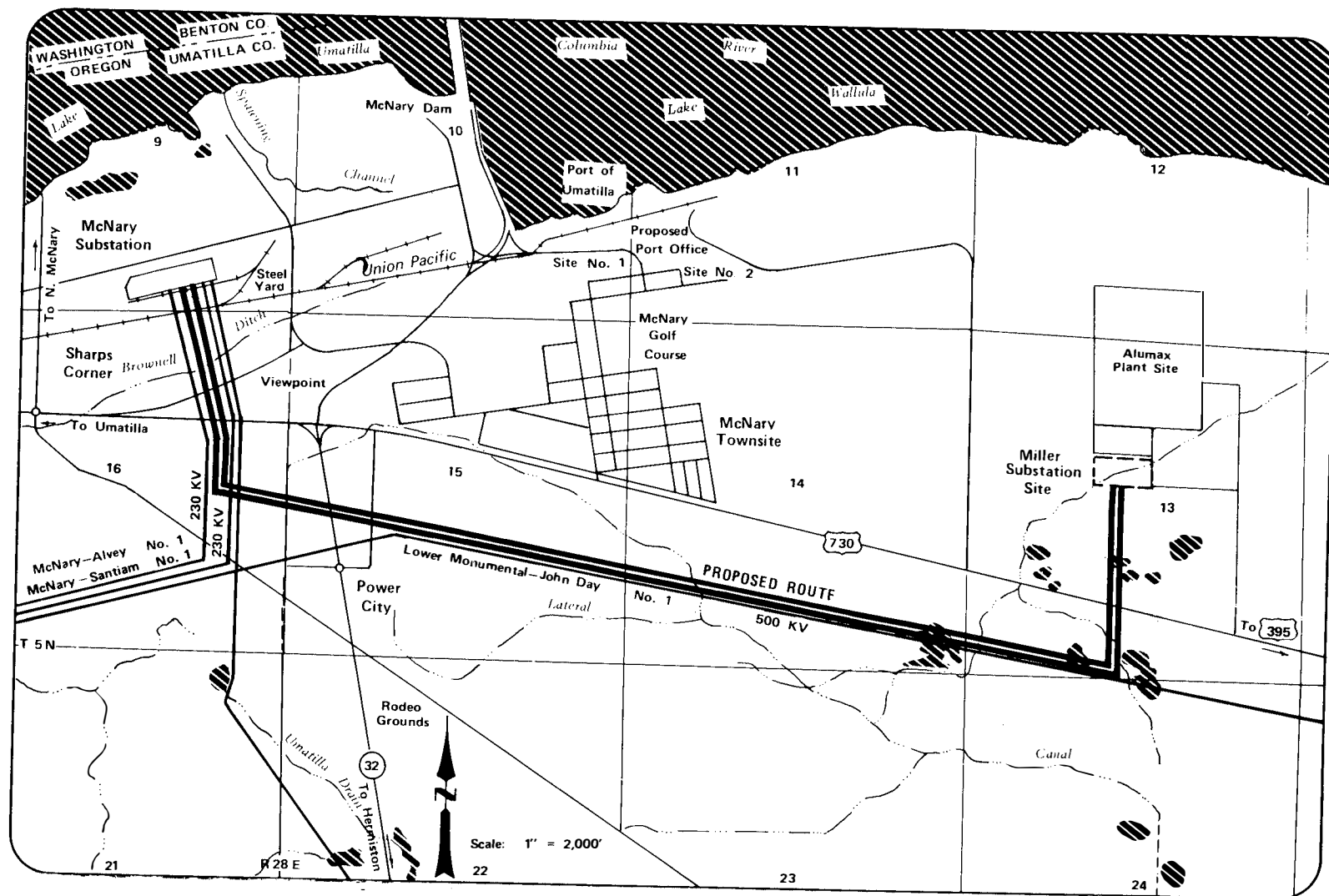


Figure II-7
PROPOSED ROUTE
SERVICE TO ALUMAX

3. Bulk Alumina Handling Facility. At present, Alumax has not reached a decision related to a discharge facility for imported alumina. A ship unloading, storage, and rail loading facility would be required, capable of mooring 40,000-ton capacity ships. This facility could be an expansion of an existing alumina unloading and storage facility on the Columbia River or the construction of a separate facility. Such a separate facility could be Alumax sponsored or constructed as a joint venture.

In any case, establishment of such a facility constitutes a separate action and would require separate authorizations and permits from the appropriate regulatory authorities.

C. Construction Programs.

1. Alumax Plant. Alumax estimates a 32-month construction schedule. The first potline would be completed 28 months from commencement of construction and the second potline completed 4 months later, with an additional month following completion of the second potline required for completion of ancillary facilities, landscaping, and finishing detail.

Construction labor is expected to peak at 1,400 people at month 22 in this schedule, with essentially a straight line buildup to this peak and a similar straight line decline to month 32.

The source of construction labor is not possible to predict at this time. The eventual scheduling of both the Alumax project and other projects in the eastern Oregon and Washington areas would have a decided influence on the total availability of both local and regional labor. In any event, the normal policy of Alumax's general contractor is, in concert with the appropriate labor organizations, to maximize the recruitment of a local and regional construction work force. Similarly, use of local or regionally available construction materials would be encouraged as good construction management. Local and regional suppliers and contractors would be encouraged to bid on most aspects of the project.

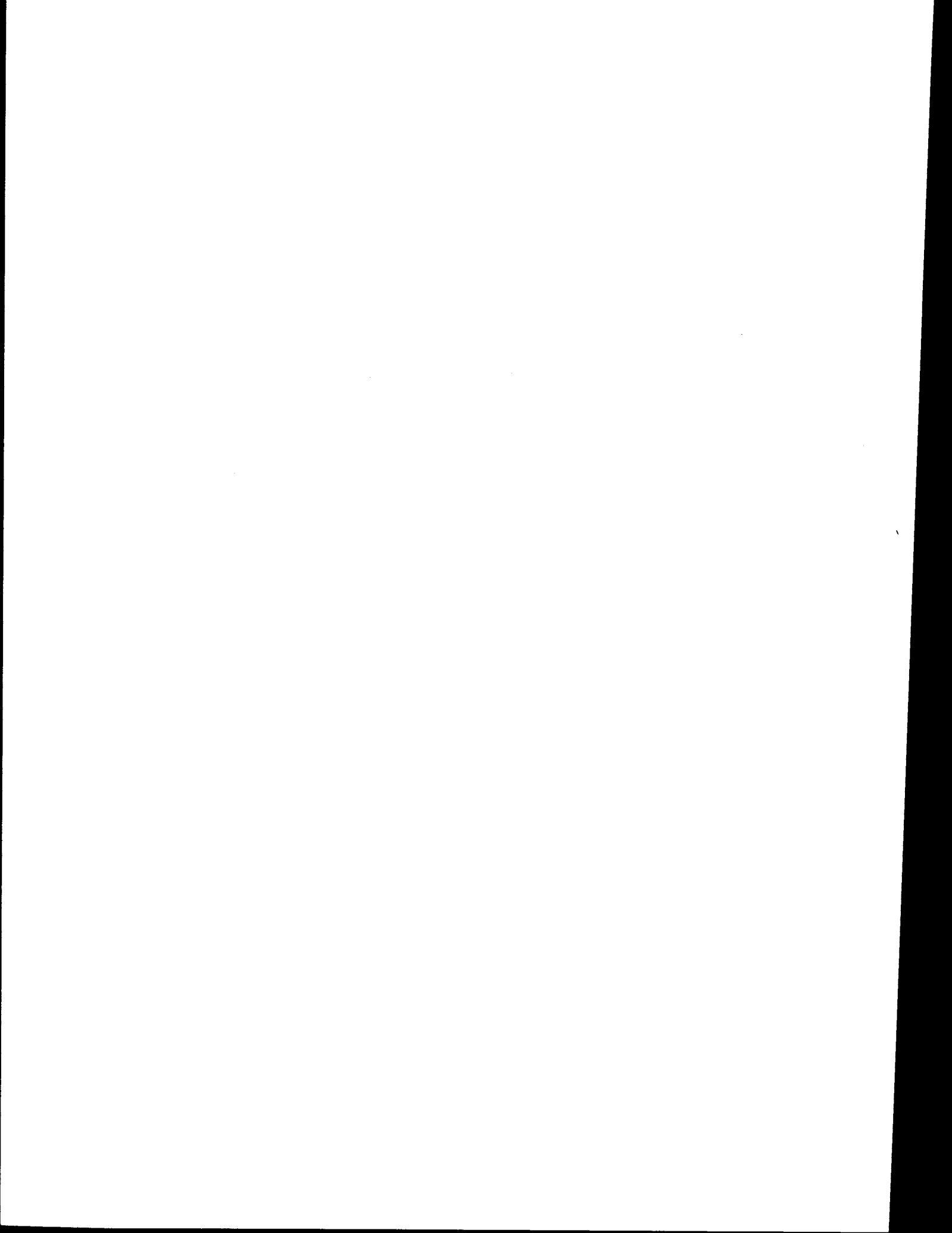
Capital equipment would be purchased through the normal bid process. Qualified bidders throughout the domestic market, and possibly foreign markets, would be invited to participate.

2. Transmission Facilities. The current schedule for construction of the proposed transmission facilities anticipates acquisition of right-of-way and procurement of necessary equipment and construction materials to commence approximately two months after this EIS is scheduled to be filed with EPA. BPA would not purchase land for right-of-way, but would obtain easements from landowners which would provide access for construction and maintenance. The material to be procured would be in addition to that which is already in BPA's stock having been procured for the originally planned Amax facilities in Clatsop County. Land acquisition and procurement of additional materials would take approximately 8 months. Actual construction of the proposed

facilities would commence approximately 9 months after the planned filing of this document. Construction would take approximately 12 months, with completion expected approximately 21 months after the planned filing of this EIS.

General construction requirements for the two Alumax service 230-kV transmission lines would include clearing the right-of-way of trees and shrubs which could impair construction or operation of the line, limited construction of access roads on and off the right-of-way, excavation for tower footings, and assembling and erecting towers. Standard clearing and construction practices would prevail, using equipment and procedures appropriate for each phase of construction. Additional information regarding the construction sequence, techniques, equipment and requirements for clearing, construction, and maintenance of transmission lines can be found in Appendix B of the draft Role EIS.

DESCRIPTION OF EXISTING ENVIRONMENT



III. DESCRIPTION OF EXISTING ENVIRONMENT

A. Physical and Biological Environment.

1. Definition of Site and Study Area. In general, for the purpose of this analysis the geographical areas evaluated are defined as follows:

Study Area: Benton and Franklin counties in Washington, Umatilla and Morrow counties in Oregon.

Significant Impact Area: Umatilla and Morrow counties in Oregon.

Alumax Property: 3,000 acres in the northeast corner of Umatilla county; bounded on the north by Lake Wallula (Columbia River), on the south by U.S. Highway 730, on the west by Port of Umatilla road extending approximately 4 miles east of the Western Boundary (see Chapter II, Figure II-2).

Plant site: 165 acres of Alumax property upon which the plant will actually be constructed.

In certain areas of review the impact areas may differ slightly to conform with actual physical impact. The differences are noted in the appropriate text section.

2. Topography.

a. General Area. The proposed Alumax plant site is located in the eastern section of the Umatilla lowlands (the north central Oregon lowlands). The lowlands are a natural basin, bounded on the west by the northern Cascade Mountains, on the south and southeast by the Blue Mountains, and on the north and northeast by the Horse Heaven Hills.

The Columbia River crosses the Umatilla lowlands just north of the proposed Alumax site. Two northward flowing streams, Butter Creek and the Umatilla River, merge south of the site near the city of Hermiston. The combined streams flow into the Columbia River downstream from McNary Dam.

A transition from lowlands to the Blue Mountains begins above an elevation of 1,150 feet. South of the Alumax site, the transition is a gradual incline extending about 25 miles southward from the lowlands and ascends to about 3,000 feet. The transition slope, dissected by deep, steepwalled stream channels, stops at the Blue Mountains which range up to 5,000 feet in altitude.

North and northeastward from the Alumax site, the topography consists of 100-foot cliffs along the Columbia River that crest at an elevation of 500 feet above sea level. From the cliffs, the land surface slopes gently northward to the crest of the Horse Heaven Hills. The slopes are rolling and generally covered with wind-worked material.

b. Plant site. The site is located on a relatively flat bench or terrace. The surface of the bench varies in elevation from 450 to 500 feet. The immediate local drainage is to the south except along the eastern portion of the site which is bordered and drained by Box Canyon. Box Canyon drains northward to the Columbia River. Irrigation ditches exist on the plantsite; however, no natural drainage channels cross the plantsite.

On and immediately south of the proposed plant location is an area of small ponds. Both surface and subsurface water flows to these ponds as a result of seepage from nearby irrigation ditches. Elevation of water in the ponds is above the true groundwater table elevation. (See Natural Systems section for further discussion of ponds.)

3. Geology.

a. General Area. The geologic area relevant to the site is that part of the Umatilla Lowlands bounded on the north by the Columbia River, on the west by the Service anticline (an upfold of rocks opening downwards), on the south by the rise to the Blue Mountain slope, and on the east by the Reith anticline.

The eastern Umatilla Lowlands are part of the Deschutes-Umatilla Plateau, which is located on the northern slope of the Blue Mountains and is bounded by the northern Cascade Mountains to the west. Elevations range from 300 feet by the Columbia River to over 500 feet within the lowlands, and to about 3,000 feet along the southern and western margins. The Umatilla River and Butter Creek, as well as other smaller streams, have cut into the thick, underlying lava bedrock, forming steep-walled canyons. Near the mouth of the Umatilla River and extending southward for several miles are broad alluvial deposits (Baldwin 1964, p. 87). Basalt buttes rise above the alluvial plains near Hermiston (Baldwin, 1964, p. 87). The buttes are aligned with the rapids that existed in the Columbia River prior to the construction of McNary Dam.

b. Plant site. The geology of the site is similar to that for the rest of the Umatilla Lowlands below elevation 750 feet. With respect to surficial soils, the underlying Columbia River basalt is overlaid with Pleistocene outwash deposits of fine sand, silt, and some gravel. Near the edge of the cliffs along the Columbia River all of this soil has been eroded away, but it is up to 10-feet thick on other parts of the site. The underlying basalt is exposed in numerous areas in deflation basins, and "blowouts."

A foundation investigation of the area on the site where buildings would be located was done for Alumax in 1975. The study confirmed that the near surface basalt is horizontally lying and the upper part is 75 to 100-feet thick. The upper part is sound and has few caverns, tubes, or other discontinuities.

c. Soils. Most of the soils in the study area are sandy in nature. Nonarable types are found along the Columbia River,

which are composed of rough stony land and scablands. The region around Umatilla and Hermiston consists mostly of Ephrata and Rupert-type soils.

Ephrata soils have developed from old alluvial sediments modified in places by windworn materials and consist of fine sandy loam over gravel. Large bodies of Ephrata-type soils are found about 2 miles northeast of Stanfield and southwest of Echo. Ephrata loamy sand occurs in the area between Hermiston, Stanfield, and Cold Springs Reservoir, and west of Echo, and southwest of Umatilla. Ephrata soils are very susceptible to wind erosion. Permeability is moderate (Futrell-Redford-Saxton, 1974, p. II-6).

Rupert soils occupy extensive areas north and north east of Hermiston and northeast of Cold Springs Reservoir. Rupert series soils develop from alluvial terrace materials consisting predominantly of sand fragments derived from basalt, together with quartz particles. Permeability is rapid (Futrell-Redford-Saxton, 1974, p. II-6).

Other soils series found in the area include: Onyx-type, Stanfield series, Quincy series, and nonarable soils. Onyx soils are found in the Umatilla River Valley. These are sandy loams, with moderate permeability, and slight erosion characteristics. Stanfield soils are found around Stanfield, Echo, west and southwest of Hermiston, south of Umatilla, and west of Umatilla Butte. Permeability is very poor, owing to a hardpan layer found at a depth of 3 to 4 feet. The soil developed from alluvial sediments, and partly from windlaid material. Quincy series soils are located primarily northeast, east, and southeast of Cold Springs Reservoir and southwest of Echo. Formation occurred from windlaid deposits, although subsoil materials may be partly waterlaid. This soil has a heavy, loamy, fine sand texture (Futrell-Redford-Saxton, 1974, p. II-6, II-7).

Nonarable soils consist of soils and land types that are shallow, steep, and infertile, and subject to overflow. This soil is confined to Umatilla Butte, the region along the Columbia River east of Umatilla (Alumax site), and to areas south and west of Umatilla. The land is suitable for range pasture, and much of the soil has been severely eroded. Most of the stones are basalt in nature, with bedrock occurring from 3 to 12 inches below the surface (Futrell-Redford-Saxton, 1974, p. II-7).

4. Land Use.

a. Character of the Proposed Site. Approximately 4 square miles of the 3,000-acre main tract purchased by Alumax and almost all of the secondary tract optioned by Alumax south of U.S. Highway 730 were owned by the Conforth Broken Circle Ranch. The remaining square mile-and-a-half of the main tract was owned by the Port of Umatilla, (Svicarovich, 1975, p. 4).

Predominate land use on both main and secondary tracts has been livestock grazing, although both tracts have marginal value for forage due to poor soils and overgrazing. In the late sixties

the Port of Umatilla purchased Sections 12 and 18 (see Figure II-2, Chapter II) which were subsequently zoned for industrial use in the Umatilla Comprehensive Plan, (Svicarovich, 1975, p. 6). A portion of the proposed plant will occupy this original Port property. The remainder of the 165 acres, about 60 percent, is found in Sections 13 and 7. This property was zoned for agriculture until Alumax and Conforth received industrial zoning from the Umatilla County Planning Commission in 1975.

b. Adjacent Land Uses. Adjacent land is used for agricultural crops and grazing. Irrigated crops such as corn, wheat, potatoes, alfalfa, and asparagus are grown in scattered locations, but are found predominately south and southeast of the proposed plant. Agricultural and residential land uses are found south of the plantsite, in proximity to Hermiston. Dairying is found adjacent to the southern boundary of the secondary 1,100-acre tract. Hat Rock State Park is located about 4 miles east of the plant building site, on Lake Wallula. The Cold Springs Natural Wildlife Reservoir is located approximately 5 miles southeast of the Alumax building site.

Estimated Acreages
Within a Radius of
5 Miles 15 Miles

MAJOR CROPS

Alfalfa (<u>Medicago sativa</u> L.)	90	25,000
Corn, silage and green (<u>Zea mays</u> L.)	200	25,000
Potatoes (<u>Solanum tuberosum</u> L.)	150	50,000
Sugar beets (<u>Beta vulgaris</u> L.)	15,000	25,000
Wheat, spring (<u>Triticum</u> spp.)	160	25,000
Wheat, summer fallow (<u>Triticum</u> spp.)	30,000	120,000
Unimproved grazing lands	15,000	110,000

MINOR CROPS

Alfalfa seed (<u>Medicago sativa</u> L.)		100
Asparagus (<u>Asparagus</u> supp.)		200
Barley (<u>Hordeum vulgare</u> L.)	60	120
Beans, dry (<u>Phaseolus vulgaris</u> L.)	150	300
Carrots (<u>Daucus carota</u> L.)		100
Corn, sweet (<u>Zea mays</u> L.)		100
Grapes (<u>Vitus</u> spp.)		80
Melons (<u>Cucumis</u> supp.)	200	200
Mint (<u>Mentha</u> supp.)		200
Oats (<u>Avena</u> supp.)	60	120
Sorghum (<u>Sorghum vulgare</u> Pers.)		320
Tree fruits (<u>Prunus</u> supp., <u>Malus</u> supp.)		320
Irrigated pasture, containing a mixture of grasses and forbs	16,000	60,000

POTENTIAL OR EXPERIMENTAL CROPS

Peanuts (Arachis supp.)
Safflower (Carthamnus tinctorius L.)
Soybean (Glycine max Merr.)
Sweet Potato (Ipomoea batatas Lam.)
Tomato (Lycopersicon asculentus Mill.)
Triticale (Triticum x Secale)

Land use west of the Alumax property includes the City of Umatilla, the Port of Umatilla industrial development, the McNary townsite, and McNary Dam. On the north side of the Columbia most land is devoted to grazing.

c. Comprehensive Planning. Umatilla County has updated its comprehensive plan under the guidelines established by the 1973 Land Use Act and administered by the State's Land Conservation and Development Commission (LCDC). Goals and guidelines have been developed in 14 categories applicable to the county: (1) Citizen Involvement; (2) Land Use Planning; (3) Agricultural Lands; (4) Forest Lands; (5) Open Spaces, Scenic and Historic Areas, and Natural Resources; (6) Air, Water, and Land Resources Quality; (7) Areas Subject to Natural Disasters and Hazards; (8) Recreational Needs; (9) Economy of the State; (10) Housing; (11) Public Facilities and Services; (12) Transportation; (13) Energy Conservation; and (14) Urbanization. Planning and implementation of these goals under LCDC guidelines is required in the preparation of land use plans. These requirements are applicable to State agencies, cities, counties, and special districts in preparing, adopting, revising, and implementing comprehensive plans. Thus, LCDC has established standards to promote land use planning which would assure a high standard of livability for Oregon's citizens.

5. Natural Systems.

a. Vegetation. The vegetation existing on the Alumax property (3,000 acres) is characteristic of the arid to semiarid climate of eastern Oregon. The actual plant site is on irrigated land although most of the surrounding property is of a nonirrigated vegetative type.

Composition of the plant community on the 165-acre Alumax plant site consists of forbs and grasses (pasture land), aquatic vegetation, shrubs, and occasional trees. Most abundant forbs and grasses are legumes, filarees and bluegrass (Poa spp.). The rabbit bush/cheatgrass (Chrysothamnus nauseosus/Bromus tectorum) community is next most abundant.

The pond habitats are dominated by cattail (Typhus spp.), sedge (Carex spp.), and bulrush (Scirpus spp., Juncus spp.) which are extensively utilized by wildlife resources in the area. This habitat exists near those ponds on the actual 165-acre site and also on the majority of the ponds to the south and southeast of the plantsite.

The majority of the Alumax property east of the plant site consists of a rabbitbush/cheatgrass community with big sagebrush which is typical of the arid to semiarid climate. This area is used by small mammals, birds, and reptiles but is considered less productive than the irrigated property.

Numerous ornamental species, sensitive to air emission impacts (particularly sulfur dioxide and fluoride) occur in the vicinity of the Alumax property (Treshow, 1975). At McNary Dam there are junipers, pines, blue spruce, maples, Carolina poplar, and Lombardy poplar. McNary Beach Park has mainly poplars, honey locust, and sycamore trees. At Hat Rock State Park predominant trees are Russian olive, black cottonwood, black locust, willows, and pines. In Umatilla town site there is a peach and cherry orchard, some apricot and pine trees.

b. Aquatic Life. Aquatic habitat on the Alumax property is composed of ponds maintained by irrigation drainage throughout the area. Aquatic biota is represented by plankton, invertebrates and warmwater fishes in varying population densities depending upon the limnological characteristics of the individual ponds. Phytoplankton species commonly present are diatoms (Asterionella formosa, Nitzschia acicularis, Synedra delicatissima and Chlamydomonas globosa). Other groups of phytoplankton are green algae, euglenoids, cryptophytes and filamentous blue-green algae. Population densities are high, similar to nutrient enriched pond and lake type biotas. Zooplankton invertebrates are represented by Rotifer, Cladocera, and Copepod taxonomic groups. Populations of Keratella spp., Bosmina spp., cyclopoid copepods and copepod nauplii are dominant groups of Polyarthra spp, Asplanchna spp. Daphnia spp. are also present in lesser numbers. These zooplankton populations are relatively high in permanent ponds (548 to 648 individuals/liter water) compared to temporary type ponds (170 to 216 individuals/liter water) indicating habitat variation. Benthic invertebrates (bottom dwelling organisms) are present in the organic and silt-clay substrates of the ponds. Natural populations of taxonomic groups such as oligochaeta, Odonata, and Diptera (Chironomidae, Culicidae) are dominant although other species do occur depending upon the season. These aquatic groups of phytoplankton, zooplankton and invertebrates are commonly found in shallow pond habitats reflecting environmental conditions satisfactory for sustaining warmwater fish populations.

A limited warmwater fishery exists in some of the ponds on the Alumax property according to net sampling (Beak, 1976) and known public use of the area. Species composition consists mainly of carp, white crappie, largemouth bass, brown bullhead, and pumpkinseed. All of these species, except the carp, are important to local anglers as recreation.

c. Terrestrial Life. Birds, mammals, amphibians, and reptiles occur on the Alumax property in association with the irrigated land, shrub-steppe vegetation, and aquatic vegetation near the ponds. The most productive wildlife habitat is the shrub and aquatic vegetation surrounding the ponds located on the actual plant site and generally south to southeast of the site. Species of wildlife are known from

lists compiled for the Umatilla region; however, actual population densities are unknown for the specific Alumax property.

Bird lists for Umatilla report 103 species which include 4 upland game birds and 25 species of waterfowl (U.S. Fish and Wildlife Service, 1973). The following game birds are known to occupy the Alumax property:

<u>Common Name</u>	<u>Scientific Name</u>
Ringnecked pheasant	Phasianus colchicus
California quail	Lophortyx californius
Mallard	Anas platyrhynchos
Gadwall	Anas strepera
Redhead	Aythya nalisinaria
Cinnamon teal	Anas cyanoptera

The habitat furnished by the ponds is used extensively as nesting habitat and therefore contributes to waterfowl production. Additional species of ducks, geese, swans, and shorebirds also frequent the pond habitats during fall migration and winter resting. During a February 1975 winter field survey 300-500 ducks and geese were observed resting and feeding on the plant property (Todd, 1975). Rare, endangered, or threatened species are known to occur in the Umatilla area, and some of these birds have been documented within the proposed impact area of the plant site. The Long-billed curlew (status undetermined) nests on the plant property (Kurtz, 1976). The ferruginous hawk and the burrowing owl (status undetermined for both) possibly occur in the Alumax site but have not yet been documented.

There are 51 species of mammals that occur through out the Umatilla region and that can possibly utilize present habitat types existing on the Alumax property. The most important game mammals known to occupy Alumax property are mule deer and furbearers such as mink, muskrat, and raccoon. For the amphibians and reptiles, about three species of amphibians and nine of reptiles may be found on the Alumax property.

d. Endangered and Threatened Flora and Fauna. The U.S. Fish and Wildlife Service has identified several wildlife species as endangered or threatened (50 CFR 17.11) that may occur in eastern Oregon including the Umatilla region. Although none of these individual species have been documented on the Alumax property, the following lists presents those species possibly occurring there:

Bald eagle, Haliaeetus leucocephalus - Threatened

American peregrine falcon, Falco peregrinus
anatum - endangered.

Gray wolf, Canis lupus, endangered.

The last, confirmed sighting of the northern gray wolf in Oregon occurred near Huntington in 1973. There are no endangered or threatened species of amphibians, reptiles, or plants documented for the region. Several plants have been identified by the Smithsonian Institute (1975) as possible candidates for the FWS list. These are:

Douglas' whitlow-grass, Draba douglasii Gray.

Henderson's lomatium, Lomatium hendersonii, Coult and Rose.

6. Air Quality.

a. Meteorology.

(1) General Climate. In general, the area of the proposed plant site is semi-arid; subject to frequent, often strong, winds; and has relatively low precipitation. There is an average of 107 clear days per year at the Pendleton Airport. The topography of the Columbia Basin influences the climate of the site. The Columbia River Gorge serves as a passageway for mild maritime air to move from the Pacific to the interior and for cold continental air of the interior to move to the west (CH2M Hill, 1976a, p. 88).

(2) Winds. Winds along the Columbia River tend to flow parallel to the river. The Portland General Electric (PGE) Boardman meteorological tower, located 21 miles southwest of the proposed plantsite, provides a good representation of the wind regimes at the site of the proposed aluminum plant when these data are adjusted for the difference in valley orientation. At the PGE meteorological tower, the Columbia River Valley has a west-southwest to east-northeast orientation. At the site of the proposed aluminum plant, the valley has an approximate east-west orientation, changing to a west-northwest to east-southeast orientation east of the plant production area. Because of a difference in valley orientation at the two sites, the PGE Boardman wind distributions were rotated 22.5° clockwise to approximate the long-term wind distribution shown in Figure III-1 for the Alumax site (Cramer and Bowers, 1975, p. 6-11). A yearly wind direction and speed distribution derived for the Alumax site from the Boardman data is presented in Table III-1. Extreme winds are not uncommon in the area. Data on peak wind gusts from south Columbia Basin stations indicate that gusts in the 50 to 70 mph range are not unusual.

(3) Precipitation. The annual mean for precipitation at Hermiston is 8.77 inches. Precipitation both helps prevent entrainment of wind-blown dust and dust kicked up by vehicles, and has a "washingout" effect on air pollutants in the air. Although the area is relatively arid, it is subject to extremes in precipitation caused by thunderstorms (e.g., a 1-day value in Umatilla-Hermiston, October 1957 of more than 3 inches).

(4) Atmospheric Stability. The basic meteorological parameters considered in evaluating air pollution potential of

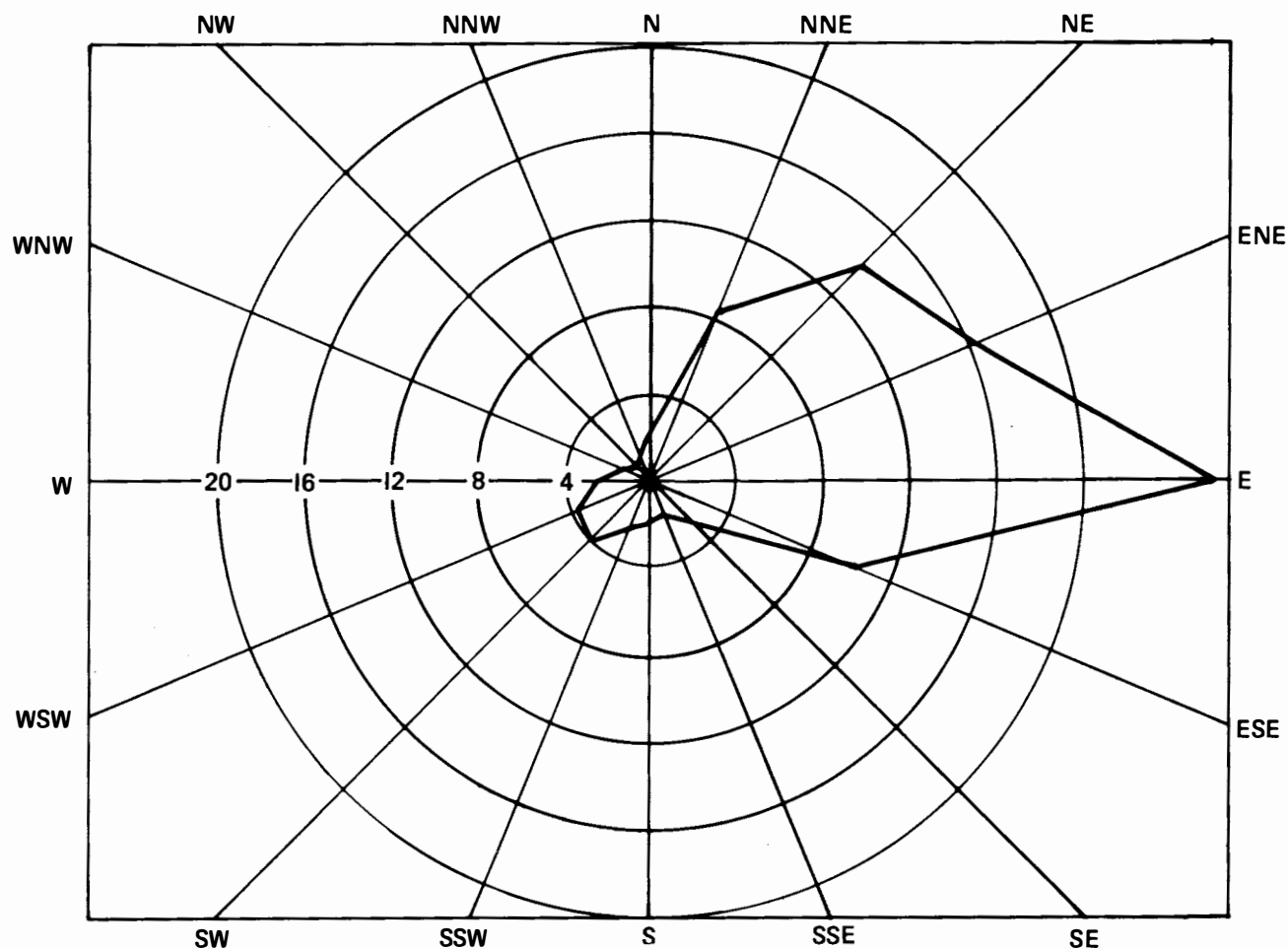


Figure III-1

Annual frequency distribution of wind direction at the proposed plant site. The directions are the directions toward which the wind is blowing, and the percentage frequency scale is at the left center of the figure. (This distribution was derived from wind directions obtained at the 30 foot level of the PGE Boardman meteorological tower for the period April 1, 1973 to March 31, 1974 by rotating them clockwise 22.5 degrees to compensate for the change in orientation to the river valley between Boardman and the proposed plant site (see text).)

TABLE III-1

ANNUAL JOINT FREQUENCY OF OCCURRENCE OF
WIND-SPEED AND WIND-DIRECTION CATEGORIES
FOR THE PERIOD APRIL 1, 1973 THROUGH MARCH 31, 1974
AT THE PROPOSED PLANTSITE

Direction (Sector)	Wind Speed (meters per second)						Total
	00.0-01.5	01.6-03.0	03.1-05.1	05.2-08.2	08.3-10.7	10.7	
N	.7193	1.3991	.5700	.0389	.0000	.0000	2.7273
NNE	.5376	1.8396	1.3085	.5830	.0130	.0000	4.2816
NE	.7200	1.5028	1.1012	.4016	.0259	.0259	3.7774
ENE	.4855	1.5805	.3368	.0000	.0000	.0130	2.4158
E	.4725	.9198	.1555	.0000	.0000	.0000	1.5478
ESE	.4841	.5700	.0518	.0130	.0000	.0000	1.1189
SE	.4328	.5441	.0648	.0130	.0000	.0000	1.0546
SSE	.5641	.9975	.1684	.0648	.1036	.0000	1.8984
S	.7870	3.1610	3.7958	.2721	.1814	.0518	8.2491
SSW	.7593	4.2104	7.1253	1.6064	.1684	.0389	13.9087
SW	.7200	2.0210	4.4565	6.8403	1.6453	.4534	16.1365
WSW	.4187	1.7878	3.7570	10.7138	6.6589	2.9797	26.3159
W	.6419	1.6842	1.5546	3.1610	2.0987	1.2825	10.4229
WNW	.5376	1.1919	.4534	.4146	.1425	.0130	2.7529
NW	.4449	.9069	.1555	.0259	.0000	.0000	1.5331
NNW	.5894	1.0364	.1555	.0777	.0000	.0000	1.8590
TOTAL	9.3147	25.3530	25.2105	24.2259	11.0377	4.8581	100.0000

Source: Cramer and Bowers, 1975, p. B-6.

an area are (a) the depth of the atmosphere through which pollutants are mixed vigorously (mixing height), and (b) the average wind speed. Low mixing heights tend to result in higher ambient concentrations, as do low wind speeds. These parameters usually undergo diurnal variations, tending to be highest in midafternoon and lowest in early morning (CH2M Hill, 1976a, p. 101).

Data on mixing depths or inversion heights are sparse for the area of the proposed plant. Cramer and Bowers (1975, p. 14-16) calculated the seasonal and annual media mixing height at Umatilla using as a basis data taken in Spokane from January 1960 through December 1964 (see Attachment A). Average mixing heights are lowest in the winter. Mixing heights were calculated to be 125 meters (410 ft.) during night hours when wind speeds are 3.0 meters per second or less, a situation which occurs about 17 percent of the time.

b. Ambient Air Quality.

(1) Local Air Shed. The air shed pertinent to the proposed Alumax plant can be considered to be the area encompassing the low-lying area west, south, and immediately east of the site; the hills to the north and northeast of the site; and the area along the river to the east of the site. The area south of the plant site is fairly open. This open area narrows to the east, converging on the Columbia River, as hills rise to the east on the south side of the river. North of the plantsite, hills rise starting at the river and climaxing with the Horse Heaven Hills to the north. The dominant winds in the area are from the west and southwest, so one might expect channelization of the pollutants from the plant along the river to the east. This can be seen from calculated isopleths of pollutant concentrations. However, these isopleths (see Chapter IV.A.4.b.) also show considerable dispersion across the river over the hills northeast of the plant.

(2) Pollutant Concentrations.

(a) Particulates. Ambient suspended particulate levels in the vicinity are given in Table III-2. Portland General Electric (PGE) conducts additional monitoring at Boardman, Ordinance, and Cecil, but this data has not been reduced. It does generally agree with the data presented in Table III-2. The PGE data is available for public review at the DEQ.

Primary and secondary annual geometric mean standards for suspended particulates have been exceeded within the region. Values in excess of the primary standard have not been exceeded since 1971, and the secondary standard has been exceeded at only two of the four sites since 1973 (Oregon Department of Environmental Quality, 1975b, p. 4).

Microscopic evaluation of samples obtained at the Umatilla background sampling station indicates that about 80 percent by weight of the particulate samples are the result of wind-entrained dust. It is believed that other particulate sampling stations in the region are similarly affected (Oregon Department of Environmental

TABLE III-2

AMBIENT AIR SAMPLING DATA ^{1/}

		Days Exceeding Federal Secondary Standard Value	Days Exceeding Federal Primary Standard Value	Annual Geometric Mean	Maximum Value	Second Highest Value	Number of Samples
<u>Site</u>		<u>Year</u>					
<u>Suspended Particulate, mg/m³</u>							
<u>Oregon 2/</u>							
Baker	1970	7	2	65.1	286	196	73
1925 Washington	1971	0	0	67.3	139	131	92
	1972	1	0	68.4	180	136	69
	1973	2	0	63.0	131	130	50
	1975	0	0	55.0	113	105	45
	1976	0	0	55.5	138	131	46
Dewey & Bridge Aves.	1977	0	0	51.5	120	120	48
LaGrand, EOSC	1970	2	0	48.2	180	158	62
Science Bldg.	1971	0	0	-	119	102	46
	1972	0	0	-	116	106	20
	1973	1	0	-	171	98	38
	1974	1	1	44.9	356	138	56
	1975	1	0	34.1	174	102	54
	1976	1	0	46.1	165	140	57
Post Office	1977	9	0	79.0	260	210	53
Pendleton County	1970	3	1	74.4	282	197	71
Courthouse	1971	8	2	77.9	504	322	93
	1972	3	1	78.3	307	209	74
	1973	5	0	77.5	211	202	44
	1974	5	1	75.3	322	168	52
	1975	2	0	67.9	201	168	49
	1976	3	0	76.9	180	180	47
	1977	5	2	78.5	610	510	55

TABLE III-2 (Continued)

	<u>Year</u>	<u>Days Exceeding Federal Secondary Standard Value</u>	<u>Days Exceeding Federal Primary Standard Value</u>	<u>Annual Geometric Mean</u>	<u>Maximum Value</u>	<u>Second Highest Value</u>	<u>Number of Samples</u>
Umatilla 1, Skyview	1972	1	1	35.5	405	109	69
Memorial Gardens,	1973	3	0	39.4	243	184	47
Highway 395	1974	2	1	-	566	200	21
	1975	2	0	30.3	211	168	44
	1976	0	0	-	83	78	17
<u>Washington</u> ^{3/}							
Benton County, Hanford	1976 ^{4/}	0	0	37	90	-	-
Meteorological Site	1977	3	1	30	373	184	60
	1978 ^{5/}	0	0	-	65	59	38
Kennewick, Columbia	1974	5	3	51	343	-	-
Center	1975	5	3	61	776	-	-
	1976	4	1	37	298	-	-
	1977	9	4	66	741	384	62
	1978 ^{5/}	2	1	-	310	259	46
Richland, Pump	1974	3	2	44	391	-	-
Station	1975	4	2	45	322	-	-
	1976	2	0	61	179	-	-
	1977	6	3	68	982	411	62
	1978 ^{5/}	0	0	-	137	128	46
Pasco, County	1974	15	4	77	489	-	-
	1975	19	4	84	415	-	-
	1976	5	0	73	224	-	-
	1977	8	2	83	669	389	63
	1978 ^{5/}	3	0	-	165	159	45

TABLE III-2 (Continued)

	<u>Year</u>	<u>Days Exceeding Federal Secondary Standard Value</u>	<u>Days Exceeding Federal Primary Standard Value</u>	<u>Annual Geometric Mean</u>	<u>Maximum Value</u>	<u>Second Highest Value</u>	<u>Number of Samples</u>
Walla Walla County, Touchet	1975	5	2	51	403	-	-
	1976	12	2	82	406	-	-
	1977 ^{5/}	6	1	66	1296	227	53
	1978	7	1	-	341	215	43
Walla Walla, Whitman College	1974	4	1	60	399	-	-
	1975	3	0	61	206	-	-
	1976	6	0	75	245	-	-
	1977 ^{5/}	3	2	71	1552	349	59
	1978	1	0	-	152	130	39
<u>Sulfur Dioxide, mg/m³</u>							
<u>Oregon</u> ^{2/}							
Pendleton	1974	0	0	13.1	13.1	-	69
	1975	0	0	13.1	15.0	-	53
	1976	0	0	13.1	16.0	-	43
	1977	0	0	13.1	13.1	-	40

^{1/} Oregon State Ambient Air Quality Standards are:

For Suspended Particulate:

- (a) 60 mg/m³ annual geometric mean, never to be exceeded.
- (b) 100 mg/m³ 24-hour concentration not to be exceeded more than 15 percent of the time for samples collected in a given calendar month.
- (c) 150 mg/m³ maximum 24-hour concentration not to be exceeded more than once per year.

For Sulfur Dioxide:

- (a) 60 mg/m³ annual arithmetic mean, never to be exceeded.
- (b) 260 mg/m³ maximum 24-hour average not to be exceeded more than once per year.
- (c) 1300 mg/m³ maximum 3-hour average not to be exceeded more than once per year.

Washington State Ambient Air Quality Standards are:

For Suspended Particulate:

- (a) 60 mg/m³ annual geometric mean, never to be exceeded.
- (b) 150 mg/m³ maximum 24-hour average not to be exceeded more than once per year.

For Sulfur Oxides:

- (a) 0.02 ppm (53.3 mg/m³) annual arithmetic mean, never to be exceeded.
- (b) 0.10 ppm (266.7 mg/m³) maximum 24-hour average, not to be exceeded more than once per year.
- (c) 0.40 ppm (1067 mg/m³) maximum 1-hour average, not to be exceeded more than once per year with 0.25 ppm (666.7 mg/m³) 1-hour average, not to be exceeded more than twice times in any seven consecutive days.

- 2/ Oregon data are from "Oregon Air Quality Report-1977," State of Oregon, Department of Environmental Quality, Air Quality Control Division.
- 3/ Washington data are from "Washington State Air Monitoring Data for 1974," November 1975, and like publications for 1975 (published April 1976), for 1976 (published May 1977), and for 1977 (published June 1978), all issued by the Washington State Department of Ecology, Air Programs Division, Olympia, Washington, and, also, "1978 Quarterly Air Monitoring Data Summary," November 20, 1978, Washington State Department of Ecology, Air Programs-Data Control Section.
- 4/ Based on data for July through December 1976 only.
- 5/ Based on data for the first three quarters of 1978 only.

Quality, 1975b, p. 5-6). Examination of the data reveals high ambient particulate concentrations often coincide with high wind speeds.

The area comprising the Eastern Oregon Intrastate Air Quality Control Region, which includes Umatilla County, has not been designated as a standard violation area. (Oregon DEQ, 1978, p. 7)

(b) Sulfur Oxides. Sulfur dioxide ambient sampling data for the area are available from a station located at Pendleton during 1973, 1974, and 1975. In addition, sulfur dioxide monitoring has been conducted at Boardman by PGE since May 1974. Sulfur dioxide levels at the plant site should be about the same as at these sampling stations since there are no major SO₂ sources in the immediate area. As shown in Table III-2 sulfur dioxide levels at Pendleton are less than or equal to the minimum detectable limits (15 ug/m³) for ambient sulfur oxide monitors. Results obtained by PGE are similar.

(c) Other Pollutants. PGE has monitored NO, NO₂, and NO_x at its sampling stations in the vicinity and their un^xreduced data indicates ambient NO_x levels well below standards. No ambient air monitoring data is presently available for photochemical oxidants, carbon monoxide, hydrocarbons, or fluorides. However, because of the relatively low population and limited sources of air pollution in the area, the Oregon Department of Environmental Quality (DEQ) has determined the area to be in compliance with adopted ambient air standards for these pollutants.

(3) Major Area and Point Emission Sources in the Study Area. A summary of major point and area emission sources from the vicinity is given in Table III-3. Operation of the proposed Alumax plant would increase particulate emissions by 0.86 percent and SO_x emissions by 385 percent in Umatilla County based on emission rates projected by the DEQ (Kramer, 1975, Table 2).

7. Water Quality.

a. Alumax Property. Water supplies on the Alumax property consist of irrigation water from the Columbia River, ground water and numerous ponds. Water quality of the irrigation supply has chemical characteristics similar to its Columbia River source reported in the following section.

Groundwater in the Umatilla area is generally of good quality (USGS, 1974). Groundwater chemical characteristics are unavailable for the specific Alumax site; however, this data would be obtained prior to plant startup. The DEQ (permit 2287, 1975) requires a pre-operational monitoring program to document background data for potential aluminum plant contaminants such as fluorides, cyanide, sulfates, etc. Provisions of the Alumax water pollution control permit provide for the prevention of contaminating the irrigation water and the ground water supplies in the vicinity of the aluminum plant operations.

TABLE III-3

EMISSION INVENTORY DATA

	Fine Particulate tons/year	Total Particulate tons/year	SO _x tons/year	NO _x tons/year	CO tons/year	Total Organic tons/year
<u>Umatilla County, Oregon</u> ^{1/}						
Point Sources						
Ready Mix Sand & Gravel, Milton-Freewater	6.97	17.07	2.40	4.18	0	0
Harris Pine Mills, Pendleton	67.17	103.41	0	90.00	18.00	18.00
U.S. Gypsum Co., Pilot Rock	39.80	128.15	12.92	57.90	7.40	2030.55
General Foods Corp., Pendleton	32.20	59.60	0	0	0	0
Louisiana Pacific Corp., Pilot Rock	25.30	64.54	0	37.70	7.50	0
Pendleton Ready Mix, Pendleton	0.46	1.30	0	0	0	0
Central Cement Products, Pendleton	0.02	0.02	0	0	0	0
M&T Lumber Co., Athena	10.13	15.50	0.25	2.50	100.00	2.50
City of Pendleton	2.21	2.21	0	0.26	6.50	0.52
Union Pacific Railroad, Hinkle	3.43	3.68	9.90	17.64	1.00	0.74
Exterior Wood, Ukiah	0.70	2.80	0.01	0.10	9.40	0.60
Pendleton Grain Growers, Umatilla	13.60	97.50	0	0	0	0
Morrison-Knudsen Co., Inc., Pendleton	6.43	6.43	0	0	0	0
Snipes Mountain S&G, Hermiston	17.50	35.00	0	0	0	0
St. Anthony Hospital, Pendleton	0.28	1.59	0.01	3.30	0.01	0.77
Eastern Oregon Hospital, Pendleton	1.19	1.75	0.03	12.18	0.02	2.77
Johns Manville Products Corp., Port of Umatilla	1.62	1.74	1.50	2.80	0.10	0
Pendleton Grain Growers, Pendleton	33.47	35.22	0	0	0	0
General Foods Corp., Pendleton	0.78	0.78	0	0	0	0
Riverbend Construction Co., Hermiston	12.02	12.02	0	0.75	0	0
Riverbend Construction Co., Pendleton	6.31	12.25	0	0	0	0
E. S. Schuell & Co., Hermiston	0	0.46	1.20	2.09	0	0
Good Shepherd Hospital, Hermiston	0.36	0.43	0	2.73	0.78	0.02
Lamb-Weston, Inc., Hermiston	17.30	18.40	44.46	122.70	7.63	3.87
Western Farmers Association, Umatilla	0.70	7.00	0	0	0	0
J. R. Simplot Co., Hermiston	19.46	33.69	92.49	28.14	2.34	0.47
Celpril Industries	0.55	0.55	0	0	0	0
Pendleton Grain Growers, Milton-Freewater	10.25	20.50	0	0	0	0
Umatilla Ready Mix, Inc., Hermiston	1.14	1.14	0	0	0	0

TABLE III-3 (Continued)

EMISSION INVENTORY DATA

	Fine Particulate tons/year	Total Particulate tons/year	SO _x tons/year	NO _x tons/year	CO tons/year	Total Organic tons/year
Area Sources						
Surface Coating	0	0	0	0	0	125.21
Dry Cleaning	0	0	0	0	0	63.79
Slash Burning	342.19	342.19	0	76.04	2,433.38	456.26
Forest Fires	203.40	203.40	0	45.20	1,446.40	271.20
Field Burning, Agriculture	11.87	11.87	0	1.48	74.94	8.90
Motor Vehicles, Light Duty	285.19	285.19	72.99	2,488.23	23,726.03	3,220.70
Motor Vehicles, Heavy Duty	104.66	104.66	105.83	1,270.57	3,775.04	370.50
Gasoline Marketing	0	0	0	0	0	355.19
Off-Highway Fuel Use	22.08	22.08	15.44	191.55	2,574.12	133.09
Vessels, Harbor Craft	1.00	1.00	1.08	11.20	4.00	2.00
Residential Space Heating	8.17	8.17	98.60	64.54	16.33	4.09
Commercial & Institutional Space Heating	40.11	41.86	345.03	121.17	10.24	8.30
Industrial Fuel Combustion	6.17	6.24	17.69	118.11	8.76	1.55
Pendleton Airport	0.86	0.86	1.51	13.68	198.69	12.20
Railroads	69.21	69.21	157.79	1,024.27	359.88	294.82
Orchard Prunings Burning	6.25	21.25	0	2.50	75.00	25.00
Agricultural Tilling Dust	4,300.00	42,700.00	0	0	0	0
County Total	5,732.50	44,502.70	981.10	5,813.50	34,863.40	7,413.60
Morrow County, Oregon ^{1/}						
Point Sources						
Kinzua Corp., Heppner	165.35	187.37	0	381.32	76.24	86.88
Morrow City Grain Growers, Lexington	10.00	72.00	0	0	0	0
Morrow City Grain Growers, Heppner	4.50	30.00	0	0	0	0
Pioneer Memorial Hospital, Heppner	0.28	0.36	0.01	0.31	0.14	0.12

TABLE III-3 (Continued)

EMISSION INVENTORY DATA

	Fine Particulate tons/year	Total Particulate tons/year	SO _x tons/year	NO _x tons/year	CO tons/year	Total Organic tons/year
Eastern Oregon Farming Co., Boardman	131.90	269.96	12.52	4.57	0	0
Readymix Sand & Gravel, Boardman	2.51	2.66	0.40	0.72	0	0
Gourmet Foods, Port of Morrow	0	0	0	0	0	8.00
Western Alfalfa, Inc., Irrigon	31.32	103.83	0	0	0	0
Morrow City Grain Growers, Irrigon	0.92	3.13	0	0	0	0
Umatilla Ready Mix, Inc., Boardman	0.50	0.50	0	0	0	0
Umatilla Ready Mix, Inc., Heppner	0.20	0.20	0	0	0	0
Portland General Electric Boardman Plant Const.	1.40	1.40	0	0	0	0
Area Sources						
Surface Coating	0	0	0	0	0	12.59
Dry Cleaning	0	0	0	0	0	6.41
Slash Burning	194.58	194.58	0	43.24	1,383.71	259.45
Forest Fires	16.96	16.96	0	3.77	120.64	22.62
Field Burnings, Agriculture	9.22	9.22	0	1.15	58.18	6.91
Motor Vehicles, Light Duty	59.26	59.26	15.49	522.21	4,924.69	699.91
Motor Vehicles, Heavy Duty	33.57	33.57	33.86	407.46	1,219.89	119.64
Gasoline Marketing	0	0	0	0	0	72.94
Off-Highway Fuel Use	7.49	7.49	5.29	69.11	1,224.54	58.82
Vessels, Harbor Craft	3.14	3.14	3.39	35.14	12.55	6.27
Residential Space Heating	0.86	0.86	13.91	6.21	1.72	0.34
Commercial & Institutional Space Heating	4.43	4.63	39.73	12.09	0.81	0.81
Industrial Fuel Combustion	0.12	0.13	1.71	0.42	0.03	0.01
Railroads	17.40	17.40	39.67	257.48	90.47	74.11
Agricultural Tilling Dust	2,500.00	2,500.00	0	0	0	0
County Total	3,195.90	3,518.65	165.90	1,745.20	9,113.60	1,405.80

TABLE III-3 (Continued)

EMISSION INVENTORY DATA

	Fine Particulate <u>tons/year</u>	Total Particulate <u>tons/year</u>	SO _x <u>tons/year</u>	NO _x <u>tons/year</u>	CO <u>tons/year</u>	Total Organic <u>tons/year</u>
<u>Benton County, Washington</u> ^{2/}						
Point Sources						
North Pacific Grain Growers, Kennewick	- 3/	12	-	-	-	-
Chevron Chemical, Kennewick	-	210	-	528	3	4
Central Pre-Mix, Kennewick	-	3	-	-	-	-
Blacktop Materials, Richland	-	513	-	-	-	-
Philips Pacific Chemical	-	-	-	753	-	-
Acme Concrete, Richland	-	154	-	-	-	-
Bi-State Grainery, Prosser	-	3	-	-	-	-
Hanford 100-N Area Boilers	-	55	500	147	10	7
Hanford 300 Area Boilers	-	445	288	343	10	9
Hanford 200-E Area Boiler	-	2,046	332	354	47	24
Hanford 200-W Area Boiler	-	1,638	425	283	38	19
Hanford 100-D Area Boiler	-	2	7	6	-	-
Hanford 1100 Area Boiler	-	1	1	3	-	-
Hanford Central Pre-Mix and Acme Concrete Joint Venture	-	154	-	-	-	-
Peter Kiewit, Richland	-	60	-	-	-	-
Prairie Asphalt, Kennewick	-	134	-	-	-	-
County Total	-	5,430	1,553	2,417	108	63

Franklin County, Washington ^{2/}

Point Sources

Tidewater Terminal, Pasco	-	-	-	-	-	1,705
Louis Dreyfus Grain Terminal, Pasco	-	8	-	-	-	-
Standard Oil of California	-	-	-	-	-	1,029

TABLE III-3 (Continued)

EMISSION INVENTORY DATA

	Fine Particulate tons/year	Total Particulate tons/year	SO _x ¹ tons/year	NO _x ¹ tons/year	CO ₁ tons/year	Total Organic tons/year
Central Pre-Mix	-	100	-	-	-	-
Continental Grain, Pasco	-	9	-	-	-	-
L. W. Vail Asphalt & Concrete, Pasco	-	157	-	-	-	-
Pacific Inland Navigation, Pasco	-	-	-	-	-	1,094
Chevron Pipeline and Tank Farm, Pasco	-	-	-	-	-	200
County Total	-	274	-	-	-	4,028
<u>Walla Walla County, Washington</u> ^{2/}						
Point Sources						
Walla Walla Grain Growers, Port Kelly	-	4	-	-	-	-
Cargill Grain, Burbank	-	12	-	-	-	-
Boise Cascade Pulp and Paper, Wallula	-	284	650	168	1,461	3
Louisiana-Pacific Lumber, Walla Walla	-	91	5	25	46	8
Jones-Scott Asphalt Batch Plant, Walla Walla	-	78	-	-	-	-
Walla Walla Grain Growers	-	1	-	-	-	-
McGregor Feedlot	-	429	-	-	-	-
Everett Craik Lumber, Walla Walla	-	15	1	5	1	1
Washington State Penitentiary, Walla Walla	-	65	190	75	10	5
Western Farmers Association Grain, Wallula	-	3	-	-	-	-
County Total	-	982	846	273	1,518	17

^{1/} Oregon data from "Current BEC File - Basic Equipment Listing," October 26, 1978.

^{2/} Washington data from "Annual Report - Tri-County Air Pollution Control Authority, 1977" by D. E. Jenne, Benton-Franklin - Walla Walla Counties Air Pollution Control Authority, December 1978, Area sources have not been fully quantified for these counties and are therefore not presented.

^{3/} "-" indicates data not available.

Permanent ponds exist on the Alumax property that are being sustained by irrigation water used for agriculture production of cattle. These ponds support established aquatic vegetation and natural populations of mammals and birds, most important being waterfowl.

b. Columbia River: (Lake Wallula). Alumax property is located adjacent to Columbia River for about 4 miles. The McNary Pool (Lake Wallula) extends approximately 60 miles upstream from McNary Dam. The impoundment is used principally for recreation, irrigation, navigation, and hydroelectric power generation. Normal pool elevation is 340 feet (msl) and it covers an area of approximately 38,800 acres. Discharges at McNary Dam are highest from March through July and lowest in fall and winter months. Mean monthly water temperatures range from about 2°C. in the winter to 20°C. in the summer.

Mean values for dissolved fluoride (F^-), total sulfate ($SO_4^{=}$), total alkalinity (as $CaCO_3$), pH, dissolved oxygen and conductivity measured on the Oregon and Washington sides of McNary Dam are presented in Table III-4. Data were taken from the EPA STORET Retrieval System (U.S. Public Health Service, 1974).

8. Ambient Noise Levels.

Sound level measurements of ambient conditions conducted for Alumax by M. A. Porter of Bolt, Baranek & Newman, Inc. (BBN) from January 27 through February 1, 1975, showed that the acoustic environment of the plant site is dominated by motor vehicles on Oregon Route 730. Traffic count figures used for Route 730 are based on State of Oregon, State Highway Traffic Volume Tables (1973), and actual counts taken for a 2-hour period. Heavy trucks are a major factor, comprising 23 percent of the daytime traffic and an estimated 60 percent of nighttime traffic (Porter, 1975, p. 23). The State average percentage of truck traffic is only 7 percent. (DEQ, 1976.)

Since sounds emitted by the proposed plant would be continuous day and night, measurements were taken during nighttime hours, the most sensitive hours in view of existing Oregon nondegradation requirements.

Porter computed the late night 50th percentile sound level (L_{50}). Figure III-2 shows that ambient noise contours between $L_{50} = 35$ dBA and $L_{50} = 40$ dBA lie within a 1-1/2 mile radius of the plant-site. The nearest noise-sensitive properties are at the McNary town-site, which is over 5,000 feet from the plant. The homes lie between the 35 and 40 dBA contours.

9. Significant Unique Features.

a. Designated or Recognized Scenic Areas. The proposed Alumax plant is located in an area which is primarily agricultural or arid desert land. To the north some 1,500 feet from the plant boundary lies the Columbia River George, which can be viewed from various vantage points in the vicinity of the proposed plantsite.

TABLE III-4

WATER QUALITY DATA FOR DEEP, SHALLOW, AND TEMPORARY-TYPE
PONDS IN THE VICINITY OF THE PROPOSED ALUMAX PLANTSITE FOR FEBRUARY 1976

<u>Pond Type</u>	<u>Temperature (degrees C)</u>	<u>Dissolved Oxygen (mg/l)</u>	<u>Oxygen Saturation (percent)</u>	<u>Conductivity (μmhos/cm)</u>	<u>pH</u>	<u>Total Alkalinity (mg/l as CaCO₃)</u>	<u>Sulfate (mg SO₄⁼/l)</u>	<u>Fluoride (mg F⁻/l)</u>
Deep								
Replicate 1	3.1	13.8	103	378	8.4	144.4	24.5	0.15
Replicate 2	-	13.9	103	-	-	153.9	25.7	0.15
Shallow								
Replicate 1	4.0	15.3	117	1400	8.8	615.6	34.8	0.42
Replicate 2	-	15.6	119	-	-	627.0	35.0	0.43
Temporary								
Replicate 1	7.2	17.8	147	3800	8.9	1531.4	24.9	0.68
Replicate 2	-	19.0	157	-	-	1531.4	25.5	0.70

Source: Beak Consultants, 1976, p. 62.

b. Sites of Historic Significance. The Advisory Council on historic preservation has determined no properties included in or eligible for inclusion in the national Register of Historic Places will be affected by the proposed undertaking.

Existing historic sites of local interest in close proximity of the plant include: the old schoolhouse in Umatilla (5 miles distant), the log jail site in Echo (15 miles distant), the Umatilla landing site (7 miles distant) at the mouth of the Umatilla River which was a major trade junction around 1860, the Queen Ann farm house in Echo (15 miles distant), and the Umatilla River arch bridge (5 miles distant) constructed in 1925.

The Fort Henrietta site near the town of Echo, located about 15 miles south of the proposed plant site, was built along the Oregon trail in 1855 and is of particular interest. The Lewis and Clark expedition accounts for several historic sites in the area. Hat Rock, a large monolith, some 4 miles east of the proposed plant, was the first landmark sighted by the Lewis and Clark expedition upon entering Oregon. Umatilla Rapids, located 5 miles west of the plant, is the site of a landing by Clark, who viewed Mt. Adams and Mt. Hood from a nearby cliff.

c. Sites of Archeologic Significance. An archeological assessment of the proposed Alumax plant site was undertaken in February 1976 by David R. Brauner and an assistant, both of the Department of Anthropology, Oregon State University. One day was spent conducting an intensive reconnaissance of the 165-acre plantsite. A second day was required for a cursory reconnaissance of the land adjacent to the plantsite.

Both the plant site and adjacent lands yielded no pre-Euro-American cultural features or materials.

Historically this locality offered little to pre-historic man due to the exposed landscape which lacked protective habitat, economically important botanical resources, and exploitable lithic materials (Brauner, 1976, p. 3).

Access routes for transmission facilities have had only a cursory reconnaissance. No archeological artifacts were found when the existing transmission corridor was constructed. A thorough reconnaissance of the proposed transmission route (which partially parallels the existing right-of-way) will be undertaken as required.

B. Social and Economic Environment.

1. Definition of Study Area. For purposes of the socio-economic analysis, the study area is defined as Benton and Franklin counties in Washington and Umatilla and Morrow counties in Oregon. The significant impact areas vary from discipline to discipline and areas are defined by section in the text.

2. Population. It is anticipated that the primary population impact areas related to the Alumax plant will be located in Umatilla and Morrow counties, Oregon. Although a small percentage of the Alumax-related population is expected to settle in Benton and Franklin counties, the impacts on these counties are not expected to approach significant levels. Consequently, the following material will deal only with Umatilla and Morrow counties.

Between 1950 and 1960 the population of the Morrow/Umatilla county area increased 5.9 percent. Very little population growth took place during the period 1960-70 when the population increased a mere 0.3 percent. A sharp upturn in the rate of increase has occurred since 1970. According to 1975 population estimates (CH2M Hill, 1976a, p. 143), the populations of these two counties increased 8.1 percent during the 5-year period between 1970 and 1975. A 16.2 percent increase occurred in Morrow County whereas the increase in Umatilla County was 7.3 percent. The most dramatic local changes occurred in the cities of Boardman and Umatilla. The population of Boardman increased 262 percent whereas Umatilla increased 138.6 percent from 1970 to 1975. The average annual growth rate for both of these cities was approximately 1.5 percent between 1960 and 1970. Between 1970 and 1975 the average annual growth rate increased to over 20 percent. Part of the population increase in the City of Umatilla resulted from the October 1973 annexation of the McNary townsite. The population of the McNary townsite at the time of annexation was approximately 250. In the 6 months following annexation the townsite had grown by an additional 100 persons (see Table III-5). Boardman's rapid increases have resulted from the introduction of the Portland General Electric Carty Reservoir coal-fired thermal generation plant and several agricultural enterprises (i.e., Morrow Produce, Gourmet Foods, Oregon Potato).

Information on the age profile of the population of the impact area is presented in Table III-6. Data is also provided for the State of Oregon as a whole for purposes of comparison. The City of Pendleton has a lower percentage of young people (0-18 years old) and a higher percent of persons over 65 years than adjacent areas in the zone of impact. Of those persons 14 years of age and older living in the impact area, 65.5 percent are married, a figure slightly below that for the State (66.1 percent).

Minority groups comprise a relatively small proportion of the population residing in the study area. With the exception of the American Indian, very small numbers of racial minority group members reside in the study area. American Indians represent slightly over 2 percent of the population in Umatilla County as a result of the presence of the Umatilla Indian Reservation (see Table III-7).

Table III-8 presents projected population in the impact area without Alumax over the period from 1975 through 1995. These projections reflect the anticipation that the major portion of growth in Umatilla and Morrow counties will take place in the cities. With the exception of Pendleton, it is anticipated that relatively high rates of growth will occur in all impact area cities in the next 20 years as a

TABLE III-5

POPULATION TRENDS FOR CITIES AND
COUNTIES IN IMPACT AREA, 1950-1975

<u>County/City</u>	<u>1950</u>	<u>Percent Change</u>	<u>1960</u>	<u>Percent Change</u>	<u>1970</u>	<u>Percent Change</u>	<u>1975</u>
Morrow County	4,783	1.8	4,871	-8.3	4,465	16.2	5,190
Boardman	N.A. *	N.A.	153	25.5	192	262.0	695
Irrigon	N.A.	N.A.	232	12.5	261	41.8	370
Umatilla County	41,703	6.4	44,352	1.3	44,923	7.3	48,200
Echo	N.A.	N.A.	456	5.0	479	4.4	500
Hermiston	N.A.	N.A.	4,402	11.2	4,893	21.2	5,930
Stanfield	N.A.	N.A.	745	19.6	891	12.2	1,000
Umatilla	N.A.	N.A.	617	10.0	679	138.6	1,620
Oregon	1,521,341	16.3	1,768,687	18.2	2,091,385	10.0	2,299,500

*N.A. = Not Available

Sources: U.S. Bureau of the Census, 1972, p. 39-19, Portland State
University Center for Population Research, 1975, p. 3-4; U.S.
Bureau of the Census, 1963, p. 39-14.

TABLE III-6

1970 AGE PROFILES
SELECTED AREAS
(Percent)

	<u>0-18</u>	<u>65 & Over</u>	<u>Median</u>
Umatilla County	33.6	11.4	30.9
Hermiston Division	36.2	10.2	29.9
Pendleton Division	29.7	12.3	31.3
Stanfield Division	37.6	9.7	28.6
Umatilla Division	33.0	11.1	33.1
Hermiston City	34.6	11.8	30.5
Pendleton City	29.7	12.3	31.3
Morrow County	35.1	12.8	32.7
Boardman Division	35.3	13.9	32.1
OREGON	33.4	10.8	29.0

Source: U.S. Bureau of the Census, 1973, p. 39-90, 39-91.

TABLE III-7

RACIAL CHARACTERISTICS OF IMPACT AREA
POPULATION (1970)

<u>Race</u>	<u>Morrow County</u>		<u>Umatilla County</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
White	4,414	98.9	43,526	96.9
Black	3	0.1	221	0.5
Native				
American	29	0.6	976	2.2
Japanese	1	0.0	21	0.0
Chinese	0	0.0	37	0.1
Filipino	1	0.0	18	0.0
Other	<u>17</u>	<u>0.4</u>	<u>124</u>	<u>0.3</u>
TOTAL	4,465	100.0	44,923	100.0

Source: U.S. Bureau of the Census, 1973, p. 39-92.

TABLE III-8

POPULATION PROJECTIONS ^{1/}
(Without Alumax)

	<u>1975</u> ^{2/}	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	Percent Increase <u>1975-1995</u>
Umatilla County	48,200	52,100	53,900	54,800	56,400	63,450	68,200	71,550	48
Echo	500	520	500	600	650	750	750	800	60
Hermiston	5,930	7,575	8,150	8,200	8,250	10,600	11,850	13,500	128
Pendleton	14,080	14,650	15,000	15,150	15,300	16,400	16,750	17,150	22
Stanfield	1,000	1,245	1,350	1,450	1,550	1,600	1,650	1,700	70
Umatilla	1,620	2,740	2,920	3,200	3,500	4,650	5,000	5,200	252
Other	25,070	25,370	25,980	26,200	27,150	29,450	32,200	32,700	30
Morrow County	5,190	5,550	6,400	7,100	7,850	8,800	9,600	10,000	94
Boardman	695	1,020	1,295	1,500	1,900	2,350	2,700	3,000	332
Irrigon	370	415	515	600	700	800	900	1,000	170
Other	4,125	4,115	4,590	5,000	5,250	5,650	6,000	6,750	47

^{1/} All projections rounded to nearest 50. Due to inability to foresee annexations, some of the population shown outside of Umatilla County cities may actually be within the cities, particularly after 1980.

^{2/} 1975 base year.

Source: CH2M Hill, 1976a, p. 143 and Portland State University Center for Population Research, 1977 and 1978.

result of both present and planned agricultural and industrial developments in the area.

3. Community Development. Seven Oregon communities, located in the environs of the plant site, are expected to receive about 95 percent of Alumax-induced population (see Chapter IV.B.1). Pendleton, in west central Umatilla County, and Hermiston in northwest Umatilla County are the two largest urban centers with estimated 1975 populations of 14,080 and 5,930, respectively (see Chapter III.B.2). Five smaller communities, Umatilla, Stanfield, and Echo in northwest Umatilla County, and Boardman and Irrigon in northeast Morrow County, all had populations of less than 1,200 in 1975.

a. Land Use Planning. Land use planning is conducted by cities, counties, regional councils of government, and the State of Oregon through its adopted goals and guidelines. All land use plans in Oregon are being revised to bring them into conformance with the recently adopted State of Oregon Land Conservation and Development Commission (LCDC) goals on land use planning. The western portion of Umatilla County has been given first priority by the County Planning Commission in developing an interim plan to conform with LCDC requirements. Development of an updated comprehensive plan was scheduled to begin in the summer of 1976.

Future land use development in Umatilla County is presently guided by the County Comprehensive Plan adopted in April 1972. Since that date the plan has been amended several times. It calls for maintaining development around the existing urban nodes to prevent sprawl, and to preserve and protect agricultural lands.

Some of the plan's industrial development goals (Umatilla County Planning Commission, 1972, p. 32-33) pertinent to the proposed Alumax plant are: (1) to encourage diversification of the county's economic and tax base by attempting to attract additional industrial development; (2) to welcome all types of industries, although certain restrictions may be placed on the location and operation of heavy industries; (3) to designate as industrial land only the land that has characteristics that would make it suitable for industrial use; (4) to protect industrial land from encroachment of other uses that would diminish its value for industrial use; and (5) to locate industries which create excessive noise, traffic, smoke, etc., at such places where terrain, wind, and other conditions can best tolerate such industries, and to insure that industrial plants are constructed so as to prevent damage to the natural environment.

Hermiston's development is guided by a 2-part plan prepared in 1972. Part I consists of a series of background studies which serve as input for Part II, the actual development plan. The Hermiston plan extends beyond its city limits. The limits of the planning area are defined as the Urban Development Line. The unincorporated area is strongly aligned physically, socially, and economically to Hermiston. It is this area in which urban growth is expected to occur over the next 20 years. The plan retains the urban core as the center of activity. Outlying commercial areas are within relatively easy

access of residential areas. Development beyond the current city boundaries is largely designated as residential, with some outlying industrial areas. Residential growth is expected to occur uniformly about the city.

Recent annexation to the city has been for the purpose of industrial or commercial development. The city is encouraging development of vacant areas within the current boundaries before additional areas are annexed for residential development. The basic policy of the plan is to contain urban development in an area where urban services can be readily provided.

Pendleton, the largest city near the proposed Alumax site, prepared and adopted its most current comprehensive plan in 1965. The city is currently updating the plan. The new plan acknowledges growth trends to the south and southwest and the need to restrict development to the north in order to protect agricultural land. Expansion to the east is restricted by the location of Indian Reservation lands.

None of the smaller communities of Umatilla, Stanfield, Echo, Boardman, or Irrigon have formally adopted a land use plan.

b. Commercial Land Use. The major commercial center in western Umatilla County is Hermiston. The city has an established central commercial area. The lack of other large commercial centers in the area (the nearest being in Pendleton and the Tri-Cities, Washington area) requires Hermiston to serve the commercial needs of much of the western portion of the county. Its commercial trade center function, based on providing more complex, specialized services, makes Hermiston the dominant center in the area where Alumax populations are projected to reside and shop. In 1972, Hermiston accounted for 107 retail trade establishments which did over \$19 million in sales (University of Oregon, 1975, p. 92-93).

Outlying commercial establishments in Hermiston extend along Highway 32 through the city. Several other commercial areas are found within the city limits. Commercial establishments in unincorporated areas around Hermiston are found along Highway 32 north of the city, and form a strip commercial pattern. A significant commercial area is also found along Buttercreek Road, and scattered commercial development occurs south of Hermiston along Highway 32 (Hermiston City Planning Commission, 1972a, p. 29).

The City of Umatilla would, like Hermiston, receive a large percent of Alumax-generated population. Umatilla does not have a well-developed commercial sector at present. The function of Umatilla's business establishments is the provision of ubiquitous services, and services oriented towards highway-related commercial activity.

c. Industrial Land Use. Industrial land use in western Umatilla County and eastern Morrow County is concentrated in Hermiston (16 firms); in central Umatilla County industry is concentrated in

Pendleton (27 firms); and in northeastern Umatilla County Milton-Freewater dominates with 16 firms. Smaller communities in the general area have one to three industries apiece (Oregon Department of Economic Development, 1976, p. 67, 76-77).

Major employers (100 employees or more) among area manufacturers are: Lamb-Weston and Marlette Homes in Hermiston; Key Equipment Company and the Western Farmers Association located in Milton-Freewater; Harris Pine Mills, Prowler Industries of Oregon, and Pendleton Woolen Mills in Pendleton; and Lamb-Weston located in Weston (Oregon Department of Economic Development, 1976, p. 76-77).

Several large industrial developments are proposed in the 4-county (Umatilla, Morrow, Benton, and Franklin) area of Oregon and Washington by 1987. In Oregon, besides Alumax, Portland General Electric has plans for a coal-fired plant in Carty, and a nuclear plant in Pebble Springs. The U.S. Army Corps of Engineers has proposed a second powerhouse on the McNary Dam. In Washington, the Washington Public Power Supply System expects development of three new nuclear projects at Hanford, and Pacific Power & Light has proposed generating plants at Roosevelt.

Agricultural products have been the main industrial product in the area. The expansion of agricultural processing industry is predicted to be a continuing trend. A large potato processing plant employing an estimated 800 persons is scheduled by 1979 in Boardman. By 1985 the area is expected to develop further agriculturally oriented industry creating over 800 additional jobs.

d. Land Use Trends. Land uses in the area are now in a transitional stage. Population projections indicate new growth in the region, which would create additional demands for urban services. Undeveloped land would become increasingly more valuable where suitable for residential, commercial, and industrial uses.

The final pattern of land use in the area is still highly speculative, because of the development of new comprehensive land use planning. As land use parameters are established to meet LCDC requirements, future patterns of usage will become clearer.

4. Infrastructure.

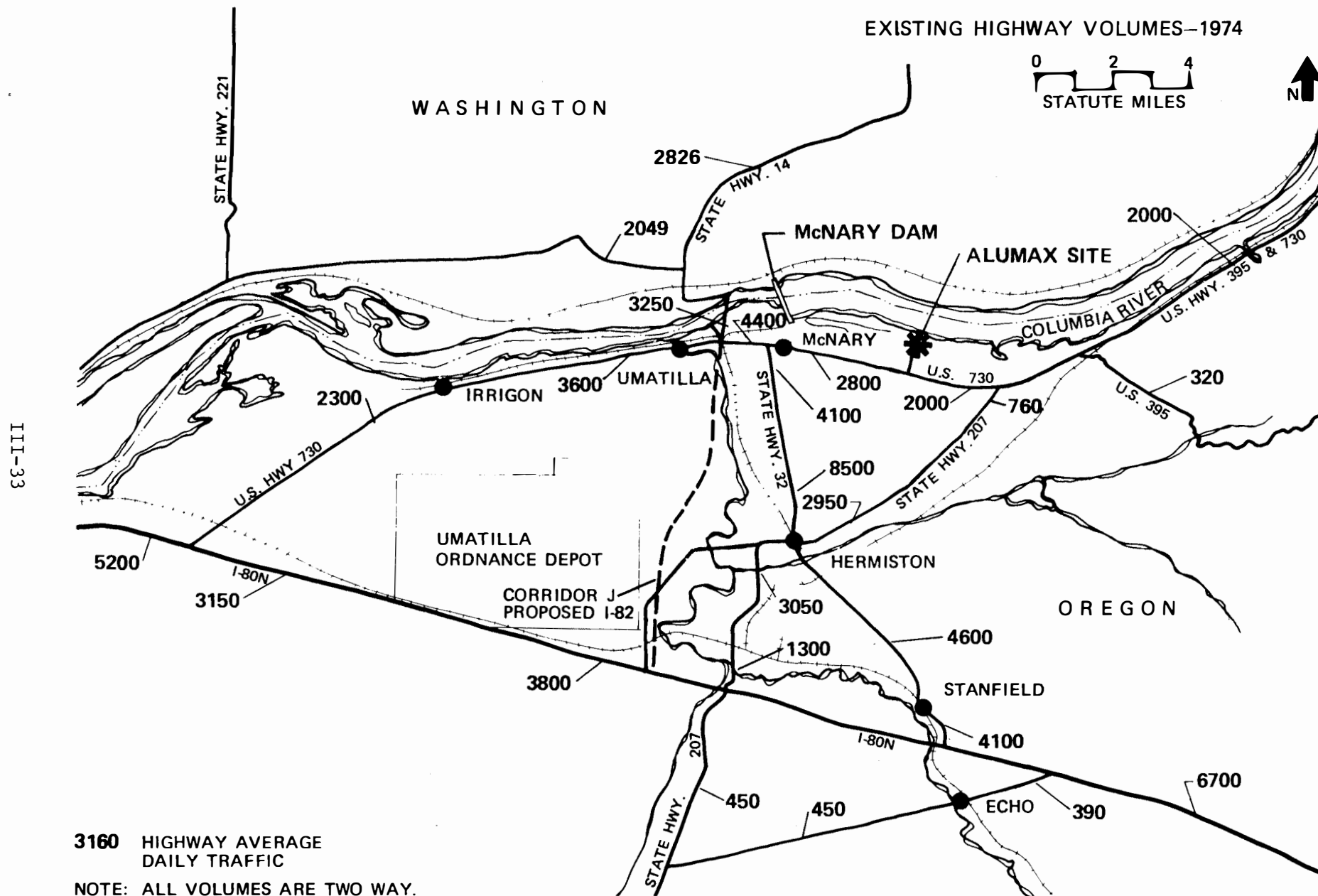
a. Transportation.

(1) Roadways. Figure III-3 depicts the location of the proposed plantsite, the existing highway system, and traffic counts attributable to the major arterial routes.

U.S. 730 provides direct access to the plant site and passes along the plant's southern boundary. U.S. 730 is a primary area highway linking Portland, the Tri-Cities, and eastern Washington. It is a 2-lane highway except for a 3- and 4-lane section near Umatilla.

Figure III-3

EXISTING HIGHWAY VOLUMES—1974



Intersecting U.S. 730 are Oregon Routes 32 and 207. Oregon Route 32 provides access to the plant site via Hermiston and Stanfield; Hermiston being about 7 miles south, with Stanfield another 2-1/2 miles further. Oregon Route 207 also provides access to the plantsite, but is approximately 2 miles farther from Hermiston and Stanfield.

The shortest route between the Tri-Cities, Washington and the plantsite, about 28 miles, is by way of the Umatilla Bridge and Washington Route 14.

The primary east-west interregional route is Interstate 80 North, which links the Portland metropolitan area with Boardman, Pendleton, and points farther east.

One additional highway, currently under construction is noteworthy. The Oregon portion of the Interstate 82 project, designated as Corridor J by the Oregon Department of Transportation, is shown on Figure III-3. The Interstate 82 project is planned to extend from Prosser, Washington, to Interstate 80N in Oregon. Corridor J originates at I-80N, about 1.8 miles east of the Ordnance Interchange, and proceeds northerly along the east side of the Umatilla Ordnance Depot bending northwest as it enters Umatilla. It then crosses the Columbia River into Washington to points northwest (Oregon Department of Transportation, 1972; and Washington State Department of Highways, 1972).

(a) Traffic Data. Traffic data for the highway system have been obtained from a short-term count conducted by CH2M Hill in March 1975 on U.S. 730 at the plantsite; from periodic counts taken by the Oregon Highway Division on all primary and secondary roads in the area; and from the Oregon Highway Division's permanent counters, 30-002 on U.S. 730 near Cold Springs Junction, 11-008 on I-80N near Arlington, and 30-004 on I-80N near Pendleton, (CH2M Hill, 1976a, p. 167).

Traffic counts in 1974 show that U.S. 730 average daily traffic (ADT) at the plant site is about 2,000 vehicles per day and increases to 2,800 vehicles per day directly east of the intersection of Route 32. The peak-hour weekday volume at the plant site is about 260 vehicles per hour. This occurs in August between about 3:00 p.m. and 4:00 p.m.

(b) Traffic Characteristics. The dominant characteristics of traffic in the area are the high-volume tourist traffic during the summer months and the high-volume truck traffic. In August the average daily traffic at, for example, the Cold Springs counter is about 200 percent of the January average daily traffic. This shows the relative increase in traffic volumes during the summer months. Truck volumes at the Cold Springs counter during 1974 were about 28 percent of all vehicles. The national average for trucks is about 12 percent (Pignataro, 1973, p. 152).

Throughout most of the year, truck volumes are mostly through-trucks. Through-trucks traffic has few stops and usually maintains speeds of passenger cars except when long, steep hills are encountered. Most highways in this area have relatively flat grades. Local farm-based truck traffic uses the highway system during the peak-volume summer months and reduces highway speeds and capacity. The high percentage of trucks is the only existing factors that appreciably limits the capacity of any section of roadway near the plantsite.

Oregon Route 32, north of the city limits of Hermiston, is the only section of highway now at or near capacity during peak-volume periods of the summer. This section of highway is 2-lane with a hill about one-quarter mile long and a grade of about 5 percent. High truck volumes restrict capacity on the hill. Several roadside businesses and access roads north of the hill generate turn movements which reduce speeds and delay through-traffic.

(c) Transit Systems. Area traffic does not benefit from transit systems. None of the communities in the Alumax impact area have intracity public transit systems. Intercity service is provided by the Greyhound Bus Line.

(2) Railroads. Rail service from Portland to the Hermiston-Umatilla area is provided by Union Pacific Railroad. Local access to the Alumax site is provided by the Umatilla Branch line of the Union Pacific which starts at the Hinkel Yard (Hermiston) and runs north to the Umatilla Yard (Umatilla), forming a wye connection at this location. The line extends east to Irrigon and west to the Port of Umatilla.

Rail access from Washington to the Hermiston-Umatilla area is provided by an intertie between the Union Pacific line and Burlington Northern line which crosses the Columbia River at Wishram, Washington, and Trunk Junction, Oregon (around 10 miles upstream of The Dalles). This line continues south through Oregon along the Deschutes River.

The Union Pacific, the U.S. Corps of Engineers, and the Port of Umatilla each own separate segments of the portion of the Umatilla Branch line extending west from the Umatilla Yard to the Port of Umatilla. The trackage in the Port of Umatilla was constructed in 1973 to provide rail access to Johns-Manville Company's newly constructed PVC pipe plant. The trackage layout permits easy expansion to meet the rail transportation needs of future industrial plants within the Port, such as Alumax.

The Union Pacific has announced an expansion at its Hinkel Yard in Hermiston. This expansion is expected to be completed by the end of 1976 and will provide increased capacity and automatic classification of rail cars.

The Union Pacific projects that its rail system in the Hermiston-Umatilla area is equipped to handle current and projected growth.

(3) Airports. Several airports are located within close proximity of the proposed plantsite. Hermiston operates a public airport facility; Boardman a private facility; and Umatilla Army Depot, a military field. The nearest commercial airports of significance other than Hermiston are Pendleton, in Oregon, and the Tri-Cities, Walla Walla, and Richland airports in Washington.

The present airport system provides general aviation facilities at all airports and air carrier facilities at Pendleton, Tri-Cities, and Walla Walla. All airports have sufficient capacity to accommodate considerably higher levels of activity than now exist. However, at Hermiston, some aircraft may have a weight restriction because of insufficient runway takeoff length. Hermiston has plans to modify this situation.

The aviation system is forecast to grow moderately, without future growth in the area attributed to Alumax (Mitchell, 1975; Aerospace Corp., 1973).

b. Utilities.

(1) Electrical Power, Natural Gas, and Telephone. Electrical power is provided by Pacific Power & Light Company to Hermiston, Stanfield, Echo, and most of Umatilla. Umatilla Electrical Cooperative Association provides electricity to Boardman, Irrigon, parts of Umatilla, and adjacent rural areas. Benton County Public Utility District No. 1, Big Bend Electrical Co-op, Franklin County PUD, Benton REA, and the Richland Municipal also provide electricity in the study area.

Natural gas in the study area (where available) is supplied by the Cascade Natural Gas Corporation.

Telephone service to Oregon communities and rural areas is provided by Pacific Northwest Bell, while Washington communities and rural areas are serviced by General Telephone Company.

In all communities natural gas and telephone service are found to be adequate or to have the expansion capability to serve a population in excess of Alumax-related growth in the area.

(2) Water Systems. The Water Resources Department of the State of Oregon has released two study reports entitled "Ground Water Conditions and Declining Water Levels in the Ordinance Area, Morrow, and Umatilla Counties, Oregon Report No. 23" and "Groundwater Conditions and Declining Water Levels in the Butter Creek Area, Morrow, and Umatilla Counties Oregon Report No. 24." Both of these areas have been classified as critical groundwater areas due to rapidly declining groundwater elevations. The recommendations of these reports call for the curtailment of future development of the groundwater aquifers within the critical areas. Shallow aquifers in the vicinity of the Columbia River and deeper basalt aquifers outside the critical areas are currently available for development. None of the aquifers have been designated as sole source aquifers.

The major source of alternative water is the Columbia River. Other significant water sources within the study area are the Umatilla River, Lake Umatilla, Cold Springs Reservoir, and Threemile Falls Diversion Works. The quantity available from these surface water sources is relatively small in comparison to the Columbia River and, without treatment, the quality is such that the water is usable only for agricultural purposes.

It has been estimated the major part of the Alumax-related population pressure will be felt in Hermiston and Umatilla. Since the publication of the draft EIS both communities have made significant progress towards upgrading their water systems.

Eventually the triumvirate of Umatilla, Hermiston, and the Port of Umatilla plan to develop a regional water system tapping the Columbia River when construction of the second powerhouse at McNary begins. This would provide a long-term solution to local water problems.

(a) Hermiston. Hermiston can currently serve a population of 12,000 persons from two wells with a 8,200 gallon per minute capacity. Water is now being tapped at only 100 feet by the City's newest well. Hermiston has a peak demand of about 3.5 million gallons per day (mgd). Hermiston has three water storage reservoirs with a combined capacity of 2.25 million gallons, which is adequate for present needs. If a regional water system is not constructed, the city will need additional water storage capacity for future projected growth even without Alumax. The water distribution system is in good condition, is well designed, and can accommodate future extensions.

(b) Umatilla. Umatilla has upgraded its water system to accommodate about 14,000 persons. The city now has four wells which can provide up to 8,900 gallons per minute. The Port of Umatilla has a 2,500-gpm source, and the U.S. Army Corps of Engineers has a supplemental 500-gpm well for emergency use. The port is currently experiencing groundwater depletion problems (Futrell-Redford-Saxton, 1974, p. III-3). The combined city and port system has a peak demand of about 2.5 mgd. The proposed Alumax plant would require an estimated 600,000 gallons per day from the Port of Umatilla system. The City of Umatilla now has water storage reservoirs with a combined capacity of 2.8 million gallons.

The water distribution system is in good condition except for some size deficiencies in the downtown area of Umatilla. The McNary system is in good condition and has been repaired recently. Developers are expected to install additions to the system in the south part of Umatilla.

The city is constructing a waterline intertie between McNary and lower Umatilla, which will help provide water supply and backup service.

(c) Stanfield. The City of Stanfield has three wells, only one of which can be used. This well yields up to

660 gpm and is capable of yielding up to 900 gpm if a new pump is installed. The city has a peak water demand of about 450,000 gpd. The city has a 650,000-gallon storage reservoir with sufficient capacity to meet present demand.

(d) Echo. The existing sources of water for the City of Echo are two wells. The old city well has a capacity of 190 gpm. A new well has been completed which has a capacity of 650 gpm. Echo has a peak demand of about 220,000 gallons per day and needs a new source of water due to depletion of groundwater in the area.

The city has a 140,000-gallon elevated storage reservoir. A study is underway to determine the additional storage capacity needed to satisfy present needs and future projected growth.

(e) Boardman. The water source for the City of Boardman is a well with a capacity of approximately 500 gpm sustained yield. This well is in the deep basalt aquifer with depletion problems similar to those in Hermiston. Consequently, there is an urgent need for a new water source. The Oregon Public Health Division has placed a moratorium on new water hookups until the city develops a satisfactory plan to provide for a new water supply. The city has installed a new Ranney collector system, chlorination chamber, and transmission line, which has a capacity of approximately 10,500 gpm; sufficient to meet the requirements of future populations, including Alumax-generated growth.

(f) Irrigon. The present water source for the City of Irrigon is a 140-gpm well in the deep basalt aquifer. Water use in Irrigon has been limited to domestic supply. Capacity of the well and storage system does not allow for lawn irrigation or fire demand. A new source of water is required to adequately accommodate future growth.

(3) Sewer Systems. Sewer collection systems (from residence to interceptor sewer) are generally adequate throughout the area where Alumax-generated populations would be expected to reside. The area considered includes Hermiston, Umatilla, Stanfield, and Echo. Not expected to be greatly affected by Alumax-generated populations are Irrigon, Pendleton, Boardman, and the Tri-Cities. It should be noted that additions to the sewer collection systems are normally financed by the developers of benefiting property owners as development occurs.

(a) Hermiston. Hermiston's sewage treatment plant was constructed in 1951 and provides secondary treatment of effluent. The plant design capacity is 1,000,000 gallons per day (mgd), with a population equivalent (PE) of 10,000. The Oregon State Department of Environmental Quality (DEQ) reports problems in maintaining effluent standards, primarily because of the excessive infiltration/inflow into the collection system which overloads the plant. The city has begun construction of a \$12 million, 2.85 million gallon per day sewer project that will be able to serve a population of 25,000 persons. Completion is scheduled for early 1981.

The Hermiston sewage collection system adequately handles present flow volumes. There is an infiltration/inflow problem which is attributed to flood irrigation of agricultural lands within and adjacent to the city. Hermiston is undertaking a program to repair the collection system where infiltration volumes are excessive. Additional sewer collection systems are currently needed in the southwest part of the city to provide for population increases.

(b) Umatilla. The sewage treatment plant in Umatilla was completed in 1973 and provides secondary treatment of effluent; rated capacity is approximately 0.14 mgd. DEQ reports that the plant conforms with discharge regulations. The construction of an interceptor sewer from McNary to the sewage treatment plant was completed in 1976. The sewage treatment plant has reached or exceeded the design capacity. The sewage collection system within the old City of Umatilla was constructed in 1973 and is in good condition. The system in McNary was constructed by the U.S. Army Corps of Engineers and is also in good condition.

(c) Stanfield. The Stanfield sewage treatment plant was built in 1952 and provides for secondary treatment of effluent. The plant design capacity is 0.2 mgd with a PE of 1,500. The Oregon State DEQ reports problems caused by excessive infiltration in the collection system. The sewage collection system is adequate to handle the present population, and no improvements are needed with the exception of solving the infiltration problem and improving the pump stations.

(d) Echo. A new sewage treatment plant for Echo was recently constructed. The system consists of a stabilization lagoon designed for 1,000 PE and now operates at about 50 percent of design capacity. The city plans to provide sprinkler irrigation of effluent, as required by DEQ, to meet future waste discharge requirements. The recently completed sewage collection system will adequately serve Echo's present population and future projected growth.

(4) Solid Waste.

(a) Quantities. The State of Oregon recently completed Statewide solid waste plans. The Umatilla County plan, prepared by R. W. Beck and Associates, was approved by the DEQ in mid-1974 (DEQ Grant Project SWP 530).

The plan indicates that the Umatilla area, including Hermiston, Stanfield, and Echo, presently disposes of about 36,400 loose cubic yards of refuse per year. Adding refuse collected from the McNary, Irrigon, Boardman, and Plymouth-Paterson areas raises the annual total to about 50,000 cubic yards. The entire area's service population is about 16,000, which gives a per capita waste collection rate of roughly 3.13 cubic yards per year, or 1.7 pounds per capita per day assuming a loose density of 200 pounds per cubic yard. This average per capita waste collection rate is about one-half of the national average, but is typical of Oregon's rural areas, which experience

considerable illicit dumping and backyard burning (American Public Works Association, 1971, Table 6, p. 32).

Other areas in Umatilla County report similar waste collection rates: the Pendleton service area generates an average of 2.0 pounds per capita per day; the Milton-Freewater area about 1.65 pounds per capita per day; and the remainder of the county about 0.9 pounds per capita per day.

(b) Collection. Umatilla County has franchised four collectors to serve the entire county: Sanitary Disposal Co., Inc., handles wastes in Umatilla-Hermiston area and also collects in the Irrigon, Boardman, and Plymouth-Paterson areas.

The collectors offer residential, commercial, and industrial collection service. However, many of the rural residences do not have collection service because of their remote locations.

(c) Disposal. There are six major landfill sites in Umatilla County, Oregon, with DEQ permits. The landfills and their approximate locations are:

Umatilla Butte--about 3 miles north of Hermiston
Pendleton--about 1 mile west of the Pendleton Airport
Milton-Freewater--about 4 miles northwest of the City of
Milton-Freewater
Eldon Michael--about 3 miles north of Pilot Rock
Athena--about 4 miles west of the Athena area
Confederated Tribes--about one-half mile south of the Indian Agency
headquarters for the Umatilla Indian Reservation

The Umatilla Butte landfill is nearest to the proposed Alumax plantsite. The plant site is located about 5 miles to the north of the landfill.

Most disposal sites in the study area will accept special wastes, with the exception of sewage sludges and car bodies.

There are no significant generators of hazardous waste in the study area, and none of the study area disposal sites accept such wastes.

The waste quantities projected by the Umatilla County solid waste plan assume that the study area population will not increase, but that the per capita waste generation rate will increase about 1 percent per year. This assumption is unrealistic for this EIS because of the growth that is projected in parts of the county even without Alumax. The figures in Table III-9, therefore, assume population growth in Table III-8.

TABLE III-9

PROJECTED WASTE QUANTITIES WITHOUT ALUMAX
ALUMAX STUDY AREA DISPOSAL SITES
(Cubic Yards Per Year)

<u>Site</u>	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>
Athena	6,000	6,305	6,630	6,970
Confederated Tribes	6,000	6,305	6,630	6,970
Eldon Michael	6,000	6,305	6,630	6,970
Milton-Freewater	12,000	12,610	13,260	13,390
Pendleton	58,000	62,350	65,250	68,695
Umatilla Butte	50,000	54,530	57,655	63,750

Source: R. W. Beck and Associates, 1973, in CH2M Hill, 1976a, p. 193.

5. Housing. Housing is scarce in the impact area. The housing vacancy rate is essentially zero with the exception of the City of Umatilla, where building and rehabilitation have occurred at the McNary townsite. The shortage seems to be the result of three factors. First, the area is booming economically, primarily because of agribusiness expansion, and, consequently, the population has increased more quickly than expected. Second, the boom has occurred during a period of high inflation and tight money, which has prevented the construction of housing that people can afford. Third, the rapid growth has overburdened the physical facilities of some towns.

Table III-10 summarizes past trends and the existing housing supply. Rapid increases in housing have occurred in Boardman and Umatilla in the last 5 years. Hermiston, Irrigon, and Stanfield have grown at moderate rates. Relatively little growth occurred in Pendleton during this period. Growth has been most explosive in the small towns, like Boardman, Irrigon, and Umatilla. In the case of Irrigon, growth is not expected to continue at the same rate.

The proportion of housing of a given type existing in the impact area varies from city to city. In Table III-11, housing types are broken down into three categories: single family, multifamily, and mobile homes. The percentage of the total housing supply represented by each of these types is presented for each of the cities in the impact area as well as for the State of Oregon as a whole. Single-family accommodations represent the largest percentage of housing units in impact area cities with the exception of the City of Boardman, where slightly over one-fourth of the housing units are single-family dwellings. More than half of the housing units in Boardman are mobile homes. Irrigon also has a relatively high proportion of mobile homes. These relatively large percentages are probably due to the fact that these cities have recently experienced considerable population growth. Permanent housing to accommodate these increases has not yet been constructed. The cities of Umatilla and Stanfield also have a higher percentage of mobile home units than the State as a whole, although the proportion for these cities does not approach the magnitude of that for

TABLE III-10

HOUSING INVENTORY
ALUMAX IMPACT AREA

<u>City</u>	<u>Number of Dwelling Units</u>			<u>Average Annual Rate of Increase</u>
	<u>1960</u>	<u>1970</u>	<u>Jan. 1976</u> ^{1/}	<u>1970-76</u> ^{2/}
Hermiston	1,342	1,805	2,595	7.6%
Umatilla	N.A.	289	640	21.2%
Pendleton	4,589	4,695	5,055	1.3%
Stanfield	N.A.	317	390	4.0%
Irrigon	N.A.	102	155	9.0%
Boardman	N.A.	79	238	35.0%

*N.A. = Not Available

- ^{1/} The 1976 data was obtained from local officials in each of the cities.
- ^{2/} Average annual increase for the 1970-76 period is based on a span of 5.75 years. The 1970 data was valid as of April 1970; the 1976 data as of January 1976.

Table III-11

BREAKDOWN OF HOUSING UNIT TYPES
IN ALUMAX IMPACT AREA (JANUARY 1976)

	<u>Single Family</u>	<u>Multifamily</u>	<u>Mobile Home</u>
Boardman	25.6%	20.9%	53.5%
Echo	87.8%	5.2%	7.0%
Hermiston	61.6%	29.7%	8.7%
Irrigon	76.0%	0.0%	24.0%
Pendleton	73.1%	19.8%	7.1%
Stanfield	75.8	10.5%	13.7%
Umatilla	63.4%	20.6%	16.0%
Oregon	73.8%	17.1%	9.1%

Source: BPA, 1976; Oregon Department of Commerce, Housing Division.

Boardman and Irrigon. Multifamily dwellings represent up to one-third of the housing units available in the impact area cities.

Past trends indicate that there has been a marked shift in recent years from single family to multifamily and mobile home dwellings. This shift may be due, in part, to the increasing mobility of the population. It is probably more closely related to the fact that housing costs have been increasing more rapidly in recent years than family incomes. If these trends continue, it is likely that multifamily dwellings and mobile homes will provide an ever greater share of the housing stock. Since much of the growth in the impact area is fairly recent, it is not surprising to find relatively high rates of multifamily and mobile home dwellings in several of the impact area cities.

Selected factors pertaining to the quality of housing in the impact area are presented in Table III-12. Information of this type was unavailable for the smaller impact area cities. Median gross rental rates in the county of Umatilla are approximately 18 percent below the State average. A majority of units have been constructed since 1940 and only a small percentage lack complete bathrooms or heating facilities. In the City of Hermiston, which is expected to receive a major portion of the population impact, only 17 percent of the housing units were constructed prior to 1940, with less than 1 percent lacking complete bathrooms or heating facilities. Also, median gross rent is less than 78 percent of the comparable figure for the State of Oregon as a whole.

TABLE III-12

SELECTED HOUSING CHARACTERISTICS,
1970 CENSUS OF HOUSING

<u>Area</u>	<u>Median Gross Rent</u>	<u>Percentage of Units Built Before 1940</u>	<u>Percentage of Units Lacking Complete Bathrooms of Heating Facilities</u>
Hermiston	\$ 83	17	less than 1
Pendleton	94	51	5
Umatilla County	88	41	6
State of Oregon	107	35	4

Source: CH2M Hill, 1976a, p. 148.

6. Community Services.

a. Educational Facilities. This section describes educational services presently available in the Alumax impact area. Six Oregon school districts are included in the Alumax impact area. Each district will be discussed in terms of (1) its present level of services, (2) the degree of expansion required to meet anticipated needs

(exclusive of Alumax) in school year 1980-81 (the initial year of Alumax operation), and (3) the degree of expansion required to meet non-Alumax growth in school year 1995-96 (a point well into the Alumax operational period).

School Year 1975-76. Building capacities, current enrollments, and student/teacher ratios for the impact area school districts are presented in Table III-13.

Services to elementary students are satisfactory in most of the schools in the impact area. The Irrigon School is the only facility where enrollments exceed capacity (by 11 percent). Student/teacher ratios are below, or very near, the State average (19.9:1) in all schools except Irrigon and Heppner (each having a ratio of 24:1).

Services to secondary students are, on the whole, adequate. Student/teacher ratios are below the State average (19.9:1) in all impact area secondary schools. A shortage of classroom space exists in the Boardman and Pendleton schools. In Boardman enrollments total 125 percent of capacity. Pendleton's enrollments are 104 percent of capacity; however, enrollments are projected to decline somewhat.

School Year 1980-81. Anticipated educational service needs for school year 1980-81 are presented in Table III-14. Providing currently planned additions to classroom capacity are completed as anticipated, the only elementary school systems in which enrollments are projected to seriously exceed capacities would be those of Hermiston where a 45 percent overload would occur and Umatilla where enrollments are expected to be 164 percent of capacity. Hermiston would also need a substantial number (12) of additional elementary teachers to meet projected elementary increases. Pendleton, Umatilla, and Boardman would also need to make several additions to their staffs (10, 5, and 7 teachers, respectively). Other area systems would need no more than three additional teachers to keep pace with enrollments, assuming current student/teacher ratios are to be maintained.

The only secondary school system which would experience a serious deficit of classroom space by school year 1980-81 based on current enrollment and capacity projections would be that of Umatilla where enrollments would be 127 percent of capacity. Hermiston's enrollments would exceed capacity by 5 percent.

Staff increases would generally be minor in the secondary systems. Moderate staff additions would be required in Umatilla (7) and Pendleton (5) in order to maintain current student/teacher ratios.

School Year 1995-96. Table III-15 presents projected school enrollments, projected enrollments as a percentage of current enrollments, and projected staff increases (necessary to maintain current student/teacher ratios) in impact area cities for the 1995-96 school year. Unlike Tables III-13 and III-14, Table III-15 does not include projections for school capacities. It would not be possible

TABLE III-13

CURRENT EDUCATIONAL SERVICE LEVELS IN ALUMAX IMPACT AREA CITIES

<u>City</u>	<u>Boardman</u> ^{1/}	<u>Echo</u>	<u>Heppner</u>	<u>Hermiston</u>	<u>Ione</u>	<u>Irrigon</u> ^{1/}	<u>Pendleton</u>	<u>Stanfield</u>	<u>Umatilla</u>
<u>Elementary Schools</u>									
Enrollment ^{2/}	0	96	314	1,260	80	245	1,555	190	282
Capacity	0	150	473	1,300	144	220	1,800	260	375
Percent Utilization of Capacity	-	64%	66%	97%	56%	111%	86%	73%	75%
Student/Teacher Ratio	-	17:1	24:1	20:1	12:1	24:1	20:1	14:1	20:1
<u>Secondary Schools</u>									
Enrollment	250	103	327	1,320	112	0	1,771	193	259
Capacity	200	140	353	1,370	153	0	1,700	230	350
Percent Utilization of Capacity	125%	74%	93%	96%	73%	-	104%	84%	74%
Student/Teacher Ratio	17:1	15:1	15:1	18:1	12:1	-	17:1	11:1	15:1

1/ Boardman elementary students attend school in Irrigon; Irrigon secondary students attend school in Boardman.

2/ Enrollment figures represent school district estimates of average daily membership for school year 1975-76.

Source: CH2M Hill, 1976a, p. 197; CH2M Hill, 1976b.

TABLE III-14

EDUCATIONAL SERVICES AND PROJECTED NEEDS FOR SCHOOL YEAR 1980-1981

94-III-46

<u>City</u>	<u>Boardman</u> ^{1/}	<u>Echo</u>	<u>Heppner</u>	<u>Hermiston</u>	<u>Ione</u>	<u>Irrigon</u> ^{1/}	<u>Pendleton</u>	<u>Stanfield</u>	<u>Umatilla</u>
<u>Elementary Schools</u>									
Projected Enrollment	370	125	435	1,880	115	350	2,065	290	615
Projected Capacity	450	150	525	1,300	144	450	1,800	260	825
Percent Utiliza- tion of Capacity	82%	81%	83%	145%	80%	78%	115%	112%	164%
Additional Teachers Required to Maintain Current Student/Teacher Ratio ^{2/}	7	1	0	12	1	3	10	3	5
<u>Secondary Schools</u>									
Projected Enrollment	200	125	225	1,445	115	170	1,600	210	445
Projected Capacity	400	140	400	1,370	153	300	1,700	250	350
Percent Utiliza- tion of Capacity	50%	89%	56%	105%	75%	57%	94%	84%	127%
Additional Teachers Required to Maintain Current Student/Teacher Ratio	3	1	0	3	0	1	5	2	7

^{1/} Assumes Boardman elementary students will attend new elementary school in Boardman and Irrigon secondary students will attend new secondary school in Irrigon.

^{2/} Number of teachers is rounded.

Source: CH2M Hill, 1976a, p. 357-358; CH2M Hill, 1976b, updated by BPA telephone interviews conducted with local school superintendents on February 1, 1979.

TABLE III-15

EDUCATIONAL SERVICES AND PROJECTED NEEDS FOR SCHOOL YEAR 1995-1996

<u>City</u>	<u>Boardman</u>	<u>Echo</u>	<u>Heppner</u>	<u>Hermiston</u>	<u>Ione</u>	<u>Irrigon</u>	<u>Pendleton</u>	<u>Stanfield</u>	<u>Umatilla</u>
Projected Enrollment	1,080	355	820	4,665	280	660	3,990	665	1,625
Percent Increase Over Current Enrollment	170%	42%	24%	40%	22%	47%	9%	33%	53%
Additional Teachers Required Beyond Current Staff to Maintain Current Student/Teacher Ratio	40	8	11	86	5	12	35	12	40

Source: CH2M Hill, 1976a, p. 203; updated March 1, 1979 by BPA using latest BPA population projections.

to make reliable projections of classroom capacity so far into the future.

All impact area schools anticipate increases in enrollments. The largest increases in enrollments are expected in Boardman, Umatilla, and Irrigon. Moderate increases are projected for Echo, Heppner, Hermiston, Ione, and Stanfield. A comparatively slight increase is projected for Pendleton.

Substantial staff increases would be required in several impact area cities in order to maintain current student/teacher ratios. Approximately 86 additional teachers would be required in Hermiston, 40 in Boardman, 40 in Umatilla, 35 in Pendleton, 12 each in Irrigon and Stanfield, 11 in Heppner, 8 in Echo, and 5 in Ione.

b. Safety Services.

(1) Police. The January 1976 level of police protection in the study area is indicated in Table III-16 by jurisdiction.

The local, county, and State police are supported by jail attendants, dispatchers, and clerks, and in several cases by reserve officers. Table III-16 shows that police protection per thousand residents ranges from 0.5 to 3.0 sworn officers per 1,000 for the various jurisdictions. Including State police, the average per capita police protection is 1.7 sworn officers per 1,000 population. The national average is 2.3 sworn officers per 1,000 population; the average for the Pacific Region being 1.8 (Federal Bureau of Investigation, 1975).

Deficiencies in law enforcement facilities, such as offices and detention centers, are apparent. There are two detention facilities in Umatilla County: the Public Safety Center in Hermiston and the Umatilla County Jail in Pendleton. The Public Safety Center is a fairly new facility and serves the communities of Echo, Stanfield, Umatilla, and Irrigon in addition to Hermiston. The Umatilla County facility is undersized, and the county has appropriated \$0.5 million from revenue-sharing funds to build a new facility or remodel the present one. A study to determine the best course of action is currently underway. Completion of construction within 2 years is a possibility; however, no firm date has yet been projected. The City of Pendleton needs more office space for its police force than is currently available.

(2) Fire. All fire districts in the State of Oregon are graded on a scale of 1 to 10 by the Insurance Services Office of Oregon. Low gradings indicate high levels of fire protection, whereas high gradings denote less adequate protection. Four factors are considered in the determination of gradings: (1) water supply; (2) fire fighting equipment and personnel; (3) fire prevention measures; and (4) fire alarm systems.

Table III-17 shows the current fire ratings of the fire protection districts in the Alumax impact area. Most of the

TABLE III-16

POLICE PROTECTION IN STUDY AREA

<u>Agency</u>	<u>Number of Sworn Officers</u>	<u>Reserve Officers</u>	<u>Sworn Officers/- 1,000 Pop.</u>
Umatilla County			0.5
Sheriff	10		N.A.
Hermiston	12		4.0
Echo	2	6	3.0
Stanfield	3		1.9
Umatilla	3		1.4
Pendleton	20	9	
Morrow County			0.8
Sheriff	4 <u>1/</u>		
State of Oregon (Umatilla Area)	46		N.A.

1/ The cities of Boardman and Irrigon are served by Morrow County Sheriff and regional State police.

Source: Alumax Pacific Corporation, 1976.

TABLE III-17

1976 FIREFIGHTING CAPABILITIES
AND RATINGS, ALUMAX IMPACT AREA

<u>Community</u>	<u>Fire Grading</u>	<u>Comments</u>
Boardman	7	Volunteer fire department staff. Improvements needed to fight major fires. Need new pumper.
Echo	8	Volunteer fire department staff. Water system inadequate to fight major fires, especially at schools.
Hermiston	5	Volunteer fire department staff with full-time fire chief. Additional full-time personnel may have to be hired to maintain a "5" grading. Water capacities are slightly low for fighting commercial/industrial fires.
Irrigon	9	Serious water problem.
Pendleton	4	Full-time fire department staff.
Stanfield	7	Volunteer fire department staff. Water supply inadequate to supply 5,000 gpm need to fight fires at schools.
Umatilla	6	Volunteer fire department staff. Greater capacity water source needed to fight fires. Need new pumper.

Source: Insurance Services of Oregon, 1976.

smaller districts have poor ratings, reflecting their dependence on volunteer forces, the lack of adequate water to fight major fires and, in some cases, insufficient equipment. Districts with ratings of 5 or below usually have some full-time firemen.

c. Health Services. For the purposes of this analysis health services are considered to be those persons and facilities who provide health care including hospitals, doctors, emergency rooms, county clinics, etc.

(1) Hospitals. Umatilla County, in absorbing most of the Alumax-related population, will also be most heavily impacted in the field of health services. Umatilla County presently has four hospitals -- one in Hermiston, one in Umatilla, and two in Pendleton -- with a total of 248 acute care and 65 long-term care beds.

The hospitals are currently operating within a range of 37 to 54 percent occupancy (Table III-18). An occupancy rate of 85 percent is considered standard for fiscally sound hospital management.

The low occupancy percentages are accompanied by a higher than average ratio of beds/thousand population. The four hospitals in Umatilla County average 6.5 beds per thousand people. An average of 5.5 beds/thousand population is considered standard (State of Oregon, 1975). These figures indicate that hospital service capacity exceeds present demand. Based upon the optimum occupancy rate of 85 percent, a total of 175 beds could currently serve the area.

TABLE III-18

UMATILLA COUNTY HOSPITAL SIZE
AND OCCUPANCY LEVELS

<u>Hospital</u>	<u>Location</u>	<u>Beds</u>	<u>Occupancy</u>	<u>Admissions</u> (1975)
St. Anthony	Pendleton	185 *	48%	3,554
Pendleton Community	Pendleton	55	46%	2,196
Good Shepard	Hermiston	56	54%	2,050
Umatilla Dist. Hospital	Umatilla	17	37%	368

*Includes 65 long-term care beds

Source: CH2M Hill, 1976a, p. 209.

(2) Emergency Service. Ambulance service is provided in four localities: Pendleton, Hermiston, Weston-Athena, and Umatilla. St. Anthony Hospital has the only 24-hour emergency room in the region with a staff physician. Good Shepherd Hospital in Hermiston indicates their emergency room is adequately sized and that the X-ray

and lab facilities are being expanded to meet projected needs. Unlike other health services no service standard for emergency services exist to use as a basis of comparison for adequacy.

(3) Health Care Professionals. The distribution and per population ratios of health care practitioners in Umatilla County are presented in Tables III-19 and III-20. The tables indicate there is currently one primary care physician per 1,375 persons in Umatilla County, a ratio below the preferred ratio of one physician to 1,250 population (Paxton, 1973, p. 105). Umatilla County ratios do exceed the corresponding medians for the State, however, in all categories listed.

d. Cultural and Recreational Services. Cultural resources in the impact area consist of local museums, historical society displays, and libraries.

Libraries represent an important cultural and recreational resource in the impact area. Umatilla County has 10 libraries in its county system containing a total of approximately 132,500 volumes. Morrow County has no county-based system, but city libraries exist in Heppner and Ione. The Heppner library possesses 10,250 volumes; the Ione collection consists of 6,021 volumes. Countywide per capita expenditures for Morrow and Umatilla counties were \$0.80 and \$3.66, respectively. The State average in areas served by libraries was \$5.30. Per capita circulation figures were 1.2 for Morrow County, 4.4 for Umatilla County, and 6.4 for the State.

The Columbia River is the primary recreational resource in the study area. The river creates a variety of water-oriented recreational activities, including boating on Wallula Lake behind McNary Dam, and water skiing, hydroplane racing, swimming, and fishing on the river.

Forested areas in the eastern portion of Umatilla County have many natural attractions including wilderness, scenery, fishing, and wildlife. There are more than 100 overnight camping sites in the Umatilla National Forest along the Umatilla River.

The Columbia River, ponds, and other area waters attract large numbers of waterfowl to the impact region. Hunting is permitted on two Federal wildlife refuges (Umatilla and Cold Springs National Wildlife Refuges), one Federal wildlife management area (Power City) two smaller State wildlife management areas (Irrigon and Willow Creek Wildlife Management Areas), and other Federal and private lands. Winter migratory waterfowl populations are increasing because of refuge development and the expansion of irrigated croplands throughout the area.

Hunting for upland game birds and small mammals is also an important recreational pursuit in the dry, sparsely vegetated terrain of the impact area. Upland game hunting is permitted on the Federal, State, and private lands. The ring-necked pheasant is the most popular upland game bird (Smith, 1973) and high pheasant densities have occurred in Umatilla County. Both ring-necked pheasants and California

TABLE III-19

PRIMARY CARE PHYSICIANS AND DIRECT-CARE SPECIALISTS
UMATILLA COUNTY, OREGON

<u>Location</u>	<u>Category</u>	<u>Number</u>
Hermiston	General Practice	7
Umatilla	General Practice	1
	Internal Medicine	1
Milton-Freewater	General Practice	1
	General Surgeon	1
Pendleton	Internal Medicine	5
	General Surgery	4
	General Practice	4
	Pathology	2
	Orthopedic Surgery	2
	Family Practice	1
	Surgery of Eye	2
	Dermatology	2
	X-Ray Diagnosis	2
	Pediatrics	1
	Psychiatry ^{1/}	2
	Thoracic Surgery	1
	Anesthesiologist	1

^{1/} Does not include those employed by the State of Oregon at the Eastern Oregon Hospital and Training School.

Source: Umatilla County Health Planning Committee, 1976.

TABLE III-20

HEALTH PROFESSIONALS
PER 1,000 POPULATION

	<u>M.D.s</u> ^{1/}	<u>Dentists</u> ^{2/}	<u>R.N.s</u> ^{2/}
Umatilla County	.83 *	.52	3.61
Oregon Median	.77	.50	2.71

*One physician/1,205 persons

^{1/} Umatilla County Health Planning Committee, 1976.

^{2/} Oregon Office of Health Planning Services, 1976.

quail populations are found in the immediate vicinity of the Alumax plant site in areas of dense cover (Hall, 1976). Some Mourning doves also occur in the vicinity of the Alumax plant site during the early fall. Hunting of these species has occurred both on and adjacent to the site. No figures on hunter-days or harvest in the vicinity of the Alumax plant site are available.

A warmwater fishery is presently found in some of the ponds on the Alumax site and fishing use is primarily by local residents. In 1970, an estimated 12,593 angler-days were spent in the Umatilla River Basin (most of Morrow and Umatilla counties) fishing for warmwater species (Smith, 1973, p. 42). In 1974, Irrigon and Willow Creek Wildlife areas had 4,900 fisherman-days (Oregon State Wildlife Commission, 1975). The Alumax site contributes to the warmwater angling for the Umatilla region although specific values for angler-days are unavailable.

All the cities within the impact area have city park facilities for the local populace. Pendleton has 21 separate park areas totaling 76 acres. This includes 28 acres recently purchased, which are undeveloped. A swimming pool is located on a 3-acre site adjacent to the city high school. An old swimming pool structure has been converted into a multipurpose facility used by all age groups. Schools within the city have a total of 13 acres classified as playground or recreation area. In addition to school gymnasiums, the National Guard Armory functions as an indoor sports and activity area.

The City of Hermiston has six municipal parks providing approximately 50 acres of land for outdoor recreation. The largest park, Hermiston Butte, is 39 acres and is largely undeveloped.

Schools within the area, including three elementary schools, one junior high, and one high school, provide adjacent play area. The high school is equipped with an outdoor swimming pool, tennis courts, a lighted stadium and track, and a gymnasium.

Hermiston has constructed a civic recreation center in McKenzie Park providing an excellent resource for service clubs and community organizations. The center is equipped with a kitchen, banquet/auditorium room, and ping pong and pool tables. Adjacent to McKenzie Park, a 7-acre site now provides baseball diamonds, horseshoe pitching, and parking area.

The Hermiston area is served by two public golf courses and one driving range. Other facilities include the Sage Riders Rodeo Grounds and the Umatilla Speedway.

The cities of Stanfield and Boardman each have two city parks totaling 1.5 and 20 acres, respectively. Stanfield's Municipal Park is a 1-acre site including a basketball court and horseshoe court. The Picnic Park is a one-half-acre facility with limited facilities. Boardman has a small city park with barbecue facilities and a baseball park. A second larger park is located on the

river and includes a boat launch, picnic area, overnight camping, and restrooms.

Irrigon, Umatilla, and Echo each have a single city park. The Irrigon and Umatilla parks are waterfront parks and include a playground, picnic area, and boat ramp. The Irrigon Park also provides a swimming area and small boat marina. The Umatilla and Irrigon parks are 40 acres and 3 acres, respectively. The Umatilla Park is about 40 percent developed. The Echo park is a 1-acre site, used principally as a picnic area.

Only Boardman and Umatilla exceed the 15.5 acres 1,000 population standard. Irrigon, Echo, and Stanfield could attain the standard with some modest supplemental acquisitions -- 3 acres, 7 acres, and 14 acres respectively. The remaining cities are considered well below the standard. Pendleton currently has a shortage of 142 acres, Hermiston a shortage of 42 acres.

7. Regional Economy. The major economic impacts of the proposed Alumax plant would be felt in four counties, Morrow and Umatilla in Oregon and Benton and Franklin in Washington. The economy of this region is heavily dependent on agriculture. Wheat is a particularly important crop. Agriculture is also important to the economy because it provides the basis for the food processing industry which is the region's major source of manufacturing employment.

The way in which the land is being farmed is undergoing change. Small farms are being integrated into larger farms which are being cultivated with larger amounts of mechanical equipment. Irrigated farming is also becoming common. These changes have resulted in greater and more efficient agricultural production (Oregon Dept. of Economic Development, 1976).

There is no evidence that the economy is experiencing major structural changes. The service and trade sectors are growing rapidly but their growth has been the result of growth in the agricultural sector (Emerson and Lamphear, 1975). Employment in State and local government is also growing rapidly but this is a reflection of national trends that most likely will not cause major changes in the region's economy (Isard, 1975).

The region's economy is typical of most agricultural-based economies, in that nonagricultural activity is concentrated in trade centers. The study area's major trade center is the Tri-Cities area in Benton and Franklin counties which provides services, trade, and commerce for much of southeastern Washington and northeastern Oregon. Pendleton, in Umatilla County, is a less important trade center which provides a smaller variety of service and serves a smaller area. Residents who reside in rural areas of the 4-county area must travel to one of these trade centers to obtain some types of commercial goods and services.

8. Employment and Labor Force.

a. Current Conditions. Employment in the 4-county impact region is estimated to be about 60,500 in 1975 (Table III-21). Approximately 54 percent of total employment is in Benton and Franklin counties. Umatilla County has over one-third of the region's employment and Morrow County has only about 6 percent of the total.

Services and trade are the largest employment sectors in the region comprising about 45 percent of area employment. Government, manufacturing, and agriculture are other major employment categories. However, in Umatilla County, government and trade are the largest sectors; in Morrow County agriculture is the largest employment category.

Table III-21 which displays unemployment trends in the study area shows that the rate of unemployment has varied between 6.1 percent and 7.2 percent during the years for which data are presented. Since the greatest part of Alumax's recruiting effort would be made in Umatilla County, more detail on the unemployed is provided for that County in Table III-22. Table III-22 shows that about 70 percent of the unemployed in Umatilla County are male and about half are less than 25 years old. Machine operators, service workers, and farm labor are the occupations with the largest estimated unemployment. Professional employees are the smallest unemployment group in terms of percentage. Unemployment in the professional, sales, and clerical categories are low compared with the State unemployment distribution, and unemployment in the service sector is relatively higher.

About 20 percent of the unemployed in Umatilla County are construction workers. Trade, manufacturing, and services are other industries with relatively high unemployment.

b. Future Conditions With Expected Development (but Without Alumax). The Alumax impact region is expected to have substantial employment growth in the next few years. Several major developments in the region have been planned, and construction is expected to begin on most of them between 1976 and 1978 (Table III-23). The data in this table is based on a 1975 report prepared for the Office of the Governor of Oregon by a task force composed of representatives of Oregon State University and various State and local government agencies. The list was supplemented with other known projects after consultation with local government officials in Umatilla County. Most of the planned developments are related to either energy or agriculture. This represents a continuation of the agricultural orientation of the area's economy, but also reflects plans to deal with projected energy shortages.

Table III-24 shows projected employment in the impact area without Alumax but including other developments. Employment in Umatilla County without Alumax is expected to grow most rapidly in the Trade and Service sectors. Agricultural employment is projected to decline and transportation and utilities and nonagricultural self-employment are expected to grow slowly.

TABLE III-21

LABOR FORCE AND EMPLOYMENT TRENDS
UMATILLA, MORROW, BENTON, AND FRANKLIN COUNTIES TOTAL

	<u>1960</u>	<u>1970</u>	<u>1974</u>	<u>1975</u> ^{1/}
Labor Force	51,244	57,136	62,300	65,100
Employment	48,066	53,255	58,495	60,510
Agricultural Employment	5,625	5,455	--	6,075
Mining	31	68	10	50
Contract Construction	4,545	3,508	4,200	4,550
Manufacturing	11,623	11,903	10,040	10,200
Transportation & Utilities	3,747	3,920	3,120	3,025
Trade	8,138	10,502	10,570	10,625
Finance, Insurance, and Real Estate	1,181	1,608	1,505	1,750
Service	8,011	13,130	11,985	12,025
Government	5,165	6,460	9,490	10,050
Unemployment	3,178	3,911	3,805	4,590
Rate (percent)	6.2	6.8	6.1	7.1

^{1/} Estimated

NOTE: 1975 estimates for sector employment are on a place-of-work basis, but labor force and total employment are for place of residence. Therefore, employment by sector does not add to total.

Source: CH2M Hill, 1976a, p. 154.

TABLE III-22

ESTIMATED UNEMPLOYMENT CHARACTERISTICS
UMATILLA COUNTY
1975

	<u>Percentages</u>
Sex	70
Male	70
Female	30
	100
Age	
Under 25	20
25-34	31
35-44	18
44-54	14
55-64	13
65 and over	4
	100
Duration	
1-2 weeks	21
2-4 weeks	18
5-14 weeks	41
15 weeks and over	20
	100
Occupation	
Professional	4
Sales	6
Clerical	6
Craftsmen, foremen, etc.	9
Operatives	28
Laborers	12
Farm Workers	14
Service and private household workers	21
	100

Source: CH2M Hill, 1976a, p. 156.

TABLE III-23

EXPECTED DEVELOPMENTS (EXCLUDING ALUMAX)

	<u>Construction Period</u>	<u>Peak Construction Employment</u>	<u>Full Operation Date</u>	<u>Operation Employment</u>
Portland General Electric Coal-Fired Plant (Carty)	1976-80	730	1980	100
Portland General Electric Nuclear Plant No. 1 (Pebble Springs)	1976-83	1,400	1983	170
U.S. Corps of Engineers Second Powerhouse on McNary Dam	1980-85	400	1988	20
Washington Public Power Supply System Nuclear Projects Nos. 1 and 4	1975-81	3,600	1982	180
Pacific Power & Light Power Generating Plants at Roosevelt, Washington	1977-87	2,700	1989-90	200
Potato Processing Plant (Boardman)	1978-79	200	1979	800
Agricultural Expansion, General	1976-85	25	--	840

Source: CH2M Hill, 1976a, p. 157.

TABLE III-24

PROJECTED EMPLOYMENT WITHOUT ALUMAX

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
<u>Umatilla County</u>				
Agriculture	2,250	2,225	2,200	2,175
Nonagricultural Self-Employed	2,650	2,775	2,750	2,725
Mining	25	25	25	50
Construction	750	850	950	1,000
Manufacturing	4,150	4,475	4,750	5,050
Transportation and Utilities	1,125	1,150	1,200	1,225
Trade	4,575	5,300	5,975	6,650
Finance and Insurance	525	600	675	725
Services	3,025	3,550	4,050	4,550
Government	4,200	4,650	5,025	5,400
 <u>Study Area*</u>				
Agriculture	6,100	6,150	6,175	6,225
Nonagricultural Self-Employed	6,625	6,950	7,100	7,350
Mining	50	75	75	100
Construction	6,150	5,250	3,975	3,750
Manufacturing	11,625	12,550	13,350	14,175
Transportation and Utilities	3,475	4,050	4,250	4,375
Trade	12,800	14,800	16,625	18,450
Finance and Insurance	1,900	2,300	2,750	3,175
Services	14,450	16,650	18,675	20,750
Government	11,350	12,700	14,025	15,375

*Morrow and Umatilla Counties in Oregon, and Benton and Franklin Counties in Washington.

NOTE: Projections are on a place-of-work basis. Bonneville Power Administration information indicates that projections on a place-of-residence basis would not be significantly different.

Source: CH2M Hill, 1976a, p. 159.

In the entire study area, employment in agriculture is projected to stay fairly constant, but construction employment from 1980 to 1985 is expected to decline. Construction declines because most of the expected developments are projected to have completed construction by 1985. The period of intensive construction, based on current construction plans, is expected to be between 1977 and about 1983. Finance and Insurance, Trade, and Services are the sectors projected to have the most rapid growth over the entire study area.

9. Income. The current income characteristics of the 4-county Alumax economic impact area are displayed in Tables III-25, III-26, and III-27. Table III-25 shows the percentage of family incomes at various levels. Table III-26 displays selected income characteristics of the population. Table III-27 shows the source, by sector, of most of the wage income in the study area.

The tables can be used to draw some conclusions about income in the impact area. Total personal income was over \$775 million in 1973 (Table III-26). Benton County had \$356 million, which was about 45 percent of the total. Franklin County had the highest per capita personal income, nearly \$6,200. Morrow County had the lowest median family income in 1969, \$8,425, but it also had the largest percentage of families with incomes of \$25,000 or more (Table III-25).

Services is the largest income sector in terms of pay rolls because of a large employment base (Table III-27). Manufacturing comprises the next largest sector because of the large estimated employment and the relatively high average earnings per worker. The high income totals for Benton and Franklin counties reflect relatively high average earnings and a large employment base.

10. Taxation. The following study of local taxation is limited to Umatilla County because almost all of the Alumax-related local taxes would be paid in that county. Irrigation districts are not considered in this analysis since no tax impacts on them are expected from the proposed plant. Table III-28 shows the number and types of taxing districts in Umatilla County.

TABLE III-25
FAMILY INCOME BY COUNTY
1969

	<u>Morrow</u>		<u>Umatilla</u>		<u>Benton</u>		<u>Franklin</u>	
	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>
All Families	1,194	100.0	11,527	100.0	17,521	100.0	6,344	100.0
Less than \$3,000	152	12.7	1,224	10.6	1,246	7.1	475	7.5
\$3,000-5,999	183	15.3	2,100	18.2	2,210	12.6	980	15.4
\$6,000-9,999	342	28.6	3,696	32.1	4,396	25.1	1,807	28.5
\$10,000-14,999	307	25.7	2,974	25.8	5,544	31.6	1,873	29.5
\$15,000-24,999	135	11.3	1,270	11.0	3,537	20.2	1,042	16.4
\$25,000-49,999	63	5.3	207	1.8	545	3.1	153	2.4
\$50,000 or more	12	1.0	56	0.5	43	0.2	14	0.2

Source: CH2M Hill, 1976a, p. 161.

TABLE III-26

SELECTED INCOME CHARACTERISTICS BY COUNTY
ALUMAX IMPACT REGION

	<u>Morrow</u>	<u>Umatilla</u>	<u>Benton</u>	<u>Franklin</u>	<u>Area Total</u>
Total Personal Income (millions of dollars)					
1969	\$ 14	\$ 148	\$ 241	\$ 91	\$ 494
1972	18	191	307	125	641
1973	22	233	356	164	775
Per Capita Personal Income					
1969	3,146	3,331	3,716	3,527	3,545
1972	4,250	4,198	4,507	4,693	4,436
1973	4,718	5,042	5,144	6,191	5,284
1969:					
Median family income (\$)	8,425	8,639	10,656	9,815	--
Mean family income (\$)	10,380	9,559	11,351	10,486	10,605
Number of families with Social Security income	211	2,246	2,550	798	--
Mean Social Security income (\$)	1,465	1,729	1,818	1,810	1,770
Number of families below poverty level	115	1,196	1,276	597	3,184
Percent of families below poverty level	9.6	10.4	7.3	9.4	8.7
Number of families on public assistance	69	481	870	371	1,791
Mean public assistance income (\$)	829	1,318	1,320	1,497	1,337
Percent families on public assistance	5.8	4.2	5.0	5.8	4.9

Source: CH2M Hill, 1976a, p. 162.

TABLE III-27

COVERED PAYROLLS BY COUNTY*
THIRD QUARTER 1974
(Thousands of Dollars)

<u>Industry</u>	<u>Morrow</u>	<u>Umatilla</u>	<u>Benton</u>	<u>Franklin</u>	<u>Area Total</u>
Mining	0	258	24	19	301
Contract Construction	700	1,096	12,693	1,543	16,637
Manufacturing	874	7,683	15,443	2,637	26,637
Transportation & Utilities	222	1,794	1,511	1,432	4,959
Trade	516	5,856	6,823	4,776	17,791
Finance, Insurance & Real Estate	88	725	1,355	580	2,748
Service	95	2,645	22,161	2,080	26,981
Government	<u>617</u>	<u>7,686</u>	<u>4,486</u>	<u>1,969</u>	<u>14,758</u>
TOTAL, all industries	3,112	27,900	64,661	15,279	110,952

*Payrolls to workers covered under State unemployment compensation laws.

NOTE: Figures may not add to total due to unclassified payrolls and rounding.

Source: CH2M Hill, 1976a, p. 163.

TABLE III-28

NUMBER AND TYPES OF TAXING DISTRICTS
UMATILLA COUNTY
1975-76

<u>Type of District</u>	<u>Number of Districts</u>
County-wide (Blue Mtn. C.C., and County Sheriff's patrol)	2
Cities (police and fire protection, etc.)	12
County school districts	16
Special taxing districts	29
Port of Umatilla	1
Fire districts	10
Cemetery districts	8
Chemical control	1
Water supply district	1
Water control districts	6
Hospital district	1
Vector control	1
TOTAL	59

a. Property Taxes. The largest proportion of all property taxes raised within Umatilla County (about 75 cents of each dollar) is used to provide educational services, the balance is used to provide other public services such as police and fire protection. Total Umatilla County school tax payments in 1975-1976 amounted to over \$12 million out of a total countywide tax revenue of \$16.3 million. Table III-29 lists the distribution of tax revenues by type of taxing district. Of all local taxes raised for education, about 71 percent is raised by individual school districts and about 17 percent through IED property tax levies. The remainder is raised through the Blue Mountain Area Educational District and the county school fund. State and Federal funds provide about 20 percent of total expenditures for education.

b. Other Local Taxes. In addition to property tax levies, the county and cities have other revenue sources such as user charges, fees, permits, franchises, license taxes, grants, subsidies, and State and Federal funds. Local government services, such as sewer, water, and sanitation systems are financed primarily through user charges. Major capital improvements are usually financed through bond issues, special levies, and funds obtained from State and Federal agencies.

TABLE III-29

DISTRIBUTION OF COUNTY TAX REVENUES
UMATILLA COUNTY
1975-76

<u>Tax Recipient</u>	<u>Amount (\$ Million)</u>	<u>Percentage</u>
County	1.8	11.0
Cities	1.9	11.7
Schools	12.1	74.2
Special Districts	<u>.5</u>	<u>3.3</u>
TOTAL	16.3	100.0

c. Property Tax Assessments. Umatilla County has 59 tax districts, which are classified by tax code areas for purposes of computing tax rates for individual properties. For example, Tax Code Area 8-5, which includes the plantsite, includes nine tax districts (Table III-30) with a combined tax rate (or millage) of \$25.56 per thousand dollars of assessed valuation.

TABLE III-30

BREAKDOWN OF PROPERTY TAXES
AT THE PROPOSED ALUMAX PLANTSITE
1975-1976

<u>Tax Code Area 8-5</u>	<u>Millage</u>
County	2.87
IDE 3.21	
Blue Mountain ED	1.93
Port of Umatilla	.25
School No. 8	15.28
Fire District No. 8	.44
Cemetary District No. 8	.25
Hospital District No. 1	1.09
Vector Control	<u>.24</u>
TOTAL	25.56

Source: CH2M Hill, 1976a, p. 232A.

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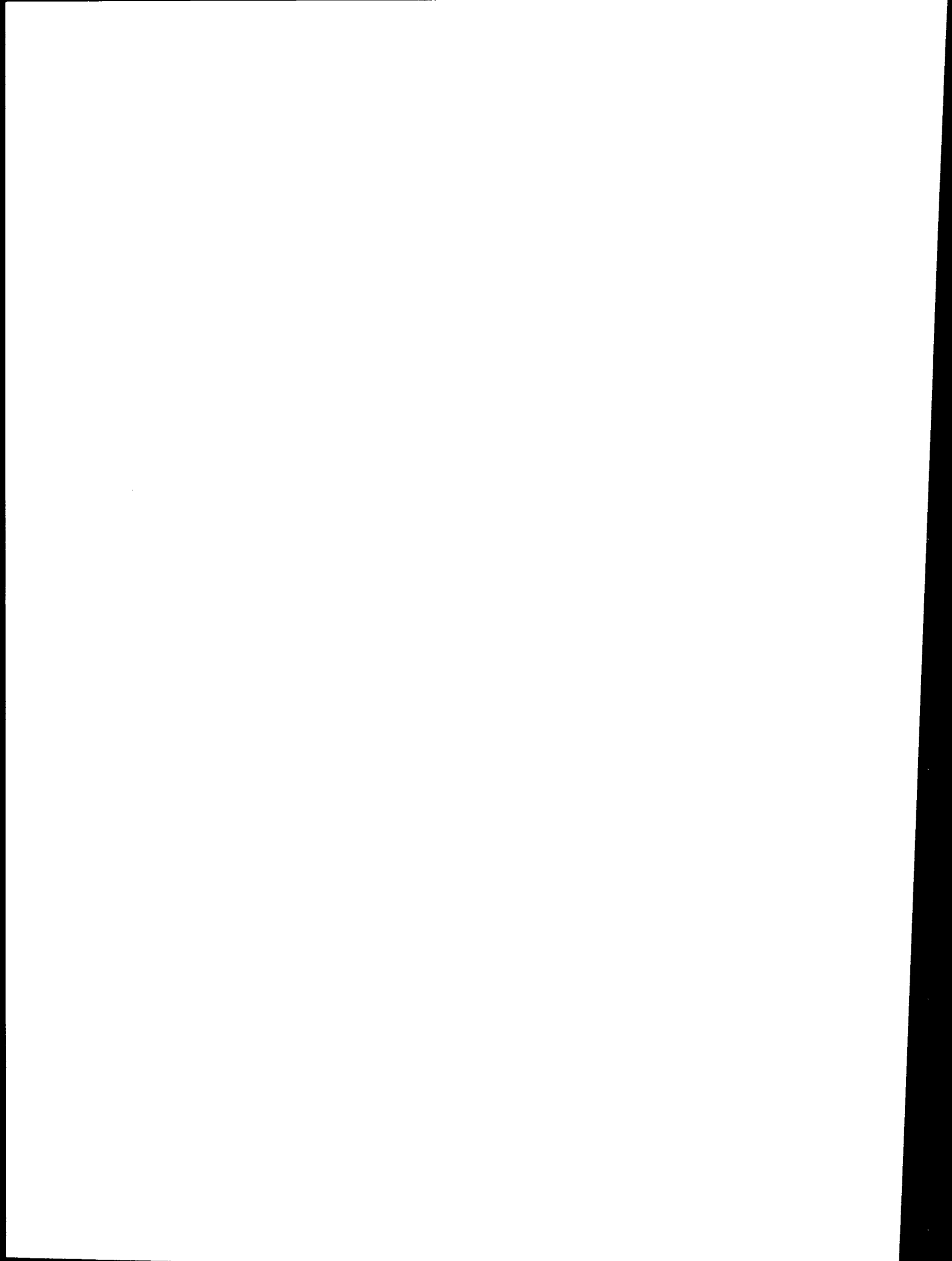
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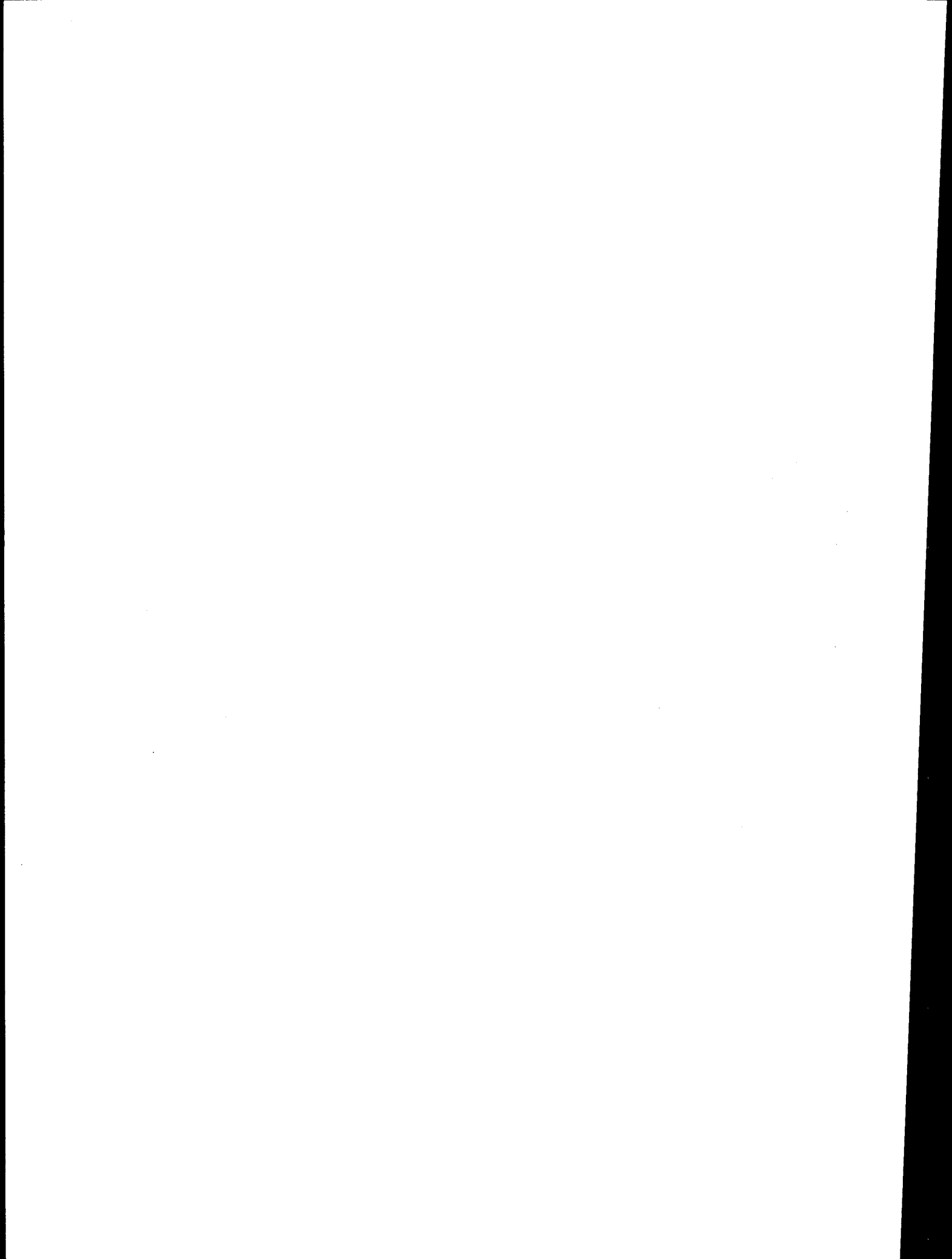
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IMPACTS OF THE PROPOSAL



IV. IMPACTS OF THE PROPOSAL

The proposal in the final EIS calls for BPA to provide power to the Alumax plant until contract expiration in 1986. However, in recognition of the fact that it is possible the company will obtain a source of power supply beyond 1986 if the plant is constructed, the physical and socio-economic impacts are projected until 1995. This is consistent with the draft EIS. Where termination of plant operations in 1986 would result in a significant impact this is also discussed.

Impacts of the proposal on the power system are projected until 1986. After this date impacts will depend on the source of power and terms under which it is provided. At the present time it is not possible to speculate with any accuracy on what these might be. Regional controversies related to resource development and the allocation of federal power are unresolved inputs into any long term power system analysis. When and if long term service to the DSI's in general and Alumax in particular is proposed appropriate environmental assessment will have to be undertaken prior to implementation of specific proposal.

The question has been raised as to whether or not the plant will be constructed without a long term power source. It is not possible for BPA to conclusively answer this question as the decision is one Alumax-Pacific must make, not BPA. The company's official position to date has been that the plant continues to be viable for the company although the regional power situation is definitely a factor. It would be inappropriate for BPA to speculate further on the question. Some general discussion of long term impacts is provided where possible.

Several comments were received from reviewers of the draft suggesting the data base used in the draft be updated as most of the information is from 1975. Where relevant to the understanding of impacts this has been done. In other areas where updating would not alter the significance or magnitude of the impact or otherwise diminish the value of the document to the decisionmaker no modifications were made. There were two major reasons for this decision. First was the substantial funds and staff time which would have been required with no benefits received. Second was the dynamics of the information involved. Primarily population based data, virtually any information developed would have been out of date by publication. In the socio-economic section of this chapter the reader will note tables and text identifying impacts projected to occur in 1977, 1979, etc. When the draft EIS was developed it was anticipated construction would begin in 1977. For reasons discussed above the text has in some instances not been modified. The reader can apply the impact increment to the appropriate future time period by reading year of construction commencement for 1977 and project impacts from that point along the 32-month construction schedule. Impacts designated to occur after the plant has begun operation (1983) stay the same.

A. Physical and Biological Impacts

1. Topographical and Geological Impacts. The flat topography and stable underlying basalt make landslide potential at the

site small, and no impacts would be expected. As the site is not located on a flood plain (U.S.G.S., 1974) no impacts associated with this phenomena will occur. Even prior to the major dam development on the Columbia River the site was not subject to inundation.

The land around the site has been used for grazing, but is not well suited for agriculture (even with irrigation) because of thin soil cover and the considerable number of rock outcrops. The site has no rare geological features. Basalt rock for an undetermined amount of aggregate to be utilized for site preparation (which is in short supply in the area) is the only known mineral resource at the site that would be less available if the proposed Alumax facility were built.

The underlying geology along the proposed BPA transmission route provides a good foundation for the facility, and no adverse impacts would occur.

a. Soils. The nonarable soils at the proposed plant site, and along the proposed BPA transmission route, are subject to severe wind erosion. Disturbances of the soils and vegetation during the construction phase would increase the potential for air quality impacts resulting from wind erosion. These would be temporary in nature and would not cause a violation of National Ambient Air Quality Standards.

It is estimated that as much as 500,000 cubic yards of fluvio-glacial deposits (layers of sand or gravel deposited by glacial streams) manteling the basalt at the site would be replaced with a structural backfill. These sandy soils would be used by Alumax for other purposes, such as landscaping or construction materials where applicable. To replace these soils a quarry could be opened on Alumax property in order to obtain the necessary backfill materials. The necessary quarry size has not been determined, and would be dependent on the amount of backfill required; however, the disturbance of land for quarry activities would be temporary, provided reclamation would be undertaken once quarry activities cease. Alumax has not made such a decision regarding the development of a quarry at this time, however; development is very unlikely, as sufficient aggregate materials are available elsewhere. Should a quarry be warranted, Alumax would be required to petition for a conditional use permit from Umatilla County, subject to rehabilitation procedures set forth in the county zoning ordinance.

b. Groundwater Recharge. The proposed Alumax site is located on a bluff above Lake Wallula. No natural drainage courses cross the site. The site is generally higher than the surrounding ground, providing for a good surface water runoff and control. Developments, due to paving and roofing over a considerable part of the surface area, may reduce the area available for groundwater recharge. However, because of the low annual precipitation (less than 10 inches annually), and because the primary groundwater recharge to the Columbia River basalt occurs in the highlands a considerable distance from the site, only negligible impact to groundwater recharge would occur.

BPA transmission facilities would not impact groundwater resources.

2. Land Use Impacts.

a. Plant Site Impacts. The proposed Alumax plant would alter the approximate 165-acre plant site from its present land use of grazing land to heavy industrial use. The remainder of the 3,000-acre main tract would be left undisturbed, with the exception of the construction of access roads, utilities, and the proposed BPA substation required to service the plant. These facilities would impact only small portions of the 3,000-acre main tract.

Secondary impacts of the construction of the proposed plant could change the nature of land use in the area adjacent to the plant from an undeveloped, low intensity state to one of high intensity usage. Should developing comprehensive plans be influenced by industrial development in the Port of Umatilla area, including Alumax, the area (presently zoned for agriculture) could be designated for further industrial development.

b. Land Development Impacts. Between 90 and 95 percent of Alumax-related growth would be expected to locate in northeastern Morrow and northwestern Umatilla Counties (see Chapter IV.B.1). Undeveloped land would be needed to meet projected residential, commercial, recreational, and public facility requirements of additional population generated by Alumax. Conversion of agricultural land, primarily grazing land, in the region to urban land uses would occur in order to accommodate Alumax-generated populations.

Table IV-1 provides an approximation of the amounts of land needed for development with and without Alumax. Alumax-related population is estimated to generate a demand for about 660 acres of additional land by 1995. A large portion of Alumax-generated development would be for residential land, about 83 percent. Based on the estimates in Table IV-1, Alumax-induced development would be expected to contribute about 20 percent of additional development by 1980, and 9 percent by 1995.

c. Transmission Lines. BPA transmission lines to serve the proposed Alumax plant would have little impact on lands crossed by the route. The route crosses lands south of U.S. Highway 730 which are primarily semi-arid brush covered range with a few scattered farms and dwellings.

Agriculture uses along the proposed route consist of irrigated pastureland and dryland grazing. The lines would have little impact on these uses.

Urban land uses would not be greatly impacted by the location of BPA's transmission lines. The McNary Townsite and Power City would be subjected to visual impacts. Three residences are located within 500 feet of the proposed route and could be temporarily impacted by construction activities, such as dust, noise, congestion and inconvenience.

TABLE IV-1

ACRES NEEDED FOR DEVELOPMENT
WITH AND WITHOUT ALUMAX

Land Use	1975-1980		1980-1990		1990-1996		Total	
	With	Without	With	Without	With	Without	With	Without
Residential ^{1/}	2,200	1,770	2,660	2,690	1,360	1,260	6,220	5,720
Commercial ^{2/}	23.5	19.0	28.5	28.5	14.5	13.5	66.5	61.0
Industrial	NA	NA	NA	NA	NA	NA	NA	NA
Recreation ^{3/}	309.0	247.0	371.0	376.0	190.0	175.0	870.0	798.0
City Parks & ^{4/} Playgrounds	85.0	68.0	102.0	103.0	52.0	48.0	239.0	219.0
Other Recreational Open Space ^{5/}	224.5	179.5	269.0	273.0	138.0	127.0	632.0	579.5
Public Facilities ^{6/}	38.0	30.5	45.5	46.0	23.5	21.5	107.0	98.0
TOTALS	2,880.0	2,314.0	3,476.0	3,516.5	1,778.0	1,645.0	8,134.5	7,475.5

^{1/} Average household size Umatilla County in 1970 was 2.9 (rounded to 3-0) single-family house on 10,000 sq. ft. lots = 3 dwelling units per acre.

^{2/} Weiss, 1968, p. 127. 1.18 acres/1,000 persons.

^{3/} Oregon State Highway Division, 1972, p. 3. 15.5 acres/1,000 persons.

^{4/} Weiss, 1968, p. 127. 4.25 acres/1,000 persons.

^{5/} Oregon State Highway Division, 1972, p. 3. 11.25 acres/1,000 persons.

^{6/} Weiss, 1968, p. 127. 1.9 acres/1,000 persons.

Source: CH2M Hill, 1976a, p. 255A.

3. Natural System Impacts.

a. Vegetation. The proposed plant site would eliminate 165 acres of irrigated pasture (115 acres) and natural vegetation (50 acres). In addition, access roads and the power substation would remove 0.44 additional acre. Most of the plant site would occupy the irrigated grassland but some natural vegetation, such as rabbitbush, cheatgrass, big sagebrush, and aquatic plants (pond habitat), would also be impacted.

Construction impacts would cause windblown dust to have minor effects on vegetation surrounding the plant site. Alumax physical effects upon vegetation from windblown dust would be the elimination of sensitive or young plant species and also reduced growth for established plant communities. Types of vegetation affected would be grasses and aquatic plants adjacent to ponds. This impact will mainly occur downwind (east to northeast) of the plant site within the Alumax property (3,000 acres). Vehicles traveling off the roads may also produce some impacts on existing vegetation.

Air emissions of sulfur dioxide and fluorides would affect vegetation immediately surrounding the plant site but not off the Alumax property boundary. Grasses around the plant site would accumulate fluorides to concentration levels above the 40 ppm dietary tolerance level established for protection of animal life (DEQ, 1975a). Table IV-2 lists those domestic and native plant species susceptible to fluoride damage. The species of major concern would primarily be the grasses. Agriculture crops and urban ornamentals are not existing within the plant boundary so they would not be expected to be affected by fluoride uptake (DEQ, 1975a).

b. Wildlife and Domestic Fauna. Wildlife habitat would be lost on the 165-acre plant site and on additional acreage used for access roads and the power substation. Within the plant site there are nine ponds, constituting about 1.16 acres, which are utilized for water fowl and furbearer production. This available water also complements habitat for upland game bird production. The existing ponds on the 165-acre plant site have been rated high in habitat value according to a recent wetland classification (U.S. Fish and Wildlife Service, 1976).

It would be possible to relocate the plant eastward on the site to avoid conflicting with the ponds. To do so however, would require additional transmission and rail line construction and associated impacts. Alumax has determined replacing the ponds elsewhere on the site is the most viable alternative. This can be accomplished with minor modifications in the irrigation patterns and will result in negligible net impact.

Construction activities would have secondary effects upon resident wildlife inhabiting the surrounding plant site. Nesting waterfowl would be disturbed on ponds located within short distances of the plant site and the access roads. These impacts would be minor and temporary.

TABLE IV-2

FLORA SURVEY OF SPECIES LOCATED OR POSSIBLY
LOCATED WITHIN FIVE MILES OF ALUMAX

Plants	Susceptibility to Fluoride Damage		
	Susceptible	Intermediate	Resistant
<u>Ornamentals</u>			
Juniper			X
Pines (most sensitive)			
Young Needles	X <u>1/</u>		
Old Needles			X
Blue Spruce		X	
Maples		X	
Russian Olive			X
Lombardy Poplar		X	
Honey Locust			X
Sycamores			X
Cottonwood		X	
Willow		X	
Black Locust		X	
Peach		X	
Cherry		X <u>3/</u>	
Apricot (most sensitive sp.)	X <u>2/</u>		
<u>Native Species</u>			
Sage			X
Russian Thistle			X
Cheatgrass			X
Cattails, Marsh Plants			X
Pasture Grass			X
Bitterbrush			X
<u>Crops</u>			
Potatoes			X
Corn		X <u>4/</u>	
Asparagus		X	
Pasture Grass			X
Wheat			X
Sugar Beets			X
Grapes (European)	X		
Alfalfa			X
Melons		X	
<u>Minimum Level of Exposure Causing Damage</u>		<u>Calculated F⁻ Impact at Plantsite</u>	
<u>1/</u> 3 ug/m ³ F ⁻ 24-hour avg.		1.5 ug/m ³ F ⁻ 24-hour maximum	
<u>2/</u> 1 ug/m ³ F ⁻ monthly avg. (growing season)		0.38 ug/m ³ F ⁻ monthly maximum (growing season)	
<u>3/</u> 1 ug/m ³ F ⁻ monthly avg.		0.45 ug/m ³ F ⁻ monthly maximum	
<u>4/</u> 15 ug/m ³ F ⁻ 24-hour avg.		1.5 ug/m ³ F ⁻ 24-hour maximum	

Source: National Academy of Science, 1971

Since wildlife and domestic fauna have fluoride dietary tolerance levels above 40 ppm (Table IV-3) no direct physiological effects are expected (Suttie, 1975). Secondary effects could occur from long-term accumulated air emissions of fluorides in vegetation immediately surrounding the plant as well as on the Alumax property. These subtle effects upon terrestrial and aquatic plants could result in some loss of habitat surrounding the ponds south and east of the plant site. Loss of vegetation could cause a reduction in the existing waterfowl and mammal production for the area. The total acreage of vegetation and ponds possibly affected would be unpredictable; however, the area surrounding the plant site contains about 57 temporary and permanent-type ponds for a total of 36.1 acres.

c. Warm Water Fish. There are two ponds (11.0 acres) where populations of largemouth bass, white crappie, and pumpkinseed provide local fishing recreation. These ponds exist outside the plant site area and therefore are not expected to be impacted by plant construction. Planned access roads will transect one of the ponds causing minor loss of habitat. The long-term accumulation of fluoride concentrations in the pond water could reduce overall productivity of plankton having possible long-term effects upon growth of fish.

4. Air Quality Impacts.

a. Emissions.

(1) Plant. The Oregon State Department of Environmental Quality (DEQ) requires that "the highest and best practicable treatment and control currently available" be applied to control air pollutants from new aluminum plants (Kramer, 1975, p. 3). Environmental Protection Agency (EPA) standards of performance limiting emissions from new aluminum plants (Federal Register, 1976a) are also based on best demonstrated air pollution control technology taking into account cost. The specific State and Federal emission limitations to which the proposed plant would be subject are presented in Table IV-4. Both DEQ and EPA have reviewed Alumax's plans for air pollution control and have concurred that the proposed control systems 1) are consistent with the mandate for best practicable air pollution control technology, and 2) should meet both the EPA standards of performance and the more stringent State emission regulations (Kramer, 1975, p. 3) (Smith, 1975).

Air pollution control equipment to reduce sulfur dioxide emissions is not planned by Alumax, instead the State Air Contaminant Discharge Permit issued to Alumax limits sulfur content of fuel oil that would be used by the plant to 0.3 percent by weight for ASTM Grade 1 oil and 0.5 percent by weight for ASTM Grades 2, 4, 5, and 6. Sulfur contents of coke and hard pitch are also limited to 2.0 and 1.0 percent by weight, respectively (DEQ, 1975a, p. 3). These restrictions limit emissions of sulfur dioxide. Low sulfur fuels often have lower nitrogen and ash contents resulting in lower nitrogen oxide and particulate emissions from combustion as well.

Aluminum production encompasses a variety of operations, each with their own emission characteristics. Table IV-5 identifies all discharge points of air pollutants in the proposed Alumax

TABLE IV-3

FLUORIDE TOLERANCE FOR DOMESTIC FAUNA AND WATERFOWL SPECIES
POSSIBLY LOCATED WITHIN FIVE MILES OF THE ALUMAX PLANTSITE

<u>Species</u>	<u>Dietary Fluoride Tolerances-in PPM F</u>
<u>Domestic-Economic Significance</u>	
Beef or dairy heifers	40
Mature beef or dairy cattle	50
Finished cattle	100
Feeder lambs	150
Breeding ewes	60
Horses	60
Finishing pigs	150
Breeding sows	150
Growing or broiler chickens	300
Laying or breeding hens	400
Turkeys	400
<u>Native-Environmental Significance</u>	
Birds	400
Geese, Ducks, Quail	400
Magpie, Pheasant, etc.	400

These values assume continual ingestion of fluoride by the animals. They take into account the economic usefulness of the animals and are meant to assure that this role is not impaired. These suggested tolerances are for fluoride in soluble form.

Available data suggest that a threshold for an accumulation of fluoride in forage of more than 40 ppm would be a 30-day average air concentration of gaseous fluoride of about 0.5 ug/m^3 .

Annual average air concentrations of gaseous fluoride off the Alumax plantsite are less than 0.2 ug/m^3 .

Source: Suttie, 1974; National Academy of Science, 1971.

TABLE IV-4

EMISSION LIMITS APPLICABLE TO NEW ALUMINUM REDUCTION PLANTS

	<u>Fluorides</u>	<u>Particulate</u>	<u>Visible Emissions</u>
Oregon State Standards for New Aluminum Plants ^{1/}	1.3 lbs. F ⁻ /ton Al produced monthly average	7.0 lbs./ton Al produced monthly average.	Not to exceed 10 percent opacity from any source
	1.0 lbs. F ⁻ /ton Al produced annual average	5.0 lbs./ton Al produced annual average	
	12.5 tons F ⁻ /mo. from any single Al plant without prior approval		
Federal EPA Standards of Performance for New Aluminum Plants ^{2/}	1.9 lbs. F/ton Al produced for potroom groups at prebake plants		Not to exceed 10 percent opacity from any potroom group
	0.1 lbs. F/ton of aluminum equivalent ^{3/} for anode bake plants		Not to exceed 20 percent opacity from any anode bake plant
	2 lbs. F/ton of aluminum produced for vertical or horizontal stud Soderberg plants		

^{1/} Oregon Administrative Rules, 1974.

^{2/} Federal Register, 1976a.

^{3/} "Aluminum equivalent" is the amount of aluminum in tons produced from a ton of anodes at a particular plant.

Table IV-5

DESCRIPTION OF AIR CONTAMINANT DISCHARGE POINTS

Discharge Point Code for Attachment E	Location Code for Attachment B	Source of Emissions	Proposed Control Device	Control Device Efficiency	Discharge Temp. (°F)	Discharge Velocity (ft/min)	Discharge Flow Rate (scfm)	Discharge Elev. Above Grade (ft)	Discharge Point Cross Sect Area ft²	Period of Discharge			Emission Rate								
										hrs/day	days/wk	hrs/wk	Total Particulate			Total Fluoride (F ⁻)			Gaseous		
													gr/scf	lb/hr (max)	lb/ton	gr/scf	lb/hr (max)	lb/ton	gas	lb/hr (max)	
14-1	5	Alumina rail unloading hopper and enclosed rail unloading building	Baghouse	99%	Amb ¹	3,500	20,000	25	5.7	10	7	70	0.020	3.4	0.07						
14-2	6	Alumina storage area-belt conveyor discharge vents and fluidized conveyors	Baghouse	99%	Amb	1,700 1,700	5,000 5,000	110 110	2.9 2.9	10 24	7 7	70 168	0.020 0.020	0.9 0.9	0.02 0.04						
15-1	7	Coke rail unloading hopper, enclosed unloading building and coke silos	Baghouse	99%	Amb	3,500	20,000	100	5.7	4	5	20	0.020	3.4	0.02						
15-2	8	Coke and spent anode silos at green anode plant, silo delivery and reclaim conveyors	Baghouse	99%	Amb	4,200	5,000	100	1.2	24	5	120	0.020	0.9	0.03						
31-1	9	Air swept coke grinding mill at green anode plant	Baghouse	99%	130	3,600	2,500	120	0.7	24	5	120	0.020	0.4	0.01						
31-2	9	Green anode plant processing equipment and conveyors	Baghouse	99%	Amb	3,400	10,000	120	2.9	24	5	120	0.020	1.7	0.06						
31-3	9	Green anode plant processing equipment and conveyors	Baghouse	99%	Amb	3,400	10,000	120	2.9	24	5	120	0.020	1.7	0.06						
31-4	9	Vent for pneumatic conveyor to return packing material from anode baking furnace to the green anode plant	Baghouse	99%	Amb	3,000	1,500	120	0.5	4	5	20	0.020	0.3	0.001						
31-5	9	Liquid pitch storage area, pitch unloading, and mixing and forming areas in the green anode plant	Johns-Manville High Energy Air Filter (HEAF)	95%	100	3,000	30,000	90	10.0	24	5	120	0.010	2.6	0.09						
31-A	-	Hot oil boiler ³	None	-	500	-	-	30	-	24	7	168	-	-	-	Combustion Products - Oil Firing ³					
33-1	10	Removal of carbon packing from anode bake furnace (1 baghouse on each of two cranes used)	2 Baghouses	99%	200	3,300	6,000 (3,000 each)	50	0.9	4	7	28	0.037	1.9	0.01						
33-2	11	Baked anode cleaning machine	Baghouse	99%	Amb	3,500	9,000	25	2.6	10	7	70	0.020	1.5	0.03						
33-3	3	Anode baking furnace	Dry Scrubbers	-	225	3,450	137,000	100	39.7	24	7	168	0.005	5.9	0.27	0.000188	0.22	0.10	HF SO ₂ CO CO ₂ 14,285	0.23 42 73 14,285	
34-A	-	Furnace and Dryers ¹	None	-	Amb	Through Gravity Roof Vent										Combustion Products - Oil Firing ³					
34-1	13	Anode rod, cathode collector bar, and spent anode cleaning machines and cast iron tumbling mills	Baghouse	99%	Amb	3,500	20,000	25	5.7	7	7	49	0.020	3.4	0.05	0.000109	0.02	0.0003			
34-2	13	Spent anode crushing including crusher feed and discharge	Baghouse	99%	Amb	3,400	10,000	25	2.9	7	7	49	0.020	1.7	0.02						
42-1	-	Crushing, screening and conveying of reclaimed bath material	Baghouse	99%	Amb	3,300	4,000	30	1.2	4	2	8	0.020	0.7	0.001	0.010	0.34	0.001			
43-1	1	Primary potline control system	Dry Scrubbers	97%	175	3,450	1,470,000	150	426	24	7	168	0.00257	32.4	1.51	0.000342	4.31	0.201	HF SO ₂ CO CO ₂ 54,029	0.35 782 10,815 54,029	
43-2	2	Reacted alumina day bins (one for each potline)	Baghouses (1 for each bin)	99%	Amb	3,300	6,000 (3,000 each)	75	0.9	24	7	168	0.020	1.0	0.05	0.00014	0.01	0.0003			
43-3	2	Secondary potline control system	80 Spray Scrubbers	75% ²	5°F over Ambient	400	8,000,000 (10,000 each)	75	250	24	7	168	0.000207	14.2	0.66	0.000038	2.62	0.123	HF SO ₂ CO CO ₂	1.37 12 165 823	
44-1	-	Dross cooling system	Baghouse	99%	150	3,000	18,000	30	6	8	7	56	0.023	3.5	0.05						
44-A	4	Holding furnaces, degassing operation	None (see text)	-	600	1,700	30,000	70	3	24	7	168	0.0057	1.5	0.07	Combustion Products - Oil Firing				SO ₂ Cl	25 0.20
44-B	4	Ingot homogenizing furnace	None	-	1,200	940	3,000	50	0.8	24	7	168				Combustion Products - Oil Firing ³					
56-A	-	Laboratory fume hood	None	-	Amb		Fume Hood Exhaust														
57-A	-	Mobile equipment and maintenance shops	-	-	Amb		Automotive Exhaust														

Source: Alumax Pacific Corp., April 1975

¹Ambient²Fluoride and particulate efficiency³The original proposal called for use of natural gas fuel in these sources and impacts were calculated on this basis.

Alumax (MacDonald, May 25, 1976) now states that only oil will be used as fuel.

plant, the sources of these pollutants, the control device planned for use, the discharge dimensions, discharge temperature, amount of pollutants discharged, periods of discharge, etc. Locations of the discharges are shown on Attachment B using Table IV-5 as a key. Plans call for a built-in redundancy permitting some air pollution control units to be shut down for repair or maintenance without affecting overall control (CH2M Hill, 1976a, p. 402). Attachment B gives more detailed information about the planned air pollution control equipment. Manufacturers of this equipment have not yet been selected, but equal quality and efficiency are offered by several manufacturers (Alumax Pacific Corporation, 1975, Schedule 1).

Fluxing of aluminum, prior to casting, with chlorine gas, salt fluxes, or hexachlorethane pills has caused a significant emission problem at other aluminum plants in the past. Ingot casting at the proposed Alumax plant would only use external diffuser degassing with a nitrogen-chlorine mixture during molten metal transfer. This method produces lower amounts of air pollutants than some other methods of fluxing, as well as having process advantages. Fumes from the degassing operation would be expelled through a holding furnace stack. A similar operation at an existing plant had particulate emissions of 0.0057 grains per standard cubic foot (gr/SCF), well below Oregon requirements, and residual gaseous chlorine emissions of 1.2 parts per million. No control device is planned to further reduce emissions of chlorine or particulate from the degassing operation or cast house holding furnaces (Macdonald, 1975).

The emission estimates given on Table IV-6 are Alumax estimates based partially on emission data obtained from other primary aluminum reduction plants. Total emissions for the plant are estimated as follows:

TABLE IV-6

ALUMAX PROJECTED MAXIMUM EMISSIONS FROM THE PROPOSED PLANT

	<u>lb./ton Al</u>	<u>tons/year</u>
Particulate <u>1/</u>	5.00000	468.0
Total Fluoride <u>1/</u>	0.50000	46.8
Sulfur Dioxide <u>1/</u>	40.30000	3,774.0
Carbon Monoxide <u>2/</u>	518.00000	48,500.0
Chlorine <u>3/</u>	0.00094	0.88

1/ Alumax projections of maximum emissions contained in a DEQ report presented at the Environmental Quality Commission's public hearing on Alumax, July 15, 1975.

2/ Includes CO from the primary and secondary control systems and the carbon baking plant only. Does not include CO from other combustion sources or in-plant and plant-induced vehicular traffic. Calculated from Table 1 of "Calculated Impact on Ambient Air Quality of CO Emissions from Stationary and Mobile Sources at the Proposed Aluminum Plant at the Port of Umatilla, Oregon," H. E. Cramer Company, Inc., May 22, 1975.

3/ Calculated from Table IV-4 based on fluxing 24 hours per day, 365 days per year. Fluxing will probably not be performed to this extent, but will depend on product mix.

In addition, nitrogen oxides and hydrocarbons would be emitted from combustion sources, the anode preparation operations, and the reduction cells, but sufficient information is not available to quantify these beyond knowing that they are minor when compared to the other emissions.

The Oregon Department of Environmental Quality performed statistical analyses on emission data on which some of the above estimates were made and arrived at the following maximum emission rates (Kramer, 1975, p. 2):

Oregon State standards for new primary aluminum plants require all discharges to the air to be 10 percent capacity or less at all times. Condensed water vapor is exempted. All emission sources in the proposed plant would comply with the Department rules for visible emissions based on expected particulate emission concentrations that would be emitted from individual exhaust points (Kramer, 1975, p. 2). Visible plumes caused by condensed water would occur above the stacks of the secondary scrubbers and over four cooling towers near the metal services building. Formation of these plumes depends on humidity and wind speed. When humidity is low, the secondary scrubber plumes would probably not be visible and the cooling tower plumes will be very short. At 90 percent relative humidity with a 2-mile-per-hour wind, conditions which occur less than 14 percent of the time in the Umatilla area, the secondary scrubber plumes could extend for about 2,200 feet downwind (Cramer and Bowers, 1975c).

TABLE IV-7

DEQ MAXIMUM PROJECTED AIR EMISSIONS
FROM ALUMAX
(lbs/ton of Aluminum)

	<u>Yearly Average</u>	<u>Monthly Average</u>	<u>Short-Term Average</u>
Particulate	4.1	5.1	6.5
Total Fluoride	0.5	0.7	1.0
Gaseous Fluoride	0.1	0.1	0.2
Sulfur Dioxide	40.3	40.3	40.3

Principal thermal emissions to the atmosphere are summarized in Attachment C. Hot gases would rise because of the

stack gas velocity and thermal effects until thermal equilibrium is reached through entrainment and mixing with ambient air. Thermal emissions would cause localized heating of the air over the plant, but effects beyond this are not expected to be significant (Cramer and Bowers, 1975b).

Current total emissions (sum of point sources emitting 25 tons/year of particulate or SO_x and area sources not including wind blown dust) in Umatilla County would be increased by .86 percent for particulates and 485 percent for SO_x if the Alumax plant is built, based on Table IV-8 and the emission^x inventory data of Chapter III.A.6.b.(2). The Alumax plant would become the largest single source of these two pollutants in the county.

(2) Construction-Related Emissions. The major impacts from construction would be exhaust emissions (particulate, CO, hydrocarbons, aldehydes, SO₂, and NO_x) from trucks and construction equipment and dust stirred up by the^x equipment and wind. No open burning at the plant site is permitted by the air contaminant discharge permit (DEQ, 1975a, p. 6). It is not possible at this time to estimate exhaust emissions from the construction equipment because the types of equipment and the extent of their use are not known. Emission factors for construction equipment are given in Compilation of Air Pollutant Emission Factors (U.S. EPA, 1977, Part A, p. 3.2.7-1 through 3.2.7-7). Dust generated by heavy construction operations if mitigating measures are not taken has been estimated as 1.2 tons per acre per month of activity (U.S. EPA, 1977, Part B, p. 11.2.4-1). This value applies to construction operations with: (1) medium activity level, (2) moderate soil silt content, and (3) semiarid climate. Data is not sufficient to correct the estimate for differing conditions. The air contaminant discharge permit (DEQ, 1975a, p. 6) requires that dust suppression measures be used at all times to meet requirements of the Oregon Administrative Rules on "Fugitive Emissions" and "Nuisance Conditions" (1972, Chapter 340, Sections 21-050 through 21-060). Thus, some mitigation of construction related impacts will occur. An effective watering program (i.e., twice daily watering with complete coverage), if chosen to comply with the requirement for dust suppression, could reduce dust emissions by up to 50 percent (U.S. EPA, 1977, p. 11.2.4-1). Since this dust would be generated at ground level, dispersion would be poor. It is likely that particulate levels would at times exceed standards in areas adjacent to the plant site during some phases of construction even with mitigating measures being used.

(3) Emissions from the Transmission of Electricity. Impacts of transmission lines are discussed generally in Appendix B of the draft Role EIS. The only post-construction impact on air quality of the transmission and substation facilities for the proposed Alumax plant is the possible generation of ozone and nitrous oxide from corona discharges. The amounts which would be generated will not have significant adverse effects. (See Appendix B, VII.C.2., of the draft Role EIS for further discussion of ozone generation by transmission facilities.)

Table IV-8

MAXIMUM 1/ AIR QUALITY IMPACT $\mu\text{g}/\text{m}^3$

Air Contaminant	Estimated Annual Numbers of Occurrences	Plant Site Existing Air Quality Background (estimated)	Impact Based on Case 1 Average Emissions Projected by Alumax	Impact Based on Case 2 Maximum Emissions Projected by DEQ	Impact Based on Case 3 Emissions at the DEQ Standard 2/	Proposed EPA Significant Air Quality Deterioration Criteria and State Air Quality Standards					
		(BKGND) 3/	W/O BKGND	W/BKGND	W/O BKGND	W/BKGND	W/O BKGND	W/BKGND	Class I Area "Clean Air" Increase over bkgnd	Class II Area "Moderate Growth" Increase over bkgnd	Class III Existing State Ambient Standards
Particulate Matter											
Annual Geometric Mean	- 4/	39.4	3.5	42.9	4.6	44.0	6.8	46.2	5	10	60
Max. 24 Hr. Average	7	105.0	8.0	113.0	10.0	115.0	17.0	122.0	10	30	150
Sulfur Dioxide											
Annual Arithmetic Mean	-	13.0	14.0	27.0	14.0	27.0	14.0	27.0	2	15	60
Max. 24 Hr. Average	2	13.0	41.0	54.0	41.0	54.0	41.0	54.0	5	100	260
Max. 3 Hr. Average	3	13.0	105.0	118.0	105.0	118.0	105.0	118.0	25	700	1,300
Gaseous Fluoride											Wash. DOE Ambient Standards
Annual Average	-	0.0	0.14	0.14	0.16	0.16	0.30	0.30	-	-	-
Monthly Maximum	1 5/	0.0	0.22	0.22	0.24 6/	0.24	0.45	0.45	-	-	(0.84)
Seasonal Avg. (Growing Season)		0.0	0.12	0.12	0.19 7/	0.38	0.38	0.38	-	-	(0.50)
Max. 24 Hr. Average	7	0.0	0.60	0.60	0.80	0.80	1.50	1.50	-	-	(2.90)
Max. 12 Hr. Average	7	0.0	1.20	1.20	1.60	1.60	3.00	3.00	-	-	(3.70)
Max. 3 Hr. Average	7	0.0	5.00	5.00	6.30	6.30	11.80	11.80	-	-	-
Particulate Fluoride											
Annual Average	-	0.0	0.18	0.18	0.20	0.20	0.37	0.37	-	-	-
Monthly Maximum	1 5/	0.0	0.25	0.25	0.27 6/	0.27	0.50	0.50	-	-	-
Seasonal Avg. (Growing Season)		0.0	ND 8/	ND	0.31 7/	ND	ND	ND	-	-	-
Max. 24 Hr. Average	7	0.0	0.70	0.70	1.10	1.10	2.10	2.10	-	-	-
Max. 12 Hr. Average	7	0.0	1.40	1.40	2.10	2.10	3.90	3.90	-	-	-
Max. 3 Hr. Average	7	0.0	5.50	5.50	8.50	8.50	15.90	15.90	-	-	-
Carbon Monoxide 9/											
Stationary Sources 10/											
1 Hr. Average	13	NA 11/	1.75 ug/m ³	NA	-	-	-	-	-	-	10 ug/m ³
8 Hr. Average	1	NA	1.15 ug/m ³	NA	-	-	-	-	-	-	40 ug/m ³
Mobile Sources 12/											
1 Hr. Average	ND	NA	0.13 ug/m ³	NA	-	-	-	-	-	-	10 ug/m ³
8 Hr. Average	ND	NA	0.02 ug/m ³	NA	-	-	-	-	-	-	40 ug/m ³

1/ Maximums occur northeast of plant just off plant site boundaries except for carbon monoxide.

2/ Estimates based on ratioing impacts calculated for Case 1 and 2 conditions.

3/ Umatilla County (does not include days having obvious dust storms).

5/ Occurs in December.

7/ September value determined to be the worst case month out of the growing season.

9/ Maximums resulting from stationary sources occur under different conditions than maximums resulting from mobile sources so both will not occur simultaneously.

10/ Maximums from stationary sources occur at the center of the Columbia River north of the primary scrubber system stack.

11/ NA - data not available.

12/ Maximums occur on U.S. Route 730 at the eastern edge of McNary.

Sources: Kramer, L., 1975, Table 3.

Cramer and Bowers, 1975a, p. 32, 33, 41, 42, 43

Cramer and Bowers, 1975f, p. 11, 14

Cramer and Bowers, 1975d, p. 4-24.

4/ "-" means not applicable.

6/ Ratioed.

8/ ND - not determined.

b. Impact on Ambient Air Pollutant Concentrations.

(1) Plant Emissions. The H. E. Cramer Company, Inc., has performed dispersion modeling calculations under contract to Alumax to predict ambient concentrations of pollutants which would result from the proposed Alumax plant at Umatilla (Cramer and Bowers, 1975a). The assumptions and methods used by Cramer have been reviewed by the Oregon DEQ and the Region X Office of the Environmental Protection Agency and found satisfactory (Smith, 1975). DEQ has also performed some modeling independently to spot check Cramer's results and found reasonable agreement (Kramer, 1975, p. 3). Up to three bases for determining possible impacts were used by Cramer, depending on the pollutant of interest: Alumax maximum emission estimates, DEQ's estimates of emissions based on statistical analyses of the data from which the Alumax estimates were made (see Table IV-7), and the levels of emission standards. The emission estimates and impact calculations used are based on the original proposal of using natural gas for about 9 percent of the plant's fuel requirements. According to later information from Alumax (Macdonald, 1976), only oil will be used as fuel. The estimates and calculations were not corrected for the additional SO₂ which would result since this increase would be small compared to total projected SO₂ emissions from the proposed plant.

Alumax maximum air quality impacts are summarized in Table IV-8. These maximum air quality impacts are calculated maximum concentrations which would be expected to occur under "worst case" adverse conditions at a point outside of the plant site boundary averaged over a set time period. The table presents these impacts for the three bases mentioned in the preceding paragraph. This table shows that ambient air quality standards and EPA Significant Air Quality Deterioration criteria for Class II (moderate growth) areas for particulate and SO₂ would be met if the plant is built, even on the most pessimistic basis assumed, Case 3.

Worst case conditions for dispersion of pollutants from the proposed plant vary depending on the pollutant under discussion because the characteristics of the discharges vary. This can most easily be understood by examining the proposed primary and secondary potroom scrubbing systems. The secondary system will discharge at 80 different points along the potline buildings. The stacks will extend only 25 feet above the 50-foot high potline buildings, the gas will be only slightly above ambient temperature, and the stack gas velocity is low. In this case, the plumes will not rise vertically but are drawn downwards when wind speeds approach or exceed the stack velocity. The plumes become trapped in the spaces adjacent to the buildings. This effect, known as downwash, leads to high ambient concentrations close to the plant.

The primary system exhausts through a single 150-foot stack at comparatively high temperature and velocity. For such sources, there is a critical wind speed which will lead to maximum pollutant concentrations, in this case about 35 miles per hour (Cramer and Bowers, 1975a, p. 26).

Maximum ambient particulate, gaseous fluoride, and particulate fluoride concentrations at or beyond the plant site boundary result primarily from the secondary scrubber system and occur at a low wind speed of about 4.5 miles per hour, the approximate minimum speed at which downwash occurs. Maximum ambient SO_2 and CO concentrations at or beyond the plant site boundary line were ascribed primarily to the discharge from the primary scrubbing system.

All maximum concentrations measured at or beyond the plant site boundary result from winds blowing north or south. This is for two reasons: first, the distance from the plant proper to the boundary is less in these directions, and second, the discharge points are more concentrated in the east-west direction than in the north-south direction leading to greater overlap of plumes when they are dispersed to the north or south (Cramer and Bowers, 1975a, p. 22-27).

Figures IV-1 through IV-7 are maps showing various isopleths of average ground level pollutant concentrations expected to be generated by the plant, as determined by Cramer based on DEQ emission projections. (To obtain actual concentrations, background levels given in Table IV-8 must be added.) September isopleths for gaseous and total fluorides and particulates represent the worst case month during the growing season. These figures show that the predominant area of impact from the plant is to the east and northeast, as expected from the wind distribution.

Additional maps showing isopleths of ground level annual average and September average particulate fluoride concentrations and isopleths of June average gaseous fluoride, particulate fluoride, total fluoride, and particulate concentrations based on DEQ emission projections are provided as Attachments C through I.

(a) Sulfur Dioxide. Figure IV-1 shows the increases above background levels in average annual SO_2 concentration which would result from the proposed plant, and the areas over which these increases would occur. Annual average SO_2 concentrations in a corner of Umatilla, not including McNary which was recently annexed by Umatilla, would be increased by about 0.5 ug/m^3 . Annual average SO_2 concentrations over part of McNary would be increased by between 2 and 5 ug/m^3 . Areas in which average annual SO_2 concentrations would be increased by more than 5 ug/m^3 are either on the plant property, over the river, or vacant scrubland except for strips immediately along either side of the river used for public recreation and by wildlife. Existing annual average SO_2 concentrations are about 13 ug/m^3 . Ambient SO_2 standards would not be exceeded if the plant were built and operated.

(b) Particulate. Figures IV-2 and IV-3 show isopleths of annual average and September average particulate concentration increases which would result from the proposed plant. Increases in particulate concentrations at Umatilla would be very low and, at McNary, would range between 0.2 ug/m^3 and 1 ug/m^3 depending on time of year and the location in McNary. Areas where increases in average monthly or annual particulate concentration shown on these figures

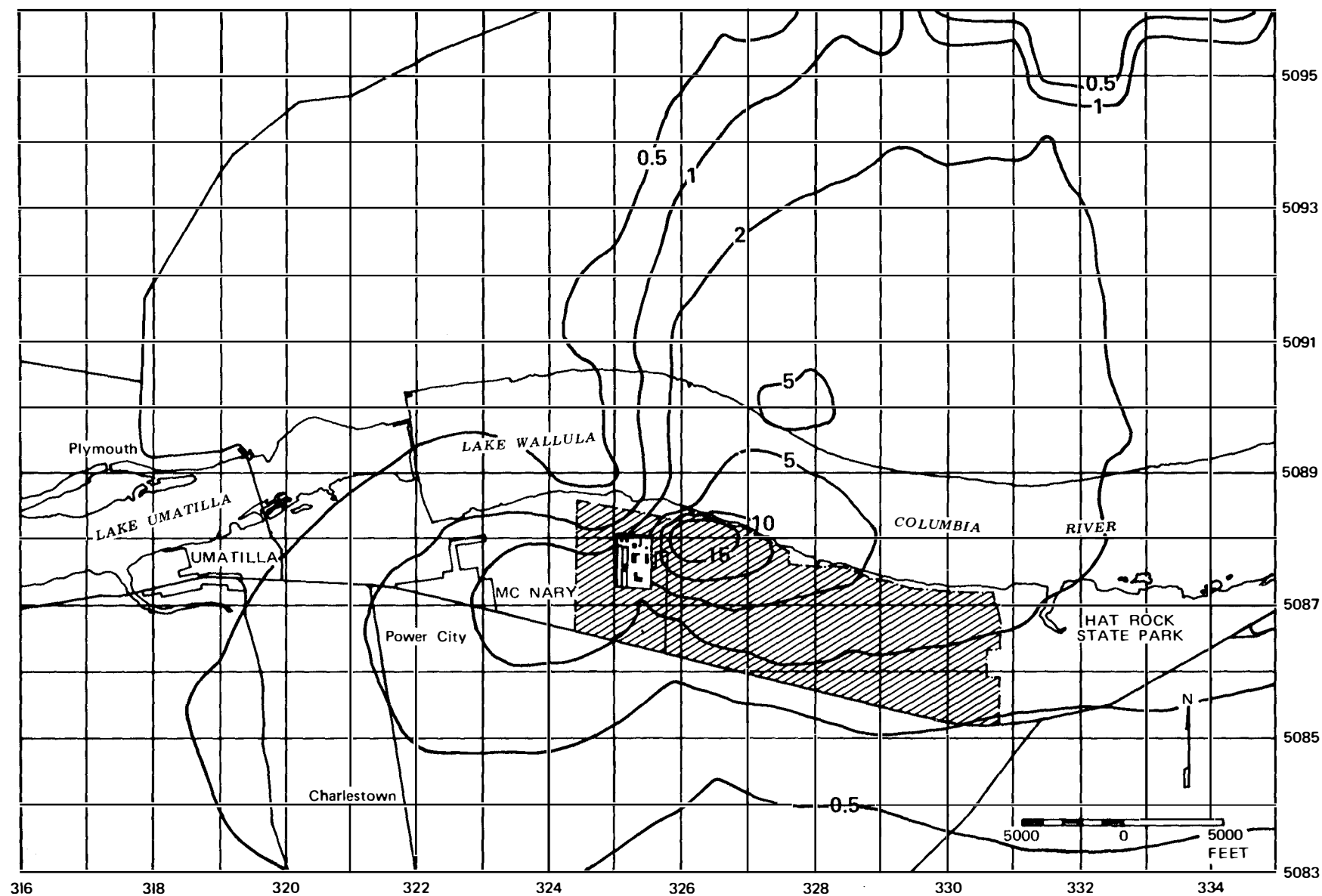


Figure IV-1
CALCULATED ISOPLETHS OF ANNUAL AVERAGE GROUND-LEVEL SO_2 CONCENTRATION IN
MICROGRAMS PER CUBIC METER.

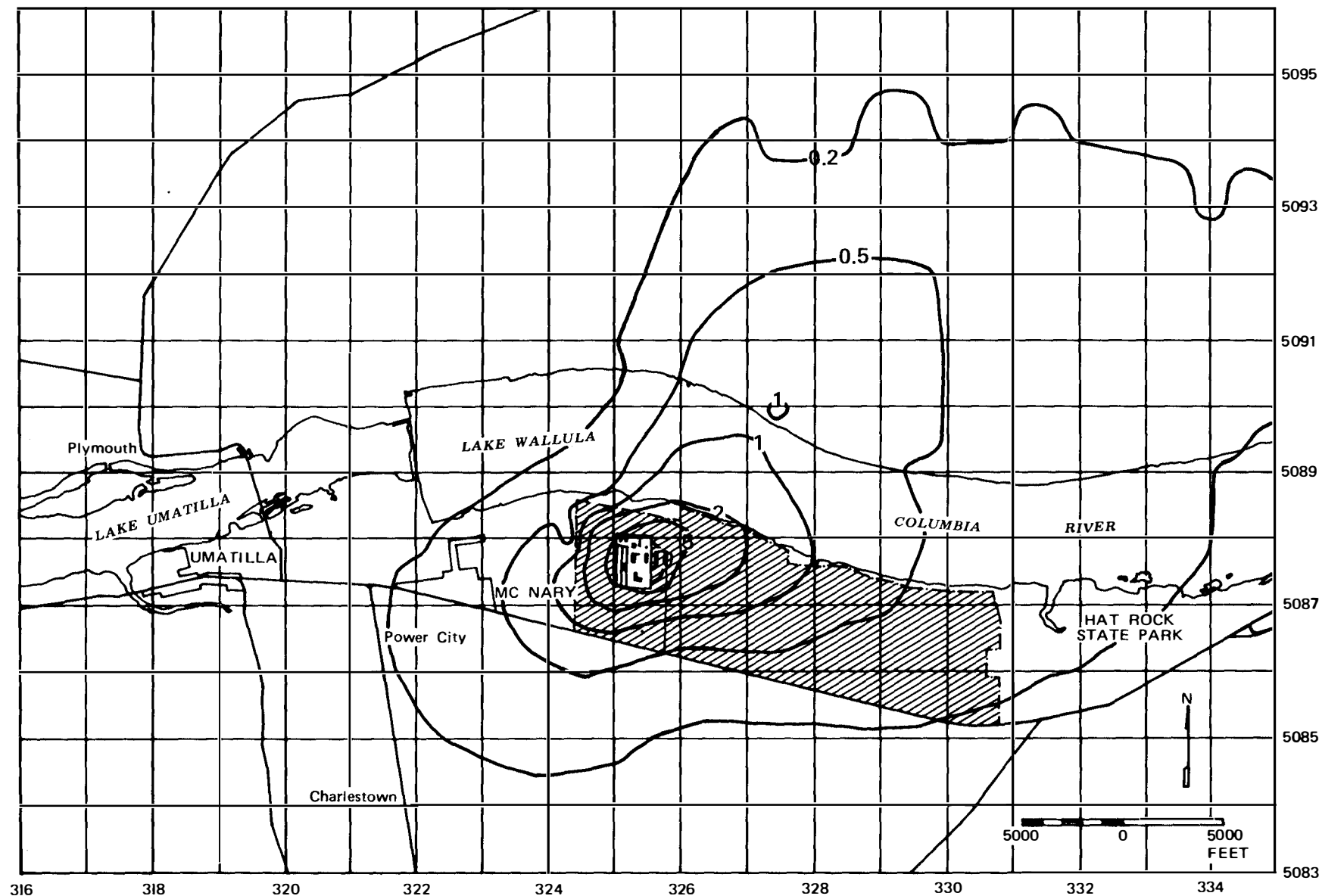


Figure IV-2
CALCULATED ISOPLETHS OF ANNUAL AVERAGE GROUND-LEVEL TOTAL PARTICULATE
CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM
EMISSION RATES.

Source: Cramer, Bowers, 1975d, P. 10.

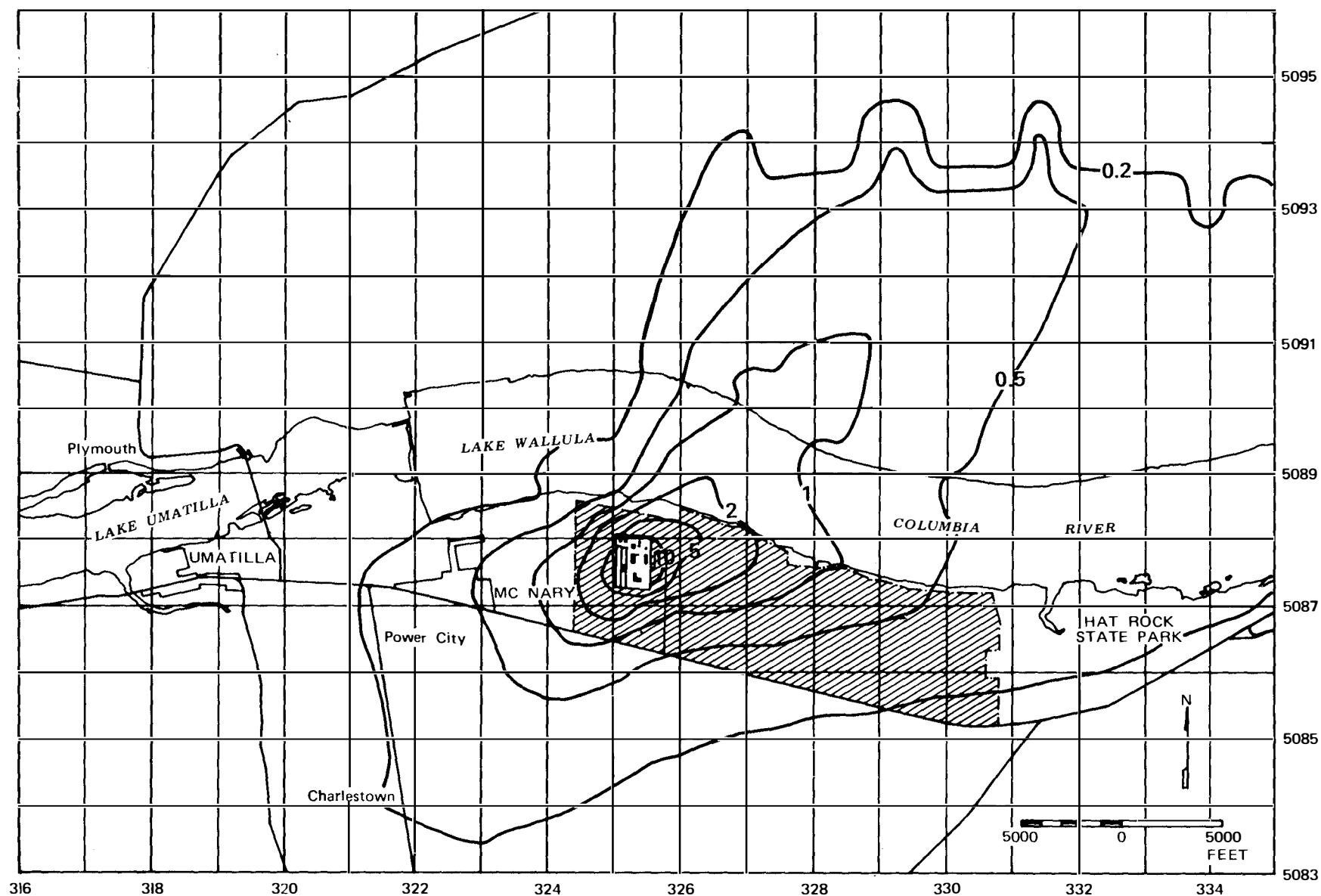


Figure IV-3

CALCULATED ISOPLETHS OF SEPTEMBER MONTHLY AVERAGE GROUND-LEVEL TOTAL PARTICULATE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

Source: Cramer, Bowers, 1975d, P. 20.

exceed 2 ug/m^3 are primarily the plant property, and over the river. Ambient particulate concentrations in the Umatilla area sometimes exceed standards during dust storms. Excluding these times, the annual geometric mean concentration is about 40 ug/m^3 . Contributions of the proposed plant to ambient particulate concentrations are not great enough to result in violations of standards.

(c) Fluorides. Figures IV-4 and IV-6 show isopleths of annual average gaseous and total fluoride concentrations resulting from the plant, and Figures IV-5 and IV-7 show average isopleths of gaseous and total fluoride concentrations for September, the worst case month of the growing season. Background fluoride levels can be considered to be negligible since there are no unnaturally occurring sources of them in the area. Oregon has no ambient fluoride standards, but the levels of the Washington standards for gaseous fluorides would not be exceeded anywhere off the plant site. McNary would be exposed to less than 0.02 ug/m^3 gaseous fluoride as an annual average, although monthly average concentrations of gaseous fluorides may approach 0.05 ug/m^3 in December (Cramer and Bowers, 1975d, p. 36). Ambient concentrations of total fluorides would be between 0.02 and 0.05 ug/m^3 at McNary on an average annual basis, although parts of the town would be exposed to monthly average total fluoride concentrations between 0.05 and 0.1 ug/m^3 part of the time.

Areas exposed to more than 0.2 ug/m^3 (annual or monthly average) of total fluoride and areas exposed to more than 0.1 ug/m^3 (annual or monthly average) of gaseous fluoride are over the plant property, the river, and the land between.

(d) Specific Receptor Sites. Expected long-term contributions of the proposed plant to ambient pollutant concentrations at several specific sites of interest were determined by Cramer and Bowers (1975a, Ap. D; 1975d, p. 22-24). These sites are identified on Figure IV-8 by the code letters given in Table IV-9 which show the results. Short-term SO_2 concentrations from the plant at Hat Rock State Park, the Cold Springs Wildlife Refuge, and the McNary Wildlife Refuge were also calculated (Cramer and Bowers, 1975e and 1975g). Fumigation which may occur under conditions of persistent light winds would result in the highest concentrations at distances of 3 to 5 miles from the plant where these sites are located. However, light but persistent winds are not the only criteria necessary for fumigation to occur and examination of meteorological data for the period April 1, 1973 to March 31, 1974, showed only two instances where fumigation of any of these areas would have actually occurred. Data indicate that one instance of fumigation would have occurred at the Cold Springs Wildlife Refuge and this instance would have resulted in increases of ground level SO_2 concentrations of 23 ug/m^3 based on the 3-hour averaging time, and 4 ug/m^3 based on the 24-hour averaging time, had the Alumax plant existed at that time. At Hat Rock State Park, the one instance of fumigation would have resulted in increases of groundlevel SO_2 concentrations of 23 and 3 ug/m^3 , based on the 3-hour and 24-hour averaging times, respectively, if the plant had been there.

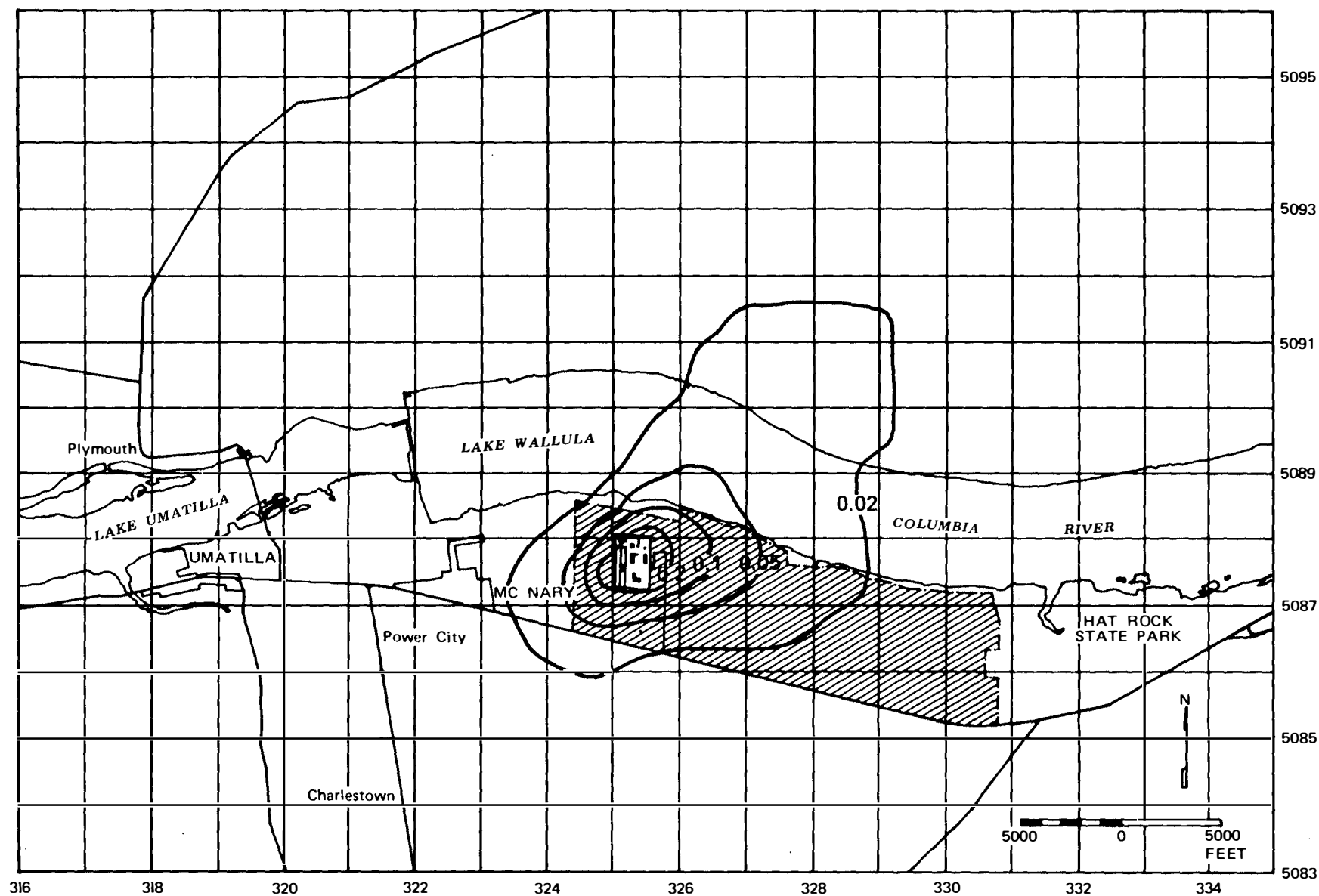


Figure IV-4

CALCULATED ISOPLETHS OF ANNUAL AVERAGE GROUND-LEVEL GASEOUS FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

Source: Cramer, Bowers, 1975d, P. 7.

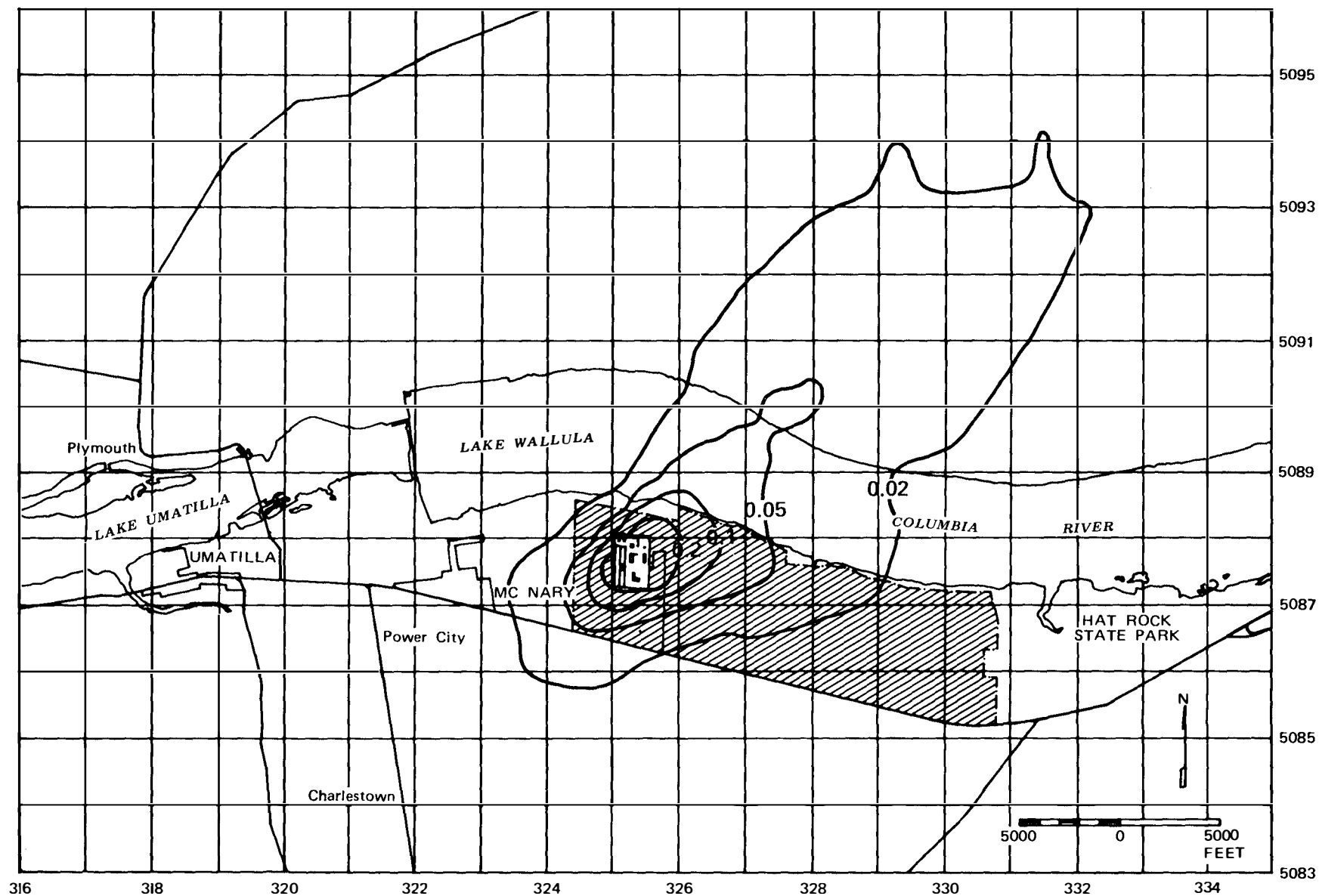


Figure IV-5

CALCULATED ISOPLETHS OF SEPTEMBER MONTHLY AVERAGE GROUND-LEVEL GASEOUS FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

Source: Cramer, Bowers, 1975d, P. 15

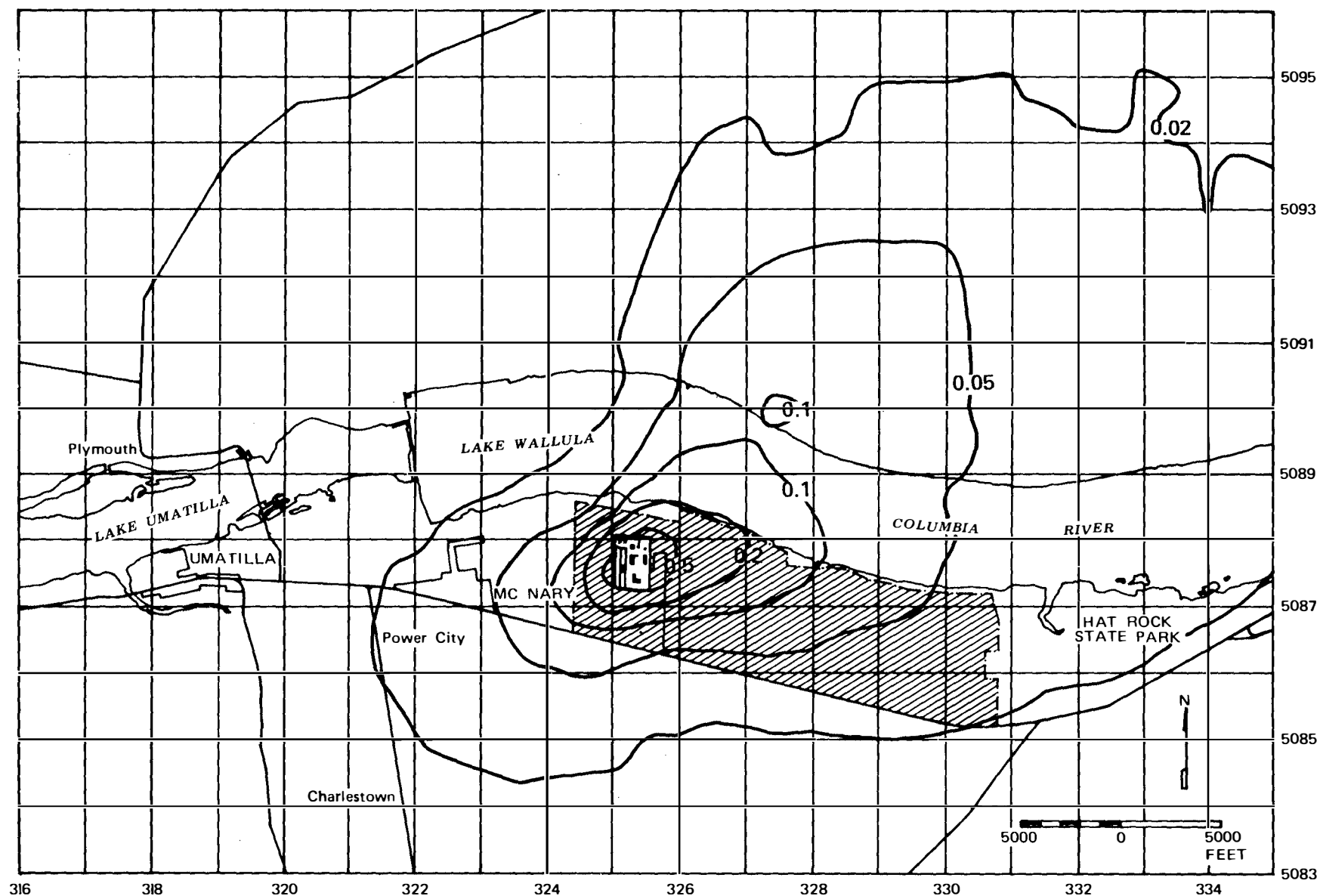


Figure IV-6

CALCULATED ISOPLETHS OF ANNUAL AVERAGE GROUND-LEVEL TOTAL FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

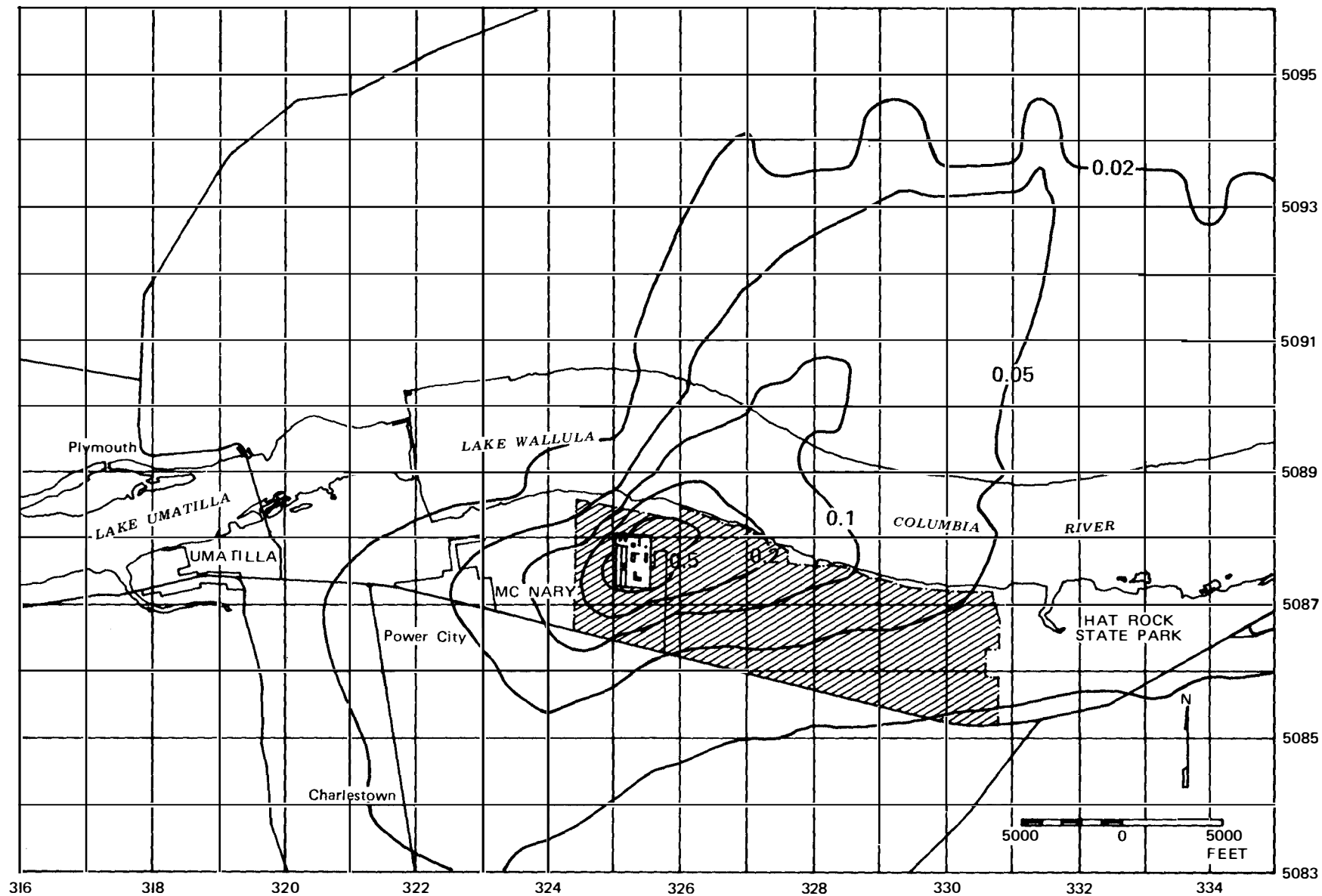


Figure IV-7

CALCULATED ISOPLETHS OF SEPTEMBER MONTHLY AVERAGE GROUND-LEVEL TOTAL FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

Source: Cramer, Bowers, 1975d, P. 17

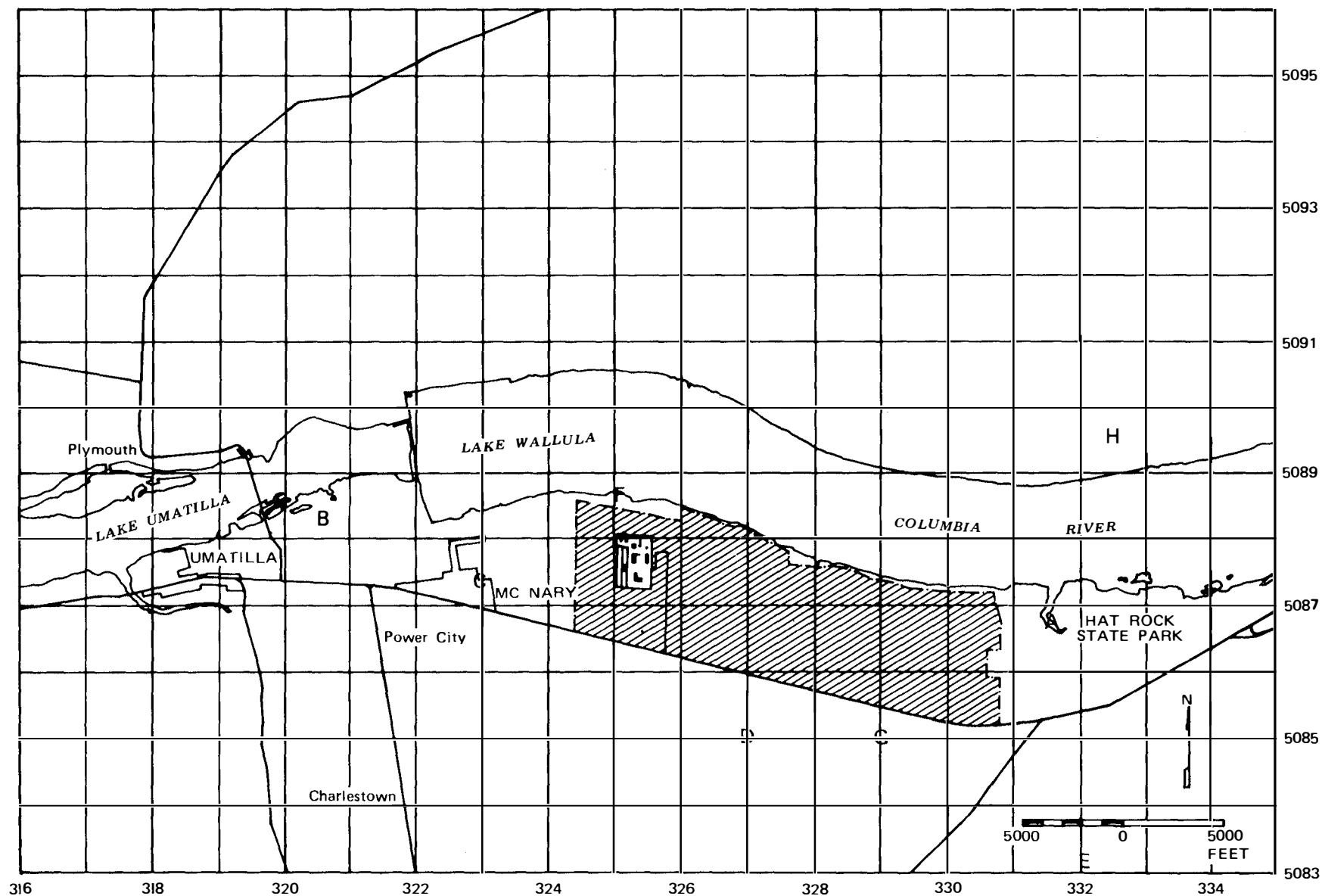


Figure IV-8

LOCATION OF THE PROPOSED ALUMAX ALUMINUM PLANT. THE STIPPLED AREA DEFINES THE ALUMAX PROPERTY AND THE LETTERS A THROUGH I SHOW THE LOCATIONS OF THE RECEPTOR POINTS IDENTIFIED IN TABLE IV-9.

TABLE IV-9

ANNUAL AND MONTHLY AVERAGE FLUORIDE CONCENTRATIONS
 BASED ON DEQ ESTIMATED EMISSION RATES CALCULATED
 FOR SPECIFIC RECEPTOR POINTS

Receptor Point		Concentration (ug/m ³)		
Name	Symbol on Figure IV-8	Annual	June	September
<u>Gaseous Fluorides</u>				
Hat Rock State Park	A	0.008	0.007	0.008
McNary Wildlife Area	B	0.003	0.001	0.003
McNary	C	0.014	0.003	0.014
LaRue Dairy	D	0.007	0.002	0.007
Cold Springs Refuge	E	0.004	0.001	0.003
Picnic Area (Oregon)	F	0.038	0.016	0.030
Conforth Property	G	0.007	0.004	0.006
Cox Property	H	0.010	0.009	0.012
Picnic Area (Washington)	I	0.007	0.002	0.004
<u>Particulate Fluorides</u>				
Hat Rock State Park	A	0.019	0.026	0.002
McNary Wildlife Area	B	0.006	0.001	0.009
McNary	C	0.027	0.016	0.049
LaRue Dairy	C	0.011	0.007	0.013
Cold Springs Refuge	E	0.006	0.005	0.006
Picnic Area (Oregon)	F	0.044	0.021	0.040
Conforth Property	G	0.013	0.014	0.013
Cox Property	H	0.024	0.026	0.024
Picnic Area (Washington)	I	0.010	0.005	0.007
<u>Sulfur Dioxide</u>				
Hat Rock State Park	A	1.65	--	--
McNary Wildlife Area	B	0.47	--	--
McNary	C	1.95	--	--
LaRue Dairy	D	0.75	--	--
Cold Springs Refuge	E	0.45	--	--
Picnic Area (Oregon)	F	0.63	--	--
Conforth Property	G	0.95	--	--
Cox Property	H	2.08	--	--
Picnic Area (Washington)	I	0.58	--	--

Source: Cramer and Bowers, 1975d, p. 24.
 Cramer and Bowers, 1975a, D-3 through D-7.

EPA has found the proposed Alumax plant to be in compliance with Class II significant deterioration limits (Smith, 1975). These limits are maximum permissible increases in ambient pollutant concentrations to limit degradation of current air quality. Class II limits are for areas where moderate deterioration is permitted. Although the Cold Springs Wildlife Refuge and Hat Rock State Park are designated as Class II with respect to prevention of significant deterioration criteria, even the more stringent Class I limits would not be expected to be exceeded at these sites. Deterioration at Cold Springs is expected to be just under Class I limits for SO₂ (Kramer, 1975, p. 4).

(e) Chlorine. Some chlorine would be emitted from the cast house stack resulting from the degassing operation. Although reports indicate it would be emitted at a concentration within the range reported for odor thresholds (Macdonald, 1975), this would not be expected to present a problem because of the proposed stack height and atmospheric dilution. There is no ambient air quality standard for chlorine in Oregon.

(2) Traffic-Related Emissions. Cramer and Bowers (1975f) have also calculated maximum impacts on ambient carbon monoxide concentration from additional vehicular traffic which is projected if the proposed plant is constructed. These impacts are included on Table IV-8. As can be seen, these increases in CO concentration are very small and are much less than those which would result from the proposed plant itself. Increases in other vehicle-related emissions such as hydrocarbons and nitrogen oxides would be still smaller since automobiles, which would constitute the majority of the traffic, emit more CO than other pollutants (Cramer and Bowers, 1975f, p. 3-4; U.S. Environmental Protection Agency, 1976, p. 3.1.1-2 through 3.1.2-15).

(3) Summary. Overall, the proposed Alumax plant would not cause ambient air quality standards to be exceeded except, possibly, during construction (although particulate levels will continue to be high during dust storms) nor exceed criteria for Class II Areas under EPA Significant Deterioration regulations. Ambient air quality standards were established at levels sufficient to protect public health and welfare under normal circumstances. Therefore, adverse impacts on public health and welfare would not be expected.

The degradation of existing air quality which would result if the proposed plant were built will obviously reduce the ability of the area to accommodate additional emission sources, particularly major fluoride or SO₂ sources which might want to locate there in the future, while maintaining ambient air quality within regulations.

5. Water Quality Impacts.

a. Plant Effluents. The Alumax aluminum plant would not discharge any plant wastewaters to State public waters. The plant process wastewater would be completely recycled, requiring about 645,000 gallons per day of makeup water from the Port of Umatilla. The contaminated storm water runoff would be disposed in unlined evaporation ponds

located on the Alumax property. Provisions to monitor and prevent potential contamination of the groundwaters are contained in the State Water Pollution Control Permit. Since Alumax proposes to utilize this type of wastewater treatment and control, no direct impacts upon local water quality would occur.

The total domestic sewage equivalent to Alumax discharge would be approximately 320 people. It is anticipated that the plant would discharge either to the port of Umatilla sewer system or the city of Umatilla system (discharge to the Umatilla system would require a variance from city ordinances). This increase of domestic treated wastewater would cause a minor increase in organic material being discharged to the Columbia River. Depending upon the degree of treatment, water quality impacts of this increased organic discharge could be more biological oxygen demand (BOD) and suspended solids, causing increases in dissolved oxygen depression and turbidity at the point of discharge.

b. Ponds. On the Alumax property there are ponds that are presently utilized by wildlife such as waterfowl, shorebirds, upland game birds, and mammals. The nine ponds (1.16 acres) included on the actual 165-acre plant site would be completely eliminated by construction impacts. An additional 0.44 acre would be eliminated by construction of the access roads to the power substation and power transmission lines. The remaining 57 ponds (36.1 acres) would be subject to water quality impacts from construction activities and plant air emissions. Windblown dust and aluminum plant emissions of particulate fluoride would affect water quality of the ponds (Beak, 1976). Windblown dust from construction activities would cause sedimentation and turbidity, which subsequently would reduce productivity of the aquatic life. Total fluoride concentrations could accumulate in the pond water to levels detrimental to aquatic life such as phytoplankton and zooplankton.

Direct water quality impacts on the ponds consist of complete elimination of nine ponds (1.16 acres) and long-term effects on 57 ponds (36.1 acres). These impacts would be limited to water resources on only the Alumax property since no air emission impacts beyond the plant site boundary are predicted.

c. Irrigation Water. Irrigation water from the Columbia River is presently utilized on the proposed Alumax site for raising grass to support cattle production by the present landowner. The construction of the plant on the 165 acres will remove part of the irrigation requirement, although Alumax has committed itself to continue irrigating the remaining land that supports vegetation and pond habitats for existing fish and wildlife resources.

Short-term impacts on irrigation water quality would occur from sediments originating from wind erosion on the plant construction site. Water quality impacts would primarily be increased turbidity reducing vegetation productivity and wildlife consumption. This impact would be minor and only temporary during the plant construction phase.

Airborne emissions of fluorides and sulfates would enter the open irrigation ditches east of the plant site. Concentration levels are not expected to increase the natural Columbia River content; however, the Oregon Department of Environmental Quality has included the following special condition in the Alumax Water Pollution Control Facilities Permit (Number 2287):

"3. Wastewater control facilities shall be provided for the irrigation water aquaduct which crosses the permittee's plant site such that this irrigation water cannot become contaminated by the permittee's operations. Special consideration shall be given to minimizing contamination of this irrigation water by fallout of air contaminants."

d. Groundwater. Water quality impact on the groundwater supplies in the Alumax plant site have been considered, although direct use and exposure to plant operations is not expected. Alumax is required by their water pollution permit to conduct an approved pre-operational monitoring program 6 months prior to plant operation. Chemical characteristics of the groundwater would provide background data for comparison to operational data. This would then provide the necessary information to evaluate any groundwater impact. The monitoring program requirement may be deleted from the Permit Conditions if Alumax can prove to the Oregon DEQ that groundwater would not be contaminated.

e. Columbia River. The Alumax aluminum plant, with total water recycling has no direct discharge of plant effluents to the Columbia River. Airborne emissions of fluorides and sulfur dioxide could be dispersed primarily over Lake Wallula (Columbia River) due to prevailing winds. Total projected maximum emissions of gaseous and particulate fluoride amount to an average of 256 pounds per day from the operation of the Alumax plant (DEQ, 1975c). Assuming that this entire fluoride emission enters the surface water of the Columbia River northeast of the plant, the increase of fluoride concentration was calculated. Using the natural background fluoride concentration of 0.24 mg/liter and the mean monthly discharge rates (cfs) at McNary Dam, 1972, (Beak, 1975) the predicted increase in fluoride concentration would range from less than 0.0001 to 0.0004 mg/l. The actual change would be somewhat less since the total fluoride emissions would not enter the Columbia River waters and all fluorides are not in a chemical state readily soluble in water. Conversely, the air dispersion and water dilution would not be uniform; therefore, localized areas of concentrations exceeding the above-predicted changes could possibly occur.

DEQ (1975) has also projected impact on the Columbia River surface waters from the fluoride air emissions. Their conservative calculations are a fluoride concentration increase of 0.0023 ppm or 1 percent over a natural existing concentration of 0.24 ppm. DEQ concludes that no significant aquatic effects would be expected at this insignificant increase in fluoride concentration in the Columbia River surface waters.

Sulfur dioxide air emission from the Alumax plant would form acid products upon entering the surface waters around the plant site. DEQ concluded that the Alumax sulfur dioxide air emissions should not cause any measurable pH change in the Columbia River since the aquatic buffering capacity is 37 times greater than required to neutralize all of the aluminum plant sulfur dioxide air emissions.

6. Ambient Noise Level Impacts. Normal operating sounds emitted by proposed plant operations would be continuous throughout the day and night because the plant would operate continuously. Variable sounds associated with plant operations would include transportation-related and construction sources.

The L_{50} noise level (the noise level exceeded 50 percent of the time) is used in the Oregon noise standards. The Oregon regulations require that the plant either have a nighttime L_{50} noise level of less than 50 dBA or not increase the ambient noise levels at the nearest noise sensitive property over 10 dBA, whichever is the more stringent. Measurements presented by Porter (1975, p. 3) indicate ambient nighttime noise levels of 35 dBA at the nearest noise sensitive property; consequently, the latter standard is binding (Porter, 1975, p. 3). Therefore, the plant's impact should be measured against the standard of an L_{50} of 45 dBA at the nearest noise sensitive property. The L_{50} level is used rather than the L_{10} or L_1 because the plant is expected to produce sound levels that vary only marginally with time due to the continuous nature of the plant's operation. Thus, the L_{10} and the L_1 levels would be nearly equal to the L_{50} .

L_{dn} is a description proposed by the EPA to describe diurnal noise levels and is a weighted average of daytime and nighttime sound levels, with the nighttime noise (10:00 p.m. to 7:00 a.m.) being weighted more heavily. An L_{dn} of 55 dBA has been identified by EPA as adequate to protect the public health and welfare with an adequate margin of safety. By converting the EPA's L_{dn} into the steady-state level that would be permissible 24 hours a day, it is found that 49 dBA would be permissible for a continuous 24-hour operation similar to the operation of the proposed plant. This 49 dBA is higher than the 45 dBA limit identified in the previous paragraph. The 45 dBA limit will, therefore, be the standard to which the plant impact will be compared.

a. Evaluation of Steady-State Plant Operations. This and following noise-related sections are based on the detailed noise study conducted by Bolt, Baranek, and Newman (BBN) in 1974-75 (Porter, 1975). All data are taken from this report unless otherwise noted.

Three elements in the proposed plant facility would have enough noise-producing potential to merit special consideration: the electrical equipment conducting power to the potrooms, the metal service furnaces, and the fans in the air pollution control system. Measurements conducted at other facilities which use similar equipment were used to evaluate the sound levels that could be expected in the communities surrounding the proposed Alumax reduction facility.

(1) Electrical Equipment. Analysis of electrical transforming, regulating, and rectifying equipment at other facilities; data from BBN files; and field measurements indicate that the L_{50} sound levels of 45 dBA would not extend beyond 1,200 feet from the geometric mean center of the electrical complex, which is well within the Alumax property line.

(2) Metal Service Operation. Measurement of furnaces and associated equipment (which would be located within the cast house or metal services building) at other similar facilities has shown that the L_{50} levels of 45 dBA would not extend beyond 1,600 feet from the center of the facility, again well within Alumax property lines.

(3) Air Pollution Control Equipment. The primary noise generating equipment, the fans and other air handling equipment associated with the air pollution control system, consist of (1) the Potline Air Control (primary system), (2) the Carbon Baking System, and (3) the Potline Control (secondary system). These are discussed separately below.

(a) Potline Air Control -- Primary System. The primary air handling system would consist of fans located near the north end of the property. A design goal of 42 dBA at the site boundaries was specified by Porter for the potline primary and secondary systems individually because the levels produced by each would be cumulative.

Measurements of similar units at other facilities have given sound levels of 55 dBA 1,400 feet from the site. However, the proposed facilities would have fans in a relatively confined area instead of in a line, and would act more as a point source than a line source. This means sound would be attenuated more rapidly as distance increases. Also, it is intended that proposed fan units be more efficiently designed than units observed at other plants, which should reduce noise levels by 7 to 10 dBA (Porter, 1975, p. 10-12).

The computed A-weighted sound power level of the baghouse fan units was calculated to be 120 dB (after figuring an 11 dB insertion loss of the baghouse). (The insertion loss is attributed to the absorption of sound and buffering of noise by the baghouses themselves.) By using backward curve fan blades and ducting the fans through a single 150-foot-high stack, the baghouse would have a computed A-weighted sound power level of 102 dB, or a reading of 42 dBA at a distance of 1,200 feet.

(b) Carbon Baking -- Baking Furnace Exhaust System. The baking furnace exhaust system, to be located at the northeast portion of the plant, would be similar to but smaller than the potline primary system. The calculated A-weighted sound level of 101 dB (with the 11 dB insertion loss caused by the baghouse) would give a 42 dBA contour at a distance of 1,100 feet from the exhaust system.

(c) Potline Air Control -- Secondary System. This system would consist of 80 individual units, uniformly distributed

along the potline buildings. The system would have an estimated A-weighted sound power level of 112 dB (with the 11 dB insertion loss caused by the wet scrubbing system) which would be computed to be 49 dBA at a distance of 1,400 feet. Care in selecting fans and in aerodynamic design could reduce the sound levels by 5 to 10 dBA. If the right fans are unavailable, the use of fan silencing equipment could achieve a 7 dBA reduction for each unit, or a 42 dBA level.

(4) Summary. The use of backward curve blade centrifugal fans and acoustically absorptive material would reduce discrete tones, characteristically produced by fans, below limits prescribed by the Oregon regulations at the nearest noise-sensitive property. Figure IV-9 shows that the composite sound level contour of $L_{50} = 45$ dBA lies wholly within the Alumax property line. Assuming that the proper acoustical considerations were taken in regard to equipment design and choice, and that sound reduction materials or equipment were used as necessary, Alumax steady-state plant operations would not be expected to exceed the ambient level by 10 dBA anywhere outside the property line and would not violate Oregon noise regulations.

b. Transportation-Related Noise Sources. Transportation-related noises associated with the proposed facility consist of three categories:

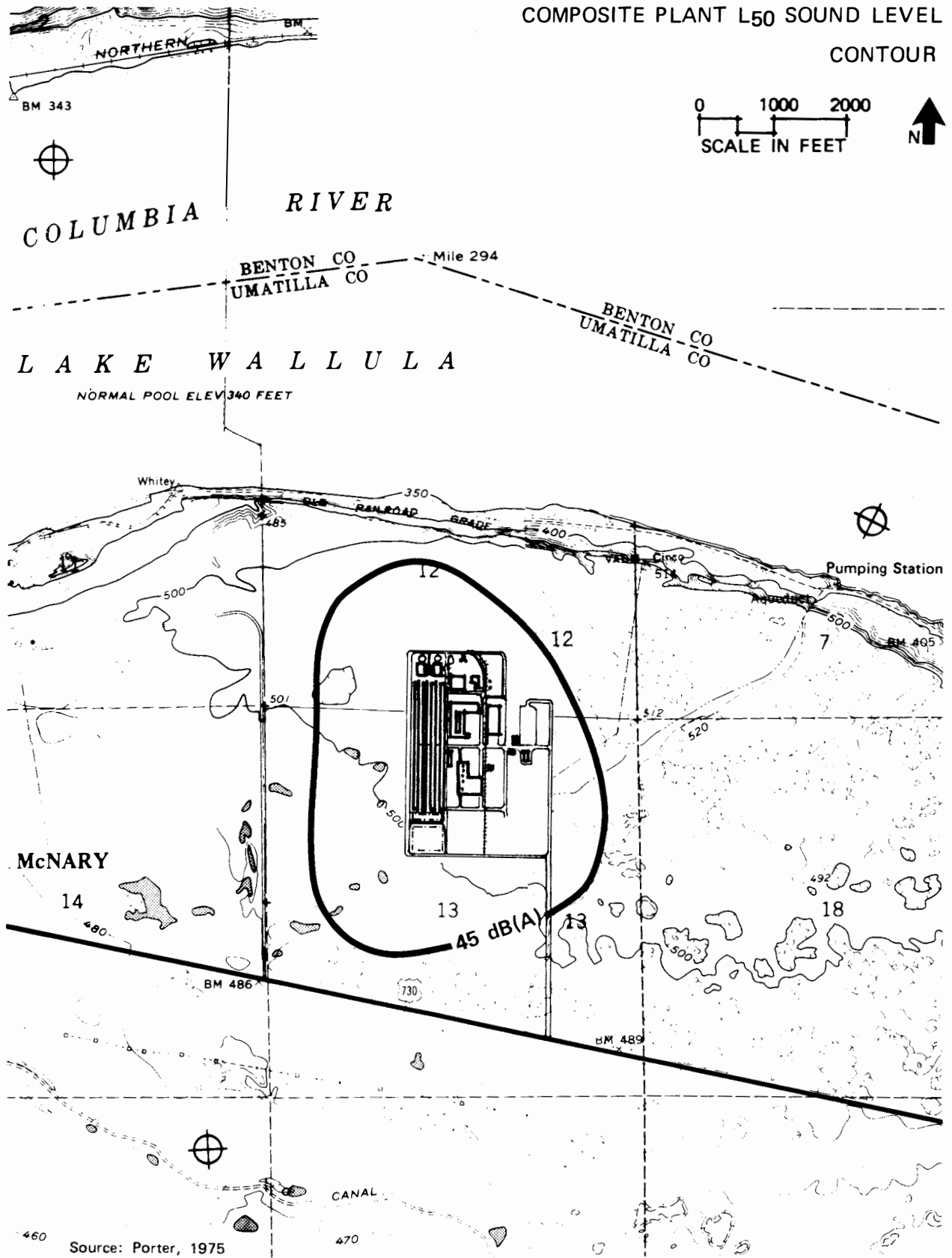
1. Truck traffic carrying raw materials into the plant and finished products and wastes away from the plant.
2. Automobile traffic carrying personnel to and from the plant.
3. Railroad operations in and out of the plant.

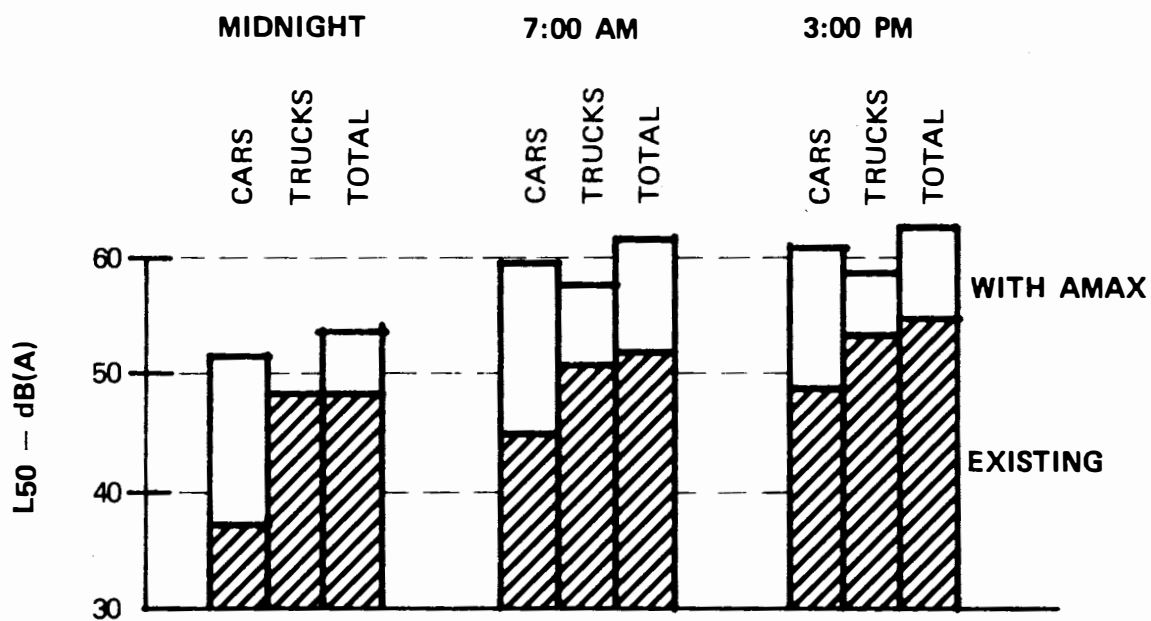
(1) Truck Traffic. The expected increase in truck traffic (ten vehicle operations per hour occurring primarily during the 8-hour day shift) would add about 1 dBA to existing ambient levels (with 35 to 40 heavy trucks operating per hour on Route 730 in the vicinity of the plant site) (Porter, 1975, p. 19).

(2) Automobile Traffic. A maximum of about 145 vehicles would move in and out of the plant during the midnight shift change and about 370 during the other shift changes at 8:00 a.m. and 4:00 p.m. Figure IV-10 shows projected noise levels at these approximate times at a distance of 100 feet from the centerline of Route 730 as well as existing L_{50} levels at the same distance. Although automobile traffic would contribute to a greater than 10 dBA increase over ambient automobile L_{50} levels, the increase in total sound levels due to Alumax-related L_{50} auto and truck traffic would not exceed 10 dBA. (It should be noted again that decibels are logarithmic and consequently, the cumulative effect of multiple sound sources cannot be obtained through arithmetic addition of the individual decibel ratings.)

(3) Rail Traffic. If trains were used to deliver alumina, an estimated one to two trains would move in and out of the plant each weekday. Trains consisting of approximately 30 cars would be about 1,200 feet long and would move at an average of 35 miles per hour

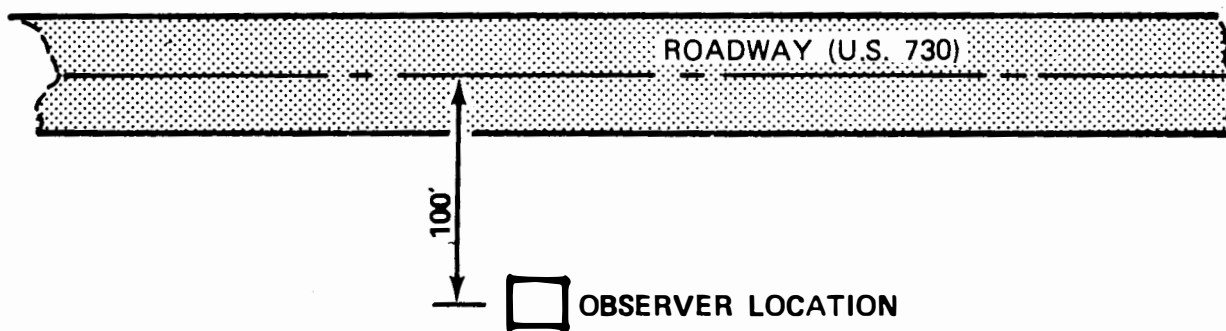
Figure IV-9
COMPOSITE PLANT L50 SOUND LEVEL
CONTOUR





U.S. 730 WAYSIDE SOUND LEVELS*

*EXISTING SOUND LEVELS BASED ON STATE OF OREGON TRAFFIC COUNTS AND VERIFIED BY ACTUAL FIELD MEASUREMENT. SEE BBN REPORT NO. 2815 FOR L50 CALCULATION SCHEME.



Source: Porter, 1975, P. 29.

Figure IV-10
HIGHWAY NOISE NEAR PLANT

along the Alumax rail spur. Porter shows that noise levels for these trains at 100 feet from the wayside for L_{10} and L_{50} levels would be 49 dBA and 35 dBA respectively (1975, p. 20-23).

c. Construction Noise. Construction is projected to take place for 32 months in five phases: (1) ground clearing, (2) excavation, (3) foundation work, (4) erection, and (5) finishing. Figure IV-11 illustrates the L_{50} sound level contours that would be due to construction at the site and shows that they would blend into the background by the time they would reach the nearest residence. Construction noises would not therefore be a problem at the nearest noise sensitive properties. Oregon Noise Control Regulations do not cover sounds originating on construction sites; however, the DEQ has specified that noisy operations be confined to daytime hours.

DEQ reviewed Porter's acoustical evaluation of the proposed Alumax facility and concluded that "the facility should be capable of complying with Department noise rules and regulations" (DEQ, 1975c, p. 7). It was noted by the DEQ that truck traffic may have to be limited and car pool and/or mass transit programs may have to be instituted if actual traffic is significantly greater than the projected traffic.

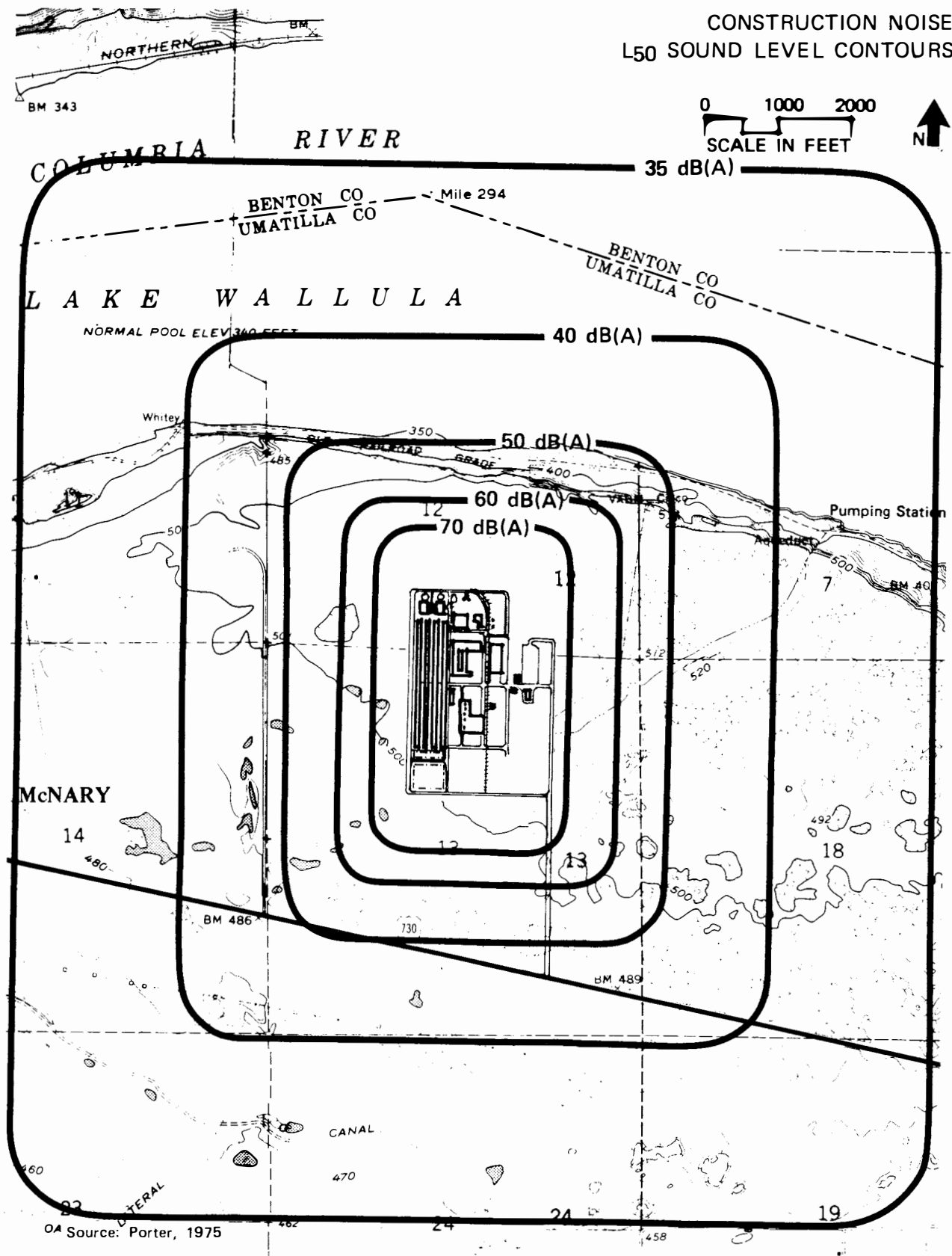
7. Significant and Unique Features Impact. No properties on, nominated to, or eligible for, The National Register of Historic Places are found in the study area.

Little adverse impact upon locally significant historical, cultural, or natural sites would occur as a result of the proposed Alumax plant. The Columbia River Gorge is the only significant unique feature in close proximity to the plant site, located about a quarter of a mile north from the plant boundary. Views of the gorge from the Washington side of the river would be adversely impacted by the plant's existence.

Indirect impacts to locally important historical and cultural sites noted in Chapter III.A.9, resulting from plant-related population could occur due to higher usage of these facilities. Cities and counties in Oregon are required by the the Land Conservation and Development Commission (LCDC) to identify and protect these resources. Updated comprehensive plans, reflecting LCDC requirements, are expected to be finished before the proposed Alumax plant construction would be completed. No significant effects on archeological sites are expected. There exists the possibility that an isolated buried feature would be encountered during construction. Should this occur, Alumax proposes to halt construction and call an archeologist to the site.

Figure IV-11

CONSTRUCTION NOISE
L50 SOUND LEVEL CONTOURS



Since alignments for rail spurs and access roads are not yet established, a reconnaissance of them could not be made. If they enter the rugged scabland area east of the primary plant site, a thorough archeological investigation would be necessary because some of the earliest archeological sites in the region occur in this type of area. This also applies to construction activities involving transmission lines and the substation site.

8. Esthetic Impact. Construction of the proposed Alumax plant would change the appearance of the site area. Due to the flat topography and low-lying vegetation, the plant would be highly visible. The plant site area would change from a landscape of open space interspersed with ponds to one of a large industrial plant, contrasted by the surrounding undeveloped land. The plant would be especially visible to the McNary Townsite to the west; to passing motorists on U.S. Highway 730 south of the plant; and to viewers of the Columbia River Gorge, north of the plant site in Washington. Steam plumes from the plant could be visible, occasionally, as far as the McNary Dam area about 2 miles to the west.

The proposed BPA transmission route would parallel existing transmission lines along U.S. Highway 730, and would not significantly change the visual character of this area. The greatest visual impacts of the transmission line would occur where the proposed line crosses U.S. Highway 730. The western crossing coincides with existing lines; however, no line previously existed at the eastern crossing, which runs north to the proposed substation facility. This area has little natural screening and the lines would be visible for several miles.

The proposed substation facility would be backgrounded by the plant, and would have little visual impact.

Other locations in the general area, where development occurs related to the proposed Alumax facility, would change in their visual character. The urbanization of the area would constitute changing landscapes, especially in the Hermiston-Umatilla area where the majority of development is expected to take place.

9. Impacts of Plant Closure in 1986. Environmental impacts which would be induced by the plant, would persist as long as the plant operates. This includes the plant's contribution to pollutant loadings in the local air, impacts on water quality and natural systems, and use of the land which makes up the plant site. If the plant ceased operation, the impacts, with the exception of those involving land use, would no longer exist. The land use implications would depend on if the land were returned to its original state.

B. Social and Economic Impacts.

1. Population Impacts. Population impacts from the proposed Alumax plant would consist of the construction force, operational personnel, and secondary employees. The relative impacts of these groups on the population can be viewed in relation to the population projections for the area exclusive of Alumax impacts. These projections are presented in the preceding chapter (see Table III-8).

To obtain an estimate of the population impacts likely to result if Alumax were built it is necessary to estimate the number and size of families which would move into the impact area. It is estimated, based on 1970 U.S. Census data, that families coming into the area will contribute an average of 1.3 workers per family to the labor pool. Therefore, the average number of families per worker contributed would equal $1/1.3$ or .77. Thus, it is possible to obtain an estimate of the number of families migrating to the area by multiplying the number of jobs expected to be filled by workers from outside the area by .77. Whereas most of the construction labor is expected to come from outside the impact area, substantial numbers of operational and secondary jobs could probably be filled by indigenous personnel, thus reducing the impact of immigration somewhat.

In order to obtain the population impact estimates presented in Table IV-10, it is necessary to convert "families" to "persons." U.S. Census figures (1970, p. 19-105) indicated that average household size in the Morrow/Umatilla County region was slightly less than three. Accordingly, a persons-per-household multiplier of 3 is used to obtain population estimates for the permanent segment of Alumax-related employment. Although this figure should be a good approximation of household size for permanent (operational and secondary) employees, it is likely to be too high for construction workers. Many of the construction employees are not expected to relocate their families to the area. For this reason a multiplier of 2 is applied to construction employees.

Table IV-10 indicates that population impacts would begin occurring by 1977. They would reach an intermediate peak in 1980 when the combination of construction personnel with operational and secondary employees would generate a particularly heavy impact. Following a temporary decline in the mid-1980s, due to the departure of the construction force, a maximum impact of 4,650 would be reached by 1995.

Table IV-10 also indicates that the greatest numbers of Alumax-related persons would settle in the Cities of Hermiston and Umatilla. A smaller number of people would be expected to reside in Pendleton, and still fewer would reside in the remaining impact cities. In addition, by 1995, roughly 525 persons would settle in unincorporated areas within the Morrow/Umatilla County region or in areas outside this region (i.e., Benton and Franklin Counties in Washington).

The impact of a given number of individuals on an established community bears a relationship to the size of the community. Large communities are able to absorb a given number of individuals much

TABLE IV-10

ESTIMATED POPULATION IMPACT DUE TO ALUMAX
(Cumulative)

	<u>1975</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Umatilla County	0	425	950	2,400	3,500	2,750	3,200	4,100
Echo		10	25	50	100	50	100	50
Hermiston		150	350	950	1,400	1,100	1,250	1,625
Pendleton		50	125	300	400	300	400	450
Stanfield		10	25	75	100	100	100	150
Umatilla		150	350	950	1,400	1,100	1,250	1,600
Other		55	75	75	100	100	100	225
Morrow County	0	50	75	175	250	250	250	350
Boardman		0	50	100	100	100	100	150
Irrigon		15	25	50	50	50	50	150
Other		35	0	25	100	100	100	100
Impacts Outside the Morrow/Umatilla County Area	0	25	75	125	250	150	200	200
Total Population Impact	0	500	1,100	2,700	4,000	3,150	3,650	4,650

more easily than are smaller ones. Therefore, in Table IV-11 Alumax-generated population impacts are presented in terms of their percentage impact on area city populations in various years. The base figure for computing these percentages was derived by combining the projected population in the city in a given year with the projected impact due to Alumax in that same year. Thus, each of the percentages represents a percentage of the total population, including that due to Alumax. A substantial percentage (over 10 percent) of the population of Umatilla would be composed of Alumax-related individuals beginning in 1978. Approximately one-third of Umatilla's population would ultimately be associated either directly or indirectly with Alumax. Hermiston would also experience substantial impacts beginning in 1979 and extending throughout the impact period.

2. Community Development Impacts.

a. Hermiston. Population estimates indicate that Alumax-related growth for Hermiston would be approximately 1,625 persons by 1995 (see Table IV-10). The Comprehensive Plan for Hermiston indicates that the corporate city could accommodate a total population of 12,500 persons (Hermiston City Planning Commission, 1972a, p. 13). This is a maximum figure which the plan suggests will not be reached, since all zoned land would not be developed to its maximum density. The potential for Hermiston to accommodate 10,000-11,000 persons is more appropriate and adequate to absorb projected growth, including Alumax growth, through 1996. In early 1976, the city had in excess of 400 building lots available for rapid development. This number would be sufficient to meet about one-third the demand for residential development by 1980 (see Table IV-2). Accelerated development would be necessary to meet Hermiston's housing needs, with or without Alumax.

The City of Hermiston still has a large amount of undeveloped land, 35 percent in 1972, within its corporate limits. A major land use planning policy is to avoid new, uncontrolled development outside the city, especially in areas where urban services cannot be economically provided. However, annexations will become increasingly more likely as Hermiston's urban fringe continues to grow. For instance, in 1970 outlying areas around the city contained nearly one-half as many dwelling units (880 compared to 1935) as did the city (Hermiston City Planning Commission, 1972, p. 27). Thus, Alumax-related growth will create new challenges to the city's land use planners.

b. Umatilla. The City of Umatilla would also share a large portion (about 1,600 persons) of Alumax-related growth. Umatilla currently has over 1,000 building lots ready for development. About 800 of these building sites are located in four newly developing subdivisions. These include: the McNary townsite, 450 lots; Orchard Terrace, 60 lots; Norpa development, 95 lots; and the Conforth Addition, 94 lots. This current inventory of building space is adequate to house an additional 3,000 to 4,000 persons, sufficient for projected population including Alumax-related growth.

TABLE IV-11

ALUMAX-GENERATED POPULATION IMPACTS AS A PERCENTAGE OF
PROJECTED TOTAL POPULATION IN IMPACT AREA CITIES

<u>City</u>	<u>Estimated Percentage Impacts for Selected Years</u>							
	<u>1975</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Boardman	0	0.0	2.0	3.2	2.7	3.6	3.2	4.4
Echo	0	1.8	4.0	6.7	11.8	5.6	10.5	5.3
Hermiston	0	2.3	4.8	11.4	15.3	10.5	10.6	12.0
Irrigon	0	2.3	3.0	5.0	4.3	5.3	4.5	12.0
Pendleton	0	0.4	0.9	2.1	2.7	2.0	2.6	2.8
Stanfield	0	0.9	2.0	5.3	6.5	6.3	6.1	8.6
Umatilla	0	7.0	13.5	27.5	33.7	29.3	30.5	33.0

c. Other Communities. A moderate amount of growth due to Alumax is expected in Stanfield. Currently, the city has 170 available building sites, and is evaluating annexations totaling 265 acres. The combination of available sites and proposed annexations would more than satisfy the future growth projections for the city. Only a small amount of Alumax-generated development is likely to occur in Boardman, Echo, Pendleton, and the Tri-Cities.

d. Commercial Land Use. The 4,650 people expected to be added directly and indirectly to the area's population by the project will create a demand for commercial goods and services, primarily in the Hermiston-Umatilla area. This demand could be sufficient to encourage development of a new, medium-sized community shopping center in the Hermiston-Umatilla area. For regional shopping needs, the population would probably continue to patronize the two existing regional facilities in the Tri-Cities, Washington area, and Pendleton.

e. Industrial Land Use. Additional industrial developments associated with or complimentary to aluminum processing are possible in the general area. However, no such developments have yet been proposed.

f. Recreational Land Use. Existing use of public lands, parks, and open spaces will also likely increase. The projected increase in population because of the proposed project will place a small additional incremental demand on recreational areas and facilities.

g. Impediments to Community Development. The northwest portion of Umatilla County and the northeast portion of Morrow County are not currently able to accommodate Alumax growth due to the serious decline of groundwater aquifers. The region depends on its groundwater wells exclusively for its domestic, commercial, and industrial water supply. Resultant from unprecedented population growth since 1965, from increased urbanization, and commercial and industrial expansion, the communities in the area have found it necessary to lower the bowls in their deep wells and to develop shallow wells in order to meet ever increasing water demands (Futrell-Redford-Saxton, 1974, p. I-1).

As the Regional Water System Feasibility Study for Hermiston-Boardman states, "groundwater depletion in the region is a serious problem and constitutes a major threat to the existing commercial and industrial facilities and discourages new developments in the region" (Futrell-Redford-Saxton, 1974, p. I-2).

3. Infrastructure Impacts.

a. Transportation.

(1) Traffic Impacts.

(a) Construction Truck Traffic. It is not anticipated that construction truck volumes would be high enough at any time to create an adverse impact on the highway system. Construction truck volumes would normally not be part of the highway system peak-hour

volumes since the peak hours are at the beginning and end of the work day. Truck volumes moved vary with the particular phase of construction at the plant.

(b) Construction Workers Commuter Traffic.

During the peak Alumax plant construction period the estimated maximum impact on the highway system would occur on weekdays from 3:00 p.m. to 4:00 p.m. Total traffic volume generated by the plant site at this hour is estimated 922 passenger vehicles (CH2M Hill, 1976a, p. 335). This volume consists of construction worker and plant employee traffic.

During peak-volume August afternoons, the entire highway system could experience some congestion, reduced operating speeds, and resulting delay to motorists because of the large number of construction workers, their families, and related secondary supporting businesses imported into the area to construct the Alumax plant and other new industrial plants. The routes receiving the greatest traffic impacts from Alumax plant construction workers would be U.S. Route 730 from the plant entrance west to the intersection with Route 32, and the Route 32 from U.S. Route 730 south to Hermiston. The entire length of Route 32 would be at or near capacity during the afternoon peak hour. The total Alumax-generated construction traffic would make up about 30 percent of the total hourly volume during the afternoon peak hour.

U.S. 730 between the plant entrance and Oregon Route 32 is expected to be very near capacity (congested, level of service D, as defined by the Oregon State Highway Dept.), both during the morning and evening peak hours. At these times, reduced speeds and delay can be expected on U.S. 730 until traffic nears the intersection of Oregon Route 32, where the highway widens into four lanes. There the capacity would be increased sufficiently to accommodate the construction traffic without serious delay. Also, about 50 percent of the construction traffic would turn left at this intersection toward Hermiston and other points south. This heavy left-turn movement would be expected to back up traffic in the westbound left-turn lane on Route 730 during the evening peak hour.

During the afternoon peak hour, eastbound U.S. 730 traffic turning left onto Willamette Avenue would be expected to be delayed because of the heavy westbound U.S. 730 Alumax plant construction worker traffic. U.S. 730 has three lanes at this intersection, one of which could be used as a left-turn lane for traffic turning into Willamette Avenue. This would allow through U.S. 730 vehicles to pass stationary vehicles waiting to turn left.

Serious delay is not expected on the hill on Oregon Route 32 north of Hermiston during winter months since winter traffic volumes are low enough to accommodate the additional construction traffic volumes. During summer months, however, congestion and delay can be expected, especially during the afternoon peak hour, due to vacation traffic, a high percentage of truck traffic, and considerable roadside traffic.

(c) Plant Operation Traffic Impacts. The plant employee work schedule would produce a peak hourly volume of 293 vehicles in the morning between 7:00 a.m. and 8:00 a.m. and an afternoon peak of 216 vehicles between 4:00 p.m. and 5:00 p.m. (CH2M Hill, 1976a, p. 329). Although the morning peak hour is greater, the afternoon peak would create the greater impact since other traffic volumes on the highway system are significantly greater at that hour (level of service D).

For both morning and afternoon peaks, Route 730 between the plant entrance and the intersection of Oregon Route 32 would receive the greatest impact from plant-generated traffic. Increases in average daily traffic resultant from Alumax-generated traffic would be approximately 25 percent during peak volume days.

Willamette Avenue is the main access street serving the McNary townsite and intersects U.S. 730 between the plant entrance and the intersection of Oregon Route 32. This intersection could receive an adverse impact from the plant traffic if the McNary townsite reaches maximum development by 1996. However, Route 730 has three lanes at this intersection, one of which can be used as a left-turn lane for the eastbound Route 730 traffic turning into Willamette Avenue. Therefore, it is not expected that the eastbound Route 730 through-traffic would be delayed by left-turning vehicles. The left-turning vehicles would, however, experience some delay during the evening peak hour because of the high volume of westbound Route 730 traffic.

At the intersection of Route 730 and Route 32 an estimated 105 vehicles from the Alumax plant would be turning left from U.S. 730 onto Oregon Route 32 during the evening peak hour. Route 730 at this intersection has four lanes, one of which can be used as a left-turn lane. Therefore, it is not expected that through westbound Route 730 traffic would be delayed by the left-turning vehicles.

(2) Railroads. Construction of the Alumax plant would require extension of the Umatilla Branch track. The Union Pacific has indicated its Umatilla Branch is adequate to handle current demand, and can be easily expanded or modified to accept increased freight generated by Alumax.

The proposed Alumax plant would require an approximate 1-mile extension of the existing spur which serves the Johns-Manville Company.

(3) Airports. The proposed Alumax development would not have a significant impact upon airport facilities in the area. The Hermiston airport would receive the greatest impact from Alumax. The main impact of Alumax growth should be that of providing new business to an already adequate system, and promote a better economic situation for the airports in the area. New growth, then, could provide the impetus for better air access to the area.

b. Utilities.

(1) Electrical, Natural Gas, and Telephone Impacts.

In all communities, natural gas (where gas is available), and telephone service were found to be adequate or to have the expansion capability to serve a population in excess of Alumax-related growth in the area. Expansion of electrical power, natural gas, or telephone facilities would be financed by direct hookup fees to new development or by user fees.

The electrical power picture in and around Hermiston and Umatilla, where 70 percent of the Alumax-associated population increases would be expected to occur, is one of forecast firm power deficits in concert generally with the entire Pacific Northwest area. Approximately 3 MW of increased energy demand associated with Alumax-generated population growth and commercial development would fall principally on Pacific Power & Light Company (PP&L) which serves Hermiston and Umatilla. According to the current PNUCC Long-Range Projection of Loads and Resources, PP&L becomes deficient in firm energy in 1983 and remains deficient through 1999, the end of the PNUCC forecast period.

In addition, Umatilla Electric Cooperative, a preference customer for BPA power, has been requested by Alumax to supply nonprocess, firm power (22 MW peak, 12 MW average) for wheel turning loads. Umatilla Electric is investigating its ability to supply this power with a combination of power allocated to it by BPA and power it may acquire through the Pacific Northwest Generating Company.

(2) Water System. New water source requirements with and without Alumax are shown in Table IV-12. A figure of 850 gallons per capita per day (gpcd) was used based upon the median peak day water usage in the region (CH2M Hill, 1976, p. 344). The impact due to Alumax is the greatest for Hermiston and Umatilla, where the projected impact of population would be the greatest.

Since the filing of the draft EIS, both of these cities have developed new sources of water adequate to serve future demands including Alumax (See Chapter III). The only impacted communities which will have water inadequacies during the study period are Echo and Irrigon, both of which project deficits without Alumax. Studies are underway to identify potential new water supplies. When new supplies are developed, it is anticipated that they will be adequate to serve Alumax-induced growth.

(3) Sewer System.

(a) Sewage Treatment. A standard method for calculating required capacity of sewage treatment plants is based on daily sewage flow. Because information on existing daily sewage flows was inadequate to accurately predict the particular treatment needs of each city, a standard number of 100 gallons per capita per day (100 gpcd) has been used (CH2M Hill, 1976a, p. 344). This figure includes an allowance for infiltration and inflow and for commercial and

TABLE IV-12

WATER SOURCE REQUIREMENTS FOR CITIES IN ALUMAX IMPACT AREA

City	Projected Peak Day Demand (GPCD)	Projected Required Water Source Capacity Without Alumax (GPD)		Projected Required Water Source Capacity With Alumax (GPD)		Projected Net Impact Due to Alumax (GPD)		Projected Percent Increase Due to Alumax - (%)	
		1980	1995	1980	1995	1980	1995	1980	1995
Hermiston	850	6,588,000	10,158,000	7,778,000	11,539,000	1,190,000	1,381,000	15.3	12.0
Umatilla	850	2,338,000	2,763,000	3,528,000	4,123,000	1,190,000	1,360,000	33.7	33.0
Stanfield	850	1,233,000	1,360,000	1,318,000	1,488,000	85,000	128,000	6.4	8.6
Echo	850	638,000	765,000	723,000	808,000	85,000	43,000	11.3	5.3
Boardman	850	3,103,000	2,763,000	3,188,000	2,890,000	85,000	127,000	2.7	4.4
Irrigon	850	935,000	935,000	978,000	1,020,000	43,000	85,000	4.4	8.3

Source: CH2M Hill, 1976a, p. 345.

industrial uses. For the cities above, current daily load is estimated to vary from 70 to about 275 gpcd and the city treatment plants are generally deficient (CH2M Hill, 1976a, p. 344).

Table IV-13 summarizes projected sewage treatment requirements. The projected net impact of Alumax is given in gpcd and as a percentage over what would occur without Alumax.

(b) Sewage Treatment Costs. A methodology based on "buy-in" charges was used to determine the costs to provide sewer services (CH2M Hill, 1976, p. 342). This concept allows that new residents "buy-into" the existing systems by the payment of a pro rata share of the capital costs of the system, which is paid for by the community as a whole. These capital costs would include sewer mains and sewage treatment plants. The cost for sewer laterals to serve individual developments are generally financed by direct assessments on the property owner, so no extra "buy-in" charges are made.

The estimated costs given do not take into account Federal grants which could reduce the per capita costs by up to 75 percent. The status of Environmental Protection Agency grants is presently undetermined.

The estimated cost to expand and upgrade Hermiston's existing sewage treatment plant and interceptor sewers would be approximately \$500 per capita.

The estimated cost to expand and upgrade the sewage treatment facilities (i.e., treatment plant and interceptor sewers) of Stanfield, Echo, Umatilla, the Port of Umatilla, and McNary (as a combined system) would be approximately \$575 per capita.

No significant cost impact would be attributable to Alumax in Irrigon since acceptable septic tank systems are normally financed by the new developers or homebuilders. If a future sewer system becomes necessary, the total per capita costs would be approximately \$1,000 for a collection system, plus \$575 for a treatment system (i.e., a total of \$1,575).

No significant cost impact would be attributable to Alumax in either Boardman or the Tri-Cities area because of the relatively small percentage of Alumax-related population expected to reside in these locations.

(c) Sewage Collection. No significant cost impact would be attributable to Alumax in any of the communities considered, since additional required lateral sewers to serve individual users are normally financed by the new developers or homebuilders. Existing collections are generally adequate to handle future growth.

(4) Solid Waste. The proposed Alumax development would place an added load on the solid waste system in the study area. New solid waste loads would be generated by the families directly

TABLE IV-13

SEWAGE TREATMENT REQUIREMENTS FOR CITIES IN ALUMAX IMPACT AREA

City	Projected Average Sewage Load (GCD)	Projected Required Sewage Treatment Capacity Without Alumax (GPD)		Projected Required Sewage Treatment Capacity With Alumax (GPD)		Projected Net Impact Due to Alumax (GPD)	
		1980	1996	1980	1996	1980	1996
Hermiston	100	775,000	1,195,000	915,000	1,358,000	140,000	163,000
Umatilla	100	257,000	325,000	415,000 ^{1/}	485,000 ^{1/}	140,000	160,000
Stanfield	100	145,000	160,000	155,000	175,000	10,000	15,000
Echo	100	75,000	90,000	85,000	95,000	10,000	5,000
Pendleton	100	1,420,000	1,560,000	1,460,000	1,605,000	40,000	45,000
Boardman	100	110,000	110,000	115,000	120,000	5,000	10,000
Irrigon	100	110,000	110,000	115,000	120,000	5,000	10,000

^{1/} Includes Alumax plant.

Source: CH2M Hill, 1976a, p. 347.

employed at the facility, the families of secondary employees, and the construction and operation of the plant itself.

(a) Generation. The quantity of refuse generated at the site during construction of the Alumax facility is difficult to project. However, most of this refuse would be inert and could be disposed of in local landfills with minimal impact.

Table IV-14 shows the types and quantities of plant-generated solid waste that would be disposed of in a local landfill. Seventy-three percent (2,240 tons per year) would be refractory material and bricks from the bake ovens and cast house, and could be used as a cover material at the local landfill. The relatively dense refractory material would assist in stabilizing the soil and refuse, thereby decreasing blowing litter and wind erosion of existing soil cover. The remaining 23 percent would be comprised of air contaminants collected by air pollution control equipment. This material could be deposited at landfill sites able to accommodate the fluoride compounds without violating the groundwater contamination provisions of the Resource Conservation and Recovery Act. Contacts with the Department of Environmental Quality indicate inadequate hydrological information is available on the Umatilla Butte site to make this determination, and therefore, prior to disposal of the air contaminant material at this location groundwater studies would be required. It has been determined however, that the Pendleton landfill site can accommodate the material. In addition, numerous acceptable sites exist in the vicinity of the plant for the disposal of the industrial waste. Therefore, while it is unknown at this point where the material will be taken, appropriate sites do exist for proper and environmentally sound disposal.

A significant number of new families would settle in the Hermiston-Umatilla area as a result of the Alumax facility. Each family would generate some incremental amount of refuse, part of which would enter the area's waste stream. This refuse would be predominantly "residential." Smaller amounts of "commercial" refuse would come from new or expanded commercial establishments. Table IV-15 projects the future amounts, in cubic yards, of employee-related solid waste from 1980 to 1995. This projection is based on the number of primary and secondary employees after startup of the Alumax facility, and assumes that refuse generation would continue to increase at a rate of 1 percent per year (CH2M Hill, 1976a, p. 283).

(b) Collection. The amount of waste collected in the Hermiston-Umatilla area resulting from the Alumax plant and related population growth could increase by as much as 25 percent by 1980. The local collection service should be able to meet these additional demands for service.

(c) Disposal. The major impact on the study area refuse disposal system would be on the landfill nearest to the proposed Alumax site, the Umatilla Butte landfill. The refuse from the plant, combined with the refuse generated by the new families in the Umatilla Butte service area, would shorten the life of the landfill.

TABLE IV-14

PLANT-GENERATED SOLID WASTE TO LOCAL LANDFILLS
ALUMAX PLANT

<u>Condition</u>	<u>Content</u>	<u>Source</u>	<u>Quantity</u>
Solid	Inert Sludge -- 35% Solids, CaF_2 , CaCO_3 , CaSO_4	Plant Water Treatment	250 tons/yr Dry Solids
Solid	Refractory Material Brick	Bake Ovens Cast House Refractory waste from bake ovens will commence in second year of operation - not before fifth year of operation from cast house	1,960 tons/yr
Solid	Induction Furnace Slag, FeO-FeSiO_2	Anode Rodding	30 tons/yr
Collected Air Contaminants	Carbon, Iron Oxide Fluorides Fine Particulate	Baghouse -- Anode Rodding	650 tons/yr
Collected Air Contaminants	Pitch Fumes Pitch Particulate	Filter Pitch Storage & Mixers	150 tons/yr
Solid	Mixed Refuse	General Plant	50 tons/yr

Source: AMAX Pacific Aluminum Corporation, 1974, p. IV-21 and IV-22.

The Umatilla Butte landfill is projected to reach capacity by the end of 1984 without Alumax; by the end of 1982 with Alumax.

TABLE IV-15

PROJECTED EMPLOYEE-RELATED SOLID WASTE QUANTITIES
ALUMAX STUDY AREA
(Cubic Yards Per Year)

Landfill Service Area	Projected Quantities				1/
	1980	1985	1990	1996	
Umatilla Butte	20,440	22,240	24,210	26,340	
Pendleton	2,330	2,730	3,175	3,680	
Tri-Cities	1,430	1,510	1,590	1,675	

1/ BPA Projection

Source: CH2M Hill, 1976a, p. 284.

During plant construction, an undetermined amount of construction waste would also be disposed of in the Umatilla Butte landfill. The influx of new families would also increase the seasonal waste loadings at local recreational facilities.

Adequate time is available to investigate and plan for a new disposal site before the current site reaches capacity. The Department of Environmental Quality indicates that Umatilla County is one of the three best counties in Oregon from a physical and geological standpoint for landfills.

4. Housing.

a. Aggregate Demand Projections. Table IV-16 shows the aggregate housing demand expected from Alumax and non-Alumax related growth. These projections are intended to show the relative impact of growth, not to serve as a market projection of the total possible absorption of housing units in the impact area. The latter type of analysis would include such additional things as housing to replace demolitions and additions to the housing stock to increase the vacancy rate above its present near-zero level in much of the impact area. In other words, the table is not a prediction of the actual number of housing units that will be built but rather of the number required to accommodate anticipated population increases. Almost all of the Alumax-related growth will occur in Umatilla County: Alumax-related growth will account for about 50 percent of the housing needs from 1975 to 1980 and for almost 30 percent from 1980 to 1985. Alumax's relative impact declines in the later years as the impact of other projected development in the area becomes more significant. The table does not separate temporary construction worker demand from permanent housing demand for operational and secondary workers. In general, the 1975-1980

TABLE IV-16

NEW DWELLING UNITS NEEDED FOR NON-ALUMAX AND
ALUMAX-RELATED GROWTH IN SELECTED TOWNS IN SELECTED PERIODS

	1975-1980				1980-1995			
	For Non- Alumax	For Alumax	Total	Alumax Demand As Percent of Total Demand	For Non- Alumax	For Alumax	Total	Alumax Demand as Percent of Total Demand
Umatilla County								
Echo	85	35	120	29	85	20	105	19
Hermiston	630	480	1,110	43	1,450	560	2,010	28
Pendleton	40	140	180	40	480	155	635	24
Stanfield	155	35	190	4	50	50	100	50
Umatilla	390	480	870	55	170	550	720	76
Other	--	35	35	100	1,600	80	1,680	5
County Total	1,300	1,205	2,505	48	3,835	1,415	5,250	27
Morrow County								
Boardman	1,020	35	1,055	3	-140 ^{1/}	50	-90 ^{1/}	100
Irrigon	250	20	270	7	0	35	35	100
Other	525	35	560	6	120	35	155	23
County Total	1,795	90	1,885	5	-20 ^{1/}	120	100	100
Other Areas		85				70		

^{1/} Indicates a decline in housing needs.

Assumptions:

- a) Three people per dwelling unit for operational and secondary employees; two people per dwelling unit for construction employees.
- b) Rounded to nearest 5.
- c) No allowance added to compensate for demolitions or additions to increase vacancy rate.
- d) Same occupancy rate for owner and renter and single and multifamily units.

Source: CH2M Hill, 1976a, p. 277

period demand is made up mostly of construction worker demand and the period thereafter is permanent worker demand.

b. Detailed Projections of Alumax-Related Impact. The housing estimates in this section are based on the population projections already discussed and on assumptions about average family size, family income, the amount families spend on housing, and family preferences for tenure and dwelling type. The reasoning behind these assumptions is presented below.

(1) Construction Impacts. Table IV-17 shows the estimated housing demand at four periods during construction. (The month-to-month figures for construction employment are shown in the chapter on Employment.) If there were no other large-scale developments occurring in the Alumax impact area, one would normally predict that few of the construction workers would permanently reside in the area. However, since considerable additional development is projected extending to 1995 and beyond, Table IV-17 assumes that a fairly large number of construction workers (15 to 25 percent) will remain in the area after Alumax construction is completed. This assumption is partially supported by experience in the Tri-Cities area where surveys found that 30 percent of the construction workers moved into the area (Field Research Corp., 1975, p. 3). However, Tri-Cities is a considerably larger area with more construction occurring than in the Hermiston area, so the lower figures of 15-25 percent were selected for this study. Although the permanence of employee relocations is difficult to predict, the prospect of long-term employment is expected to generate a greater demand for permanent types of housing among the construction force than would otherwise be the case. It is estimated that 40 to 50 percent of those workers permanently relocating to the area will purchase single-family homes, 25 to 30 percent will purchase mobile homes, and 20 to 25 percent will reside in multifamily dwellings (CH2M Hill, 1976a, p. 303-307).

Alumax does not plan to set up a construction camp for the workers, so only housing provided by the private market will be available to the construction force. About 25 percent of the workers are estimated to occupy motels, campsites, or multifamily dwellings. The peak construction worker demand of 280-420 units is sufficiently below the expected long-term demand of 408 to 638 units by permanent and secondary workers that the private market should be willing to build them.

The rest of the workers are shown as residing in mobile homes, the traditional housing for nonpermanent construction workers. The number of units needed (560 to 840) is 301 to 403 more than the long-term demand (259 to 437) as calculated by adding needed mobile homes from Tables IV-19 and IV-22. This means that there would either be a high vacancy rate after construction ends, the units would be moved elsewhere, the units would be occupied by other construction workers on other projects, or the units would be occupied by families in Umatilla County now living in less desirable housing. It is likely that all of these would occur to some extent.

TABLE IV-17

HOUSING DEMAND
CONSTRUCTION WORKERS

<u>Date</u>	<u>Number</u>	<u>Housing Units</u> ^{1/}		
		<u>Motel-Apt-Camp</u> <u>20 Percent-</u> <u>30 Percent</u>	<u>Mobile Home</u> <u>40 Percent-</u> <u>60 Percent</u>	<u>Single-Family</u> <u>Home</u> ^{2/} <u>10 Percent-</u> <u>15 Percent</u>
Early- 1978	255	50-115	100-155	25-40
Late- 1978	955	190-290	380-575	95-140
Mid- 1979	1,400	280-420	560-840	140-210
Early- 1980	280	60-85	110-170	30-40

^{1/} All number rounded to nearest five.

^{2/} It is assumed that 5 to 10 percent of the construction workers will settle permanently in the area; 40 to 50 percent of these are assumed to purchase conventional single-family homes and the rest to purchase mobile homes. Very few rental single-family dwellings are assumed to be available for construction workers.

^{3/} A 1:1 worker dwelling ratio is assumed.

Source: CH2M Hill, 1976a, p. 305.

A separate table for housing demand during construction by secondary employees is not shown because it was assumed that most secondary employees are part of the permanent component of demand, which will be discussed in the following section.

It is difficult to project the location of construction housing. Typically, construction workers have to accept what they can find, and often this means a daily round trip of 100 miles or more. If towns near the construction site will permit construction of sufficient temporary housing, most construction workers will live there. As the next section shows, there appears to be insufficient land currently zoned for this type of housing in towns near the proposed site. Under the best circumstances, the distribution would probably be about as shown for permanent employees (see the following section).

(2) Permanent Employee Impacts. Since it is assumed that primary and secondary employees would be permanently relocating to the Alumax impact area, it must also be assumed that their housing needs will be different from those of the construction force. A primary determinant of housing choice for persons locating in the area on a permanent basis would be income. Derivation of the family income estimates was discussed in the chapter on Income. Since the income of Alumax employees and secondary employees will be somewhat different, these groups will be treated separately in the following analyses.

Tables IV-18 and IV-19 present estimates of what permanent Alumax employee families will spend on housing and their preferences for tenure (own or rent) and housing type (single-family, multifamily, mobile home). The 1970 U.S. Census showed that the percentage of households renting increased between 1960 and 1970 nationwide. This occurred largely because of sharp increases in housing costs and changes in the age structure of the population. In Hermiston, for example, the percentage of owner-occupied units declined from 68 percent in 1960 to 62 percent in 1970, and probably dropped to about 60 percent by 1975. National trends (U.S. Census, 1973) indicate that the percentage of ownership rises with income. It is assumed this would also be true with respect to Alumax employees. Assumptions about the demand for different housing types are based on available information about what is occurring in the impact area, on what the 1970 census shows for people in various income categories (see Table IV-20), and on interviews with local officials and realtors.

Mobile homes are generally well accepted in the area. Table IV-21 shows that in the Cities of Hermiston and Pendleton, mobile homes were a large proportion of the new dwellings erected between 1970 and 1975. Multifamily dwellings also comprised a large proportion, whereas only 20 to 30 percent of the new units were conventional, single-family dwellings.

Table IV-22 shows the expected housing demand from the permanent secondary employment generated by Alumax. The main difference between these projections and those for permanent Alumax employees concerns the housing-type percentages. The average household income in 1975 dollars for secondary employees is projected at \$11,500

TABLE IV-18

HOUSING DEMAND OF PERMANENT ALUMAX EMPLOYEES BY PRICE

<u>Gross Income</u> ^{1/}	<u>Ratio of Annual Income to</u>		<u>Price Range of Needed Units</u>		
	<u>Home</u> ^{2/} <u>Price</u>	<u>Monthly</u> ^{3/} <u>Rent</u>	<u>Single</u> ^{4/} <u>Family</u>	<u>Multi-</u> ^{5/} <u>Family</u>	<u>Mobile</u> ^{4/} <u>Homes</u>
Less than \$10,000	2.2	.25	to \$22,000	\$180-200	\$7,000-9,000
\$10,000-\$14,999	2.2-2.1	.20-.25	to \$32,000	\$200-250	to \$14,300
\$15,000-\$19,999	2.1-2.0	.20-.18	to \$40,000	\$250-300	to \$17,500
Over \$20,000	2.0-1.9	.15	to \$60,000	over \$300	over \$17,500

^{1/} All figures in 1975 dollars.

^{2/} National Average from HUD, Urban Housing Market Analysis, 1967, p. 70. Does not include mobile homes.

^{3/} Actual averages in 1970 Census were much lower. However, since most multifamily dwellings would be new, the rents would be higher.

^{4/} Purchase price.

^{5/} Monthly rent for two to three bedrooms.

Source: CH2M Hill, 1976a, p. 300.

TABLE IV-19

PERMANENT ALUMAX EMPLOYEES
HOUSING DEMAND

<u>Income</u> ^{1/}	<u>Number</u>	<u>Tenure</u> ^{3/} (Percent)		<u>Housing Type</u> (Percent)			<u>Approximate Number of Units Needed</u>		
	<u>Employees and Households</u> ^{2/}	<u>Own</u>	<u>Rent</u>	<u>Single-Family</u>	<u>Multi-Family</u>	<u>Mobile Home</u>	<u>Single-Family</u>	<u>Multi-Family</u>	<u>Mobile Home</u>
Less than \$10,000	7	40-60	40-60	25-50	30-45	20-30	2-4	2-3	1-2
\$10,000-\$14,999	524	50-65	35-50	40-60	25-40	15-25	210-315	130-210	80-130
\$15,000-\$19,999	229	65-78	22-35	55-70	20-30	10-15	125-160	45-70	20-70
\$20,000 and over	40	95	1-5	80-90	3-10	7-10	30-35	1-5	3-5
TOTAL	800						367-514	178-288	104-207

^{1/} 1965 dollars.^{2/} Based on data from Intalco Aluminum plant; actual number of new households would likely be lower. A direct correspondence between jobs and households has been assumed to cover the worst-case situations.^{3/} Based on existing averages in the study area and on regional and nationwide trends.

Source: CH2M Hill, 1976a, p. 299.

TABLE IV-20

HOUSING TYPE BY INCOME
ALL OREGON RESIDENTS
1970
(percent)

<u>Income</u>	<u>Single-Family</u>	<u>Multi-Family</u>	<u>Mobile Home</u>	<u>Total</u>
\$10,000-14,999	49	22	29	100
\$15,000-19,999	51	20	29	100
Over \$20,000	56	20	24	100

Source: CH2M Hill, 1976a, p. 301.

TABLE IV-21

NEW DWELLING UNITS BY TYPE
1970-1975
(percent)

	<u>Hermiston</u>	<u>Pendleton</u>
Single-Family ^{1/}	28	23
Multi-Family	52	16
Mobile Home	20	61

1/ Includes duplexes

Source: CH2M Hill, 1976a, p. 301.

TABLE IV-22

SECONDARY PERMANENT EMPLOYMENT HOUSING DEMAND
ALUMAX IMPACT AREA ^{1/}
(Average Family Income = \$11,500)

Number of New Employees	1,000
Number of New Households	770
Tenure ^{2/} - Own	60 percent
Rent	40 percent
Housing Type ^{3/} - Single-Family	30-40 percent
Multi-Family	30-45 percent
Mobile Home	20-30 percent
Number of Units Needed (Rounded)	
Single-Family	230- 310
Multi-Family	230- 350
Mobile Home	155- 230
Prices of Units Needed ^{4/}	
Single-Family	\$22,000-27,000
Multi-Family (2-3 bedroom)	\$ 280- 225
Mobile Home	\$ 9,000-14,000

^{1/} Based on 1970 Census information indicating 1.3 workers per family in selected trades in Umatilla County. See Section A-3-e of this chapter.

^{2/} Estimated 1974 Umatilla average.

^{3/} Based on 1970 Census averages, a recent Oregon State Housing Division market analysis of Pendleton area, and recent trends in the county.

^{4/} Price or rent-to-income ratios same as in Table IV-A-3-c-3.

Source: CH2M Hill, 1976a, p. 304.

(see Section B.7. of this chapter). Families with this income are at the lowest margin of those able to purchase new, conventional single-family dwellings. Since the housing situation is tight in the area, few older homes would be available for them to purchase and they would be in the market largely for new housing. Mobile homes and multifamily dwellings would probably be the primary source of housing for them.

c. Location of Housing. It is expected that housing for permanent employees and secondary workers would be distributed according to the percentages shown in the population section. There would probably be some differences in the proportions of Alumax employees and secondary workers living in various places, but the average distribution should be approximately as shown.

The numbers of dwelling units that could be built on land within the existing boundaries of the cities in the Alumax impact area were not analyzed because the cities are rapidly annexing new land, and estimates of land capacity would require almost monthly updates in order to be of any practical use.

Umatilla County, where most of the Alumax-related impact would occur, favors development of new housing within the cities rather than in unincorporated areas, and has, therefore, not opposed the cities' annexations. There are few physical barriers that would prevent the towns projected to receive most of the impact (Umatilla, Hermiston, and Stanfield) from annexing as much land as would be needed to accommodate foreseeable demand.

5. Community Services Impacts.

a. Educational Services. The ability to accommodate increased enrollment varies widely among districts and within school district boundaries. In some cases, the district averages conceal overcrowding in specific schools; so, while it may appear that increased enrollments could be accommodated in a district without school expansion, additional building or modification may be necessary. The following analysis assumes that Alumax plant construction begins in late 1977.

Three periods are of special significance for this analysis. The first is the Alumax plant construction phase. Since startup and construction overlap, it is meaningless to isolate the construction impacts, so the combined effect is explained as a construction period impact instead of a construction worker impact. School districts may attempt to meet much of the demand in this period with temporary facilities.

The second period covers school enrollments during the time when Alumax would first be in full operation and construction employment is zero. This represents a near-term impact period which school districts would probably plan to accommodate with permanent facilities. Unlike the common pattern, enrollments in this permanent

impact period would not be significantly lower than during the construction phase since Alumax plans to delay the introduction of operational personnel until after the departure of most of the construction personnel.

The third period considered includes the impacts of Alumax on school enrollments 20 years from now. Enrollments have been projected to school year (SY) 1995-96 to illustrate that Alumax-related secondary employment would continue to increase after the plant is in full operation (beyond 1980). The projections are presented for planning purposes only, and not compared to any capacity of the schools to accommodate the demand since school capacity changes cannot be accurately projected 20 years into the future. Enrollments expected to result from Alumax during these major periods are outlined in Table IV-23.

(1) Construction Period. The Hermiston and Umatilla school districts are expected to receive almost all of the school children of construction workers. This is assumed because most of the construction workers who would temporarily relocate to the area would probably live in temporary accommodations near the plant site.

Peak construction employment would reach 1,400 in the summer of 1979. This figure does not represent 1,400 new families because many of the construction workers would not relocate their families. Those who do relocate are expected to have a high proportion of elementary-age school children. Since peak construction employment would occur during the summer, and should decline to 1,260 by the start of the following school year, the impacts of construction on school enrollments would be lessened.

A study of Amax's community impacts in Warrenton (Sedway/Cooke, 1974, p. 87) estimated that construction-related school enrollment would be approximately 300, based on a peak construction work force of 1,800. This figure has been adjusted to 210 for the Umatilla site since the construction work force would peak in the summertime and would reach only 1,400. Estimated construction-related enrollment reaches its highest value (210 students) in September 1979; but, since construction overlaps with plant startup, peak construction period enrollments would not occur until February 1980.

Table IV-24 displays the distribution of enrollment anticipated for school year 1979-80 among the study area school districts. This distribution has been reentered in Table IV-25 and compared with current and projected elementary and secondary school capacities. Although the Alumax-related population changes in Hermiston and Umatilla are approximately equal, school superintendents in these two areas feel that the Hermiston schools will receive more Alumax-related students than the Umatilla schools.

Serious impacts on school capacities would occur in several school districts as a result of Alumax. The most serious problem would arise in Umatilla School District 6-R where utilization of

TABLE IV-23

ELEMENTARY AND SECONDARY ALUMAX-RELATED ENROLLMENTS BY SCHOOL YEAR

		<u>Construction Employees</u>	<u>Permanent Alumax Employee Families</u>	<u>Secondary Employee Families</u>	<u>School Year</u>	<u>Enrollments</u>			<u>Total (Rounded)</u>
						<u>From Construction Employees</u>	<u>From Alumax Employees</u>	<u>From Secondary Employees</u>	
October	1977	65	0	90	(1977-78)	10	0	74	85
February	1978	320	0	240		53	0	197	250
September	1978	700	0	240		(1978-79)	115	0	197
February	1979	1080	0	240	180		0	197	375
March	1979	1145	40	270	190		51	221	460
September	1979	1260	184	270	(1979-80)	210	234	221	665
December	1979	840	440	270		140	559	221	920
February	1980	420	592	348		70	752	285	1105
September	1980	0	640	348	(1980-81)	0	813	285	1100
September	1995	0	640	600	(1995-96)	0	813	492	1305

Assumes: The number of secondary employment families = 0.6 families per employee.
 The number of Alumax families = 0.8 families per employee. Construction employment enrollment = 210 at peak (adapted from Seway/Cooke, August 1974, p. 87, Amax Community Impact Analysis).
 Secondary employees average 0.82 school age children per family. (Enrollment Projections 1974-79, Morrow County School District R-1).
 Alumax employees average 1.27 school age children per family. (Intalco-Warrenton Population & School Survey, August 1971).
 No students enroll or leave during the last quarter of a school year.
 No students will enroll for less than 3 months.

Based on employment figures presented in Section IV-A-3-d.

TABLE IV-24

PEAK CONSTRUCTION PERIOD ALUMAX-RELATED SCHOOL DEMAND
(SY 1979-80)

	<u>Families of Alumax Employees</u>	<u>Families of Secondary Employees</u>	<u>Enrolled Children of Alumax Employees</u>	<u>Enrolled Children of Secondary Employees</u>	<u>School Age Children of Construction Employees</u>	<u>Total Alumax- Related School Children at Peak</u>
Hermiston	207	122				
Kindergarten			20	7	4	31
Elementary			124	49	21	194
Secondary			114	44	10	168
Umatilla	207	122				
Kindergarten			20	7	4	31
Elementary			124	49	21	194
Secondary			114	44	10	168
Pendleton	59	34				
Kindergarten			11	2	0	13
Elementary			35	13	0	48
Secondary			34	13	0	47
Stanfield	17	10				
Kindergarten			2	1	0	3
Elementary			11	4	0	15
Secondary			10	4	0	14
Irrigon (Morrow Co. District R-1)	12	7				
Kindergarten			3	1	0	4
Elementary			18	6	0	24
Secondary			0	0	0	0
Echo (5-R)	12	7				
Kindergarten			1	0	0	1
Elementary			8	3	0	11
Secondary			7	3	0	10

TABLE IV-24 (Continued)

	<u>Families of Alumax Employees</u>	<u>Families of Secondary Employees</u>	<u>Enrolled Children of Alumax Employees</u>	<u>Enrolled Children of Secondary Employees</u>	<u>School Age Children of Construction Employees</u>	<u>Total Alumax- Related School Children at Peak</u>
Boardman (Morrow Co. District R-1)	18	10				
Kindergarten			0	0	0	0
Elementary			0	0	0	0
Secondary			16	6	0	22
Ione (Morrow Co. District R-1)	15	9				
Kindergarten			2	1	0	3
Elementary			9	4	0	13
Secondary			8	3	0	11
Heppner (Morrow Co. District R-1)	15	9				
Kindergarten			2	1	0	3
Elementary			9	4	0	13
Secondary			8	3	0	11
Other Areas	30	18				
Kindergarten			3	0	0	3
Elementary			21	6	0	27
Secondary			18	6	0	24
TOTAL	592	348	752	285	70	1107

Assumptions: 0.6 families/secondary employee.

0.82 school children/secondary employee family (from: Enrollment Projections 1974-75, Morrow School District R-1).

210 school children from construction force families at peak (adapted from Sedway/Cooke, August 1974, p. 87, Amax Community Impact Analysis).

0.8 families/Alumax employee.

1.27 school children/Alumax employee family (Intalco-Warrenton Population and School Survey, August 1971).

Hermiston District will offer kindergarten, as proposed; Boardman will not.

Distributions are based on the population distributions presented in Table IV-11.

TABLE IV-25

CONSTRUCTION PERIOD ENROLLMENT VS. PROJECTED CAPACITIES IN
MORROW AND UMATILLA COUNTY SCHOOLS WITH AND WITHOUT ALUMAX
(SY 1979-80)

	Projected SY 1979-80 Enrollment Without Alumax	Peak SY 1979-80 Alumax-Related School Age Children	Projected Capacity in SY 1979-80	Percent Utilization of Projected Capacity Without Alumax	Percent Utilization of Projected Capacity With Alumax
Hermiston (8-R)					
Elementary	1800	194	1840	98%	108%
Secondary	1850	168	1920	96%	105%
Umatilla (incl. McNary) (6-R)					
Elementary	430	194	825	52%	76%
Secondary	400	168	350	114%	162%
Pendleton (16-R)					
Elementary	1727	49	1800	96%	99%
Secondary	1647	47	1700	97%	100%
Stanfield (61-R)					
Elementary	213	15	260	82%	88%
Secondary	224	14	230	97%	103%
Irrigon (Morrow Co. Dist. R-1)					
Elementary	356	24	400	89%	95%
Secondary	0	0	0	0%	0%
Echo (5-R)					
Elementary	116	11	150	77%	85%
Secondary	125	10	140	89%	96%

TABLE IV-25 (Continued)

	Projected SY 1979-80 Enrollment Without Alumax	Peak SY 1979-80 Alumax-Related School Age Children	Projected Capacity in SY 1979-80	Percent Utilization of Projected Capacity Without Alumax	Percent Utilization of Projected Capacity With Alumax
Boardman (Morrow Co. Dist. R-1)					
Elementary	0	0	0	0%	0%
Secondary	365	23	300	122%	129%
Ione (Morrow Co. Dist. R-1)					
Elementary	83	13	164	51%	59%
Secondary	114	11	153	75%	82%
Heppner (Morrow Co. Dist. R-1)					
Elementary	326	13	473	69%	72%
Secondary	339	11	353	96%	99%

Source: CH2M Hill, 1976a, pp. 359-360; BPA.

secondary school facilities would be at 114 percent of projected capacity without, and 162 percent with Alumax. In order to prevent overcrowding, facilities would have to be expanded to accommodate an additional 218 students (168 of these being due to Alumax).

Another serious facility shortage would occur for secondary students in Boardman (Morrow County District R-1, 1974) where utilization, including Alumax impacts, would equal 129 percent of projected capacity. Only about 25 percent of Boardman's overcrowding--23 of 88 students--could be attributed to Alumax, however.

Relatively slight overcrowding would occur in the elementary and secondary schools of Hermiston and in the Stanfield secondary system as a result of Alumax. All of these systems could meet their projected (non-Alumax) enrollments without overcrowding provided planned increases in capacity occur. The number of students over capacity would be 154 for the Hermiston elementary system, 98 for the Hermiston secondary system, and 8 for the Stanfield secondary system.

None of the other impact area school systems would be forced by Alumax to exceed planned capacity by 1980. In some cases systems would be functioning at or very near capacity, however, an expansion of facilities would become necessary within a year or two.

In addition to the need for expansion of classroom capacity in various systems, all districts would require additional teachers if current student/teacher ratios are to be maintained. Table IV-26 provides information on current student/teacher ratios in impact area schools and on the number of additional teachers which would be required to accommodate Alumax enrollments while maintaining current ratios. The greatest needs would occur in the Umatilla and Hermiston districts where 21 and 19 additional teachers would be required, respectively. Pendleton would need 5 additional with the Stanfield, Echo, Lone, and Heppner districts requiring 2 each. One additional elementary teacher would be required for Irrigon and one secondary teacher for Boardman.

(2) Initial Operation Period. If completed on schedule, the Alumax plant would begin startup procedures at the end of school year 1979-80 with an initial work force of 50. Permanent, non-construction period enrollments would occur during SY 1980-81, when Alumax employees and an additional 580 secondary employees would reside in the area. Since more than one family member would be employed in some families, the resulting number of new families at peak employment in this period is expected to total 988.

Industrial employees of similar age and income to expected Alumax employees have an average of 1.27 school age children per family (Intalco-Warrenton Population and School Survey, August 1971). The composition of the secondary employment is expected to be varied and the number of school age children from this category is expected to be nearly the same as the area average (0.82 school children per new family). (Morrow County School District R-1, 1974.)

TABLE IV-26

PROJECTED TEACHER NEEDS IN IMPACT AREA SCHOOLS - SCHOOL YEAR 1979-80

<u>District</u>	<u>Current Student/ Teacher Ratio</u>	<u>Number of Alumax- Related Children in School System in 1979-80</u>	<u>Number of Teachers Required to Accommodate Alumax-Related Students at Current Student Teacher Ratio</u>
Hermiston (8-R)			
Elementary	20:1	194	10
Secondary	18:1	168	9
Umatilla (6-R)			
Elementary	20:1	194	10
Secondary	15:1	168	11
Pendleton (16-R)			
Elementary	20:1	49	2
Secondary	17:1	47	3
Stanfield (61-R)			
Elementary	14:1	15	1
Secondary	11:1	14	1
Irrigon (R-1)			
Elementary	24:1	24	1
Echo (5-R)			
Elementary	17:1	11	1
Secondary	15:1	10	1
Boardman (R-1)			
Secondary	17:1	23	1
Ione (R-1)			
Elementary	12:1	13	1
Secondary	12:1	11	1
Heppner (R-1)			
Elementary	24:1	13	1
Secondary	15:1	11	1

NOTE: For the State of Oregon as a whole, the student/teacher ratio in elementary and secondary schools is 20:1.

Source: CH2M Hill, 1976b; BPA.

Table IV-27 presents the anticipated distribution of Alumax-related students in SY 1980-81. This school year represents the beginning of the permanent employment period following the construction peak. Contrary to the common post-construction pattern, school enrollments are not expected to decline significantly.

Based on projected capacities for school year 1980-81, most impact area schools would have sufficient classroom space to accommodate their non-Alumax enrollments without difficulty. Exceptions to this rule would, however, occur in four school systems. The most heavily overburdened systems would be the secondary schools of Boardman and Umatilla where non-Alumax enrollments would equal 200 percent and 129 percent, respectively, of projected classroom capacities. Both the elementary and secondary schools of Hermiston would be slightly beyond capacity.

When Alumax impacts are added to projected 1980-81 enrollments, the situation in the Umatilla secondary system becomes critical. The utilization figure increases from 129 percent to 181 percent of capacity. The already critical situation in Boardman is further exacerbated, raising the utilization rate to 214 percent of classroom capacity. The strain on Hermiston schools would also begin to be of concern with utilization increasing from 103 percent to 114 percent in elementary schools and from 102 percent to 111 percent in the secondary system. Less serious capacity overruns would occur in the elementary schools of Irrigon and the secondary system of Stanfield, both of which would be at 105 percent of capacity. Pendleton elementary schools and the Heppner secondary school would be at 101 percent of capacity. All other impact area school systems would be able to accommodate Alumax impacts without exceeding projected capacity.

Blue Mountain Community College (BMCC), located in Pendleton, is the only center for higher education located in the impact area. The siting of Alumax within BMCC's service area could be mutually beneficial. Alumax could stimulate increased utilization of BMCC facilities, increase student enrollments (and thereby increase tuition income and State allocation based on Full-Time Equivalent (FTE) enrollment), and increase the true cash value of the property tax base. At the same time, BMCC could serve Alumax by providing day and night classes for employees and their families and by training skilled labor.

Current on-campus total enrollment is slightly less than 2 percent of the service area population. Assuming that 2 percent of the anticipated Alumax-related population increase in Morrow and Umatilla Counties would also become BMCC on-campus students, approximately 85 new students would be added to the 1980-81 school enrollment. Capacities of general purpose classrooms could accommodate this increase, whereas some of the specialized facilities could not.

A similar pattern is projected for FTE enrollment. FTE is projected to rise from the current 1,150 to 1,200 in the fall of 1976 without Alumax. In contrast to on-campus enrollment, FTE enrollment cannot be compared to any physical capacity. This enrollment

TABLE IV-27

ENROLLMENTS VS. PROJECTED CAPACITIES IN MORROW AND UMATILLA COUNTY
SCHOOLS DURING INITIAL ALUMAX OPERATION PERIOD
(SY 1980-81)

	Projected SY 1980-81 Enrollment Without Alumax	Peak SY 1980-81 Alumax-Related School Age Children	Projected Capacity in SY 1980-81	Percent Utilization of Projected Capacity Without Alumax	Percent Utilization of Projected Capacity With Alumax
Hermiston (8-R)					
Kindergarten	240	35			
Elementary	1900	200	1840	103%	114%
Secondary	1950	184	1920	102%	111%
Umatilla (incl. McNary) (6-R)					
Kindergarten	81	35			
Elementary	470	200	825	57%	81%
Secondary	450	184	350	129%	181%
Pendleton (16-R)					
Kindergarten	300	10			
Elementary	1767	56	1800	98%	101%
Secondary	1604	53	1700	94%	97%
Stanfield (61-R)					
Kindergarten	18	3			
Elementary	221	17	260	85%	92%
Secondary	226	16	230	98%	105%
Irrigon (Morrow Co. Dist. R-1)					
Kindergarten	63	5			
Elementary	391	28	400	98%	105%
Secondary	0	0	0	0%	0%

TABLE IV-27 (Continued)

	Projected SY 1980-81 Enrollment Without Alumax	Peak SY 1980-81 Alumax-Related School Age Children	Projected Capacity in SY 1980-81	Percent Utilization of Projected Capacity Without Alumax	Percent Utilization of Projected Capacity With Alumax
Echo (5-R)					
Kindergarten	26	2			
Elementary	122	11	150	81%	89%
Secondary	131	11	140	94%	101%
Boardman (Morrow Co. Dist. R-1)					
Kindergarten	0	0			
Elementary	0	0	0	0%	0%
Secondary	401	27	200	200%	214%
Ione (Morrow Co. Dist. R-1)					
Kindergarten	21	3			
Elementary	84	15	164	51%	60%
Secondary	115	13	153	75%	84%
Heppner (Morrow Co. Dist. R-1)					
Kindergarten	60	3			
Elementary	329	15	473	70%	73%
Secondary	343	13	353	97%	101%

Assumptions: Hermiston will offer kindergarten in the future, as proposed; Boardman will not.

Source: CH2M Hill, 1976a, pp. 357-358.

includes a large number of students who attend classes conducted off the main campus.

Average teacher/student ratios at Blue Mountain Community College have little meaning, since classes vary widely in both current teacher/student ratio and "desired" or practical teacher/student ratio. It could be said, however, that the current teacher employment (69) would be expected to be roughly adequate through 1980, including the Alumax-related demand.

(3) Long-Term Impact. Since Alumax-related secondary workers would continue to move into the area after the plant is fully operational, school enrollments would also continue to rise. Table IV-28 illustrates the distribution of Alumax-related enrollees in SY 1995-96 and compares it with projected district enrollments in the absence of Alumax. As can be seen from the table, substantial numerical impacts would occur in Umatilla, Hermiston, and Pendleton. No comparison is made with any school capacities, since school modifications cannot be meaningfully projected 20 years in advance.

While Alumax would increase the demands placed on area educational facilities, it is likely that these could be accommodated as a result of the significant expansion of the area's tax base resulting from the introduction of the plant and increases in taxable property and income.

b. Safety Services. Since Alumax would provide its own plant site security and firefighting systems, discussion of area safety system impacts is limited to those which would result from Alumax-induced population increments.

(1) Police. Statistics from the Federal Bureau of Investigation's Uniform Crime Reports (1975) indicate that there are, on the average, 2.2 sworn officers and 0.6 civilian support personnel for every 1,000 persons in cities under 10,000 in the Pacific Region (Alaska, California, Hawaii, Oregon, and Washington) of the United States.

Based on the above averages, there would be a need for approximately eight additional sworn officers and two civilians in the impact area upon completion of plant construction (see Table IV-29). Most of this need would occur in Hermiston and Umatilla where each city would require four additional personnel, three of whom would need to be sworn officers. By 1995 these needs would increase to nine sworn officers and three civilians for the area as a whole, with Hermiston and Umatilla each requiring four of the nine officers and one of the civilians. The costs of each additional officer would be about \$20,000 per year in 1976 dollars. This cost does not include capital expenditures required for additional vehicles and equipment, or expansion of existing facilities.

(2) Firefighting. New residential growth imposes a relatively minor burden on existing firefighting systems. The greatest impact is imposed by commercial and industrial growth. An adequate

TABLE IV-28

ALUMAX-RELATED SCHOOL DEMAND IN SCHOOL YEAR 1995-96

	Kindergarten			Elementary and Secondary		
	Projected Enrollment Without Alumax	Alumax-Related Enrollment	Percent of Total Enrollment Attributable to Alumax	Projected Enrollment Without Alumax	Alumax-Related Enrollment	Percent of Total Enrollment Attributable to Alumax
Hermiston	475 ^{1/}	46 ^{1/}	9%	5,186	456	8%
Umatilla	101	46	31%	1,088	456	30%
Pendleton	367	13	3%	3,692	132	3%
Stanfield	58	4	6%	613	39	6%
Irrigon	185	3	2%	728	26	3%
Echo	36	3	8%	358	26	7%
Boardman	0 ^{2/}	0 ^{2/}	-	1,170	39	3%
Ione	25	3	11%	250	32	11%
Heppner	81	3	4%	833	32	4%

^{1/} Assumes that Hermiston District will offer kindergarten, as proposed.

^{2/} Assumes that Boardman will not offer kindergarten.

Source: CH2M Hill, 1976a, p. 371.

TABLE IV-29

NUMBER OF POLICE PERSONNEL REQUIRED TO
ACCOMMODATE ALUMAX POPULATION CONTRIBUTIONS IN
1980 AND IN 1995

<u>Department</u>	<u>Population Contribution</u>		<u>Sworn Officers Required</u>		<u>Support Personnel Required</u>	
	<u>1980</u>	<u>1995</u>	<u>1980</u>	<u>1995</u>	<u>1980</u>	<u>1995</u>
Boardman	100	150	0.22	.33	.06	.09
Echo	100	50	0.22	.11	.06	.03
Hermiston	1400	1625	3.08	3.58	.84	.98
Irrigon	50	150	0.11	.33	.03	.09
Pendleton	400	450	0.88	.99	.24	.27
Stanfield	100	150	0.22	.33	.06	.09
Umatilla	<u>1400</u>	<u>1600</u>	<u>3.08</u>	<u>3.52</u>	<u>.84</u>	<u>.96</u>
TOTAL	3550	4175	7.81	9.19	2.13	2.51

Assumptions: Population impacts are as projected in Table IV-11, and a standard of 2.2 sworn officers and 0.6 support personnel per 1000 population are used (standard figures represent averages for cities in the Pacific Region with populations of less than 10,000 as reported in the FBI's Uniform Crime Reports, 1975).

firewater flow for residential areas is 2,000 gpm, whereas a firewater flow up to 5,000 gpm is required for commercial areas, schools, and apartments. These required firewater flows can be offset to some degree through use of fire-resistant construction and/or sprinkler systems.

There is insufficient information available on the amount, size, location, or type of construction, for new commercial or industrial businesses that might locate in the Alumax impact area to allow a detailed assessment of future fire protection needs. Only sketchy predictions can be made about the impact of both indigenous and Alumax-generated growth on the requirements for firefighting systems. If primarily residential growth occurs in the town, little impact would occur. If large amounts of commercial or industrial growth occur, on the other hand, improvements to some of the systems would probably be needed. The types of industrial plants expected to locate in the impact area normally provide their own fire protection equipment and train their personnel to fight fires; they impose little direct burden, therefore, on local fire departments. The existence of Alumax's fire protection capability would not improve the fire rating of nearby fire districts to any significant degree.

It is likely that most smaller scale commercial/industrial development would occur in the larger cities which already have relatively good fire ratings. The City of Hermiston is likely to receive the greatest impact and will need to hire at least two additional full-time firemen, with or without Alumax, to keep its present fire rating.

c. Health Services. As indicated in Chapter III.B.6.c., it would be possible to accommodate a larger than current population with the presently existing number of hospital beds in Umatilla County without exceeding recommended standards. This is also true, to a lesser extent, for physicians. The current excess of hospital beds is 135. Based on an average of 5.5 beds/thousand-people (a figure considered standard by the State of Oregon, 1975), only 26 beds would be required to meet the needs of Alumax-related populations. Since surplus capacity far exceeds this need, there should be no need to supplement present capacity through 1995. While some facilities may require renovation or replacement, the availability of hospital beds should be adequate.

Although the current ratio of physicians to population (1:1,205) in Umatilla County is slightly more favorable than the recommended standard of 1:1,250 (Paxton, 1973, p. 105), unless recruitment measures are instituted, supply is expected to lag behind population growth in a year or two. Based on the 1 to 1,250 standard, Alumax-related population would generate a need for 3 additional physicians by 1980, and another by 1995.

Impacts of Alumax employees on community health services would be lessened somewhat by the existence of a first aid facility planned for the plant. The facility would be manned on a 24-hour basis and would be equipped for emergency first aid, chest X-rays, and routine visual and hearing tests. The plant would also have an ambulance equipped with oxygen and other emergency equipment. The

first aid facility would be manned by Emergency Medical Technicians. There would be regularly scheduled visits to the plant by doctors to conduct preemployment physicals and to give periodic employee examinations. An active medical history of all employees would be maintained at the plant. All company supervisory personnel would be required to have and maintain the currency of a first aid card.

d. Cultural and Recreational Resources. Cultural attractions in the impact area are quite limited. Small local museums and historical society displays have served to preserve various items of historical and cultural significance. Although usage of these facilities may be expected to increase somewhat as a result of Alumax, this should have no significant adverse impacts on these resources.

As in the case of other cultural and recreational resources, libraries in the area would experience increased usage as a result of population increments generated by Alumax. Table IV-30 indicates the number of additional volumes and the increases in expenditures which would be required by impact area libraries in order to accommodate Alumax additions to their respective area populations while maintaining their current per capita volume and cost ratios. The Umatilla system would require substantial increases in resources and expenditures. Relatively minor increases in cost and resources would be needed for libraries in Morrow County.

Much of the impact of the Alumax-related population will be in the form of high intensity, day use recreation found in or near population centers in the study area. For most cities, it is recognized that the capabilities of their overall park system has already been surpassed and that increases in population will further diminish the level of service if new recreational developments do not keep pace with increases in population.

Table IV-31 describes the future need for park space in cities in the impact area. Most of the high impact communities have a current shortage of developed parklands. Considerable expenditures would be required to satisfy these present shortages, let alone to keep pace with increasing population. The Alumax project will have its greatest effect on parkland resources in Hermiston and Umatilla. The remaining communities would experience relatively minor impacts on these recreational facilities.

The population in the region is conveniently located to numerous Federal and State recreational facilities. The facilities are largely adjacent to rivers and lakes, and are used by thousands of people annually, many of whom come from outside the region. Generally, more pressure will be placed upon these facilities by increasing resident population in the region. However, considering the large number of outside users and the growing trend toward outdoor recreation, the impact of Alumax growth upon these State and Federal facilities would be relatively minor.

TABLE IV-30

ALUMAX IMPACTS ON LIBRARY
RESOURCES AND EXPENDITURES

	<u>Morrow County</u>	<u>Umatilla County</u>
Current Volume Per Capita Ratio.	3.2	2.8
Current Cost Per Capita Ratio	\$0.80	\$3.66
Expected Alumax Population Impact (1995)	350	4,100
Additional Volumes Required to Maintain Current Per Capita Ratio	1,120	11,480
Additional Expenditures Needed to Maintain Current Per Capita Cost Ratio	\$280.00	\$42,017.00

Source: Oregon State Library Board of Trustees, 1975, pp. 30-31 and 42-43.

TABLE IV-31

ADDITIONAL URBAN PARK ACREAGE
REQUIRED TO MEET THE NEEDS OF
ALUMAX-RELATED POPULATION
(1995)

<u>City</u>	<u>Current Acres Per 1000 Persons</u>	<u>Total Acres</u>	<u>Needs at Current Ratio (Acres)</u>	<u>Need at Ratio of 15.5 Acres/1000 ^{1/} (Acres)</u>
<u>Morrow County</u>				
Boardman	28.8	20.0	4.3	2.3
Irrigon	8.1	3.0	1.2	2.3
<u>Umatilla County</u>				
Echo	2.0	1.0	0.1	0.8
Hermiston	8.4	50.0	13.6	25.2
Pendleton	5.4	76.0	2.4	7.0
Stanfield	1.5	1.5	0.2	2.3
Umatilla	24.7	40.0	39.5	24.8

^{1/} Recommended as a minimum standard by the State of Oregon (Oregon State Highway Division, 1972).

Hunting and fishing in the region will be impacted in three ways: (1) increased demand due to population growth; (2) destruction of certain portions of the wildlife habitat to accommodate new housing and service facilities; and (3) elimination of wildlife habitat due to Alumax plant site. It is reasonable to assume that increases in usage pressures would be proportionate to the population impacts on the area discussed in Section A.3.a. of this chapter. Any precise estimate of the amount of habitat lost to the construction of housing and service facilities would be highly speculative, and would be dependent on the location of such construction.

A decrease in waterfowl hunting would occur as a result of the elimination of hunting on the 165-acre plant site and the reduction or restriction of hunting in areas adjacent to the plant site due to safety considerations.

Alumax intends to maintain the irrigation system upon which the existence of the ponds comprising the site's waterfowl habitat is dependent.

The impacts on fishing in the immediate vicinity of the plant would be similar to those on waterfowl hunting. The ponds containing the main warmwater fishery on the property will not be disturbed by plant construction. The decision to permit or prevent continued fishing by local citizens would be based on safety and insurance considerations.

Some decrease in upland game habitat would also occur as a result of plant construction. The 165-acre plant site would be totally lost as a wildlife habitat, and activities concomitant with the construction and subsequent operation of the plant would reduce the value of the remaining habitat in adjacent areas. Again, continued upland game hunting in areas surrounding the plant would be contingent on safety considerations.

6. Employment and Labor Force Impacts.

a. Construction Employment. Table IV-32 shows Alumax's projected construction work force needs. Construction employment would reach a peak of about 1,400 about 22 months after the beginning of construction. Thereafter, the construction work force is expected to decline until construction is completed after 32 months.

It is difficult to project the number of construction workers that would be hired locally. The construction labor force in the region is relatively small compared to the needs of Alumax and other corporations building or expected to build in the area. There is also a shortage of workers in some trades. On the other hand, there is currently a relatively high unemployment rate (about 15 percent) among construction workers in the area. Assuming that demand will increase for most construction labor in the four-county area, the analysis of construction impacts has been confined to the four-county study area's currently unemployed group of about 600 construction workers (CH2M Hill, 1976a, p. 308). It is assumed that Alumax will hire most of the

TABLE IV-32

ALUMAX EMPLOYMENT

<u>Month</u>	<u>Construction Employment</u>	<u>Operation Employment</u>	<u>Total</u>
0	0		0
1	65		65
2	130		130
3	190		190
4	255		255
5	320		320
6	380		380
7	445		445
8	510		510
9	575		575
10	635		635
11	700		700
12	765		765
13	825		825
14	890		890
15	955		955
16	1,020		1,020
17	1,080	0	1,080
18	1,145	50	1,195
19	1,210	70	1,280
20	1,275	85	1,260
21	1,335	105	1,440
22	1,400	120	1,520
23	1,260	230	1,490
24	1,120	335	1,455
25	980	445	1,425
26	840	550	1,390
27	700	600	1,300
28	560	650	1,210
29	420	700	1,120
30	280	740	1,020
31	140	780	920
32	0	800	800

Source: CH2M Hill, 1976a, p. 309.

unemployed construction workers in Umatilla and Morrow Counties and about 15 percent of the unemployed construction workers in the Tri-Cities area. This means that as many as 375 current residents of Umatilla and Morrow Counties may be hired to help construct the plant. This estimate is only an approximation. Actual hiring will depend not only on local conditions but also on the demand for construction workers throughout the Pacific Northwest and even the nation.

b. Operation Employment. Alumax projects that the proposed plant would begin startup procedures with about 50 employees, but would reach full capacity of 800 employees by 1985, the last year of the construction period. Some plant employees would be hired before the formal plant opening and would be involved in training programs, operation planning, preparation work, and other activities. Qualifications for production employees do not require previous experience in the aluminum industry or any other special skills.

Current employment rates in the Hermiston-Umatilla area suggest that about 200 workers are unemployed in the vicinity of the proposed plant (Oregon State Employment Division, 1976). It is estimated that about 50 of these workers would be hired by Alumax. The remaining unemployed workers would be available for hire by other local employers. It is likely that some currently employed residents in the area would seek and obtain Alumax jobs because of the relatively high wage paid by Alumax, thereby creating vacancies in other sectors of the local economy. It is not possible to project the precise extent of this turnover, but it might be as much as 150 (equivalent to a 5 percent labor turnover). Therefore, permanent hire from the Hermiston and Umatilla areas may range from 50 to 200 persons. Another 100 employees may be hired from other parts of the four-county impact region, so total regional hire of plant employees may range from about 150 to about 300. It is Alumax policy to hire as many people locally as possible so a successful recruiting effort could push these figures considerably higher.

c. Secondary Employment - Operating Employment Multiplier. An employment multiplier for permanent employees in Umatilla County has been determined by comparing the percentage distribution of employment over all sectors in the county with the comparable distribution for the United States. Employment sectors in Umatilla County with relatively larger percentages of employment than the nation are judged to have some employment that is basic (i.e., employment that creates goods and services that are exported from the region). The difference in percentages between the county and nation yields the percentage of county employees in the sector involved in basic production. Workers employed in sectors in the county that have a relatively smaller employment base than the nation are viewed as serving local demand and are called secondary employees. The secondary employees represent the portions of the economy that are oriented toward providing goods and services necessary to support or supplement the basic sector. There are two exceptions to this methodology: all agricultural and manufacturing employment, except newspaper publishing, are assumed to be basic.

This division of the economy into basic and secondary components is in accordance with economic base theory (Emerson and Lamphear, 1975, p. 129-132). Economic base theory views economic specialization as the basis of the economy and its growth. Specialization in activities such as agriculture and manufacturing yields exports from the region which in turn generate the funds necessary to import the goods and services that the region is lacking. Specialization is undertaken by a region on the basis of its comparative advantage in producing a particular product or service. Secondary sectors support the basic industries or sectors and their employees in terms of providing essential goods and services such as retail trade, housing, communications, transportation, and so on. Higher levels of basic economic activity tend to generate higher levels of demand for these secondary outputs, and secondary employment is thereby stimulated.

Employment in each sector is divided into basic and local totals as shown in Table IV-33. Total employment is then divided by total basic employment to obtain the employment multiplier: this application of economic base theory yields a multiplier of 2.25; i.e., for each job created by Alumax, an estimated 1.25 additional jobs may be created, resulting in an overall increase of 2.25 jobs.

The employment multiplier should be viewed as an approximation that is as accurate as can be obtained given the limitations of economic research data and the base theory used for this analysis. Other studies reviewed by BPA reported aluminum industry multipliers ranging from 1.6 to 3.6 (The 3.6 multiplier was reported by A. D. Little, Inc., the 1.6 multiplier was reported by the U.S. Chamber of Commerce. The A. D. Little multiplier is larger than the multiplier used in this study because A. D. Little's multiplier shows Statewide secondary employment, while the multiplier used in this study is for Umatilla County only. The multiplier increases as the geographical size of the study area increases (see CH2M Hill, 1976b).

d. Secondary Employment - Construction Employment Multiplier. The employment multiplier for the construction work force is estimated to be 2.0. This figure is based on input-output studies done for the States of Oregon and Washington by the University of Washington Graduate School of Business Administration. The lower multiplier reflects the lesser response of both current and potential employers in the local area to a temporary increase in demand for retail goods and services.

e. Secondary Employment Lag Time. In general, secondary employment tends to lag behind the primary employment that generates it. This lag is due to uncertainties, market imperfections, the time required to open new businesses, and a variety of other factors.

The length of this time lag for secondary employment is difficult to predict. In Table IV-34 the full employment impact is not shown until 1995, which is about 10 to 15 years after full plant operation is reached. This is, of course, an estimate -- the actual length of the lag would depend on many factors, such as development of

TABLE IV-33

DETERMINATION OF EMPLOYMENT MULTIPLIER
UMATILLA COUNTY
1970

	<u>Basic</u>	<u>Local</u>	<u>Total</u>
Farm Proprietors	1,579	0	1,579
Farm Employees	1,288	0	1,288
Government		0	1,302
Federal	1,302		3,166
State & Local	0	3,166	
Manufacturing	2,742	147	2,889
Mining & Other	0	73	73
Construction	0	433	433
Transportation & Utilities	305	741	1,046
Trade	352	2,532	2,884
Finance, Insurance, Real Estate	0	342	342
Services	284	1,973	2,257
Nonfarm Proprietors	<u>843</u>	<u>1,430</u>	<u>2,273</u>
TOTAL EMPLOYEES	8,695	10,837	19,532

$$\text{Multiplier} = \frac{19,532}{8,695} = 2.25$$

Source: CH2M Hill, 1976a, p. 313.

TABLE IV-34

ESTIMATED ALUMAX EMPLOYMENT IMPACT

	<u>1975</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Alumax Employment ^{1/}								
Construction	0	250	730	1,020	210	0	0	0
Operation ^{2/}	0	0	0	120	790	800	800	800
Secondary ^{2/}	<u>0</u>	<u>150</u>	<u>400</u>	<u>450</u>	<u>580</u>	<u>360</u>	<u>600</u>	
1,000								
TOTAL	0	400	1,130	1,590	1,580	1,160	1,400	1,800
Alumax Employment as Percent of Study Area Total ^{3/}								
Direct	0	--	--	--	1.3	1.0	0.9	0.8
Secondary	<u>0</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>0.8</u>	<u>0.4</u>	<u>0.7</u>	<u>1.0</u>
TOTAL	0	--	--	--	2.1	1.4	1.6	1.8
Alumax Employment as Percent of Umatilla County Total ^{4/}								
Direct	0	--	--	--	4.0	2.9	2.7	2.5
Secondary	<u>0</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>2.3</u>	<u>1.3</u>	<u>2.0</u>	<u>3.4</u>
TOTAL	0	--	--	--	6.3	4.2	4.7	5.9

^{1/} Average annual employment. Individual months may be greater or less.

^{2/} Estimated actual secondary employment, including time lags.

^{3/} BPA estimates of establishment employment for Umatilla, Morrow, Benton, and Franklin counties. No estimates available for 1977-1979.

^{4/} BPA estimates of establishment for Umatilla County. Some of this employment will take place outside Umatilla County, but the major impact will be within the county.

Source: CH2M Hill, 1976a, p. 314a.

adequate public services, the availability of labor, the longrun supply of loanable funds, national economic trends, etc.

f. Total Employment Impacts. Alumax construction employment is expected to reach a peak of 1,400 in 1979, but total Alumax employment would probably be slightly higher in 1980 when construction and operation employment overlap. Direct Alumax employment is expected to be about 4 percent of Umatilla County employment in 1980, and Alumax-induced secondary employment would account for another 2.3 percent of the total. Alumax, therefore, is projected to account for over 6 percent of the total employment and would be one of the county's major employers. Some of this employment would take place in Morrow, Benton, and Franklin Counties, but most of the impact would be in Umatilla County. The 1980 Alumax employment impact is projected to be about 2 percent of the study area total.

Alumax-related employment would decline from 1980 to 1985 due to the end of construction. However, it would then increase again as secondary employment adjusts to permanent plant employment. The full impact is expected to be about 1,800 employees. This would be nearly 6 percent of the projected total employment for Umatilla County and about 1.8 percent of the study area total in 1995. Most of the secondary employment would be concentrated in the trade and service sectors. Alumax direct employment in 1995 is expected to be about 2.5 percent of Umatilla County employment and less than 1 percent of the four-county employment.

Local hire for secondary employment in Hermiston and Umatilla is estimated to be 150, which is roughly equivalent to the remainder of those currently unemployed who are estimated not to be hired by Alumax. Therefore, unemployment in the area in and around these cities could be significantly reduced. Those currently unemployed might be hired directly by Alumax or might fill vacancies created by those who leave their present positions to work for Alumax. About 250 jobs are expected to be filled from other parts of the study area. This estimate is equal to 5 percent of the unemployment in Benton and Franklin Counties plus 10 percent of the unemployment in Umatilla and Morrow Counties (excluding the Cities of Umatilla and Hermiston). The remaining secondary jobs plus any job openings due to local labor turnover are assumed to be filled from outside the area. Exact estimates of local hire are difficult to make because of the many factors involved, but it is believed that these local hire estimates are conservative in that local hire could actually be somewhat greater. Workers within the study area are likely to fill many jobs because they are closer to the plant, have better information concerning opportunities than those outside the study area, and would have little or no relocation costs. In addition, most employers, including Alumax, will prefer to hire local people. Therefore, local hire estimates made here may be conservatively low.

g. Labor Force Impacts. Alumax could also have some impacts on the general labor force. People who are unemployed but who gave up looking for work because they felt they would be unable to find a job (i.e., the so-called "discouraged workers") might reenter the

labor force because of expanding employment opportunities due to Alumax. Marginal workers, such as teenagers, the elderly, and housewives would have an increased incentive to enter the labor force because of available opportunities. The secondary jobs due to Alumax might be filled by these workers because they can be available to fill part-time openings and they are generally able to accept low wages because they are usually not the primary worker in the family. These are, however, only general tendencies that do not necessarily apply to each such worker. Finally, the labor force would be increased as outsiders move into the area in search of employment. The overall tendency would be for the labor force to increase when job openings occur or are expected.

7. Income.

a. Construction Income. Total earnings of construction workers are expected to be over \$50 million for the 32-month construction period, based on November 1975 wage rates for skilled and common construction labor.

b. Operation Income. Annual earnings of the plant employees, including both salaried and hourly workers, are estimated to average \$15,600 in 1976 dollars, and would be distributed as shown in Table IV-35. This is about 75 percent higher than the study area's 1975 average individual income of \$8,900 (Table IV-35). If inflation were to continue at a rate of about 6-1/2 percent, actual average annual wage payments would be about \$19,000 per full-time employee in 1979 when the first operation employees would be hired.

Total employee earnings at full operation would be about \$13.2 million (1976 dollars). About \$5 million of this total would be paid to current residents of the area. The balance of \$8.2 million would be paid to workers who would be hired from outside the area (BPA estimate).

c. Secondary Income. The earnings workers receive for constructing and operating the Alumax plant would generate earnings for other residents of Umatilla County. This effect is commonly referred to as the earnings multiplier and is caused by the spending of plant workers' salaries. Each dollar of income to Alumax employees would either be spent in Umatilla County, spent outside Umatilla County, or saved. The portion of the plant workers salaries that would be spent in Umatilla County would become income to other county residents who, in turn, would spend a portion of it in Umatilla County. The continued respending of the original dollar means that the total change in income would be a multiple of the change that would result from only Alumax's payroll.

TABLE IV-35

ALUMAX EMPLOYEE INCOME DISTRIBUTION AT FULL OPERATION
(1976 Dollars)

<u>Income</u>	<u>Hourly</u>	<u>Salaried</u>	<u>Total</u>	<u>Percent</u>
Under \$10,000	0	7	7	0.9
\$10,000-14,999	465	59	524	65.5
\$15,000-19,999	135	94	229	28.6
\$20,000 and up	<u>0</u>	<u>40</u>	<u>40</u>	5.0
TOTAL	600	200	800	100.0

Source: CH2M Hill, 1976a, p. 318.

An earnings multiplier for Umatilla County has been determined by dividing total earnings by basic earnings where basic earnings were determined by applying the percentages of basic employment for each sector to the respective 1970 earnings totals (Table IV-36). The base year 1970 was chosen for the determination of the multiplier because this is the most recent year for which complete information is available. Total earnings divided by total basic earnings results in a 2.15 multiplier. This means that for each dollar of wage paid to Alumax employees, an additional \$1.15 of earnings would be generated in Umatilla County through secondary spending when the full income effect is reached.

The earnings impacts with expected lags, shown in Table IV-37, are estimated in 1976 dollars. Secondary earnings during the construction phase are projected at over \$25 million (1976 dollars). At full operation secondary earnings could reach \$15 million per year. The 2.15 earnings multiplier may lead to an understatement of the actual net real income effect of Alumax because the value of vacations, insurance, and other fringe benefits has not been included in computing the multiplier.

Total real earnings due to Alumax are projected to reach a temporary peak in 1979 at about \$28 million and later reach about \$29 million per year at full impact. This \$29 million annual impact on real earnings is equivalent to 3 percent of the 1973 total personal income for the four-county region (adjusted for changes in price level). It is also equivalent to 10 percent of the Umatilla County 1973 total personal income (adjusted).

The income for secondary employee families was determined by examining the estimated 1975 total incomes for sectors that essentially serve local demand (Table IV-38). Income for this group of 6,600 employees was about \$59 million in 1975, for an average individual income of about \$8,900. An average of 1.3 workers per family in Umatilla County is assumed, so the estimated average family income is

TABLE IV-36

DETERMINATION OF EARNINGS MULTIPLIER
UMATILLA COUNTY, 1970
(Thousands of Dollars)

	<u>Basic</u>	<u>Local</u>	<u>Total</u>
Farm*	17,550	0	17,550
Government			
Federal	13,109	0	13,109
State & Local	0	19,319	19,319
Manufacturing	20,037	1,077	21,114
Mining & Other	0	784	784
Construction	0	599	599
Transportation & Utilities	2,876	6,975	9,851
Trade	2,506	18,033	20,539
Finance, Insurance, Real Estate	0	2,782	2,782
Services	<u>1,613</u>	<u>11,189</u>	<u>12,802</u>
TOTAL EARNINGS	57,691	66,158	123,849

$$\text{Multiplier} = \frac{\$123,849}{\$57,691} = 2.15$$

*Includes farm proprietors.

Source: CH2M Hill, 1976a, p. 319.

TABLE IV-37

ESTIMATED EARNINGS FROM ALUMAX EMPLOYMENT IMPACTS
(1976 Dollars)

<u>Earnings</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	\$4,850,000	\$14,162,000	\$19,788,000	\$ 4,074,000	\$ 0	\$ 0	\$ 0
Operation	0	0	2,016,000	13,272,000	13,444,000	13,444,000	13,444,000
Secondary	<u>4,414,000</u>	<u>6,090,000</u>	<u>6,323,000</u>	<u>8,846,000</u>	<u>27,125,000</u>	<u>9,007,000</u>	<u>15,461,000</u>
TOTAL	\$9,264,000	\$20,252,000	\$28,127,000	\$26,192,000	\$40,569,000	\$22,451,000	\$28,905,000

Source: CH2M Hill, 1976a, p. 322.

TABLE IV-38

FAMILY INCOME ESTIMATE FOR SECONDARY EMPLOYEES
(Umatilla County)

	1975 Estimated Income ^{1/}	Number of Employees ^{1/}
Transportation & Utilities	\$ 9,955,600	779
Trade	26,336,000	3,292
Finance, Insurance, Real Estate	3,982,500	450
Services	<u>18,668,400</u>	<u>2,119</u>
TOTAL	\$58,942,500	6,640
Average Individual Income (rounded)	<u>\$ 8,900</u>	
Average Household Income ^{2/} (rounded)	<u>\$11,500</u>	
Average Household Income in 1976 Dollars (rounded)	<u>\$11,900</u>	

^{1/} Income and employment figures cover only those portions of sector income and employment that are estimated to result from local demand.

^{2/} Assumes 1.3 workers per household.

Source: CH2M Hill, 1976a, p. 323.

about \$11,500 in 1975 dollars. This is equivalent to about \$11,900 in 1976 dollars. These averages assume none of the workers in the family are plant employees. If one or more is hired by Alumax, income of the family would be much higher. The income figures imply that about \$3.6 million of earnings from secondary employment may be received by those hired locally.

Alumax employees would receive an average wage of about \$16,000 (1976 dollars). This would tend to increase average incomes in the study area. Secondary employees would probably receive an average wage of about \$9,000, which is near the study area average, and would therefore have little effect on average incomes. To the extent that incremental secondary employees are currently unemployed or not in the labor force, average family income would probably increase.

8. Taxation Impacts. The proposed Alumax plant's taxation impacts during the construction would be significantly different from the impacts during operation. During the construction phase the primary impact would be on State personal income taxes rather than local property taxes. This is because during the construction, only that portion of the plant which is complete will be on the county property tax roll. Therefore, the property tax paid during construction would only be a fraction of the amount paid after construction is complete. During the operation phase the plant's greatest impact would be on local property taxes. These relationships are developed in greater detail below.

a. Construction Impacts. Construction activities would bring substantial numbers of workers to the area, most of whom would be expected to reside in the Hermiston-Umatilla area. Although they, or their landlords, would pay property taxes and various user charges for local government services, this sudden influx would probably overload some community services and would, therefore, require additional capital investments by the local communities. Therefore, plans to provide additional sewer, water, police, fire, and school capacity might have to be accelerated to provide the services when they are needed as reported in other chapters in this report.

It appears that the Hermiston and Umatilla school districts will receive the greatest impact. Alumax and the affected school districts are exploring a number of options for insuring that the needed school facilities would be provided during construction and during the start of operations before the full value of the plant is added to the property tax rolls. As the chapter on schools showed, peak construction period impacts would not hit the schools until school year 1979-1980.

The impacts that constructing Alumax would have on State taxes are summarized in Tables IV-39 and IV-40. The tables show that the peak impact on State personal taxes would be about \$512,000 in 1979. The peak impact on State personal income taxes would be about \$743,000 and would also occur in 1979.

b. Operation Impacts. Alumax plant and property would increase the total assessed valuation in Umatilla County by about

TABLE IV-39

ESTIMATED PERSONAL TAXES ^{1/}
ALUMAX DIRECT AND INDIRECT EMPLOYMENT
(1976 Dollars)

	<u>1975</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	0	125,000	366,000	512,000	105,000	0	0	0
Operation	0	0	0	52,000	343,000	348,000	348,000	348,000
Secondary	<u>0</u>	<u>114,000</u>	<u>157,000</u>	<u>164,000</u>	<u>229,000</u>	<u>184,000</u>	<u>233,000</u>	<u>400,000</u>
TOTAL	0	239,000	523,000	728,000	677,000	532,000	581,000	748,000

^{1/} Taxes on gasoline, alcoholic beverages, cigarettes, insurance premiums, inheritances, and licenses of various types. Based on an average of \$25.86 per \$1,000 personal income.

Source: CH2M Hill, 1976a, p. 390.

TABLE IV-40

ESTIMATED STATE PERSONAL INCOME TAX PAYMENTS
(1976 Dollars)

	<u>1975</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Construction	0	182,000	532,000	743,000	0	0	0	0
Operation	0	0	0	87,000	575,000	582,000	582,000	582,000
Secondary	<u>0</u>	<u>131,000</u>	<u>181,000</u>	<u>188,000</u>	<u>264,000</u>	<u>213,000</u>	<u>268,000</u>	<u>460,000</u>
TOTAL	0	313,000	713,000	1,018,000	992,000	795,000	850,000	1,042,000

NOTE: All figures are expressed in 1976 dollars. Wages will increase due to inflation and productivity. Therefore, actual tax collections may exceed these estimates because workers will be moving into higher tax brackets.

Source: CH2M Hill, 1976a, p. 389.

\$250 million if the proposed plant is constructed. This increase would take effect in 1981-82 when the construction of Alumax would be complete. In earlier years the value of the portion of the plant constructed would go on the tax rolls. In addition to this \$250 million, it is estimated that Alumax-related residential and commercial increases will amount to \$63 million for a total increase of \$313 million. This means that each of the 4,650 persons who would be expected to move to Umatilla County because of Alumax would account for about \$67,000 in assessed valuation. The county-wide per capita assessment would increase from about \$14,000 in 1975-1976 to about \$20,000 in 1981-82. The addition of such a large volume of assessed value would have important effects on the tax rates in several taxing districts (CH2M Hill, 1975, p. 160-171).

c. Property Tax Impact Due to Proposed Plant Only.

Table IV-41 shows CH2M Hill's projection of the minimum tax rates in selected tax districts with the addition of Alumax and its related residential and commercial assessed valuations. These minimum rates were calculated based on the following criteria:

1. Except for the four districts noted below, the funds needed by the districts to provide services for expected growth will be the same on a per capita basis as was spent in the 1975-1976 tax year. The tax rates in Table IV-41 were calculated, therefore, by first computing a per capita expenditure for each district, multiplying this by the average of the number of persons expected to be served in 1981-1982 by these districts, adding this figure to the present tax levy, and then dividing this total by the expected 1981-1982 assessed valuations for each district. The Alumax-related impact on each district varies with district boundaries. This is reflected in the valuations shown for each district.
2. The cost of providing services is not always proportionate to population changes. The tax rates for four districts were calculated on the basis of the following measures:

Fire District No. 8. The tax levy was doubled for 1981-1982.

Hermiston Cemetery District Number 8. A 10 percent increase in the tax levy for 1981-1982 was used.

Vector Control. No expected increase in tax levies.

Hospital District No. 1. The tax levy was doubled for 1981-1982.

3. The 1981-1982 assessed valuations (shown in 1975 dollars) are a composite of the expected Alumax-related assessed valuation increases plus the estimated value of new plants constructed by other corporations.
4. It is assumed that voters will approve the levy increases needed to meet the projected budgets.

TABLE IV-41

COMPARISON OF EXISTING TAX RATES WITH PROJECTED 1981-82 RATES WITH ALUMAX PLANT ^{1/}
(1975 Dollars)

Code 8-5 Districts	Tax Rates Per		Assessed Value		Tax Levy	
	\$1,000 of Assessed Value					
	1975-76	1981-82	1975-76	1981-82	1975-76	1981-82
County of Umatilla	2.87	2.03	659,425,480	1,081,463,260	1,881,216	2,192,280
I.E.D.	3.21	2.28	659,425,480	1,081,463,260	2,112,233	2,461,496
Blue Mountain Community	1.93	1.37	659,425,480	1,081,463,260	1,269,655	1,479,596
Port of Umatilla	0.25	0.17	557,156,752	981,588,104	139,132	166,958
Hermiston School No. 8	15.28	4.87	114,751,383	459,585,640	1,752,824	2,239,091
Fire District No. 8	0.44	0.06	13,903,252	366,026,356	6,040	12,080
Hermiston Cemetery No. 8	0.25	0.14	114,751,383	750,656,440	28,141	30,955
Hospital District No. 1	1.09	0.13	32,318,552	354,284,344	35,023	70,046
Vector Control	0.24	0.12	191,718,258	642,362,136	45,696	45,696
	25.56	11.17			7,269,960	8,698,199
<u>Outside 8-5</u>						
Umatilla School No. 6	17.02	17.02	27,469,837	69,482,529	467,523	1,182,558
Stanfield School No. 61	13.67	13.67	21,879,964	31,507,148	299,075	430,668
Echo School No. 5	13.16	13.16	19,563,119	27,947,313	257,420	367,754

Minimum Alumax Tax

NOTE: Blue Mountain Community includes only Umatilla County figures.

^{1/} The comparisons in Table 1 include only the impact of the plant on Tax Code 8-5 Districts. The table does not include the impact of Alumax-related new housing on commercial structures which could possibly locate in Tax Code 8-5.

As Table IV-41 shows, the tax rate in Code Area 8-5 which includes the plant site could decline from \$25.56 to \$11.17 per thousand using the criteria. This is a drop of about 56 percent.

A limitation to the figures in Table IV-41 is a lack of knowledge about how the voters would react to the potential of decreasing their tax rates. They could decide to maintain the same tax rate as now (\$25.56 per thousand in Code 8-5), which would increase tax receipts (and the services that could be provided) considerably above those shown in Table IV-41. Alumax, for example, would pay about \$3.6 million more per year in taxes than shown in Table IV-41 if the old rate were left unchanged. The voters could, of course, also decide to tax themselves at rates between those shown in Table IV-41 and the present rate. This would enable them to enjoy both a tax rate decline and an increase in the level of services provided by government.

d. State Taxes. Alumax's construction, operation, and secondary employment would generate Oregon personal income tax payments. Table IV-40 shows personal income tax revenue during the construction phase (through 1980) to be about \$3.0 million (1976 dollars). Annual personal income tax revenue during operation would be about \$1,042,000, which would be less than 1 percent of the total revenue generated by the State's income tax. Secondary employee State income tax payments would probably be smaller than those of direct employees (i.e., construction and operation employees) during operation despite the large number of secondary workers. This is because the secondary employees would generally command lower personal incomes than would plant workers. (See chapter on Income.)

Oregon residents pay a variety of other personal taxes which include taxes on gasoline, alcoholic beverages, cigarettes, gifts, inheritances, and licenses of various types. It is estimated that construction-phase employment would result in about \$2.2 million (1976 dollars) of these miscellaneous personal tax revenues as shown in Table IV-40. Up to \$750,000 could be collected annually when the full employment effect is reached. Like personal income tax revenues, not all of these personal tax payments would be net additions to State revenue because some Alumax-related employment would involve employees leaving other jobs within the State.

9. Impacts Related to Plant Closure in 1986. In the short term, the benefits to the study area induced by the Alumax project are primarily economic. The introduction of the new industry would not only diversify the area's economy, but also provide a significant increase in tax base for several taxing entities and, to a lesser degree of significance, add to the area's employment base. These benefits would be compounded by the increased income and secondary effects.

The plant's closure in 1986 would have the effect of negating those impacts that were anticipated to occur in the period 1986-1996. Since construction is scheduled to be completed before 1986, none of the construction phase impacts would be altered.

The severity of the impact of a 1986 closure, therefore, would depend upon the degree to which Umatilla County's economy would be dependent on the plant's operation. The extent of a county's economic dependency on any single employer can be measured by estimating the percentage of the county's total employment that is dependent on the employer.

In 1986, the proposed Alumax plant would employ 800 workers whose employment would induce the employment of about 360 additional secondary workers. Taken together, these two groups of workers would account for about 4 percent of total Umatilla County employment in 1986. Clearly, then, Umatilla County would not be dependent on the proposed Alumax plant in the sense that Seattle's economy has been dependent on Boeing or that Detroit's economy is currently dependent on the automobile industry. However, the loss of Alumax as a source of employment would be a serious matter that would require adjustments in the county's economy.

In the very short term, the county's unemployment rate could increase from the 1986 estimated rate of 5 percent to about 13 percent, which is nearly twice the county's historical unemployment rate of about 7 percent. Such a relatively high unemployment rate would induce some outmigration, particularly among residents who entered Umatilla specifically to seek Alumax-related employment. Those who choose to stay would face a period of perhaps 2 years in which their livelihood would depend upon unemployment compensation, occasional work, and the earnings of other family members. During this 2-year period, it is likely that normal economic growth in the county would be sufficient to provide these workers with new employment opportunities and the unemployment rate would return to its normal level.

Since the level of employment during these 2 years would be reduced, the amount of wages paid would also be reduced. The reduction would be about \$29 million (1976 dollars) or about 12 percent of the total wages estimated to be paid in Umatilla County in 1986.

The size of the property tax base in Umatilla County would also be reduced, because if the plant were not being operated, its assessed value would be reduced. The amount of the reduction is difficult to estimate because there are several methods that could be used to reassess the plant site. However, it is possible that the entire value of the plant could be discounted and the site reassessed to reflect the value of only the land. The reduction in county property taxes would be compounded by the outmigration of unemployed workers, resulting in a general decline in property values.

The outmigration of unemployed workers would also lower the demand for public services, particularly education. Since, as described in Chapter IV, considerable expansion of the county's infrastructure is expected to occur before 1986, this means that the area's water, sewer, and educational systems would have excess capacity. This excess capacity would be a financial burden on the remaining residents of Umatilla County and could result in tax increases.

C. Impacts on the Power System.

The Alumax contract of 320 MW of industrial firm (IF) power represents 80 MW of interruptible power; 80 MW of system reserves, and 160 MW of firm power. ^{1/} When totalled with the 22 MW of wheel turning power to be supplied by Umatilla Electric Co-op (a BPA preference customer), the 342 MW of total service to the plant represents the following system load increases. ^{2/}

West Group	- Energy	2.0%
	- Peak	1.2%
Federal System	- Energy	3.5%
	- Peak	2.0%
BPA Direct Service Industry		9.0%

1. Generation Impacts. Power system generation impacts of this increased load fall into two major areas: system resource planning and development and system operations.

a. System Resource Planning and Development.

(1) Resource Planning. Initially service to Northwest Aluminum did not impact regional resource planning and development as the plant was proposed to take advantage of existing and programmed resources. The original power sales contract was designed to use hydro system generating capability to be made available through provisions of the 1964 Canadian Treaty (See Chapter II). BPA had determined that a portion of the power generated as a result of Treaty projects was excess to regional utility needs and could be sold to new or existing direct service industries. Without a regional market for excess resources, Treaty project construction and operation would have resulted in generation excess to regional loads and water being spilled until needed. The ensuing Northwest Aluminum contract was for 240 MW of firm power plus the amount of interruptible energy requested by the company and the Administrator was able to provide. Based on proposed plant production capacity and other factors, the interruptible load served was anticipated to be approximately 80 MW.

^{1/} The bottom two quartiles of the IF powerload is identified as firm even though it is subject to short term interruptions for forced generation outages and transmission system reliability. Firm power sold to other BPA customers is not subject to these restrictions until all industrial power subject to restriction has been restricted.

^{2/} All percentages based on 1979-80 loads as projected in the West Group Area Forecast (Bluebook) dated April 23, 1979.

In the long term, due to the size and nature of the load and some planned resources not being constructed, service to the plant has impacted regional resource planning. When BPA contracted to serve the plant, the new load was incorporated into the regional load forecast prepared by the Pacific Northwest Utilities Conference Committee (PNUCC). It is this forecast that PNUCC and individual utility members utilize in planning the development of resources and in determining their adequacy to serve regional loads. When the original Northwest Aluminum power sales contract was signed, it was anticipated that when BPA's preference customer loads required additional power, new resources would have been developed and integrated into the power system to serve both new and existing loads, including the DSIs. This was part of Phase I of the Hydro-Thermal Power Program (HTPP-I).

With actual resource development less than planned the Alumax contract, by increasing BPA's firm power demand and thereby increasing the probability that under certain conditions BPA will be unable to meet firm power commitments, has also impacted BPA resource planning. The Alumax IF contract calls for BPA to provide 320 MW of power from the Federal system; 240 MW of this amount is power from the region's firm energy base, i.e., it is produced even in critical water years. By not serving the plant, BPA's projected firm energy deficit for contract year 1983-84 would be reduced 32.7 percent, based on the April 1979 PNUCC forecast. ^{1/} Not serving the plant would reduce therefore the amount of energy BPA or its preference customers would be required to obtain from other sources during critical or near critical water periods. Further, during periods of surplus water the amount of secondary energy available to private utilities and other DSIs would increase without Alumax.

The reserve provisions of the contract mitigate to some degree the impacts of service on BPA's projected deficits. The MF contract terms give BPA the right to restrict 25 percent of the plant's contract demand if, because of generation or transmission forced outages, the Administrator is unable to meet all firm loads. This provision was modified in the current industrial firm power contracts to allow for interruptions in the event completion of a generating facility is delayed or a generation unit does not operate at capacity. These provisions in the Alumax contract in effect "give back" to the Administrator 80 MW of power for use in meeting firm loads. The IF contracts also allow for portions of the load to be interrupted for up to 2 hours at a time thereby providing additional peaking reserves for the region. All of these provisions reduce the amount of power BPA must plan on providing.

(2) Resource Development. While the region planned adequate resources to serve the new aluminum plant and other regional load growth into the future, the resources have not developed in the

^{1/} This contract year was chosen as a basis of comparison as it not only reflects the largest projected energy deficits during the term of the contract, but also the first year of full plant operation based on current timetables.

time frame originally projected. The revised draft Role EIS discusses at some length the reasons for the delays in resource development and operation. For the purposes of this discussion it is adequate to state the region is approaching a time of electric energy insufficiency. For this reason BPA will be unable to renew or extend the direct-service industry contracts beyond their current expiration dates, as preference customers have first rights to any available Federal power. The Alumax load will be served under the terms of the contract from existing BPA resources until July 1986. These resources are primarily hydro with some limited net-billed thermal. Whether or not and how the plant would be served beyond 1986 is unknown.

If Alumax is unable to obtain a power supply after the expiration of its BPA contract, service to the plant will have had no significant impact on regional resource development but will only have served as a temporary market. This is due to the delays in plant construction and operation, and the limited ability of the region to develop resources with short leadtimes to compensate for anticipated shortages prior to 1986. (This generalization does not include regional conservation programs which are developing partially in response to projected deficits.) The overall significance of the Alumax load on resource development is illustrated by the fact the total Alumax load only represents approximately 5 months regional load growth. Therefore, while 320 MW is a major load, it is a small part of the total system.

In summary, under today's energy picture and contract time-frame, service to the plant will exacerbate potential deficits, and perhaps speed up conservation efforts but will not encourage additional resource development.

If the plant obtains a long-term power supply and continues to operate after 1986, development of new resources will be required to serve the load. It is not possible to identify what type of resources would be developed until it is known who would be providing the power and under what conditions. It is possible however, to provide some very general statistics on the impacts of developing resources to meet this size load.

Assuming the top quartile of the load remains interruptible, the remaining 240 MW represent 27.4 percent of the output of a 1,250 MW nuclear plant or 49 percent of a 700 MW coal unit. Both figures are based on the generating plant operating at a 70 percent capacity factor.

A nuclear source would require a \$.62 billion investment with busbar energy costs between 45-50 mills based on 1979 figures for the region's newest nuclear project, WNP-5. Major environmental impacts would include land and water commitments, hazards associated with radioactive releases and accidents, and nuclear waste disposal. Construction leadtime would be approximately 12 years.

A \$.52 billion capital investment would be necessary for coal-fired generation. Busbar energy costs will be approximately 60 mills based on figures for regional facilities currently planned or under construction. Environmental impacts again include land and water commitments, air quality degradation associated with the combustion of coal, and land impacts of coal mining (see Part 1, Chapter 5 of the draft Role EIS and Section IV.A of the revised draft Role EIS for a more complete discussion of resource technologies).

The interruptible portion of the Alumax load will not directly impact resource development as facilities are planned and developed to make maximum use of this intermittent resource. Some indirect impacts are possible. Historically the DSIs have endeavored to obtain power from resources outside BPA to replace the top quartile of their IF contract demand in the event of BPA interruption. However, as electric energy supplies become insufficient and BPA's ability to meet firm loads is jeopardized, not only does the likelihood of interruption increase even in good water years but also competition for energy supplies available from other sources grows along with higher prices for the energy. In response some industries are proposing to install combustion turbines for use in "firming up" their interruptible quartile. While not the optimum choice for baseload generation because of high operating costs and questionable fuel availability, combustion turbines' operating flexibility and minimum leadtimes may make them desirable for use as peaking units and in emergency situations. It is not possible to determine what effect the Alumax load will have on other industries' decisions in this regard beyond noting that increased competition for power supplies makes this an increasingly attractive resource option.

Indirect effects would also result from a decrease in the amount of secondary power available to utilities in the Pacific Northwest and Pacific Southwest. These utilities use hydro energy surplus to BPA's firm load requirements to displace more expensive thermal power. This results in reduced fuel consumption, most importantly oil in the PSW, and in reduced environmental impacts related to generating operations. Delivery of power to Alumax would reduce the amount of secondary energy available to those utilities.

b. System Operation. The potential effects of the proposed plant on the operation of generating facilities can be related to impacts associated with the load's high load factor and the load's interruptibility.

The fact that the Alumax plant would operate at a very high (98 to 100 percent) load factor would mean that generation at Federal hydroelectric plants would be consistently greater, but that daily fluctuations in that generation would be slightly reduced from present levels (due to an approximate Federal system load factor increase of 0.5 percent). The same would be true for flows discharged from the hydroelectric plants.

The high load factor characteristic of the Alumax load would have a beneficial impact on the Federal system during off-peak hours. During nighttime hours, particularly the low load hour when energy is returned to the Federal system under peak sales and peak-energy exchange agreements, the resulting reduction in generation can necessitate the spilling of water or more generation than needed to serve firm loads to maintain required minimum streamflows. Without modification of existing contracts regarding rates of return of energy to the Federal system, lowest load hour spill or overgeneration is forecast to range as high as 1,200 MW of equivalent generation during the fall months under median or worse water conditions. The Alumax load, 320 MW, would increase the minimum generation required, thereby reducing the need to spill water or overgenerate.

During springtime, when the highest natural streamflows occur due to the runoff from melting winter snowpacks, storage capacity in reservoirs behind hydroelectric dams is frequently inadequate to hold all the water which enters the reservoirs, but is not needed for generation to meet either Pacific Northwest loads or other export loads. As a result, water must be spilled to prevent actual and potential overflow of reservoirs. The Alumax load would increase generation at the hydroelectric facilities and reduce spill and losses of energy.

Water must sometimes be released or moved through hydroelectric projects for reasons other than those discussed above. For instance, water may be required downstream to "flush out" portions of rivers with temporary water quality problems or to meet navigation, recreation, or fish requirements. On the other hand, it may be desirable to reduce the reservoir level upstream for future flood control, or for construction or maintenance of equipment or structures at the dam itself or at other locations on the reservoir. In these cases, water must be spilled if available loads are less than what could be generated by using the released water. The Alumax load would increase generation, thereby reducing spill.

The fact that the Alumax load would be interruptible for various reasons, including forced outage of generating facilities, means that existing generating plants could be operated at closer to their maximum capability, with less generating capacity held as reserves. Because the quantity of power produced with any given set of generating facilities would be greater, the average cost per unit would be less. In turn, because BPA and the region's utilities set their rates according to average costs, rates paid by all customers would be lower than with an alternative load of the same magnitude, but without the interruptibility feature.

c. Third Quartile Reserves. Interim purchase agreements for industrial firm power contain regional plant delay reserves and resource financing provisions not present in the modified firm power sales contracts. Generally known as the third quartile arrangements the HTPP Phase 2 provisions were designed to address potential firm power deficits caused by delays in generating unit construction and operation or the inability of a new unit to operate at design capacity, as well as

regional problems in financing new resources. In return for accepting a lower grade of power and an expanded role in resource development, the industries were to receive long term power sales contracts in a time of reduced energy availability.

Since the signing of the Alumax contract and the interim agreements with the other direct service industries for the sale of IF power a number of events have however worked to make the third quartile arrangements unviable. Though the third quartile is unviable it is part of the Alumax contract ruled valid by the court. In response to court questions this section attempts to present what the general impacts of the third quartile on power system resource development and operations would have been.

Implementation of the third quartile had as its objective the industries providing financial backing for additional regional thermal generation of about 1000 megawatts, or in the alternative BPA having the right to restrict up to an additional 1000 megawatts of industrial load if needed to supply the region's firm loads. The provisions for interrupting the third quartile of service provided the region with additional plant delay reserves similar to those provided the Federal system under the second quartile. Although the specifics on how the reserves would be implemented were not worked out it was intended they be utilized to increase the region's flexibility in matching loads to resources in the shift to a thermal base. The thermal generation was to be financed and constructed by the region's utilities, both publicly and privately owned, and sold to the industries. If an industry declined to contract for purchase of its share of the generation its third quartile could be interrupted if other regional plants were delayed in completion or did not operate as planned.

Since the inception of Phase I of the Hydro-Thermal Power Program, thermal resources under construction have been plagued by delays; capacity factors of operating thermal plants have been significantly lower than projected; and costs for new resources have tripled over original project estimates. As a result, both new and existing preference customers have asserted their right to the lower cost BPA power. This prevents BPA from providing long term service directly to the industries. Therefore as discussed in Section IV.A. of the revised draft Role EIS if BPA attempted to implement the third quartile, the industries would revert to the less restrictive modified firm power contracts.

The Alumax contract presents a different situation as the company does not have a modified firm contract to revert to. In this case, however, the 1986 expiration date does not allow adequate lead time for implementation even if new resources were available for participation.

The 25 percent of the IF contract demand which falls under the third quartile is equal to approximately 1000 MW for the DSIs as a whole; 80 MW for Alumax singly. This is 14 percent and 1.1 percent respectively of the total resource capability currently under construction to meet regional loads.

It is unlikely the resource mix developed by the region's utilities would have been altered by the industries' participation due to the large number of other variables considered by a utility in making this decision and the limited significance of industry participation in relation to the amount of capability being constructed. Industrial backing would have made the financing of any type of resource easier and less expensive since the plants output could be used to serve the industries' top quartile of load on a firm basis if all plants happened to be completed on schedule.

Without the third quartile, regional resource development has progressed in a limited fashion. It has been stalled due to factors such as resource controversy, not related to the third quartile. Recognizing these delays and the sky rocketing costs of conventional thermal generating plants, BPA and the region's utilities have embarked on major conservation and renewable resource programs. It is hoped these alternatives will serve to alleviate projected deficits in the 1980's. It is partially due to these deficits that the third quartile was developed.

The third quartile would not impact the operation of the systems thermal plants. The unique characteristics of the regional hydro-thermal system dictate the thermal facilities be operated as baseload facilities with hydro generation fluctuating to accommodate changes in regional demand. Thermal facilities are operated as close to capacity as possible to achieve maximum system efficiencies. The third quartile would not have changed this.

2. Transmission System Impacts. In addition to the transmission facilities to be constructed as part of the proposal described in Section II.B.3, the proposed Alumax plant would result in other effects upon the Federal transmission system. While the facilities to be constructed as part of the proposal are industrial customer service facilities required to facilitate transmission of power from the main transmission grid to the plant, these additional impacts of the plant would be felt on the main grid itself.

A recent addition of a 500/230-kV transformer bank at McNary has provided additional support to the 230-kV bus at McNary, the source for the proposed 230-kV line additions to serve Alumax. In the early to mid-80's, loss of this bank, when McNary generation is low, will cause heavy loadings on lower voltage circuits in the Pasco area unless lines between McNary and the Pasco area are open. The Alumax load served from McNary will contribute to this problem. There will also be increased loading on the 500-kV line from Lower Monumental to McNary as a result of the Alumax load, even with all facilities in service. This will cause increased system losses above those which would occur without this load. The addition of the Ashe-Willamette Valley 500-kV double-circuit line will greatly delay the time when loading on the Lower Monumental-McNary 500-kV line will be a problem.

There are also positive impacts on the transmission system which would result from the Alumax load, offsetting to some extent the negative impacts. The main-grid transmission facilities out of the McNary area to the west are most heavily loaded when the generating facilities at McNary and Ice Harbor Dams are being operated for peaking purposes. The loadings on these transmission facilities are expected to increase in the late 80's or 90's, particularly if and when the second McNary powerhouse is developed. The proposed Alumax plant would reduce loadings on these main-grid transmission facilities, by supplying load locally. However, this will not eliminate the need for an additional line when the second powerhouse is developed. Thus, transmission facilities and system losses would tend to be lower than if the proposed plant (or another load of the same magnitude) were located in an area more removed from a generating plant.

D. Other Impacts

1. Supply and Demand in the Aluminum Industry. This section will discuss the impact of the proposed Alumax plant's output on the national and worldwide supply of aluminum. The impact can be measured as the difference between the amount of aluminum supplied by the industry with and without Alumax. The section will also discuss the national and world demand for aluminum and determine whether or not Alumax's output would be important in satisfying that demand.

Table IV-42 displays a forecast of national and world production of primary aluminum with and without Alumax to the year 2000.

TABLE IV-42

NATIONAL AND WORLD SUPPLY OF ALUMINUM WITH AND
WITHOUT ALUMAX FORECASTED TO THE YEAR 2000
(Thousand of Metric Tons)

<u>Area</u>	<u>Without Alumax</u>				<u>With Alumax</u>				<u>1/</u> <u>Percentage Increase (%)</u> <u>Due to Alumax</u>			
	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>
U.S.	5270	5670	6030	8820	5388	5800	6160	8950	2.2	2.3	2.2	1.5
World	18690	23440	28310	41850	18808	23570	28440	41980	.63	.55	.45	.31

1/ Alumax's output is estimated as 118,000 metric tons in 1980 and 130,000 metric tons in all other years. 130,000 metric tons is approximately 185,000 short tons.

Sources: CH2M Hill, 1976a, p. 247. Percentages calculated by BPA.

The table shows that the impact of Alumax on world and national aluminum supply in percentage terms would decline over time in both world and national markets.

Table IV-43 displays a forecast of national and worldwide demand for aluminum.

TABLE IV-43

NATIONAL AND WORLDWIDE CONSUMPTION OF ALUMINUM
FORECASTED TO THE YEAR 2000
(Thousands of Metric Tons)

<u>Area</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>
United States	6,260	7,370	8,400	11,800
World	18,700	23,435	28,395	41,480

Source: CH2M Hill, 1976a, p. 242.

The importance that Alumax's output would have in satisfying national and world demand for aluminum can be determined by comparing Tables IV-42 and IV-43. Such a comparison shows that in each year for which data are presented, the world supply of aluminum with Alumax is nearly equal to the world demand. Therefore, it can be concluded that, with minor price adjustments, the world supply of aluminum could be brought into balance with the world demand.

The tables also show that the U.S. production of aluminum is less than the amount of United States demand. Therefore, domestic production will not be great enough to supply domestic demand. However, United States demand for and supply of aluminum is included in world totals, which show that an equality between supply and demand is achievable. This means that the United States will be able to import enough aluminum to compensate for the inadequate national supply.

Table IV-44 displays the amount of aluminum the United States will be required to import when Alumax's output is included for selected years to 2000.

TABLE IV-44

U.S. IMPORTS OF ALUMINUM WITH ALUMAX'S OUTPUT INCLUDED
FORECASTED FOR SELECTED YEARS TO 2000
(Thousands of Metric Tons)

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>
Amount Imported	872	1,570	2,240	2,850
Imports as Percent of Total U.S. Consumption	14%	21%	27%	24%

Source: Table IV-44 is a summary of Tables IV-42 and IV-43.
Percentages calculated by BPA.

The importation of such a large amount of aluminum would have an impact on the United States balance of payments. Based on 1975 prices it is estimated that the average annual cost of the imported aluminum would be over \$1 billion. Most of the imports would most likely come from the developing countries of Latin America and Africa, which means that the U.S. would have to acquire over a billion dollars annually of these countries' currencies in order to finance the imports. Without Alumax, the amount of imports would be greater by 118,000 metric tons in 1980 and 130,000 metric tons in all other years. In dollar terms the average annual cost of importing aluminum would increase by about 7 percent (70 million 1976 dollars) if the proposed Alumax plant was not constructed.

Alumax would have the option of exporting part of its output. The amount that might be exported would depend upon the price of aluminum in national markets relative to the price in world markets and other business conditions. The amount of the proposed plant's output that might be exported would also depend upon the actions of Mitsui Corporation, which controls 50 percent of the aluminum ingot produced by Alumax. Mitsui is a multinational corporation whose principal business is to act as a broker in commodity transactions. In these transactions Mitsui obtains ownership of a commodity and, after marking up the price, sells it to a customer. Mitsui has 202 offices on 5 continents; the Alumax ingot could be sold through any of these offices. The amount that might be sold to non-United States corporations is extremely difficult to estimate; all that can be said with certainty is that Mitsui possesses a marketing organization capable of selling its entire share of Alumax's output to non-United States corporations. Conversely, Mitsui is also capable of selling its entire share of ingot in the United States.

2. Raw Materials Usage.

a. Extraction Operations. Alumax would purchase alumina from Alcoa's western Australia mining and refining operations.

Bauxite, a high alumina content ore, is surface mined. The major potential impacts of the mining operation include loss of land availability; esthetic deterioration of the area; particulates from the mining operation; particulates, carbon monoxide, hydrocarbons, oxides of nitrogen, sulfur oxides, and aldehydes from fuel consumption of mining equipment and vehicles; suspended and dissolved solids and runoff water from the mine; and solid waste (mine residual and sludge from water treatment).

BPA has insufficient information on the Australian operations and national pollution control requirements to quantify the impacts of these operations. (For a detailed discussion of the general impacts associated with surface mining, see Appendix A, II.B.1.a. of the draft Role EIS).

b. Refining of Raw Materials. Bauxite is crushed, ground, and dried before being refined by the Bayer process. The ground bauxite is mixed with caustic soda or lime and soda ash. This mixture flows to digesters where it is under direct steam heat and pressure. Here the alumina dissolves, forming a sodium aluminate solution and insoluble impurities such as free silicas, iron oxides, titanium oxides, and sodium aluminum silicate.

The mixture is passed through a series of pressure-reduction and filtering steps. Waste solids or, "red mud", are either disposed of or treated further to recover some of the alumina in the waste stream. The additional treatment is used when high silica ores are being processed. (The procedure involves sintering the red mud with limestone and soda ash, recovering a sodium aluminate solution for recycling, and discarding waste solids or "brown mud.")

The original sodium aluminate solution is further cooled and sent through precipitators. Here crystalline alumina hydrate is added to act as "seeds" for the separation of the hydrated alumina crystals. The precipitate is settled out of solution. This product is separated into coarse and fine materials. The fines are recycled as seeding material and the coarse material is filtered and then sent to calcining kilns. Heat in the kilns drives off the water and dries the crystals. The result is commercially pure alumina which is ready for reduction to aluminum.

Spent liquor from the precipitation step is sent through heat exchangers to remove excess liquid and is then recycled to the mixing and/or digesting operations.

The process consumes 10 to 15 million Btu's of thermal energy for each ton of alumina produced (Fejer, 1974, p. XIII-5).

The major environmental problems associated with this process are the particulates from the crushing and calcining operations and difficulties of mud disposal.

Again, BPA has insufficient information on the Australian operations and pollution control requirements to quantify the specific impacts of these operations.

3. Impacts of the Ultimate Consumption of Aluminum.

Aluminum is the most abundant metal and the third most abundant element (after oxygen and silicon) in nature, although pure aluminum does not occur naturally in a free state. Aluminum metal, such as would be produced at the proposed Alumax plant, is relatively inert and is nontoxic. Consumption of the aluminum produced at the plant would for this reason have no direct impacts upon the environment; however, there are a number of indirect impacts which can be identified.

Aluminum is an intermediate economic good. This means that it is generally not consumed for its own sake, but rather is used in the production of other goods demanded by ultimate consumers. In most, if not all, cases the use of other materials as substitutes for aluminum is technically (if not economically) feasible. The indirect impacts of the ultimate consumption of aluminum can thus be thought of as the effects of using aluminum rather than the most likely alternatives.

One impact of the use of aluminum stems from the fact that it is, in many cases, more economically efficient than the alternatives; that is, it can either perform the same function as the alternatives at a lower cost or it can perform better than the alternatives at the same cost. In either case, this means that ultimate consumers are able to enjoy greater total utility than they otherwise would. To the extent that this results in the increased consumption of goods and services (i.e., alternative uses of income that would otherwise be required to achieve a given level of total utility, given the use of alternative materials instead of aluminum), it, in turn, increases the environmental impacts associated with production and consumption of such goods and services.

Another impact which can be distinguished is that due to the consumption of aluminum, consumption of the potential substitutes is less than it otherwise would be. For example, where aluminum is used in place of wood (e.g., window frames, siding, studs, etc.), consumption of timber is reduced; where aluminum is used in place of iron and steel (e.g., engine blocks, cookware, etc.), consumption of iron ore is reduced; and where aluminum is used in place of copper (e.g., electrical conductors and equipment), consumption of copper ore is reduced. This results in an increase in the length of time existing sources of such resources will be adequate to meet demand, and reduces the environmental impacts associated with their production and consumption (the latter impact is offset, of course, by the increased environmental impacts of the production of aluminum).

A closely related impact is the effect on total consumption of energy. While production of aluminum is quite electrical-energy intensive (i.e., requires large quantities of electricity relative to other factors of production), it does not necessarily require more total energy than production of substitute materials. What is more, aluminum's light weight results in a significant fuel saving when used in automotive, rail, or aircraft application in place of heavier metals. Total energy consumption can, in many cases, be reduced still further by taking advantage of aluminum's excellent conductivity of heat

and electricity to reduce thermal and electrical losses in various industrial, commercial, and household applications. Also important in this regard is the fact that aluminum is readily recyclable at a fraction of the energy required to produce an equivalent amount from raw materials.

The impact of aluminum's weight is manifested not only in fuel conservation in the transportation industries, but in conservation of construction materials as well. In general, less supporting materials are necessary for light-weight structures and components than for heavier structures and components of the same strength. For example, electric transmission towers would undoubtedly be larger and/or more numerous if a material heavier than aluminum were used for high-voltage conductors; similarly, the use of aluminum in construction of buildings can result in savings of other materials which would be necessary for strength if a heavier structural material were used.

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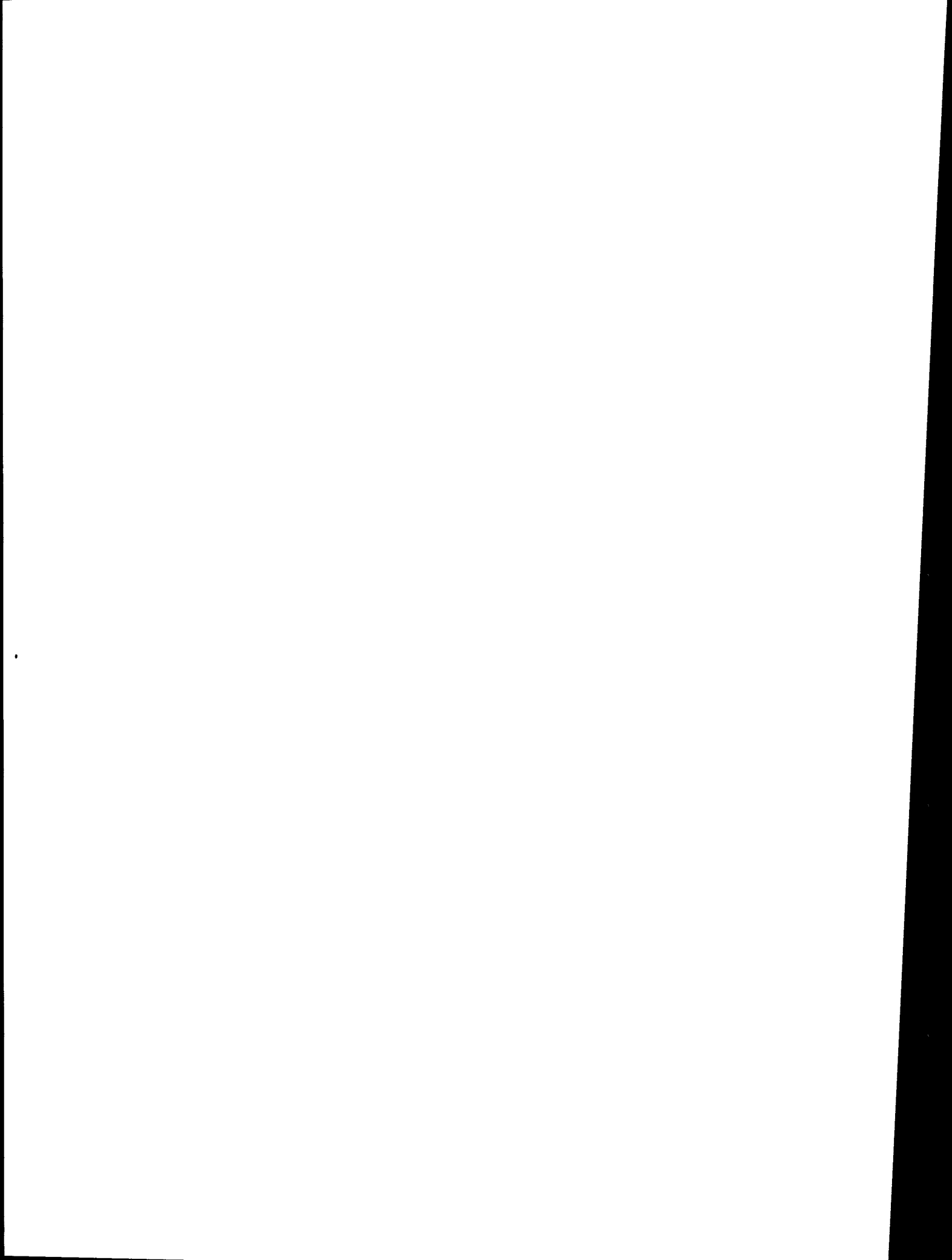
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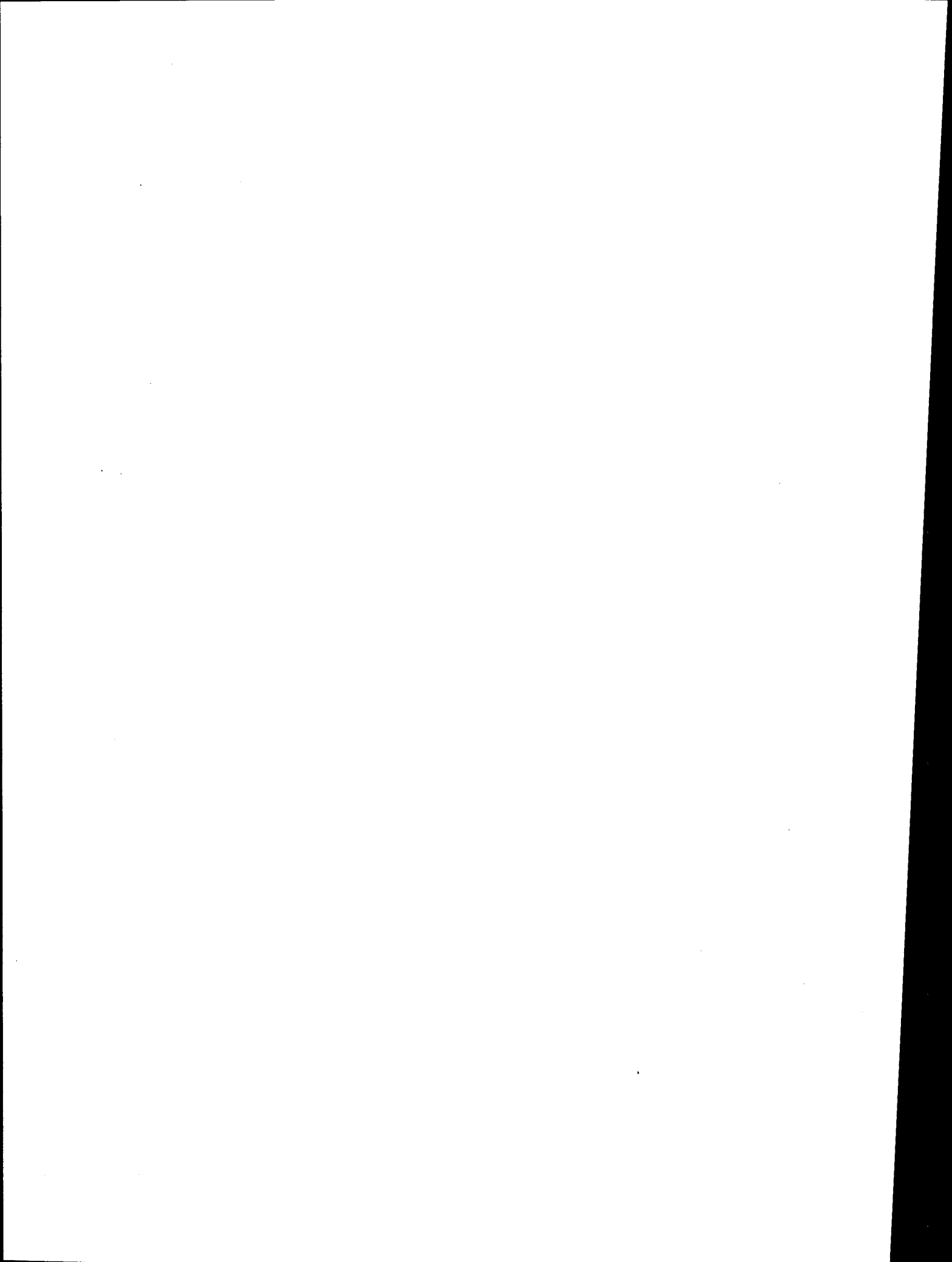
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MITIGATION



V. MITIGATION.

A. Physical and Biological Environment. The enforcement of certain laws and regulations will reduce or mitigate the cumulative impacts on several of the specific resource values and the environment in general. These include the following Federal, State and local regulations:

1. Federal. The proposal is in compliance with the following Federal laws and regulations.

(a) National Environmental Policy Act of 1969 (85 Stat. 852) provides for detailed environmental analysis of all major Federal actions and requires public input, public knowledge of and public response to proposed actions.

(b) Section 7 of the Endangered Species Act of 1973 requires that Federal actions do not jeopardize the continued existence or result in the destruction or modification of such habitat of such species which is determined by the Secretary to be critical.

(c) Historic Preservation Act of 1966 and Executive Order 11593 require identification of all known cultural and historical resources listed in or nominated as eligible for the National Register of Historic Places (36 C.F.R., Part 800).

(d) The Clean Air Act as amended 1974 establishes national ambient air quality standards, requires such standards be achieved, limits deterioration of air quality in areas currently cleaner than standards and establishes new source performance standards.

(e) Federal Water Pollution Control Act as amended in 1972 provides that any Federal department or agency having jurisdiction over any building, installation, or other property shall, insofar as practicable and consistent with the interests of the United States, and with any State or interstate agency or municipality having jurisdiction over waters into which any matter is discharged, prevent or control the pollution of such waters.

(f) Intergovernmental Cooperation Act, 42 U.S.C. 4233 assures State, areawide and local plans and programs are considered in activities undertaken by the Federal government.

(g) Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, 42 U.S.C. 3251 et. seq., provides that solid waste be recycled where possible, or otherwise properly stored, transported, and disposed of.

2. State.

(a) Oregon Revised Statute 469.275 establishes State air quality requirements and limitations for the plant and associated facilities. These include the issuance of an air contaminant discharge

permit containing provisions specific to the plant. The Air Contaminant Discharge permit requires the proposed plant to conduct monitoring and reporting programs to assure that the plant meets standards on a long-term basis (DEQ, 1975b, p. 4-5). These programs will include: (1) periodic measurement of particulate, particulate and gaseous fluorides, sulfur oxides, and carbon monoxide from the primary (reduction cell) dry collection system, secondary (potroom) wet collection system, and anode baking furnace dry collection system; (2) continuous capacity monitoring of the two dry collection systems; (3) semiannual emission tests of the nuisance dust collectors; (4) measurement of sulfur content of each shipment of fuel oil, coke, and hard pitch; (5) maintenance of records of anode and aluminum production, raw material feed rates, and cell or potline voltages; and (6) a program to begin at least two growing seasons prior to plant start-up to measure effects on flora and fauna, and air, water, and land quality in the vicinity of the plant. The exact details of these procedures have yet to be decided, but they must be approved by the DEQ.

(b) ORS 468.700 regulates the water quality impacts of industrial facilities and requires issuance of a water pollution control facilities permit.

The DEQ has approved the permit for the wastewater control treatment and disposal facilities for the aluminum plant proposed by the Alumax Pacific Corporation. The Water Pollution Control Facilities Permit Number 2287, issued on July 21, 1975, permits the following:

- (1) Construct, operate, and maintain wastewater control, treatment, and disposal facilities.
- (2) Disposal of contaminated storm runoff by evaporation.

Special conditions of the permit require DEQ approval of the wastewater control facilities design and minimizing contamination of the irrigation water and disposal of waste potlines containing potential cyanide pollutants. A groundwater monitoring program of chemical characteristics would be implemented at least 6 months prior to aluminum plant operation. An extensive monitoring program has been approved by DEQ for implementation 2 years prior to plant operation and during operation. Water quality monitoring of fluoride and pH would be required for ponds near the plant site and also at Cold Springs National Wildlife Refuge.

(c) ORS 467.010 limits the noise pollution associated with the plant through building and equipment design and any other necessary controls.

(d) ORS 459 restricts solid waste disposal by the plant to a DEQ-approved site.

3. Local. The County Zoning Code requires issuance of a conditional use permit for the aluminum reduction facility. The permit

contains provisions the plant must meet to reduce local impact. The majority of these are social-economic in nature and are discussed in the following section. The permit does, however, contain provisions requiring landscaping and other visual treatment to minimize esthetic impact.

Comprehensive planning as required of the local communities by the Oregon Land Conservation and Development Commission would further mitigate the plants impact on local land use.

4. Plant. In addition to meeting the Federal, State, and local requirements designed to assess and mitigate the impacts of the plant, Alumax-Pacific has proposed a number of other actions intended to reduce the plants environmental and community impacts.

Irrigation ponds which presently serve as wildlife and furbearer habitat and which would be eliminated by plant construction would be replaced by the company. The irrigation system would be diverted to other Alumax land areas suitable for creation of new ponds for wildlife enhancement.

Soils and vegetation would be disturbed by the proposed plant construction. In order to reduce the impact of wind erosion, for which there exists a high potential in the area, several measures would be taken. Included in these measures would be: (1) restriction of heavy machinery from unstable areas; (2) leave ground cover to stabilize soil where possible; (3) after construction restabilize vegetative cover in disturbed areas having erosion potential; (4) design and construction of access roads to include erosion control and maintain such roads after construction; (5) where necessary, require contractors to utilize special construction techniques to minimize ground disturbances; and (6) limit construction activity when ground conditions are unfavorable.

In addition Alumax will pave plant roads, drives, and parking lots, and maintain some type of ground cover in other areas to help eliminate windblown dust and dust from plant vehicular traffic.

To reduce the impact of construction noise, construction traffic and hauling would be limited to daytime hours as would be noisy construction operations.

5. BPA. As specified in Appendix B, VIII.A.2. of the draft Role EIS, a number of measures would be taken to mitigate the impacts of the transmission facilities.

Soils and vegetation would be protected through utilization of the same construction techniques proposed by Alumax.

Where possible, BPA would use an existing right-of-way by paralleling lines. This reduces land use impacts by minimizing new land requirements. Where new right-of-way would be utilized, consideration would be given to the compatibility of the new right-of-way with current and future land uses. Local and regional agencies would be contacted for

their approval, and the proposed right-of-way would conform to existing and proposed land use plans (draft Role EIS, Appendix B, VIII.B.1.).

Where land under cultivation occurs along U.S. Highway 730, towers would be located in a way which would limit their number, thus reducing the loss of land, and construction activity would be undertaken when crop lands are least susceptible to impacts. The proposed transmission lines, where crossing irrigated farmland, would be planned to minimize conflicts with irrigation systems (draft Role EIS, Appendix B, VIII.B.1.).

Measures to compensate landowners for property affected by the proposed right-of-way would be taken on the basis of changes in the market valuation of the land, and for damages incurred during the construction of the proposed transmission facility (draft Role EIS, Appendix B, VIII.B.1.).

Existing access roads would be utilized when possible to reduce the need for new acreage. Permanent access roads would not be constructed to towers on cultivated land (draft Role EIS, Appendix B, VIII.B.1.).

Landowners would be compensated for structures removed from the proposed right-of-way under the procedures stated in the Uniform Relocation Assistance and Land Acquisition Policies Act of 1970.

BPA would comply with both the Historical Preservation Act of 1966 and Executive Order 11593 in locating transmission facilities to avoid sites of historical, architectural, and archeological significance.

Clearing for tower footings, substations, control houses, maintenance buildings, radio communication, and hydromet facilities would be limited to the minimum service area required. Retention of native vegetation as natural landscaping is a main goal of the site planning for these facilities. Such treatment would reduce the need for intensive site restoration and landscaping, and would provide a more natural setting for the substation and other facilities. Disturbed areas, cut and fill slopes, or other esthetically degraded areas would be seeded as soon as feasible after construction to reduce erosion and restore the natural appearance.

The primary impact of transmission lines and substation sites on wildlife would be the removal or disturbance of habitat. The extent of these impacts would be dependent on the size of the project, the sensitivity and quality of habitat, and the degree to which the individual species can adapt to changes within its environment. Impacts to wildlife, attributed to changes in wildlife habitat, would be primarily mitigated by measures addressing water quality and vegetation. The adverse impacts could be reduced in many cases by positive planning, such as allowing secondary succession to occur on rights-of-way, reseeding with grasses and legumes, controlling erosion, limiting pond and canal crossing by vehicles, and avoiding critical areas whenever possible.

Where State wildlife authorities identify areas in which special vegetative cover plantings are important and where such plantings are acceptable to the landowner, special ground cover vegetation would be used. If the proposed facility could adversely affect a threatened or endangered species, Federal and State wildlife authorities would be consulted to identify specific actions required to eliminate the possibility of impact to such species.

Whenever possible, critical game areas such as breeding or nesting grounds are avoided in the location of the line or other facilities, or construction will be scheduled during noncritical seasons. Canal or pond crossing points established for construction and later used for maintenance would be kept to a minimum and, whenever practicable, permanent crossings would be as compatible as possible with aquatic habitat. Where appropriate, State fish and wildlife authorities would be consulted regarding the location and design of facilities directly involved and the timing of construction.

Measures to mitigate effects upon water quality of the ponds and irrigation canals on the transmission corridor and on the Alumax property would be implemented. Because of the interrelationship of soil erosion and water quality, the various erosion-mitigating measures described under soils would control water quality impacts during and after construction. Vegetation would be left along all ponds and canals in an effort to trap sediment from runoff. Canal crossing by heavy construction equipment would be carefully monitored to minimize canal and stream turbidity. By following these practices, impacts to waterways resulting from BPA's construction activities would be kept within the limits prescribed by State and Federal water pollution control regulations.

Spraying of herbicides into streams, wetlands, rivers, lakes, or other bodies of water would be prohibited. Herbicides would not be applied aerially within 100 feet of the shorelines of such water bodies. Ground application of herbicides, except safe chemicals, would not be allowed within 10 feet of any body of water.

In order to minimize the esthetic impact of the proposed transmission route, procedures such as vegetative screening and management, selective siting, occasional deflection of the right-of-way, and the use of dull, nonreflective surfaces would be utilized where necessary (see draft Role EIS, Appendix B, VIII.B.2.).

B. Social and Economic Environment. The social and economic impacts of the proposed Alumax plant have been discussed in detail in Subchapter IV.B. of this supplement. Unlike physical and biological impacts, it is often difficult to ascertain which of these effects are adverse, and suggest or require mitigation, or to determine early in the project what level of action is desirable. This is due to the nature of the impacts, widely varying community attitudes toward the impacts, and in contrast to physical and biological concerns, lack of regulations and/or standards establishing workable guidelines.

For example, while it is possible to predict what is expected to be the increase in demand for schools induced by Alumax-related population, it is not always possible to decide the degree to which this impact would be adverse. On the one hand school facilities would be overcrowded, on the other the tax base would be enlarged to provide funding for expansion, if the local district so decides. This decision may be made now or in the future when the needs are more pressing. In summary, the Alumax impacts may overcrowd the schools or may provide the impetus for newer and better schools. Similar cases can be made in other areas.

Furthermore, it is frequently outside the jurisdiction or capability of the party proposing the action to undertake to accomplish such mitigation measures as are required. For these reasons many of the mitigation measures discussed in the subchapter following are not concrete actions to which someone is committed to performing to a specified level of efficiency. Generally they are accepted planning practices and techniques utilized to limit the adverse effects of community growth which have been specifically applied to Alumax. The degree to which they would be effective depends on community acceptance, timing of implementation, degree of commitment by local officials, etc.

1. Local Requirements. The conditional use permit issued by the county contains provisions addressing several local plant impacts.

Traffic. In order to mitigate traffic impacts Alumax would "assist in the solution of traffic problems on Highway 730 at the plant (regarding left turns) and at the intersection of Highways 730 and 395" (Umatilla County Planning Commission, 1975, p. 2).

Solid Waste. Under the proposed Alumax plant's conditional use permit, granted by the Umatilla County Planning Commission, two specific measures are required to mitigate solid waste impacts. First, all solid waste generated by the plant which cannot be recycled and reused by the plant or sold to others, must be inert, nonhazardous, and nonleaching to be suitable for disposal in a sanitary landfill. Disposal must be carried out in a manner approved by DEQ. Secondly, Alumax would assist in locating and developing new landfill sites to mitigate the impact of shortened lifespans of existing landfills, resulting from increased waste materials generated by the plant.

2. Plant. In addition to those procedures required by the county use permit Alumax has indicated other actions will be undertaken to reduce the plants adverse impacts.

Water. Alumax will support and participate in the development of a regional water system, such as proposed under grant preapplication by the Port of Umatilla.

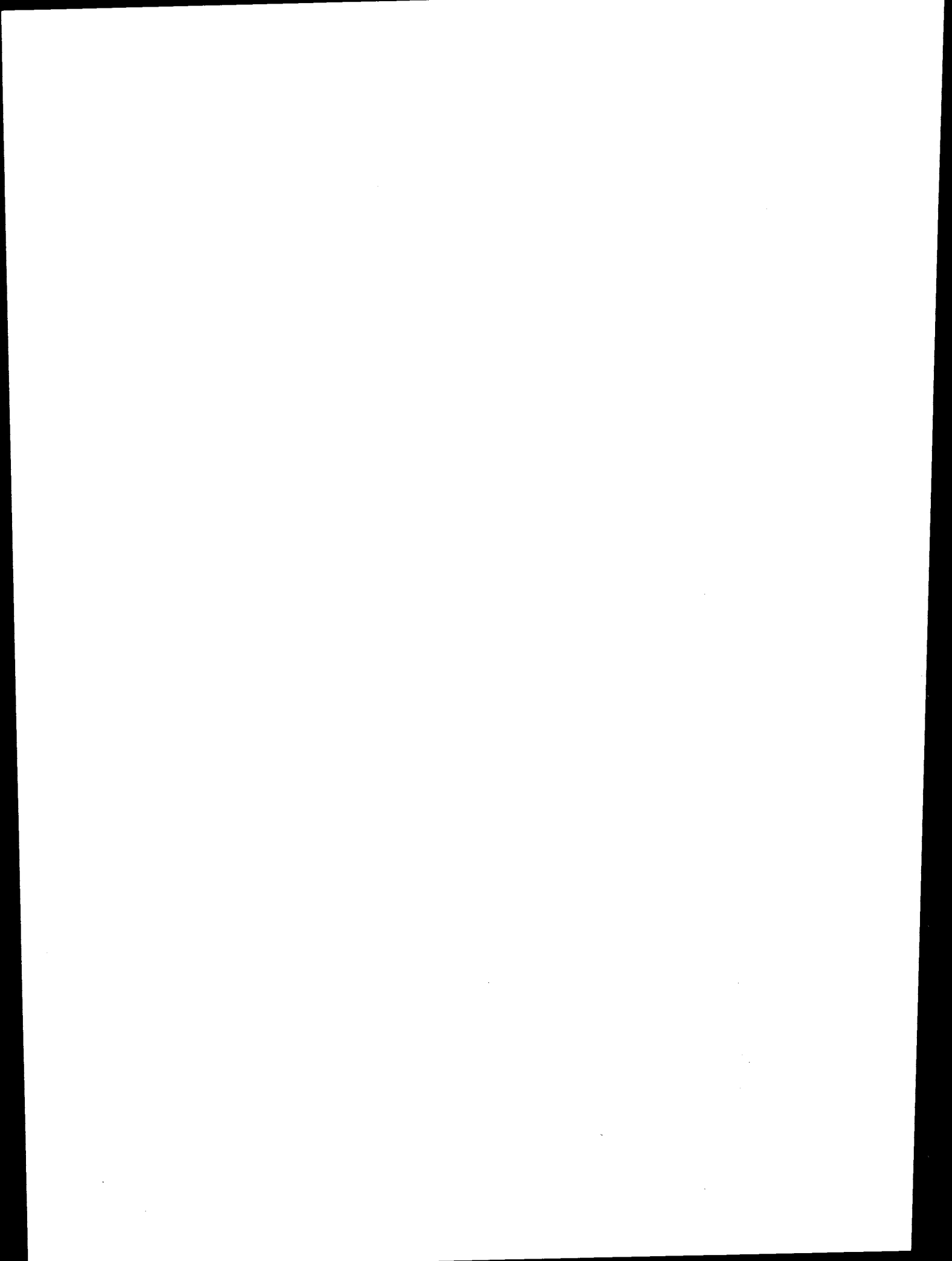
Community Services. To the extent possible under State law, Alumax would assist local governments in meeting the short-term impacts imposed on community services during construction and plant startup. Alumax recognizes that expanded community service facilities would be required before the true cash value of the proposed plant would be added to the assessment and tax rolls. If other means of financing

needed services and facilities prove impractical, Alumax has indicated a willingness to prepay a reasonable amount of property taxes. (Prepayment of taxes is permitted under Oregon HB 2629, July 2, 1975.)

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UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS



VI. UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

A. Physical and Biological Impacts.

1. Natural Features. While some adverse impact to natural systems in the plant site would occur due to fluoride emissions from the plant, the major impact would result from the removal of the 165 acres for the plant site and additional acreage for access roads, power substation and transmission lines. These impacts would be primarily a loss of wildlife production. Specifically, waterfowl production will be lost on all nine ponds (1.16 acres) within the 165-acre plant site along with upland game bird and small mammal habitat. Some waterfowl production would also be lost from ponds around the plant site due to access roads and construction activities.

2. Air Quality Impacts.

a. Construction. It is likely ambient air quality standards for particulate would be exceeded at times in areas adjacent to the plant site during some phases of plant construction. These conditions will be temporary in nature and limited through use of the mitigation measures discussed in Chapter V.

b. Operation. The plant and related traffic and development would degrade air quality, but not significantly enough to violate ambient air quality standards nor to exceed EPA Class II Significant Deterioration Limits. Visible emissions would be within standards, although steam plumes may have an esthetic impact.

3. Water Quality. Water quality of the ponds on the plant-site would be adversely affected from construction activities, wind-blown sediments, and fluoride particulate accumulation. While the construction-related impacts are temporary in nature, the fluoride accumulations are long term.

4. Noise. There would be an increase in ambient noise levels due to plant construction and to plant operations. The construction noise would be temporary, lasting only until construction is completed. The projected increases in noise levels due to plant operations and related activities would meet Oregon noise standards. L_{50} noise levels associated with plant operations would be less than 45 dBA at the Alumax property lines. Assuming that all design goals are met and that Oregon noise standards will be met, noise should not be a major problem in the area.

5. Esthetics. The proposed Alumax plant's impact on the visual character of the area of the plant would be great. The plant would alter the appearance of the site and adjacent lands from an area of open space to one of heavy industry.

B. Social Impacts.

1. Population. Increases in population may be considered either harmful or beneficial, depending on the focus of analysis. A

basic assumption made in this section is that population impacts which cannot be adequately accommodated with respect to a particular service or need must be considered adverse within the perspective of the service or need in question. Adverse impacts in one area may be offset by beneficial impacts in another area. The influx of an estimated 4,650 persons would undoubtedly produce unavoidable strains in a number of areas. These strains will be identified in the sections which follow.

2. Community Development. Community development would be significant in the study area as more land is required to support Alumax-generated populations. It is estimated that approximately 650-700 acres would require development to accommodate Alumax-related growth. The effects of this development are difficult to ascertain, that is, beneficial or adverse. Mitigation of adverse community development impacts would be largely dependent on the success of planning controls in regulating development.

3. Infrastructure.

a. Traffic. During the construction phase, and after the plant becomes operational, traffic generated by plant activities would cause congestion in the vicinity of the plant site. Especially during shift changes, plant commuter traffic would impact local roads, particularly U.S. Route 730.

(1) Sewer Systems. Plant-related residential requirement for sewer services would cause some sewer mains and treatment systems with current capacity problems to become more inadequate.

(2) Solid Waste. The major solid waste impact would be the shortening of the lifespan of Umatilla Butte Landfill by 2 years.

4. Housing. As indicated in Chapter IV, housing demand for Alumax would represent almost half of the total demand in Umatilla County during the period of plant construction and over one-fourth of total county demand during the operational phase. The availability of an adequate supply of homes and apartments would be unavoidably hampered by such increases in demand, given the inevitable lag between increases in demand and response on the part of developers. It is possible that heavy demand would result in a substantial increase in housing cost.

5. Community Services. As in the case of housing, the population increments associated with the Alumax plant would be likely to pose some unavoidable problems in the provision of various community services.

a. Educational Services. Alumax construction workers and associated secondary employees would be expected to contribute between 300 and 1,100 children to the school age population during most of the construction period. Since most impact area schools are projecting near capacity and, in some cases (Umatilla and Boardman), excess capacity enrollments even without Alumax, the addition of Alumax students would create moderate to severe strains on the area's school

systems, possibly necessitating at least temporary cutbacks in service levels in some areas. Increases in class sizes and the use of temporary facilities would be likely.

b. Cultural and Recreational Resources. Most of the impact area cities currently have a shortage of urban park space designed to accommodate high intensity day-use recreation. Population increases due to Alumax would further aggravate this situation.

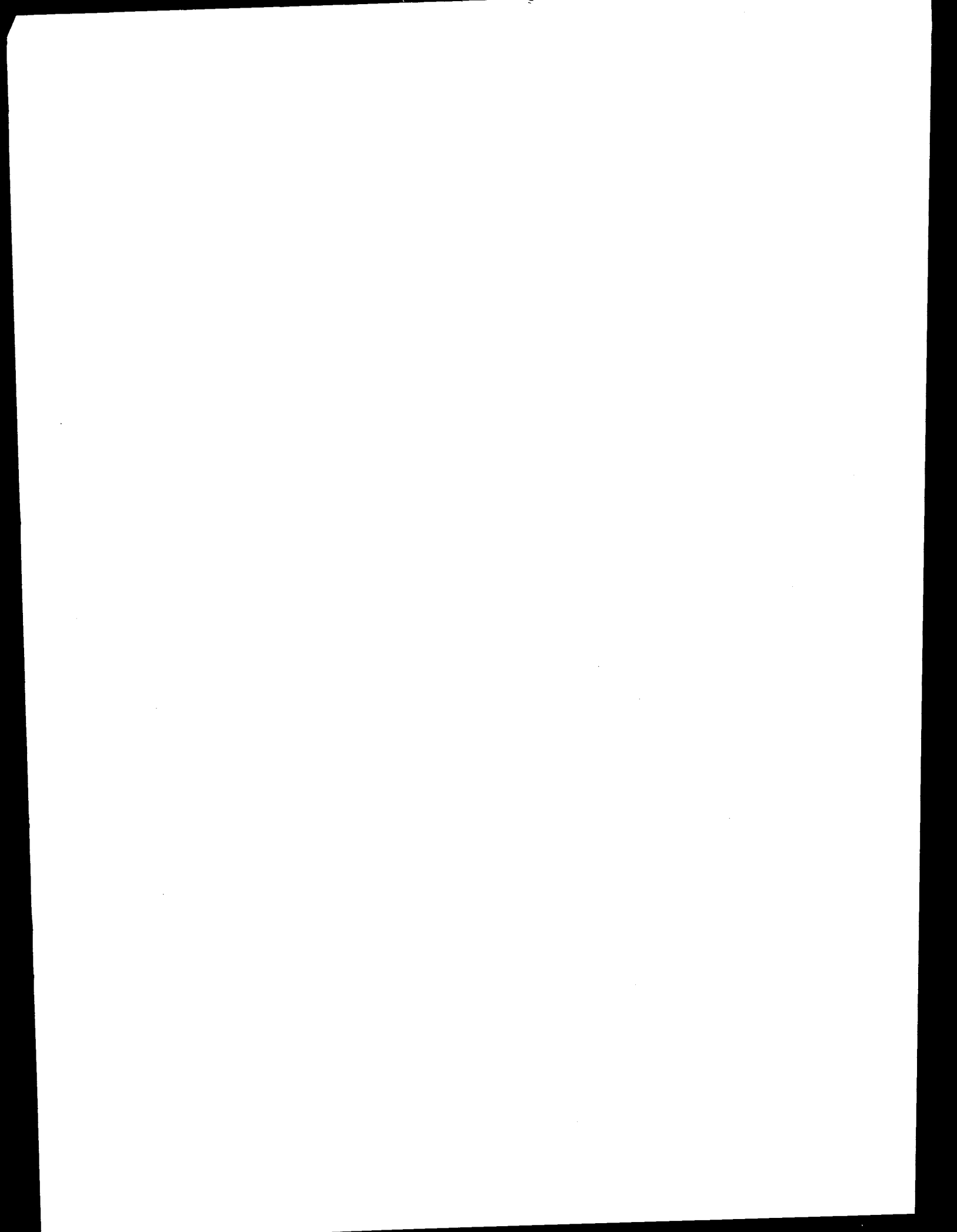
Construction of the plant would destroy the wildlife habitat at the plant site and would limit the use of adjacent areas by wildlife. This would lead to a decline in the value of the lands in the vicinity of the plant as a resource for hunters.

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RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY



VII. RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY.

In the short term, the benefits to the study area induced by the Alumax project are primarily economic. The introduction of the new industry will not only diversify the area's economy, but also provide a significant increase in tax base for several taxing entities and, to a lesser degree of significance, add to the area's employment base. These benefits would be compounded by the increased income and secondary effects.

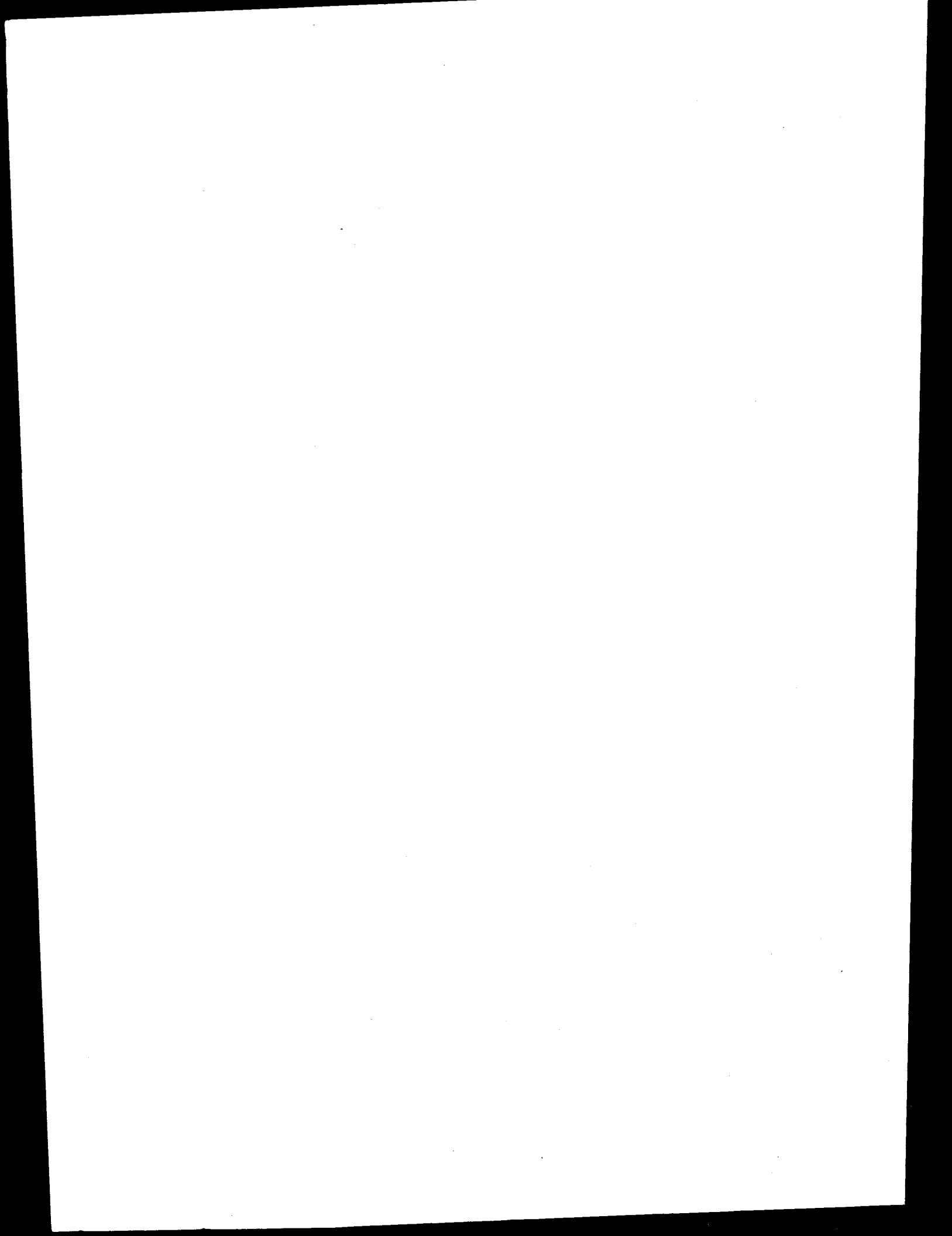
The allocation of the electrical energy to Alumax also has some long-term impacts on the regional power system. Inasmuch as the Alumax load increases the region's firm energy deficit, it reduces the power reliability to BPA's firm load customers under adverse water conditions. This situation would prevail until the region's firm energy deficit is negated. Allocation of the energy to Alumax would also preclude its use by other potential customers.

Long-term environmental impacts would be induced by the plant, which would persist as long as the plant operates. This includes the plant's contribution to pollutant loadings in the local air, impacts on water quality and natural systems, and use of the land which makes up the plant site. If the plant ceased operation, these impacts, with the exception of those involving land use, would no longer exist. The land use implications would depend on if the land were returned to its original state.

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IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES



VIII. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES.

A. Raw Materials. Bauxite would be mined and refined into alumina by Alcoa's Australian operations. The alumina, petroleum coke, and pitch would be consumed in the production of aluminum and would be essentially irretrievable. Aluminum, however, is a highly recyclable material; therefore, part of the aluminum produced will probably be recycled at some time. (For a discussion on aluminum recycling, see Appendix C, Attachment D of the draft Role EIS.)

Once a commitment to build is made, capital resources, construction materials, and labor would be irreversibly committed to the project; this includes those resources utilized for expansion of community facilities, housing, etc.

B. Electrical Energy. Electrical energy is a raw material in the production of aluminum. It essentially becomes a part of the final product and is irretrievable as electrical energy. The portion of electric power that is hydraulically generated is renewable through the hydrologic cycle. Thermal or nuclear-generated power is nonrenewable and will form a greater percentage of power available in the future because of increased electrical demands and limits on the hydroelectric system. Energy used for transportation purposes is irretrievably consumed.

C. Land.

1. Plant and Associated Facilities. One of the greatest resource utilizations associated with the proposed Alumax facility is land. About 165 acres would be permanently dedicated to the plant site. If the plant ceased production, the land could be rehabilitated for another use; however, for all practical purposes, the 165-acre site is not likely to revert to its present usage. Further dedication of land would be required to construct transmission facilities, access roads, and water and sewer infrastructure.

2. Secondary Impacts. Growth related to the Alumax facility would commit about 650 to 700 acres of land for residential, commercial, recreational, and other land uses. This trend would have long-range impacts on the area and would further commit its natural resources to the man-made environment.

D. Natural Systems.

1. Vegetation. Irreversible commitments of vegetation result from the impact of the 165-acre plant site which consists of 115 acres of irrigated pasture and 50 acres of natural vegetation. Additional acreage would also be committed for access roads and the power substation. The natural vegetation would primarily be grasses, shrub-steppe vegetation (rabbitbrush, sagebrush), aquatic vegetation (cattail, sedge, bulrush), and trees (Russian olive, juniper).

2. Wildlife. Irreversible commitment of wildlife resources would result from habitat eliminated by construction of the aluminum plant on the 165 acres and also the additional acreage for access roads

and the power substation. The terrestrial and aquatic habitat (about nine ponds) is occupied by important upland game birds (ringnecked pheasant, California quail), waterfowl, and small mammals. Loss of the habitat would cause a population decrease for these wildlife resources reproducing within the 165-acre plant site, although construction of new ponds on the 3,000-acre property would partially reverse this commitment.

Secondary impacts of human activity and air emissions could commit additional terrestrial and aquatic habitat immediately surrounding the plant site but on the Alumax property. Long-term impacts of fluoride and sulfur dioxide air emissions could affect vegetation 2,000 feet beyond the 165-acre plantsite enough to reduce necessary habitat requirements for reproduction of upland game birds and waterfowl. Human activity could affect nesting behavior of game birds, causing subsequent decline in those populations. These secondary impacts would constitute an irreversible commitment for the life of the Alumax aluminum plant.

ALTERNATIVES



IX. ALTERNATIVES.

The alternatives available to BPA regarding the Alumax contract have changed since the development of the draft EIS. At this time BPA has two alternative courses of action available: serve the plant under the terms of the existing industrial firm power contract; or do not serve the plant.

As the proposal, the impacts of the first alternative are discussed in Chapter IV. The impacts of not serving the plant are discussed in Section A of this chapter. Section B of this chapter presents an alternative originally identified in the draft EIS. This discussion is an impact analysis of siting the plant in Warrenton, Oregon as directed by the court. The Warrenton alternative is no longer considered valid however, due to the company's posture on the site and State environmental constraints. Other alternatives identified in the draft as invalid follow the Warrenton discussion for purposes of reader information.

Alternative sources of a longer term power supply and associated impacts (post 1986) are not covered as it is premature to speculate on what future power sources may become available and under what conditions. Several regional power bills have been introduced in the Congress of the United States which either directly or indirectly address service to the plant. No one position has been consistently proposed and service opportunities have in fact shifted within the same piece of legislation as its development progressed.

The draft BPA Allocation Policy released in late 1979 does allow for continued service to the plant through the local utility, Umatilla Electric Co-op. However a decision on this policy, as with the regional legislation, is sometime into the future. Attempts to identify the impacts of these alternatives would be highly speculative at this time and are more appropriately addressed at the time these decisions are made and implemented. The BPA Allocation Policy EIS currently under development will address the appropriate impacts of the Policy as related to the direct-service industries. (See BPA, Allocation of firm energy and system reserve energy Notice Of Intent to prepare a draft environmental impact statement, 44 F.R. 57465, October 5, 1979.)

A. No Service to Alumax. If BPA did not supply power to the proposed Alumax plant, it is unlikely the plant would be built in the region within the time frame under discussion. Two sources of energy other than that supplied by BPA would be potentially available to Alumax for the proposed Umatilla smelter: self-generation, either at the site or in centralized generating facilities in conjunction with other power users (such as other aluminum companies, public and private utilities, etc.), or the purchase of power from alternative sources inside or outside the region such as the Washington Public Power Supply System.

Self-generation could be undertaken as either a joint-industry or a utility endeavor or by Alumax alone. With either option, the limiting factor for the alternative is economic cost. Power produced by industry is projected to cost over six times the current BPA rate when

total financing is figured in. Assuming the ability to raise the necessary capital for self-generation, a more favorable balance of total costs would result if the plant were sited closer to the product market in order to reduce transportation costs, which are significantly higher in the Pacific Northwest. Environmental impacts of the generating facilities developed under option cannot be assessed unless a specific site and plant size are chosen.

Purchase of power from other sources is limited in the Pacific Northwest due to lack of power available for purchase. Public and private utilities have similar capital and environmental problems to industry in financing and building generating plants. The region is currently facing long term projected power deficits due to these and other problems including public acceptance of new generation plants. Outside the region the same conditions exist. At this time there are no known reliable energy sources available for purchase by Alumax.

No service to the plant resulting in the plant not being built is environmentally the "no action" alternative; neither the physical nor social economic impacts identified in Chapter IV would occur. This would be environmentally beneficial primarily due to improved air quality conditions. Economically the local area would be deprived of the additional employment opportunities and the increased tax base. Chapter III provides additional information on the study area without Alumax.

Impacts on the power system would in the short term be positive due to reductions in projected regional resource deficits. One of the major components of the contract, the third quartile, cannot be implemented during term of the contract, thereby reducing the potential impacts of the contract.

Without the plant's load during nighttime hours BPA will face an increased possibility of having to generate above firm load requirements or spilling to meet minimum river flows. Non-service would also result in more secondary energy being available for sale to utilities in both the PNW and PSW.

If the aluminum production capacity is not constructed somewhere nationally, the national supply will be reduced, possibly leading to greater importation and/or higher aluminum prices, particularly in light of projected increased aluminum use in future years.

B. Alumax Served at Warrenton. The Alumax plant evaluated at the Warrenton site is basically the same as that proposed for Umatilla. Where minor differences occur, they are noted in the text.

If Alumax were built at the Warrenton site, the raw materials, electrical, and total energy demands would be essentially the same as they would be at the Umatilla site. Although the building arrangement would probably be different at Warrenton, the aluminum reduction process and plant operations would be the same as those that would be used at Umatilla. (For a discussion of raw materials usage, energy requirements, and plant processes and operations, see Chapter II.)

In order to serve the requirements of the Alumax site at Warrenton, the following facilities or systems additions were proposed by BPA: (1) a 500,000-volt, 47.5-mile transmission line between BPA's existing Allston and new Skipanon Substations with terminal facilities at Allston and a 500,000/230,000-volt transformation at Skipanon; (2) a 2.4-mile 230,000-volt transmission line between Skipanon Substation and a new Miller Substation; and (3) a 7-mile 230,000-volt line between Clatsop Substation and Miller Substation.

1. Physical and Biological Environment.

a. Study Area. In most instances the study area for the Warrenton alternative is Clatsop County. In those instances where it may vary, it is defined in the appropriate text section.

b. Physical Setting.

(1) General Area. The Warrenton area, in Clatsop County, is located in the marine cool summer climatic region. Physiographically the Warrenton site is located in the Pacific Border Province, an area of coastal mountain ranges with elevations of generally less than 2000 feet. Clatsop County's topography is comprised primarily of shores, river valleys, estuary flood plains, uplands, and mountain footlands. The shores of Clatsop County are composed of rocky headlands, marine terraces, and an extensive coastal plain of vegetated dunes and interdune wetlands.

Coastal area surficial deposits are composed of unconsolidated and semi-consolidated alluvium. Surficial layers in the river valleys and bottomlands comprise silts and sands. Talus and landslide debris occur at the base of the foothills. Compressible peat and organic soils are found in the tidal flat areas of the Columbia, Skipanon, and Lewis and Clark Rivers. Soils in Clatsop County receive up to 100 inches of winter rainfall annually. High winter wetness, periodic high water tables, and flooding in the bottomlands result from heavy permeation of rainfall. Slopes of the Coastal Range foothills are subject to heavy rains and due to shallow soils are highly erodible and susceptible to landslide activity. The sand dune area of the coastal plains is a naturally unstable, fragile area which is highly vulnerable to human activity (Sedway/Cooke, 1974, p. 32-33). The Clatsop Plains dune area is already being developed, and could be further endangered by Alumax-generated residential development.

(2) Plant site Area. The proposed plant in the Warrenton area would occupy an approximate 726-acre site overlapping the southwest boundaries of the City of Warrenton. About one-half the plant site is within the city, while the remainder of the site lies in unincorporated Clatsop County.

The site is south of U.S. Highway 101. The central 240-acre portion of the site had already been cleared and rough-graded by its previous owners in anticipation of industrial development. The remainder of the site is in the natural state of secondary growth conifers, as well as deciduous trees and brush. The

area surrounding the site is, for the most part, undeveloped. To the north the lands are relatively level and are adjacent to the Skipanon River. To the west lies the Skipanon Valley, a wetland area subject to periodic flooding. To the south and east topography rises sharply and the land is heavily forested.

Impacts on the soils and natural features within the study area resulting from the proposed plant's location would include the loss of the plant area to industrial use and further disturbances related to the provision of access roads, transmission, sewer and water facilities.

(3) Comparison with Umatilla Area. The Warrenton and Umatilla areas are quite different. Climatic, vegetational, topographic, and geologic differences between the two regions are extensive. The climate in Warrenton is wet (annual rainfall is approximately 70 inches), and temperatures are moderate, whereas Umatilla is semi-arid (less than 10 inches annual rainfall), and temperatures are more extreme. Vegetation in the Umatilla plateau is comprised mostly of sagebrush and grassland, while Clatsop County displays a verdant landscape, with Douglas-fir the prevalent tree species. The physiographic character of the Umatilla Basin is homogeneous, while the Warrenton area is quite diverse in its makeup.

The Alumax site in Umatilla is a more resilient area to the siting of an aluminum reduction smelter than is the Warrenton site. The Umatilla site has several climatic and topographic characteristics which make it more favorable for development including: more resistant vegetation types, relative low humidity and rainfall, and level topography. The Warrenton site provides a local ecosystem of far greater diversity and is, therefore, more interdependent and vulnerable.

c. Land Use.

(1) Regional Land Use. The land use patterns of Clatsop County include scattered, small communities within a natural environment of forest, pasture, river estuaries, coastal wetlands, and sand dunes. Large portions of the county are resistant to development due to steep topography, marshy soils, fragile sand dunes, and public ownership.

Major crops in the study area are forage grasses and legumes. Also, nursery crops, blueberries, and cranberries are well suited to the area. Commercial forestry is the area's predominant land use. The forests are largely privately owned and managed.

Recreational land use is very important in the study area. The forests of the area provide a diversity of leisure-time pursuits, such as hunting, fishing, and hiking. The Astoria area has a rich heritage, and attracts many visitors to its historical monuments. The Pacific Ocean is another important area for recreational activity, as well as commercial fishing.

Astoria is the largest community in the County, with an approximate 1975 population of 11,000, and is located about 4 miles northeast of the proposed plant site. Warrenton, population of about 2,000, is located adjacent to and north of the plant site in a largely undeveloped area between the Pacific Ocean and Young's Bay. Other communities are Hammond, population 530, found about 5 miles north of the plant site; Gearhart, population 890, located on the Pacific 9 miles south of the site; and Seaside, just south of Gearhart, population 4,640. Seaside and Gearhart are primarily tourist-oriented communities (Amax Pacific Aluminum Corp., 1974b, p. V-35).

Like the Umatilla area, the Warrenton area exhibits a basically rural flavor. Neither area is well endowed with natural assets that promote large urban growth; however, the Umatilla area has fewer natural restrictions to urban growth, such as less public land and a homogenous topography with fewer physical limitations to development. Clatsop County's diverse environmental setting, and the intricate balance of the various ecosystems, make for an area where man's utilization of land need be very selective.

Lands highly suitable for urban purposes are limited to the Astoria, Warrenton, and Seaside municipal sewer service areas (Sedway-Cooke, 1974, p. 47). These areas have insignificant development constraints. Much of the area in Clatsop County is not suitable for development due to flood hazard, excessive slopes, land slide topography, marshland, dunes areas, unusual natural habitats, and public ownership.

(2) Site and Immediate Vicinity. The proposed Warrenton site consists of approximately 726 acres south of U.S. Highway 101 adjacent to the southeast corner of Warrenton; a portion of the site lies within the city limits. The central 240 acres of the site have been cleared and rough-graded by previous owners in anticipation of industrial development. They are surrounded by secondary growth conifers and assorted deciduous trees and brush. This outer portion of the site would be left in its natural state as a visual buffer. The approximate 726-acre site would utilize about 160 acres for the plant itself. Both sites, then, offer buffer zones. The nature of heavy industry is that of a "nuisance" type land use, incompatible with most other uses. Buffer zones provide mitigation of adverse effects on adjacent lands. The Warrenton site, although only about one-fourth the size of the Umatilla site, and having a smaller buffer zone, still maintains a comparative advantage by virtue of having effective natural screening provided by dense conifer cover. The Umatilla site, on the other hand, occupies an area of flat topography with little vegetative cover, and would have a greater esthetic impact.

Land adjacent to the Warrenton site are primarily agricultural, forest, and residential, with some scattered commercial establishments located on U.S. Highway 101. Similar to the proposed Umatilla site, adjacent lands are either undeveloped and/or utilized by low intensity land uses such as forest and agriculture. At both sites, the impact of the proposed plant's development would be that

of the land being used for heavy industry, a very intensive form of land use. Thus, the character of the immediate vicinity of the sites in question would be dramatically changed by Alumax's proposed plant from areas of low intensity use to high intensity industrial use.

Table IX-1 gives an estimation of lands needed to accommodate future growth in Clatsop County through 1995, with and without Alumax. Acreage required in the Warrenton area is much lower in the Umatilla area for two reasons. First, Clatsop County has a much lower projected growth rate over the 20-year study period; and second, Alumax-related growth in Clatsop County is projected to be about 1,000 persons less than in the Umatilla region. Therefore, while the Warrenton area has greater physical limitations on growth, which is reflected in its projected low growth rate, Alumax-induced growth would require about two-thirds as much acreage for development as the Umatilla area, approximately 445 acres.

Significant impacts resulting from the construction of BPA transmission facilities to serve Alumax at Warrenton would occur. The proposed routes required would traverse over 55 miles of right-of-way, and would necessitate the clearing of over 700 acres of land which would be lost to future timber production.

The Umatilla site is preferable in terms of transmission facilities required. The proposed Umatilla route has several comparative advantages, such as its much shorter length, use of existing right-of-way over most of the route, less new land required, and fewer disruptions of environmentally sensitive areas.

d. Natural Systems.

(1) Terrestrial Impacts. Potential impacts of the Alumax aluminum plant upon the terrestrial environment near Warrenton result from fluoride and sulfur dioxide air emissions. Preparation of the 160-acre plant site took place in 1969, so some of the construction impacts have already occurred.

If compliance with particulate and gaseous fluoride air quality standards could be sustained under normal operation, then vegetation and terrestrial fauna would be protected (DEQ 1974, p. 24). Significant fluctuations in particulate and gaseous fluoride emission rates to maximum projected levels would exceed ambient air quality standards in an approximately one-half square mile area northwest of the plant site. These higher levels of emissions could affect sensitive plant species, wildlife, or agricultural animals within the vicinity of the plant site.

Sulfur dioxide air emissions would not exceed ambient air quality standards off the plant site; therefore, no effects upon surrounding vegetation and animals by SO₂ would be expected.

Accumulation of fluorides would occur in the vegetation north and east of the plant site (Suttie, 1974, p. 8). Fluoride levels in the plants would exceed the recommended forage

TABLE IX-1

ACRES NEEDED FOR DEVELOPMENT WITH AND WITHOUT ALUMAX
Clatsop County

Land Use	1975-1980		1980-1990		1990-1995		Total	
	With	Without	With	Without	With	Without	With	Without
Residential <u>1/</u>	260.0	120.0	460.0	310.0	180.0	130.0	900.0	560.0
Commercial <u>2/</u>	2.5	1.2	4.8	3.5	1.9	1.3	9.2	6.0
Industrial	NA	NA	NA	NA	NA	NA	NA	NA
Recreation <u>3/</u>	36.0	16.0	65.0	43.0	25.0	19.0	126.0	78.0
City Parks and Playgrounds <u>4/</u>	10.0	4.5	18.0	12.0	7.0	5.0	35.0	21.5
Other Recreational Open Space <u>5/</u>	26.0	12.0	47.0	31.5	18.0	13.5	91.0	57.0
Public Facilities <u>6/</u>	<u>4.5</u>	<u>2.0</u>	<u>8.0</u>	<u>5.5</u>	<u>3.0</u>	<u>2.0</u>	<u>15.5</u>	<u>9.5</u>
TOTAL	339.0	155.7	602.8	405.5	234.9	170.8	1176.7	732.0

1/ Average household size Clatsop County in 1975 was 2.9 (rounded to 3.0) single-family houses on 10,000 sq. ft. lots = 3 dwelling units per acre.

2/ Weiss, S. F., 1968, p. 127, 1.18 acres/1,000 persons.

3/ Oregon State Highway Division, 1972, p. 3, 15.5 acres/1,000 persons.

4/ Weiss, p. 127, 4.25 acres/1,000 persons.

5/ Oregon State Highway Division, p. 3, 11.25 acres/1,000 persons.

6/ Weiss, p. 127, 1.9 acres/1,000 persons.

standard of 40 ppm during the fall season within a few hundred yards of the plant boundary. The yearly average of fluoride concentration, however, should not exceed the 40 ppm in this area; consequently, beef and dairy production should not be affected. Dental fluorosis would be possible for cattle confined to a small area within 0.5 mile northeast of the plant site. Since cattle are considered most sensitive to continual ingestion of fluorides (wildlife being more tolerant) and yearly forage standards are in compliance, measurable impacts upon wildlife populations are not expected.

(2) Comparison of Warrenton and Umatilla Sites.

Terrestrial impacts at the Warrenton site are somewhat greater than at the Umatilla site due to the different existing flora and fauna, climate, and proposed plant buffer zone between the aluminum production area and the surrounding public and private land. In the Warrenton area, the humid coastal climate perpetuates a greater preponderance of forest and wildlife resources around the proposed plant site. Also, Fort Stevens State Park is about 2 miles west-northwest and Fort Clatsop National Monument is about 1.6 miles southeast of the aluminum plant stack emissions. The buffer zone between the proposed Warrenton plant and the northern property boundary is about 500 feet (Cramer and Bowers, 1976, p. 3).

At the proposed Umatilla site, terrestrial impacts would be primarily limited to the Alumax property (3,000 acres) containing the 165-acre plant site. However, at the Warrenton plant site, land preparation and construction of the aluminum plant, access roads and power substation would eliminate furbearing mammals and waterfowl nesting areas within the 165-acre plant site and on some additional surrounding acreage. Compliance with air quality standards and recommended fluoride level for forage would be more easily achieved at the Umatilla site due to the larger buffer zone of 4 miles east-west and 1.3 miles north-south (Cramer and Bower, 1976, p. 3). Considering the climate, existing flora and fauna, proposed air quality compliance and the buffer zone, the Umatilla site would be preferable to the Warrenton site.

e. Air Quality.

(1) Impacts. The facilities of the Alumax plant proposed for Warrenton were essentially the same as for the proposed Umatilla plant except for minor differences in arrangement which were planned at the time the air quality impact calculations for Warrenton were performed (Cramer and Bowers, 1974a, p. 2). These original plans were never finalized and the final arrangement, had the plant been built, may have been slightly different in order to reduce the projected impacts on noise and air quality in areas adjacent to the plant site. However, the differences in terms of overall air quality impact of the arrangements would be small.

Estimated emissions of fluorides and particulates from either proposed plant are also essentially the same (Cramer and Bowers, 1974a, p. 6-7; Cramer and Bowers, 1975, p. 7-8). (Emissions

for the proposed Umatilla plant are tabulated in Chapter IV.A.4.a.). Emissions of SO_2 would be the same if the sulfur contents of the raw materials and the various fuels remain the same. In determining impacts, however, SO_2 emissions about four times those used for the Umatilla site were assumed for the Warrenton site, primarily because 1.75 percent sulfur fuel oil was proposed for use at the Warrenton site, but only 0.5 percent sulfur oil was proposed for use at the Umatilla site (Cramer and Bowers, 1974a, p. 6; Cramer and Bowers, 1975, p. 7; DEQ, 1974, p. 12). At the same time, a greater portion of the fuel requirements at the Umatilla site was proposed, at the time of the impact calculations, to be supplied by fuel oil, with the remainder to be supplied by natural gas at both sites (CH2M Hill, 1976, p. 34; AMAX Pacific Aluminum Corp., 1974a, p. IV-15). According to later information from Alumax (MacDonald, 1976), use of natural gas is no longer proposed at the Umatilla site; all fuel used will be oil. Even if emissions were identical at both sites, environmental impacts would be different because conditions at the two sites differ.

The winds at Warrenton do not have high directional tendency or persistence (Cramer and Bowers, 1976, p. 11). Figure IX-1 shows the annual distribution of wind direction. Average rainfall is 71.13 inches per year (AMAX Pacific Aluminum Corp., 1974). Existing ambient air quality data show particulate levels at Warrenton to be 40 ug/m^3 annual geometric mean with a maximum 24-hour average of 149 ug/m^3 . Existing gaseous fluoride levels in the air can be assumed to be zero since there are no major fluoride sources in the area (DEQ, 1974, Table 1.) Warrenton is classified as a Class II (controlled growth) area in accordance with EPA significant deterioration criteria.

The H. E. Cramer Company and DEQ have projected the maximum air quality impacts off the plant site for particulate, SO_2 , and gaseous fluorides which might result from the Warrenton plant on three bases. These projections are shown in Table IX-2. Table IV-8, Chapter IV, gives similar information for the Umatilla site.

Maximum particulate levels determined for the proposed Warrenton plant are projected to violate ambient particulate standards off the plant site. Maximum particulate concentrations occur near the northwest corner of the plant (Cramer and Bowers, 1974a, p. 32) and are caused principally by emissions from nuisance dust collectors near the northern boundary of the proposed plant which discharge near the ground. Design changes to alleviate this problem were being considered at the time the plans to build at Warrenton were dropped (Cramer and Bowers, 1976, p. 8). Installation of stacks on these collectors to improve dispersion or relocation further from the plant boundary is a possible solution.

Predicted maximum annual arithmetic mean SO_2 concentrations at the Warrenton site were below ambient standards and Class II degradation criteria.

Maximum gaseous fluoride levels predicted at the Warrenton site could exceed Washington's monthly maximum, growing season

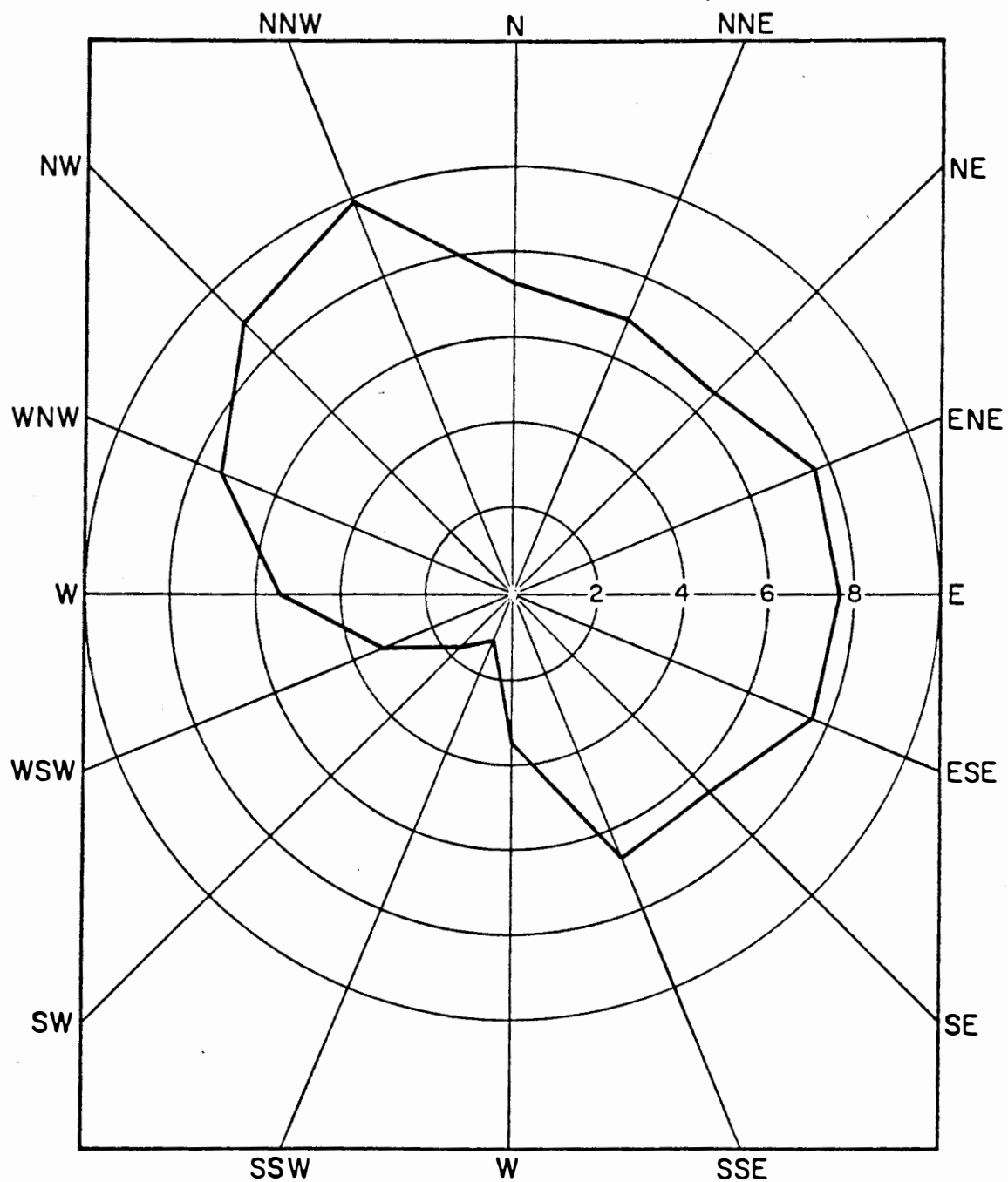


Figure IX-1

ANNUAL FREQUENCY DISTRIBUTION OF WIND DIRECTION AT THE ASTORIA (CLATSOP COUNTY) AIRPORT (DIRECTIONS ARE DIRECTIONS TOWARD WHICH THE WIND IS BLOWING). PERCENTAGE FREQUENCY SCALE IS SHOWN AT THE RIGHT CENTER OF THE FIGURE.

Source: Cramer, Bowers, 1974a, P. 12

TABLE IX-2

PROJECTED AMAX AIR QUALITY IMPACT, $\mu\text{g}/\text{m}^3$

Air Contaminant	Plantsite	Impact Based on		Impact Based on		Impact Based on Case 3		Proposed EPA Significant Air Quality		
	Existing Air	Case 1 Average		Case 2 Maximum		Emissions at the D.E.Q.		Deterioration Criteria and		
	Quality	Emissions		Expected Emissions		Standard		State Air Quality Standards		
	Background	W/O BKGND	W/BKGND	W/O BKGND	W/BKGND	W/O BKGND	W/BKGND	Class I	Class II	
	(BKGND) 1/							Area	Area	Existing
								"Clean Air"	"Moderate	State
								(increase	Growth"	Ambient
								over back-	(increase	Standards
								ground)	over back-	
									ground)	
Particulate Matter										
Annual Geometric Mean	40	15.6	56	25	65	25	65	5	10	60
Maximum 24-Hour Average	149	29	178	47	196	65	214	10	30	--
Second Highest 24-Hour Average	121	29	150	47	168	65	186	--	--	150
Sulfur Dioxide										
Annual Arithmetic Mean	5	7.4	12.4	7.4	12.4	7.4	12.4	2	15	60
Maximum 24-Hour Average	5	51	56	51	56	51	56	5	100	260
Second Maximum 3-Hour Average	5	163	168	163	168	163	168	25	700	1,300
										(Washington
										DCE Ambient
										Standards)
Gaseous Fluoride										
Annual Average	0	0.39	0.39	0.57	0.57	1.17	1.17	--	--	--
Monthly Maximum	0	0.60	0.60	0.91	0.91	2.34	2.34	--	--	(0.84)
Seasonal Average (Growing Season)	0	0.35	0.35	0.53	0.53	1.18	1.18	--	--	(0.5)
Maximum 24-Hour Average	0	1.6	1.6	2.4	2.4	6.3	6.3	--	--	(2.9)
Maximum 12-Hour Average	0	3.4	3.4	5.2	5.2	13.5	13.5	--	--	(3.7)
Maximum 2-Hour Average	0	7.3	7.3	11.1	11.1	28.7	28.7	--	--	--

Source: DEQ, 1974, Table 1

average, and 12-hour average standards if actual emissions were consistently as high as estimates of maximum emissions (Case 2). (Washington standards obviously have no legal status in Oregon, but they are used as a guideline by Oregon's environmental agency and represent values which, if exceeded, may result in vegetation damage. Washington State fluoride standards would not be exceeded across the river in Washington.) Cramer and Bowers (1974a, p. 34) state that their estimates of gaseous fluoride concentrations contributed by the plant within several thousand feet of the potline buildings may be 10 to 20 percent high.

Two areas of historical interest, Fort Stevens State Park and the Fort Clatsop National Memorial, are in the vicinity of the Warrenton site. These areas have been designated as Class II with respect to significant deterioration criteria. Cramer and Bowers (1974c) calculated maximum impacts of SO_2 from the proposed Warrenton plant on these sites and found that the applicable Class II criteria would be met but the Class I criteria would be exceeded in portions of both (DEQ, 1974, p. 12). Use of low sulfur fuels and/or raw materials (or SO_2 emission controls) to lower SO_2 emissions to the level of the proposed Umatilla plant could result in compliance at Fort Stevens State Park and the Fort Clatsop National Memorial with the Class I criteria.

Isopleths of average annual particulate, SO_2 , and gaseous fluoride concentrations which are predicted to result from the proposed Warrenton plant are shown in Figures IX-2 through IX-4. Figures IX-5 through IX-8 show predicted isopleths of gaseous and total fluoride concentrations resulting from the plant for May and December, a typical growing season month, and a typical non-growing season month. These figures are based on Case I emissions (Amax projections).

Thermal emissions from the proposed Warrenton plant are expected to have negligible effect beyond localized heating of the air above the plant (Cramer and Bowers, 1974b). Visible steam plumes at Warrenton are predicted to extend for as much as 350 feet from the exit points of the secondary scrubbers and for as much as 800 feet from the exit points of the cooling towers under conditions of 90 percent relative humidity. The maximum rise of the cooling tower steam plumes would be 300 feet (Amax Pacific Aluminum Corp., 1974a, p. X-5). The effect of these plumes is only esthetic.

In summary, the Warrenton plant could be built and operated in accordance with standard State ambient air quality standards and EPA criteria for significant deterioration. At Warrenton this would require design changes from the original proposal to solve the problem of high particulate levels off the plant site resulting from the nuisance dust collectors at the north end of the plant. The plant could not be operated in compliance with the special area standards adopted by the Environmental Quality Commission for the Warrenton site (see Chapter I).

(2) Comparison with Air Quality Impact at Umatilla.
Of the two sites, Umatilla would be better in terms of air quality

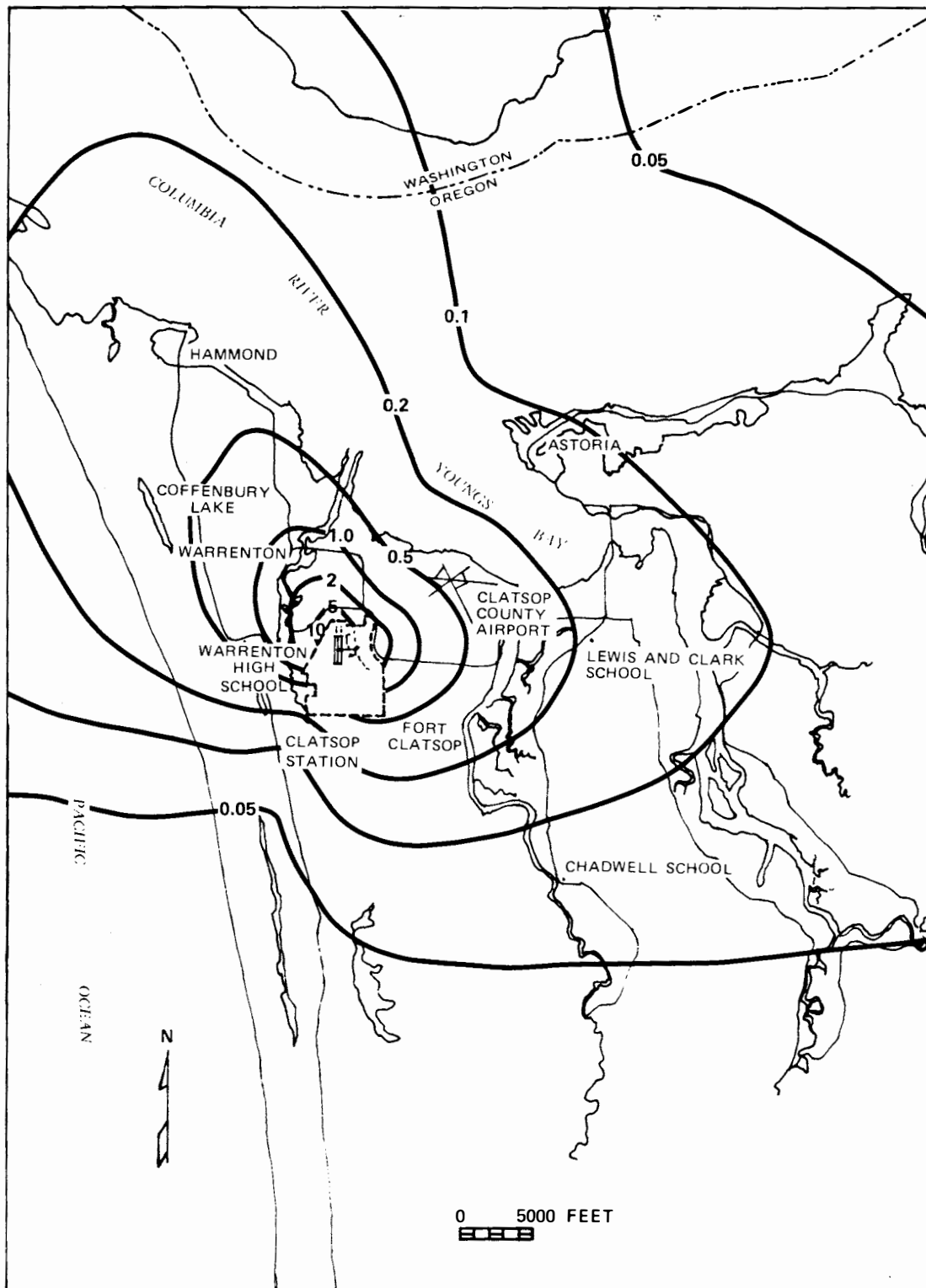


Figure IX-2

CALCULATED ISOPLETHS OF AVERAGE ANNUAL SUSPENDED PARTICULATE CONCENTRATION IN MICROGRAMS PER CUBIC METER.

Source: Cramer, Bowers, 1974a, P. 30

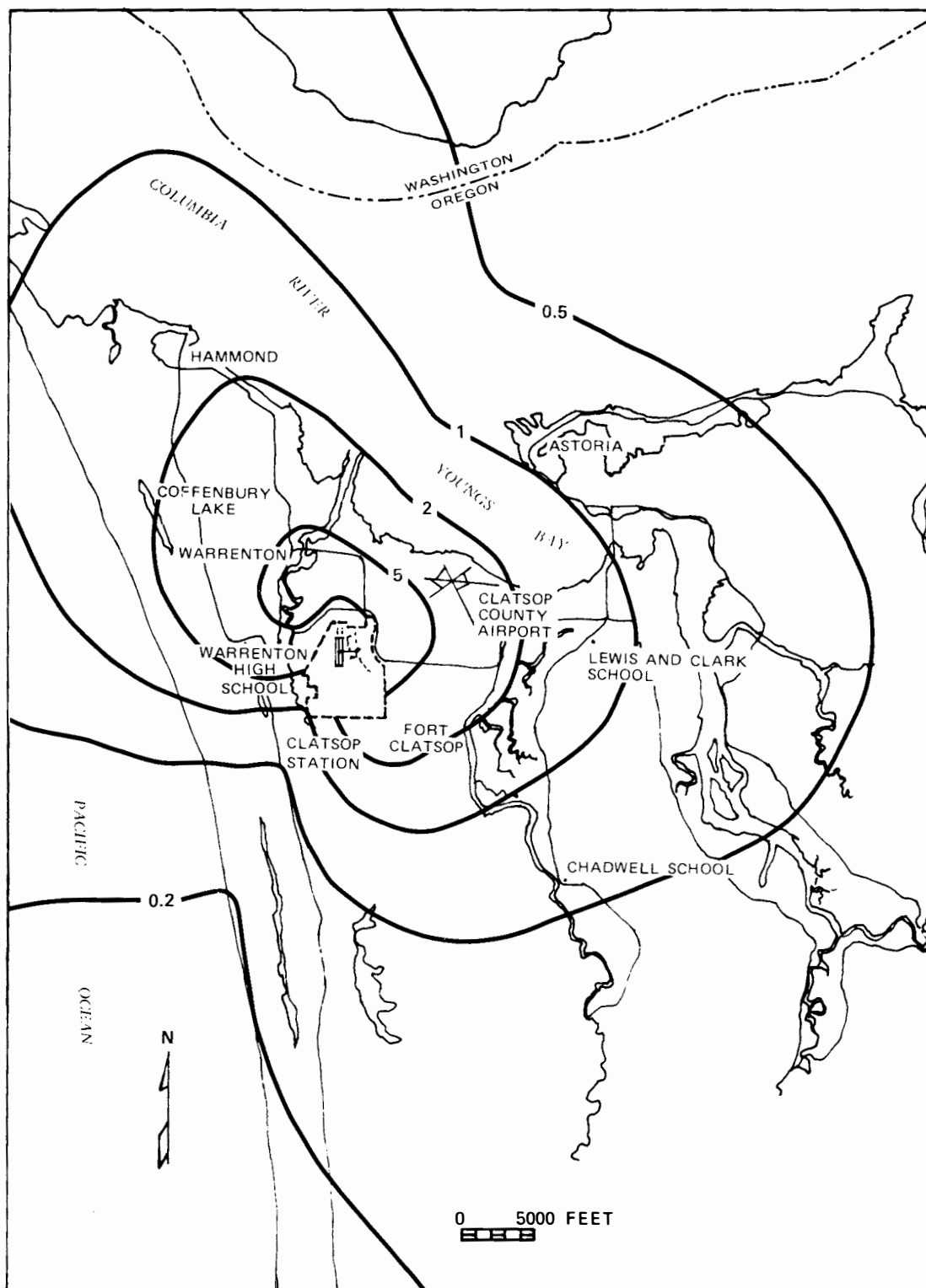


Figure IX-3

CALCULATED ISOPLETHS OF AVERAGE ANNUAL SO_2 CONCENTRATION IN MICROGRAMS PER CUBIC METER.

Source: Cramer, Bowers, 1974a, P. 29

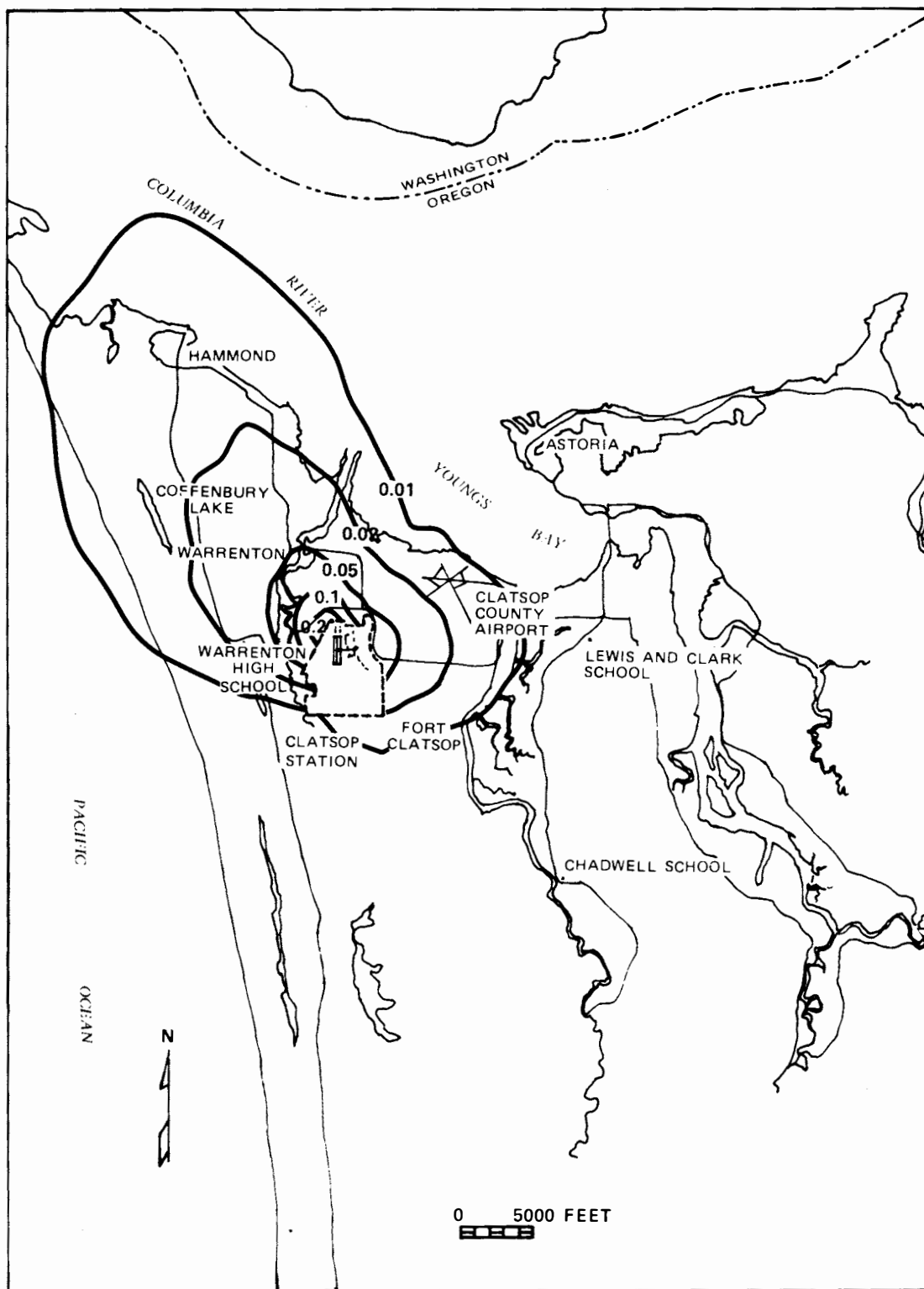


Figure IX-4

CALCULATED ISOPLETHS OF AVERAGE ANNUAL GASEOUS FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER.

Source: Cramer, Bowers, 1974a, P. 31

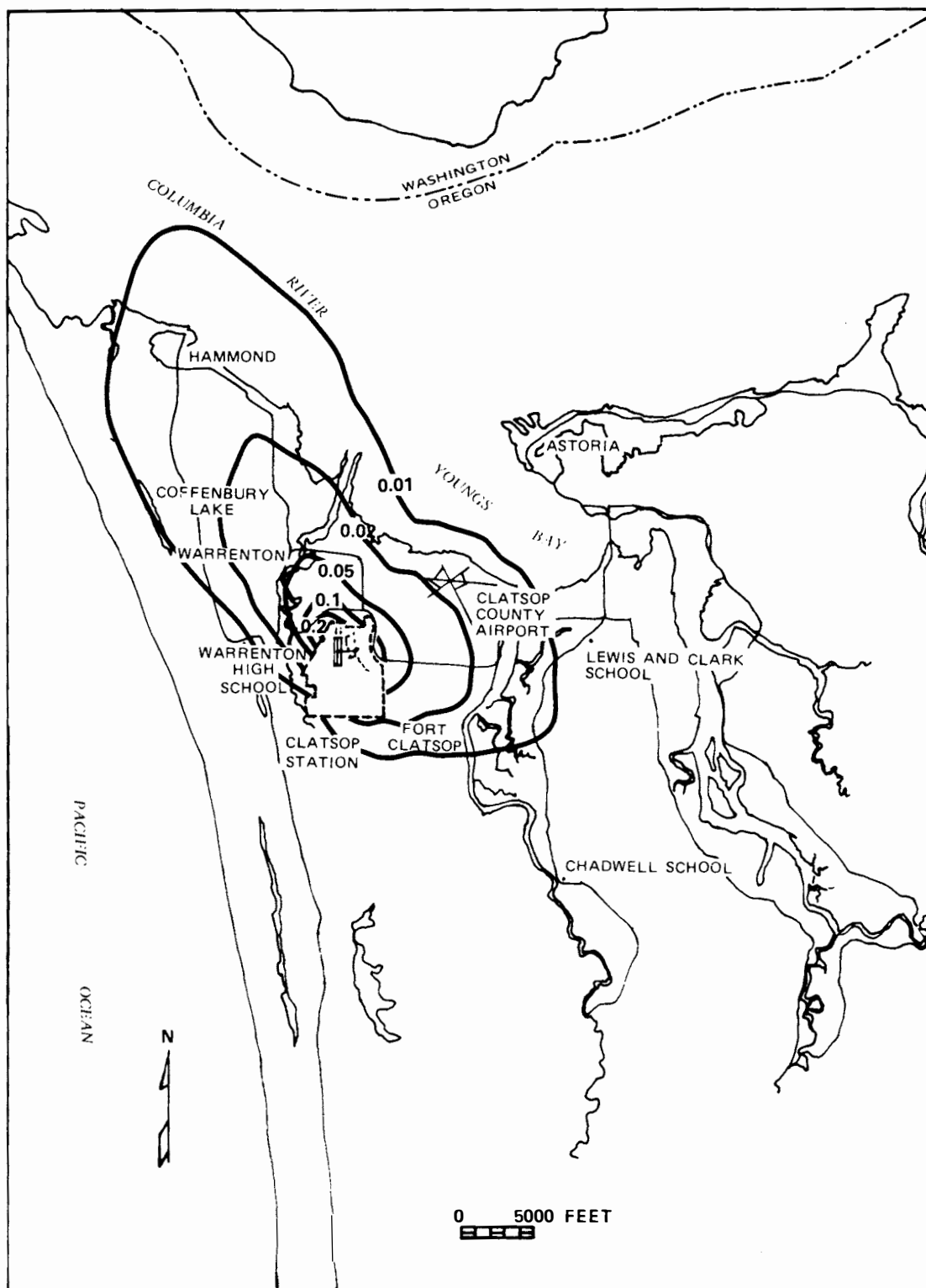


Figure IX-5

CALCULATED ISOPLETHS OF MONTHLY AVERAGE GROUND-LEVEL GASEOUS FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR MAY.

Source: Cramer, Bowers, 1974a, P.c-6

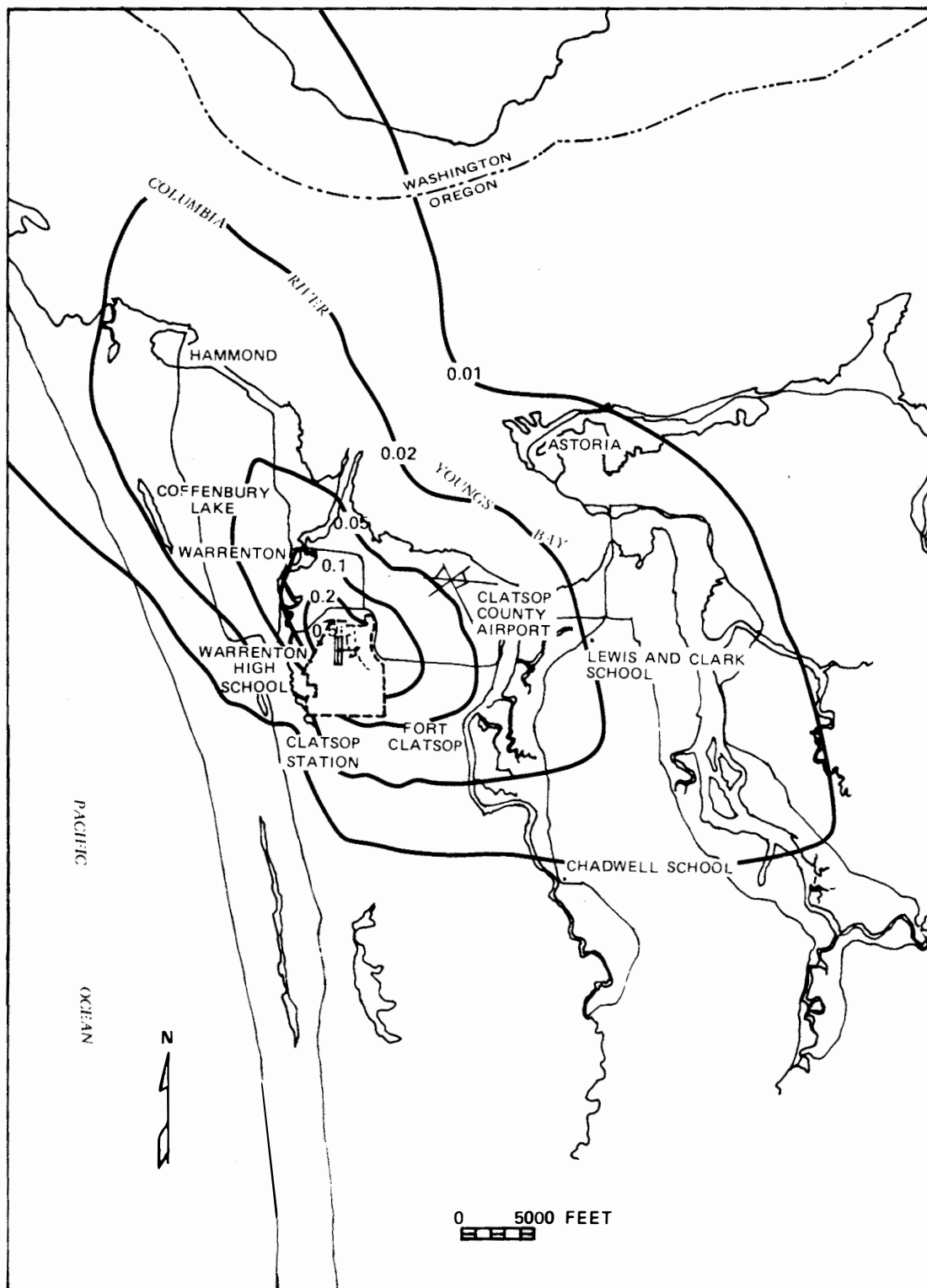


Figure IX-6

CALCULATED ISOPLETHS OF MONTHLY AVERAGE GROUND-LEVEL TOTAL FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR MAY.

Source: Cramer, Bowers, 1974a, P. c-15

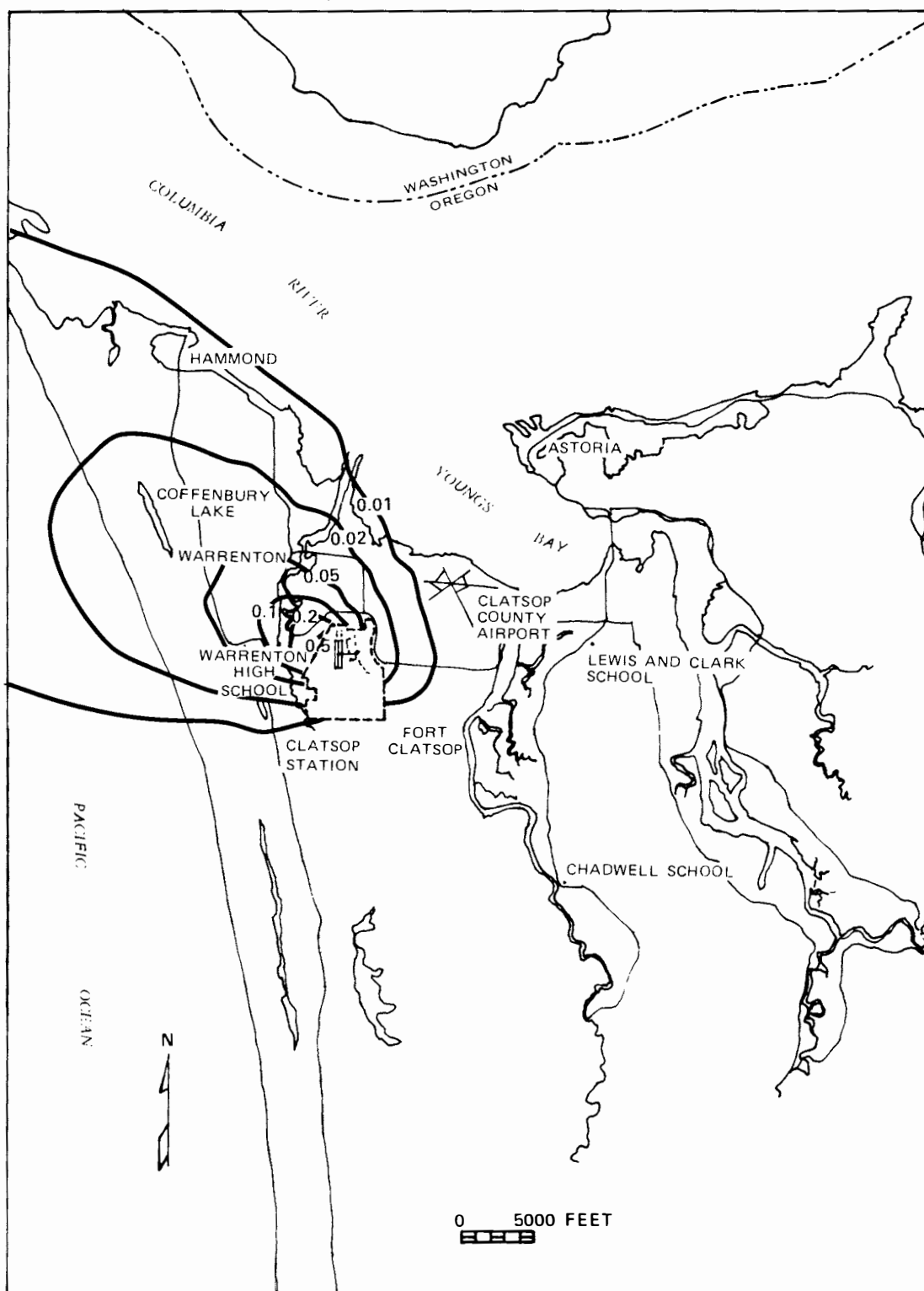


Figure IX-7

CALCULATED ISOPLETHS OF MONTHLY AVERAGE GROUND-LEVEL GASEOUS FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR DECEMBER.

Source: Cramer, Bowers, 1974a, P. c-13

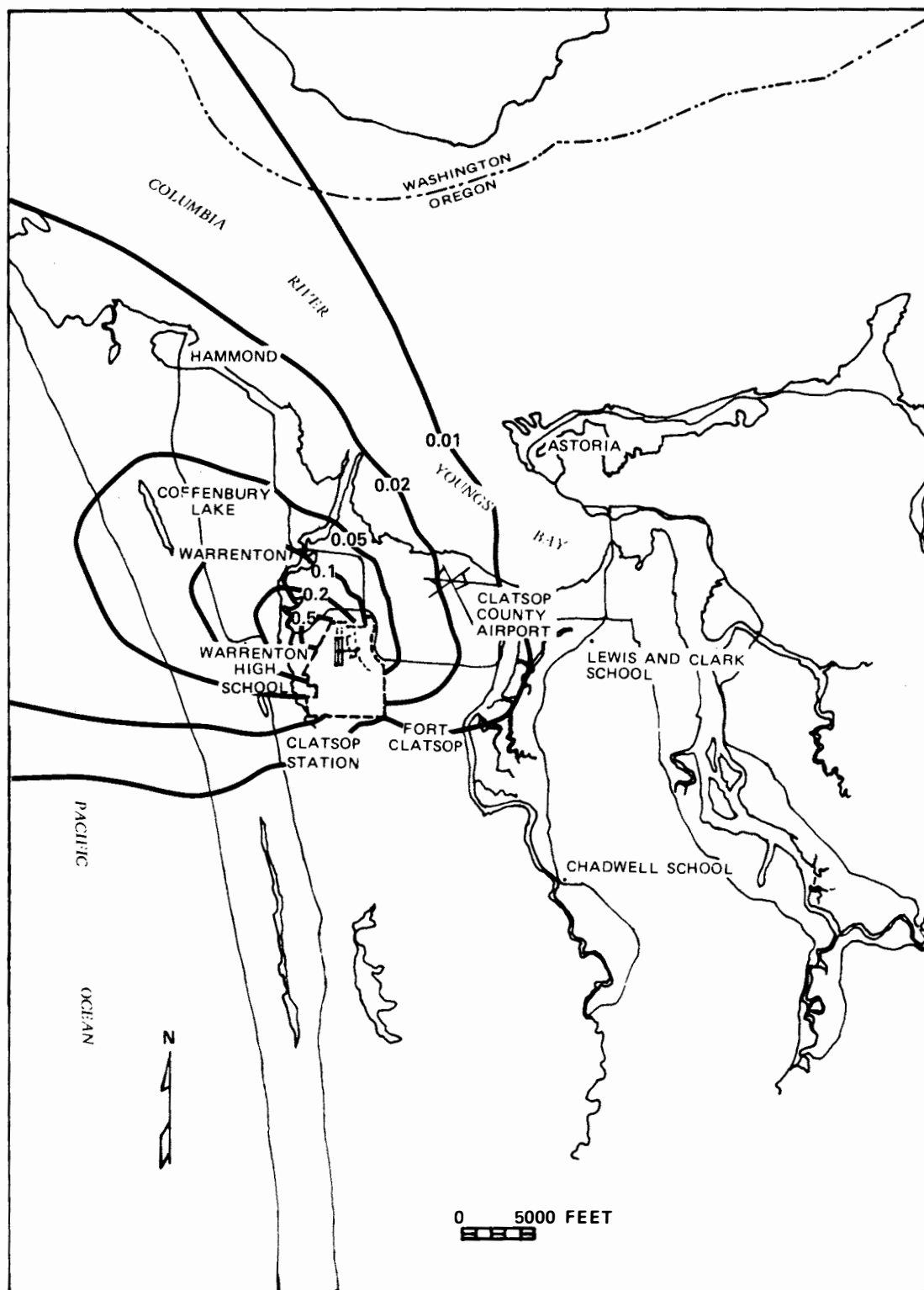


Figure IX-8
CALCULATED ISOPLETHS OF MONTHLY AVERAGE GROUND-LEVEL TOTAL FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR DECEMBER.

Source: Cramer, Bowers, 1974a, P. c-17

impact. Resultant particulate and gaseous fluoride concentrations at the Umatilla site are significantly below those predicted at Warrenton. At Umatilla, ambient gaseous fluoride concentrations would be below the Washington State Ambient Standards by a comfortable margin even if actual emissions were as high as the Oregon emission standards. SO_2 levels would be well within standards at either site. However, maximum annual arithmetic mean SO_2 concentrations at the Umatilla site would be significantly higher than at Warrenton, a result of both higher background levels and the greater persistence of the wind direction and speed at Umatilla. Maximum concentrations for shorter averaging times are higher at Warrenton because wind persistence is less important in these cases and the emission rates used in the calculations were much higher. At Umatilla, the dispersion of pollutants is predominantly to the east and northeast away from human populations. However, at Warrenton, dispersion is predominantly in the northwest and southeast directions, bringing a substantial part of the proposed plant's air pollutants over the town of Warrenton.

f. Water Quality. The proposed wastewater treatment system for the Alumax plant at the Warrenton site would be similar to the Umatilla site except for the discharge of storm runoff water (Amax Pacific Aluminum Corp., 1974b, App. VIII- 7). The processed wastewater would be completely recycled within the aluminum plant with no discharge to State waters.

Storm water would be collected in a holding pond and recycled within the plant. During periods of heavy rainfall between October and April, the holding pond would be allowed to overflow into a tributary of the Skipanon River. Possible water pollutants would be fluorides, oil and grease, and suspended solids.

The Oregon Department of Environmental Quality would require cyanides from the spent pot storage area to be controlled to prevent entering the storm water (DEQ, 1974, p. 14). The DEQ staff also determined that the holding pond should provide sufficient treatment and control for oil and grease and suspended solids; fluorides should be at low levels that have no significant effects. They also concluded that the primary impact would be expected during the plant construction period when the settling pond overflowed into the tributary, although no significant impacts should occur during plant operation.

The impacts of fluoride and sulfur dioxide air emissions on the Youngs Bay estuary, the Columbia River, and the surrounding watersheds have been implied. The DEQ staff studied the opinions and calculations of Amax consultants regarding the predicted air emissions of fluorides and compared them to their supportive calculations (DEQ, 1974, p. 16).

DEQ performed independent calculations of maximum probable fluoride concentrations in Youngs Bay, three major rivers, and nine lakes located around the proposed Alumax aluminum plant (DEQ, 1975, p. 2). Their calculations used hydrological and meteorological data measured at Astoria and tidal volume data obtained from Oregon State University (1975). For Youngs Bay, assumptions were made to calculate

the maximum concentration of fluoride under varying tidal cycles and flushing times. For one case the calculated fluoride concentrations in Youngs Bay ranged from 0.0027 ppm F⁻ to 0.0054 ppm F⁻ for a 12-month period. For another case the fluoride concentration ranged from 0.017 ppm F⁻ to 0.035 ppm F⁻ for a 12-month period (Cannon, 1975, p. 2).

DEQ estimated the distribution of fluorides within watershed and ultimate deposition into three major rivers. For the Youngs River and Lewis and Clark River the maximum probable concentration of fluoride would be 0.7 ppm F⁻ and 0.9 ppm F⁻, respectively, during August. The estimated fluoride concentration in the Skipanon River would range from a minimum of 0.35 ppm F⁻ in March to a maximum of 1.7 ppm F⁻ in August. Since the proposed Alumax holding pond would be permitted to overflow during months of heavy rainfall between October and April, additional fluorides would be added to the Skipanon River. The average concentration of fluorides during this period would then range from 0.8 ppm F⁻ to 1.3 ppm F⁻ (Cannon, 1975, p. 4).

Alumax consultants studied the theoretical effects of fluoride air emissions on Youngs Bay estuary. Using a conservative model, the increase in fluoride content of Youngs Bay would be from 0.1960 ppm to 0.1967 ppm, an increase of 0.0007 ppm. Based upon toxicity literature and known natural fluctuations of ambient fluoride levels, they concluded that no overt toxicity will occur and subtle effects will probably not occur for organisms residing in Youngs Bay (Beak Consultants, 1974, p. 2).

The predicted increase of 0.0007 ppm fluoride for Youngs Bay was used to predict the potential effects upon the resident aquatic life (Holton, 1974). The fluoride levels in Youngs Bay vary from 0.2 ppm in low salinity to as high as 0.9 ppm. Considering the ambient fluoride levels, the predicted increment would result in an increase of less than 1 percent over ambient fluoride concentrations. Acute fluoride effects upon marine organisms are not expected and there is a low probability of long-term low level effects (Holton, 1974).

Baseline physical, chemical, and biological studies have been conducted to document existing conditions and assist impact predictions for the proposed aluminum plant (Johnson and Cutshall, 1975; Higley and Holton, 1975; Holton, Ulbricht and Morgan, 1975; Oregon State University, 1975). The freshwater of the Columbia River has a fluoride concentration of 0.2 ppm F⁻ and the Pacific Ocean has 1.3 ppm F⁻. Fluoride levels for Youngs Bay, dependent upon salinity, vary from 0.12 ppm F⁻ to 0.9 ppm F⁻. Therefore, the marine organisms may be exposed to a range of fluoride concentration as great as 0.2 ppm F⁻ during a single tidal cycle. Thus the marine organisms are naturally adapted to daily and seasonal changes of fluoride concentrations of this magnitude. Oregon State University (OSU) recommends that the incremental addition of fluoride should be kept below 1.0 ppm F⁻, although occasional short-term fluctuations of 5 ppm F⁻ would not produce adverse effects. Aquatic life in the freshwater rivers and lakes would be more sensitive to fluoride increases before effects upon marine life in Youngs Bay would occur.

Conclusions. The potential impact of the proposed Alumax aluminum plant at Warrenton, Oregon, upon water quality would be primarily from air emissions and the permitted discharge of wastewater from the holding pond during periods of heavy rainfall. The DEQ Staff Report (1974) concluded that air emissions of fluorides would not increase the ambient content of the Columbia River estuary significantly; consequently, no measurable effects on marine organisms would be expected. OSU used the predicted increase of fluoride content for Youngs Bay and concluded that the less than 1 percent increase would be far below natural changes of fluoride concentrations already tolerated by marine organisms in Youngs Bay.

Short-term impacts of fluoride emissions on the water quality of three major rivers and the surrounding freshwater lakes would not cause measurable changes that could affect aquatic life. Long-term effects of accumulated fluorides on the surrounding watershed, lakes, and major rivers remain unpredictable.

g. Noise. An analysis of noise associated with a reduction plant in Warrenton and a comparison of projected noise levels with Oregon's noise regulations was done by M. A. Porter (1974b); the following sections are based on his findings. The analysis methodology is the same as that employed for the Umatilla plant and can be found in Chapters III.A.6. and IV.A.2.f.

Ambient noise measurements were taken at various sites on and near the proposed site and were analyzed by Porter (1974a and 1974b). His conclusions were that automobile and truck traffic noise predominated the ambient levels during the day, while noise from the surf breaking on the nearby coast dominated background levels and ambient levels at night. It was determined that the minimum L_{50} in the vicinity of the plant was $L_{50} = 35$ dBA (Porter, 1974b, p. 4). In order to meet Oregon's nondegradation noise regulations, plant-associated noise levels cannot raise the ambient noise levels at a noise sensitive property more than 10 dBA. This means that the plant associated noise levels should not exceed $L_{50} = 45$ dBA. (Because of the continuous nature of the plant operations, the operations-related L_{10} noise levels would be equal to the L_{50} levels.)

Table H of the Oregon Noise Control Regulations for new industrial noise sources allows a nighttime $L_{50} = 50$ dBA and $L_{10} = 55$ dBA. Since the nondegradation standards are more stringent, they are the ones which must be met.

The analysis of construction noise is the same as the Umatilla analysis in Chapter IV.A.6.c. Porter found that the majority of nearby residences would be affected by construction noise levels of $L_{eq} = 55$ to 60 dBA (Porter, 1974a, p. 20) which would mean an increase in the ambient $L_{eq} = 55$ to 60 dBA. The construction noise would be temporary, lasting only until the plant is finished. Another mitigating circumstance is the fact that construction noise would occur mainly during daylight hours when ambient levels are higher.

Oregon does not regulate noise that originates on construction sites.

The Warrenton plant-related traffic noise analysis assumed that approximately 100 trucks could be expected to move in and out of the site on a normal working day. The number of trucks would be in large part due to the need to transport alumina from the bulk unloading facility to the reduction plant. Based on about 30 truck operations per hour over a typical 8-hour day, a $L_{50} = 59$ dBA at 100 feet from the centerline of the roadway was calculated (Porter, 1974b, p. 19). At approximately 100 feet from Highway 101, the daytime L_{50} is generally between 50 and 60 dBA. Thus, the daytime L_{50} would not be appreciably increased.

Measurements about 400 feet from the old Highway 101 indicate ambient sound levels between 39 and 45 dBA during normal day light working hours (Porter, 1974b, Figure 11). Assuming that all truck traffic (worse case) used this highway, the L_{40} level would be about 49 dBA at 400 feet. The subsequent increase in noise levels would be approximately 10 dBA.

L_{10} levels measured 100 feet from Highway 101 range between 59 and 67 dBA during the hours from 8 a.m. to 6 p.m. (Porter, 1974b, Figure 10). Truck traffic would cause an L_{10} of 71 dBA and would consequently violate Oregon nondegradation standards at the L_{10} level. This problem could be alleviated by transporting the alumina by rail instead of by truck. If this were done, the L_{10} level generated by truck traffic would be 63 dBA at 100 feet from the centerline of the roadway (Porter, 1974b, p. 27), and the Oregon standard would not be violated by the truck traffic. [Train operation would not cause degradation of the ambient levels according to Porter (1974b, p. 25).]

Table IX-3 below shows the automobile-induced sound levels that would be associated with the plant during periods of greatest traffic activity.

TABLE IX-3

STATISTICAL SOUND LEVELS DUE TO AUTOMOBILES OPERATION
AT A DISTANCE OF 100 FEET FROM THE CENTERLINE
OF THE ROADWAY AND AN AVERAGE SPEED OF 35 MPH ^{1/}

<u>Condition</u>	<u>Vehicle Volume (Vehicle Hour)</u>	<u>L₅₀</u>	<u>L₁₀</u>
Shift Change Midnight	146	50	58
Shift Change 8:00 a.m.	370	56	62
Shift Change 4:00 p.m.	370	56	62

^{1/} Porter, 1974b, p. 28

Comparing these projected levels with the measured ambient levels shown in Figure 1, Porter concluded that the ambient levels would not be increased by more than 10 dBA (1974b, p. 20).

The rail noise analysis is the same as the one done for Umatilla in IV.A.6.b. The assumed noise levels associated with the locomotive and rail cars at a speed of 35 mph and a distance of 100 feet from the wayside, 92 dBA and 79 dBA, respectively, are lower than EPA standards of 96 dBA and 88 dBA for moving locomotives and rail cars which are to go into effect at the end of December 1976 (Federal Register, 1976, p. 2194-2195). At this writing, Oregon has no noise regulations of its own which limit rail traffic noise.

The calculated $L_{10} = 49$ dBA and $L_{50} = 35$ dBA levels associated with rail traffic would not be expected to increase ambient noise levels by as much as 10 dBA except during the very early morning hours.

Noise generated by the electrical equipment, the metal service operations, and the air pollution control equipment was discussed in IV.A.6.a. The $L_{50} = 45$ dBA noise contour for plant operations at the Warrenton site is shown in Figure 2. Except for a small area at the Northwest portion of the site, the contour lies within Alumax property lines.

Porter's analyses and projections of noise levels that would be associated with the construction and operation of the Alumax plant if it were to be built in Warrenton were reviewed by the Oregon Department of Environmental Quality. DEQ concluded the following (Hector, 1975):

- (1) Plant-generated noise would not be expected to violate either the statistical level or the 10 dBA nondegradation standards for new industrial noise sources.
- (2) A discrete 120 Hertz tone from electrical equipment would probably not exceed standards as the nearest noise-sensitive property would be over 300 feet from the electrical noise source.
- (3) The main concern with vehicular-generated noise was the more than 10 dBA increase in ambient levels that would be caused by ore truck traffic. If the ore were shipped by rail, instead, the standards would not be violated.
- (4) Rail traffic would not violate standards unless it occurred in the very early morning hours. Consequently, it could be expected that the plant, if built in Warrenton, would meet Oregon noise standards.

Although the plant would probably meet Oregon noise standards at either site, from a noise viewpoint, the Umatilla site would be the better site. One of the reasons for this is that the site at Umatilla covers more than four times the area that the Warrenton site does. Noise impact is not considered until the noise reaches a sensitive property. Any noise on the site itself is not regulated; consequently, there are more people which can be potentially affected than at the Umatilla area.

h. Significant Unique Features. The proposed Warrenton site is located in an area of diverse coastal, estuarine, inland and upland, natural features. Natural scenic resources include ocean beaches, dunes and coastal plains, rivers, estuaries, wetlands, lakes, and forests. Major significant features include Fort Stevens located about 5 miles northwest of the plant site in Fort Stevens State Park; the Samuel Elmore Cannery in Astoria; Fort Astoria in Astoria; and the Fort Clatsop National Memorial just south of Warrenton. These four sites are designated in the National Register of Historic Places. Also of importance is the Astoria Column atop Coxcomb Hill which provides a view of the northern part of the study area including the Alumax site.

Impacts related to the construction of the Alumax plant would have an adverse effect on the landscape as viewed from the Astoria Column and other points of high elevation such as from the Lewis and Clark Highway. Alumax-related population growth would increase attendance at area landmarks and place additional requirements on the beaches, dunes, wetlands, forests, and uplands of the area for recreational use.

Proposed BPA transmission facilities to serve Alumax at Warrenton would, for the most part, parallel U.S. Highway 30, which has been identified as a scenic highway. The most significant impact of the line would be its contrast with the natural setting offered by the coastal range and the Columbia River. Scenic Highway 202, known as the

Nehalem Highway, would also be adversely impacted by the proposed route where it crosses the highway at Youngs River.

2. Social and Economic Impacts. The following analyses are based on the assumption that construction of the Alumax plant at Warrenton, Oregon, would involve the same levels of construction and operational employees that are projected for the Umatilla site. Differing employment multipliers for the two areas result in differing projections for secondary employment (see section on employment), thus resulting in somewhat different population estimates. Furthermore, some disparity would probably exist between the percentages of jobs filled by persons from outside the respective impact areas. These differences would be compounded to the extent that the Warrenton and Umatilla sites differ from one another in such basic characteristics as school capacities, housing vacancy rates, public service levels, etc.

In the detailed analyses which follow, each of the topic areas discussed with respect to the Umatilla site will be explored in a comparable manner for the Warrenton site. Where significant differences in the impacts projected for the two areas occur, these differences will be specifically identified.

a. Population. The geographic features within and surrounding Clatsop County and the specific location of the proposed Alumax site make it highly unlikely that population impacts of any significant degree would extend beyond the borders of the county. This analysis will, accordingly, be restricted to Clatsop County.

With the exception of the City of Astoria, population increased in all Clatsop County cities, as well as in the unincorporated areas of the county (see Table IX-4) during the period from 1960 to 1970. The increases were greatest in the cities of Cannon Beach (57.4 percent), Gearhart (14.3 percent) and Seaside (13.5 percent), all of which are located along the Pacific Coast and are serving to attract increasing numbers of retired couples. Comparatively, small increases occurred in the cities of Hammond (4.2 percent) and Warrenton (6.3 percent) during this period.

The growth trends of the 1960s changed somewhat between 1970 and 1975. The City of Astoria, rather than continuing to decline in population, increased in size by 4.3 percent. Growth in Cannon Beach and Seaside slowed somewhat. The pace of growth remained stable in Gearhart, but more than doubled in the cities of Hammond and Warrenton. The unincorporated areas of the county lost 1.6 percent of their population.

These data indicate that the Clatsop County area has been growing at a considerably slower rate than that experienced in areas associated with the Umatilla site. Consequently, demands for housing, public services, etc., are not as urgent around the Warrenton site as around the Umatilla site. The Umatilla area, on the other hand, is "geared up" for rapid expansion, whereas Clatsop County has not needed to develop an ability to accommodate rapid growth to the same

TABLE IX-4

POPULATION TRENDS FOR CITIES AND
COUNTIES IN IMPACT AREA, 1960-1975

<u>Location</u>	<u>1960</u>	<u>1970</u>	<u>Percent Change</u>	<u>1975</u>	<u>Percent Change</u>
Astoria	11,239	10,244	-8.9	10,680	4.3
Cannon Beach	495	779	57.4	865	11.0
Gearhart	725	829	14.3	890	7.4
Hammond	480	500	4.2	530	6.0
Seaside	3,877	4,402	13.5	4,640	5.4
Warrenton	1,717	1,825	6.3	2,005	9.9
Unincorporated Areas	8,847	9,894	11.8	9,740	-1.6
Clatsop County	27,380	28,473	4.0	29,350	3.1

Source: U.S. Bureau of the Census, 1973, p. 39-16; Portland State University
Center for Population Research, 1975, p. 1.

TABLE IX-5

POPULATION PROJECTIONS
(Without Alumax)

<u>Location</u>	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Astoria	10,680	11,060	11,640	12,070	12,520
Cannon Beach	865	900	940	980	1,010
Gearhart	890	920	970	1,010	1,040
Hammond	530	550	580	600	620
Seaside	4,640	4,810	5,060	5,250	5,440
Warrenton	2,005	2,080	2,190	2,270	2,350
Unincorporated Areas	9,740	10,080	10,620	11,020	11,420
Clatsop County	29,350	30,400	32,000	33,200	34,400

Source: BPA, 1976e (county totals).

degree. The relatively slow growth rate of Clatsop County is projected to continue throughout the period considered by this impact analysis (see Table IX-5).

If the two areas were to receive equal population impact from Alumax, it would be difficult to decide which area would experience the greatest difficulty in adjusting to the increases. It is estimated, however, that the Alumax-induced population would be 50 percent greater at the Umatilla site than at the Warrenton site (4,650 versus 3,100, respectively). It is expected that the rates of local hire for operational and secondary employees would be much higher at the Warrenton site, thus reducing immigration. Table IX-6 presents the Alumax population impacts which BPA projects in the event of construction and operation at the Warrenton site. In Table IX-7 these impacts are presented as percentages of projected local populations.

Major segments of the Alumax-generated population would settle in the cities of Astoria, Hammond, Seaside, and Warrenton. Only small numbers of persons would locate elsewhere in the county. By 1995 Alumax would contribute significant percentages of the populations of Hammond (24.4 percent), Warrenton (23.6 percent), and Seaside (17.1 percent). Due to its larger size, the percentage impact on Astoria would be considerably lower (5.5 percent). These percentage impacts are in the same neighborhood as those for the more heavily impacted cities in the area of the Umatilla site. In terms of absolute numbers, however, the Umatilla area impacts would be roughly 50 percent greater than those for the Warrenton site.

The substantial number of retired persons residing in the coastal communities results in a median age (see Table IX-8) for the county (33.5) which is significantly above the State figure (29.0). This characteristic is quite pronounced in the City of Seaside where the median age (44.4) is more than 15 years above the State median. The influx of Alumax workers and their families would lower the median age, especially in the City of Seaside. This would require some adjustments on the part of the affected areas to insure a sufficient supply of goods and services (playgrounds, schools, etc.) required by younger families with children.

The racial characteristics of Clatsop County residents are similar to those of residents surrounding the Umatilla site. The major differences are that whereas in the Umatilla area 0.5 percent of the population is black and 2.2 percent Indian, the corresponding figures for Clatsop County are 1.9 percent and 0.4 percent. The introduction of Alumax into Clatsop County would not be expected to impact the racial profile of the area significantly.

b. Community Development. The proposed plant site at Warrenton, like the Umatilla site, is zoned for heavy industry. Existing county zoning south and east of the site is limited to agricultural and forest uses. The remainder of surrounding lands is zoned for residential and agricultural use, with spot commercial and industrial zoning existing along U.S. Highway 101. Zoning in the City of Warrenton, north of the proposed site, is residential, again with spot commercial zoning on property fronting U.S. Highway 101.

TABLE IX-6

ESTIMATED POPULATION IMPACT DUE TO ALUMAX
(Cumulative)

<u>Year</u>	<u>Astoria</u>	<u>Cannon Beach</u>	<u>Gearhart</u>	<u>Hammond</u>	<u>Seaside</u>	<u>Warrenton</u>	<u>Other</u>	<u>Total</u>
1975	--	--	--	--	--	--	--	--
1977	40	5	5	10	60	40	5	165
1978	425	15	20	125	650	425	160	1,820
1979	650	25	25	175	1,000	650	275	2,800
1980	300	10	15	75	475	300	125	1,300
1985	525	25	25	150	800	525	200	2,250
1990	625	25	25	175	975	625	225	2,675
1995	725	25	25	200	1,125	725	275	3,100

Source: Sedway/Cooke, 1974, p. 76; BPA.

TABLE IX-7

ALUMAX IMPACTS AS A PERCENTAGE OF LOCAL POPULATIONS

<u>Year</u>	<u>Astoria</u>	<u>Cannon Beach</u>	<u>Gearhart</u>	<u>Hammond</u>	<u>Seaside</u>	<u>Warrenton</u>	<u>Other</u>	<u>Total</u>
1980	2.6	1.0	1.6	12.0	9.0	12.6	1.2	4.1
1985	4.3	2.6	2.5	20.5	13.7	19.3	1.8	6.6
1990	4.9	2.5	2.4	22.6	15.7	21.6	2.0	7.5
1995	5.5	2.4	2.3	24.4	17.1	23.6	2.4	8.3

TABLE IX-8

1970 AGE PROFILES SELECTED AREAS
(Percent)

<u>Location</u>	<u>0-18</u>	<u>65 and Over</u>	<u>Median</u>
Astoria	30.0	15.0	34.4
Seaside	25.0	23.4	44.4
Clatsop Plains Division ^{1/}	31.1	12.2	35.0
Clatsop County	30.6	14.3	33.5
Oregon	33.4	10.8	29.0

^{1/} Includes the cities of Gearhart, Hammond, and Warrenton.

Source: U.S. Bureau of the Census, 1973, pp. 39-48, 39-78, 39-88, and 39-93.

Community development goals in the Warrenton study area emphasize a balance between preservation of the natural environment and the encouragement of economic development compatible with the environment. The introduction of the proposed Alumax plant at either the Warrenton or the Umatilla site would theoretically meet the desired growth and conservation goals stated.

Community development in the Warrenton area (Warrenton, Hammond, Gearhart, Seaside, and Astoria) would reflect new land use pressures for housing, commerce, and community services should Alumax locate there. Residential growth presents the major problem, and like the Umatilla area, the provision of housing within a sound land use planning framework could mitigate the potential for adverse, uncontrolled growth. In both areas land use plans would be vital in focusing on the need for additional community facilities. Future development is tied in to the ability of the impacted regions to adequately update their comprehensive plans to accommodate Alumax-generated growth; to expand inadequate water and sewer facilities and channel growth to areas which can be served; and to protect the natural amenities of their respective regions.

Growth resultant from Alumax would have a permanent impact on either area. The problems associated with this growth have no significant differences at Warrenton or Umatilla. Both sites are located in rural areas, with small communities providing urban amenities. The capability of accommodating Alumax growth is the key factor in determining which site is more advantageous from a community development perspective.

Urban Land Use. The impacts of Alumax-generated growth on urban land use are dependent upon the distribution of projected population, and a land use policy which effectively channels the growth into areas which are suitable for urban development.

Approximately 80-85 percent of Alumax-related growth concentrations are projected for four areas: (1) Warrenton/Hammond; (2) the City of Seaside; (3) the City of Astoria; and (4) the Clatsop Plains.

Much of the land in the incorporated areas of Warrenton and Hammond are undeveloped and undevelopable. However, there are sufficient lands to provide housing for the approximately 250 projected new Alumax-generated households. The area suffers from some substandard dwelling units and new homes built to accommodate Alumax growth would improve neighborhood appearance. As long as areas unsuitable for urban development are avoided, such as backdunes areas, and installation of adequate sewerage is provided, the Warrenton/Hammond area would be able to sustain the projected new growth. The increase of 250 households to the area would represent a dwelling unit increase of about 23 percent and would have a noticeable impact on urban land use. The extent to which impacts are favorable or adverse is largely reliant upon adequate planning controls.

Residential development in Seaside related to Alumax growth is expected to add approximately 390 dwelling units. Existing and proposed subdivisions could adequately absorb Alumax growth.

Astoria's projected share of the projected plant's growth would be 250 additional households. While absorption of increased households could be facilitated, the areas of landslide topography in the hill areas have development constraints, and over-development could create problems.

The Clatsop Plains area is projected to increase by about 80 dwelling units if Alumax would be developed at the Warrenton site. Infilling of existing residential areas around Smith Lake, Sunset Lake, Cullaby Lake, and Westlake would result. "Adverse physical impacts would be minimal here if sewer systems were installed to avoid both the polluting of lake waters and the filter field problems associated with high lakeside watertables" (Sedway/Cooke, 1974, p. 108). The additional population pressures could further endanger the sand dune areas of the Clatsop Plains, as these lands are attractive for development due to their high scenic value. Continued development of the dunes would endanger natural habitats, diminish scenic values, diminish one of the area's few groundwater sources, and destabilize dune formation by destroying vegetation (Sedway/Cooke, 1974, p. 108).

c. Infrastructure.

(1) Transportation.

(a) Roadways. Three major roads form the basic framework for highway travel in Clatsop County. Highway 101 runs north and south along the Pacific Ocean and would be the major arterial providing access to the proposed plant site via Dolphin Road on the west side of the plant (secondary access to the plant would be provided on the east side from the Old Coast Highway). Highway 101 provides the major north-south connection between the two major east-west highways, Highway 30 and Highway 26.

Highway 30, which parallels the Columbia River, is the most heavily traveled highway in the county and connects with Highway 101 near Astoria. Highway 30 links northern Clatsop County with the manufacturing areas of the lower Columbia and Portland. Highway 26 is the third major arterial, and runs east and west from Seaside to Portland, and connects with Highway 101 at Cannon Beach.

Highway 101 would be the roadway most adversely impacted by the construction of the proposed Alumax plant. It is currently overburdened from Cannon Beach to Astoria, due to its narrow and crooked characteristics, as well as the existence of many residential accesses (Amax Pacific Aluminum Corp., 1974a, p. V-70).

Currently planned for construction (possibly beginning in late 1976) is the proposed Highway 101 South Unit, a 2.2-mile bypass of Highway 101 from Camp Rilea to where the highway turns inland south of Warrenton. The existing 3.3-mile portion

of Highway 101 is narrow and badly aligned, and the proposed bypass would provide more efficient movement via its diagonal alignment between Camp Rilea and Astoria.

Construction Phase Impacts. The construction phase of the proposed Alumax plant would create additional congestion on Highway 101, especially during morning and evening peak hours when construction workers arrive and leave the plant site. Should Highway 101 improvements be underway during plant construction, further congestion would occur.

There would be increased truck traffic serving the plant, on both Highways 30 and 26, connecting with Highway 101.

Operation Phase Impacts. The operational phase of the proposed Alumax plant would have several impacts on the area's highway system. Circulation impacts would include truck activity between the Port of Astoria and the plant site, providing the movement of materials (basically alumina and ingot); traffic generated by the plant's employees; and the effects of secondary-induced traffic generated by increased population in the area (Sedway/Cooke, 1974, p. 101).

It is estimated that 114 mean weekday trips by 25-ton alumina trucks would be required to serve the plant, should alumina be moved via truck rather than rail, and 34 mean weekday trips of 22-ton ingot trucks (Sedway/Cooke, 1974, p. 101).

During shift changes, especially at peak morning and evening traffic periods, increased congestion would occur on Highway 101. The majority of this traffic would utilize new Highway 101 (if constructed), with access at Dolphin Road to Clatsop Plains and south, and old Highway 101 to Astoria and the Lewis and Clark area (Amax Pacific Aluminum Corp., 1974a, p. VIII-22).

New residential and commercial development would create new demands for local access roads.

(b) Railroads. Rail service to the proposed plant would be furnished by the Burlington Northern Railroad, whose Seaside Branch passes north and west of the proposed plant site. Construction of a new spur off of the Seaside Branch would be required (Sedway/Cooke, 1974, p. 102).

The proposed plant would stimulate increased freight volumes for the Burlington Northern, and could conceivably generate local employment resulting from the increase in business volume (Amax Pacific Aluminum Corp., 1974a, p. VIII-23).

(c) Public Transit. Public transit is provided by daily Greyhound bus service between Astoria and Portland and between Seaside and Portland via Tillamook. An intracity bus system operates in urban Astoria.

The Warrenton area, like the Umatilla area, currently is not populous enough to support public transit at a large scale. Increases in population could cause a reevaluation of existing service and schedules; however, it is unlikely that increases due to Alumax alone would generate sufficient demand to dramatically change existing conditions.

(d) Airports. The Warrenton area is serviced by two public airports; one, Clatsop Airport, is located on Young's Bay; the other, Seaside airport at Seaside. Clatsop Airport handles commercial passenger and freight service and is in close proximity to the proposed Alumax site.

Whether Alumax locates at Warrenton or Umatilla, the main impact on airport facilities would be increased passenger and freight demands, and potentially upgraded facilities.

(e) Waterways. Unlike the proposed Umatilla site, which would utilize an existing port facility downriver as a break-of-bulk point, the Warrenton site would require a new port facility in the Astoria area.

A comparison of potential sites for a new port facility for alumina unloading was undertaken for Amax in October 1971 by CH2M Hill (Amax Pacific Aluminum Corp., 1974b, Appendix A, p. 1). The report recommended that the Pier 3 site located in the Port of Astoria harbor area would be the most advantageous location. However, should Alumax locate at the proposed Warrenton site, it has not been determined where port facilities would be located.

Generally, the impact of the port facilities would depend upon their location.

(2) Utilities.

(a) Water. The primary impact from the construction of the proposed plant in Clatsop County would be placed on the Warrenton water system which, in addition to Warrenton, serves Hammond, Gearhart, Clatsop County Plains, and the Fort Stevens area. Expected plant demand is estimated at 640,000 gallons per day, with additional requirements made on the system by Alumax families residing in the Warrenton area. The Warrenton system could meet these new demands except under extreme drought conditions. Thus, increased water supply and storage facilities would be required to provide service during drought periods for plant and domestic needs.

The Astoria, Seaside, and Youngs River-Lewis and Clark water districts would also be impacted by increased demand for domestic water supply resulting from population generated by Alumax.

The Astoria water system has an existing capacity capable of serving 14,000 to 15,000 persons (Sedway/Cooke,

1974, p. 97). By 1975, it is estimated that population growth in the Astoria water service area (BPA estimate) would, including Alumax-induced population, be between 14,000 to 15,000 persons (approximately 13,200 in Astoria and an additional 1,300 located in outlying water service areas). Therefore, the current capacity of the Astoria water system would be exceeded by 1995 with Alumax.

The Seaside municipal water system is estimated to receive about 1,359 additional users as a result of Alumax-generated population, and an incremental demand for domestic water of approximately 0.74 million gallons per day. The impact on the Seaside water system resulting from Alumax would not be significant.

The Youngs River-Lewis and Clark Water District is currently operating at service capacity and Alumax-generated demand would necessitate development of new facilities (Sedway/Cooke, 1974, p. 100).

(b) Sewer. It is estimated that the proposed Alumax plant's sewage discharge, and that of its generated population growth, would not overtax the capacity of the Warrenton sewage treatment facility (Amax Pacific Aluminum Corp., 1974a, VIII-20).

Other sewer systems in the area would, however, be required to expand their facilities in order to meet potential demand resulting from increased residential needs of Alumax employees and related population growth.

The town of Hammond presently has no municipal sewer system, and to accommodate future population growth, including Alumax, would have to construct a municipal sewer system. A new Hammond sewer collection system would have to accommodate about 500 users by 1985 without Alumax, and about 650 with Alumax. If the Hammond collector system were to tie into the Warrenton treatment system, the 1985 treatment load would approach the estimated 4,500 person capacity of the system (Sedway/Cooke, 1974, p. 96).

The City of Gearhart also has no municipal sewer system. A new system would be necessary to accommodate new growth with or without Alumax.

Both the Seaside and Astoria sewer systems would be able to handle additional sewage loads generated by the proposed plant's employees and induced secondary population.

(c) Solid Waste. Alumax-related residential population would affect an estimated 17 percent increase in county solid waste generation (Sedway/Cooke, 1974, p. 100). The plant would produce an additional 3,090 tons of solid waste per year.

Currently the cities in Clatsop County operate and control garbage collection and disposal. Clatsop County is

in the process of proposing a unified county solid waste service district to the voters, whereby the county would become the sole collector of the region's solid waste (Rittenback, 1976).

Existing solid waste disposal sites are located in Astoria, Warrenton, Cannon Beach, and Seaside. The Astoria and Warrenton landfill sites do not currently satisfy DEQ standards, and are to be upgraded by October 1977. Both sites are approaching capacity.

Both the Cannon Beach and Seaside operations are open burning dumps, which also are being required to upgrade their facilities to meet DEQ standards in October 1977.

The existing locations for solid waste disposal in Clatsop County are inadequate to accommodate the residential population generated by the Alumax facility. New landfill sites are being considered but, due to economic, social, physical, and zoning limitations, no satisfactory new sites have been found. The county is presently studying the establishment of a privately operated composting operation in the Astoria-Warrenton area which would provide for free disposal of municipal refuse to be utilized in its composting process.

d. Housing. Information regarding housing characteristics for Clatsop County cities is incomplete. U.S. Census data provide information for incorporated cities of 1,000 or more. Data from the 1970 U.S. Census of Housing is presented in Table IX-9.

During the period between 1960 and 1970 the number of housing units in Warrenton changed only slightly. In Astoria the number of units actually declined about 1 percent, and in Seaside the number increased by 2 percent. These changes are in line with alterations in the populations of these areas.

The distribution of housing types (single family, multifamily, mobile home) would be assumed to be the same as for the Umatilla site (see Chapter IV.B.4.). There is sufficient developable land available for needed expansion.

Only small percentages (5.1 for Astoria, 0.8 for Seaside and 3.6 for Warrenton) of the homes lacked complete plumbing facilities. Median home values ranged from \$12,700 in Astoria to \$10,400 in Warrenton. Median gross rents ranged from \$71 in Seaside to \$65 in Warrenton. These costs probably underestimate current costs by roughly 25-30 percent.

The price ranges of available Clatsop County housing would, for the most part, be in line with the desires and budgets of Alumax-related families. The vacancy rates in Astoria and Seaside for homes and rental units were in line with State averages. No vacancies were reported for Warrenton.

Table IX-10 represents projections of the number of dwelling units required to accommodate both non-Alumax and Alumax growth during the 1975-85 and 1985-95 periods. Alumax would account for nearly

TABLE IX-9

HOUSING IN CLATSOP COUNTY CITIES

	<u>Astoria</u>	<u>Seaside</u>	<u>Warrenton</u>
Number of Dwelling Units - 1960	4,719	2,090	658
Number of Dwelling Units - 1970	4,292	2,510	667
Average Annual Rate of Change, 1960-70	-0.9%	2.0%	0.1%
Median Home Value	\$12,700	\$11,500	\$10,400
Median Gross Rent	\$ 68	\$ 71	\$ 65
Percent Lacking Complete Plumbing	5.1%	0.8%	3.6%
Vacancy Rate - Homes	1.6%	3.2%	0.0%
Vacancy Rate - Rental Units	10.8%	8.6%	0.0%

Source: U.S. Bureau of the Census, 1972, pp. 39-29, 39-39, 39-43

TABLE IX-10

NEW DWELLING UNITS NEEDED FOR NON-ALUMAX AND
ALUMAX-RELATED GROWTH DURING SELECTED PERIODS
1975-1985

<u>Location</u>	<u>Non-Alumax</u>	<u>Alumax</u>	<u>Total</u>	<u>Alumax Demand as a Percent of Total Demand</u>
Astoria	330	180	510	35
Cannon Beach	25	10	35	29
Gearhart	30	10	40	25
Hammond	15	50	65	77
Seaside	145	275	420	65
Warrenton	65	180	245	73
Unincorporated Areas	<u>305</u>	<u>70</u>	<u>375</u>	19
Clatsop County Total	915	775	1,690	46

half of the county's new housing needs between 1975 and 1985 and slightly over one-fourth of the total between 1985 and 1995. The cities of Astoria, Seaside, and Warrenton would account for nearly 82 percent of the needs during the 1975-85 period, and 86 percent during the 1985-95 period. These figures assume that the current vacancy rate will be maintained. If the vacancy rate were allowed to reach zero, approximately 22 percent fewer housing units would be required during the 1975-85 period. Some reduction in the current vacancy rate would probably occur, so the estimates of housing needs in Table IX-10 may be considered worst-case estimates. The amount of Alumax housing required at the Warrenton site would be approximately 35 percent of the needs at the Umatilla site.

e. Community Services. In general, increases in community services due to Alumax at the Warrenton site would not need to be as great as at the Umatilla site. There are two reasons for this. First, because of the higher rate of local hire at the Warrenton site, the amount of in-migration would be considerably below the impact anticipated for the Umatilla site. Second, due to the relatively slow growth rate of the area in recent years, community services have been better able to keep up with population increases. Also, the changing character of the area has actually resulted in underutilization of some service capacities (i.e., schools).

(1) Educational Services. There are six school districts in Clatsop County. Each district maintains its own school system. In some cases, however, students in certain grades are sent to a system outside their district, with the home district paying a tuition fee to the receiving district.

Table IX-11 summarizes information pertaining to current levels of educational services in Clatsop County. All of the school districts currently have sufficient building capacity to accommodate present enrollments at both the elementary and secondary levels. The Warrenton elementary school is currently operating at full capacity. Seaside's high school is nearing full capacity (93 percent utilization).

TABLE IX-11

CURRENT EDUCATIONAL SERVICE LEVELS
IN CLATSOP COUNTY (1976)

<u>District</u>	<u>Astoria</u>	<u>Lewis and Clark</u>	<u>Jewell</u>	<u>Seaside</u>	<u>Olney</u>	<u>Warrenton</u>
<u>Elementary Schools</u>						
Enrollment ^{1/}	723	253	46	668	41	289
Capacity ^{2/}	1,250	285	85	840	100	290
Percent Utilization of Capacity	58	89	54	80	41	100
Student/Teacher Ratio	18:1	17:5	15:1	12:1	15:2	16:1
<u>Secondary Schools</u>						
Enrollment	1,148	85 ^{3/}	55	710	0 ^{4/}	344
Capacity	1,550	95	250	760	0	460
Percent Utilization of Capacity	74	89	22	93	--	75
Student/Teacher Ratio	17:1	17:5	8:1	22:1	--	10:1

^{1/} Bonneville Power Administration, 1976a; Oregon Department of Education, 1976.

^{2/} Bonneville Power Administration, 1976a.

^{3/} The majority of Lewis and Clark's secondary students are tuitioned to the Astoria district.

^{4/} Olney's secondary students are tuitioned to the Astoria district.

School year 1980-81 would be the first in which substantial permanent impacts would begin occurring. Enrollment projections for this year with and without Alumax are compared to current building capacities in Table IX-12. The capacity of the Warrenton Elementary School would be exceeded either with (129 percent utilization) or without (103 percent) Alumax. Non-Alumax enrollments at the Seaside High School would be 9 percent beyond capacity. With Alumax, enrollments would equal 126 percent of capacity. The Warrenton High School would be capable of accommodating non-Alumax enrollments, but Alumax enrollments would put it 10 percent beyond current capacity. The Lewis and Clark district would have to tuition a larger proportion of their students (including all their Alumax students) to the Astoria district in order to avoid overcrowding.

TABLE IX-12

PROJECTED ENROLLMENTS VERSUS SCHOOL CAPACITIES
WITH AND WITHOUT ALUMAX FOR 1980-81 SCHOOL YEAR

<u>District</u>	<u>Non-Alumax Enrollments</u>	<u>Alumax Enrollments</u>	<u>Capacity</u>	<u>Percent Utilization of Capacity Without Alumax</u>	<u>Percent Utilization of Capacity With Alumax</u>
<u>Elementary Schools</u>					
Astoria	810	50	1,250	60	64
Lewis and Clark	260	10	285	91	95
Jewell	50	0	85	59	95
Seaside	735	105	840	82	95
Olney	45	5	100	45	50
Warrenton	320	75	290	103	129
<u>Secondary Schools</u>					
Astoria ^{1/}	1,290	90	1,550	87	93
Lewis and Clark	95	0	95	100	100
Jewell	65	5	250	26	28
Seaside	785	130	760	109	126
Olney	0	0	--	--	--
Warrenton	385	100	460	88	110

^{1/} Includes students who would be tuitioned from the Lewis and Clark Olney districts.

Source: BPA

Table IX- 13 indicates the increase in the number of teachers which would be required to handle the additional student load in 1980-81. These projections are based on the assumption that current student/teacher ratios would be maintained. It is often the case that as school systems grow, the student/teacher ratio increases. Often a teacher can be more efficiently used where larger groups of children are present, since unusually small classes are less likely to occur. Therefore, the actual teacher needs may fall somewhat below the "worst case" projections of Table IX- 13. As indicated, most of the increased needs would occur in the Astoria, Seaside, and Warrenton districts.

TABLE IX-13

ADDITIONAL TEACHERS REQUIRED TO ACCOMMODATE
PROJECTED ALUMAX AND NON-ALUMAX ENROLLMENTS
IN SCHOOL YEAR 1980-1981 ^{1/}

<u>District</u>	<u>Additional Teachers for Non-Alumax Pupils</u>	<u>Additional Teachers for Alumax Pupils</u>	<u>Total</u>
<u>Elementary Schools</u>			
Astoria	5	3	8
Lewis and Clark	0	1	1
Jewell	0	0	0
Seaside	6	9	15
Olney	0	0	0
Warrenton	<u>2</u>	<u>5</u>	<u>7</u>
TOTAL	13	18	31
<u>Secondary Schools</u>			
Astoria	8	5	13
Lewis and Clark	1	0	1
Jewell	1	0	1
Seaside	3	6	9
Olney	0	0	0
Warrenton	<u>4</u>	<u>10</u>	<u>14</u>
TOTAL	17	21	38

^{1/} Assumes maintenance of current student/teacher ratios.

Source: BPA

Table IX-14 presents projected enrollments with and without Alumax for school year 1995-96 and the percentages of current (1975-76) enrollment which they would represent. In most of the schools, 1995-96 non-Alumax enrollments would be around 150 percent of present levels. With Alumax enrollments included, substantial percentage increases would occur in the Seaside and Warrenton schools where enrollments would be about twice current enrollments.

As enrollments increase, teacher requirements would also increase. The numbers of teachers required to meet projected enrollments with and without Alumax in school year 1995-96 are presented in Table IX-15. Most of the teachers will be required by the Astoria, Seaside, and Warrenton districts. Alumax-related teacher needs would represent 63 percent (232 of 371) of the requirements beyond current staff levels for the county.

TABLE IX-14

PROJECTED ENROLLMENTS AS A PERCENTAGE OF
CURRENT ENROLLMENTS 1995-1996 SCHOOL YEAR

<u>District</u>	<u>Non-Alumax Enrollments</u>	<u>Enrollments</u>	<u>1995-1996 Non-Alumax Enrollments as a Percent of Current Enrollments</u>	<u>1995-1996 Enrollments Including Alumax as a Percent of Current Enrollments</u>
<u>Elementary Schools</u>				
Astoria	1,105	120	153	169
Lewis and Clark	355	25	140	150
Jewell	70	5	152	163
Seaside	1,000	250	150	187
Olney	60	10	146	171
Warrenton	435	180	151	213
<u>Secondary Schools</u>				
Astoria ^{1/}	1,790	215	156	175
Lewis and Clark	95	0	100	--
Jewell	90	10	164	182
Seaside	1,070	310	151	194
Olney	0	0	--	--
Warrenton	484	240	141	210

1/ Assumes Lewis and Clark and Olney Districts would tuition students to Astoria.

As stated previously with reference to teacher needs for the 1980-81 school year, as student enrollments increase, student/teacher ratios often increase. Therefore, actual teacher needs may be somewhat below those given in Table IX-15.

In comparing the extent to which Alumax would impact educational services at the Warrenton and Umatilla sites, three factors would cause the impacts on the Umatilla area to be much heavier than on the Warrenton area. First, the in-migration projected for the Warrenton site is considerably below that for Umatilla, thus reducing the number of additional students which must be accommodated. Second, the Clatsop County schools are generally not functioning as close to capacity as the Umatilla area schools. Third, non-Alumax population growth projections for Clatsop County are considerably below those for the Umatilla area.

TABLE IX-15

NUMBER OF ADDITIONAL TEACHERS REQUIRED
TO MEET 1995-1996 ENROLLMENTS ^{1/}

<u>District</u>	<u>Without Alumax</u>	<u>With Alumax</u>
<u>Elementary Schools</u>		
Astoria	21	28
Lewis and Clark	6	7
Jewell	2	2
Seaside	28	49
Olney	1	2
Warrenton	9	20
<u>Secondary Schools</u>		
Astoria ^{2/}	38	50
Lewis and Clark	0	0
Jewell	4	6
Seaside	16	30
Olney	0	0
Warrenton	14	38

^{1/} Assumes maintenance of current student/teacher ratios.

^{2/} Assumes Astoria receives tuitioned students from Olney and Lewis and Clark districts.

(2) Safety Services.

(a) Police. Table IX-16 depicts current law enforcement personnel levels in Clatsop County. With the exception of Hammond, protection levels for local jurisdictions range from 1.3 (Astoria) to 4.6 (Cannon Beach) sworn officers per 1,000 population. It is anticipated that Hammond will replace their former police officer (now deceased) in the near future, thus bringing their ratio to 1.9 sworn officers per 1,000 population.

The primary local police departments are those of Astoria and Seaside. The Clatsop County Sheriff's Department consists of 8 sworn and 14 reserve officers. The regional State police has a force of 24 sworn officers.

Population growth will necessitate an increase in the number of police personnel serving Clatsop County jurisdictions if current service ratios are to be maintained. Increases in personnel needs, based on 1995 population projections both with and without Alumax, are presented in Table IX-17.

(b) Fire. The fire gradings (see Chapter IV.B.5.b.(2) for an explanation of the grading system) for the Clatsop County fire districts are relatively poor. Improvements in

TABLE IX-16

POLICE PROTECTION

<u>Agency</u>	<u>Number of Sworn Officers</u>	<u>Reserve Officers</u>	<u>Sworn Officers/ 1,000 Population</u>
Clatsop County Sheriff	8	14	0.3
Astoria	14	9	1.3
Cannon Beach	4	3	4.6
Gearhart	4	6	4.5
Hammond ^{1/}	0	0	0.0
Seaside	12	15	2.6
Warrenton	3	3	1.5
State of Oregon	24		N.A.

^{1/} Hammond is authorized one sworn officer. Their former policeman died recently. The position should be filled in the near future.

Source: Bonneville Power Administration, 1976b.

TABLE IX-17

PROJECTED NEED INCREASES FOR POLICE PERSONNEL
BY 1995 WITH AND WITHOUT ALUMAX ^{1/}

<u>Agency</u>	<u>Additional Sworn Officers</u>		<u>Additional Reserve Officers</u>	
	<u>Without Alumax</u>	<u>With Alumax</u>	<u>Without Alumax</u>	<u>With Alumax</u>
Clatsop County Sheriff	1	2	2	4
Astoria	2	3	2	2
Cannon Beach	1	1	1	1
Gearhart	1	1	1	1
Hammond	0	0	0	0
Seaside	2	3	3	6
Warrenton	1	1	1	2
State of Oregon	4	7	--	--

^{1/} Assumes maintenance of present service levels.

equipment and addition of a full-time fireman could improve current gradings.

FIRE PROTECTION

Community	Grading
Astoria	5 $\frac{1}{2}$ /
Cannon Beach	6 $\frac{2}{2}$ /
Gearhart	6
Hammond	7 $\frac{3}{4}$ /
Seaside	5 $\frac{4}{4}$ /
Warrenton	6 $\frac{5}{5}$ /

- 1/ Gradings for commercial properties over 500 feet and private dwellings over 1,000 feet from a hydrant are 7. In the Navy Heights area gradings are 7 for commercial properties within 500 feet and private dwellings within 1,000 feet of a hydrant and 9 for properties exceeding these hydrant distances.
- 2/ Commercial properties more than 500 feet and private dwellings more than 1,000 feet from a hydrant have a rating of 9.
- 3/ Commercial properties more than 500 feet from a hydrant have a rating of 9. Private dwellings more than 1,000 feet from a hydrant have a grading of 8.
- 4/ Commercial properties more than 500 feet and private dwellings more than 1,000 feet from a hydrant have ratings of 7.
- 5/ Commercial properties more than 500 feet and private dwellings more than 1,000 feet from a hydrant have ratings of 9.

Source: Insurance Services of Oregon, 1976.

Although fire protection services in the area of the Warrenton site would be strained by the introduction of the plant, the impacts on these services would be significantly less than those projected at the Umatilla site.

(3) Health Services. There are two hospitals located in Clatsop County (see Table IX-18). Columbia Memorial, located in Astoria, is an 85-bed hospital. During 1975 Columbia Memorial admitted 3,166 patients with an average daily occupancy rate of 70 percent of capacity. Seaside General is located in the City of Seaside and contributes an additional 34 beds to the County's resources. Average daily occupancy rate for Seaside General in 1975 was 51 percent of capacity with a total of 967 admissions. As indicated in Chapter III, an occupancy rate of 85 percent is considered standard for fiscally sound hospital management.

On a county-wide basis there is an average of 4.1 hospital beds per 1,000 population, which is below the State standard of 5.5 per 1,000. Although the bed ratio is below standard, the

average occupancy rates for the hospitals in the county do not indicate a facility shortage. The area's proximity to Portland probably results in lowered demands for local hospital care. Assuming the present usage rate per 1,000 population continues and that the average daily occupancy rates can be allowed to rise toward, but not beyond, 85 percent, present hospital capacity should be adequate to accommodate both natural and Alumax-related growth through 1995.

Table IX-19 indicates the numbers and per-population-ratios for health care professionals in Clatsop County. The current average number of persons per physician in the county (1,000 to 1) is more favorable than the recommended minimum standard (1,250 to 1), (Paxton, 1973, p. 105) and is also above the average of Umatilla County (1,205 to 1). The ratios for dentists and registered nurses are also better than the Oregon State average.

No additional physicians would be required to serve non-Alumax growth in Clatsop County prior to 1995, assuming the present ratio is allowed to rise to 1,186 to 1. In order to accommodate both Alumax and non-Alumax growth in 1995, one additional physician would be required to achieve a population/physician ratio of 1,250 to 1.

In summary, the health care systems of both the Warrenton and Umatilla site areas would probably be the least strained of the various social service systems. Increased levels of usage might, in fact, result in greater operational efficiency.

TABLE IX-18

CLATSOP COUNTY HOSPITAL
SIZE AND OCCUPANCY LEVELS

<u>Hospital</u>	<u>Location</u>	<u>Beds</u>	<u>Occupancy</u>	<u>Admissions</u> (1975)
Columbia Memorial	Astoria	85	70%	3,166
Seaside General	Seaside	34	51%	967

Source: BPA, 1976c.

TABLE IX-19

CLATSOP COUNTY HEALTH CARE PROFESSIONALS

	<u>M.D.'s</u>	<u>Dentists</u>	<u>R.N.'s</u>
Number per 1,000			
Population	.99	.61	2.79
Total in County	29	18	82

Source: BPA, 1976c.

(4) Cultural and Recreational Resources. The Clatsop County area is especially rich in both geographical and historical attractions of many kinds. Many of the historical attractions are related to the period of initial settlement of the far West by trappers and fur traders. Astoria, largest city in Clatsop County, was at one time the center of a considerable fur trading empire developed by the city's namesake and founder, John Jacob Astor. Among the many attractions of the city are the Astor Column, a monument to Mr. Astor, and the first post office to be opened west of the Mississippi. Many other sites of considerable historical interest are located throughout the county.

Although there is no county library system, the cities of Astoria and Seaside maintain good library collections. Both libraries experience heavy use, an indication of their importance as cultural and recreational resources to county residents. Table IX-20 summarizes information pertaining to current library operating levels as well as projections of the need for resource increases required to meet the needs of future growth through 1995 with and without Alumax. The predicted resource increases are based on the assumption that current service levels would be maintained. The Astoria library would require an addition of 7,900 volumes to its collection for non-Alumax growth and 3,120 for Alumax growth by 1995. The corresponding figures for Seaside would be 3,350 and 4,725, respectively.

The library service levels in the area of greatest impact are significantly higher for the Warrenton site than for the Umatilla site.

Outdoor recreational opportunities in Clatsop County are highly varied and of exceptional quality. The Pacific Ocean, along with the area's rivers and bays, provides extensive opportunities for fishing, boating, swimming, crabbing, and clamming. The scenery ranges from rocky cliffs and wide sand beaches along the Coast to heavily forested mountain slopes in the interior regions of the county. Animals such as deer and elk are available to big game hunters in many areas of the county.

The State of Oregon has provided a number of day-use recreational areas, as well as several overnight camping areas in the county. In addition, several Clatsop County cities have their own parks (see Table IX-21). Astoria maintains 12 different park areas totaling 60 acres. The two major parks are Shively Park and Tapiola Park, each 12 acres in size. Shively Park features a picnic area and a community house where various groups may hold meetings.

Tapiola Park offers a picnic and play area, a swimming pool, a wading pool, and ballfields. Smaller park areas in the city offer tennis courts, playgrounds, ballfield, and boating facilities.

Cannon Beach has a 5-acre city park. Approximately half of the acreage in the park is improved.

TABLE IX-20

CURRENT LIBRARY OPERATING LEVELS AND PROJECTED
RESOURCE INCREASES REQUIRED TO MEET ALUMAX AND
NON-ALUMAX DEMAND BY 1995 IN CLATSOP COUNTY

	<u>Astoria</u>	<u>Seaside</u>
Population of Area Served	10,740	4,620
Volumes in Collection	45,897	19,433
Volumes Per Capita	4.3	4.2
Circulation	92,948	41,295
Per Capita Circulation	8.7	8.9
Hours Open Per Week	72	43
Projected Population Increase Without Alumax for Area Served by 1995	1,840	800
Additional Volumes Required to Maintain Current Per Capita Rate	7,900	3,350
Projected Alumax Population for 1995	725	1,125
Additional Volumes Required to Maintain Current Per Capita Rate	3,120	4,725

Source: BPA; Oregon State Library Board of Trustees, 1975.

Gearhart has three parks including Leslie Miller Park and two unnamed park areas. Leslie Miller park is located on the coast at the northern end of the city. It consists of approximately 75 acres, 2 to 3 acres of which are improved. A small 4-acre park is located at the center of the city, and a large (150-acre), undeveloped park area is located at the south end of town where the Necanicum River empties into the Pacific.

Broadway Park in Seaside is a 10.5-acre park offering a picnic area and ballfield. A boatramp and swimming pool are expected to be ready for use by summer, 1977.

TABLE IX-21

ACRES OF PARK SPACE PER 1,000
POPULATION IN CLATSOP COUNTY CITIES

<u>City</u>	<u>Population</u>	<u>Parkland</u>	<u>Parkland Acres/ 1,000 Population</u>
Astoria	10,680	60.0	5.6
Cannon Beach	865	230.0	5.8
Gearhart	890	230.0	258.4
Hammond	530	0.0	0.0
Seaside	4,640	10.5	2.3
Warrenton	2,005	0.0	0.0

Source: BPA, 1976d.

Although the amount of urban park acreage in Clatsop County cities, with the exception of Gearhart, is below recommended standards (Oregon State Highway Division, 1972), the abundance of recreational opportunities in the area offset these deficiencies. If Alumax were to locate at the Warrenton site, it would be necessary to increase the number of facilities designed for the use of children and young adults, such as playground and teen centers.

f. County Economy.

(1) Current Conditions. The primary economic impact of constructing and operating the Alumax plant in Warrenton would be felt in Clatsop County, Oregon. Clatsop County's economy is typical of Oregon coastal economies in that it is based on the region's resources. Resources of particular importance are the county's forests, which are the basis of the forest products industry; natural beauty, which is the basis of the tourist industry; and proximity to the Pacific Ocean, which is the basis of the fish processing industry. These three industries, when taken together, combine to form the county's economic base and account for about 30 percent of total county employment.

The dependency on these three industries has resulted in wide seasonal fluctuations in economic activity. One measure of the extent of these fluctuations is changes in rates of unemployment. The seasonal fluctuations in unemployment are displayed in Table IX-22 which shows that unemployment is low during summer months when activity in the three basic industries is brisk, but is high in the winter when activity in these industries is slack.

TABLE IX-22

SEASONAL FLUCTUATIONS IN UNEMPLOYMENT
CLATSOP COUNTY, OREGON 1969-70 - 1973-74

	<u>1973-74</u>	<u>1973-72</u>	<u>1972-71</u>	<u>1971-70</u>	<u>1970-69</u>
July	4.1	3.2	4.2	5.1	4.0
August	3.0	2.7	4.7	3.5	2.6
September	2.6	2.5	4.3	3.7	3.2
October	4.0	3.0	4.1	4.0	4.2
November	6.1	5.3	6.7	7.3	5.4
December	7.8	6.5	10.5	11.6	9.9
January	10.2	10.5	10.5	15.1	11.4
February	8.5	7.2	9.7	12.3	9.8
March	9.1	7.0	9.1	9.9	9.2
April	6.6	4.6	9.8	8.1	6.9
May	4.6	4.5	4.9	5.4	5.5
June	4.2	4.8	4.2	4.7	6.0

Source: Sedway/Cooke, 1974, p. 62.

(2) Future Conditions Without Alumax.

(a) Forestry and Forest Products. Aside from the recent one-time impact of increased cutting rates to the limit of yield level, and the introduction of the Wauna Lumber Mill, the forest industry has not been an instrument of growth in the county. It is far more efficient to ship logs to larger manufacturing facilities today. Local employment in this industry is expected to continue its current decline (Sedway/Cooke, 1974, p. 63).

(b) Fishing. The future of the county's fish harvest appears quite secure, and there will probably be little substantial change over the next decade. The Oregon Fish Commission believes that current harvest levels for salmon, crabs and tuna are close to the reasonable maxima without threatening long-range survival of the resource; but the harvest of shrimp and bottom fish could be increased without causing future problems.

(c) Fish Processing. The Astoria-Warrenton-Hammond area has the largest concentration of skilled seafood process workers in the Northwest. The large fish processing capacity and concentration of skilled manpower in the study area together with the local fish resource probably means continued stability of the industry. Demand for fish and shellfish is increasing despite the industry's higher production costs. This demand should continue to increase and county employment in the industry should also increase slightly.

(d) Tourism. Tourism should continue to grow in Clatsop County as population and real income in the Portland Standard

Metropolitan Statistical Area (SMSA) continue to increase. The county will continue to receive an important share of these expenditures.

(e) Government. While employment should increase in government sectors the rate of expansion is not expected to be as rapid during the near future as it was during the 1960 and 1970 decade. There has apparently been some speculation that the Federal government may eventually phase out their funding of the Tongue Point Job Corps Center, with its 138 staff members and 440 Corps members. The center is authorized by Congress and the President to continue through 1977, though its impact, in terms of budget, employees, and Corps members, is presently less than half of its earlier effect on local employment.

(f) Agriculture. The general decline in the value of farm products, Clatsop County's small farm area, wet climate, and difficult terrain, together with increasing demand to use farm land for other purposes, means a continued decline in income from this sector.

(g) Shipping. There are some significant indications that port patterns could change and that the Port of Astoria could become an important transfer point in the coming years. World shipping trends have been to larger, deeper draft ships requiring minimum channel depths of 50 feet. Yet the 40-foot deep Columbia River Channel to Portland is considered to be near maximum feasible depth. In 1970 the American Association of Port Authorities reported that the Columbia River entrance could be feasibly deepened to 48 to 55 feet, thus allowing deep-draft ships to travel from the river mouth to Astoria and Hammond.

The Columbia is a gateway to a significant market area which not only includes Portland but some 464 miles of waterways reaching up to Lewiston, Idaho. These waterways cannot be traversed by deep-draft ships, but they could be navigated by barges such as the LASH (Lighter Aboard Ship) system. The American Association of Port Authorities of the West Coast has stated that the mouth of the Columbia River is the best location for a LASH terminal. Should such developments occur, they would not only increase transfer point activities employment but would tend to stimulate the whole Astoria economy since that location would become very desirable for processing and manufacturing installations wishing to be near their material sources rather than large population centers.

Summary of Economic Outlook Without Alumax. The economic outlook, without Alumax, then, is for continued modest growth. Economic activity associated with agriculture is expected to decline, manufacturing employment to remain more or less constant, while food processing increases make up for declines in wood products. The "other" category should grow only marginally. Hence, the majority of future growth will be oriented to tourism and, as a result of the growth in real incomes and in the number of retired persons in the area, to normal retail and service commercial activities.

(3) Future Conditions With Alumax.

(a) Construction Phase.

i. Employment Impact.

(i) Direct Employment. The construction of the proposed Alumax plant would occur over a period of about 32 months. Construction employment would peak at about 1,400 workers in the 22nd month of construction as shown in Table IX-23. Table IX-23 also estimates the percentage of the construction force which would in-migrate to Clatsop County. Most of the in-migrants would likely come from the Longview, Washington, area where construction of the Trojan nuclear plant is being completed.

(ii) Secondary Employment. The presence of such a large construction force in Clatsop County would induce secondary employment. The approximate amount of secondary employment can be estimated with an empirically determined employment multiplier. Based on a study prepared by Collins, Youmans, and Stoevener (1973, p. 28), the employment multiplier for the construction work force is estimated as 1.2. This means that for every ten workers that would be directly involved in constructing the proposed Alumax plant, two additional workers would be required in the service sector of the county's economy.

TABLE IX-23

ALUMAX CONSTRUCTION EMPLOYMENT

<u>Month</u>	<u>Construction Employment</u>	<u>Percent of Construction Workers Who Are In-Migrants</u>
0	0	0
1	65	0
2	130	40
3	190	58
4	255	70
5	320	75
6	380	80
7	445	82
8	510	85
9	575	86
10	635	88
11	700	89
12	765	89
13	825	90
14	890	91
15	955	92
16	1,020	92
17	1,080	92
18	1,145	93
19	1,210	93
20	1,275	94
21	1,335	94
22	1,400	95
23	1,260	94
24	1,120	94
25	980	92
26	840	90
27	700	89
28	560	86
29	420	81
30	280	71
31	140	43
32	0	

Source: CH2M Hill, 1976, p. 309. Percentages calculated by BPA.

The amount of secondary employment that could be generated by the construction of Alumax is difficult to estimate because of the monthly variations in construction employment and because secondary employment tends to lag behind the primary employment that generates it. However, based on the limited data available, it is possible that as many as 280 county residents could find construction-related service sector jobs (BPA estimate).

(iii) Unemployment. In June of 1976 there were about 80 unemployed construction workers in Clatsop County. Since a far greater number of construction workers would be required, unemployment among construction workers would be virtually eliminated.

The impact on unemployment in other sectors is difficult to estimate because, as was described above, the amount of construction related service sector jobs is difficult to estimate. If, as was estimated above, 280 county residents could find service sector jobs, the county's unemployment would decline from the current rate of about 9 percent to about 6 percent.

ii. Income Impact.

(i) Direct Income. Based on 1975 wage rates, the construction of the proposed Alumax plant would require the direct expenditure of over \$50 million in wages.

(ii) Secondary Income. The spending of construction workers' salaries would produce income for other residents of Clatsop County. Collins, Youmans, and Stoevener (1973, p. 28) estimate that for every \$100 paid to construction workers, other county residents would receive about \$11 in additional income. Therefore, based on this criteria, the secondary income generated by the construction of the Alumax plant would be about \$5.5 million, which means that the total of direct and secondary construction income would be about \$55.5 million.

iii. Taxes. The taxation impacts during the construction phase of the proposed Alumax plant can be divided into three categories: impacts on property taxes, State personal taxes, and State income taxes. The impact on property taxes during construction would not be as great as the impact after construction is complete because during construction only that portion of the plant which is complete would be on the county property tax roll. However, the construction workers or their landlords would pay property taxes. The exact amount by which they would increase the tax base is difficult to estimate without prior knowledge of the amount of new construction that would be required for their accommodation.

The amount of State personal and income taxes that would be paid by construction and secondary workers is estimated in Tables IX-24 and IX-25, respectively. The tables show that the maximum tax impact would occur in 1979.

TABLE IX-24

ESTIMATED PERSONAL TAXES ^{1/}
 Alumas Direct And Indirect Employment
 at Warrenton During Construction
 (1976 Dollars)

	<u>1975</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Construction	0	125,000	366,000	512,000
Secondary	<u>0</u>	<u>23,000</u>	<u>31,000</u>	<u>33,000</u>
TOTAL	0	148,000	397,000	545,000

^{1/} Taxes on gasoline, alcoholic beverages, cigarettes, insurance premiums, inheritances, and licenses of various types. Based on an average of \$25.86 per \$1,000 personal income.

Sources: CH2M Hill, 1976; p. 390; Secondary personal taxes estimated by BPA using Collins, Youmans, and Stoevener multiplier (1973, p. 28).

TABLE IX-25

ALUMAX AT WARRENTON
 Estimated State Personal Income Tax
 Payments During Construction
 (1976 Dollars)

	<u>1975</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Construction	0	182,000	532,000	743,000
Secondary	<u>0</u>	<u>26,000</u>	<u>36,000</u>	<u>37,000</u>
TOTAL	0	208,000	568,000	780,000

NOTE: All figures are expressed in 1976 dollars. Wages may increase due to inflation and productivity. Therefore, actual tax collections may exceed these estimates because workers may be moving into higher tax brackets.

Source: CH2M Hill, 1976, p. 389; Secondary personal income taxes estimated by BPA using Collins, Youmans, and Stoevener multiplier (1973, p. 28).

(b) Operation Phase.

i. Employment Impact.

(i) Direct Employment. The proposed Alumax plant would require 800 employees at full operation (1981). About 200 of these workers would be salaried professional, technical, and clerical workers. The other 600 would be hourly production workers. The production positions do not require previous experience in the aluminum industry or any special skills.

(ii) Secondary Employment Impact -- Multiplier Effect. In addition to the direct employment, the plant would, through direct expenditures of its own, as well as its employees, generate demand for a variety of goods and services over and above that presently produced in the county, which, in turn, would generate additional employment opportunities; this effect is commonly called the employment multiplier. There would be a need, for example, for additional financial, personal, and professional services, restaurants, food stores, etc. Nonetheless, the probable impact of the Alumax plant on secondary employment in the remainder of Clatsop County would be weak. No satellite manufacturing installations of any consequence are anticipated for the initial years. Sedway/Cooke, in their 1974 study (p. 67), estimated the Clatsop County employment multiplier as 1.6, which means that for every 10 operating employees hired by Alumax, another 6 workers will be hired by other county employers for a total of 16 new jobs. Based on this criteria, we estimate that a total of about 1,280 new jobs would be created if Alumax were located in Warrenton. Of this total, 800 would be plant workers, and 480 would be secondary workers. Since secondary employment typically lags behind the basic employment that generates it, the full employment multiplier would not be felt immediately. The length of the time lag would depend on many factors such as the development of adequate public services and the availability of labor. In Table IX-26, which displays the employment impact of operating the plant, it is assumed that the full multiplier effect would not be felt until 1995. In that year the total direct and secondary employment dependent on Alumax would account for about 8 percent of Clatsop County's total employment (BPA estimate).

TABLE IX-26

ESTIMATED DIRECT AND SECONDARY EMPLOYMENT IMPACT
OF OPERATING THE ALUMAX PLANT AT WARRENTON, OREGON

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Alumax Employment				
Operation	790	800	800	800
Secondary	<u>95</u>	<u>170</u>	<u>280</u>	<u>480</u>
TOTAL	885	970	1,080	1,280

Sources: CH2M Hill, 1976, p. 309, Secondary employment estimated by BPA using Sedway/Cooke multiplier (1974, p. 67).

(iii) Unemployment. The discussions of direct and secondary employment have shown that if the proposed Alumax plant were constructed in Warrenton, as many as 1,280 new jobs could be created (Table IX-26). Based on data provided by the Oregon Employment Division, we estimate that about 90 percent of the plant positions and about 85 percent of the secondary jobs could be filled by current residents of Clatsop County. This means that a total of 1,100 county residents could find plant-related employment. However, not all these positions would be available in the first year of full plant operation (1981) because of time lags between primary and secondary employment. In 1981 only about 800 Clatsop County residents would have been hired for plant-related employment (BPA estimate). In June 1976, there were about 1,050 unemployed workers in Clatsop County. The unemployment rate was about 9 percent. If 800 workers were hired for plant-related employment, the number of unemployed would decrease to 250 workers and the unemployment rate to about 2 percent. This is, of course, only an estimate based on 1976 unemployment data. The actual impact would depend upon unemployment data in 1981. There are reasons to believe that the actual reduction in unemployment would be less in 1982. This is because the size of the labor force should expand between now and 1981. The expansion would be the result of unemployed workers entering Clatsop County in the hope of finding plant-related work. There would also be a tendency for Clatsop County residents who are not now either working or seeking work to enter the labor force because of the employment opportunities that would be provided if Alumax were to locate in Warrenton.

ii. Income Impact.

(i) Direct Income. Annual earnings of the plant employees, including both salaried and hourly workers, are estimated to average \$15,600 in 1976 dollars, and would be distributed as shown in Table IX-27. If inflation were to continue at a rate of about 6.5 percent, actual average annual wage payments would be about

\$19,000 per full-time employee in 1979 when the first operation employees would be hired. Total employee earnings at full operation would be about \$13.2 million (1976 dollars). As much as 90 percent (\$11.9 (million) dollars) of this total could be paid to current residents of Clatsop County (BPA estimate).

(ii) Secondary Income. The earnings workers receive for operating the Alumax plant would generate earnings for other residents of Clatsop County. This effect is commonly referred to as the earnings multiplier and is caused by the spending of plant workers' salaries. Each dollar of income to Alumax employees would either be spent in Clatsop County, spent outside Clatsop County, or saved. The portion of the plant workers salaries that would be spent in Clatsop County would become income to other county residents who, in turn, would spend a portion of it in Clatsop County. The continued respending of the original dollar means that the total change in income would be a multiple of the change that would result from only Alumax's payroll. Sedway/Cooke (1974, p. 67) estimated the Clatsop County earnings multiplier to be 1.5. This means that for each dollar of wage paid to Alumax employees, an additional \$.50 of earnings would be generated in Umatilla County through secondary spending when the full income effect is reached.

The earnings impacts with expected lags, shown in Table IX-28, are estimated in 1976 dollars. At full operation secondary earnings could reach \$15 million per year. The 2.15 earnings multiplier may lead to an understatement of the actual net real income effect of Alumax because the value of vacations, insurance, and other fringe benefits has not been included in computing the multiplier.

TABLE IX-27

ALUMAX EMPLOYEE INCOME DISTRIBUTION AT FULL OPERATION
(1976 Dollars)

<u>Income</u>	<u>Hourly</u>	<u>Salaried</u>	<u>Total</u>	<u>Percent</u>
Under \$10,000	0	7	7	0.9
\$10,000-\$14,999	465	59	524	65.5
\$15,000-\$19,999	135	94	229	28.6
\$20,000 and up	<u>0</u>	<u>40</u>	<u>40</u>	5.0
TOTAL	600	200	800	100.0

Source: CH2M Hill, 1976, p. 318.

TABLE IX-28

ESTIMATED EARNINGS FROM ALUMAX
OPERATING EMPLOYMENT IMPACTS AT WARRENTON
(1976 Dollars)

<u>Income</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Operation	\$13,272,000	\$13,444,000	\$13,444,000	\$13,444,000
Secondary	<u>6,300,000</u>	<u>7,125,000</u>	<u>9,007,000</u>	<u>15,461,000</u>
TOTAL	\$19,572,000	\$20,569,000	\$22,451,000	\$28,905,000

Sources: CH2M Hill, 1976, p. 322; Secondary operating earnings estimated by BPA using Sedway/Cooke multiplier (1974, p. 67)

iii. Taxation Impact. The taxation impact of constructing the proposed Alumax plant in Warrenton would be composed of two elements: (1) property taxes paid by Alumax Corporation, its employees, and secondary workers whose employment is dependent upon the plant workers; and (2) personal and income taxes paid by plant and secondary workers.

Property tax revenue from the increases in assessed valuation would not, of course, be spread uniformly through out the county. The City of Warrenton and Warrenton School District No. 30 would benefit most greatly and directly from the Alumax plant's presence on the tax rolls. An assessed valuation of \$250,000,000 for the plant would raise the assessed valuation of the City of Warrenton by about 1,400 percent, and the assessed valuation of the Warrenton School District by about 1,000 percent over the 1973-74 levels. About one-third of the Alumax plant's local property taxes would go to the School District and City of Warrenton.

Two-thirds of the plant's property taxes would go to support county-wide jurisdictional units -- County government, the Port of Astoria, Clatsop Community College, and the Intermediate Education District which, in turn, distributes funds to local school districts in the county.

Cities other than Warrenton would not benefit directly from property taxes paid by the plant. Increases in residential and commercial property values from the Alumax-related population would, for the most part, go on city tax rolls of those communities and other areas where the new population would live and transact its business.

Since only about 3,100 persons would be expected to in-migrate to Clatsop County because of Alumax, the impact of plant and secondary workers on property taxes would be less than \$500,000. When all increases to the property tax base are

combined, the total increase within Clatsop County would amount to \$250,500,000. This would be an increase of about 50 percent over the county's 1974 assessed valuation of \$500 million.

The impact of Alumax-related employment on State personal and income taxes is displayed in Table IX-29. The Table shows that the peak impact of \$1,157,000 occurs in 1995 when the full effect of the employment multiplier is felt.

TABLE IX-29

ESTIMATED IMPACT OF ALUMAX-RELATED EMPLOYMENT
ON OREGON PERSONAL AND INCOME TAXES IN 1976 DOLLARS
\$(000)

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Personal Tax	215	255	340	355
Income Tax	<u>635</u>	<u>684</u>	<u>710</u>	<u>802</u>
TOTAL	850	939	1,050	1,157

Source: Estimates were made by adjusting CH2M Hill estimates (1976, pp. 389-390) with a multiplier derived by Sedway/Cooke, 1974, p. 67).

3. Power System. Impacts on operation of generation and transmission described in Chapter IV would be basically as described except for a slightly higher amount of system generation to offset increased transmission losses.

The transmission facilities required for service at the Warrenton site have been described in Chapter I of this document. The cost associated with these facilities is approximately \$13 million. This cost is at least \$7 million greater than the cost of service at the Umatilla site (based on original cost estimated for the Warrenton site and current estimates for the Umatilla site) and would be borne by all BPA customers.

C. Service To Alumax Delayed Until Firm Energy Surplus to Preference Customers' Requirements is Available. Under present BPA statutory authority and policy, and assuming that existing and possibly new preference customers would in the future request that the largest possible portion of their loads be served with Federal System firm energy, BPA load-resource studies show that at no time during the term of the present Alumax contract would there occur Federal System firm energy resources surplus to preference customer requirements. (Alternative allocations of Federal System energy under present and future possible statutory authority are discussed in Appendix C, Chapter III of

BPA's draft Role EIS.) Therefore, under this alternative, the plant would not be built and the accompanying impacts not incurred.

D. Alternative Contract Expiration Dates. Earlier contract expiration dates would decrease the likelihood that Alumax would construct the plant as proposed and that the associated impacts would occur.

Later expiration dates would not change the impacts of the plant with the exception of lengthening the period over which the impacts on the operation of power system would occur.

E. Alternative Plant Technology or Methods Operation.

1. More Energy Consumed per Unit of Output. Assuming all other factors are constant, Alumax would have to either find a source of additional power in order to maintain production capacity or else cut production due to the limitations of the electrical supply. Since electricity is essential to the reduction process, it is to the company's advantage not to use a higher electrically consumptive process as the aluminum industry is already threatened with power shortages in the near future.

When discussing higher energy consumptive processes, one is currently concerned with less energy efficient Hall-Heroult technology. Most research being done by industry has been concerned with reducing electrical consumption (see IX.E.2.) along with other costs. There are no commercial processes now available which would offer enough of a financial or environmental incentive to switch to a substantially higher energy-consuming process.

From the environmental impact standpoint, if production were cut, the physical and biological impacts would be reduced correspondingly, with the exception of the plant site size, which it is assumed would remain constant. It is not possible to project social and economic impacts as it is unknown what the reduction in construction and operating personnel would be. If the plant obtained additional energy from an alternate source, the impacts would be the same as those detailed in Chapter IV.

All other impacts would remain constant with those discussed in Chapter IV.

This alternative is not considered viable.

2. Less Energy Consumed Per Unit of Output. The Alumax plant is designed to be an energy efficient plant. Operating at a projected 6.9 kilowatthours per pound of aluminum produced, it would be one of the most efficient plants in the Northwest.

Alternate reduction processes and modifications to current Hall-Heroult aluminum reduction technology are at various stages of research. The following sections discuss ideas that have been or are being investigated and indicate their current research status.

Process Modifications.

Sumitomo. Sumitomo Chemical Company has developed modifications to conventional Hall cells (both prebaked and Soderberg) which reduce electrical consumption. Proprietary modifications to the prebaked anode cells include graphite-lined electrodes, computer control, closer electrode spacing, and improved insulation. They claim electrical consumption of 6 kilowatthours per pound of aluminum produced (kWh/lb) (Rosenzweig, 1975, p. 62). Sumitomo also anticipates reduced labor costs and cell life increased from the usual three years.

The modifications to Soderberg cells are claimed to lead to a 15 to 20 percent reduction in electrical consumption, a 50 to 100 percent increase in cell life, reduction of hydrocarbon and fluoride emissions, and a 50 percent decrease in number of man-hours per ton of aluminum produced (McAbee, 1975, p. 19). Increased cell stability is said to be achieved through a minimization of voltage fluctuations by optimizing the heat balance through the cathode. Sumitomo uses an analytical model to choose insulation configurations for a given cathode material. Anode design and materials are also modified. Smoother cell start-up, and revised crust breaking and alumina feeding techniques are also introduced.

The cut in energy consumption has been demonstrated by Sumitomo's use of the above procedures in some of its reduction plants. Consumption was lowered to 6.9 kWh/lb from the more typical usage of 7.3 to 8.2 kWh/lb for a Soderberg cell (McAbee, 1975, p. 19).

One of the major attractions of all the Sumitomo modifications is the fact that the changes can be made in a piecemeal manner. For example, cathode insulation changes can be made when a cell is normally shut down for relining. Sumitomo is now licensing use of these proprietary methods.

Kaiser Modifications. Kaiser is also seeking to improve current Hall reduction cells. Test cells are being studied at Kaiser's Permanente Research Center in California. Early hopes are for a 10 percent reduction in power consumption from the best current cells (Rosenzweig, 1975, p. 62). Changes are being studied in the areas of minimization of heat losses, control of electromagnetic effects, decreased air loss, improved loading, increased anode area, altered current densities, and closer operating controls.

Electrolyte modifications. Work has been done by several companies on improving cell electrical efficiency through modifications of the electrolyte. The electrolytic characteristics are changed by the addition of various compounds such as lithium carbonate or magnesium carbonate. Different additives can produce different effects such as lowering the bath temperature or lowering the bath's electrical resistance, both of which could lower the electrical consumption per pound of aluminum produced.

Bath additives have provided varying degrees of success. Some companies have found the procedure too expensive and/or difficult

to deal with; others have been able to successfully use electrolyte additives to increase electrical efficiency. There are no data available on the actual cost of this procedure, but it is considered expensive. The fact that the procedure is currently used in some production plants indicates that it is a viable operation. Although specific energy figures are not available, it is estimated that the potential energy reduction is less than 5 percent.

One of the problems associated with both modifications is the difficulty of learning to operate the cells with the changes that the modifications cause. Both modifications would best be used by a trained staff in an established plant. Alumax would not even consider implementing any bath modifications until the plant and its workers became established and the modifications could be evaluated in terms of Alumax's operating situation.

Alcoa Smelting Process. After 15 years of research and over \$25 million, Alcoa has announced a totally different process for aluminum reduction. In this process, alumina (Al_2O_3) is chemically reacted with chlorine to form aluminum chloride (AlCl_3), which is then fed to a closed electrolytic cell containing a fused electrolyte consisting of sodium, lithium, and aluminum chlorides at an operating temperature of 700°C (Peacey and Davenport, 1974, p. 26). Direct current is passed through the cell and molten aluminum forms at the cathode and gaseous chlorine at the anode. The aluminum is collected and the chlorine is recycled to the chlorination plant. Observations by Peacey and Davenport (1974, p. 26), indicate a new bipolar cell design will be used with the process. Alcoa claims a 9 MWh/ton (4.5 kWh/lb) energy consumption, which is a 30 percent decrease from the most efficient conventional usage values at present. It is anticipated that much of the present pollution control equipment would no longer be needed with the Alcoa process because it has been designed as a closed system and cryolite, a major fluoride source, is not used.

Peacey and Davenport (1974, p. 28), evaluated the relative costs of the Alcoa and Hall processes and concluded that the Alcoa process would require less fixed capital investment, less electrical energy, less carbon requirement, and higher direct operating costs than the Hall process in producing a given amount of aluminum.

Alcoa is scheduled to begin operation in 1977 of a new 15,000-ton per year small production plant in Palestine, Texas. If this plant proves out, the process could be used by Alcoa in any new reduction facilities and could be licensed for use by other companies. This process is applicable only to new facilities and cannot be used by existing Hall-Heroult plants. Even if successful this technology will not be available to the general industry until the 1980s because of testing requirements and licensing procedures. It should be noted that this process still must prove its viability on a production level, and if it does not, it will not be adoptable.

It should also be noted that the Electrochemistry Association in Japan is researching a similar process. They hope to gain financing for a pilot plant and small production operations in the near future.

The Toth Process. In the Toth process, aluminum ore is calcined and then chlorinated in the presence of a reductant to form aluminum chloride, which must subsequently be separated from other metal chlorides by fractional condensation. The liquid aluminum chloride reacts with manganese metal particles at relatively moderate temperatures to produce a fused salt mixture. An aluminum powder is then extracted from the salt mixture. Aluminum chloride is separated from the manganese chloride, which is recycled to reclaim the chlorine and manganese.

Despite claims of up to 90 percent less energy consumption than the traditional Bayer-Hall alumina-aluminum process, and up to 75 percent reduction in capital costs, (Chemical Engineering, Feb. 4, 1975, p. 65), the potential of this process is currently not promising, as financial backing for large-scale testing, pilot runs, etc., has not been forthcoming. Some engineers feel the process is not really feasible on a large scale, and Peacey and Davenport (1974, p. 28) point out that the large amount of manganese metal (three tons of manganese per ton of aluminum manufactured) makes the process economically unattractive.

Alcan Process. The Aluminum Company of Canada (Alcan) reports spending more than \$40 million and 12 years researching a process and then abandoning it because of unsatisfactory results of a pilot plant. This process smelts bauxite and coke to produce an aluminum-containing alloy which is then reacted to form aluminum monochloride. In a decomposer, the aluminum chloride is broken down into aluminum and aluminum trichloride, which is recycled in the alloy treatment portion of the process.

Pechiney Process. Pechiney has discontinued work on its carbothermic and nitride processes due to poor results. The carbothermic process involves charging alumina with carbon to produce aluminum carbide, which is then reduced to aluminum. In the nitride process, aluminum is condensed from the vapor resulting from thermal production of aluminum nitride.

Other Processes. There are other alternate aluminum processes under study but they are still being tested. Some, like a monochloride process proposed by Peacey and Grimshaw (Peacey and Davenport, 1974, p. 27), use more energy than current techniques. Still other processes, such as the Ethyl Corporation process, have not had details released about them.

As mentioned above, several innovative processes have not met initial expectations and research has not continued on them. Other processes, such as the new Alcoa process, have not been thoroughly tested out yet. If they do prove to be economically and commercially feasible, they may then be available for licensing. Presently, they are not practical alternatives to Alumax. They are possible future alternatives.

Due to insufficient information on the specific modifications to the Hall-Heroult process discussed above, their applicability to the Alumax situation cannot be assessed.

From this analysis this alternative is not considered a viable one.

3. More Environmental Control.

Air Quality. The Alumax plant is currently designed with the highest and best practicable air pollution control systems currently available. While emissions could be reduced by further controls, such reductions are not appropriate at this time in light of cost and energy use considerations. Zero fluoride emissions as proposed for the plant when sited at Warrenton are not technologically feasible.

Water Quality. The proposed water treatment system at the Umatilla site represents maximum environmental quality possible for the Alumax aluminum plant. Total water recycle within the plant eliminates direct discharge of potential water pollutants that would affect the water quality of the Columbia River. More environmental control for domestic water use and treatment would probably not be required by the Oregon Department of Environmental Quality than is already proposed.

More environmental control for air emissions of fluoride and sulfur dioxide could reduce potential impact upon the ponds and irrigation water existing around the plant site on Alumax property and also the Columbia River surface waters. Less fluoride accumulation in the ponds immediately surrounding the aluminum plant site would lower the potential of detrimental impact upon aquatic vegetation and aquatic life. Lower potential for fluoride contamination of irrigation waters on the Alumax property would occur. Less increase of fluorides in the Columbia River surface waters would occur, although the present proposed air emissions of fluorides and sulfur dioxide are not expected to cause measurable water quality effects.

Natural Systems. More environmental control of fluoride air emissions from the proposed Alumax plant at Umatilla would reduce the potential impact upon terrestrial and aquatic vegetation and resulting effects upon resident wildlife populations. Since no adverse impacts of fluoride and sulfur dioxide air emissions on the environment beyond the Alumax plant property boundary are predicted, more environmental control of air emissions would not alter the overall impact upon the public and private land, air, and water resources at the Umatilla site.

All other impacts would remain constant with those in Chapter IV.

4. Less Environmental Control.

Air Quality. The proposed air pollution control systems for the Umatilla plant are capable of meeting all requirements regarding air quality with a significant margin of safety. From this standpoint, less environmental control could still meet ambient standards and the Oregon emission standards for aluminum reduction plants. However, the

Oregon standards also require "the highest and best practicable collection, treatment and control of atmospheric pollutants emitted from primary aluminum plants through the utilization of technically feasible equipment, devices and procedures necessary to attain and maintain desired air quality" for each primary aluminum plant (Oregon Administrative Rules, 1974, Section 25-255). The Oregon Department of Environmental Quality has found the proposed Umatilla plant to conform with this requirement (Kramer, 1975, p. 3). Also, control systems are available which trade off lower efficiency on some pollutants for higher efficiency on others. Whether the State would have also found these systems acceptable is not known. The very effective dry scrubber control system selected by Alumax for the proposed plant also has benefits in that valuable fluorides are captured for reuse in the process.

Thus, less environmental control for air pollution is not a viable alternative since it is doubtful that an air pollution discharge permit would be obtained from DEQ if a less effective air pollution control system were proposed and a factor in the selection of the particular control systems to be used was process-related rather than environmentally-related.

Water Quality and Natural Systems. The proposed Alumax plant at Umatilla would have a total water recycle system approved by DEQ. Less environmental control would be some amount of plant effluent discharged to State waters. An effect upon local water quality would occur, but its magnitude would be dependent upon the quantity of effluent and degree of in-plant effluent treatment. Similar for air emissions, less environmental control would result in probable effects of fluorides and sulfur dioxide on the terrestrial environment beyond the Alumax property boundary. Considering these alternatives and the State and Federal air and water quality standards for the protection of the environment, less environmental control than already proposed would probably result in disapproval of the application for Oregon air and water discharge permits preventing construction and operation of the Alumax plant at the Umatilla site.

All the other impacts would remain constant with those in Chapter IV.

F. Alumax Served but Power Inadequate to Facilitate Operation at Planned Capacity. The impacts of this alternative would vary depending on the size of the inadequacy and Alumax's response to the cutback. If a supplemental energy source is found, the impacts would be the same as those discussed in Chapter IV. If the plant is operated at less capacity, the impacts in Chapter IV would be reduced accordingly. If Alumax opted not to build in the region or at all, the impacts would be those discussed in alternative A of this chapter.

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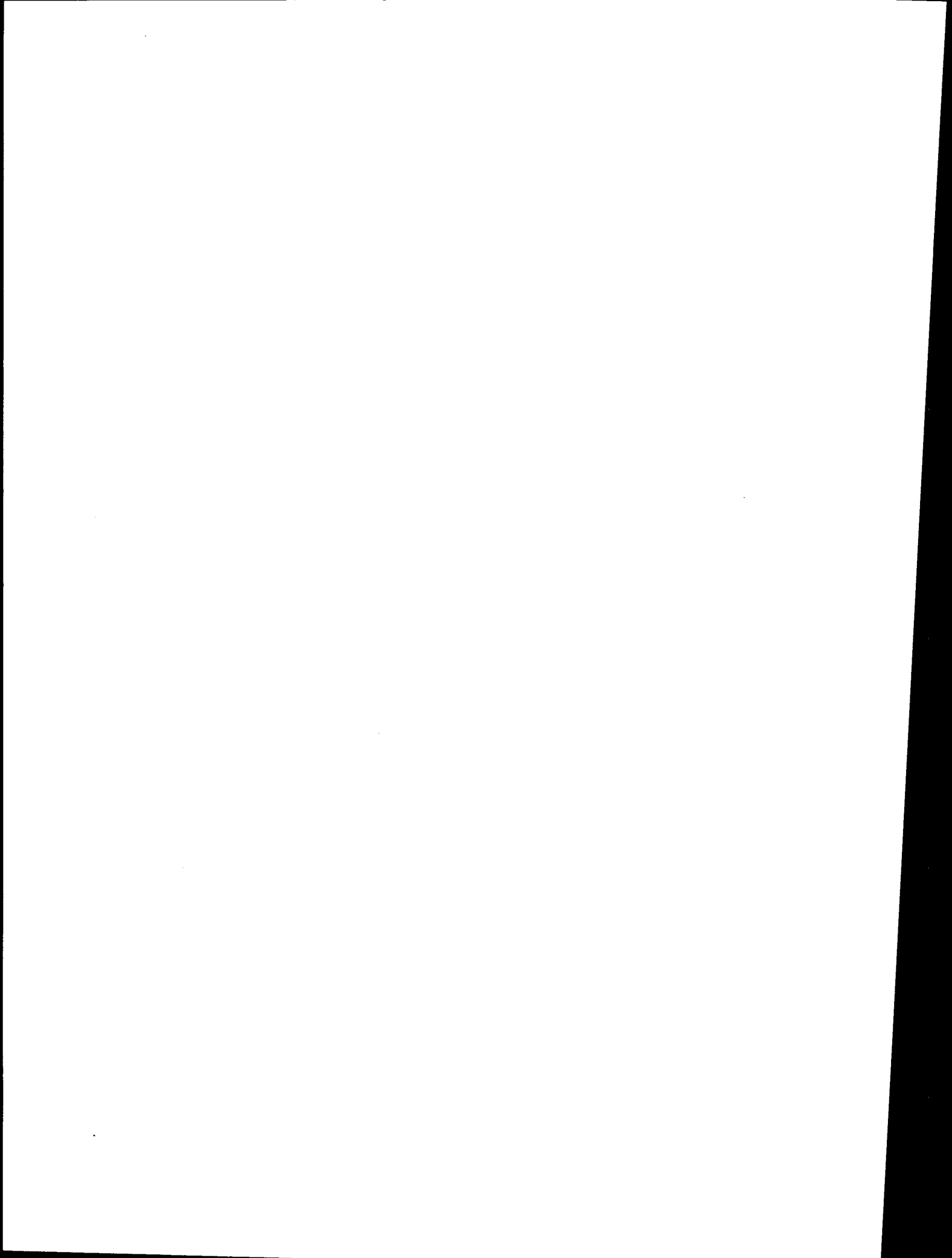
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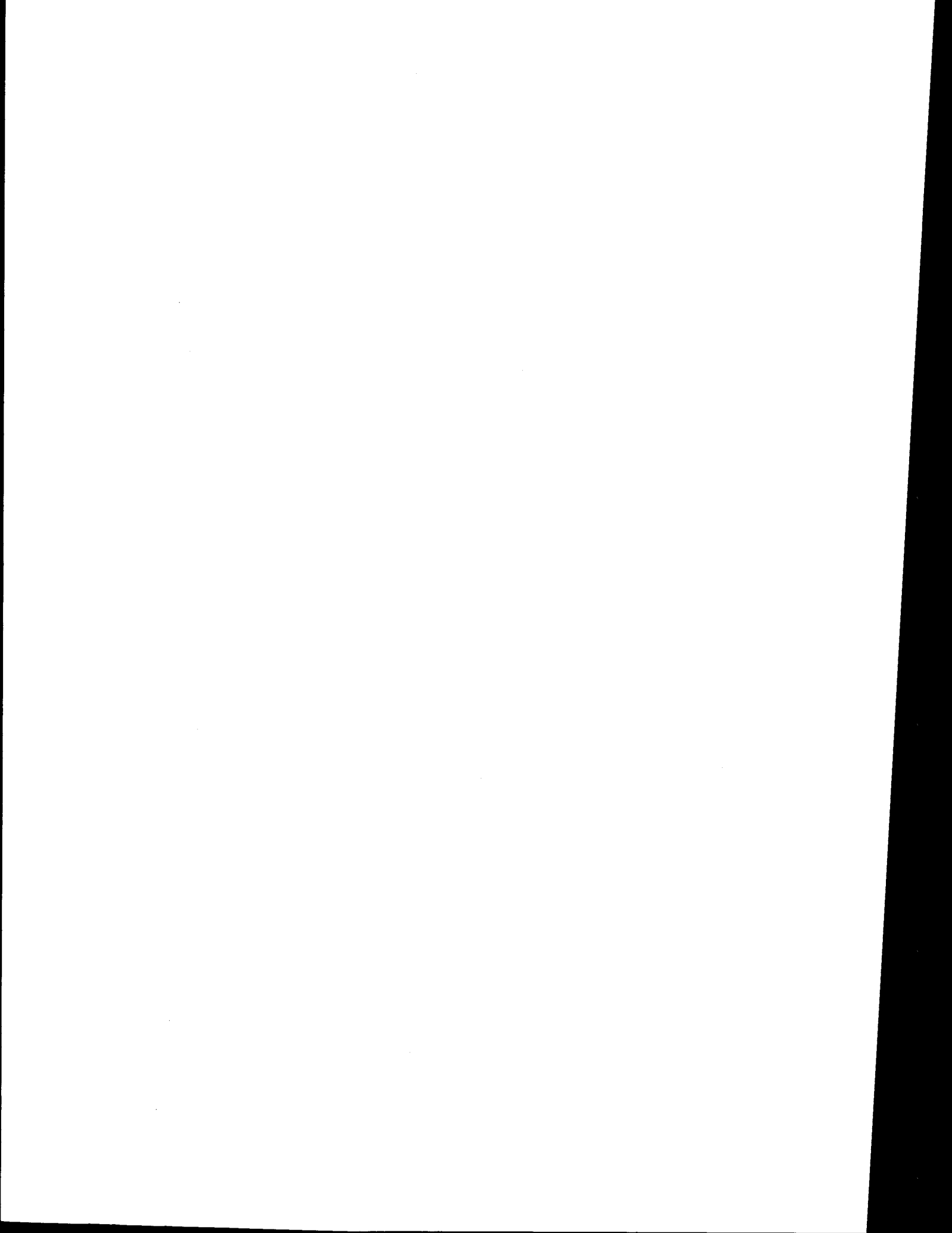
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CONSULTATION AND COORDINATION IN PREPARATION OF THE
FINAL ALUMAX ENVIRONMENTAL IMPACT STATEMENT



X. CONSULTATION AND COORDINATION IN PREPARATION OF THE FINAL ALUMAX ENVIRONMENTAL IMPACT STATEMENT.

A. Consultation in Proposal Development and Draft Preparation.

Role EIS. An expanded program of EIS preparation procedures was utilized in the development of BPA's Role EIS, which provides the regional power backdrop for the Alumax EIS. The outline for the Role EIS was prepared in cooperation with the President's Council on Environmental Quality, the Governors of the Northwest States, and all parties who commented on a 1975 draft environmental statement entitled, BPA Participation In Regional Interutility Cooperation. This latter document was a precursor to the Role EIS.

Regionwide involvement, representing a broad spectrum of regional interests, was considered necessary in assuring a comprehensive Role EIS. Investor-owned utilities, BPA preference customers, BPA direct-service industrial customers, environmental groups, State governments, Federal agencies, and others were contacted by BPA to designate representatives to review preliminary draft Role EIS material. As completed, chapters were sent to these representatives for their input. Their comments were a valuable resource for BPA and provided an opportunity for involvement to those participating reviewers.

Due to the scope and regional significance of the draft Role EIS, BPA also established an unprecedented public information and involvement program to encourage public review of the draft. This included an extension of the normal 45-day public comment period to 180 days, a greater number of review agencies, more widespread distribution of the statement summary, newspaper advertising, and media and community leader briefings. A total of 13 public meetings and workshops were held throughout the region.

Alumax EIS. As the Alumax statement was originally developed as a supplement to Appendix C of the 1977 draft Role EIS, it has received the same reviews and involvement. In addition, environmental sections of the Alumax supplement were developed using data and other information supplied by the Oregon Department of Environmental Quality. The consulting firm of CH2M-Hill also provided a wide base of data used throughout the supplement. Other agencies providing assistance included the Oregon Fish and Wildlife Commission, Portland State University, and the Oregon Department of Human Resources. Regional aluminum producers provided information on production and use of aluminum.

B. Comments Received on the Draft Environmental Statement.

Upon filing with the Council on Environmental Quality in July 1977, the draft Alumax statement was sent to Federal, State, and local agencies and other groups listed in Attachment J. Notices of availability were published in the Federal Register and in local news media. Copies of the draft statement were provided to the public upon request.

A public meeting to hear comments on the draft Alumax statement was held in Hermiston, Oregon, on November 22, 1977. In addition, comments were accepted at the Role EIS Public Response Meetings held throughout the region.

The majority of the comments received were either an expression of support for the project or of opposition, not comments related to the EIS. Support for the project was based primarily on economic reasons both regional and local, including increased employment, diversity of the economic base, and expansion of the tax base. Opposition was related to energy concerns with some environmental hesitancies.

Responses to comments follow immediately. Comment letters are reproduced following this chapter. The transcript of the public meeting is available for review at BPA Headquarters in Portland, Oregon. All comments were considered in the preparation of the final EIS.

Oregon Environmental Council

Comment #1: Is this industry a wise use of our dwindling supply of low cost power?

Response: As the Alumax contract has been ruled a valid power sales commitment, this decision is not one currently facing BPA. Future service beyond the expiration date of existing contracts is being analyzed as part of BPA's allocation policy development (see City of Portland Comment #5). Whether any use is "wise" is a subjective determination which depends upon the perspective of who is making the determination.

Comment #2: There is a conflict in the EIS regarding where the effects of fluoride and SO₂ may occur. Hydrocarbon and nitrogen oxide emissions are dismissed as minor, and emissions were expressed in terms of pollutants emitted per ton of aluminum which does not relate to the impacts of the plant.

Response: The statement in the draft EIS and the maps showing dispersion of pollutants are not contradictory. Part of the apparent contradiction regarding these items seems to result from confusion of the terms used in the draft EIS. "Plant site" refers only to the 165 acres shown as shaded on Figure II-2, whereas the "plant property" is that area identified as "Alumax Option A" on the same figure. Two thousand feet beyond the plant site to the east (the direction where impacts would be most likely on a long-term basis because of the predominant wind direction) is still on Alumax property. The air pollution from the plant does not go so far and then stop, but instead, the pollutants are dispersed outward from the plant, skewed in the direction of the wind, and are diluted. As the pollutants go further out, their concentrations and effects become less until, beyond approximately 2,000 feet from the plant site edge, their effects are no longer significant.

Data is not available to accurately quantify emissions of nitrogen oxides or hydrocarbons from the plant. Hydrocarbons may be emitted in

moderate amounts from the anode paste in horizontal and vertical Soderberg reduction cells (pots), but are not generated in significant quantities from prebake reduction cells. The anode bake furnace in prebake aluminum production plants may emit 0.50 to 1.50 pounds of hydrocarbons per ton of aluminum produced (Singmaster and Breyer, 1973, "Air Pollution Control in the Primary Aluminum Industry," Vol. 1, EPA-45013-73-004A, New York, New York, July 23, 1973). This compares to an expected 40.3 pounds of SO₂ emitted per ton of aluminum from the Alumax plant.

Other aluminum plants have not resulted in violations of ambient standards specifically resulting from their emissions of nitrogen oxides; correspondingly, no significant impacts would be expected from the Alumax plant either, other than the effect of reducing the vicinity's ability to accommodate additional nitrogen oxide sources in the future. Quantities of emissions from the proposed plant are given, by individual sources, in units other than pounds per ton of aluminum in Table IV-5 of the EIS.

Gary Matson

Comment #3: The Alumax EIS does not describe current U.S. aluminum uses in analytical form. A cutback of less than 10 percent in the production of pop and beer cans would seem to cancel the need for the Alumax plant. The final EIS must discuss packaging alternatives, benefits and disadvantages and then must address the need for the Alumax plant according to these perspectives.

Response: A general overview of U.S. aluminum use is contained in Appendix C of the draft Role EIS. Additional specific information is readily available to the public from a number of other sources including the U.S. Department of Commerce and the U.S. Bureau of Mines. A decision on utilizing recycling to obviate the need for the plant is not within BPA's ability to make. BPA does not have the authority to mandate the recycling of aluminum. (see Comment #27)

U.S. Department of Health, Education, and Welfare

Comment #4: The statement could be improved by the inclusion of additional data on future water and sewage treatment.

Response: Section III.B provides this additional information.

City of Portland

Comment #5: An allocation of power to a new aluminum facility would be most inappropriate at a time when BPA has denied Portland's application for firm power and issued notices of insufficiency to existing preference customers. Why is BPA considering an allocation to a new industrial customer when it can't meet its projected preference load?

Response: The Alumax industrial firm power contract signed by BPA in 1975 did not represent a new allocation of power but rather a change in the terms under which power allocated and contractually committed in

1966 was sold. When the original contract was signed, it was anticipated adequate electric energy resources would be available during the term of the contract to meet all regional loads including the existing DSI's and Alumax. The decision before BPA at this point is not whether to allocate the power to Alumax; this decision was made 12 years ago and contractually agreed to. The decision pending is whether the proposed Alumax facilities and contract terms are environmentally acceptable. BPA is not now in the position of making new power allocations to direct-service industries.

Comment #6: Connections between Alumax and the Role EIS should be more directly asserted. There should be some way to trace the implications of Alumax through the material in the Role EIS.

Response: The Role EIS provides the regional power system backdrop for the site-specific Alumax EIS. Impacts directly related to the plant are covered in the latter; the role of the DSI's, including Alumax, is in the former. The complex nature of the overall regional power system makes it impossible to trace the individual Alumax impacts through regional power operations.

Comment #7: Where is the detailed analysis of the new industrial firm power concept and its alternatives as required by NEPA?

Response: Industrial firm power is described in some detail in Appendix C of the draft Role EIS, Chapter Four of the revised draft Role EIS and in Chapter II of the draft Alumax EIS. Alternative industrial sales policies are being investigated by BPA in the development of an allocation policy and associated environmental analysis currently underway.

Comment #8: Has BPA considered altering the critical water year calculation to create more, less reliable firm power?

Response: This discussion is presented in Appendix A of the draft Role EIS and is to be reviewed in the allocations policy process.

Comment #9: Discussion of the impacts on the power system is not adequate. What will be the effect of this power allotment on BPA's overall allocation scheme? The discussion seems to imply it is appropriate to grant power to Alumax (which BPA may be unable to supply); why not Portland?

Response: Service to the plant will not in the short-term effect BPA's current allocation procedures. Long-term impacts will depend on the allocation policy adopted by the agency next year. See response to Comment #5 for discussion of final question.

Comment #10: Although the EIS does not adequately develop the no-service alternative, this alternative keeps power available for customers with legal preference.

Response: BPA believes the no-service alternative is adequately addressed. BPA's notice to the DSI's regarding nonrenewability of their contracts protects the rights of preference customers.

Comment #11: The EIS procedure allows the agency to carefully evaluate its proposal and alternatives to come to a reasoned decision. That decision is not preordained. BPA can, after weighing the impacts of the proposal, simply decline to serve the facility.

Response: The EIS allows for review of the proposal and alternatives from an environmental impact standpoint. Any decision not to serve the plant based on the EIS must have environmental cause. (see Comment #5).

Concerned Citizens of Clatsop County

Comment #12: The draft statement is woefully inadequate as it fails to develop the alternative of serving Alumax at Warrenton. Much of the data on Warrenton is two to three years older than comparable data for Umatilla.

Response: The Warrenton alternative is not considered reasonable as the Alumax-Pacific Corporation has dismissed the site as a viable option and has subsequently disposed of the property. This was in response to the Environmental Quality Commission's (EQC) adoption of special air contaminant standards for the locale which cannot be met by an aluminum plant using existing technology. The analysis provided in the draft was in response to the court's directive to look at this alternative. Updating of the data would not change the conclusion regarding the viability of the site nor significantly affect the comparisons between the two sites.

Comment #13: The draft fails to take into account testimony to the Umatilla County Planning Commission that the Warrenton site was preferable to the Umatilla site with respect to the issue of fluorides on water quality because of the flushing action of the estuary.

Response: This testimony is part of the controversy surrounding the Warrenton site and its suitability for a primary aluminum plant. This information was presumably considered by the EQC during their deliberations prior to the adoption of the special standards to protect the estuary from fluoride emissions even with the flushing capability.

Comment #14: Whole passages of the EIS appear to be taken wholesale from documents prepared either by Amax-Pacific or their consultants. We object strenuously to this cut and paste approach.

Response: Substantial portions of the base data used to develop the EIS were collected by consultants under the direction of BPA staff. The material was then reviewed by BPA prior to inclusion in the draft. Use of consultants, their reports, and information supplied by the company in this fashion is an accepted practice in the development of environmental documents.

Seattle City Light

Comment #15: The unavoidable social impacts discussed do not have to be adverse if proper planning and community assistance are provided by the company.

Response: This conclusion is supported by both the local communities and Alumax-Pacific Corporation. Alumax has committed itself to active participation in this process. See Chapter V for additional information.

Bruce M. Bolme

Comment #16: Discussion of the bulk alumina facility should be expanded to discuss the navigation impacts that would occur if the facility were constructed. If Alumax increases river barge traffic will Bonneville Lock become overloaded any earlier than the Corps of Engineers has estimated (1990)?

Response: At this time it is not possible to identify the specific navigation impacts of a loading facility as no decision has been made on whether such a facility will be constructed or, if the facility is constructed, where it will be built. It can generally be stated the effect will be minimal and that the Bonneville Lock will not be used to capacity any sooner. This is due to approximately 85 percent of the river's barge traffic being directed downriver. Alumax might be able to utilize now-empty barges headed upriver to pick up other products such as sand and gravel. This diversity would potentially benefit river traffic. Also, it should be noted that the Corps of Engineers Rivers and Harbors Board has recommended that modifications be made to the Bonneville Lock to reduce existing traffic problems.

Port of Astoria

Comment #17: Information contained in the EIS is in some instances outdated or presented in such a manner as to make its validity questionable.

Response: It is not known what the commentor finds objectionable in the presentation of the analysis; therefore, it is impossible to respond to this point. The question of the data being outdated is discussed under Comment #12 and in the Introduction to Chapter IV - Impacts.

Comment #18: Analysis in Chapter IX is superficial and not of sufficient depth to give the reader a true picture of the Warrenton or Clatsop County communities.

Response: Without the commentor providing specific areas of concern it is not possible to respond to this criticism. BPA believes the analysis to be adequate in detail.

Comment #19: The Warrenton site is 726 acres in size. The plant would occupy approximately 160 acres. Would compatible industrial uses be prohibited from using a portion of the remainder of the site?

Response: It is not known what the company would have done in regard to the Warrenton site; they have indicated they would accept the location of compatible industry on the Umatilla site.

Comment #20: BPA draws the conclusion that the Alumax site in Umatilla is more resilient to the siting of an aluminum reduction smelter than the Warrenton site. On what is this conclusion based?

Response: This is based on the presence of a more complex and diverse ecosystem in the Warrenton area, including the nearby estuary. This fact is evidenced by the EQC's concern with protecting the estuary in the adoption of special air quality limitations for the area.

Dick Van Tassell

Comment #21: The draft EIS does not demonstrate that the Alumax facility would be capable of producing aluminum at a lower price than it can be purchased abroad. Unless Alumax can demonstrate that the new plant can produce more efficiently than foreign producers, the proposed plant should be held in abeyance pending the outcome of the new technologies.

Response: It is not possible to predict how the cost of producing aluminum at the Alumax plant will compare with foreign produced ingot, due to a lack of data and the variety of factors contributing to the final cost. The Alumax plant will be one of the most efficient in the region, reducing energy costs. The decision on when to build the plant and the technology to be used is up to the company, not BPA.

Comment #22: The communities within the region need new sources of water. A section should be included on how shortages can be alleviated.

Response: Section III.B discusses improvements made in area water systems since the completion of the draft EIS.

U.S. Department of the Interior, Geological Survey

Comment #23: It is noted a preoperational monitoring program to document background data for potential contaminants appears to consider only groundwater quality. Monitoring measures also should include surface water permanent ponds on the Alumax property.

Response: Monitoring requirements are established by the Oregon State Department of Environmental Quality and the Environmental Protection Agency. BPA has no regulatory or enforcement authority to require this. It is assumed, should any significant impact become apparent, such monitoring programs would be undertaken. However, at this time there is no indication that this is the case, i.e., impacts are within tolerable limits.

U.S. Department of Agriculture, Soil Conservation Service

Comment #24: Rupert soils have been dropped from the soil classification system and reclassified as Quincy soils.

Response: The text has been changed to reflect this.

Comment #25: Onyx soils are considered prime agricultural soils when irrigated.

Response: Lack of proposals for expanding irrigation activities in the area of the plant site negate the significance of this for the Alumax analysis.

Doug Batey-Northwest Citizens for Wilderness

Comment #26: If BPA does not plan to serve growth in industrial loads, why is the Alumax statement being done?

Response: The Alumax statement does not involve serving industrial growth but analysis of a contractual obligation made in 1966 (see response to Comment #5). The statement examines a change in the point of service and contract terms.

Comment #27: Why is there no discussion of the costs and benefits of a major recycling program as an alternative to the construction of new electroprocess plants? Recommend a stiff surcharge on all aluminum products guaranteeing they will be recycled.

Response: Although recycling has increased in the past few years, existing programs lack the proven effectiveness needed to displace primary capacity expansion across the board. Institutional mechanisms do not currently exist for a program of the magnitude sponsored by the commentor. BPA does not have the authority to implement a surcharge. This would require action by the appropriate State governments or Congress. A general overview of aluminum recycling is provided in Appendix C of the draft Role EIS.

Comment #28: Why is BPA considering the addition of a major electrical user at the same time as they are contending that the region faces imminent shortages of electricity?

Response: See Comment #5.

William Van Horn-Forelaws on Board

Comment #29: The chlorine-assisted smelting process which is now in full production in Texas can revitalize our need to phase out the aluminum industry. Alumax offers a golden opportunity to bring this technology to all the Pacific Northwest aluminum plants. Domestic fly ash processed through the Alcoa process could completely replace our need for foreign bauxite.

Response: There has been much research done concerning alternate methods of producing aluminum. Some of the resultant processes, and their status, were briefly discussed in Attachment C to Appendix C of the draft Role EIS. Some of these processes, such as the Sumitomo process, are economically viable; for example, Anaconda aluminum has adopted the Sumitomo process as part of its program to reduce air pollutant emission to comply with Montana State requirements. Other processes, such as the Alcoa process and the use of fly ash for aluminum

production, must yet prove their economic and technical viability. In addition, certain authors have indicated doubt that the Alcoa process will prove more efficient on an overall energy basis than the best presently available Bayer-Hall-Heroult technology (Beck, F. R., "Report on Improvements in Energy Efficiency of Industrial Electrochemical Processes." Electrochemical Technology Corp., prepared for the Argonne National Laboratory, Office of the Electrochemical Project Management, Argonne, Illinois, January 1977, pp. 181-185).

Even if the Alcoa process proves commercially viable, it is not applicable to existing plants but rather would be used in new facilities.

Comment #30: Selling power at less than marginal cost will cause the DSI's to delay capital investment in energy efficient technologies.

Response: Contrary to the comment, the aluminum industry in the region is proceeding with major capital investments in efficiency improvements and pollution control equipment. Anaconda, Martin-Marrietta, Kaiser, Reynolds, and Intalco are all making multi-million dollar capital commitments in these areas. The question causing hesistancy is not what price the industries will have to pay for power but rather whether they will have adequate power available for continued operation.

Samuel Moment

Comment #31: Expansion of industrial loads resulting from BPA's Korean War activities should be specified.

Response: This information is included in Chapters I and II as well as in Appendix C of the draft Role EIS.

Comment #32: Alumax contract should be identified as a result of the Canadian Treaty.

Response: See Sections I.B and IV.C.

Umatilla Public Schools

Comment #33: Data concerning the Umatilla School District is out of date (later data supplied).

Response: Data has been updated. See introduction to Chapter IV.

City of Umatilla

Comment #34: Population and other data provided in the EIS are out of date. Additional information provided by the commentor.

Response: Data has been updated; see the introduction to Chapter IV.

Comment #35: Draft EIS does not appear to conclude that people drawn to the area because of Alumax will live in Umatilla.

Response: Data contained in the statement indicate persons relocating to the study area will settle primarily in the Umatilla and Hermiston areas. The final split between the two will ultimately depend upon such factors as available housing when the plant begins to operate. Data supplied by the City of Umatilla was used in updating statistics on these factors.

Virginia Newell

Comment #36: Identify the region's aluminum companies by name and indicate those 30 years of age or older.

Response: Additional information on the direct-service industries, their environmental impacts and relationship to the regional power system can be found in Appendix C of the draft Role EIS and Chapter IV of the revised draft Role EIS. Analysis relating to rates and rate schedules is covered in BPA's final EIS, 1979 Wholesale Rate Increase dated October 1979. All of these documents are available from BPA. This information is not within the scope of this EIS.

Comment #37: Is it not possible Mitsui would choose to export its portion of the ingot?

Response: It is not possible to predict where or how Mitsui will fabricate its portion of the ingot. This will depend on factors such as available fabricating facilities, market conditions, type of products to be produced, etc. These factors are dynamic and will vary over the life of the plant. It is possible the ingot will be exported.

Comment #38: How will the fuel oil be used?

Response: The fuel oil will be used primarily in the production of anodes and to fire holding furnaces (see Section II.B.1).

Comment #39: Do the area water and sewer systems have the capability to handle the additional Alumax-induced load?

Response: Material contained in Chapter III.B has been modified to reflect improvements made in area water and sewer systems since the development of the draft EIS. No major problems in accommodating Alumax related growth are anticipated by local officials with these new systems.

Comment #40: The 435.5 percent projected increase in SO_x emissions must be an error.

Response: The text has been modified. The actual projected increase is 385 percent. The high percentage increase reflects the absence of other major emission sources in the area.

Comment #41. Is the coal-fired plant at Carty actually in or beyond the planning stage?

Response: The Portland General Electric Carty coal plant is currently under construction. It is scheduled to begin commercial operation in late 1980.

Comment #42: Is Alumax within the critical area for ground water aquifers?

Response: No.

Comment #43: As the party responsible for preparing the EIS, BPA should determine the costs involved in providing a new and ample water supply.

Response: The cities receiving the major portion of the Alumax population now have adequate facilities to serve this growth. Planning for a regional water system is continuing. It is too early in the process to predict costs, but this factor will be considered by the appropriate government entities.

Comment #44: School figures should be updated.

Response: See Comment #33.

Comment #45: Has Alumax considered funding the purchase of additional park lands to alleviate the predicted shortage of park property? What about other services? What amount of taxes will be prepaid? Do I hear you saying you are in effect sympathetic but not really able to mitigate the damages to the community which your action precipitates?

Response: Alumax has indicated a cooperative stance in assisting local governments in the mitigation of adverse socioeconomic impacts associated with plant construction and operation. Specifics will be negotiated at a time closer to when the impacts would actually occur. The negotiations would include the amount of taxes to be prepaid.

Comment #46: Would the occupants of the three impacted residences be compensated financially or be relocated by Alumax during construction of the transmission lines?

Response: At this time there are no provisions for this.

Comment #47: The draft EIS states that "air emissions of SO_x and fluorides would affect vegetation immediately surrounding the plant site, but not off the Alumax property." How do you predict exactly how far the fluorides would travel?

Response: The statement that SO_x and fluorides impact vegetation immediately surrounding the plant site, but not off the Alumax property, does not imply that the pollutants travel so far and then stop. Fluorides and SO_x emitted from the plant are carried by air currents and are dispersed in a large volume of air surrounding the plant. The further from the plant, normally, the lower the concentration. Dispersion analyses using computer programs to predict ambient fluoride and SO_x concentrations performed by Cramer and Bowers showed that concentrations of fluoride beyond the plant property boundary are low enough

to not significantly affect vegetation. Cramer and Bowers did not address ambient levels on the plant site. However, it is conceded that relatively high fluoride and SO_x levels may occur in parts of the plant site, primarily because of downwash conditions in which pollutants may be drawn down and concentrated between and adjacent to the plant buildings by wind currents. Concentrations of fluoride and SO_x in work areas are controlled by Occupational Safety and Health Administration standards which are considerably higher numerically than the ambient air quality standards.

Comment #48: EIS should contain an estimate of the effects on birds and mammals of building Alumax, mentioned in Chapter III, particularly migratory waterfowl.

Response: Plant construction will have a short-term impact on terrestrial life in that as the plant is constructed, the additional activity will cause disruption of the natural systems. However during the operation phase this impact will be limited to the area immediately surrounding the plant with the remainder of the plant site reverting to preconstruction activities. Adequate nesting area exists for waterfowl displaced by plant construction and operation. The same holds true for resident mammals.

Chris Talkington

Comment #49: Perhaps the single most important point to take into account for such an energy-intensive industry is that the bulk power deliveries are sold at costs which require subsidization by the residential and commercial consumer.

Response: This statement is incorrect. Cost-of-service studies done by BPA and others indicate the industrial rates are adequate to recover costs. Historically, the industrial revenues have subsidized other categories as they have lower service costs while paying the same base rate as other customers (see Appendix C of the draft Role EIS and BPA's final EIS on the 1979 Wholesale Rate Increase).

Comment #50: Industrial firm means 25 percent of the total power could be interrupted at any time and would tend to cause Alumax sooner or later to look for firm power to supplement the uncertain 25 percent.

Response: Section IV.C has been expanded to address this issue.

Comment #51: There are questions concerning emissions of considerable quantities of carbon monoxide (CO), a substance known to have deleterious health effects, from the plant. Adequate research into wind dispersion of the CO should be conducted and protection to area residents should be provided, perhaps by purchasing and preventing access to the areas having the maximum concentrations.

Response: The proposed Alumax plant would be a significant source of carbon monoxide. However, modeling to predict maximum impacts of carbon monoxide from both the plant and from plant-related traffic has been performed by Cramer and Bowers and is reported in Table IV-5. The

impacts are significantly below State ambient air quality standards. Data on existing ambient carbon monoxide concentrations in the area are not available, but in other locations similar to the study area which have not been heavily urbanized and which have no major existing point sources, ambient carbon monoxide concentrations are below standards. Carbon monoxide is principally a problem in large cities with dense traffic congestion. Therefore, no effects from carbon monoxide emissions from the proposed plant are predicted other than the effect that the introduction of the plant would reduce the ability of the area to accommodate other carbon monoxide sources in the future.

Comment #52: Water rights are liable to be affected by the 645,000 GPD required by the plant.

Response: Water supplied to the plant will be from ground water sources. The controversies of competing uses and water rights are of ongoing concern to the region, but will not be significantly impacted by the Alumax proposal.

Comment #53: To claim that the tax base increase will solve growth problems is unrealistic, at least without supporting research of considerable more depth than has been provided.

Response: Due to the magnitude of the tax base increase versus population increase, it is believed by local officials responsible for service planning that the additional services required can be provided. Chapter IV describes in some detail what the actual impacts would be. The analysis adequately supports the conclusions reached.

Comment #54: The EIS should consider waste heat utilization and cogeneration.

Response: Cogeneration is not considered a reasonable energy alternative for the plant as the process requires electric energy, not just heat. BPA and the Pacific Northwest Regional Commission are investigating the use of waste heat from industrial facilities, including aluminum plants, in a variety of uses. A pilot project at Intalco Aluminum in Ferndale, Washington, is currently under development.

Comment #55: Object to the State Air Contaminant Discharge permit for sulfur dioxide because it is expected that low-sulfur fuel oil may be impossible to obtain in the future and, therefore, alternate control of sulfur dioxide emissions should be required.

Response: The State Air Contaminant Discharge permit limits sulfur dioxide emissions by limiting the sulfur contents of the fuel oil, coke and hard pitch which may be used at the plant. With time, these low-sulfur materials may become impossible to obtain. In this event, the State could require the plant to be retrofitted with sulfur dioxide emission-control equipment, or the plant would switch to other fuels, such as low-sulfur gas derived from coal to prevent violations of ambient SO_x standards. These solutions would be expensive, however, and since the plant is not predicted to cause excessive ambient SO_x

concentrations with use of the currently available low-sulfur oil and raw materials, the imposition of further sulfur dioxide control at this time was deemed inappropriate and unnecessary.

Oregon Department of Environmental Quality

Comment #56: Final EIS should include a map of noise-sensitive properties along the rail spur.

Response: In an attempt to limit the volume of the EIS, this was not included. The text provides adequate information for analysis.

Rev. Douglas M. Still

Comment #57: Final EIS should contain the terms of the existing contract with Alumax.

Response: The information is provided in Section II.A.

Comment #58: Publish the terms of the out-of-court settlement of the suit brought by Congressman Weaver and the committee for an Emerald PUD agreed to in 1976.

Response: In October 1975, Congressman James Weaver and the Emerald PUD Committee, Inc., filed suit against BPA Administrator Don Hodel and Acting Secretary of Interior Kent Frizzell, alleging that BPA was proposing to renegotiate its power sales contracts with its direct-service industrial customers to permit service to those customers past the time when then-current contracts were scheduled to expire, and requesting, among other things, that the court enjoin the signing of such contracts. The Weaver suit was settled in a Stipulation and Order of Dismissal filed by all parties in the U.S. District Court for the District of Oregon on January 19, 1976, Civil No. 75-955, with the stipulation "that the Bonneville Power Administration continues to adhere to its policy of consideration for the rights of preference customers...." Since that time, BPA has not renegotiated power sales contracts to extend service past scheduled expiration dates. Any proposal to extend the term of service of a power sales contract would be evaluated on the basis of an environmental impact statement, or other appropriate environmental document. The Stipulation and Order for Dismissal is available for public inspection in the clerk's office of the Federal Courthouse, Portland, Oregon.

Harmon H. Rulifson

Comment #59: Where are potential alternate sites? Why doesn't BPA consider a wider range of sites?

Response: The decision on a plant site was made by Alumax-Pacific after a study of regional sites. It would not be possible for BPA to determine alternate sites which meet Alumax-Pacific criteria as these depend on company priorities and other proprietary information. The Umatilla site meets BPA criteria regarding minimized transmission requirements. Sites considered prior to Warrenton are identified and discussed in Chapter I.

Comment #60: What is the environmental balance desired for aluminum facilities in the BPA market area?

Response: Beyond the State and Federal requirements for pollution control at said facilities, no formal "balance" exists. BPA does not have a policy on this issue beyond requiring in the appropriate power sales contracts that environmental requirements be met.

Comment #61: Should we consider the Pacific Northwest a closed issue for certain energy-intensive industrial/manufacturing concerns who, on balance, do little to improve employment in relation to the amount of energy they consume.

Response: The resolution of this issue is beyond the authority of BPA and the scope of this EIS. It involves questions and priorities for utilities, State, and local governments, and the public at large.

Comment #62: EIS does not equitably treat how the allocation of power contracted from BPA might better serve the citizens of the Pacific Northwest over the long-term.

Response: The question of power allocation alternatives is not appropriate to this document as there is no allocation decision pending on the proposal. BPA is addressing this issue in the allocation policy and associated environmental documents currently being developed (see Comment #5).

Andrea Paroni

Comment #63: The effects of the Alumax plant on the already critical water situation were not given substantial consideration.

Response: Adequate analysis is contained in the draft EIS to evaluate the impact of the plant and associated population growth on water supplies. In addition, Chapter III of the final EIS has been updated to reflect recent improvements in area water systems.

Comment #64: What impact will the introduction of manufacturing workers into an agricultural community have on community cohesion?

Response: The social structure effects resulting from the introduction of the Alumax work force would be felt most significantly in the City of Umatilla where it is estimated these workers and their families could amount to as much as one-third of the city's population. The community presently serves as a business and service center for the area's predominantly agricultural economy. The Alumax work force would significantly increase the heterogeneity of the area's socioeconomic composition. In some cases, the new influences and desires of the Alumax workers may be perceived as threatening or in conflict with existing local goals and standards. It may take some time for these workers to become fully assimilated into and accepted by the existing community. This process could be slowed if the new community members are concentrated in new housing developments. The impact will be mitigated by the company's emphasis on hiring local residents where possible.

Comment #65: Why build a new capital investment facility like Alumax when facilities which produce substitute products sit idle?

Response: The plant is being constructed to meet the growing market for aluminum, both in the United States and abroad. Although in many instances there are products which can be substituted for aluminum, the substitutes frequently lack some of the qualities which make aluminum preferred in the market place. An example of this is the increasing use of aluminum in the transportation industry to reduce energy consumption. BPA is not in a position to use its industrial sales policy to change market mix.

Peter Bosserman

Comment #66: The combined potential effects of the proposed Alumax plant, Portland General Electric's coal plant near Boardman, Oregon, which is under construction, and Boise Cascade's pulp and paper mill at Wallula, Washington, should have been discussed. These are three significant SO_x sources in nearly a straight line and relatively close together.

Response: It is correct that the projections of air quality impact of the Alumax plant given in the draft EIS did not consider the effects of the Boardman coal-fired powerplant nor the Wallula mill. BPA has obtained projections of the air quality impact of the Boardman plant ("Boardman Coal Plant and Associated Transmission Final Environmental Impact Statement," USDA-REA-EIS(ADM)-77-4F, January 1978, U.S. Department of Agriculture, Rural Electrification Administration) and for the Wallula pulp and paper mill expansion ("Final Environmental Impact Statement for Boise Cascade Corporation's Proposed Pulp and Paper Mill Expansion at Wallula," December 23, 1977, Washington State Department of Ecology (Lead Agency)). Due to lack of information concerning the spatial distribution of pollutant concentrations from the Boardman plant, it is impossible to completely assess the combined effects of the three plants on the basis of these documents and the analysis which was performed for Alumax; to do so would require additional modeling. However, it is possible from these available analyses to characterize the probable combined impacts relative to air quality standards and prevention of significant deterioration (PSD) criteria.

First, as a gross means of analysis, the maximum expected impacts of each of the plants were tabulated and compared to ambient air quality standards and PSD criteria. This tabulation appears as Table X-1. The Boise Cascade mill at Wallula is currently undergoing expansion, so for purposes of comparing its effect with respect to the PSD criteria, only the difference between its base condition (accepted as the plant's condition as of December 1975 by the regulatory agencies) and contributions to ambient pollutant concentrations after the plant expansion is used. This analysis is extremely conservative in that the maximum impacts from the individual projects would not occur at the same time, in the same place, or under the same conditions, and furthermore, the dispersion modeling and assumptions used to derive the values in the

TABLE X-1
MAXIMUM CONTRIBUTIONS OF ALUMAX, CARTY COAL, AND
BOISE CASCADE TO CONCENTRATIONS OF AMBIENT AIR POLLUTANTS

	1	2	3	4	5	6	7	8	9	10
	Background ug/m ³ 1/	Alumax ug/m ³ 2/	Boardman Coal ug/m ³ 3/	Boise Cascade Before Expansion (12/24 Base Conditions) ug/m ³ 4/	Boise Cascade After Expansion ug/m ³ 4/	Boise Cascade PSD Increment (Column 5 Minus Column 4) ug/m ³	Maximum Air Quality Deterioration (Totals of Columns 2, 3, And 6) ug/m ³	Class II Prevention of Significant Deterioration Limit ug/m ³	Maximum Ambient Air Quality Concentrations (Total of Columns 1, 2, 3, and 6) ug/m ³	Ambient Air Quality Standard ug/m ³
Particulate										
Annual Geometric mean	39.4	6.8	6	22	23	1	13.8	19	53.2	60
24-hour maximum	105	17	15	90	90	0	32	37	137	150
SO ₂										
Annual Arithmetic Average	13	14	6	5	14	9	29	20	42	53.3 6/
24-hour maximum	13	41	26	95	51	-44	23	91	131	260
3-hour maximum	13	105	130	228	162	-66	169	512	410	1300 7/

Footnotes:

- 1/ Background values from the Table IV-8 of the Draft Alumax EIS are used. These are probably typical for the entire area of concern, but do not include days having obvious dust storms.
- 2/ From Table IV-8 of the Draft Alumax EIS.
- 3/ From Tables 2.5 and 26 of the REA EIS on the Carty Coal plant and page 3.2-17 of its attachment.
- 4/ From Table 6.3 of the Final EIS on Boise Cascade Plant Expansion.
- 5/ This calculation uses column 6 since the Wallula mill is an existing plant and its existing emissions are reflected in the background values. Only the change in emissions due to the expansion will appear as increases over existing ambient pollutant concentrations.
- 6/ Washington State Standard which is more stringent than Oregon or Federal standards. Except as otherwise noted, standards apply to both Washington and Oregon.
- 7/ In addition, Washington has a 1-hour SO₂ standard of 1040 ug/m³ which is more stringent.

table are conservative. Even with these conservative assumptions, however, the table shows that particulate PSD limits and ambient standards and SO₂ PSD limits on 3-hour and 24-hour basis will all be met. Ambient particulate concentrations will continue to exceed standards because of wind blown dust, field burning, agricultural tilling, etc. on some days, but this would occur independently of the three industrial plants.

The table indicates a possibility that the annual arithmetic average PSD limit for SO₂ might be exceeded, and a more realistic analysis of this case is warranted. The EIS's done on the three projects indicate the impact of the Alumax plant is less than 0.5 ug/m³ at Boardman, and less than 2 ug/m³ at Wallula. The impact of the Wallula plant (after expansion) at Boardman and Umatilla, is less than 1 ug/m³. Information on the Boardman plant indicates that the maximum annual average SO₂ impact is 6 ug/m³, but that, with respect to the Boardman and Alumax plants, "very little interaction between these plants is expected owing to the distance between them" (REA Final EIS, p. 92). Maximum combined impacts at each of the three sites are determined in Table X-2. The combined effect of the three plants is not anticipated to violate the annual arithmetic average PSD limits because the distances between them are such that pollutants from any one of the plants will have dispersed to small concentrations before they reach any of the other two plants.

Comment #67: The Alumax area is farm country. Damage to crops and animals deserves more thorough treatment.

Response: It is true Alumax is located in an agricultural area. The impacts on area agriculture are discussed in Section IV.A.; as no significant damage or impact is expected, the discussion is limited in accordance with CEQ guidelines.

Comment #68: There is no description of the effects of excessive fluoride emissions on livestock nor any comparison of ambient levels of anything but State or other standards; these are needed because the area is dominated by agriculture and because EIS's must be understandable to the layman.

Response: There was no extensive discussion of the effects of excessive fluoride concentrations on livestock because these effects are well documented in readily accessible literature and because such effects are not predicted to be significant in the case of Alumax. The standards referred to in the EIS are valid devices by which to assess impacts since they are based on scientific evidence and are established at levels generally considered adequate to prevent undue harm to humans, animals, and plants.

Francisco Hernandez

Comment #69: Be more specific about the bulk alumina handling facility. Would BPA agree to provide power to such a facility? Would the widening of the Columbia River be in question?

TABLE X-2

COMBINED IMPACTS WITH RESPECT
TO THE ANNUAL AVERAGE PSD LIMIT FOR SO₂

Impact Location	SO2 Contributions, $\mu\text{g}/\text{m}^3$			Combined Air Quality Deterioration (Total of Columns 1 Through 3) $\mu\text{g}/\text{m}^3$	Class II PSD Limit, $\mu\text{g}/\text{m}^3$
	(1) Alumax	(2) Boardman Coal Plant	(3) Boise Cascade After Expansion		
Boardman	Less than 0.5	6	Less than 1	Less than 7.5	20
Alumax Site	14	6 <u>1/</u>	Less than 1	Less than 21	20
Wallula	Less than 2	6 <u>1/</u>	9 <u>2/</u>	Less than 17	20

1/ Page 92 of the Final REA EIS on Boardman indicates that impacts from the Boardman plant at the Alumax and Wallula sites will be must less than this maximum value, but no quantitative data were given. Alumax is about 25 miles east of the Boardman plant, and the Wallula mill is about 20 miles northeast of Alumax.

2/ This value represents the deterioration resulting from the plant expansion at Wallula.

Response: At this time, additional information on the location and type of alumina facilities to be developed is not available. Consideration will be given to the alternatives at a time closer to commencement of plant operations. The alumina facility will require additional environmental approval from appropriate local, State, and Federal agencies. Power to the facility will likely be provided by the local utility. Power demands are not anticipated to be large. The Columbia River would not be affected.

Comment #70: Are there any air pollution control systems capable of controlling SO, CO, and CO₂? It is unclear what will be done about emissions of these gases from the plant.

Response: Sulfur dioxide (SO₂) emissions from the plant are being limited through limitations on the sulfur content of fuel oils, coke, and hard pitch which may be used by the plant. These limitations are contained in the State of Oregon Air Contaminant Discharge permit issued for the facility. Additional SO₂ controls, such as scrubbers similar to those applied to coal-fired powerplants, could be applied but would be costly, resulting in additional water usage, waste water treatment, solid waste, noise, raw material consumption, and energy requirements. In light of these disadvantages and the fact that SO₂ scrubbers are not necessary to meet ambient air quality standards,² the Department of Environmental Quality did not require control of SO₂ emissions beyond that resulting from the limitations on sulfur content of raw materials.

No control of carbon monoxide (CO) is planned beyond using good operating and maintenance practices for combustion sources. Combustion sources produce increased amounts of CO and require additional fuel if poor operating and maintenance practices are followed. The only other control technique for CO is oxidation of CO to carbon dioxide (CO₂). Some of the CO produced by the chemical reactions occurring in the pots is inherently oxidized when it contacts free oxygen above the bath within the pots and as it leaves the pots. The remaining CO is too low in concentration to make practical control by deliberate oxidation in an afterburner. The predicted emissions of CO would result in concentrations of CO in the ambient air which are far below applicable standards as shown by Cramer and Bowers' calculations, obviating the need for additional equipment.

Carbon dioxide (CO₂) is an inherent by-product whenever carbonaceous materials are burnt or oxidized. Although there is now concern and controversy about the potential for eventual climatic changes from increased atmospheric CO₂ (the "greenhouse" effect), CO₂ has not historically been considered a pollutant and is not harmful to health. There are no ambient air quality standards for CO₂ and no environmental agencies have taken specific actions to control or limit CO₂.

Comment #71: How the waste water will be treated remains unclear at this time.

Response: It is anticipated the waste water will be handled by the City of Umatilla sewer system. If this proves to be unviable, the company has indicated they may install their own system. If this occurred, approval from the State Department of Environmental Quality would be required.

Comment #72: There should be a more definitive statement concerning alternative control plans should the proposed system fail to meet specifications. If ambient air standards are exceeded, what is the proposed strategy for rectifying this?

Response: The efficiencies and characteristics of operation of the proposed air pollution control systems are in line with good engineering practice and experience. Violations of the permit conditions relating to air quality established by the Department of Environmental Quality (DEQ) and/or violations of ambient air quality standards resulting from the plant are unlikely during normal operation. Violations of ambient standards could occur if there were a failure of an air pollution control device. In this event, prompt action would be required by DEQ to repair the control device and/or shut down the offending plant facilities to alleviate the problem. Instrumentation and monitoring programs have been required by DEQ to detect any problems with or deteriorations in performance of the control devices, in order that corrective action can be taken prior to the development of serious failures. If, in spite of all precautions, violations still occur, DEQ could require further air pollution control measures to be implemented, or in the extreme case, could force closure of the plant.

Kevin Saderup

Comment #73: What other areas are being considered or might be considered for location of the plant?

Response: While Alumax remains committed to a plant at the Umatilla site and no substitute sites are being considered, the company has an additional plant currently under construction in South Carolina, and one under consideration in Australia. Factors analyzed in determining site suitability include access to and availability of raw materials (including electric energy), labor, transportation facilities, and environmental characteristics.

Shaun Maxey

Comment #74: What inhibits BPA or other groups from submitting other sites for consideration?

Response: See Comment #59.

Comment #75: There is inadequate consideration given to emergency services. What is meant by localities? Is the impact area adequately covered? Is a rating system available?

Response: Localities is used here to mean the local communities under discussion and surrounding development. The area is adequately covered in the sense services are available, recognizing the rural, low-density nature of the study area. BPA is unaware of a rating system for this type of service.

Comment #76: Will Alumax create jobs that allow small farm families to keep their property and slow the changes toward larger, more mechanized farms?

Response: It is not possible to make a credible correlation between Alumax employment and the survival of family farms due to extraneous factors.

Comment #77: The area's governments are not prepared to adequately manage the problems that will be caused by Alumax.

Response: Without specific areas of concern being identified, it is not possible to respond to the comment. Area officials are confident they are prepared to deal with any problems which may arise.

Comment #78: Comprehensive planning was not completed in time for the draft. Will it be done by the time Alumax begins production?

Response: It is anticipated that, in line with the requirements of the Oregon Land Conservation and Development Commission, this will be accomplished.

Curtis Nimz

Comment #79: Aluminum is said to be more economically efficient than alternatives; however, no examples are given to support this contention.

Response: Examples would include the use of aluminum in the construction and transportation industries and in the transmission of electrical energy (see "The Pacific Northwest Aluminum Industry: The Impact of Anticipated Power Rate Increases to 1991," Office of Industrial Economics, Office of the Chief Economist, U.S. Department of Commerce, April 1979).

Comment #80: The writers of the EIS have skirted a significant impact of the plant by not mentioning the aluminum industry's connection with the beverage container industry and not considering the competition of aluminum beverage containers with those made of glass.

Response: BPA is unaware of any such connections which would affect the decisions addressed by this EIS.

U.S. Army Corps of Engineers

Comment #81: Discussion of the bulk alumina handling facility should be expanded to discuss the navigation impacts that would occur if such a facility were constructed.

Response: See Comment #69.

Jean Siddall-Oregon Rare and Endangered Plant Species Task Force

Comment #82: Commentor provides information on rare and endangered species in the area.

Response: This information has been incorporated into the text in Chapter III.A.

Comment #83: Site should be searched for all the species noted.

Response: Based on the information in Chapter III and the uncertain construction schedule for the plant, a site search is not justified at this time. If appropriate, this will be done prior to plant construction.

Jerry J. Bromenshenk

Comment #84: Do the authors really expect anyone to believe that fluorides would accumulate in vegetation to levels above the DEQ 40 ppm dietary tolerance levels for animal life and not expect to see fluoride accumulate in biological systems outside of the plant boundary, or that the smaller animals would not move on and off the property.

Response: Fluoride accumulation will occur to some degree off the plant site. As with air pollution, fluoride does not go just so far and stop but decreases as distance from the source increases. Levels off the plant site would be below the tolerance threshold, particularly for wildlife (see Table IV-3). On the plant site where the 40 ppm dietary tolerance level will be exceeded, domestic animals which are most affected will not be present. It would be unrealistic to expect native animal life to remain only on the plant site. However, it should be kept in mind that as these animals do wander, the percentage of their diet that is made up of fluoride-exposed vegetation becomes smaller, thereby reducing any impacts which may occur through their ingestions of vegetation from the plant site.

Comment #85: The EIS does not adequately address the impact of fluoride emissions on bees.

Response: The commentor presents a great deal of information on potential impacts of fluorides on bees. Most of the data is based on existing aluminum plants which emit larger quantities of fluorides due to having less efficient controls than the proposed Alumax plant. Based on the lower emissions and nature of the agricultural activity closely located to the proposed plant, the plant's impact on bees is not anticipated to be a major problem. The majority of the area bee population identified by the commentor is located outside the area impacted by fluoride emissions from the plant.

Comment #86: The estimate of total fluoride emissions from the proposed Alumax plant, 46.8 tons per year, seems unusually low compared to similar plants and in view of the estimates of fluoride accumulation in

vegetation of over 40 ppm near the plant. Also, fluoride emissions were recalculated based on the amount of ore processed and were found to be 2,663 pounds per day as opposed to the 256.4 pounds per day reported in the EIS.

Response: The total fluoride emissions from this proposed plant would be low compared to other aluminum plants because it would feature superior air pollution control. For example, if constructed, the plant would be the first in the Northwest, and possibly the nation, which would have both primary and secondary air pollution control systems applied to its potlines. The predicted accumulations of fluoride in excess of 40 ppm occurring near the plant site and not off the Alumax property, result from the fact that, even though planned air pollution control is superior and predicted emissions are low, the dispersion of pollutants, particularly from the secondary scrubbers, is not good. This is because the temperatures from these discharges are low, giving little buoyancy to the plume and because the discharges are only 75 feet above ground. These discharge characteristics result in the highest fluoride concentrations being very close to the plant.

Without knowing how the fluoride emission estimates referred to in the comment were derived, BPA cannot comment on them. However, the estimates of fluoride emissions published in the draft EIS have been reexamined and were found to be reasonable in view of the air pollution control devices planned. Furthermore, these estimates have been scrutinized by the Oregon Department of Environmental Quality and the Federal Environmental Protection Agency, and have been found accurate by both.

State of Washington-Department of Game

Comment #87: If firm power generation facilities have to be constructed as a result of Alumax demands and the resultant energy deficit, BPA is creating an artificial demand. System reliability would be jeopardized. Additional discussion of power system impacts would be helpful.

Response: Section IV.C has been revised to address these concerns.

Comment #88: It is stated that "The Alumax load would increase generation, [during low load hours] thereby reducing spill." Is there connected with this statement an underlying meaning or forewarning that more and more trucking operations will be necessary as a result of this proposal?

Response: No.

Comment #89: There are conflicts in the draft EIS concerning the air pollution control proposed for the plant. In one instance, the text implies that the best control is to be used whereas, later in the text, it is stated that more control is possible. Perhaps this dilemma could be resolved by correlating the quality and quantity of pollution control devices to pollution reduction potential.

Response: The air pollution control devices and measures proposed for the plant will be superior to that of existing aluminum reduction plants. Alumax would be the only aluminum reduction plant in the Pacific Northwest with both primary and secondary control of potline emissions, and would use the highly efficient "dry scrubber" technology for fluoride and particulate control of both primary potline emissions and anode bake furnace emissions. The proposed plant controls have met the Oregon Department of Environmental Quality requirements for application of "the highest and best practicable treatment and control." Nevertheless, it is conceivable that further air pollution control could be applied, particularly for sulfur dioxides. For example, scrubbers similar to those used on powerplants to reduce sulfur dioxide emissions could technically be installed in series with the proposed control devices to treat the gases from the primary potline control system and the anode bake furnace. Such controls have not been applied to other aluminum reduction plants; would substantially increase the plant capital and operating costs; would result in additional water consumption, water pollution control requirements, solid waste, and noise; would require additional electrical energy and raw materials; would adversely affect dispersion of the remaining pollutants by cooling the gases; and would not be necessary to meet ambient air quality standards. Thus, the application of these controls is not very practical and the Oregon State Department of Environmental Quality has chosen to impose only the more easily implemented and economical limitations on sulfur contents of fuels and raw materials in order to assure that the plant will not result in excess sulfur dioxide emissions nor violate ambient air quality standards.

Comment #90: What is the possibility of cyanides from spent pots entering the Columbia River through drainage or sewer systems? What about detergents, oils, grease, suspended solids, or trace metals?

Response: Proper storage of spent pot material will prevent cyanide contamination to either the Columbia River through drainage or sewer systems or ground water through leaching. Other pollutants identified may occur in minor quantities and will be accommodated through the water disposal systems. Any subsequent impact would be insignificant.

Comment #91: Impacts on wildlife of eliminating ponds should be covered in the wildlife section.

Response: As the ponds will be replaced elsewhere on the plant site, the wildlife impacts related to eliminating the ponds are anticipated to be negligible.

Comment #92: What measures would be taken to protect irrigation water from fallout of air contaminants as required by the Oregon DEQ?

Response: Specific measures have not been identified at this time. These will be developed after the preoperational monitoring program is completed and specific potential problems identified. Measures may be modified after the plant begins operation to assure problems are addressed.

Comment #93: How was the aquatic buffering capacity factor obtained? Is the Columbia River included as a whole, or would there be small sections or periods when buffering capacity would be low enough to become critical to wildlife?

Response: The buffering factor was obtained from the DEQ analysis done prior to the issuance of the Air Contaminant Discharge permit. It includes the total Columbia River as the impacts are related to airborne emissions. The circumstances are inconceivable which would create impacts of a critical nature in any area of the river.

Comment #94: A possible impact to wildlife that might be included in your document involves transmission lines. Studies such as The Impact of a Proposed 500-kV Transmission Line on Waterfowl and Other Birds, by Willard and Associates, indicate that there are measurable kill rates of birds where lines cross aquatic habitat. The McNary area is within a major flyway intensively used by ducks and geese. Waterfowl concentrations of up to 100,000 are presently in the general vicinity. Increases in numbers of transmission lines may result in a higher rate of bird kills.

Response: The proposed plan of service would be the construction of two single-circuit 230-kV transmission lines from BPA's existing McNary Substation to the proposed Miller Substation. These would parallel the Lower Monumental-John Day No. 1 500-kV transmission line along most of the proposed route. The greatest possibility for impact to waterfowl would be where the two lines do not parallel the Lower Monumental-John Day No. 1 line for a half mile coming out of the Miller Substation. BPA studies of a similar-type line have shown that waterfowl flights across the line resulted in collisions (Meyer, James R. 1978. Effects of Transmission Lines on Bird Flight Behavior and Collision Mortality. Prepared for Bonneville Power Administration, Engineering and Construction Division, by Western Interstate Commission for Higher Education (WICHE), Resources Development Internship Program, Boulder, Colorado, pp.201). Most collisions were thought to have occurred with overhead groundwires. Actual numbers of waterfowl involved in collisions were slight and the level of mortality was not considered biologically significant. Similar results are expected with the proposed lines. The chance of collision would be increased for flocks which cross the transmission lines repeatedly. Most waterfowl in this area are migratory and would be affected for only a short period.

Comment #95: Further discussion regarding water resource priorities (irrigation, agriculture, fisheries, navigation, etc.) in relation to impacts from Alumax power consumption could be helpful.

Response: As the Alumax power consumption will not cause an increase in power generation except potentially during low load hours, there is no direct relationship between service to Alumax and these priorities. These issues are discussed on a system level in many readily accessible documents including BPA's draft and revised draft Role EIS.

Comment #96: In light of the Washington State Department of Commerce Aluminum Industry Study, validity of the Alumax EIS assessment of the local area benefits and disbenefits resulting from the proposed plant is questionable.

Response: For purposes of perspective, the employment and electric power use have been related to those comparable regional totals. Employment at primary aluminum plants in the Pacific Northwest in 1976 was 11,250, with wages and salaries of \$233.8 million. This employment was about 2 percent of the region's manufacturing employment and about 0.4 percent of the total employment. These percentages on a regional basis are not significantly large; however, the economic importance of these plants varies substantially depending on the location. Also, the region's aluminum producers contend that even though the industry is not labor intensive, it nonetheless does support local economies because of the relatively high wages paid with a resulting comparatively large flow of this income into local economies.

The proposed Alumax plant would serve to diversify the economic base of Umatilla County and the surrounding areas. The employment and economic impacts, while significant, are not anticipated to be overwhelming to the local economy or to create undue community impacts. Those areas that derive the greatest economic benefits from the plant's location would also be the areas that experience the greatest impacts.

Comment #97: Additional discussion of environmental impacts that would result from peaking and/or installation of additional power generators could be helpful.

Response: It is not possible to specify impacts of this type which would be directly related to Alumax service due to the complex nature of the region's power system. In addition, no new generating facilities will be developed to serve the plant. For a discussion of system impacts relating to these areas, the reader is referred to Appendix A of the draft Role EIS and Chapter IV of the revised draft Role EIS.

EPA Region X

Comment #98: The description of existing public water supplies should be expanded to indicate whether each supply meets the interim Primary Drinking Water Regulations promulgated under the Safe Drinking Water Act.

Response: The Oregon Operations Office of the EPA reports that Echo was operating under a compliance agreement due to bacteriological problems. Hermiston was characterized as having minor bacterial problems; however, this was disputed by a Hermiston official. Irrigon was in violation due to not reporting. No other area communities had any problems. The Alumax plant would not impact the drinking water quality of the area's communities due to plant induced population growth; however, should problems persist or exist in the future, more people could potentially be exposed to them.

Comment #98: Tables III-7 and III-8 should be expanded to include information for southeastern Washington.

Response: Tables have been revised.

Comment #99: Table IV-5 should state the efficiency of the dry scrubbers.

Response: Table has been revised.

Comment #100: The discussion of fluoride emission impacts on wildlife needs some clarification and expansion. The FEIS should: (a) indicate whether any of the species bioaccumulate fluorides, and (b) discuss impacts on rare and endangered species in the area such as the prairie falcon.

Response: (a) The impacts of fluoride emissions over long time frames have not been well-documented. It is not known which wildlife species bioaccumulate fluorides or what the impacts would be. Research on the tolerance levels of fluorides indicates that the primary effect of acute exposure in concentrations above a few mg/m³ is irritation of the skin, eyes, and respiratory passages. Localized tissue damage may occur as a result of the corrosive nature of this compound at concentrations above the recommended limits. The severity of any pathological change would be more or less proportional to the duration and concentration of exposure to the contaminants.

(b) The prairie falcon is not listed by the U.S. Fish and Wildlife Service on their list of endangered or threatened species. In the past, this species has been of special concern to the State of Oregon and some disturbance from construction activities might disturb the nesting activities of birds which may be in the area. No endangered or threatened species have been documented on the Alumax property.

Comment #102: Cold Springs Wildlife Refuge and Hat Rock State Park are Class II PSD areas, not Class I.

Response: The text has been modified.

Comment #103: Discussion of waste water treatment plants should indicate the impacted plant's ability to comply with the effluent quality conditions of their discharge permits without modification.

Response: Due to unknowns relating to when the plant will be built and extremely dynamic growth conditions in the impacted area, this is a difficult thing to pin down. At the time of the drafting of the final EIS existing systems (including new systems and modifications under construction) would be able to meet permit conditions.

Comment #104: The noise impact analysis should be expanded to discuss the noise impacts of the new substation and whether it will be able to comply with Oregon's noise regulations, including the octave band standards.

Response: This transformer substation, like other similar substations, has a noise that is non-varying in intensity throughout the 24-hour day. The Alumax substation is designed so that from a point 25 feet

from the nearest existing or potential residence, towards the noise source, the noise will not exceed 50 dBA (125 Hz octave band). This is within the Oregon State Noise Regulations.

Comment #105: The statement should discuss the role Alumax will play in the mitigation of impacts on water supply and waste treatment facilities.

Response: See Comment #45.

Comment #106: Discussion of impact on balance of payments appears to be overstated. Does not reflect the importation of alumina.

Response: The balance of payments discussion is designed to indicate the value of the aluminum produced in gross dollars and does not reflect the costs of the alumina which is owned and imported by American companies. Because of this and the fluctuating price of alumina, it is difficult to separate out the components in the discussion.

Comment #107: Commentor suggests additional mitigation measures be required to reduce construction noise.

Response: Suggestions are good and in many respects are generally utilized simply as good construction practices. BPA does not have the authority to require these measures. State and Federal enforcement agencies also lack jurisdiction.

U.S. Department of the Interior, Bureau of Indian Affairs

Comment #108: The statement indicates that water will be provided by the Port of Umatilla. We did not locate a description of the pumping facility. If in existence, can it meet Fish and Wildlife specifications.

Response: The existing port pumping facility would not require modification. From information available, it meets applicable standards. The Port obtains its water from a well, not the Columbia River.

Audubon Society

Comment #109: List of endangered species out of date.

Response: The material has been updated.

Comment #110: Why does the plant site need to be located within a wetland?

Response: It must be kept in mind that the wetland under discussion is an artificially-created phenomenon arising from the use of irrigation in the area. Ponds (less than 1 acre total area) which would be removed by plant siting will be compensated for elsewhere on the property. Therefore, the total amount of wetland will be insignificantly impacted. If the Alumax plant is not built, there is a high probability the site which is quality industrial land will be developed by another industry and irrigation terminated.

Comment #111: Provide additional information on industrial customers.

Response: See Comment #36.

U.S. Department of the Interior, Fish and Wildlife Service

Comment #112: Use of ponds around the plant should include nesting.

Response: This has been included.

Comment #113: List of rare and endangered species inaccurate; should be revised to reflect letter from Jean Siddall.

Response: Text has been revised.

Comment #114: Hunting should be listed as a major recreational activity in Chapter III.

Response: Hunting is included in the discussion in Section III.B.6.d.

Comment #115: Fluoride impacts on flora and fauna were not adequately addressed and additional analysis should be done on such things as long-term effects, losses to fish and wildlife as a result of living or using contaminated ponds, and possible adverse effects on endangered species by chemical emissions.

Response: The Environmental Protection Agency and the Oregon State Department of Environmental Quality have reviewed the impacts of the air contaminant discharges from the plant. These reviews and those done by an independent consultant for this EIS indicate that both emissions and projected fluoride concentrations are within environmental quality standards, and will provide adequate protection for wildlife. Analysis also shows that there is no indication that any endangered species would be jeopardized by chemical emissions from the plant. Further academic research on fluoride standards, etc., is outside the scope of this impact statement.

Comment #116: Losses to fish and wildlife as a result of using or living at contaminated ponds should be evaluated in the statement.

Response: There is no indication that in the ponds will receive sufficient contamination to produce significant effects to fish or wildlife. Review of the plant by both the Environmental Protection Agency and the Oregon State Department of Environmental Quality has resulted in approval of the air pollution control systems which are designed to bring air quality impacts to within an acceptable range.

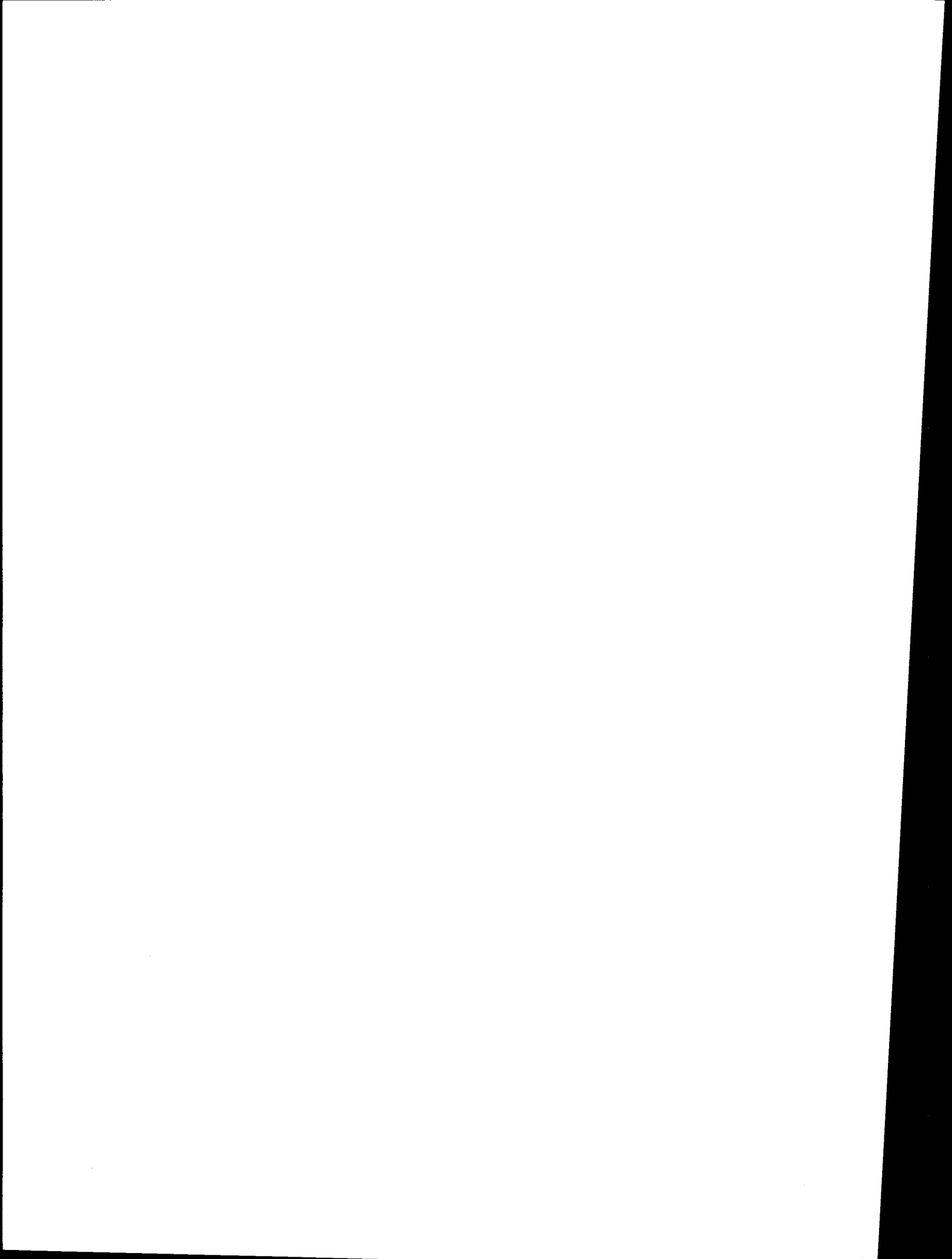
Comment #117: The projected area is within the breeding range of the peregrine falcon. This fact should be acknowledged in the statement and precepts of the Endangered Species Act met.

Response: The peregrine falcon is not listed as an endangered species and therefore the Endangered Species Act is not applicable. In addition, the probability of the species being on the site is limited.

John McMichael

Comment #118: Only a small amount of information was given concerning the impacts of the proposal on nearby Washington areas. Even though these effects might be negligible, this data should have been published.

Response: Economic analysis has shown that the impacts that can be expected upon areas in the State of Washington will not be significant, primarily due to the distance from a major population center and the currently booming economy in that section. The other area of potential impact is air quality; the air quality sections in Chapters III and IV have been expanded to address this.



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Mr. L. Wick
Get in Record
OREGON ENVIRONMENTAL COUNCIL, 2637 S.W. Water, Portland, Ore. 97201

PRELIMINARY COMMENTS OF THE OREGON ENVIRONMENTAL COUNCIL
ON THE BONNEVILLE POWER ADMINISTRATION'S ROLE ENVIRONMENTAL
IMPACT STATEMENT.

November 9, 1977
Portland, Oregon

The Oregon Environmental Council, which is a coalition of over seventy conservation, planning and sportsman's organizations, has long been concerned for the impacts of electrical energy generation and the implications of unlimited growth of electrical energy consumption. We were a party to the lawsuit that was brought by the Natural Resources Defense Council to require this Role EIS and we have been consulted in the preparation of this Draft Statement.

We appreciate having the opportunity to present our initial comments at this time, and will present additional written comments in December. We direct these comments not only to the Bonneville Power Administration management, but also to the Department of Energy.

BPA Role EIS

The greatest deficiency in the Draft document is in its treatment of energy conservation. BPA tends to approach this subject by listing all the reasons why conservation might not work. (For example, see Part 1, IV, 113, 120, 122, 123). In preparing this Role EIS BPA went outside its own organization and hired Skidmore, Owings & Merrill to do a study of the regional potential for energy conservation. S.O.M. concluded that a strong conservation program could reduce the 1995 projected load by as much as 33 percent (Part 1, IV, 168). BPA apparently does not accept this conclusion. Part 1, IV, 129. Although part of the S.O.M. report is included in the Draft EIS, it is not identified in the Table of Contents or the Index. Thus, this important outside consultant's opinion is effectively buried in the 764 pages which make up Part 1.

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BPA tends to evaluate alternative energy sources in terms of how well they fit into a central power plant program. For example, in discussing solar power, it considers a 100 Megawatt solar plant which would require six million square feet of reflector and a collection tower 1000 feet high (Part 1, V, 123). This approach overlooks the important contribution such alternative sources can make when applied on a smaller scale.

It is important that BPA not overlook its enviable position of what amounts to a gigantic storage battery to augment solar power. During the daytime when solar energy is being generated less water needs to be dumped through the turbines, thus saving that energy for later use. The encouragement of small scale community solar generators or private home solar generators also can make an important contribution to the overall energy demands. We recognize that this is not a traditional concern for utilities and BPA but it is time for new thinking to meet the ever-increasing energy challenges of the future.

BPA's mission is "...to assure a viable electric energy system in the Pacific Northwest while balancing economic, technical and environmental considerations." (Part 2, VII, 11). In the past this has meant meeting the load forecasted by the public utilities that are its "customers". Thus BPA has become deeply involved in planning and financing non-federal thermal plants without specific legislative authority. At the same time it sought to keep this activity beyond the review of the National Environmental Policy Act, and it now hesitates to devote all its resources to energy conservation because of a claimed lack of a statutory mandate.

This hesitancy need not continue. With five volumes of Draft EIS containing approximately 3,500 pages, we have the information necessary to establish an orderly pattern of controlled growth in electrical energy demand, and we can plan for a reasonably well balanced generation system that will meet that demand.

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Bonneville insists that conservation cannot eliminate the need for new electrical generation plants (Part 1, IV, 113). Yet an environmental group, working under a grant from the Energy Research and Development Administration, and using the same data available to BPA, has produced an energy scenario that would require no new thermal plants through 1995, other than those presently approved or under construction (NRDC Alternative Scenario, Attachment A to Part 1, p.23).

We are pleased that BPA printed at least a summary of the Alternative Energy Scenario. Some indication of BPA's real interest in developing alternatives to business as usual can be seen by BPA's reluctance to fund the writing of the Alternative Energy Scenario. It is ironic that it took the Federal Energy Administration to fund this report along with Sierra Club Foundation, The Oregon Environmental Foundation and the Northwest Fund for the Environment. After the Alternative Scenario was finished, however, an even stranger thing happened. FEA funded the research firm of TRW to the tune of \$50,000 (having given NRDC \$10,000 to write the report) to investigate its validity. To our great pleasure, TRW has been extremely supportive of the conclusions reached by the Alternative Scenario.

A full conservation effort will require governmental involvement at all levels, but BPA could provide important leadership now. Moreover, contrary to what we are hearing from PNWC, BPA could provide conservation leadership under its existing statutory mandate. The agency states that it has the authority to establish "energy efficient" rates both at the wholesale and retail level (Part 2, XII, 110). It could use its authority to encourage low-cost federal hydro power to achieve the same result (Part 2, XII, 111). (Such rates are described in some detail in Part 2, XII at pp. 79-91). The agency presently interprets its mandate to promote widespread use of electric power as encompassing the promotion of energy conservation (Part 2, XII, 62). What has been missing is an agency commitment to an aggressive program that could achieve this important national objective.

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With a change in management direction and priorities and a revision of this Draft EIS so as to clearly reflect those priorities, BPA can become an effective part of the nation's effort to meet our energy crisis.

Alumax Draft Environmental Statement

We have examined the Alumax Draft Environmental Statement volume and find it a thorough, detailed presentation. An underlying assumption remains in doubt: it is industry's wise use of our dwindling supply of low-cost hydro-power?

The land proposed for the plant site is grazing land, and within a radius of 15 miles, 74 percent of the total land use has been crops or irrigated pasture. The plant would remove 3,000 acres from agricultural use and the addition of 4,500 people to the community will eliminate an estimated 650 to 750 acres. The construction would significantly alter the land use from "an undeveloped low intensity state to one of high intensity usage" (p. IV-2). Other industrial development will be encouraged by the existence of the facility. However, the Alumax air emissions alone will increase sulfur dioxide levels at nearby Cold Springs Wildlife Refuge to "close to these [Class I-no significant deterioration allowed] limits" (p. VI-1). This will limit entry to other industries into the area.

We are told (p. VIII-2) that "long term impacts of fluoride and sulfur dioxide... could affect vegetation 2,000 feet beyond the 165 acre plant site enough to reduce necessary habitat requirements for reproduction of upland game birds and waterfowl." On IV-4, "Air emissions of sulfur dioxide and fluorides would affect vegetation immediately surrounding the plant site but not off the Alumax boundary." However, on IV-14 and following, in "worst case" conditions of dispersion, sulfur dioxide, gaseous fluoride and particulate fluoride will travel beyond the Alumax property. Fluoride and sulfur dioxide will enter the Columbia River at Lake Wallula.

The hydrocarbons and nitrogen oxides which would be emitted by combustion sources are dismissed as "minor" compared to other emissions, and sufficient information is not available to quantify them. In testimony presented in 1974 OEC observed that all estimates regarding performance of this plant were in terms of pollution per ton of aluminum produced. This still appears to be the case. Although it apparently will comply with federal and state requirements, Alumax will be a major source of air pollution.

Aluminum reduction is an energy-intensive process. The 320,000 kilowatts of power used by Alumax would be enough for 150,000 average Northwest homes (p.IV-2). Annually the plant will consume 2.4 billion kilowatt hours-enough to supply the combined cities of Eugene, Springfield, and Richland, Washington. All this provides only 800 new jobs.

Alumax would probably pay approximately 2.6 mills per kilowatt hour (p.II-4) as compared with 3.7 mills per kilowatt hour for utility customers. However, low cost hydro-power must now be blended with more expensive nuclear and coal fired power, produced at a far greater environmental cost. Ratepayers and the environment will make up the difference.

Placed in a broader perspective, the allocation of power to Alumax will increase the risk of a firm energy deficit and will reduce BPA's reliability to firm load customers. Given the relatively small number of jobs it will produce, Alumax is a bad bargain for the Pacific Northwest.

LM/ef

Enclosed:
PNA's Trojan Nuclear Plant (Trojan Decommissioning Alliance) - pamphlet

page 2 of 6

Comments concerning the Draft EIS: The Role of the Bonneville Power Administration in the Pacific Northwest Power Supply System.

Presented at the public hearing in Missoula, Montana. November 10, 1977

Gary Natson
Milltown, Montana 59851

Footnotes refer to the notes and bibliography on following pages.
References in the margin relate to the Draft EIS.

The Bonneville Power Administration presently operates under a legislative mandate requiring it to encourage maximum use of electrical energy at the lowest possible cost. The mandate arose out of a time of national depression and extremely serious unemployment. People who were struggling to survive during the thirties could have little thought about the biological survival of the river system they were harnessing. The Bonneville and Grand Coulee dams were logical projects of difficult times.

Today, things are different. Our pockets are stuffed with electrical gadgets. But, there is growing evidence that continued energy expansion will spell the ultimate destruction of the biological integrity of large land areas of eastern Montana. There is growing evidence that the huge increases in fossil fuel burning will seriously damage water and air resources and could change the weather of the entire planet. ^{2,3,4}

Today, unlike in the thirties, there is a choice between allowing continued expansion of electricity demand and slowing that expansion. Energy conglomerates and energy-intensive industries own half the nation's capital but employ only a tenth of its labor force. ⁵ There are major alternatives that would provide greater employment opportunities, continued economic growth, and improvement in the quality of life, in a modern sense. ⁶ These alternatives would have little added impact on already strained natural resources.

The BPA must not work to favor capital investment in electrical energy generation facilities. The present higher price of capital for utility expansion reflects an appropriate levy from a portion of the natural resource impacts. The resultant higher prices of electricity must be allowed to operate in the free market system, where the products of energy-intensive industries must be allowed to more nearly reflect their true, higher cost.

Major Points - Comments on the "Role EIS", Draft
Presented at the Public hearing November 10, 1977, in Missoula, Montana

Gary Natson
Milltown, Montana

These points are expanded on the following pages

- 1) If Bonneville Power Administration's future role were that of a facilitator of thermal electric generation expansion, then Montana, as well as other regions, would suffer major, permanent loss of land, air, and water resources.
- 2) There are alternatives to traditional electricity demand growth. The alternatives are immediately available and need agency support to speed implementation. Bonneville's utility advocacy role and its rate setting policies work against the development of alternatives.

In my own business, annual electricity use has declined 30% since 1990, while income has increased 36%. Additional savings are available from solar space and water heating.
- 3) Bonneville's legislative mandate is to encourage the most widespread use of electricity at the lowest possible cost. It arose out of a time of national depression that put the biological destruction of the Columbia River System in the background. It is old-fashioned, and backwards.
- 4) If we're going to win the race against resource exhaustion, then we can't enter our horses running backwards with a 1937 mandate. Many people today favor the preservation of natural resources over energy industry expansion. A vast vault of profits lies under the Northern Great Plains, and short-sighted business philosophies that are a holdover from the roaring twenties proclaim: "If it feels good, you should..." The time is now, on the other hand, to heed a proverb from a thrifter day: "Waste not - want not..."
- 5) The time allowed for review of this document is not adequate. There are many of us who would welcome additional opportunity for study, and I request that the deadline for comments on the Role EIS Draft be extended for 90 days past the December 15th cutoff.

Comments on BPA Role EIS, continued
Gary Natson

Page 3 of 6

The future role of BPA should be exactly the reverse of its past and present role. It must hold down growth in electricity demand. There are ample tools for the job, including rate setting, load management, and a vastly expanded energy conservation education program. ⁷

BPA's role is outdated. If we're going to win the race against resource exhaustion, then we can't enter our horses running backwards with a 1937 mandate. Many people today favor the preservation of natural resources over energy industry expansion. A vast vault of profits lies under the Northern Great Plains, and short-sighted business philosophies that are a holdover from the roaring twenties proclaim: "If it feels good, you should..." The time is now, on the other hand, to heed a proverb from a thrifter day: "Waste not - want not..."

NOTES AND BIBLIOGRAPHY - Numbers refer to footnotes in the preceding text. Notations in the left margin relate to the EIS document.

1. Montana Ag. Exp. Sta. Research Report no. 115. August, 1977. A "grazing study", on strip mined spoils, demonstrates some of the continuing problems facing land reclamation. In a November 9, 1977, phone conversation with a participant in the study, Mr. Ed DePuit of Montana State U. Reclamation Research, I was told that not nearly enough years have elapsed to permit realistic assessments of reclamation attempts. The grazing study project eventually hopes to demonstrate that a mix between introduced and native grasses may yield a good livestock range. However, Mr. DePuit says that the stability of introduced species over the long term is not known. The Northern Plains Resource Council, a rancher-based agricultural group, notes that cattle grazed on native range during the summer outgrazed those on the spoils pastures of introduced grasses. Montana state law requires that strip mined land be returned to its original level of diversity and productivity. By this definition, there is no successful reclamation today in Montana, nor will it be possible to estimate such success in the near future. In spite of the lack of knowledge about land reclamation, strip mining continues claiming large acreage. Mining companies have only established certain "showcase" plots, that are used to demonstrate reclamation "success" to congressmen and tourists.
2. There are, in Montana, current industrial water reservation attempts by Intake Water, Company and by Utah International, among others. Industrial uses of the Powder and Yellowstone rivers are at odds with the efforts of agricultural and environmental interests to preserve the resource base for their needs. There can be no doubt that each addition of thermal electric generation compromises the already limited water resource.

3. SOURCES: I. Clark Wilson. 1975. *Energy for Survival*. Anchor.
Garden City, NY. II. Energy Policy Project of the Ford Foundation.
1974. *A Time to Choose*. Ballinger. Cambridge, Mass.

Thermal electric generation is the major contributor of sulfur oxide pollution in the United States. Sulfur oxides are serious health hazards and are damaging to agriculture (Source I.). Sulfur, particulate, and trace element pollution of air can be expected to increase drastically as coal is substituted for oil and if energy demand is allowed to rise because of failures in policy, such as the failure to institute electricity rate reforms.

DEIS Pt 2
II-13
L 42
Bonneville disclaims any responsibility for the creation of additional air pollution. However, the EPA personnel I met during and after workshops exhibited a high bias in favor of utility industry expansion. Of course, such bias is natural, can be expected to pervade the agency generally, and leads to facilitating thermal electric generation for its own sake. This kind of facilitation will have major adverse natural resource impacts.

DEIS Pt 2
III-19
L 16
BPA authority to build and to purchase generation, or to facilitate such construction through purchase guarantees, would cause even greater adverse impacts on natural resources, especially if its current promotional mandate is not revised.

Either in its present, unofficial (perhaps unavoidable) role as a utility backer, or in any expanded role, Bonneville's policies cause major impacts on natural resources, such as the coal strip mining areas of eastern Montana. In its revision of the DEIS, Bonneville must address these impacts.

DEIS Pt 2
II-34
L 11
Bonneville has played an important role in coordinating power supplies and delivery in the Pacific Northwest. To the extent that such coordination reduces adverse environmental impact by eliminating duplication in generation facilities, then this role should be continued and expanded.

DEIS Pt 2
II-13
L 42
4. Major effects on weather may result from an expansion of thermal electric generation (Source I. note 3, above). Bonneville cannot disclaim responsibility for these impacts, for the reasons discussed above, and must revise the final EIS to include possible weather changes that might result from a continuation of their role as facilitators of electricity generating utilities.

5. Source II, note 3, above

6. Very significant reduction in energy demand can arise from the use of presently available energy conservation alternatives in all economic sectors, and by allowing the mix of industries to shift from energy-intensive, to labor-intensive. These changes would not drastically alter American life styles (Source II, note 3, above).

DEIS Pt 1
IV-131
L 15
My experience with my own small business supports the findings of the SOH study. My business today uses annually, 30% less energy than it did in 1970. Income has risen markedly during this period, a reflection of the labor-intensive nature of the operation. The attached chart fully demonstrates my own experience at conservation efforts.

Comments on the Alumax Draft EIS
Presented at the public hearing in Missoula, Montana
November 10, 1977
by: Gary Watson
Milltown, Montana 59851

DEIS IV-101
Line 24
Large amounts of energy are required for aluminum production. This energy requirement can result in shorter energy supplies, and can cause major adverse environmental impacts for which consumers pay the price.

Consumers have a right to know what products they are purchasing, but the Alumax EIS does not describe current U.S. aluminum uses in analytical form.

The aluminum industry uses 2% of all Pacific Northwest energy. 20% of the aluminum produced is fabricated into cartons, cans, and other packages.

DEIS IV-98
Line 12
The Alumax plant would add production equivalent to only 1/10 of the U.S. production presently committed to aluminum packaging. In other words, a cutback of less than 10% in the production of pop and beer cans would seem to cancel the need for the Alumax plant.

Data is available from the experiences of several states which would indicate whether aluminum packaging is either necessary or economic. The final EIS must discuss packaging alternatives, benefits, and disadvantages, and then must address the need for the alumax plant according to these perspectives.

Western Aluminum News 4(5), July, 1977.

The EIS analysis of conservation opportunities is totally inadequate and reflects an industry bias. Conservation impacts on employment are an example. The conclusion that there would be jobs lost in failing to build more generation is very misleading. Not one portion of the entire EIS more generation is given the consideration of employment potential, or energy savings, that could come about through promotion of solar space and water heating production and installation industries. These industries are labor-intensive, as opposed to the capital-intensive energy industry.

The State of Montana has an ongoing solar demonstration program. Solar space and water heating technologies are available now, but there are institutional and policy barriers to their implementation. BPA should follow through on its commitment to conservation and expand its consideration of this important aspect of conservation and employment. These considerations must be brought in to any meaningful revision of the DEIS.

7. The conservation program of our local utility, Montana Power Company, is inadequate. A representative visited our local P.I.A. to talk about conservation. He showed a movie extolling the virtues of Colstrip 3 and 4 generating projects, but passed along nothing of substance relating to conservation.

DEIS Pt 1
IV-127
L 33
Educational programs must include the potential long-term savings from the addition of solar space and water heating. It seems unlikely, from biases evident in the preparation of the conservation section of the EIS, that Bonneville can generate an adequate conservation education program out of its own staff. Rather, it should consider, in the final EIS, the alternative of providing major funding for a program designed by individuals concerned primarily with conservation alternatives.

8. Montana Governor Thomas Judge's "Montana Futures" survey revealed that most Montanans favor "preserving the environment" when these values are in conflict with "economic benefits". There was no support, in the survey, for economic growth at any cost to the environment.

Gary Watson
Box 908
Milltown, Montana 59851
February 6, 1978

Comments on the Bonneville Power Administration "Role EIS", Interior DEIS 77-21.

John Eiley
Environmental Manager
Bonneville Power Administration
P. O. Box 3601
Portland OR 97208

These comments supplement those given at the hearing in Missoula, Montana on November 10, 1977. I have since had the opportunity to read the DEIS sections pertaining to conservation policy and would like to expand my comments.

I am pleased to report that energy conservation efforts during the fourth quarter of operations in my own small business have resulted in savings of 23% in electricity, compared with the fourth quarter of 1976. Electricity use during the quarter was 40% less than was used in the fourth quarter of 1970. The savings have resulted only through insulation, room temperature reduction, and by turning off appliances when not in use. This example serves to illustrate the ease by which huge savings can be realized in a society which has traditionally wasted more energy than it has put to beneficial use.

Notations in the margin refer to the volume, page, and line of the DEIS.

v. 2 The BPA Mission. It is not appropriate merely to "assure a viable electric energy system".
p. VII-11
1. 38

A. C It is not appropriate for utilities merely to "serve all users".
p. II-73
1. 19

Present policy guidelines are a no-conscience approach to electricity supply, and permit self-serving practices that fly in the face of the need to reduce the very large environmental impacts caused by electricity generation facilities and their support systems.

The inappropriateness of BPA's mission should be remedied by changing the legislative mandates that have permitted the agency to work hand-in-hand with utilities in expanding electricity markets in the Pacific Northwest at the expense of the region's dwindling natural environment.

C Very large "new" regional energy resources are available from aggressive energy conservation programs. The equivalent of several 1,000 MW thermal plants is available, and there is a very great need for a regional leader who will coordinate this resource development.
IV-251
25

BPA's legislative mandate should be changed to permit rapid, coordinated development of cost-effective conservation energy resources. Conservation should be aggressively sold to consumers in the same way that BPA helped sell the Columbia River hydro-power in the earlier days of the agency's life.

C
III-129
16

Citizens cannot maximally develop conservation alternatives without major support. Utilities will not sell conservation without dollar incentives. That would be like asking Dow Chemical Company to promote lachrymators. Blaine Cummings, of Missoula's Montana Power Company office, came to our local Bonner School P.T.A. to talk on "Energy Conservation". His talk sold, instead, coal development and the utility's Colstrip project. Mr. Cummings gets around to most of the local area's clubs, sooner or later. Few who would promote renewable energy sources have the staff or budget to compete with that of the utilities.

Conservation practices need to be sold, in the same way as Kleenex, Chevy's, Coke, and Billy Beer. New conservation resources need to be developed as successfully and as completely as the Columbia River System has been dammed.

The alternative policies concerning conservation, as outlined in the DES beginning on page III-129 of Appendix C, need to be vastly expanded and then implemented.

As a guiding principle to their implementation, a specific energy budget should be developed that would provide a real measure of success in reducing rates of load growth. The energy budget could be apportioned to utilities and other users in the same way as a money budget is apportioned. Penalties for "overspending" could be in the form of higher rates, in the same way that there is a greater cost for overspent dollars that have to be borrowed.

State and local agencies could help in administering, as well as in developing, the energy budget. They could assist in oversight capacities, and in monitoring, measuring, and coordinating saved energy resources.

All the proposed policies explained in the pages that follow III-129 of Appendix C are good ones. Where there are similar policies or programs on the part of other agencies, BPA should seek to avoid duplication by following supportive and coordinating roles.

C
III-131
43

Insulation and heat pumps are but two of the cost-effective measures/technologies. BPA should develop, as completely as possible, a list of other cost-effective measures and technologies (e.g. off-peak use, solar space and water heat in appropriate regions). These measures should be aggressively promoted.

C
III-132
25

BPA should originate research when it appears that such origination could measurably help existing research, or where there is no existing research in a promising area.

Gary Matson
Box 300
Milltown, Montana 59851
February 6, 1978

Comments on the Alumax Draft Environmental Statement, Interior DES 77-22)

Bonneville Power Administration
Environmental Office - SJ
P. O. Box 9621
Portland OR 97208

I presented comments at the Missoula, Montana public hearing November 10, 1977. Since that time, I have had an opportunity to review two major sources of information concerning the need for aluminum packaging in the United States. It is clear, from this review, that there is no need for aluminum packaging. Rather, such packaging has been promoted by container manufacturers whose "pitch" to beverage industries was increased sales because of greater consumer convenience.

The passage of a national "bottle bill" patterned after that of Oregon, but phasing out aluminum cans, would cancel the need for Alumax-produced aluminum. Indeed, such a bill would free aluminum resources for the production of materials that are much more beneficial to society than are cans.

Glass-bottled beverages cost less than canned ones, sell beverages as well as bottles, and provide extra jobs.

Not building the Alumax plant would reduce environmental impacts on two counts. Not only are seriously toxic pollutants produced as effluent at the aluminum plant itself, but also major air, water, and land impacts occur in order to supply this extremely energy-intensive industry with electrical power, for which major additional sources can only be derived from new thermal or nuclear plants.

DES
Page IX-2 The Alumax plant should not be constructed. Enactment of a
Lines 23-31 national "bottle bill" could more than make up for the
aluminum that Alumax would produce.

Gary Matson
GARY MATSON

1. Hatfield, Mark. 1977. The Beverage Reuse and Recycling Act of 1977 - S276. Congressional Record 123(9): S793-S850.
2. Oregon Department of Environmental Quality. 1977. Oregon's Bottle Bill. The 1977 Report. Salem, Oregon.
3. Hannon, Bruce M. 1977. Bottles, Cans, Energy. Environment 11(2): 11-21.

C
III-133
51

Mandatory energy conservation practices in industry, with rate incentives, should be implemented by BPA. The implementation should occur according to the "best available technology" for energy savings. Monitoring of energy use practices should occur in such the same way as industrial air and water impacts are now monitored. "Failure to comply" should mean the loss of a favorable rate for electrical energy purchased from BPA.

C
III-135
9, 29

Utilities will not establish meaningful conservation programs without economic incentives. In order to protect the cost-effective characteristic of conservation efforts, BPA must develop methods for measuring utility compliance with conservation guidelines. Proof of success must accompany any financial reward given through rates or other incentives. Otherwise, dollars would be received by utilities for promotions that would continue to be self-serving (see above, page 2, paragraph 2).

C
III-135
45

Homes heated by other sources, too, in addition to electricity, must be included in a Conservation Rebate Program. Natural gas savings, for example, represent new availability of electrical energy. That is, additional, saved gas supplies replace the need for additional electrical supplies.

C
III-135
38
0
III-85
46

The BPA Residential Insulation Program and the Conservation Rebate Program must be designed to include an orderly phase-in of support for all methodologies and technologies that produce cost-effective energy savings.

Some favorable impacts of an aggressive conservation program are mentioned in Appendix C, page IV-251, 3. It can be emphasized that impacts on the physical environment would be lessened. In addition, it can be noted that economic effects of a reduced need for new thermal plants and, thus, slowed growth of the utility industry would be offset by the increased development opportunities for diverse regional economic elements. Such diversity favors stability, and is certainly a favorable impact of conservation.

Should significant encouragement for the development of renewable energy sources occur, marked industrial growth and increased employment could be expected. Two such industries that could develop are the solar systems and insulation manufacturers. It is clear that employment in such industries would be at least as beneficial to workers as employment in a thermal power plant. A major benefit would be the likelihood of the location of such industries near population centers, decreasing the number of disruptive population movements that must occur when thermal plants are built in rural areas such as Eastern Montana. A major benefit of an expanded Pacific Northwest cellulose insulation industry might be improved utilization of timber resources now wasted in thinning operations and slash disposal.

Gary Matson
GARY MATSON



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

DEC 08 1977

Mr. C. P. Habel
Administrator
Bonneville Power Administration
P.O. Box 3601
Portland, Oregon 97208

Dear Sir:

Thank you for the opportunity to review the Draft Alumax Environmental Statement, Bonneville Power Administration, Oregon.

In general, the document has presented a fair representation of the environmental impacts associated with a primary aluminum reduction plant. The statement could be improved, however, by the inclusion of additional data on future water and sewage treatment plant recommendations, especially in view of the emerging problems associated with present groundwater supplies.

Sincerely,

Charles G. Leland
Charles G. Leland
Director
Office of Environmental
Affairs



CITY OF PORTLAND
OREGON

January 27, 1978

Bonneville Power Administration
Environmental Office - 55
P.O. Box 3621
Portland, Oregon 97208

Dear Sirs:

Enclosed are our comments on the Role EIS and the Alumax
Environmental Statement.

In these comments we have made several suggestions as to how
the document could be transformed into a useful planning
document. As you know, there are legislative discussions on-
going in the region as to how Bonneville should function in
the next few decades. The document could serve as an import-
ant resource in these discussions. Unfortunately the document
falls short of providing that resource.

We, or our staffs, are happy to discuss any of the matters
we've raised with you.

Sincerely,

Neil Goldschmidt
MAYOR

Francis J. Ivancie
COMMISSIONER OF
PUBLIC UTILITIES

JPF/mm
Encl.

INTRODUCTION

In recent years the City of Portland has taken a ser-
ious interest in the marketing policies of the Bonneville
Power Administration. That involvement has convinced the
City that the Agency has improperly administered the statu-
tory mandates which should govern it. The original intent
of the Bonneville Project Act that the power go to domestic
and rural customers, has become an illusion as only 29% of
BPA's firm power reaches the region's homes and farms. At
the same time, the Agency has still failed to meaningfully
incorporate the policies of the National Environmental
Policy Act (NEPA) into its decision-making framework.

This lack of sensitivity toward NEPA policies is not
new to the Agency. Since NEPA's effective date in January,
1970, BPA has entered into numerous power sales contracts,
extension and renewal agreements, and net billing contracts.
These contracts have committed the Agency to sell massive
amounts of power and incur tremendous financial liability.
Yet the Agency has virtually ignored NEPA in the process.
Portland believes that BPA should prepare separate EIS's on
each of these contracts.

An Environmental Impact Statement is a document which
federal agencies prepare to discuss proposals for legisla-
tion or major federal actions significantly affecting the
quality of the human environment. Where the Role EIS does

-1-

contain a wealth of information, it does not clearly outline
what its proposal or action is. Concepts derived from
Hydro-Thermal Concepts derived from Hydro-Thermal Phase II,
Mr. Goldhammer's "Round 3," the BPA Study Paper, the PNUCC
Plan, and others are scattered through the EIS in such a way
as to leave the reader confused as to what Bonneville is
actually proposing to do.

I. PROPOSALS FOR LEGISLATION

Since abandoning the Hydro-Thermal Phase II Program,
BPA and the region's utilities have explored alternative
ways of dealing with regional supply shortfalls. Under
Administrator Hodel, the Agency was a moving force behind
the proposed "Pacific Northwest Electric Power and Conserva-
tion Act." The bill, known as the PNUCC bill (after the
Pacific Northwest Utilities Conference Committee who drafted
it), was recently the subject of field hearings in the
region.

The BPA has said that their role in the development of
the legislation was minor, that they merely provided in-
formation to assist the parties in developing their plan.
What few facts are available to the public do not bear this
out. In November, 1976, BPA published a document entitled
"Study Paper for Regional Power Planning." Although BPA
asserts that the document was designed to assist and en-
courage regional interests to agree on a regional power
supply program, the paper has been the basis for private

negotiations involving the investor owned utilities (IOU's),
the publicly owned utilities (PUD's), the direct service in-
dustries (DSI's) and BPA. Portland's Mayor Neil Goldschmidt
and Commissioner of Public Utilities Francis Ivancie sought
entry into these negotiations but were refused until the
underlying assumptions were set in stone. Out of these
negotiations came the bill.

NEPA requires that all agencies of the federal govern-
ment include in every recommendation or report on proposals
for legislation a detailed environmental impact statement
(Sec. 102 (a) (c)).

Because of BPA's extensive involvement in the drafting
of this bill, the City contends that it is a BPA proposal,
requiring a detailed EIS. As a matter of fact, if this bill
becomes law, much of the discussion in the Role EIS will be
mooted. If the BPA is serious about complying with its
mandate under NEPA, they will treat the legislation in a de-
tailed EIS on its ramifications.

Even if BPA had no role in advancing this proposal, its
prominence as a planning alternative certainly necessitates
detailed treatment in the EIS. Instead, BPA has given the
concepts of the bill only cursory attention as an alternative
to their current role. It seems clear that the PNUCC bill
is the direction the Agency desires to go. If so, they
should comply with NEPA in a meaningful way. This document
could serve as a useful decision making tool for the public
and Congress if it provided detailed analysis of the various

-3-

-2-

legislative and administrative options available.

There are two areas where the EIS touches on the PNUCC proposal. Part 1, Chapter 6, purportedly discusses "Regional Electric Alternatives and Their Potential Impacts." The EIS description, of five complicated proposals, takes only 13 pages (8-21). The discussion of the impacts encompasses only six pages (21-27). That's only 19 pages to describe and assess the impacts of the PNUCC plan, the NRDC Scenario, The Ivancie Plan, the Domestic and Rural Power Authority, and the Columbia Basin Corporation.

In Part 2, Chapter XII, the EIS discusses alternatives to BPA's role. First of all, it is unclear what BPA's proposed role is. The document describes it as basically continuing its current participation in regional inter-utility programs. Yet, it is clear from BPA's involvement in the PNUCC legislation and recent public statements by Administrator Hodel, that this is a course they prefer.

In the discussion of "Alternative Roles for BPA," (XII-1-20), the EIS focuses on various stages of BPA involvement in power plant financing and construction. Page XII-1 states that "... These options include programs in which BPA would play a central role as distinguished from the regional alternatives described in Part 1, Chapter VI." This is unclear. The alternatives in Part 1, Chapter VI, involve, in many cases, the principles described here. BPA plays a central role in all of these plans. Specific comments follow:

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concept? Shouldn't the Agency consider conditioning purchase on a cost-effective standard?

The City of Portland is concerned about BPA's questionable role in the formulation of the PNUCC bill. It is equally concerned that this legislative concept will escape the NEPA process and not receive the detailed analysis mandated. Whether treating the subject in a separate "proposal" EIS, or in the alternatives section of the Role EIS, the BPA has failed in its obligation. Cases under NEPA indicate that the alternatives should be developed with sufficient depth for the reader to make a reasoned choice. Agencies are required to go beyond mentioning alternatives, they must assess the risks and benefits in comparison to the main proposal.

To remedy this inadequacy, BPA should in its final EIS state clearly just what its proposal for action is. If it is, as their public statements and private activities indicate, the PNUCC approach, they should develop the EIS with this in mind. If not, the PNUCC bill, as well as other proposals, should receive sufficient attention for the members of the public to make reasoned choices.

II. ALLOCATION

The City of Portland is quite concerned about the manner in which BPA allocates power throughout the region. The preference clause of the Bonneville Project Act is designed

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Pt. 1, pp. XII-4: The EIS describes BPA continuing to serve industrial customers in substantially the same amount as is specified under existing interim contracts during the term of the contracts. Yet there is no the detailed treatment of the ramifications of these contracts. The IF-1 rate schedule contracts were part of the Hydro-Thermal Phase II and have not yet seen a detailed EIS. Either the Role EIS should provide a detailed analysis of these contracts or BPA should file a separate EIS. The statement in the EIS misleads readers into thinking that these contracts are existing standard contracts. The only reason they are presently in effect is because of BPA's avoidance of NEPA by calling them interim. Under an optional termination, these "interim" contracts can remain in effect until 1994.

Pt. 1, pp. XII-16 and Appendix A, Chapter IV, p. 3: BPA full purchase authority is basically what is called for in the PNUCC bill. The sketchy description of the concept here is clearly inadequate. What are the marketplace ramifications of government underwriting? Doesn't this take a substantial amount of economic risk out of any generation enterprise? What shall the role of the market be? Why are 35-year contracts necessary? What are ramifications of the "dry hole"

-5-

to give priority to domestic and rural customers through the publicly owned utilities. Yet, at this point, only 25% of the BPA power actually goes to domestic and rural customers, while most of the remainder goes to commerce and industry. At the same time, entities like the City are denied their applications for firm power for their own use and for resale to their citizens. BPA should look closely at its enabling statutes and reallocate its power to those customers given preference in the Act.

BPA has issued notices of insufficiency to its existing preference customers and denied applications to new customers (Portland). In doing so, it has never developed any guidelines or procedures for allocations. Customers looking at a post-1983 shortage are unable to realistically assess their options for meeting their load requirements. It may be that, in anticipation of passage of the PNUCC bill, the Agency is not treating these questions. This is clearly not proper. The Agency should assess its programs and alternatives under its existing authority as well as any changes in that authority.

The City is outraged at the economic inequity under which its residents and most Oregonians must suffer because they are denied a fair share of the low cost federal hydro-electric power. We urge the Agency to address these questions directly in the EIS and provide standards and guidelines so new and existing customers can meaningfully plan for their energy futures. Specific comments follow.

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Appendix C

Legal Directives and Determinations

II-7. The EIS lists five preference policies in the Bonneville Project Act. First is Section 4(a) providing for priority to public bodies. The EIS fails to provide a full characterization of the entire clause which reads:

"(a) In order to insure that facilities for the generation of electric energy at the Bonneville project shall be operated for the benefit of the general public, and particularly of domestic and rural consumers, the Administrator shall . . . give preference and priority to public bodies and cooperatives."

The Act gives a priority to public bodies in order to effectuate a policy of distribution to domestic and rural consumers. BPA, in practice and in the EIS, fails to consider and effectuate this policy.

II-11 - 12. In discussing wholesale rate policies, the EIS briefly discusses the net-billing method of financing new thermal plants. The program is based upon questionable authority and is certainly inadequately addressed in the EIS. What are the environmental and social effects of this program which enables the construction of new thermal plants? What are the impacts on BPA's allocation schemes of giving this "double-

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II-32. BPA comments that it doesn't present a proposal for industrial sales at this time. This is inconsistent with its interim contracts signed with its industrial customers. These contracts avoid the EIS obligations under NEPA. The contracts implement the IF-1 rate schedule on an interim basis until (presumably) the EIS is completed. The contracts appear to be the direction that BPA desires to go. If this is the case, it is essential to the fulfillment of Bonneville's legal obligations to treat the subject in a detailed manner.

II-47. The EIS states that 1978-83 availability of power for BPA industrial firm customers will be 88, 79, 82, 85, 75 and 88 percent. What are the ramifications of interrupting a portion of this power to meet the load requirements of a new preference customer such as Portland?

II-51. "BPA strives to maintain the availability of industrial firm power at 100 percent so as to maintain its level of revenues and to permit industrial plants to generate efficiently." How successful has BPA been toward this goal in the past? If BPA can provide power that is this reliable, can't it also provide the same power to new preference customers?

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preference" to public bodies? The EIS should provide a complete exposition of this program and its ramifications.

II-14. Section 5(a) of the Bonneville Project Act allows BPA to condition the sale of power to utilities. Specifically mentioned are stipulations concerning resale and resale rates. Has BPA considered exercising its prerogatives under this section to prevent resale of preference power to commerce and industry? Such a policy would implement the obvious language of the Section 4(a) preference clause.

Implementation of BPA Marketing Practices

II-19 - 20. Here BPA discusses the 35 mw of load growth available each year for preference customers for new industrial customers. How can BPA be prepared to meet these obligations and still deny new applications? Shouldn't Portland's application for residential use take priority over the industrial growth of another system?

The EIS mentions that the policy of 35 mw each year may be altered when BPA negotiates new contracts. When will this occur? Will there be sufficient notice so entities like Portland can assist in the decision?

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Alternative Marketing Policies and Practices

III-4 - 7. The EIS, in its description of alternatives to the preference clause, fails to consider several practical policy interpretations of the preference clause. What are the ramifications of forbidding preference resale to commerce and industry? What are the alternative interpretations to allow for allocation among preference users?

III-17 - 28. The alternatives discussed for allocation are not developed enough to make reasonable choices. However, based on the data presented, Portland makes the following observations:

III-19. The City favors a system whereby new and existing preference customers are treated with parity. We feel that any discrimination against new customers is violative of the Bonneville Project Act.

III-22. The City favors the concept of the power being made available to serve domestic and rural loads of its customers. We feel resale to commerce and industry is violative of the Bonneville Project Act.

III-28. The discussion on conservation indicates that BPA needs new authority to apply incentives and other methods to mandate conservation. There

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is plenty BPA can do administratively. The Act (5(a)) allows BPA to place conditions on its customers for resale. Administrator Model has asserted that the "widespread use" concept authorizes conservation.

III-33 - 70. It might be useful for BPA to provide some discussion of the outside comment letters selected. BPA solicited these letters for help in its deliberations, but it is evident they aren't really being considered. Presentation of copied material with no explanation or discussion is not particularly helpful.

Impacts of BPA's Power Marketing Programs and Alternative Programs

IV-51. BPA seems to be basing its discussion of allocation impacts on the assumption that demand is based on the West Group Forecast. Has BPA assessed the impacts if a forecast with a lower growth rate, such as the ones prepared by the Oregon PCE or Northwest Energy Policy Project, is used? What will be the overall effects of the various alternatives of need for new generation? What effects on the environment are there of the various allocation alternatives?

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are the responses of those whose self-interest is so directly served? What independent analysis did Ernst & Ernst undertake?

III. CONSERVATION

Volume 1

IV-14-15. The authors here underplay the importance that energy conservation can have in reducing demand. They state that "... the degree of acceptance by customers, and the availability of capital to install the energy saving measures described above, will determine the extent to which they are adopted." This statement leaves out the all-important factor of the role of government. Tax incentives and disincentives, as well as capital sharing programs, can strongly influence the acceptance of conservation measures by the public.

The discussion indicates that the extent that conservation will reduce demand is difficult to determine. Conservation, therefore, is not explicitly considered in determining load forecasts. The City questions why this is the case. The information available to BPA, just in the NRDC Scenarios and the SOM Study, is strong enough to suggest a vital role. If BPA and the utilities do not act to plan for conservation, we will find

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IV-134. The EIS states that there is no way to identify which (or what kind of) resource is being installed to serve the industrial segment of the total load. This may be so, but it misses the critical point. The system is adding resources to continue to meet the industrial demand which accounts for 40% of the BPA total sales. At the same time, new preference customers are denied service and existing ones are forced into expensive thermal financing arrangements.

IV-135. The EIS again mentions the new IF-1 Rate. We have still not seen the detailed treatment of this subject required in an EIS.

IV-137. The EIS states that "... in the past, BPA's direct service industrial customers have purchased nearly 25% of their power requirements on a non-firm basis?" When did this end? How much of the current industrial load is firm? Historically, how often has the non-firm portion of the load been interrupted? In other words, how firm is the non-firm energy?

IV-204. The BPA questionnaire to industrial customers finds that if existing contracts with BPA were allowed to expire, all respondents indicated that a total shut-down of operations would be very likely. How reliable

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ourselves in that untenable position where, because the public conserves energy, its rates will go up as the costs are spread to fewer units. BPA must, as in the NRDC Scenarios, seriously examine the impact of conservation on energy demand.

VI-111. Here the EIS states that conservation is the cornerstone of the National Energy Plan. This should be the case with any proposal or plan of BPA. The information in the SOM study gives BPA plenty to go on to implement such a program. Unfortunately, BPA's main emphasis seems to be in lending its support to various schemes to increase generation, rather than encourage conservation.

IV-113. The EIS states: "It is essential to recognize that conservation will not eliminate the need for the construction of new electric generating plants." It is unclear how BPA can be so sure of this statement in light of the information in the NRDC Alternative Scenarios. However, since BPA has failed to comment or analyze NRDC's findings, the reader must guess at the agency's justification. If the NRDC Scenarios contains valid information, Portland believes it should be vigorously pursued. Forestalling new thermal plants will help keep the price of energy stable for our ratepaying citizens.

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IV-116. The EIS projects an energy growth rate at 4.7 (1976). How does this stand up to much lower projections by the State of Oregon and the Northwest Energy Policy Project? Shouldn't BPA rely on forecasting done by entities other than the utilities who will be self-served by the forecasts?

IV-120. Why is the discussion here limited only to energy efficiency in new and existing buildings? Shouldn't the EIS explore measures that can impact the energy used for commercial and industrial processing? Isn't this where most industrial use of energy lies?

IV-129. In introducing the SOM Study, the EIS downplays the significance of potential figures by stating that probability of enactment is not great due to the controversial nature of the programs as well as the government procedures that would be required to implement them. This may be so, but we venture to say that the problems of public acceptance are miniscule compared to those encountered in planning for and constructing a new thermal plant. BPA should be more realistic in its analysis of what the public will and will not accept.

IV-131 - 168. The excerpts from the SOM Study support a case for a meaningful conservation program. We are

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The EIS discusses its energy conservation program. For the most part, the program has, and, from what we can glean from the EIS, will focus primarily on educational programs. BPA has the authority and the ability to involve itself in incentive and mandatory programs.

II-82 - 86. We favor the concept of a residential insulation program. The idea of BPA or the utility assisting in home insulation financing is a good one. We do, however, feel that such a program should be available to all ratepayers in the region. If the program is not available to customers of IOU's, this further widens the gap in treatment between public and private customers.

A program could be set up, with loans administered through the utilities for home insulation. Payback could be set up on a basis where the investment pays for itself through the customer's electric bill. With the utilities as a conduit, the program could extend to all residences in the region, including those not heated with electricity. This has the added benefit of lowering the number of switchovers from gas and oil.

IV. ACCOUNTABILITY

The EIS does not meaningfully address the basic concept of accountability in assessing its "role" in the

perplexed at the manner of its placement in the EIS. Does BPA endorse the study findings? If so, why isn't this thinking reflected elsewhere in the EIS? If not, why doesn't BPA present information to refute it? Why is the material included with no commentary as to how BPA intends to incorporate the findings in its programs?

The City of Portland is encouraged by the findings of the SOM Study. If seriously implemented to forestall new thermal construction, the costs we pay in the future for our power will not rise as quickly as they have in the past. We encourage BPA to undertake programs which will lead to implementation of the SOM material.

APPENDIX C

II-5. Here, Administrator Model explains that the "widespread use" policy of BPA demands conservation. The City supports this view. A meaningful conservation program can free up power for new preference customers like Portland. We strongly urge BPA to consider and implement strict measures to lessen regional energy demand.

II-79 - 82. The City supports the principle of measuring conservation's potential on an economic scale.

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region. There is no discussion as to who the agency's constituents really are. Presently, the Agency is perceived to be accountable to Washington, D.C. and responsive to the utilities. The City of Portland, and members of the public, have had little luck breaking into this closed club. In examining its role, BPA should consider revamping its role to become more responsive and open to the political structure and the citizens of the Pacific Northwest.

BPA's participation in the "closed door" PNUCC legislative deliberations illustrate who they perceive their constituents to be. Efforts by public officials and members of the public to gain access to those meetings were unsuccessful until after the basic assumptions and directives were set in stone. Failure to discuss questions of accountability presents a glaring omission in the EIS.

Part I, IV-1 - 11. The Role EIS provides a detailed discussion of how load forecasting is done in the Northwest. What it fails to do is consider the question of who should have the responsibility to forecast the region's energy future. The utilities and BPA presently rely on the West Group Forecast prepared by the PNUCC. Why doesn't BPA forecast? Should they? Recently, the State of Oregon and the Northwest Energy

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Policy Project have forecasted lower growth rates for the state and region. The PNUCC-BPA legislation calls for a regional agency of utility representatives to do the forecasting. The issue is critical to the region and should be addressed in this EIS.

V. ALUMAX ENVIRONMENTAL STATEMENT

The City of Portland is concerned that BPA is even seriously considering selling power to the Alumax facility. An allocation of power to a new aluminum facility would be most inappropriate at a time when BPA has denied Portland's application for firm power and issued notices of insufficiency to existing preference customers. The effects on the regional power supply system have not been adequately discussed in this EIS.

I-1. The EIS states that the Alumax EIS incorporates by reference, all of the material in the Role EIS. This would be fine if there was some way to trace the implications of Alumax through the material in the Role EIS. Such is not the case. If the authors seriously suggest that the Role EIS be useful in evaluating the power supply aspects of the Alumax case, the connections should be more directly asserted.

I-4. The EIS briefly describes the new Industrial Firm Power concept. Where is the detailed analysis of this

concept and its alternatives required by NEPA? If BPA expects this document or the Role EIS to suffice, they must give this concept detailed treatment.

I-5-6. The reference is made to unsaleable non-firm power. This classification is made on a critical year calculation. Has BPA considered altering the basis for this classification to create more, less reliable, firm power?

II-1 - II-3. The EIS here describes the power it will, under its proposal, deliver to Alumax. Here BPA is ready to provide 320 megawatts of power until 1986 (or perhaps 1994). The comparisons on page II-3 of Alumax's load with Eugene's service load are convincing. The fact that 150,000 homes in the region consume an equivalent amount of power is also convincing. Why is BPA considering an allocation to a new industrial customer when it can't meet its projected preference load?

IV-95. The discussion of the impacts on the power system is not adequate. What will be the effect of this power allotment on BPA's overall allocation scheme? Where do public bodies, like Portland, who have been denied power fit in? The discussion seems to imply it is appropriate to grant power to Alumax to

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cause an 18.3% less reliable power system. Why is it not equally appropriate for Portland?

XIII-1. The discussion of electrical energy as an irreversible, irretrievable commitment of resources is so insignificant as to be meaningless.

IX-1. The alternative of no service to Alumax is clearly the most appropriate. Although the EIS doesn't adequately develop the alternative, the alternative keeps power available for customers with legal preference.

In its earlier decision to amend its contract to serve the Umatilla facility, BPA asserted that they had to honor their earlier contractual commitment. Such is simply not the case. The EIS procedure allows the Agency to carefully evaluate its proposal and alternatives to come to a reasoned decision. That decision is not preordained. BPA can, after weighing the impacts of the proposal, simply decline to service the facility. That is clearly the most prudent course of action.

CONCLUSION

The City of Portland believes that BPA's "Role EIS" is insufficient in several important respects. The direction

in which the Agency proposes to go is unclear. On top of this, there are several areas, which we have addressed, where the EIS does not contain sufficient information on which to make a reasoned choice.

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February 10, 1978

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Mr. John E. Kiley
Environmental Manager
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Attention: SJ

Re: Alumax Supplement EIS

Dear Mr. Kiley:

Enclosed is a Statement of Comments by Concerned Citizens of Clatsop County which is submitted in response to your invitation in the Alumax draft Environmental Impact Statement (DES-77-22) dated July 25, 1977.

I would appreciate it if your records would note that the Statement is filed by Concerned Citizens of Clatsop County. The address of the organization is c/o Mr. Deskin Bergey, Co-Chairman, Concerned Citizens of Clatsop County, 474 Pleasant, Astoria, Oregon 97103. For your information, Concerned Citizens of Clatsop County was one of the plaintiffs in Port of Astoria v. Model, F.Supp. , 8 ERC 1156 (D.Or. 1975), appeals pending, Nos. 75-3465, 75-3621, 75-3699 and 75-1049, (9th Cir.).

As a courtesy, in order to have a record of timely filing on or before February 13, 1978, the date to which the period for comments was extended, I would appreciate it if a representative of your office would acknowledge receipt of this material on a duplicate copy of this transmittal letter.

Very truly yours,

Donald F. Scannlain

DFO:mlt

Enclosure

cc: Deskin Bergey
Robert L. Lawlis

has refused to hold public hearings in the Warrenton-Astoria area, and that hardly more than 10% of the EIS is devoted to comparing the alternative of performance of the preexisting commitment to serve at Warrenton. Indeed, the document's approach to the choice of location issues is largely by way of afterthought and gives us very serious concern that this Environmental Impact Statement has been prepared with the requisite element of "good faith" required by numerous federal court cases. The law clearly requires that the Environmental Impact Statement process be "meaningful" and that it not be "an ex post facto rationalization" of decisions already made before the process begins.

In our view, the available evidence, if considered in the EIS, would support the conclusion that Warrenton is the preferable site from an environmental standpoint for the Bonneville Power Administration to deliver the quantity of power involved in this contract. The document, as a whole, is defective in that it fails to take into consideration the totality of circumstances in existence as of and prior to April 18, 1975, the date upon which the Administrator took "major federal action affecting the quality of the human environment".

SPECIFIC COMMENTS

I

Page IX-6, Lines 1-5: (Clearing timber on Warrenton right-of-way)

Contrary to assertions in the draft EIS the environ-

STATEMENT OF COMMENTS OF
CONCERNED CITIZENS OF CLATSOP COUNTY

Concerned Citizens of Clatsop County, one of the Plaintiffs in Port of Astoria v. Model, F.Supp. , 8 ERC 1156 (D.Or. 1975), appeals pending, Nos. 75-3465, 75-3621, 75-3699 and 75-1049, (9th Cir.), wishes to make the following comments with respect to the draft Alumax Environmental Statement (DES 77-22) which was prepared by the Bonneville Power Administration on July 25, 1977 and released to the public on October 21, 1977.

GENERAL COMMENT

Taken as a whole, the draft statement is woefully inadequate within the meaning of the National Environmental Policy Act of 1969 for the principal reason that it fails to develop the alternative of serving Alumax at Warrenton.

The entire draft discloses a preconceived intention to serve at Umatilla rather than Warrenton. The best evidence, in our judgment, that the agency has already made up its mind to serve at Umatilla rather than Warrenton is the fact that so much of its data with respect to Warrenton is two to three years older than comparable data for Umatilla and bears a remarkable similarity to data originally supplied by Amax Pacific Corporation (now Alumax Pacific Corporation) and placed into the record as an exhibit in the Port of Astoria case. This is further confirmed by the fact that the Administrator

mental damage caused by loss of 700 acres of timber clearing was already done prior to signing the Umatilla contract. It is obvious that the draftsmen failed both to inspect the Warrenton right-of-way and to read testimony (or even inspect the photographic exhibits) in evidence in the court case.

II

Pages IX-20, IX-21: (Fluorides)

The draft EIS fails to take into account testimony by Victor Kazinsky, Alumax Consultant, appearing before the Umatilla County Planning Commission that, contrary to conclusions in the EIS, the Warrenton site was preferable to the Umatilla site with respect to the issue of fluorides on water quality because of the flushing action of the estuary.

III

Page IX-33, Line 17: ("future" events to occur in 1975)

This document is alleged to have been prepared on July 15, 1977.

Nevertheless the passage cited is typical of many portions of the draft Environmental Impact Statement which purport to discuss future impacts which are about to occur during 1974 or during other dates prior to the date of the publication of this report. The passage referred to here

"By 1975, it is estimated that population growth in the Astoria water service area (BPA estimate) would, . . ."

creates the serious suspicion that passages of the draft

statement were taken wholesale from documents prepared either by the then Amax Pacific Corporation or by other consultants during 1973 and 1974 at a time when the company was proceeding to complete construction arrangements at Warrenton.

We object strenuously to this "cut and paste" approach to the preparation of an Environmental Impact Statement and feel that it casts serious doubt on the question of whether it, at least as to the Warrenton alternative, was indeed prepared in accordance with the standards required under the National Environmental Policy Act of 1969.

IV

Page IX-36(e): Community services

We feel the observation with respect to the desirability of the Warrenton site over the Umatilla site is grossly understated. Rather, the factors set forth in this passage reinforce the conclusion that the Warrenton area is far better suited than the Umatilla site to absorb a population influx without disruption.

By CONCERNED CITIZENS OF CLATSOP COUNTY

Deakin Bergey
Co-Chairman
Concerned Citizens of Clatsop County
474 Pleasant
Astoria, Oregon 97103

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Sterling Munro
Page 2
February 10, 1978

As it is, the draft EIS represents a compendium of very detailed information on certain aspects of BPA's operations. The notion that the public should pick and choose among the "building blocks" contained in this set of documents is clearly an impossible task and negates the intent of the EIS as a tool for public disclosure enabling citizens to have a voice in setting governmental policies.

The present document is too long, too detailed and too disorganized for it to be judged an adequate EIS. We recommend that the wealth of technical information presented in the draft EIS not be reprinted in any redraft, but that it be referenced when necessary.

Part I

General: There are so many conceptual and organizational problems with Part I of BPA's draft EIS that all of the good things about it are either lost or ineffectual. Specifically, the document is too long and does not even come close to providing concise/complete information. The purpose of Part I is clearly spelled out in its table of contents. Individual chapter titles, however, bear little relationship to what is addressed. The reader is left with only his own knowledge/ingenuity to piece together a picture of the region's electric power supply system. The groundwork, that should have been developed in Part I to help give dimension to what hopefully should have been discussed in subsequent parts, is lacking.

Chapter IV: The reader can become instantly confused just by reading a few words. "The Future . . . Power Demand" is a long documentation of load forecasting and conservation in the region. These topics should have been discussed in footnotes or appendices referencing the broad important subjects within this area of discussion. Power demand is not defined; it is only flirted with as an adjunct to "everything you always wanted to know about load forecasting and energy conservation."

BPA's role in all of this is also lost, mostly due to the draft EIS's overall structure. BPA's role is supposed to be handled separately (Part II). Therefore, what should have been groundwork (before vs. after) to help illustrate the impacts of BPA's role change is missing.

This criticism of Chapter IV is intended to clear the way for the suggestions that point out the good things about Part I, and how they might be effectively put to use.

Your
Seattle
City Light

Letter to the Superintendent

February 10, 1978



Sterling Munro
U.S. Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Dear Mr. Munro:

We have reviewed BPA's "Role Environmental Impact Statement." We have, in addition, participated in the Public Power Council's review effort and have the following comments as a result of those efforts.

Our review efforts have been approached with the attitude that constructive, in-depth critique of this draft EIS will help provide a basis for successful completion of the role EIS process, minimizing costly delays and further legal complications in the Northwest's electric energy situation.

We strongly support the Public Power Council's recommendation that BPA circulate a draft supplement to the role EIS rather than proceed with preparation of a final EIS. The present draft document contains enough major flaws to render it, in our opinion, inadequate as a draft without public review of the additional draft material which should be included in the final EIS.

Our comments will first address themselves to format and organizational concerns with this document and then move to Part I, Part II, Appendices and the Amax EIS.

A fundamental problem, which must be rectified in any redraft, is the lack of a defined proposed action. This concern focuses on the central issue of what BPA's role in the region has been up until the present, and what BPA intends its role to be from now on. A clear delineation should then be made among a set of "role" alternatives which would represent the range of possible futures for BPA along with the range of associated environmental impacts.

City of Seattle—Department of Lighting, City Light Building, 1015 Third Avenue, Seattle, Washington 98104, (206) 425-3000

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Chapter V: This chapter also has a problem. It is a fine look at BPA's knowledge or ability to collect information on the technological world of electrical energy generation. There appears to be no cohesiveness; and the reader would be hard pressed to answer what, in fact, the future direction of regional power supply really is, or what BPA has had or will have to do with any of this.

Chapter VI: A discussion of current regional power issues, legislation, and proposals united with BPA commentary actually begins to show where power supply planning is going. This is the most useful of the three reviewed chapters. It definitely gives the reader a feeling for the complexity and the current regional thinking on power planning and operation. Some of the discussion is repetitive of Chapters IV and V and could, instead, stand on its own.

Part II

Chapter VIII: A notable omission in the parts of this chapter dealing with power generation, acquisition, transmission and marketing is a total lack of discussion of impacts of these activities outside the BPA service area, particularly impacts in and across the states of Montana and Wyoming. We noted this omission on several occasions in our review of the preliminary drafts of this EIS and our advice appears to have been ignored. This omission is not very defensible, in view of BPA's planning for long-term transmission corridor requirements which transcend the BPA service area boundary and, also, in view of the fact that BPA was given jurisdiction of the Colstrip EIS.

Chapter XII: This chapter suffers from the lack of a defined proposed action. It contains a lot of "possibilities" or "probably could do's" and, as such, presents an artificial barrier between the public and the real range of possible future policies which could be adopted by BPA. The discussion of "environmental impacts" is so general that it leaves the reader with a very limited impression of what they really are or could be.

Appendices A, B, and C

The mixture of detailed technical information and environmental impact delineation in the three appendices is unwieldy and confusing to the reader. The lack of discussion of impacts outside the BPA service area mentioned under the discussion of Part II, above, holds true for all of the appendices and must be remedied in any redraft.

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Appendix B, BPA Power Transmission

Chapter II, Page II-6. In delineating the various environmental areas which are to be evaluated, the environmental specialists have omitted the "social" environment. Concrete, tangible entities are considered. Consequences of actions on people are lacking. Environment apparently is taken to mean trees, animals, and new and old "things".

Chapter V, Page V-8. It appears to be implied in these sections that, in an area where there is no other landowner, BPA would not return temporary access roads to their original condition - they are allowed to revegetate. Access road soil may be compacted to such an extent that revegetation may occur very slowly or never recover, thus potentially leading to erosion and concomitant degradation of downslope water quality.

Chapter VI, Page VI-1. Jargon is used which is not defined in the glossary. The public shouldn't have to guess at the meaning of words in EIS's. Examples include "rocking" and "water bars".

Chapter VI, Page VI-3. There is no explanation as to why soil sterilants are necessary in switchyards, etc. Also missing is whether precautions are taken to prevent sterilants from affecting other areas.

Chapter VI, Page VI-4. Although the contract in the attachment states that no spraying shall be done near water areas, Figure VI-5 shows a helicopter spraying near a water area.

Chapter VI, General. Spraying, by its very nature, affects vegetation adjacent to the target right-of-way. This adversely impacts areas not intended to be sprayed. A better solution would be to plant short-growth vegetation which would not reach an objectionable height. The report indicates that this is the general direction BPA is going, but the percentage of replanted versus sprayed areas is not stated.

General Comment: Rights-of-way still have a straight-swath look. Short- to medium-height vegetation could be planted under the transmission lines off access roads, disguising the area somewhat and not presenting an operational threat. An alternative, which has not been accorded serious consideration, is the use of controlled burning to manage right-of-way vegetation.

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In the paragraph beginning with line 33 on page III-138, the term "voluntary curtailment" should be used rather than "energy conservation".

Chapter IV, D 2 - Impacts of Secondary Sales in the Northwest. It would seem appropriate to address the impact of possible adverse public reaction, such as was experienced this past year. This reaction surely had an impact on the distributing utilities, if not BPA itself. Future sales should take this possibility into consideration and take steps to deal with such a reaction.

Chapter IV, H 2 - Impacts of a Residential Insulating Program. The cost-benefit statement made on page IV-251, in the paragraph beginning with line 25, is unrealistic. The estimated average of \$625 per house to increase ceiling and floor insulation to R-19 and wall insulation to R-11 is out of line with the experience of Seattle City Light and its Low Income Insulation Program. In this program, which dealt only with increasing ceiling insulation, the authorization had to be increased from the original \$250 per house to \$450 per house - and insulating the ceiling is the least costly of all insulating procedures.

I have previously gone on record stating that this section lacks an adequate analysis of power allocation alternatives, specifically in the area of power allocation, as a specific incentive or reward for energy conservation by the region's utilities and industries. Such omission ignores the long-term environmental and economic benefits which would accrue to the region if the conservation ethic were to truly take hold.

Alumax EIS

Chapter VI - Unavoidable Adverse Environmental Impacts. There is an inherent assumption in the section dealing with unavoidable social impacts that certain impacts caused by rapid population influx are indeed unavoidable. It does appear that, if plant construction takes place with the company involved taking no responsibility to help the potentially-affected communities to manage and channel that rapid growth, then such things as objectionable traffic, high divorce rates, crime and suicide rates, and overloaded public facilities are a result. That is not to say that such occurrences are inevitable, however. Proper planning and community assistance, such as that provided by Standard Oil Company to the communities surrounding its proposed oil shale development in Colorado, can go a long way toward eliminating the kind of social pathology which has been experienced in such boom towns as Gillette and Rock Springs, Wyoming, and Colstrip, Montana.

City of Seattle—Department of Lighting, City Light Building, 1015 Third Avenue, Seattle, Washington 98104, (206) 625-3000

Sterling Munro
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Chapter VI, Page VI-1. The statement that brush keeps roads wet and soft is puzzling. The opposite would seem to be true - vegetation would maintain ground cover and keep the land in better condition, resulting in less rutting and erosion as well as less mud and puddling in wet weather.

Chapter VII, Page VII-10. If soil damage is permanent, the enriched state of the waters may become permanent. Nutrients from the soil can enter through erosion.

Chapter VII, Page VII-78. There is an increasing body of evidence that the herbicides commonly in use containing 2-4D and 2-4-T, as a consequence of these products' manufacturing processes, contaminated with minute quantities of dioxin, a notably teratogenic and mutagenic substance. The biological effects of this substance are not at all certain. The implications of the effects of dioxin on humans and animals is such that a recent court decision banned the use of herbicides in national forests in Oregon. In addition, the City of Seattle has had a ban on their use in the municipal drinking watersheds for two years. To simply dismiss the problems associated with the use of herbicides by stating "only those herbicides which are registered . . ." is an unfortunate gloss over a potentially serious problem.

Chapter IX. Inadequate attention is given to corridor requirements outside the BPA service area and the implications such construction will have for impacts on the natural and human environment across these potential corridor areas (which include Eastern Montana and Wyoming, as well as the length of any new southwestern intertie). It is indeed astonishing that the material, particularly the maps, contained in the April 27, 1977, BPA - U.S. Forest Service Study, "Potential Energy Corridor Requirement for the Pacific Northwest", was not incorporated into this document. We strongly recommend that the information contained in the April 1977 study be incorporated into the EIS.

Appendix C, BPA Power Marketing

Chapter III, B 7 - Alternatives within a Power Curtailment Program. A power curtailment program should contain both the mandatory and voluntary aspects of curtailment. There needs to be a clear delineation between conservation and curtailment as in Part I, IV B, 2 a (1) maintained throughout the report.

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Conclusions

Our overall impression of this document is that its poor organization and lack of proposed action results in a situation where it is a guaranteed certainty that even an informed citizen would be unable to make very much sense out of the information presented. BPA has spent many thousands of man-hours and \$2.5 million, we understand, to produce this EIS and it is quite unfortunate that the money and time were not better organized or directed. The public has a right to expect its taxes and electricity revenues to be spent wisely and for good purposes. We, as public servants, have the responsibility to see that such is the case.

Seattle City Light offered BPA written comments throughout the drafting stages of this EIS and most of them appear to have been substantially ignored. We fully understand the legal ramifications of this EIS; and I want it to be on the record that we believe that it is inexcusable that, with all of the resources BPA has had available for this effort, the EIS is so obviously and definitely inadequate.

The legal implications of this inadequacy, as well as its potential harm to the economic well-being of this region, are not to be taken lightly. We are fully cognizant of the difficulties all electric utilities and marketing agencies now face in dealing with the new political and legal realities in this age of increasing scarcity of, and competition for, resources. Environmental concerns, and the right of citizens to be informed in order to be able to participate in governmental decisions, are not to be ignored or fought against.

I, therefore, urge you to redraft this EIS and reissue it in a draft supplement form which is concise, comprehensible and comprehensive in scope. To do otherwise will be to risk intolerable delays which would adversely affect every utility and every citizen in this region. I offer you the help of my staff in providing further guidance in this effort and sincerely hope that we can successfully conclude this costly and time-consuming effort.

Yours truly,

Gordon Vickery
Superintendent
CH:d

City of Seattle—Department of Lighting, City Light Building, 1015 Third Avenue, Seattle, Washington 98104, (206) 625-3000

Bruce M. Balme
14102 NE 10th Avenue
Ridgefield, Washington 98642
January 5, 1978

Bonanza Power Administration
Environmental Office - SJ
P. O. Box 3621
Portland, Oregon 97208

This letter is in response to your invitation for public comment on your Draft EIS. The extra review time provided by the 60-day extension was very helpful. Thank you very much.

The overall statement is a valuable collection of information that, in final form, will surely be used as a standard reference source in the Northwest for years to come. The EIS seems thoughtfully organized and generally quite readable. It is true that the complete work is voluminous but I recognize that the material needing to be covered to the level of detail demanded by the BPA requires the size involved. Generally, I felt the coverage was appropriately thorough and well balanced, the most notable exception being a tendency to be defensive and protective toward your Direct Service Industries.

The EIS would not appear so overwhelming if visual separation of the appendices from the main body was provided, similar to the color separation provided for the Alaska EIS. There are probably many people who would be willing to attempt reading Part 2, which many people would consider the decision-making guts of the EIS, but with it sandwiched with four other look-alike volumes (implying equal importance) they would just give up on the whole project.

I was really delighted to find, as I read the EIS, that it is virtually free of sexist language. For a work of that size covering technical material, I consider that a remarkable and commendable accomplishment. I noticed one error on page V-231, line 11, and page VII-45, line 21. They can easily be fixed by changing to the plural form.

I understand there is considerable controversy among Northwest utilities over BPA's Operating Guide No. 9 that deals with utility response during a capacity shortage emergency. That dispute could reflect or be a symptom of reduced system reliability. To the extent that it might be, I think it should be discussed in the EIS section that discusses reliability criteria beginning on page II-37.



Page 3

Beginning on page V-25, there is a discussion of the burning of coal as part of coal-fired electric power generation. On the bottom of page V-26, the control of SO₂ is a part of that discussion. There is mention of fluidized bed combustion as an alternative for controlling SO₂. Since a substantial portion of the thermal power plant construction industry view fluidized bed combustion with optimism as an exciting new process for burning coal with very low SO₂ emissions, it would be consistent with the thorough coverage given other topical areas to include fluidized bed combustion as a featured item.

In the discussion of combustion turbine generation beginning on page V-104, it would be informative to include information on how quickly combustion turbine and combined cycle generating units can be started during an unanticipated power shortage.

The tables on pages V-217 thru -220, plus other "basic information" or summary tables are very useful in understanding the related text discussion. It would be helpful if some way would be used to make them more easily accessible, such as printing them on colored paper, putting them at the beginning of the associated section, or possibly have them fold out from the body of the text. They need to be made more visible so they can be readily referred to.

On page 23, Attachment A, following Chapter VI of Part I, WDC states that the aluminum industry employs less than 0.5 percent of the region's work force and consumes almost 25 percent of the region's electricity. Assuming that is even approximately true, that information plus other data such as the age and approaching obsolescence of the regions aluminum plants should be more prominently presented in the EIS. If such data tends to be buried in attachments while other data such as numbers of jobs, pounds of aluminum production and percentage of total national production are more prominently presented, I think it seriously compromises the objectivity of a very important part of the EIS.

On page VII-26 and elsewhere in the EIS, you indicate that the BPA distributes, blends, sells or otherwise combines the higher cost of thermal generation with lower cost hydro generation, and it is presented as something good or beneficial that BPA is doing. However, that seems to be a substitute for marginal cost pricing that a number of people think is also good or beneficial. I have talked with BPA staff persons at public meetings and on other occasions about marginal cost pricing and have been told about all the problems, pitfalls, inequities and other various evils and reasons why marginal cost pricing would be both difficult and undesirable. Decades ago when the next added increment of production was cheaper, utilities (and possibly BPA) seemed to have no trouble figuring out how to make the next increment of consumption cost less than the previous one. Now, however, when the next increment is more expensive, adjusting the cost of incremental consumption seems to be far more elusive and difficult a concept. I object to the apparent dual standard of treatment. It really does tend to appear that when rules that once were self-serving no longer are, the rules get changed.

In Section IV.A.2. Factors Affecting the Demand for Electricity, Subsection F. Technology, beginning on page IV-8 discusses the increasing efficiency of aluminum smelters. If this is so, why does the BPA in their contracts with them provide for gradually increasing loads? Surely the added load from pollution control equipment cannot consume more energy than the substantial savings from increased efficiency that you describe.

Your discussion in Subsection h. Income, on page IV-10 makes the statement that demand for electricity varies directly, or linearly, with per capita income. That statement appears to contradict other statements in the EIS where it is pointed out that low income people often cannot afford adequately insulated housing, and thus are greater consumers of electricity. Also, since most people are likely to consume some base amount of electric power and since there is probably an upper limit to how much electricity even the most rich and least thrifty can use, it's hard to accept the idea that per capita income is a strong determinant of consumption even over price of electricity - at least based on the information presented in the Draft EIS.

At several places throughout the EIS, you present information from other sources and introduce it by saying, in essence, here is some data that the reader may find important and even though we may not agree with it, here it is out of respect and obligation to the public. I wanted you to know how much I appreciate that attitude and candid approach. I felt that, as a member of the public at large, I was trusted by the BPA to act responsibly and intelligently in response to full disclosure of the facts. Now I just wish that some other government agencies would take such an honest approach in dealing with the public.

The figures and tables on pages IV-79 and -81 thru -83 would be more informative if they were expanded to include data for 1975-76 and 1976-77 also.

I believe that your analogy of load forecasts to tide tables and calendars is inappropriate and misleading as it is used on page IV-107, lines 50 and 52. There is no way that a person or agency can alter tides or seasons in response to tide tables or calendars, in contrast to electric loads and their forecasts.

On page IV-157 and elsewhere in the EIS the point is heavily stressed that solar and wind energy sources require backup systems with a time that makes them sound in need of propping up - that the "exotic" sources should be, and are, discounted. Yet the existing hydro-power, which is also dependent on backup systems in case of drought seems to be approached with a different tone. After reading your coverage of alternatives, I am left with the feeling that any alternative energy source that isn't proven by adoption into the established system is somehow suspect and not quite deserving of equally serious consideration.

Page 4

There is a statement on page VIII-3 of the EIS (lines 45-47) that predicts greater river fluctuations if operation of the existing hydro plants are not coordinated. However, elsewhere in the EIS the plan to fully develop the region's hydro resources for meeting peak loads is presented. I would think that such development and operation would require utility and BPA coordination. It sounds like the river will get a good workout either way. If hydro generation is fully utilized for peak power generation, how could fluctuations get any larger? After reading the referenced passage, I wondered if there wasn't an attempt made to justify utility coordination. It probably is a good idea but that apparent contradiction should be resolved or clarified so that it will appear more factual.

Near the top of page VIII-82, the EIS indicates that the direct service industrial customers of BPA contribute negligible amounts to water quality problems. Is there some careful working to provide an escape clause, has the aluminum plant at The Dalles been overlooked, have they installed some pollution control equipment recently, or do you believe the plant's discharge isn't a problem because the flow of the Columbia dilutes it after awhile? I read several years ago a description of what was being discharged at The Dalles aluminum plant and it looked pretty chemically active to me.

Your discussion of Inverted Rates on page VIII-97 reads to me like it has some skeptical or negative tone. Possible problems are presented prominently and possible benefits are qualified and hedged. Of course inverted rates themselves are not a smooth transition from promotional rates to inverted rates. But if conservation is an important and valuable goal, why would gradual change in the form of a transition that would delay conservation be desirable? The delay caused by gradual change would actually produce a cost to society of lost energy savings. Why is a smooth transition important anyway? You have made inverted rates sound less attractive because they don't provide their own transition. What about the utilities that don't have promotional rates now? Those wouldn't involve an abrupt change, but conditions and situations like that that would be less of a problem for implementing inverted rates were not even mentioned. That sort of omission plus the tone mentioned already suggests to me that BPA is not really as serious about changing and supporting conservation as you have often suggested. BPA and utility public relations departments certainly could develop programs to smooth any transition or other problems. They have years of experience already in trying to modify public opinion and acceptance.

The editorial claim that shifting aluminum production out of the Northwest "requires 'beggar-thy-neighbor' policies" as stated on page XI-9 may or may not be true for other regions of the U. S., depending on the economic conditions of the other regions affected. It may not be true for some regions outside the U. S. where conditions could be similar to those in the Northwest 20 years ago. It appears that the assumption was made that total U. S. production must be maintained, which is not necessarily true. There could be technological changes or shifts to materials that would compensate. The claim as written appears to me to

be misleading and inaccurate. As written it also implies that BPA recognizes that the existing aluminum plants beggar the Northwest and that maintaining present production levels in the Northwest will continue to "beggars" this area. That might be true. Some people seem to think that it is. For example, jobs that do not exist from potential industries that are less energy intensive that do not develop due to lack of adequate energy supply. In that light, it seems unfair and simplistic to blame energy shortages only on people who object to construction of new thermal plants.

The Hydroelectric Generation section on page XI-22 may be misleading because it, and other passages such as the one on page VII-36, appear to almost overlook the existence of a large number of undeveloped storage and hydropower sites, some of which may be environmentally tolerable. I recognize that many sites are small and that all of them together may only meet a portion of load growth. However, it seems quite possible that many sites not already developed were not constructed earlier due to lack of need or marginal economic justification, and that all hydro sites may not deserve the blanket reputation that some sites have of being environmentally very damaging. It seems likely that conditions have changed substantially over the last decade or two - increased need, much higher costs for non-hydro alternatives, and innovative approaches to small hydro projects such as standardized production of package generating units. Now a significant number of sites may have changed from economically marginal to feasible due to higher value of power, and may be worth looking at now. They should not continue to be ignored even though they are small and may be a bigger administrative burden because of their number than a single large thermal plant. It isn't fair to rate payers to overlook cheaper alternatives because they might be a bigger administrative bother to utility managers.

I will now summarize my opinions and preferences related to power marketing. I would like to see a sense of regional fairness prevail and greatest total well-being rather than the "I want more" or "I've got my chunk and to heck with everybody else" attitude. The federally built projects belong to everyone since they were paid for by tax dollars. Since it isn't practical to share the power over the whole U. S., the consumers of the power should at least pay enough to provide a fair return to the U. S. treasury. A low interest rate used to figure repayment as you now use is not fair - it is a subsidy by the federal government. A fair interest rate should be used - one that is at least as high as the current interest rates paid by the government to borrow money.

Another thing that doesn't seem fair to me is people of one state (or their representatives) saying I've got most of the cheap power and I want it to stay that way. I'm a resident of Washington and I enjoy the low cost power like anyone else would, but that doesn't make it feel fair or right. If the power belongs to all the people, any way that would evenly distribute it to all the citizens would seem to be the fairest. I understand that any practical, real-world way of distributing the low-cost power is going to be an approximation, but allocating it to all domestic and rural customers regardless of which state they live in or what type of utility serves them seems to be the best way. Therefore, I favor the alternative discussed on page XII-69 to allocate the low cost federally financed power to all domestic and rural customers of the Northwest.

As I read over the comments I have made on previous pages, I can see that I too am capable of writing with a negative tone. I must tell you that even though many of my comments have been critical in nature, my overall attitude and opinion of the EIS certainly is not. I still believe the draft EIS generally well written and that the final will probably be even better. I think BPA tried to do a good job writing it and tries to do a good job with their power transmission and marketing responsibilities. If BPA will now overcome their hesitation toward conservation, make a solid commitment toward equal distribution of low-cost power to all the people of the Northwest and energy conservation, and be less protective of the status quo, particularly the DSI's, I will believe that BPA is really performing the best possible public service.

One last point. I noticed in the EIS summary booklet, that I think was a very good idea, that BPA discussed the efforts made to be aware of public opinion. I believe that is both good and necessary, but it is not enough. Other agencies go to a lot of trouble listening to the public too. The trouble often is that after all the listening, the agency just listens to the portion of the comments that are favorable to what the agency wants to do for its own benefit. A lot of people have put a lot of effort into both writing and reading the draft Role EIS. I hope that the general public is both listened to and heeded, and not just the establishment groups that are supportive of business as usual.

Thank you again for the opportunity to comment and be a part of the effort to shape the energy future of the Northwest.

Sincerely,

Bruce M. Bolin

Bruce M. Bolin

My sense of fairness in equal distribution also means that I don't think it is very fair to give almost 25 percent of the low cost power to industries that provide less than one percent of the region's employment. I have no objection to the DSI's getting the power they need, but only such a large share of the power made available by tax dollars of all the citizens.

I like the several alternatives presented in the EIS that encourage low-cost choices such as conservation. The encouragement by rewarding conservation with increased low-cost allocations sounds interesting as presented on page XII-72. Two-tier rates, inverted rates, lifeline rates, I don't care what they are called but I do like the concept and I really believe they would be substantially effective in developing a more conservation-oriented attitude in our society. That is the same reason why I support Congressman Weaver's energy conservation plan and any other that will approximate an equal distribution of low-cost power to Northwest citizens and with a rate structure that will no longer promote consumption but will encourage conservation. Perhaps you can now see why I don't think BPA's mailed rates and net-billing is such a good idea.

If the lifeline rates discussed beginning on page XII-90 were not less than the cost to produce and market the low-cost hydro, I don't think it should be viewed as a subsidy as it is implied in your writeup. I don't see how it would be necessary to abandon cost rate concepts. It is true there would be some redistribution of income as you have indicated, but if it is from the DSI's and going to the cross-section citizens of the Northwest, it seems very proper and desirable.

One comment on the Aluma EIS. On page IV-A-2 is a section that covers transportation impacts. My understanding of the Aluma proposal includes Columbia River barges hauling alumina up the river to the smelter. If so, I think there should be some mention of that in the transportation section. According to a Corps of Engineers public notice sent to me in October 1977, the Bonneville Lock will be overhauled by 1993. If Aluma increases river barge traffic, will that make the lock obsolete earlier and force earlier construction of a new lock with federal money? I would like to see some more information on that subject in the final EIS. And of course I don't favor increasing the consumption of aluminum by the aluminum plants so I think BPA should not power the Aluma contract. Perhaps if Aluma was willing to build a plant with the greatly improved efficiency of new processes being developed, it might be a good idea to transfer the delivery of electricity to it from a much older, less efficient plant that also may be causing more air pollution, perhaps in a more heavily loaded airshed. That alternative might be worth some evaluation.

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December 28, 1977

Mr. John E. Kiley
Environmental Manager
Bonneville Power Administration
Dept. SJ
P.O. Box 3621
Portland, Oregon 97208
Re: Aluma EIS (DES-77-22)

Dear Mr. Kiley:

Pursuant to the invitation for comments to the Aluma Environmental Statement, and in compliance with procedures established under the National Environmental Policy Act of 1969, implementing regulations and judicial decree in *Port of Astoria v. Hodel*, 588 F. Supp. 8 (D.C. 1975), appeals pending, Nos. 75-3465, 75-3621, 75-3699 and 76-1049, (9th Cir.), the enclosed Statement of Comments by the Port of Astoria denominated "Aluma Statement" is submitted for consideration.

I would appreciate it if you would confirm receipt of the enclosed Statement of Comments as being received within the permitted comment period which now extends to February 13, 1978. You may complete acknowledgment simply by indicating receipt of these documents on the enclosed copy of this transmittal letter and returning it to this office to my attention.

Very truly yours,

Emuid F. O'Connell
Emuid F. O'Connell

(for Port of Astoria)

DFOM:lt
Enclosure
cc: Mr. George Grove
Manager, Port of Astoria
Capt. Robert Lewis, USCG (Retired)
Mr. Deskin Bergey
Co-Chairman, Concerned Citizens of Clatsop County

ALUMAX STATEMENT

In our review of the Draft Environmental Impact Statement completed by the Bonneville Power Administration regarding the proposed Aluminum Reduction Plant in Umatilla County, Oregon, the Port of Astoria has several comments and questions concerning the adequacy or inadequacy of information presented.

Specifically, information contained within the E.I.S. relating to population, housing, vegetation and community services is, in some instances, outdated or presented in such a manner as to make its validity questionable.

The depth and manner in which information concerning Clatsop County's physical, community and natural resources' ability to adapt and provide suitably for an industry such as an aluminum reduction plant is sketchily presented, if it is presented at all.

In general, the analysis contained in Section IX is superficial and not of sufficient depth to give the reader a true picture of the Warrenton or Clatsop County communities.

Admittedly, the Draft E.I.S. purports to be an analysis of facts and issues relating to the location of an aluminum reduction plant in Umatilla County, so one could argue that not as much time or attention should be paid in relating to the Warrenton site. However, in the interest of fairness and factuality, an indepth analysis and presentation of relevant, substantive information should be present in the Draft E.I.S. document.

ALUMAX STATEMENT - Page 2

Page IX-6, lines 30-32:

This factor is beneficial to the Warrenton site. No effect on surrounding vegetation and animals would be expected.

Page IX-6, lines 40-45:

There are a couple of residents in the area of the ALUMAX site that allow their beef cattle to graze. However, the nearest dairy farms are approximately 1 1/2 miles and 2 1/2 miles from the site.

Page IX-8, lines 7-13:

This information is in the favor of the Warrenton site.

Page IX-11, lines 21-27:

Redesign of certain facilities at Warrenton would solve problem of high particulate levels off the plant site resulting from nuisance dust collectors at the north end of plant. This would bring it more into line with the Umatilla site, evening out the air quality imbalances between the two sites.

Page IX-20, lines 1-12:

A factor of benefit to the Warrenton site.

Page IX-21, lines 39-43:

A factor of benefit to the Warrenton site.

Page IX-25, lines 12-18:

What about the impact of transmission lines on the flat landscape of Umatilla?

Page IX-26, lines 24-27:

Less immigration reducing massive capital expenditures by cities, county, state for roads, schools and other urban facilities. More gradual crankup in costs, etc. Clatsop County is more prepared for the impacts of an industry locating that Umatilla County.

ALUMAX STATEMENT

Page IX-2, lines 37-39:

Raw materials, electrical and total energy demands would be essentially the same for both sites (Warrenton and Umatilla) so this would not be a determining factor in choosing one site over another.

Page IX-3, lines 47-51:

This statement is a blanket assumption with no factual basis. There would be no undue disturbance related to the provision of access roads, transmission, sewer and water facilities. All facilities would be planned in a manner to minimize impacts on the community and natural resources. The Warrenton site is 726 acres in size. The plant would occupy approximately 160 acres. Would compatible industrial uses be prohibited from using a portion or remainder of site? Often times the plan approval or design review process by cities, counties or permitting agencies could disallow the use of the remainder of the site. It is doubtful that this would be the case in Clatsop County.

Page IX-4, lines 9-10:

BPA draws the conclusion that the AlumaX site in Umatilla is a more resilient area to the siting of an aluminum reduction smelter than the Warrenton site. On what do they base this conclusion - on 2 paragraphs of discussion concerning vegetation?

Page IX-5, lines 25-30:

Warrenton site while it is only about one fourth the size of the Umatilla site, would have more effective buffer zone with dense vegetation to mitigate adverse visual effects on adjacent lands.

Page IX-5, lines 43-53:

Clatsop County, because of its lower projected growth rate over the 20-year study period and because the projected growth rate is 1,000 persons less than in the Umatilla region, would be more able to handle ALUMAX - related growth since most of Clatsop County's public facilities are at a better stage of development.

ALUMAX STATEMENT - Page 3

Page IX-27, tables IX-4 and IX-5:

Please see attached population projections. The population characteristics of Clatsop County have changed in the last 3 or 4 years, a decrease in population generally. Therefore, most population projections completed prior to 1976 would possibly over estimate.

Page IX-29, lines 36-39:

This is a factor in favor of the Clatsop County area because, as has been stated before, Clatsop County community facilities are at a higher level of development than Umatilla County facilities. Because of changing character (i.e. population) of Clatsop County, many community facilities are under utilized.

Page IX-32, lines 1-10:

All beneficial to Clatsop County as a whole. Proposed plant would require a new spur off the Seaside branch of the BN railroad, increased freight volumes for BN could conceivably generate local employment resulting from increase in business volume.

Page IX-36, lines 30-39:

This is beneficial to the Clatsop County site. The Astoria School District has voted to close one school because of a decline in enrollment. Children attending that school will probably be transferred to other schools within the district. This school has a capacity of 300. Presently some children from outside the Astoria District attend schools in Astoria (with an exchange of "tuition" between the two school districts). The school that is being discussed for closure could adequately handle any overflow of students in the Warrenton, Hammond and Seaside areas. Warrenton, Hammond and Seaside are all within 15 to 20 minutes or less driving time of each other so time would not necessarily be a constraining factor.

Page IX-40, lines 44-46:

Once again Clatsop County could handle impact better than Umatilla now. ALUMAX population growth projections for Clatsop County are considerably below those for the Umatilla area (with accurate projections used as a basis for projecting).

Page 1X-43, lines 40-55:

There is considerable old data concerning Clatsop County included in the Draft E.I.S. The F.I.S. does not take into consideration the construction of a new 55-bed hospital in Astoria. Closure of Columbia Memorial Hospital after completion of the new hospital had been discussed previously. However, a community movement is underway to have Columbia Memorial operate as an extended care facility.

Page 1X-44, lines 8-13:

Number of persons per physicians in Clatsop County is more favorable than the recommended minimum standard, also above Umatilla County average.

Page 1X-48, lines 47-53:

In response to the information stating that the 40' Columbia River channel is considered to be near maximum feasible depth, I would refer you to the attached news clipping from Shipping News, October 19, 1977, and a quote from Adam Heineman, Chief of Navigation Division, Corps of Engineers, Portland District: "The 5 mile long 1/2 mile wide entrance channel is now at least 48' deep in all places, and that nearly half the channel has been deepened to 53'."

Page 1X-49, lines 1-17:

The potential, the extremely well-defined geographic location and benefits of the Port of Astoria is not sufficiently addressed or discussed in the Shipping section.

Page 1X-54, lines 4-10:

This is a factor of great benefit to Clatsop County.

Page 1X-54, lines 29-54:

Annual income of workers would have substantial direct and indirect benefits to the community.

POPULATION PROJECTIONS
FOR
CLATSOP COUNTY, OREGON

	(Actual) 1970	1975	1980	1985	1990	1995
1.	28,473	29,200	30,375	31,150	31,850	32,225
2.		29,400	30,100	31,600	32,500	

1. Bonneville Power Administration, Population, Employment and Housing Units to 1995, December 1976.

2. Pacific Northwest Bell, Population and Housing Trends of Washington, Oregon and Northern Idaho, 1975-1990, April 1976.

1. County and City

	July 1, 1976 Certified Population
CLATSOP COUNTY	29,500
Astoria	10,600
Cannon Beach	875
Gearhart	845
Hammond	545
Seaside	4,635
Warrenton	2,150

1. Portland State University, Center for Population Research and Census, Population Estimates of Counties and Incorporated Cities of Oregon, July 1, 1976.

TABLE 10
POPULATION AND HOUSING UNITS

Year	County	Population					Housing Units
		Astoria	Cannon Beach	Gearhart	Hammond	Seaside	Warrenton
1970	20,073	10,244	779	829	500	4,402	1,875
1971	20,770	10,400	790	850	520	4,425	1,885
1972	20,400	10,500	790	855	540	4,465	1,875
1973	20,900	10,700	815	875	560	4,570	1,890
1974	21,400	10,900	835	890	580	4,620	1,930
1975	22,500	10,680	866	890	530	4,660	2,000
1976	23,500	10,680	875	845	545	4,675	2,150
1970	12,502	4,276	879	431	182	2,488	667
1971		4,404	904	442	182	2,488	689
1972		4,495	906	452	200	2,530	700
1973		4,511	922	463	208	2,605	706
1974		4,569	960	472	208	2,635	733
1975		4,557	972	472	208	2,653	737
1976		4,551	1,035*	609*	219	2,666	829

*Census
Estimate of housing units is based upon building permit information and number of residential unit --
demolitions and conversions.

Source: Center for Population Research and Census, Portland State University

This information was used from Montagne-Herly Associates, Inc. and NUS Corporation, Pacific Fabricators
Environmental Assessment Report, May 1977.

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January 26, 1978

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ALUMAX OFFICE
SAN FRANCISCO, CALIFORNIA
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SEATTLE, WASHINGTON
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Dick Van Tassell
1900 West Quinn, #11
Pocatello, Idaho
83201

December 7, 1977

Mr. John E. Kiley
Environmental Manager
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Attention: SJ

Re: Alumax Supplement EIS

Dear Mr. Kiley:

Thank you for your letter of January 11, 1978 acknowledging receipt of my "letter" regarding BPA's role in the Pacific Northwest power supply system. I simply wanted to establish for the record that the "commentor" is not I, nor is it our law firm, but rather it is the Port of Astoria. I would appreciate it if you would verify that in listing sources of comments that the source (or "commentor") in this case be listed as the Port of Astoria. I believe that my transmittal letter made it clear that we were simply acting as counsel to the Port of Astoria in transmitting the comments rather than acting as principal.

I am not suggesting that your letter has overlooked that fact; I simply want to be sure that there is no misunderstanding so far as your records are concerned, just so long as your list of "commentors", when published, will reflect that you have received comments from the Port of Astoria.

Very truly yours,

Diarmuid F. O'Spinnlain
Diarmuid F. O'Spinnlain

DFO:mlt
cc: Mr. George Grove
General Manager
Port of Astoria

Bonneville Power Administration
Environmental Office--SJ
P. O. Box 3621
Portland, Oregon
97208

Dear Sir:

I have read the draft Alumax Environmental Statement and would like to submit the following comments for consideration in the final statement.

Over all I felt the draft EIS was very well prepared. I thought that the description of the proposal, the description of the existing environment and the environmental and social impacts of the proposal were very well prepared and that a conscientious effort was made to include negative costs as well as the benefits of the proposal. I do not, however, feel the Alumax facility should be initiated as proposed in the draft EIS.

The proposed facility would have sufficient electrical energy assured only until July 20, 1986. Two alternate sources of energy are considered in the draft EIS. Self generation is projected to cost six times the current Bonneville Power Administration rate (p. IX-1) and other sources of supply could, according to the draft EIS, only provide fifteen percent of the required amount for the proposed facility (p. IX-1). Such large scale investment would be unwise unless continuous sources of power can be assured.

Although the draft EIS does consider the effect of the physical environment and the local community if the facility were to be forced to shut down because of insufficient sources of power at a later time, I do not think sufficient consideration is given in the statement of the social costs of such action.



United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

OFFICE OF THE DIRECTOR

In Reply Refer To:
EGS-BES-77/22
Mail Stop 760

Memorandum

To: Administrator, Bonneville Power Administration
Portland, Oregon
Through: Assistant Secretary, Energy and Minerals
From: Director, Geological Survey
Subject: Review of draft environmental statement and draft report on "The role of the Bonneville Power Administration in the Pacific Northwest Power Supply System"

We have reviewed the subject documents as requested in your letter of September 7.

It is noted that a preoperational monitoring program to document background data for potential aluminum plant contaminants appears to consider only ground-water quality (p.11-20, sec.7.a, par.2). Water-quality monitoring measures also should include surface-water permanent ponds on the Alumax property.

The programmatic statement should more adequately assess the potential for impacts of the proposed program on ground-water resources that may result from the possible increased use of ground water for irrigation. It should compare the effects on ground-water resources resulting from increased use of electricity for pumping ground water with the effects of the direct use of fossil fuels for this purpose.

ACTING
Director



The reality is, of course, that once such a facility is built, it is very doubtful that its power supply would be discontinued. The result could be increasing rates by other customers to pay for the BPA increasing their capacity more rapidly than would otherwise be necessary.

The draft EIS makes the point (p. I-8) that the Alumax plant is needed to decrease the United States' dependence on foreign supplies of aluminum. The draft EIS does not, however, demonstrate that the Alumax facility would be capable of producing aluminum at a lower price than it can be purchased abroad. Furthermore, Business Week (April 12 1976) reported that twenty-five percent of Alcoa's production capacity was idle and that although demand is expected to increase, return on investment is expected to keep earnings low until new technologies are developed to increase efficiency in American production. I would therefore recommend that unless Alumax can demonstrate that the new plant can produce more efficiently than foreign produces, development of the proposed plant be held in abeyance pending the outcome of the new technologies discussed in alternative E (p. IX-58).

On page IV-45, the draft EIS points out that "The projected population increase expected from the proposed Alumax plant would significantly impact water demand in an area that already has critical shortages. The communities within the region need new sources of water to meet current demand." I think a section should be included in the final EIS of how this shortage can be alleviated.

Although I felt the social impacts included in the proposal were well prepared, I think one major omission exists. That is no public opinion survey was conducted to ascertain how the local populace feels about the proposal given the changes outlined in the draft statement. In this regard, given my previous comments about the water shortage, if the local populace is in favor of continued industrialization of the area then perhaps they would prefer seeking industries which require less water than the proposed Alumax plant.

I have one final comment on the physical layout of the draft EIS. I am not from the Washington-Oregon area and could not identify the impact area from the small map on page II-5. I would suggest an additional map of the entire area to put the above listed map into perspective.

Sincerely,

Dick Van Tassell
Dick Van Tassell

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
16th Floor, 1220 S. W. Third, Portland, Oregon 97204

November 7, 1977

ORIGINAL FILE COPY	
By	Date
Reviewed To	
Action Taken	
By	Date

Mr. Donald P. Model, Administrator
Bonneville Tower Administration
P. O. Box 3621
Portland, Oregon 97208

Dear Mr. Model:

We have reviewed the Alumas Environmental Statement and have the following comments:

1. P. III-3. Rupt soils have been dropped from the soil classification system and reclassified as Quincy soils.
2. P. III-3. Note that the Onyx soils are considered prime agricultural soils when irrigated.

Thank you for the opportunity to review this draft environmental impact statement.

Sincerely,

Guy W. Nutt
Guy W. Nutt
State Conservationist

cc:
Administrator, SCS, Washington, D.C.
Office of the Coordinator of Environmental
Quality, Washington, D.C.
Council on Environmental Quality,
Washington, D.C. (3 attachments)
Kenneth L. Williams, WSCS, SCS



-2-

several ways in which such a group could be chosen. The important requirement is to have the Supervising Board be publicly responsible, perhaps through direct elections (such as is now done with the Public Service Commission) or through representation from each state governor's office. The creation of a semi-autonomous Federal agency with power over individual state governments and with no representation from those governments must be avoided.

In short, public participation in energy planning is essential. This participation is not adequately provided by the present format of belated responses to a fait accompli and, to allow adequate involvement, the public, ultimately through its elected representatives, should be the final authority on regional energy matters.

There are two critical issues which, when met, will determine much about our future environment and social conditions in the Northwest. These are: 1. What is the potential for conservation? Will intelligent, resourceful conservation allow us to meet our legitimate energy needs without further destruction of our environment? and 2. How will we produce and distribute what energy is needed. Will we become more dependent on large centrally operated thermal plants with the resulting spread of pollution and power lines? Or will we opt for a decentralized low impact solution? (e.g. heat pumps- insulation- solar heating- not a thermal generator in every town).

The remainder of this response will focus on clarifying my approach to these issues, through specific references to sections of the Role EIS which I feel to be misleading, inadequate, or false.

Ultimately the issue becomes a matter of values: an expression of one's view of a desirable future. If a person actually prefers living in an energy extravagant society, arguments given in this response will have little impact. It is my hope and belief however that people do care about the quality of their environment and the stability of their economy and that given a properly expressed choice we will opt for conservation in place of increased reliance on central thermal plants.

There are obvious difficulties in a response of this kind. The EIS is quite diffuse and the issues themselves varied and complex. As a private citizen there are restraints on time and access to material. What I have chosen as the most relevant means of response is to reply to specific statements in the Role EIS. There is only a loose organization to these responses.

Appendix A, p. II-1, lines 45-52. This statement makes clear the lack of objectivity of the entire Role EIS. The conclusion of the EIS and of the BPA was obtained as soon as this basic dependency of BPA policy on utility forecasts was decided. Alternatives were given a listing, but were not allowed to change policy or BPA recommendations because that policy is not decided by utility forecasts. The social and environmental impacts of massive thermal generation are too great to be left to the utilities. If BPA policy is set by utility forecasts as this memorandum states, the entire public dialogue engendered by the Role EIS is a sham, with only the participating public taking it seriously. If the conclusion is already determined, why bother with an EIS?

Part 2, VII-12, lines 1-5. Under the statement of the BPA's 'mission' is the goal of 'promoting cost-effective conservation.' This goal was not met in other than a token fashion by the plans described in the Role EIS. It is clear, I believe, to all observers that the insulation of 200,000 homes is far from being the only cost-effective conservation method available.

Bonneville Power Administration
1002 N.E. Holladay Street
Portland Oregon

What follows is my response to the Role EIS which I am submitting on behalf of myself and Northwest Citizens for Wilderness.

It is possible, upon approaching the sheer bulk of the Role EIS, to be overwhelmed by the quantity of words and assume that the critical issues must have been addressed adequately and completely. This assumption however would be wrong. What this study represents is the minimum alteration in the status quo necessary to satisfy the private utilities and metal refining industries. It does not represent the interests of the general public and is not an example of the type of long range energy planning which is needed to maintain a stable productive economy and the long term survival of a quality environment in the Pacific Northwest.

Much of the EIS is descriptive of present generating and transmitting methods. These sections provide much needed base information which must become available to the general public in order that citizens might become productively involved in choosing their own energy future. The value of these portions of the EIS is not being questioned here. The method of encouraging participation is deficient however in several basic ways. First, despite the opportunity for speaking out, there is no necessity or even probability that, within the confines of this study, our voices will be heard. It can be well documented that citizen participation in such undertakings as this is normally ignored. There is no structural necessity for public comment to effect changes regardless of how unified or informed the comment might be. Second, by a basic law of motion, when so much energy has pushed the weight of the EIS this far, it is inherently unlikely that public opinion will alter it in any but minor ways.

My suggestion therefore, to effect planning which would be responsive to the general social and environmental needs of this area is to from the beginning phase the planning in the hands of an objective, representative and publicly responsive body. We could leave the energy planning to the utilities if there were only technical problems, but of course there is much more involved. There is and should be much controversy over these issues. The utilities by their nature and experience have a bias toward large, centrally managed plants. Social goals however would be furthest by encouraging diverse, low impact and non centralized power generation. Burning coal to produce electricity for heating is a wasteful process; it is only 1/3 as efficient as the energy actually being delivered. We should encourage instead the utilization of waste industrial heat, solar heating of buildings and water, and local, small scale generation of energy which is of a type appropriate to its local, small scale use. This type of decision is not likely to be reached by a utility which end use. This type of decision is not likely to be reached by a utility which has its investment in large centralized stations with power lines sweeping across all parts of the country. This is why we need for energy planning to be done by an independent body with an awareness of long range social needs and a creative approach toward solving them. Utilities would be represented in a group, but there is no reason why in a democratic society we should entrust such vital and pervasive social decisions to a single group. There are at least

Appendix C, IV-251-2. 'Impacts of a Residential Insulating Program.'

Costs of energy saved are estimated at 5 mills per kWh. Costs of coal fired energy by 1985 will range between 39 and 50 mills per kWh. At another point in the EIS it is stated that energy saved through conservation costs on the average 1/10th of the cost of new energy generation. Yet this program of insulating electrically heated houses is the only conservation program other than rather limited education and pamphletting proposals which the Role EIS endorses. I suggest as the only logical beginning point of a serious conservation program that all cost effective conservation programs be undertaken before any increases in electric generation. Throughout the EIS it is stated that only conservation efforts which are cost effective should be endorsed. Why, for the earth's sake, do we not require the same standards of energy generation programs? Never in the EIS is the cost effectiveness of conservation programs other than the one mentioned given a detailed study. In addition, I am unclear from reading this section whether only capital costs of generation vs insulation are being compared or whether the yearly costs of generation plus resultant negative environmental impacts are also included. I suspect that if this were done the net contrast would be even more dramatic.

Part 2 VII-13 line 1. 'consensus of many diverse interests' should read 'consensus of the area's utilities and electroprocess industries'

Part 2 VII-79, lines 37-45. Several ideas occur. 1. Why? Why must conservation costs not exceed the cost of an equivalent amount of new power generation? Frequently in the past and the present as well the social decision has been made that the cost of generation can greatly exceed the costs of conservation and yet we have followed the path of increasing generation. Why can we not now, due to increased awareness of the fragility and precarious nature of the bonds of life on this earth, make the social decision to endorse conservation and low impact generation even if and when it is more costly than thermal generation? and 2. Is the reverse true as well? Will BPA make the corollary conclusion that the costs of generation of power must not exceed the costs of conservation of an equivalent amount of energy? If not, why? This question has not been addressed in the 3,200 pages of the Role EIS. and 3. Do you take into account in calculating cost effectiveness the extra costs of generation plants? I found no detailed figures giving cost values to adverse impacts, yet we know there are many costs associated with negative impacts of thermal and hydro projects. Why are not these additional costs brought into the calculations?

Part 2, VII-3, lines 15-23. All other sources I have seen state that conservation programs generate more jobs than thermal plant construction, not approximately equal amounts as is asserted here.

Part 2 VII-6 lines 1-10. If BPA 'does not plan to continue to serve growth in industrial loads resulting from expansion' in the electroprocess industries, why is the Alumas statement even being made? This is a direct contradiction.

Part 2, VII-9 lines 1-21. This section implicitly assumes that all regions of the country should be equal in their energy generation and consumption. Why? Just because Detroit produces cars and the Ohio valley has rich industrial concentration is no reason why we should do likewise. Each region has varied strengths, exports, and needs. Recognition of this variation does not constitute a 'beggar-thy-neighbor' policy, as is contended here.

Part 2, XI-22, Lines 9-29. This section has a strong Dr. Strangelove air, and I am surprised how little the possibility of an 'as yet ~~unmeasured~~ long-term cost of fossil-fueled generation' as significant as the alteration of the global climate has figured in the long term BPA planning. We are talking here of truly major impacts and the possibility of long term climate changes must not be ignored in making long term energy plans. Surely a possibility such as this ought to provide a strong incentive for conservation, yet the Role EIS utilizes only 'more of the same' projections of electrical growth. Adequate planning for the Northwest must be done, and the Role EIS can help in certain ways, but it does not meet this region's needs for energy planning.

Part 2 VIII-27, Lines 1-35. This is a classic Pollyannaish statement. Nuclear wastes must be isolated for longer periods of time than any civilization has yet existed, suggested disposal systems have not been found adequate (e.g. Salt mines in the Midwest were found to be adjacent to water - other potential sites have been found to be geologically active.) There are good reasons why, 30 years into the Nuclear age, nuclear waste disposal has not yet been resolved. To dismiss this hazard with the assertion 'Disposal impacts are expected to be minimal' is either naive or intentionally misleading. It certainly is not at all clear from where this conclusion is derived. It simply appears without explanation and is followed by a statement which to me is contradictory: 'detailed data on impacts of radioactive waste disposal in the Pacific Northwest are unavailable.' If the data is not at hand (as it could not be since no way has yet been found) how can the assertion of minimal impacts be made?

Part 1, V-59. Again in the discussion of the decommissioning of nuclear reactors present and future problems are blithely dismissed as 'not prohibitive.' We should keep in mind what is being talked about. Nuclear reactors are given a lifetime of 30-40 years. The residues they generate are deadly for upwards of 200,000 years (plutonium) although the major contaminants are highly hazardous for 'only' 1000 years. Very little experience is yet available for costs and safety of decommissioning. In the case of the Elk River reactor, construction costs were \$6 million (it was a small experimental reactor) and decommissioning costs were \$6.9 million (Progressive-Dec. 1977), a figure which the Role EIS conveniently left out of their review. In 1972 a commercial reprocessing plant shut down in West Valley, N.Y. and in 1976 site control was transferred to N.Y. State ESDA. Decommissioning costs for this site are estimated to run as high as \$600 million. (Progressive Dec. 1977) This is a very short review of costs involved with decommissioning, but there are basic philosophical issues involved here as well. What analyses such as the Role EIS advocate is that we commit ourselves and our descendants for many generations to a society stable enough to continually monitor and shield themselves from the deadly residue of our 40 year low affair with nuclear energy. This is a real-life game which no one can win. There have been no such stable societies in our history and it requires extreme optimism or myopia to seriously suggest that our present society will be that stable. What is done here is once again take the conceptually easy present day choices and postpone the consequences and necessary changes in life style etc. for someone else in the future.

with minimizing this waste. Instead, its authors chose to ignore end use analysis in favor of the more superficial assumption that our only choice is to go 'more of the same' and continually provide more electricity with little regard either for its social and economic costs of production or for the large amount of waste in its final use.

Part 2, XII-3b, Lines 11-45

This section contends that 'peak-shaving measures reduce peaking costs but do not change energy costs...'. This contention is often simply wrong. In this area, for instance, the Army Corps of Engineers is considering pumped storage as a means of providing peaking power. Obviously, if peaks could be minimized such facilities would not need to be built, and thus energy costs would be lower. In addition, total energy consumption would be lower, as pumped storage is actually a negative producer of electricity, i.e. more electricity is used than is generated.

Part 2, XII-37, Lines 15-32

Here it is contended that 'impacts, like costs, are reduced by larger, more efficient projects.' The truth of this statement depends on how the situation is viewed. Obviously if the only alternative to large central coal or nuclear plants were many small coal or nuclear plants (as is suggested by the Role EIS) the statement would be true. I am sure that large plants can be more efficient and safer and operate with less impact than a great many small plants. These however are not the only alternatives and indeed, the second alternative is not, to my knowledge, even suggested by conservationists. The contrast more properly should be made between large central coal or nuclear plants and more unit sized solar heating units, wind generating units, etc. which can supplement already available central station or hydro electricity. In addition, there are many available sites for small scale hydro generation which could feed into already existing lines. For example, in this area (Flathead Reservation) there are several places where irrigation water in large amounts runs down steep concrete ditches, posing a constant danger to both people and livestock. This water could be sent through a pipe and run through a generator and provide benefits rather than the present dangers. This form of creative small and low impact solutions has been ignored by the central station 'more of the same' attitude which pervades the Role EIS.

Part 2, XII-90. Life line rates are here considered only as a means for income transfer and their conservation potential is ignored. I suggest that the crucial aspect of the lifeline rate idea is keeping present relatively low rates for a 'survival' portion of a consumer's electric bill, and charging increasing amounts for use above an agreed upon base to fully account for the costs of additional generation. The present method of averaging new costs with present costs keeps the incremental cost of electricity deceptively low, thus encouraging its use rather than its conservation.

Appendix B, X-6, Lines 11-53.

This section states the often repeated contention that conservation's effect on future energy requirements is to extend the time over which these facilities would be built rather than remove the need for the facilities altogether. Several ideas need to be stressed here. First, there are limits to ~~growth~~ (the type of growth recommended in this EIS. An obvious one is exhaustion of resources, but there are many others as well. There should be no question about the impossibility of constant exponential growth. So, if it is accepted that at some point this type of growth will stop, the question becomes,

Part 1, V-228. Potential hydro sites in this table are not identified. I believe it is important that they be identified. To garner an additional 516 avg. Megawatts and 5,100 peaking Megawatts would require transforming large sections of what little remains free flowing in the Columbia River System into reservoirs. These sites should be identified so the public can begin protective action.

Part 1, VI-361. The seventh and tenth principles of the National Energy Plan are not being met by the Role EIS. Pricing policies advocated here (as contrasted with those simply discussed) join the costs of 'cheap' hydro with expensive new thermal, thus encouraging additional use and directly contradicting the seventh principle which states 'that energy prices should generally reflect the true replacement cost of energy'. The tenth principle is that 'the use of nonconventional sources of energy must be vigorously expanded'. Although much discussion in the Role EIS concerned alternative energy sources, only minimal support was given to the actual development of alternatives. One glaring lack was its failure to consider how solar space and water heating as a supplement to central station electricity.

Part 2, VIII-52, Appendix B VI-10611, and VII-74-78. In these sections the Role EIS discusses BPA's use of herbicides, concluding, 'It is very unlikely that any adverse effects to wild animals or domesticated animals would occur.' Several of the BPA sprays were used by the US to destroy large sections of Vietnam. There is such evidence that their use is responsible for a wave of birth defects in that country since they were used. Dioxin, as a contaminant and break down product of 2,4-D is known to be teratogenic. Consider the Italian town of Seveso which was inadvertently sprayed when a herbicide factory released spray (2,4-D and Dioxin) into the atmosphere. The rate of birth defects and spontaneous abortions went up dramatically among the pregnant women. Consider also the March 7, 1977 decision that the Region 6 USFS EIS was inadequate in analyzing its herbicide program for, among other faults, 'failure to acknowledge effects of phenoxy herbicides on industrial workers', 'failure to mention recent research showing 2,4,5-T itself is teratogenic', 'failure to mention dioxin contaminated tissue samples taken from the Siyuila National Forest' and 'complete omission of any reference to the controversy over the effects of Agent Orange (equal parts 2,4-D and 2,4,5-T) in Vietnam'. All of these faults of the USFS EIS apply equally well to the BPA Role EIS. Refer also to the Feb. 3, 1978 editorial in the Massollian which quotes from a National Academy of Sciences report stating that indeed there is much evidence that these herbicides have lasting destructive impacts on vegetation. If one read only the Role EIS one would be left with the impression that there is not even a controversy over the issue of herbicide spraying. It is grossly deficient in its treatment of the problems associated with herbicide use.

Part 2 VIII-55. BPA clearly links economic well being with high energy use, stating that 'When international comparisons are made, those areas with highest per capita levels of energy consumption have the highest per capita income.' The fact is that Sweden and other European countries with as high or higher living standards as ours use only 1/2 or less of the amount of per capita energy that we do in this country. It is my contention that the increasingly massive commitment of capital reserves in thermal plant construction will actually have a negative impact even on our financial well being, disregarding for the moment the obvious negative impacts on our quality of life. If the Role EIS had looked closely at the huge electricity (as was done in the Alternative Energy Scenario) they could have identified massive areas of waste and inefficiency in our present use of electricity and we could have begun dealing productively

what policies can we encourage today which will bring us most quickly into a tenable balance? It seems clear to me that conservation and the development of low impact energy resources will facilitate our reaching a living balance whereas the increasing dependency on exhaustible resources will merely add to our present imbalance. Second, as is mentioned on page 7, lines 9-11 with the specific issue of transmission in mind, there is a likely possibility that technological advances will allow substantial improvement in the transmission as well as the generation of electricity. If this does occur, transmission and generation facilities which have been 'positioned' due to conservation will not need to be built at all. I would like to add here the observation that the Role EIS willingly assumes the future existence of safe storage methods for nuclear waste, but places much less reliance on the potential of technological advances to increase our efficiency in transmission, generation, and use of electricity. Considering how much as yet fruitless effort has been directed toward solving the nuclear waste problem and how little effort has yet been placed on the technology of efficient energy use, I suggest that their confidence is misplaced.

Appendix B X-26.

Under corridor studies, the unique impacts of transmission through narrow valley corridors should be given special attention. The Clark Fork valley from Plains west to Thompson Falls is already nearly filled with power lines.

Appendix A, IV-81.

Ripple control has the disadvantage of cost (line 146) yet on page 82 lines 19-25 it is shown that the costs of its installation and use are far below the costs of peak generation. Why do not the authors of the Role EIS begin to look at the high cost of thermal plant construction? Continually through the EIS promising conservation practices (such as ripple control) are rejected in favor of continued reliance on increased electrical generation despite the latter's higher cost.

Appendix B, IV-16, Lines 19-25.

Throughout the EIS, ~~as~~ as illustrated by this reference, it is stated as fact that conservation cannot provide the major source for our future (e.g. to 1995) energy needs. This is done despite the fact that the EIS never provides a rebuttal for the detailed and clear assertions of the Alternative Energy Scenario that conservation can serve as our major resource for the next 20 years. In short, the EIS chooses to deal with the arguments of conservationists by simply ignoring them and continuing as though they did not exist. For a study which claims objectivity this is a major fault.

Alumax statement.

Why is there no discussion of the costs/benefits of a major recycling program as an alternative to the construction of new electroprocess plants? It seems a major fault in an EIS addressing itself to the construction of a new aluminum plant is to fail to consider the practical alternative of reuse of what aluminum is already here. I submit that the reasonable way to deal with aluminum is to levy a rather stiff deposit charge on all manufactured aluminum products, thus guaranteeing their return to a recycling plant. This would not actually cost the consumer anything in the long run, as any deposit upon purchase would be refunded when the item was returned. Such a procedure would greatly decrease the need for manufacture of aluminum, provide diversified employment for a large number of people, and would have additional beneficial social impacts such as less litter and plant emissions. I would like to see this issue addressed in the final Alumax statement.

In addition, it seems peculiar that an Alumax statement was needed at all.

-8-

Why is the EPA considering the addition of a major aluminum user at the same time as they are contending that the region faces imminent shortages of electricity?

In conclusion, we have in this KIS a statement which claims objectivity but in actuality defends a basic bias. (In this case EPA's commitment to use utility load forecasts regardless of countervailing arguments). This bias works its way throughout the KIS rendering what could and should have been a major contribution to the public energy debate an exercise in propaganda. I hope that the errors of fact and logic which have been addressed in this and other responses will lead to changes in the final KIS, but I suspect the final will be simply 'more of the same'.

Douglas Baty

Forelows on Board

F.O.B. CLEARING HOUSE

SENATOR BUILDING - PORTLAND, OREGON 97204

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Seattle Chapter 12504 13th S.W. Seattle 98146

John E. Kiley
Environmental Manager
Dept. of Energy
B.P.A. P.O. Box 3621
Portland, Or. 97208

"THE FOUR LAWS OF ECOLOGY"

1. Everything is connected to everything else.
2. Everything must go somewhere.
3. Nature knows best.
4. There is no such thing as a free lunch.

Feb 10, 1978

Dear Mr. Kiley

We appreciate your timely letter of Feb 8, 1978 (SJ). Friday on the last work day we secured a confirmation of the research we referred to in our letter of Feb 2, 1978. The Technical Information Center of Oak Ridge Tennessee has a report numbered ID 3896 titled, "Recovery of Aluminum from Coal Fly Ash by High Temperature Chlorination" authored by M.J. Murtha and G Burnett. Mr. Burnett is still located with the ERDA Laboratories at Ames Iowa and the report is dated 1976.

The Seattle office of Dept of Energy reports that they expect to have a copy of this report within a week or ten days. Forelows On Board believes that the Aluminum industry will be greatly changed by the use of the Alcoa Process and the industrial development of chlorinated fly ash!

We can see three important reasons for the rapid development of these two processes: (1) In the PWV smelters were built and rebuilt using a process that was adequate under contracts that sold power for approximately 2 or less mills per kWh. Marginal electricity contracted for today and built in 1985 would cost 40 mills, a 20 fold increase in price. (2) Bauxite costs have gone up as much as 7 fold in the past 8 years. (3) National Security will demand that we acquire the ability to be independent from a significant amount of foreign bauxite suppliers. Once the technology is perfected the economics of the two competing systems will determine the future of the U.S. Aluminum industry.

"Energy User News" predicted that our domestic fly ash, processed through the Alcoa Process, will completely replace our need for foreign bauxite! We feel that the Alumax and Role E.I.S. should address this issue in its final report.

Sincerely, *William J. Van Horn*

Wm. Van Horn, Chair F.O.B.
BILL-BALLOT-SIGNATURE

FOCUS-FORUM-FULCRUM

ON

* Energy User News 1/24/78

△

Forelows on Board

F.O.B. CLEARING HOUSE

SENATOR BUILDING - PORTLAND, OREGON 97204
Seattle Chapter 12504 13th S.W. Seattle 98146
206 244 3901

"THE FOUR LAWS OF ECOLOGY"

1. Everything is connected to everything else.
2. Everything must go somewhere.
3. Nature knows best.
4. There is no such thing as a free lunch.

*Reprinted by permission from THE CLEARING HOUSE by Barry Commoner, a Bantam Book, published by Alfred A. Knopf, Inc.

Role E.I.S.
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

February 2, 1978

Gentlemen:

Re: Comments on Alumax Draft Environmental Impact Statement
And Role E.I.S.

After writing the enclosed letter I got approval from the membership to endorse the comments contained there in; before I mailed it I discovered that the situation is more complicated than expected.

One: "The Palestine pilot unit has passed the test" so stated Charles Parry to a meeting of security analysts in November 1976. Mr. Parry is vice president of operations for primary products and he was speaking of a five month successful run of the first production pot line using the Alcoa Process. (Energy User News 11/29/76)

Two: Tacoma's Kaiser Aluminum Reduction Plant is smaller than the Anderson County plant that is now being completed.

Three: "Eventually, the lines at the Palestine location will produce 300,000 tons per year of aluminum using the process, an Alcoa spokesman said." (E.U.N. 11/29/76) We do not have a plant that large in the PWV.

Four: We have discovered that ERDA went beyond the Alcoa process and initiated research at Ames Iowa to use the chlorine process for possible large industrial use in the 1980's. We have contacted the Honorable Mr. Cunningham and the results so far, are indicated by letter from Mr. Hutz. (also enclosed.) Our research indicates that ERDA has gone beyond the present state of the art at Palestine and contemplates even greater savings than the electricity savings inherent with its use. If their research was successful alumina made from foreign bauxite may no longer be an ever increasingly costly item for domestic reduction! It is our belief that the implications of using the Alcoa Process and ERDA research are potentially so important for all domestic aluminum production will be greatly affected by the future applications of these two processes. 1.

We ask and request an extension of time so that we may investigate the material that ERDA has promised to send us.

Sincerely, *William J. Van Horn* on Board, Seattle Chapter

FOCUS-FORUM-FULCRUM

ON

BILL-BALLOT-SIGNATURE

△

1. ERDA scientists are credited with a plan to free us from the need for all bauxite from foreign suppliers. After using the Alcoa Process in reduction plants additional patriotic and economical reasons would encourage the complete conversion away from alumina made from bauxite. Energy User News 10/25/76



November 23, 1977

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Gentlemen:

Re: Comments on Alumax Draft Environmental Impact Statement,
BPA, dated July 25, 1977

In previous testimony we have asserted that the process of selling power at less than marginal costs to O.S.I.'s will allow these industries to delay capital investment in energy efficient technologies. Since others including the Washington Energy and Utilities Committee of the House of Representatives have also expressed concern about this matter, we expect that it will be dealt with in the final E.I.S. 2

In assessing the Alumax E.I.S., one is immediately struck by the obvious advantages for energy savings in the new technology. At first it would appear that there would be only a 30% saving in energy if the ALCOA process were used over the newest Hall Cell technology, however, on Page IX-60 lines 26 to 29, you state that an additional saving would be realized in pollution control equipment which is inherent in the ALCOA process. Therefore, if we saved the 1% for 35 years, or 42% accumulated, that is part of the PNUCC bill; we have a possible saving of 72% for unneeded generation for the ALUMAX facility while still making possible a 180,000 ton capacity plant.

We are aware that this would not be a free technological advancement and that royalties might have to be paid to ALCOA. The 1974 Peasey and Davenport article was based on a study of patents that ALCOA applied for previous to initiation of construction at Anderson County, Texas. It would appear to us that the 1976 decision by ALCOA to expand and duplicate that plant which was built in 1975 at Palestine, Texas, is a verification of the decision made in 1974. This decision was reported to the Federal Energy Office, and I quote: "Future domestic plants will use the ALCOA process." 2 We feel ALCOA wants the "best of both worlds". In their national advertisements they claim the industry has continually improved efficiency from 12 kWh to 6kWh and that the latest technology allows them to produce at 4.5kWh per pound of ingot aluminum. In the PNW they ask for less than marginal cost electricity, because they need 8kWh electricity and will need a 1% increase for 35 years. In addition to these contradictions they maintain strict secrecy about their Palestine operation and make it very difficult for an accurate assessment to be made of their new process. So, one cannot help but have justifiable concerns about an industry which on the one hand asks for an energy subsidy, and on the other denies use of essential industrial information which has a direct bearing on such subsidy.

Your page IX-60 summary of the ALCOA Smelting Process is inaccurate, misleading and out-of-date. President Carter has stated that the energy problems facing America are "the moral equivalent of war", yet here we have a 'business as usual' approach to the ALUMAX matter. Whatever arguments are used to justify building new generating facilities so that the United States may continue control of the manufacturing of this vital metal, are also valid arguments for using the most efficient technology while doing so.

Yours very truly,

William F. Van Horn

William F. Van Horn Chair, Seattle Chapter
Forelows on Board

WFF:ph

1. 45% for nine out of ten PNW Aluminum plants
2. "Energy Use and Conservation in Aluminum Production" by Allen C. Sheldon. Reprinted from Energy Use and Conservation in the Metals Industry, 1975 The Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers, Inc., 345 East 47th Street, New York 10017.

③ *File EIS statement on BPA's 6 alumax. Bill Van Horn 8-1.*
William F. Van Horn 12504 13th Ave. SW, Seattle, WA 98146

Gentlemen:

The Pacific Northwest may become an anomaly in an electrical energy shortfall in the future. World wide electrical rates are skyrocketing and countries and individual industries which would survive this adversity must plan accordingly. The Aluminum industry must adjust to the new realities in the world in the most expedient way possible. The cost of making and selling aluminum will be set by the production costs in the *South*; Ohio Valley, Japan and other areas where the majority of the world's aluminum is made. So, whatever the aluminum industry does to reduce worldwide production costs (smelting costs) will enable the industry either to grow, stagnate or eventually fade *to a less competitive position*.

Your role EIS does not adequately relate to future worldwide electrical energy costs as they will affect the Pacific Northwest.

The Alumax plant process could be used to make this area's aluminum industry plants a model of industrial efficiency. Today's plants are hopelessly inefficient and tomorrow's nuclear costs must be solved immediately. The chlorine assisted smelting process which is now in full production in Texas can revitalize our need to phase out the aluminum industry. Alumax offers a golden opportunity to bring this technology to all Pacific Northwest aluminum plants.

While most of our plants use over 8 kWh's to make one pound of aluminum, the Alumax process could make aluminum for a mere 4.5 kWh's. Most of our plants could be rebuilt for this technology, a technology of the future which is here today.

Yet, gentlemen, your single reference to this highly efficient process in the 5th volume of the study was several years out of date. ALCOA, according to their own statements and pictures printed in their Annual Stockholder's Report, is rapidly expanding their Texas plant site into a tremendous smelting complex which will eliminate most pollution problems and, most importantly, produce 300,000 tons of aluminum a year using exclusively the energy efficient chlorine recycling smelting system. This is ^{equal to} one-fourth of this region's entire annual aluminum industry production.

ALCOA's Texas plant only started production in early 1976, but already it is undergoing a rapid expansion program involving over a billion dollars. This technology must be brought here, to the Pacific Northwest. When the next plant is rebuilt or a new one planned this is the process that must be used or our old, inefficient aluminum plants will continue to bleed this region's energy resources.

The Alumax plant process really is a make or break opportunity for the industry in this region--given the oil crisis, given the collapse of the nuclear bubble, given the environmental and supply problems of coal and given the coming rate payors revolts. Only improving efficiency can save this industry from becoming a tremendous millstone around all our necks. The PNUCC plan would create a false and unrealistic situation in which we would subsidize the industry thereby undermining any hope of implementation of this new technology. For 35 years we would be saddled with this makeshift solution while we were faced with every new cost problems. Year after year we would see this region ship more and more aluminum to the East while our household energy bills soared in order to subsidize them.

- 8 -

Today Portland pays twice what we, in this area, pay for electricity, but if we implement the PNJCC plan, tomorrow our energy costs will have risen to equal their high rates. And higher.

I believe that the aluminum companies in the Pacific Northwest should either modernize or phase out their plants.

1. They should adopt the energy saving chlorine process that would save between 70 and 90% of their smelting energy needs. This new process would also eliminate the need for the 1% annual Growth Allowance for environmental controls which the PNJCC plan advocates.
2. Aluminum companies should build or buy into their own generating facilities as they do in other parts of the United States, and, as they are now doing in the state of Texas.
3. I believe that they should implement an immediate Equal Opportunity Program in employment--since they currently ask this region to subsidize a 95% all white, male workforce.
4. I believe that the aluminum companies should be forced to phase out those plants which they are unwilling or unable to modernize. Rebuilding, and building only plants which will produce a pound of aluminum using 5 kWh's of electricity or less.

SAMUEL MOMENT

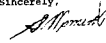
2916 S. E. WOODSTOCK BLVD.
PORTLAND, OREGON 97202
Telephone: 803-771-8807

February 10, 1978

Environmental Office
Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

I enclose for inclusion in the ROLLE EIS among the published comments a statement of suggestions for revisions to expand upon the preliminary statement I submitted at the public meeting on November 9, 1977 and in writing on November 11, 1977.

Sincerely,


Samuel Moment
SM:msh
Enclosure

SAMUEL MOMENT

2916 S. E. WOODSTOCK BLVD.
PORTLAND, OREGON 97202
Telephone: 803-771-8807

Suggestions for Revisions in the Draft BPA ROLLE Environmental Impact Statement (EIS),
February 10, 1978, by S. Moment

1. Qualifications of writer. My name is Samuel Moment, 2916 S.E. Woodstock, Portland, Oregon 97202. I am the former chief marketing economist of BPA during the period 1940-1954 in the Division of Industrial and Resources Development. I was responsible for market work relating to various industrial power sales of BPA and credited with a major role in the post-World War II resumption of operation of the Government aluminum smelters. This work led to recognition and appointment as advisor to the Secretary of the Interior for expansion of the U.S. aluminum industry and associated power supplies, particularly on the BPA system, during the Korean War. During much of the 1960-1970 decade I was also a consultant to BPA. I was co-author with Ivan Bloch of the 1967 publication of BPA, The Aluminum Industry of the Pacific Northwest as one part of the Pacific Northwest Economic Base Study for Power Markets.

I held two contracts with BPA during the years 1965-1969 and 1975-1977 to prepare policy histories. The first dealt with the Administration during the days of Dr. Paul J. Raver whose personal files were placed in my care. The second dealt with the aluminum industry and BPA. Work under these contracts was not completed but sections of the reports were filed with the Administrator's office.

2. Major revisions needed in the ROLLE EIS.

Two subjects are in need of substantial revision. One is the economic potential for additional hydro development in the region. The other is the historical role and contributions of the industrial power sales of BPA to the development of the BPA and regional power systems, to the public power movement, and to the low cost aluminum industry needs considerable elaboration in order to clarify the build-up of interests that have widened the significance of the BPA program far beyond the preference and priority rights of the public agencies under the Bonneville Act. The build-up of these interests needs clarification in order to help evaluate the environmental and associated impacts of whatever role BPA is to have in any new legislation affecting hydro-thermal power expansion and allocation in the region.

3. The underrated hydro potential.

The draft ROLLE EIS takes the position that future hydro development will be limited mainly to peaking installations at existing facilities because most of the "socially acceptable" hydro sites have been developed. Extensive revision is needed in Part I, The Regional Electric Power Supply System, V-1 to V-24.

- (a) The concept of "social acceptability" should be modified to allow for changes over the next 20 or more years if recognition builds up that among energy alternatives more hydro may well become more desirable with respect to non-pollution and other aspects. Attention should be

given to the potential demand for sport fisheries through reservoir fishing provided by dams; a possible change in acceptability of the kind of fishing, and the greater ability of reservoirs to accommodate increasing numbers of sport fishermen as compared with the limited ability of streams.

- (b) An impartial analysis should be made of impacts such hydro development would have under changing concepts of benefits and costs.

- (c) The present concepts of conservation and environmental protection of rivers should not be assumed to be fixed indefinitely. The alternative should be considered of Congressional revision of restraints upon development under the Wild and Scenic Rivers Act.

- (d) The benefits in savings of oil and gas to the nation and benefits to the Northwest should be indicated if repressed hydro development is released to the extent that supplies may be increased for interchange with Southwest utilities to take advantage of seasonal and other diversity. The interregional and national gains should be recognized in displacing polluting and more expensive sources of thermal energy. This means that the Northwest hydro potential should be recognized in the ROLLE EIS as part of the energy resources of the nation which has contributed nearly all of the Federal funds for the present Federal Columbia River power development in the national interest as compared with only 3% of the population living in the Northwest. The details of this proposed interchange may be obtained from the California Energy Resources Conservation and Development Commission at Sacramento, attention Stanton R. Smith. The Commission is presently looking into this situation.

- (e) The recent "Inventory of Potential Hydropower in the Pacific Northwest", issued in 1976 by the North Pacific Division of the U.S. Corps of Engineers, should be classified with respect to the most economical projects. These would be capable of at least 50% energy in relation to capacity and amount to over 5 million kw. of average energy out of over 9 million kw. of capacity at investment costs not over \$1,000 per kw. at 1976 levels, and if publicly financed, at not over 1.5¢ per kw-h.

- (f) The sites should be classified by location, cost level per kw. of average energy, present restrictions against development, location of public or private lands including the reservoir areas, and availability for license application by non-Federal interests.

- (g) Consideration should be given to the contribution of the economical hydro potential to at least 25% of the additional load growth forecast of the PNJCC, or as much as 50% of the additional load growth under the extreme conservation assumptions of the Skidmore, Owings, Merrill report to BPA.

4. The historical role and consequences of BPA's industrial power sales.

- (a) There is fundamental misconception and failure in the draft EIS to recognize the historical role of BPA's industrial power sales. This failure appears in the abbreviated and misleading statements about the BPA industrial power program in Part 1, The Regional Electric Power Supply System, giving the history of the regional electric power supply system, pp. II-3 to II-7 and Part 2, The Role of BPA, pp. VII-2 to VII-4. The failure appears in the omission in Appendix C, Chapter II, BPA Power Marketing Program and Practices of a separate listing of BPA's industrial power marketing policy among the various policies described, pp. II-3 to II-14. The description of Industrial Customer Policy, is incorrectly placed under the heading of Implementation of BPA Marketing Policies, pp. II-28 to II-30 instead of being listed as one of the basic policies of BPA in the preceding section where it should be given equal emphasis with encouraging widespread use, preference and priority, postage stamp rate, wholesale rate, wheeling, and other major policies. Other omissions occur in the Alumax Environmental Statement, pp. 1-2 to 1-6.

The misunderstandings and omissions are:

- (1) The disposal of most of BPA's power supply was not initially possible through promotion of public power under the preference and priority policy because of the slowness and obstacles to the public power movement.
- (2) An industrial power sales program was deliberately applied in 1939-1952 as a primary policy in order to dispose of unused power, to shelter during the formation period the growth of public power agencies, and to adapt the BPA program to the TVA concept of using Columbia River development as a means of regional economic improvement.
- (3) The industrial program was tied into regional objectives including alleviating unemployment, reducing dependence upon forestry and agricultural industries, diversifying the economy, moderating fluctuations in seasonal unemployment, and stimulating new uses and expanded uses for mineral resources and wood and agricultural products.
- (4) The defense requirements for power and electro-process industries during World War II and the Korean War were exploited by BPA to further the preceding policies. Defense agencies did not initiate the call upon BPA and the Columbia River development. The defense agencies were initially induced by BPA and the Secretary of the Interior to overcome their reluctance and make BPA and its industrial power program an important part of the national defense program.
- (5) A large staff was hired for industrial and resource development.

Alumax Environmental Statement, p. 1-2, Historical Development of Industrial Sales Policy and Rates should be revised to place the aluminum contracts in the context of the entire industrial program of BPA. The expansion of industrial loads resulting from BPA's Korean War activities should be specified.

P. 1-3 omits the industrial sales promoted during the 1960's as a result of surplus power from the Canadian Treaty although this is mentioned on p. 1-5. The Alumax contract was one of the consequences and should be so identified at this point.

- (d) There is needed in Part I a separate section devoted to the role and consequences of the BPA industrial program with special attention to aluminum. This section is desirable not only because of historical truth. It is also relevant to the issue arising under the preference and priority provisions of the Bonneville Act, proposed new Federal legislation dealing with the allocation of BPA hydro power and new thermal power supplies, and the survival of the Northwest aluminum plants. Because of such importance, the subject should not be diffused as it now is in parts of the EIS and largely in Appendix C.

The key point to this section would be the recital of important regional and national interests in the BPA industrial customers that are endangered by exclusive preference and priority to public agencies. The section should make the issue adequately clear.

The key points to include are:

- (1) Those stated above under my paragraph 4 (a) (1), (2), (3), (4), (5) and (6).
- (2) The effects upon accelerating the hydro and transmission line construction programs, the benefits of lower investment costs, the gains from larger scale output and transmission at greatly reduced costs and power rates to other BPA customers, especially the preference agencies. The CPMW report of 1977 should be cited. In addition, the contributions of the industrial customers should be emphasized in the purchase of otherwise unusable secondary or interruptible power, and the high value of the reserves to the regional power pool supplied by the cut-back provisions of the industrial contracts.
- (3) The disruption that would occur to the superstructure of regional and national industries and plants that process much of the output of the Northwest BPA industrial customers if that output were cut or eliminated by lack of economical power.

- (6) The BPA industrial power sales exceeded the sales to preference customers each year until 1958. The preference customers were unable to contribute half of BPA's annual revenues until 1965, reflecting the length of time it took for them to become strongly established following passage of the Bonneville Act in 1937. (Tables 14-1 and 14-4 attached).

- (b) This explanation of BPA's industrial power policy is found in the BPA annual reports, 1938-1954, the corresponding BPA Advance Program annual reports, the testimony of BPA officials at Congressional hearings for appropriations and for support of authorization of additional Federal power projects of the Army Engineers and Bureau of Reclamation, the many speeches and papers delivered by BPA officials in the period 1938-1954, and the huge output of economic and industrial reports.

The background also is found in the historical chapters submitted by the writer to the Administrator's office in 1976 and 1977, Bonneville Power Administration, History of Northwest Aluminum Industry Policies.

- (c) Examples of needed corrections:

Part 1, pp. II-3 to II-7. This discussion of the history of the regional power development deals with major actions affecting the region's power operations and use of the Columbia River including formation of the Northwest Power Pool, British Columbia intertie, Pacific Northwest intertie, Pacific Northwest Coordination Agreement, and the Columbia River Treaty. But these actions were in response to marketing developments of which the industrial sales were the largest force. They were so large and by deliberate policy were distributed throughout the region so that they required massive high voltage lines and the basic triangular structure between Spokane-Portland-Seattle forming the heart of the grid system. To omit this essential formative factor is to omit the underlying reason for the other major actions.

Part 2, p. VII-2. "...at its inception, BPA had no policy covering such sales. The demand for industrial power increased tremendously in the Pacific Northwest during World War II when BPA's efforts were heavily concentrated on defense needs." p. VII-3. "...the Korean conflict intensified the demand for defense production." These are misleading statements. Corrections should state that BPA starting in 1939 engaged in an industrial promotional program and participated actively in decisions of defense agencies to place defense production plants on the BPA system during World War II and the Korean War. These decisions supported BPA planning of a region-wide, balanced, high voltage transmission system by deliberate distribution of the loads.

In Appendix C, Chapter II, the industrial marketing policy should be listed among the major BPA policies in pages II-3 to II-14.

- (4) The national security importance of the Northwest aluminum plants in the true concept of national security. This is not limited to the recent level of 48 of national aluminum shipments required for direct defense needs. The true concept extends to defense supporting uses of aluminum during national emergency and a 3 year conventional war as is now in the planning of the Department of Defense and the Federal Preparedness Agency. Defense supporting uses include the entire system of commercial air transport and rail and highway transport with their large aluminum requirements, and the wide applications of aluminum in other activities and equipment converted from peacetime to defense uses.

A special need for present Northwest aluminum smelter capacity should be cited in the stockpile program of the Federal Preparedness Agency based on a 3 year conventional war, now under review by the Administration. This program requires 11.5 million tons of alumina, the equivalent of 5 3/4 million tons of aluminum. (General Stockpile Policy, Hearing before the Subcommittee on Military Construction and Stockpiles of the Committee on Armed Services, U.S. Senate, 95th Congress, First Session, on 5.11.98 and 5.18.10, September 9, 1977, p. 29). To convert that much alumina into aluminum through the use of the present national capacity of primary aluminum totalling 5.3 million tons would require an extended period of time in order to minimize disruption of essential supplies of aluminum throughout the national economy. The use of a substantial part of Northwest aluminum capacity would be essential since it comprises nearly one-third of the U.S. total. That use would then require a supporting supply of electric power over a period of time that might well extend into the early 1990's beyond the expiration date of the last BPA contract with an aluminum company.

- (5) Notice should be taken of the uncertainty facing the Northwest aluminum producers as to the availability and cost of power in the event little or no BPA power will be available upon expiration in the 1980's of the present BPA contracts. The harm caused by sharply increased costs of power should be cited in the pending shutdown by Alcoa of the entire 180,000 tons of capacity of a smelter at Point Comfort, Texas (American Metal Market, January 31, 1978). A similar cost condition has contributed to the present indefinite closure of 409,000 metric tons of Japanese aluminum capacity, one fourth of the Japanese total, based largely on power from imported coal and oil. These instances give credibility to the Ernst and Ernst report to BPA that the aluminum companies have stated that if existing contracts with BPA are allowed to expire, a total shutdown of operations would be likely.
- (6) Notice should be taken that the Northwest industry is unable to determine what level of costs of power it could sustain and remain in the region due to the many unknowns affecting other production costs and future prices, particularly of competing materials. Notice should

therefore be taken of the protective steps of the aluminum companies in looking into sources of power at other locations, especially outside the United States. The interests should be cited of these companies in Australia, Costa Rica, Brazil, and participations in smelter projects in other countries including the Middle East. The adverse effects upon the national security as well as the balance of payments should be noted if much of the Northwest aluminum capacity were ultimately to be displaced by imports. The parallel should be noted of increasing the dependence upon imports of a material vital to national defense such as aluminum and upon imports of petroleum. It would be inconsistent to pursue the national policy of reducing dependence upon imported petroleum while increasing dependence upon imported aluminum.

- (7) The increased importance to reducing the deficit in the national balance of payments by maintaining maximum aluminum production in the Northwest over the years ahead when the U.S.A. is expected to continue to import substantial quantities of petroleum at constant drain on the national balance of payments.
- (8) The importance of the Northwest aluminum smelters to the national anti-trust policy should be summarized. It should be noted that the BPA marketing policy in the early 1940's deliberately made power allocations to a number of smelters in rejecting proposals for one large smelter with a view toward post-World War II disposal to create competition in the previous one-company industry. It should be noted that some of the expansions in the Northwest during the Korean War provided under contracts between the companies and the General Services Administration that 25% of the output be made available to competing unintegrated users of aluminum for 20 years. This obligation applied to the Martin Marietta Aluminum smelter at The Dalles and expired in 1979. It should be noted that the Anaconda and Martin Marietta smelters were the results of the anti-trust and pro-competition policy of the federal Government during the Korean War as an extension of the policy growing out of the disposal of the World War II plants built for the Government. It should be noted that BPA played a role through the writer in the post-World War II disposal policy, and that this policy was tied into the anti-monopolization clause of the Bonneville Act as well as the 1945 decision in the Alcoa anti-trust case (148 Fed 2d 416).

It should be noted that there are presently only 12 companies producing primary aluminum in the U.S.A. of which three companies account for nearly two-thirds of the total capacity. The Department of Justice is presently opposing the sale of a smelter by one of the smaller companies, Revere Copper & Brass, to the Canadian producer, Alcan, on grounds that competition would be reduced in the industry. Much greater concern would be aroused if any of the smaller Northwest producers were forced to close down. The result could be greater concentration of primary capacity in the United States among the larger producers.

Attention should particularly be given to the national build-up of thousands of independent fabricators and end-producers of aluminum, attesting to the success of the Federal Government's aluminum, pro-competition policy toward the industry since World War II. The original obligation of the primary producers to sell part of their output to such companies for 20 years should be recognized as part of a longer-term policy expected to continue beyond 20 years. Otherwise, the objective would be defeated if such sales were to be terminated by the expiration of power contracts and shut-down of the related primary aluminum capacity.

- (9) Thus, the RCLE EIS should observe the dependence upon continuity of the Northwest aluminum industry of the national interests in sustaining supplies to a superstructure of many related industries throughout the region and nation to the national security including ability to contribute to a massive defense stockpile; to reducing the deficit in the balance of payments; and to supporting the anti-trust and pro-competition policy. The RCLE EIS should give due weight to the BPA industrial marketing policies as one of the essential foundations of the BPA program and build-up of the Federal Columbia River power system from which the public power movement and low power rates have benefited.
- (10) The RCLE EIS should also note that these wider interests are disregarded in the purpose to take away all of the BPA industrial firm power through the law suits filed by the City of Portland against BPA on November 14, 1977, and in the stated purposes of the Oregon Governor in securing adoption by the legislature of a state power authority (Domestic and Rural Power Authority), July, 1977.

Samuel Monnet
Samuel Monnet

2 Enclosures:
Table 14-1 BPA Dollar Sales of Energy, 1939-1976 (Fr. June 30), BPA, Branch of Customer Service
Table 14-4 BPA Cumulative Dollar Sales of Energy, 1939-1976 (Fr. June 30), BPA, Branch of Customer Service, Source: Table 14-1.

UMATILLA PUBLIC SCHOOLS

District No. 68
Umatilla, Oregon 97882

November 21, 1977

Gentlemen:

My purpose in addressing you is to point out data concerning the Umatilla School District, which is now out of date.

Since the CH2M Hill report was made in 1976, we have had extensive growth in our student population.

Table III-20 of the Alumax draft EIS gives our current enrollment as 543 students. Our present enrollment, as of November, 1977, is 860 students. This enrollment is close to Table III-21 which was projected for the school year 1980-81.

We have had to make substantial staff increases due to this increased growth and are approaching the overcrowded situation that is addressed in the Draft EIS. Page IV-62 talks to the problem of overcrowding and indicates the need for expansion of facilities in order to prevent overcrowding.

Umatilla School District has recently constructed a new 18 classroom elementary school and is presently bonded to near capacity allowed by law. Our new elementary school is near capacity at the present time. Expansion of our facilities to meet the needs of a growing enrollment is of great concern to us.

Alumax has indicated a willingness to work with the affected school districts in helping find solutions and we are looking forward to working with Alumax involving this matter of mutual concern.

Thank you.

Sincerely,

R. J. Lippold, Superintendent



4 October 1977

Linda Willis
Environmental Project Engineer
Bonneville Power Administration
Mail routine 51
1002 N.E. Holladay St.
Portland, OR 97232

Dear Ms. Willis:

In the interest of prefacing any comments that the City of Umatilla may wish to present to your group regarding the draft EIS which was compiled to assess the impacts of the Alumax development, I shall present a few recently updated data concerning the City.

First, the population of the City of Umatilla, verified and certified by census taken during December 1976, was 2481. Since that time, the past 9 months, the population has increased by approximately 500 persons. During 1976, according to the Umatilla County Assessor, the valuation of the City of Umatilla increased 45%, indicating the increases in property within the city. Separate from that, too, is the fact that in the 9 months of 1977 Umatilla annexed properties totalling 602 acres, raising the City's size from 1400 acres to over 2000, all of which is developable. A major purpose in these annexations was to prepare for growth-management within the urban confines, and to adequately serve the several major construction events looming on the horizon, one of which is Alumax. We have prepared to allow development of the following magnitude: 52 units of 1 acre, 300 units of 2000+ sq. ft. R-1, 226 units for mobile home subdivision, 121 of 400+ sq. ft. R-1, 226 units for mobile home subdivision. We units of mobile home park, and 1,000 units of multi-family. We feel that the majority of people working in and around Umatilla will prefer to live here, since we occupy a location with the only 18 hole golf course, marine park and marina in the area, further enhanced by the 400+ miles of river-lake front beach access and view properties. This is not to be construed as an advertisement, but a hard fact that we have had to address in our assessment of the City's land use patterns. Over and above the developing lands mentioned above, we have 4 subdivisions currently developing and building, with most houses pre-sold. Another sub-division is letting bids for utility construction this fall.

The City is beginning construction on a \$2.2 million water improvement construction, and a \$830,000 sewer improvement construction concurrently. These construction projects will be ready for beneficial occupancy by the summer of 1978.

4 October 1977
-Page 2-

What may be inferred from these data is that the City of Umatilla is making preparations for the impacts of major industrial construction planned for our region, for although the capital improvement and the subsequent assessed valuation will not be within our City, the people primarily and secondarily drawn into our area will tend toward living within Umatilla if possible. The draft EIS document does not appear to draw this conclusion, probably due to the recent, substantial, enhancements to the City of Umatilla capability to provide services and space.

The draft EIS does address the two types of impact upon the City, those being immediate and long-term. The immediate impact of the plant construction may be tempered somewhat by the payment of hook-or-fee to the sewer system. Our current charges are \$300 per unit for the first unit, incrementing downward to \$50, and \$50 per unit thereafter. The cost of hook-or installation is borne by the construction. Long-term use of water and sewer will also provide some financial relief, as the City charges 2x in-city rate for out-of-city customers. The proliferation of additional residences may be fiscally mitigated by the institution of systems charges which are currently being staffed within the City. These will be applied toward reserve funds for street, park, sewer, and water system maintenance/improvement.

One area of impact mentioned but for which there appears no method of relief is in public safety -- additional police, traffic volume through town, need for paid firefighting personnel, emergency medical services, etc. In the police realm, the City now has eleven full time personnel, including six sworn officers. We adhere to the Oregon Law Enforcement Council guidelines of one officer per 500 residents. Therefore an increase of 2000 residents will require the four additional sworn personnel mentioned in the draft EIS. We estimate that each additional officer costs the City \$25,000 in direct annual costs which include salary, fringes and equipment. This represents a substantial immediate and long-term impact on a City with a tax-base of \$40,000. Since the plant-site for Alumax is located within the Rural Fire District and the Hospital District, their impact may be alleviated by assessed valuation advantages, but should be requested to comment separately, if they have not done so.

As mentioned in your telephone conversation with our City Administrator, Mr. Jack Palmer, you will be forwarding another copy of the draft EIS for our use, as we have provided our copy to the Umatilla School District as the recipient of the greatest unplanned impact. We will make that copy available to the Fire and Hospital Districts as well if needed. If any additional comments on the Draft EIS are required, we will note the appropriate page and line, and forward them after we have a document to work from. Basically, however, this letter includes the primary input from the City of Umatilla.

Sincerely,


A. L. Draper
Mayor

RESOLUTION #10-75

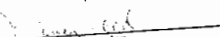
WHEREAS, the City of Umatilla is aware of the efforts of the Port of Umatilla in trying to obtain industries for its industrial site, and

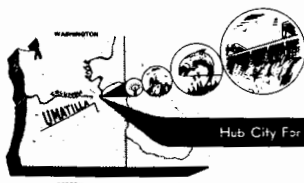
WHEREAS, the City of Umatilla has been informed of the efforts of the Port of Umatilla in trying to interest ALUMAX in the relocation of its aluminum plant to the Port of Umatilla industrial site,

NOW, THEREFORE, BE IT RESOLVED, that the City of Umatilla does hereby endorse and fully support the efforts of the Port of Umatilla in its endeavors to interest ALUMAX in relocating its aluminum plant to the Port of Umatilla industrial site. The City will further cooperate in any way possible with the Port of Umatilla to accomplish this relocation.

Approved by the Council at its regular meeting on January 20, 1975.

ATTEST:


Recorder



City of Umatilla

Hub City For The Columbia River Basin And Pacific Coast

Telephone 922-3228
P.O. Box 130
UMATILLA, OREGON
97882

November 22, 1977

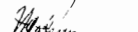
STATEMENT FOR BPA HEARING

Subject: The BPA EIS re: ALUMAX location at Umatilla

From: J. K. Palmer, City Administrator, City of Umatilla

1. The Umatilla area needs capital intensive industry.
2. The potential for employment provided by industry is of benefit to the area.
3. The enclosed letter which was forwarded to the BPA environmental project engineer discussed the preparations of the City of Umatilla for economic development. This includes the improvement of public utilities, incorporation of areas of the city for orderly increases in population, and provision of incrementally increasing public safety systems. It also addresses certain areas of the EIS which are out-of-date.
4. At a recent meeting with ALUMAX officials, they expressed a willingness to reassess the socio-economic impacts on the City and the overlapping districts. We feel that this displays ALUMAX's genuine concern for equity, and will be of material value in planning for the future, with or without this specific industry, since the power situation is the ultimate critical area of concern that will become the deciding factor.
5. Enclosed as well is a resolution, passed by the Umatilla City Council on January 20, 1975. The City has taken no official action subsequently which would establish a position to the contrary.

Respectfully submitted


J. K. Palmer
City Administrator

December 2, 1977
R. 3925 Liberty
Spokane, Wa. 99207

Dear Sirs:

You asked for it-- here are my comments on the Alumax draft statement.

I-2 lines 7,8, and 38 refer to aluminum companies. Identify by name, and indicate those that are 30 years of age or older.

I-6 line 52 --indicate or specify which plants you mean.

I-8 l. 19-23 "the proposed Alumax plant would improve import balance still more" Is it not possible Mitsui will choose to export its 50% of the ingots? Hence, "improve import balances by _____" (be factual and insert in the blank space the amount, probably 50%, of the actual proposed production of Alumax per year).

II-22 line 22 How will the fuel oil, 6.9 million gallons/yr be used?

line 51 "a major portion" would 50% be more accurate?

II-23 line 40 Clarify-- Has the city sewer system the capability to handle this amount?

lines 44,45 Clarify-- is the required water readily available?

III-20 line 12 435.5 increase of 50x -- Surely this is an error?

III-38 Explain-- a coal-fired plant at Gaty--is this the one mentioned in III-29 line 17? Is it actually in or beyond the planning stage?

III-39 "curtailment of future development of ground water aquifers within the critical area" Is Alumax within this area?

III-40 line 29 Primary deficiency through out the impact area is lack of an adequate municipal and industrial water source to provide for future urban growth, even without the proposed Alumax plant. Table III-15 seems to indicate that Warrenton, Irrigon and Umatilla need a new source of water. Perhaps you might need to an analysis of the costs--involved in providing a few and ample water supply before any more time elapses. This responsibility seems to be yours, as the responsible party preparing the EIS.

III-41 How can it handle the additional 32,000 gal/day (projected figure for Alumax) see II-23 line 40 "Sewage plant has reached or exceeded (underling is mine) its design capacity."

III-41 lines 51,52 moratorium, etc.-- when is this expected to be lifted?

When do you expect the new water supply to be operational?

III-49 lines 5,6,25--Clarify, update to include present 77-78 figures of enrollment. Can you visualize the imminency of doubling the size of existing secondary school facilities by 1980 (even if funding was available immediately) and the complexities of furnishing and staffing such buildings?

III-50 lines 35,36 Has Alumax considered funding the purchase of additional park lands to alleviate the predicted shortage of park property?

IV-2 lines 51,52 Would the occupants of the three residences be compensated financially or be relocated temporarily by Alumax?

IV-4 lines 21-23 and 47, h8-air emissions of SO_2 and fluorides would affect vegetation immediately surrounding the plant site but not off the Alumax property boundary. How do you predict with such deadly accuracy exactly how far fluorides will travel? Quail! Although I have lost the specific references, I remember reading in Environment magazine of a study done on bone damages observed in cattle in the Pacific Northwest caused by fluoride emissions from a neighboring aluminum plant. The damages to the cattle were pretty sobering.

V-6 lines 16-26 Do I hear you saying, you are in effect sympathetic, but not really able to mitigate the damages to the community which your action precipitates?

V-6 paragraph on solid waste-- Alumax would assist-- How? Financially?
"Wa ter --- again, how would Alumax assist? Does support mean moral or financial?
V-7 Define "reasonable" amount of taxes to be prepaid.

VII-8 this page addresses the terrestrial life-- I would like an estimate of the effects of building Alumax on the birds mentioned in lines 23-35 Ditto the mammals.

Appendix B
VII-27 lines 27-33 How many deaths have occurred as irrigation pipes are moved and accidentally touch transmission lines.

Appendix C
IV-268 It should also be mentioned that if apartment house installed separate meters the residents consumption would drop dramatically, hence a conservation is effected. Single metering of apartments has caused apartment dwellers to be very wasteful of energy because they are unaware of how much of they use.
Your discussion of electricity use patterns does not mention the fact that some research has proven that the low volume users tend to be low income people. Newman and Day present an extended analysis of the relationship between electricity usage levels and income. Perhaps this information might seem to urge the inclusion of the Newman Day research in your EIS. Along this same line R.H. Frank & advocate making a 300 KW hour bloc of electricity available to residential users at a very low \$/Kw rate--because under present rate-structures customer charges are not closely related to the incremental costs of providing customers with electricity.

Consider please lines 47-54 on this same page, the term "non-cost" Perhaps you might want to rewrite this paragraph--"Non-cost" might be misleading to someone. I believe you are referring to a lower cost, but the point is not clear-- In this vein, though, we should remember that existing rate structures often result in revenue for the utility (see the 1976 study by Gen Edison Co. of New York, Inc. which suggests existing rate structures often result in revenue surpluses for the Utility and estimates that rates based on private marginal costs would generate some \$2 billion in excess revenues" Lifeline rates would still be paying for the cost of producing the electricity hence I object to your term "non-cost". You have moreover, implied that "life-line" rates amount to a redistribution of income--which is simply not true. J.H. Raudinger addresses this quite well. He also advocates "time of use" rates, and predicts "we will see nationally the application of time of use rates where reasons exist for the application of such rates". IV-25f insert perhaps evidence that suggests that a simple insulating cover made of fiberglass, vinyl covered, costing \$20 and installed by the homeowner could effect a saving of about 1600 KWH per year. This information was supplied by my local utility company.

Bibliography
A. Newman and Day in their book "The American Energy Consumer", Ballinger, Cambridge, 1975

2. R.H. Frank was quoted from an article on the topic of rate-charges of consumers in Public Utility Fortnightly, 5-26-77
3. J.H. Raudinger was quoted from an article in the publication Public Utility Fortnightly also, 5-12-77
4. The utility company that calculated the amount of energy saved by using the fiberglass insulation to be installed by the homeowner was the Washington Water Power Co. of Spokane, Wa. and the Conservation Engineer making the calculation was Ted Beadle.

Sincerely,
Virginia Newell

2080 Falls Avenue East
Twin Falls, Idaho
November 28, 1977

Bonneville Power Administration
Environmental Office-SJ
P.O. Box 3621
Portland, Oregon 97208

Dear Sirs:

Pursuant to requirements for review of draft environmental statements (NEPA:102.c), I am taking this opportunity to comment on the proposed Alumax-Pacific Corp. Primary Aluminum Reduction Plant.

On the whole, the environmental impact statement (EIS) is a well conceived and researched document. It explores the consequences of the proposed plant in hard data, but is vague concerning social effects of a more tenuous nature. I will contain comment to four general areas: power, pollution, water resources and social services in the impact area.

(1) Power
The Pacific Northwest Utilities Conference Committee says aluminum industries utilize nearly 50 percent of the entire industrial power package in the Pacific Northwest, which is 46.5 percent of the energy available in the area (Summary Report: The Role of the Bonneville Power Administration in the Pacific Northwest Power Supply System, page 7, Figure 4). Given the validity of the percentages and kilowatt consumption in past years, a straightline projection appears to be utilized for future power supply and demand. This is a common mistake, since marginal costs continue to climb for the generation of additional power, yet changes in demand are not taken into consideration. Perhaps the single most important point to take into account for such an energy-intensive industry is that the bulk power deliveries are sold at costs which require subsidization by the residential and commercial user. The Bonneville Power Administration should begin to charge power users on a progressive rate structure, which would encourage energy conservation and mean a user cost pass-on to the consumer.

Although page five of the Summary Report claims "prices... are most often assumed to increase..." it is doubtful that the full economic impact is realized, both to the Alumax plant and to BPA buyers. An "industrial firm" rating means 25 percent of the total power could be interrupted at any time (Alumax Environmental Statement:11-1), and would tend to cause Alumax sooner or later to look for "firm" power to supplement the uncertain 25 percent. This power no doubt would be of the more expensive fossil-fuel type, thus increasing overhead costs, and inflating the end cost of the product (11-22.f.2). On the bright side, however, this might force plant technology changes to improve energy efficiency (1X-58).

(2) Pollution

Paragraph 3 of the Summary page of the Alumax EIS refers to the adverse effect upon the atmosphere of such a plant, specifically from particulates, sulfur oxides and fluorides. In addition, there are questions concerning the emission of considerable quantities of carbon monoxide (11-14, and 1V-10, table 1V-5). Because carbon monoxide is known to have deleterious effects upon respiration and circulation systems in humans, downwind protection such be afforded occupants of the area. It is suggested that adequate research into wind dispersion of CO be financed, so that a "critical" area might be determined. Then land acquisition to buy out the ownership in critical areas should be attempted.

Concerning other pollutants, particulates and fluorides are covered by the "highest and best practicable treatment" requirement, and are thus not of serious consequence at the projected emission rates (1V-10). However, I find reason to object to the Oregon State "Air Contaminant Discharge Permit" for sulfur dioxide (1V-7). Because it is expected that fossil fuel power will grow in importance to the Alumax plant, especially with the Alaska Pipeline in operation, low sulphur fuel oil may be impossible to purchase in the future, thus requiring an upward revision in contaminant levels. It would not assure adequate health protection to humans, flora or fauna in the emission area, and I would stand firm on the need for tighter SO pollution controls.

(3) Water Resources

While Alumax would not discharge wastewater to the entire environment (11-21), it would require 645,000 gallons of water per day for normal operation (1V-26). The water

would come from the Port of Umatilla on the Columbia River. Apparently the Columbia is the only water source, present or future, since the surrounding area has been classified a "critical groundwater area" due to rapidly declining groundwater elevations (111-39). Serious questions are raised as to the longrange effect of the plant, both for its needs, and those of the people who will live and work in adjacent areas. Water rights are liable to be affected by the 645,000 gallons daily required, and more elaboration of this impact should be aired.

(4) Growth

Growth is seldom studied as seriously as it should be, both to the positive and negative externalities. The most common shortcoming of new industry projections concerns the added tax base the industry supplies, and the higher than expected costs for supplying social services. Unexpected costs are borne out by the Summary statement: "...increased population in adjacent local communities would require significant amounts of new land development, cause overcrowding in certain school districts, and further burden regional water systems."

Despite claims that an increased tax base will allow for mitigation of the problems of growth, the EIS later refers to the touchy water problem in the Alumax-related growth area (1V-47.2.g). This, compounded with the future need for added sewage treatment facilities in the vicinity (1V-49, table 1V-14), solid waste disposal, added police and fire protection, and school additions, shows that considerable social service expansion will be needed for the 1400 people directly required for the 32-month construction plan (11-28.c).

If an average of 2.7 persons today constitutes the American family, those 1400 workers will mean an influx of nearly 3800 people into an otherwise rural area. Although a smaller, permanent work force would be required at the finished Alumax plant (1X-55.1.11), the ripple effect of service businesses would certainly have longrange economic impacts in the area. Thus to simply claim that the tax base increase will solve growth problems is unrealistic, at least without supporting research of considerable more depth than has been provided.

Other factors of lesser significance include noise pollution, esthetics and the possible co-generation of power for a related use. As outlined in the EIS, noise disturbances appear to be of minimal consequence, as determined by the

Washington DOE dBA chart levels (111-25). The overall esthetic effect of the Alumax plant would be negative, given the open topography of the surrounding area (1V-37), but is more of a subjective phenomena, which would be a tradeoff for a positive economic impact. Finally, co-generation has not been included in the "Alternatives" section (IX), as a possible way to achieve lower operating costs. The waste heat expended from the aluminum reduction process might have positive benefits for reducing overhead costs.

Thank you for consideration of these comments.

Yours in communication,

Chris Talkington
Chris Talkington



Department of Environmental Quality

1234 S.W. MORRISON STREET, PORTLAND, OREGON 97205 Telephone (503) 229-6459

November 22, 1977

RECEIVED

NOV 23 1977

DEPT. OF ENERGY

Department of Energy
326 Cottage Street NE
Salem, Oregon 97310

Attn: Richard J. Timm
Supervisor, Energy Planning

Re: Bonneville Role
Environmental Statement

Gentlemen:

Our previous comments on Bonneville Power Administration's Role Environmental Statement did not contain a complete technical critique of the air quality analysis section (Part I, pages V-297 through H-320). Since then we have acquired a copy of "Environmental Impacts of the Generation of Electricity in the Pacific Northwest, Volume II", September, 1976, by Equitable Environmental Health, Inc. This study is one of the principal sources for Bonneville's air quality analysis.

We find this report still lacking in a complete description of methods, assumptions, and inputs, and outputs of the computer programs used to arrive at the air quality values listed. We therefore still must say that we cannot determine whether the air quality analysis is realistic or accurate. We recognize the difficulty of making a broad statewide air quality assessment and feel the best approach to this matter is to highly qualify the analysis indicating that accurate impact assessments can only be made by analyzing specific sites with consideration of local meteorology and terrain.

In regard to the 1000 foot high stacks used to keep energy parks of 6 coal-fired electric plants from violating ambient air standards downwind, the 1977 amendments to the Clean Air Act, enclosed, seem to disallow such a tall stack strategy.

On page 326, the Equitable Environmental Health report states that "All coal-fired plants in each scenario were distributed uniformly throughout each sub-region...". It is not clear whether the distribution is throughout all of the subregion shown in Figure 4-1 on page 267, or just uniformly distributed in the unshaded areas of Figure 5-2 on page 272 where the poor sites for coal-fired plants are shaded.

Other comments are as follows: all concerning the Equitable Environmental Health report:

In Tables 1-1 through 1-7 Colstrip 13 and 14 power plants are listed as 490 MW facilities; a PP&L source informed me that they are both 700 MW plants.

Department of Energy
November 22, 1977
Page 2

Page 266 "...air quality typical of the majority of the subregion and co-incident with maximum impacts associated with power generation..." statement refers to values of ambient contaminants listed in table 4-1, page 268. These levels seem out of line with my experience.

Models used for the predicted ambient impacts are "Simple Gaussian" for 3 hour and 24 hour and EPA Valley for the annual concentration estimates. "All coal fired plants were distributed uniformly throughout each subregion" ...a highly improbable occurrence. To maximize the economics of operating large fossil fuel power generation facilities, they are always built in groups of two or more units, usually side-by-side.

In Task 4, the energy park (2 or more facilities operating in close proximity) is addressed for ambient impacts; however, the stack heights are raised from 500 feet to 1000 feet to (page 406) accommodate the analysis. Given 1000 foot stacks, the parks are proclaimed to provide for six 500 MW plants before violation of any air quality regulation (page 403). It should be cautioned that EPA regulations may prohibit use of such tall stacks.

Subregion 2 on page 269 is described as having "almost uniformly excellent (air quality)". This region includes Medford, which has the worst anthropogenic caused air quality in Oregon, including violations of the particulate, oxidant, and carbon monoxide ambient air standards. The author is over-simplifying.

The Human Health Effects a, through I, listed on pages 314 and 315 should appear in Bonneville's Role Environmental Statement, in addition to the vague generalities found there in the draft version.

In conclusion, Oregon State's Department of Environmental Quality desires to review Bonneville's modelling of the impact of coal-fired-steam-electric plants in great detail. We estimate that no other source will have as great an impact on Oregon's air quality in the foreseeable future as the coal-fired-steam-electric plants considered in Bonneville's Role Environmental Statement. But a meaningful review cannot be carried out with only the published summary reports, especially when so many of the critical modelling inputs are not detailed. We request that Bonneville confer with the Department over how this review could be best conducted.

Sincerely,

John F. Kowalczyk
John F. Kowalczyk, Supervisor
Air Quality Program Planning
and Development Section

TLG/PPB/JFK/h

cc: Oregon State Executive Department
Intergovernmental Relations Division

Enc.: Public Law 95-95, 95th Congress, pages 91 Stat. 685 and 91 Stat. 721



Department of Environmental Quality

1234 S.W. MORRISON STREET, PORTLAND, OREGON 97205 PHONE (503) 229-6458

November 9, 1977

Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

Attn: John E. Kiley, Environmental Manager

Re: Role IS, Part I, Pps. V-257 to V-320

Gentlemen:

Your Role Impact Statement, Part I, pages V-257 to V-320 raised some concerns in my section. We were unable to understand the basis for many air pollution and ambient air values. Our formal comments are raising concerns about your modeling and other matters.

Peter Bossert and W. Brian Crows of my staff would like to check some of the figures quoted in this section. Would you please loan us a copy of your principal reference - "Equitable Environmental Health, 1976, Environmental Impacts of the Generation of Electricity in the Pacific Northwest: A Report, prepared for BPA by EEN, Woodbury, New York, 449 p."

We would like to borrow it for a month. Also let us know who your authors of this section were, so that we may consult them.

Sincerely,

John F. Kowalczyk, Supervisor
Air Quality Program Planning
and Development

PBB:lb

cc: Dr. Robert Gay ✓

COPY



State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

To: Robert Gay cc: Eastern Region Date: November 9, 1977

From: J. F. Kowalczyk

Subject: Bonneville's Role Environmental Statement,
Part I, Air Quality Impact, pages V-257 to V-320

The most significant concern we have about the adequacy of the Impact statement involves the air quality impact section. We are concerned about the accuracy of the model predictions and interpretation of them. We feel it very important to have a reasonable indication of the air quality impact of new coal fired power plants.

This section especially modeling is vague, inexact, and not definitive about the methods used to calculate the numbers quoted. Table V-57 page V-259 is too general, too inexact, for example. The conclusions in Table V-80, page V-320:

"aggravation of symptoms in susceptible"

and

"potential damage to susceptible species"

could have been arrived at without any study. An assessment of the impacts in relation to air quality standards and prevention of significant deterioration increments is needed.

The Air Quality Division is writing Bonneville for their source document, "Environmental Impacts of the Generation of Electricity in the Pacific Northwest: A Report" prepared for Bonneville by EEN, Woodbury, New York, 449 p., Equitable Environmental Health, 1976. Possibly this will help clarify some of the concerns about modeling accuracy. We really believe that such modeling must take into account local terrain and meteorology or at least model results should be qualified to indicate that specific modeling of a plant could produce significantly different results.

We hope to comment further by December 14, 1977.

0102

0104



State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

To: Robert Gay cc: Eastern Region Date: November 8, 1977

From: PBB thru AJG GJK thru RMU

Subject: Bonneville's Draft Environmental Statement

Fiscal Year 1979 Proposed Program

The subject document concerns very little to be done in Oregon. See Figure 2 after page 4. What little construction there is in Oregon has negligible permanent impact on air quality. See Section IV.C.1. Air Quality pg. 27 where slash burning from land clearing is described. Land clearing in the environs of McNary Dam in Oregon near Harmlston is part of normal life these days. Agriculture, especially circle irrigating by spraying systems, is experiencing rapid growth in this area. Slash burning for land clearing is permissible with the Department's written permission in this area. Smoke from such burning will be quickly dispersed because of the favorable ventilation experienced in this area.

Part I

IV. Future of Electric Power Development in the Region-Power Demand.

B. Conservation and other factors affecting future power demand

4. Supplemental Energy Systems

e. Wood

On Page IV-194, lines 1 to 7 describe a situation which is contradicted by experience in Oregon.

Line 3 "Unfortunately, most of these new burners are small, so a large industry would either use several of them or revert to the old-time wood furnace. These . . . would revive a technology of 50 years ago."

I. SIZE. The Department of Environmental Quality has noted that a wood fired paper products firm tends to install the largest wood-fired boiler available to meet its needs, rather than several smaller boilers.

a. Two large pulp mills in the Willamette Valley each installed a single wood-fired boiler in order to retire oil-fired boilers. Each was installed in 1975, has a steaming capacity of 180,000 lbs/hr at 600 psig. Each has primary and secondary particulate emission controls.

b. A wood complex near Roseburg is installing a sixth wood-fired boiler with a rated capacity of 250,000 lbs/hr of 600 psig steam. It will be the largest wood-fired boiler in Oregon and will assist the plant's other wood-fired boilers in generating over 40,000 HP.

2.

c. A small wood products firm in Klamath Falls built a 28,500 lbs/hr, 260 psig wood-fired boiler of modern design, then placed their Natural Gas/Residual Oil boiler on standby in 1975.

d. A Lakeview firm did the same as (c), with a 24,000 lb/hr, 150 psig boiler.

2. TECHNOLOGY. While wood-fired boiler technology has not advanced as fast as coal-fired, neither has it stood still for 50 years. It is suggested that Bonneville contact the following firms who install or own the latest in wood-fired boilers:

- Vellons, Inc., Larry Wellons, Pres., Sherwood, OR, Phone (503) 625-5131.
- Bunstead-Woolford Co., Wayne Wagner, Portland, OR, Phone (503) 232-5171.
- Roseburg Lumber Co., James W. Pratt, Dillard, OR, Phone (503) 679-8741.
- Publishers Paper Co., Z. Rozycki, Newberg, OR, Phone (503) 538-2151.

On Page IV-194, the burning of wood biomass is discussed. It does not include Meyerhauser's latest studies, summarized by:

Robert L. Jamison, Director, Energy Management Group, Meyerhauser Co., Tacoma, Washington,

In a presentation to the Pacific Northwest International Section of the Air Pollution Control Association at their March 18, 1977, Spring Specialty Meeting.

On page V-27, Figure V-3, the "Chimney or stack should come last", with the "Stack Gas Cleaning Equipment" before it.

Part I

V. On page V-89 the adverse effects of 20,000 MW energy parks are listed. Mitigating factors could be listed here. Through much of its length, the Columbia River flows through sagebrush covered wasteland or deep canyons of lava. Many energy parks could be sited in these wastelands. The sites of Pebble Springs and Carby could be mentioned, besides Hanford on pages V-91-92, and West Roosevelt, V-92-93.

On page V-106, an air storage system is described. This system is presently in use on some of the Puget Sound ferries. It is very small, and is used only for starting; but it is in use. This could be mentioned to increase the credibility of this description.

On pg. V-223, the summary for biomass contains several statements which are misleading. Line 5 would be more exact if instead of "such as sawdust and wood chips," it read, "such as bark and other wood wastes." Sawdust is used to make particleboard. Wood chips are pulped; they are rarely burned.

0104

L-29

The next sentence implies that wood-fired boiler systems need development. Prototype systems are mentioned in line 8. This is a misconception. Wood products plants in Oregon very often generate power; others used to, but have been retired because of low cost Bonneville power.

Consult Oregon's Department of Energy or Department of Environmental Quality (P. Bosserman 229-6278) for lists of known wood-fired steam-electric plants in Oregon.

Part 1, pg. V-251, Table V-56:

CO₂ is not considered a pollutant in any other source, so it should not be added in here.

Part 2, The Role of BPA

X Unavoidable Adverse Impacts

A. Power Acquisition

Pg. X-4, effects of nuclear plants are discussed. Comment: Why are the effects of coal-fired-steam-electric air pollution left out? Neither the Centralia or Boardman plants have SO₂ removal scrubbers. The document does not address the unavoidable adverse impact of about 5000 tons/yr of sulfur oxides from each of these plants and from future thermal plants.

XI-13 and XI-14. Under the air quality considerations of long term use, mention should be made of the trace materials found in coal. These are heavy metals, mercury, and radioactive materials. Now they are locked up in coal, buried in the earth. Thermal plants are burning thousands of tons of coal per day, spreading these trace materials over land and air. There they are breathed by man and animals. Plants take up these trace materials when they fall out. What are the effects? What are the materials released?

Appendix A, page II-83, line 7-8, "It usually takes days to bring a large thermal unit from cold standby to full load." PGE-Boardman reports to DEQ that a cold start will take 11 hours.

Appendix A, page III-186, line 3, capitalize "Electric City".

Appendix A, page III-190, Table III-21, Isn't there a mistake in the particulate omission figure? The 55,000 tons/yr seems 10 times too high; 5,500 tons/yr or 550 tons/yr would be more believable. PGE-Boardman is being designed to emit 478 tons/yr.

Only the major air pollutants are listed here. Are there over 10 tons/yr of chlorides, mercury, cadmium, zinc, lead, etc., etc.? What is the radioactive particulate emission to the air? How does it compare to Trojan?

Therefore, we recommend that the construction noise mitigation measures be spelled out in detail in the Final Role E.I.S. and in any further B.P.A. construction contract.

As we have stated, the D.E.Q. does not control construction site noise, but we do have rules covering highway trucks used at construction and maintenance sites. Consequently, we also recommend that future B.P.A. construction and maintenance contracts require all highway trucks to meet D.E.Q. and/or Federal In-use truck noise standards. (See later comments on our noise standards.)

Transmission Line Noise

The discussion of transmission line noise impacts in the Draft was, for the most part, adequate (Appendix B, beginning with pages VII-51 and VIII-26). The use of double 1.6 inch or triple 1.3 inch conductors in lieu of the single 2.5 inch conductors, as mentioned in the draft, should substantially reduce the possibility of violating the D.E.Q. noise standards for transmission lines. However, the D.E.Q. does not agree with the Draft's statement that "B.P.A.'s new triple-bundle conductors for its 500 kV lines are within noise levels for both Oregon and Washington." (Appendix B, page VII-54, line 20, and Part 2, page VIII-48, line 20.)

Although the above statement is probably true for transmission lines constructed on previously used industrial or commercial sites, it is not true for some previously unused sites. In formulating this statement, B.P.A. failed to consider D.E.Q.'s 10 dBA ambient noise increase limitation for previously unused industrial or commercial sites. A transmission line constructed in a remote, quiet environment next to residential property could violate this 10 dBA ambient noise standard. We recommend that the Final Role E.I.S. correct the above statement about transmission lines unconditionally meeting the D.E.Q. noise standards. (See later comments on D.E.Q. noise standards.)

Substation Operation Noise

The sections of the Draft Role E.I.S. that deal with substation noise impacts were found to be incomplete and inadequate. (Appendix B, pages VII-55 and VIII-27.) The aforementioned substation analysis simply listed the various types of noise sources found at B.P.A. substations without stating how loud the noise sources were. (Transformer cooling fan noise should have been included on this list.) Unfortunately, a more complete analysis of substation noise impacts does not appear to be forthcoming until future B.P.A. investigations are completed. Hopefully though, a recently published B.P.A. study on substation noise heralds the completion of this investigation and will thus result in a thorough substation noise impact analysis being incorporated within the Final Role E.I.S.

Substation noise is of major concern to the D.E.Q. Hence, the Final Role E.I.S. will not be considered complete by the Department unless an adequate substation noise assessment is presented.

The Department of Environmental Quality Noise Control Section Comments on the Draft E.I.S.: The Role of Bonneville Power Administration in the Pacific Northwest Power Supply System (Clearing House No. 7703-4-56)

Generally, the B.P.A.'s Draft Role E.I.S. treated noise pollution as a minor environmental impact. The noise impact discussions in Parts I and 2 of the Draft were practically nonexistent and consisted of randomly spaced short paragraphs. The Draft's noise impact assessment was located almost entirely within Appendix B. Unfortunately, B.P.A. failed to index the Draft E.I.S. for noise, thus making it very difficult to locate those sections of the Draft which deal with the noise impacts. We recommend that the Final Role E.I.S. be indexed for noise pollution.

Generating Plant Noise. The Draft did not address the noise impacts associated with power generating facilities, except for a brief discussion of noise from hydroelectric projects (Appendix A, pages III-150 and III-188). Hydroelectric plants create little noise pollution. Thermoelectric and other types of plants, however, do have the potential to emit significant levels of noise pollution. The noise problems associated with a turbine power plant near Salem, Oregon made this pointedly clear to the D.E.Q.

The reason given in the Draft E.I.S. for not addressing power plant noise impacts was that B.P.A. has no power generating facilities of its own. Nevertheless, B.P.A. is a participant in the planning and funding of power generating facilities through the Hydrothermal Power Program (i.e., one utility concept). The Draft's lengthy discussions of present and future types of generating plants, as outlined in Part I, illustrate B.P.A.'s heavy involvement in electrical power generation. Thus, we recommend that Part I of the Final Role E.I.S. contain a discussion of the noise impacts for all the different types of generating facilities outlined in the Draft; i.e., coal, nuclear, wind, solar, geothermal, etc.

The following are comments on the three basic sources of noise pollution that were discussed by B.P.A. in the Draft E.I.S. They are (1) noise from construction and maintenance equipment, (2) noise from transmission lines, and (3) noise from substation operations.

Construction and Maintenance Equipment Noise

Although the Oregon Department of Environmental Quality (D.E.Q.) has no noise standards covering construction site noise, we appreciate B.P.A.'s efforts to avoid and mitigate this type of noise by requiring in their construction contracts that contractors take measures to minimize construction noise. (See the construction contract example in Appendix B, pages VII-48 and VIII-27). Unfortunately, these minimizing measures were not specified in the example contract shown in Appendix B.

DEQ Noise Standards

The Role E.I.S.'s discussion of the Oregon D.E.Q. noise standards was woefully inadequate (Appendix B, page 54). The Draft failed to discuss several sections of the D.E.Q.'s noise standards which would apply to B.P.A. projects. The Draft presented only the D.E.Q. statistical noise standards. It did not mention the 10 dBA degradation standard, the impulse standard, the octave band standard or the motor vehicle standards.

The following is a discussion of the Oregon Department of Environmental Quality's noise standards as they pertain to B.P.A. facilities. (OAR Chapter 340, Division 35). The noise levels listed below, unless otherwise specified, are measured at noise sensitive properties (N.S.P.); i.e., homes, schools, churches.

Statistical Noise Standards

Present and existing B.P.A. facilities (power plants, transmission lines and substations) must meet the following noise standards after January 1, 1978:

Table I

Statistical Noise Standards

7 a.m. - 10 p.m.	10 p.m. - 7 a.m.
L ₅₀ - 55 dBA	L ₅₀ - 50 dBA
L ₁₀ - 60 dBA	L ₁₀ - 55 dBA
L ₁ - 75 dBA	L ₁ - 60 dBA

(Before January 1, 1978, all of the above levels are 5 dBA higher for existing facilities.)

Because most noise sources associated with B.P.A. facilities are steady state, the L₅₀ value above should be of most concern to B.P.A. L₅₀ is that noise level which is exceeded 50 percent of the time in any one hour; i.e., the median value. The L₅₀ values listed above were the only D.E.Q. noise standards cited by the Draft Role E.I.S.

The new 3-bundle transmission lines proposed by B.P.A. would probably not violate the standards in Table I.

Ten dBA Ambient Increase Limit Standard

B.P.A. facilities constructed on previously unused industrial or commercial sites are not allowed to generate noise levels (L₁ or L₅) greater than 10 dBA over the existing noise levels before construction if the construction began after January 1, 1975. (Industrial or commercial properties are not forest or farm lands).

This 10 dBA ambient increase standard is a more restrictive standard than the statistical standard for those facilities located in quiet environments on unused lands. Thus, as stated previously, a transmission line that would probably not violate the statistical standard could violate the 10 dBA standard, if constructed near noise sensitive property located in a quiet environment.

Impulsive Noise Standard

B.P.A. facilities are not allowed to create impulsive noise levels in excess of 100 dB during the day (7 a.m. to 10 p.m.) and 80 dB during the night (10 p.m. to 7 a.m.) when measured on a peak impulse sound meter (not an "A" weighted meter) at noise sensitive properties (A.S.P.).

The Draft E.I.S. stated that substation circuit breakers can create impulsive noise levels of 100 dB at the property line. Thus, the potential for both day and nighttime violation of the impulsive standards exists.

Octave Band Standard

If the Director of the D.E.Q. has reason to believe that the above standards are not sufficiently protective, a facility that produces narrow frequency sounds can be required to meet the following noise levels.

Table 2 Octave Band Noise Standards		
Octave Band Frequency, Hz.	(7 a.m. - 10 p.m.) dB	(10 p.m. - 7 a.m.) dB
31.5	68	65
63	65	62
125	61	58
250	55	50
500	52	46
1000	47	43
2000	46	40
4000	43	37
8000	40	34

These noise levels are measured on an octave band sound meter and not on an "A" weighted meter, as are the statistical and 10 dBA ambient increase noise levels.

High voltage electrical equipment produces a narrow frequency "hum" at approximately 120 Hz (cycles/second). Thus, the 125 Hz octave band sound level standards shown in Table 2 are of the most interest to B.P.A. (61 dB day and 56 dB night).

If these 125 Hz octave standards were measured on an "A" weighted meter, it would read 45 dB(A) day and 40 dB(A) night (16 decibels less).

One can now compare these "A" weighted octave standards (45 dBA day and 40 dBA night) with the L₅₀ statistical noise standards in Table 1 (55 dBA day and 50 dBA night) and see that the octave band standards can be more restrictive than the statistical standards for narrow frequency noise sources (10 dBA more restrictive for 125 Hz frequency noise).

Motor Vehicle Standards

There are essentially two D.E.Q. motor vehicle noise standards that will affect B.P.A. activities (1) in-use truck noise standards, and (2) the off-road recreational vehicle noise standards on private property.

The truck standards are:

Table 3 In-Use Truck Noise Standards		Speed	
		35 MPH or Less	Greater Than 35 MPH
Interstate Commerce Trucks		86 dBA	90 dBA
	<u>Model Year</u>		
Other Trucks	Before 1976	86 dBA	90 dBA
	1976-1981	85 dBA	87 dBA
	After 1981	82 dBA	84 dBA

(Maximum permitted noise levels measured at 50 feet from the truck.)

B.P.A. maintenance and construction trucks are required to meet the noise standards listed in Table 1. As we have stated before, B.P.A. should specify in their contracts that these trucks meet D.E.Q. noise standards. (See example construction contract in Appendix B, Attachment A, page 4).

The off-road recreational vehicles on private property standards are 60 dBA from 7 a.m. to 10 p.m. and 55 dBA from 10 p.m. to 7 a.m., as measured at noise sensitive property. This is basically a trespass problem for B.P.A. Mitigation of this problem was discussed in

Part 2 on page IX-10, lines 21-27, and page X-8, lines 1-11. We appreciate B.P.A.'s cooperation in dealing with this off-road vehicle noise problem.

Loss of Hearing

Although the D.E.Q. has no control over occupational noise problems, we would like to point out that the 80 dBA noise exposure level mentioned in Appendix B on page VII-46, lines 48-54, is misleading. A better source of information on occupational noise exposure criteria than that cited in the Draft (Central Institute for the Deaf, 1971) is the EPA noise publication "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety", March 1974, ("Levels Document"), which states that a continuous noise exposure level of 70 dBA can cause hearing damage.

Noise Mitigation Measures

Except for proposing the use of 2 and 3 bundle conductor transmission lines, the policies and procedures outlined in the Draft E.I.S. for the mitigation of noise problems was very general and non-specific (Appendix B, page VIII-26). The Final Role E.I.S. therefore should set forth specific policies and procedures for mitigating noise impacts associated with each individual type of noise source.

Conclusions and Recommendations

The following is a summary of the D.E.Q. Noise Control Program's conclusions and recommendations on the B.P.A. Draft "Role" E.I.S.:

1. The Final E.I.S. should be indexed for noise so that those sections of the E.I.S. that deal with the noise impacts can be readily located.
2. The Final E.I.S. should discuss the noise impacts associated with the various types of generating plants; i.e., coal, nuclear, wind, geothermal, etc.
3. The Final E.I.S. should spell out in more detail the construction noise mitigation measures to be used by contractors.
4. B.P.A. should require in their contracts for construction and maintenance that highway trucks meet DEQ/EPA in-use noise standards.
5. The Final E.I.S. should correct the statement that transmission line noise will meet all D.E.Q. standards and discuss transmission line noise levels in relation to the 10 dBA ambient increase limit standard as well as the statistical standards.
6. The Final E.I.S. should contain an in-depth analysis of the substation noise impacts as they pertain to the D.E.Q. standards, including octave band standards for control of 120 Hertz hum.

7. The Final E.I.S. should present and discuss all the D.E.Q. noise standards that could apply to B.P.A. projects.

8. The Final E.I.S. should address the hearing loss impacts in relation to E.P.A. hearing loss criteria as presented in their "Levels Document."

9. The Final E.I.S. should fully state B.P.A.'s policies and procedures for mitigation of existing and anticipated noise problems.

If these comments and recommendations are incorporated into the B.P.A.'s Final Role E.I.S., we are certain that a better impact statement will result.



State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

#14

REV. DOUGLAS M. STILL
7844 BRYSON SEARS ROAD
COTTAGE GROVE, OREGON 97431
(503) 842-7985

To: Files
cc: Bob Gay ✓
Date: October 24, 1977
From: Norman Jette
Subject: Alumax - Unatilla - Draft Environmental Statement by S.P.A.
(Supplement to the S.P.A.'s "Note E.I.S.")

On the whole, S.P.A.'s presentation of the noise impacts from the proposed Alumax-Unatilla plant was very good. The only item was my fault S.P.A./Alumax for is not including a map of noise sensitive properties along the rail spur.

The D.E.Q.'s original ecological assessment of the proposed Alumax facility is still valid. The facility should be capable of complying with the Department's noise rules and regulations, if the consultant's recommendations are followed.

/s/ro

Testimony of Douglas M. Still
Eugene, Oregon - Nov. 10, 1977

Comments on Draft Role of BPA in NWPS

My name is Douglas M. Still. I live at 7844 Bryson Sears Road in Cottage Grove. My employment is with the Center For Environmental Action, but I am currently on a medical leave of absence. I am the Secretary of the Committee for an Emerald Peoples Utility District.

I appreciate the opportunity to present some comments of the Draft EIS of the BPA in relation to the NW Power Supply System, and in especial response to the intention of BPA to serve Alumax Corp. with large amounts of both firm and interruptible power. The Committee For an Emerald PUD has sought assurance from the administrator of BPA that firm and peaking power would be available to the District if the voters in the district approved the formation of an Emerald PUD. The Administrator has not been willing to give that assurance, although the former Director of the Oregon Dept. of Energy has asserted that firm and peaking power would, in fact, be available from BPA, at least after 1983.

I address the Draft EIS at the following points: Appendix C Attachment A. The Congress declared in creating BPA that it "shall be operated for the benefit of the general public, and particularly of domestic and rural consumers . . . and shall at all times . . . give preference and priority to public bodies and cooperatives." Section 4a. And section 4d requires the administrator to give encouragement to the formation of new publicly owned utilities for use of energy available under this act.

The administrator has given notices of insufficiency to all public utilities now holding contracts, and is negotiating new, more restrictive terms for the contracts with Direct Service Industrial customers. But at the same time, is planning to continue to serve the energy needs of these private corporations and even to provide for the energy needs of a brand new aluminum smelting operation in Oregon.

The energy needs of an Emerald PUD would amount to only 54.1 megawatts average load and 90 to 100 megawatts peak load (ODE Final Report EPUD 6/76 p.7), whereas the Alumax plant load as presumably presently preserved by BPA for them would amount to 320 megawatts of "Industrial Firm" power. The Alumax Environmental Statement of the EIS discusses BPA's "proposed" contract to provide power to Alumax. It is impossible for the public to assess the prospects of a proposed contract. The existing contract terms are discussed in Chapter 1 B pp. 8 - 11. Apparently the existing contract provides Alumax with 240 megawatts of modified firm power which gives Alumax 3/4 of 240 megawatts of firm power. (Sept. 1970). The contract terms were again changed to "Industrial firm power", apparently in 1973, which means (according to the glossary) "power intended to have assured availability to the industrial customer on a contract demand basis".

It appears to be a conflict with the intent of Congress that BPA is intending to meet the power needs of an industrial corporation when the law requires that domestic and rural customers have first priority for the concern of BPA, and it is obliged to assist them in forming publicly owned utilities, "when power is available".

BPA should publish in the final EIS the terms of its existing contract with Alumax. Also, you should publish the terms of the out-of-court settlement of the suit brought by Congressman Weaver and the Committee for an Emerald PUD, agreed to in 1976. These are germane to helping the public understand BPA's "Program" which appears to be to help the giant corporations at the expense of domestic and rural consumers.

Part II of its Draft EIS Chap. VII P. 11 defines BPA's mission as: "to assure a viable electric energy system in the Pacific Northwest while balancing economic, technical and environmental considerations." Appendix C 1 5 reviews the laws and regulations governing Bonneville Power marketing. These are: the Bonneville Project Act; directives from the WW II War Production Board; the 1944 Flood Control Act; Administrative decisions in the 1930's to wheel non-federal power; the 1961 Columbia River Treaty with Canada; authorization for the Northwest-Southwest Inter tie; the 1965 Water Resources Planning Act; the 1966 Act authorizing a Third Powerhouse at Grand Coulee; the 1970 and 1971 Public Works Appropriations Acts authorizing the idea of new billings. I cite all of them because in none of them are the basic precepts of the original act abrogated. That is, BPA's function to expend the use of electricity throughout the Northwest as a first priority area, and it will give priority attention to the needs of domestic and rural consumers and will give preference for all energy available after 1971 to publicly owned utilities which it will encourage to form.

Given this mandate, one would expect a BPA EIS to give focus to the history of the formation of publicly owned utilities and the continuing interests, needs, and problems of the public in forming publicly accountable electric utilities. None of this is in the Draft EIS, probably because the management of BPA is committed to another mission - one not articulated by law - and a mission which is discussed throughout the Draft EIS as the "One Utility System" (2 VII 12,13,14, etc.) The Hydro Thermal Power Program and the concepts of the Northwest Utilities Conference Committee proposed legislation, are grounded to this perspective, which will extend to business, industry and the investor owned utilities, the benefits of federal expenditures for the purpose of helping domestic residential and rural customers primarily, and thus through publicly owned utilities which encourage local citizen participation in policy decision making and control over the decisions of management. The negative bias of BPA management to these mandated principles are nowhere described as the program of BPA, but they are implicitly acknowledged by the nature of the proposals espoused by this EIS. In this respect the Draft EIS seems to deliberately obfuscate its real program. The degree to which BPA management has orchestrated the PNWCC efforts to destroy the primacy of the preference clause and to encourage a vast and rapid high technology development of the Northwest into another crisis oriented New England or crowded and polluted Southern California, is also left unstated.

The widely discussed energy options as espoused by Harry Conmoner and Emory Lovins (called by him) "soft technology", are not acknowledged by this draft EIS as a serious proposal. But large constituencies in the Northwest are advocates of this path as the preferred one. The Skidmore Owings and Merrill analysis of the conservation options available to the Northwest is an input to the Draft EIS, congenial to this perspective, Part I IV B pp. 131-139. But BPA management is skeptical of the relevance of this contribution and it is negated due to "1.) the controversial nature of some of the programs, and 2.) the government procedures which would be required to implement them" (p. 129). BPA expends great management energies to promote programs toward achieving

a "One Utility System", but finds it uncongenial to lead toward a vision of energy consumption in the Northwest much more typical of the previous history of this region.

The final EIS should elaborate more carefully the ramifications of energy policies which take seriously net energy studies based on a BTU cost basis of various options.

The cost effectiveness basis of analysis of the merit of conservation strategies now employed by BPA (Pt. 2 VII p. 79) is not responsible policy in an era of rapidly declining, non-renewable energy resources. Discussion of the energy dilemma we face based upon this reality is very important for the final EIS.

I will discuss in my written testimony submitted to you later concerns I have with the EIS treatment of:

1. Solar energy potential
2. Your trivializing nuclear hazards, etc.
3. Employment growth through decentralized energy options in contrast to the high technology preference of this draft EIS.

Thank you for your attention tonight. Good night.

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

December 6, 1977

Reference: SJ
Subject: Joint Response Transmittal
Letter, Alumasax and Role EIS

Gentlemen:

Enclosed find Exhibits 1 and 2, relating to the Alumasax and Role EIS reports, respectively.

Enclosed also please find Exhibit 3 which serves as a proposal for clarifying EIS decision making.

Sincerely yours,

Harmon H. Rulifson
Harmon H. Rulifson

P.O. Box 21366
Seattle, Washington
98111

December 6, 1977

Exhibit 1. Alumasax Environmental Impact Statement Comments

1. Questions of General Concern:

a. What regional, national, and/or international sites are potential alternate site possibilities?
b. What is the environmental (including human, natural, and energy tradeoffs) balance desired for aluminum facilities in the BPA market area?

c. Should we consider the Pacific Northwest a closed issue for certain energy-intensive industrial/manufacturing concerns or basic metals producers who, on balance, do little to improve employment in relation to the amount of energy they consume? Until and unless the above three questions are answered and supported with data and logical analysis, including media coverage of public forums, the permit to construct the Alumasax facility should be denied.

In the event these pivotal questions are not fully developed and aired in public, the President's Council on Environmental Quality should be formally invited to veto local approvals.

2. Specific Comments regarding Chapter VII. Relationship between Short Term Use and Long Term Productivity.

The published Alumasax EIS did not appear to comprehend the potential or actual intent of the Regulations affecting Section 6 of the NEPA procedure for EIS reports. The Relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity.

Exhibit 1 (Con't)

Page 2

These regulations are specified on page 20554, Vol. 38, No. 147, Wednesday, August 1, 1973, Federal Register.

In the Alumasax EIS, the applicable Chapter VII is to contain a brief discussion of the extent to which the proposed action involves trade-offs between

1. Short term environmental gains which are affected at the expense of long term environmental losses; or
2. Short term environmental losses which are generated to the benefit of long term environmental gains.

In summary, the BPA Alumasax Chapter VII presentation identifies short term consequences in taxes, construction expenditures and employment, and plant employment, but does not equitably treat how the allocation of power contracted from BPA might better serve the citizens of the Pacific Northwest over the long term.

Unless I am misinterpreting the potential and actual intent of NEPA Section 6, it appears that a restudy of the intent and significance of Section 6 of the EIS report and resource allocation process, is critical.

The clarifying Regulations appear to state that the maintenance and enhancement of long term productivity is an essential criterion for resource allocation decision making. What is desired is a brief, quantified review of the trade-offs that exist with the proposed short term benefits.

Nowhere was the word productivity used in the Alumasax report to support the study results and no mention is really made in the Regulations.

Exhibit 1 (Con't)

Page 3

It is apparent that all interested parties could benefit from a review of Section 6 NEPA implications, acquire an awareness of what productivity measurement is, and focus on revisions to the format and written outlines which treat this element of an Environmental Impact Statement.

To emphasize the importance of productivity in our economic decision making process, let me refer to a statement by former President Gerald R. Ford, made January 14, 1975: "Our nation today faces problems that are unprecedented in this generation. We are being whipsawed by both inflation and recession and pressured by powerful foreign economic forces... American productivity dropped below the average of the past two decades and fell short of its great potential.... The maintenance of our historic rate of productivity growth is a vital factor in the broader task of achieving a less inflationary and more stable economy."

" "

Exhibit 2. BPA Role Environmental Impact Statement

1. Comments of General Concern:

a. Part 2, Chapter XI of the Role EIS report combined two NEPA section areas of concern, Section 6 on the relationship between short term benefits and long term productivity, and another NEPA section on irreversible and irretrievable commitment of resources. The reviewer of these comments is invited to critique the Exhibit 3 outline, attached hereto, to more conveniently resolve the unanswered issues covered under NEPA Section 6, as developed in Chapter XI of Part 2 of the BPA Role EIS report.

The Exhibit 3 outline is a draft working paper designed to support and summarize a trade-off decision matrix for NEPA Section 6 requirements. Its application or modified application to this BPA Role EIS report may be of some assistance in allowing the lay person to grasp the dimensions of the trade-off options available.

b. Even though data is difficult to quantify, assemble, and analyze, we can no longer isolate citizen participation from macro-economic decision processes.

2. Specific Comments and Questions:

a. Per lines 1 through 9, page XI-6, Part 2, Role EIS: what national, regional, and state guidelines prioritizing distribution of power, are available to assist the public in their acceptance or denial of permits/contracts? What consideration is given to a proposed event's contribution to our international balance of payments? What is the reasonable, long term profit expected (return of and on investment) in the electrically-run productive plant?

Exhibit 3. Preliminary Working Paper for Revision of the
Regulations and Procedures for Section 6,
NEPA Environmental Impact Statements

Introduction and discussion:

It is my belief that the EIS document can serve a meaningful community role in harmonizing proposed events with policies that are supportive of economic equilibrium. It occurred to me that a careful treatment and review of the Subject Section 6 element of the EIS report is critical, both to resource allocation decision making and to the public's need to know. The treatment of short term benefits from the use of man's environment is usually discussed in generalities, and has been minimally adequate. The greater shortfall has occurred in the complete omission of study quantifying contributions to long term productivity growth and identifying alternate uses of resources. The difficulty in Section 6 productivity considerations, is that most lay people and professionals have only a vague understanding of productivity and its application to our economic system. Environmental measurement of long term productivity contributions entails a study of the proposed allocation of resources; and/or how they will be recombined to impact the rate of production relative to the consumption of labor, energy, natural resources, and investment capital. Productivity is defined as the resultant increase or decrease in real output per hour of work.

Exhibit 2 (Con't)

Page 2

b. Per lines 32-52, page XI-8 and lines 1-5, Page XI-9; why are agreements with neighboring countries for substitute sites and/or selection of economic activities practically if not theoretically unacceptable?

c. At what point does the concentration of selected energy consumptive industries reach supersaturation for a balanced economic environment within the BPA market area?

A recent Washington State University Study commissioned by the Pacific Northwest Regional Commission indicated that conservation programs could produce a range of savings from 11 to 35 percent.

To avoid precipitous irretrievable resource commitments, I suggest that the local, state, and Federal leadership join forces to immediately implement spartan conservation programs for the long term enhancement of productivity growth.

Exhibit 3 (Con't)

In order to quantify the data for review, it is convenient to separate the productivity criteria from the community impact criteria.

The following two charts may be used to summarize the impacts to each major resource. It is assumed that the charts will be utilized to measure the proposed site, two alternate sites, and one existing similar facility.

Long Term Productivity Summary

<u>Measured Criteria</u>	<u>Gain or Loss</u>
1. Labor Resource	manhours/year
2. Total New Production Anticipated	\$/year
3. Energy Consumed**	BTU/year
4. Natural Resource	\$/year
5. Capital Investment	\$/year

Public-Community Criteria Summary

1. Impact on residential property values	Total \$
2. Impact on property tax revenue	Total \$
3. New disposable income generated (Aggregate)	Total \$/year
4. New claims on public revenues and facilities	\$/year
from in-migration to Site area	
5. New employment from local manpower pool	No. of employees
6. Programmed reinvestment of profits in Community	\$/year
7. Impact on existing competing facilities	\$/year
8. Plant worker commuter miles	miles/year

** The allocation of energy requires special attention to employment and population growth. Overloading of an environment is avoidable.

December 9, 1977

Environmental Manager
Bonneville Power Administration
Environmental Office - SJ
P.O. Box 3621
Portland, Oregon 97208

Dear Sirs:

Thank you for providing me with a copy of the Alumax Environmental Statement for review and comment. Overall I thought the quality of the Environmental Statement was excellent and covered most points quite adequately.

There are a few points which I question and I would like to bring these to your attention. In Chapter VI, page 2, under Utilities, the effects of the Alumax plant on the already critical water situation were not given substantial consideration. Adequate water systems are presently a problem without the additional population Alumax will bring to the area. Since no alternative water sources are being considered or developed at this time, I question the wisdom of planning a operation which will make an already critical situation worse. This problem seemed to be glossed over in the presentation of unavoidable adverse environmental impacts and in Chapter III, page 39.

There is a projected deficit in power production (Chapter IV, page 95) which will increase if the Alumax plant is built. New hydro-electric facilities are not feasible as hydro-electric sources in the Columbia River System have been developed to their full potential. If growth is to continue in this area, alternative energy sources must be developed. The question must be asked whether the people of the area will be willing to sacrifice environmental quality in the name of growth to develop energy resources. We cannot afford to forge ahead ignoring the depletion of energy sources.

Page 3
December 9, 1977

If technology expands to lower the amount of electricity consumed in the production of aluminum and to alleviate other adverse effects, then the Alumax plant might be feasible. As it stands now, I feel the people and the area will be better off without the Alumax plant.

Sincerely,

Andrea Paroni
Andrea Paroni
Box 8797-150
Pocatello, ID 83209

The impact on the social structure of the area of the Alumax plant was not discussed in Chapter IV, page 38. The area surrounding the proposed plantsite is presently dominated by agriculture with some industry especially agriculture related firms. Addition of industrial workers and their families will definitely alter the population composition. Values of an agricultural based community tend to differ from those of industrial areas. Is the area prepared to handle this change in the makeup of the population? Though this impact is hard to measure, some attempt should be made to assess the effects of this change.

Reference is made to the use of aluminum as a potential substitute for other products (Chapter IV, page 101). It is stated that the use of aluminum lowers the use of copper ore. Copper production at this time is a depressed industry with vast production facilities operating at reduced capacity or completely shut down. Why build a new capital intensive facility like the Alumax plant when facilities which produce substitute products are sitting idle? In the same discussion, aluminum is suggested as a substitute for wood. Granted aluminum may be superior to wood in some cases, but where substitutability is possible, wood should be used because it is a renewable resource. Timber can be easily managed and harvested with much less capital outlay than is necessary to produce aluminum.

The above points were either not stressed or not brought out in the environmental statement. It is my opinion that the adverse effects of the plant outweigh the benefits that would be derived from the Alumax plant, and therefore the Bonneville Power Administration should not furnish power to Alumax. The alternatives summarized to the point that if Bonneville Power Administration does not supply power to Alumax, then Alumax will not build the plant. Perhaps,

Bonneville power administration
Environmental Office - SJ
P O Box 3621
Portland, OR 97208

December 9, 1977

Gentlemen,

Attached are my comments and criticisms of your 6 volume Role Environmental Statement and the Alumax volume.

These comments do not represent my employers' (Crexon State DEQ) comments and criticisms, as some of them were objected to by my employer.

If some of the comments are too oratorical or vitriolic for your sensibilities, please excuse my poetic license where I am merely trying to make a point without disguising it in too much polite verbiage.

Thank you for writing the statement and exposing it for private and governmental review.

Peter B. Bosserman
Peter B. Bosserman
14817 SE Raintree Ct.
Milwaukie, OR 97222

1.

Bonneville's Role:

The one thing about the whole energy crisis that most bothers me is that the government will strengthen private, investor-owned utilities so that they will continue profiting off me and my children for as long as we live.

Where I formerly lived in Seattle, the electric system was publicly owned. We all owned it, like Bonneville. But will you buy so much power from thermal plants owned by investor owned utilities, that in fifty years most of the thermal plants will be privately owned?

The collective wealth of the large and medium Pacific Northwest cities makes it possible for us to build and own new plants to meet our own power needs. Especially when the whole country has built the hydroelectric dams through the federal government as our energy base.

Therefore I can foresee Bonneville Power Administration either as a possible savior or as a tyrant.

You can save us by building public owned thermal power plants to meet our needs. You can subsidize conservation through insulation programs. You can subsidize minor energy sources such as solar, wind, geothermal, and cogeneration. You can do all these things if the federal government will pass laws to allow it.

On the other hand, Bonneville could be a tyrant and a stumbling block. Because of your autonomy, you could put first the interests of your industrial customers and the privately owned utilities. Because you are not subject to local control, you could fail to lead the expansion of public power plants. Or, you could study the whole problem until someone else solves it their way, because you are bound by federal law, federal regulations, and many miles of red tape of your own making.

New Role and Status

Apparently the federal government no longer budgets you money. Rates, your sales and transmission fees cover both your operating costs and your slow payments to the federal gov't for the cost of the transmission and hydroelectric facilities built to date.

Therefore I would like to see a new law enacted by the Federal Government to give you to use the citizens of the Columbia Basin. Our governors would be on your board, or their appointed representatives. I would suggest 2 votes from Oregon, Washington, and Idaho, and one each from Montana, Wyoming, and British Columbia. As you paid for each of the dams, you would gain title to the whole dam if it has no lock for navigation. You could free yourself of the federal civil service, and the federal red tape, regulations, and laws, and become more like state and local government. Perhaps this way, you would be less of a faceless tyrant.

Right now, because of the seniority of some of our Senators and Congressmen, we have the clout to pass such laws. If Mannison, Jackson, or Ullman should not remain in congress, then such a move would be less possible.

3.

Long Term Action

I would hope that Bonneville will proceed vigorously with new plants as soon as powers are received. The Pacific Northwest has lost a lot of time arguing how, whether, and when, we all need action, even though various "ox may be gored", including our own.

The insulation, co-generation, solar heat, and other small programs need vigorous, effective, and continuous advancement. The fragmented approaches of each state and each utility need to be combined.

I hope that your administration will not become so impressed with economies of scale that you waste too much effort on projects larger than 350 MW which seem to arouse so much opposition. I hope you don't neglect to pursue large projects because of their size or special interest opposition, but you will find that the smaller projects will be easier to get through, especially co-generation, insulation, and solar heating.

Industrial Customers

The debt owed to the industrial plants served directly by BPA has been paid. BPA needed to sell the power, the companies have used it to make profits. Now the citizens of the Pacific Northwest want the power back. BPA has notified its direct industrial customers that upon expiration of current contracts, BPA will no longer sell them firm power.

I hope that BPA has also arranged to sell the associated lines and substations to local utilities so that BPA will leave the retail sales business and concentrate on the wholesaling, transmission, and generation business.

Whether aluminum plants will remain is an interesting trade-off. As long as their power is cut first and restored last, who can object? But when private utilities build thermal plants, charge all their customers for the increased power rates to pay for the plants, then sell thermal power to aluminum plants, then the public has really been taken. It should be made quite clear to aluminum plants that the public of the Pacific Northwest wants low cost hydro power for themselves. The aluminum plants, if they stay, must pay for the high cost of the thermal plants, or be satisfied with mostly interruptible power. We don't use a lot of aluminum ingots here, nor do we mine bauxite nor do we have excess firm power any more; let them go where those conditions occur.

2.

Public Owned Energy Plants

With assets like the Federal Columbia River Power System, you should be able to float enough bonds to finance the most economical energy plants needed to meet our energy growth. You could do all of the good things outlined in your role environmental statement. We need the best features of TVA, but not the worst. We need local control.

Name and Organization

Let's call you CORIOO, for Columbia River Corporation. You could be chartered to meet the electric energy needs of the whole states of Idaho, Oregon, and Washington, and those portions of Montana and Wyoming that drain into the Columbia. You would be a federally chartered corporation, like TVA or the Post Office, but not bound by federal civil service laws. Your employees would be bound by state laws, and eventually join a state retirement system, etc.

You would be directed by a board of governors: the members of the board could be anyone, the appointing governors themselves, your own executives, etc. They would be appointed by the governors for as long as the governor held office. The governor, or his successor, could remove them without cause. A member of the board could be appointed by several governors and cast as many votes. If your present director is greatly esteemed, he could be the only member of the board of governors by securing appointment from all the governors involved. This would allow CORIOO to get off to a fast start.

The Canadian representative may not be legal so his vote may have to be a gentlemen's agreement sort of thing, where he could not be counted in close votes.

Immediate Action

Bonneville's first priority should be to secure as many powers as it needs to solve the Pacific Northwest's power needs, even if this means acquiring a boss. It is evident right now that BPA has achieved surprising autonomy. A board of governors would cause BPA a lot of adjustment. But for the long-term good, broader powers and local control are both needed.

To let the situation deteriorate into a series of crises would be irresponsible. To let the private power companies expand into thermal generation is asochism to those of us who believe in public power.

Public power has demonstrated its ability to serve the public well. If it can be kept under political control, we would have little to fear. We know that private power has become cost plus profit. The rates are being set so that they can expand. I was happily surprised to learn that Bonneville can acquire other entity's power plants by expropriation. How about starting with any plants on the middle Columbia that choose not to cooperate?

4.

BPA's Private Utility Customers

The fact that public utilities receive preference from BPA should remain that way. If the people served by private utilities don't want it that way, they can vote to have their own P.U.D., then take over the private utility's equipment within their boundaries, then get in line at BPA for their energy.

What should not happen is that BPA would refuse to sell power to new public utilities because of existing contracts with industrial customers and private utilities. BPA's role, as defined by existing federal law, is to serve public utilities first. This should be irrespective of length of existence. If Governor Straub wants to wheel power through a public wholesaler, into private companies, then BPA should sell power to Straub's Dodge ahead of industry and private utilities.

But it would be much easier for BPA to decide these things, if they were free of federal laws and governed by a board of governors representing the will of the people. Why not set up an advisory committee now, composed of the area's governors, to take some of the heat from the very difficult decisions coming up?

Hydroelectric Sites Forbidden by Law or Ruling

Before we douse the Pacific Northwest in too much SOx and flyash from coal-fired electric plants, or make a lot of nuclear waste from too many nuclear plants, Bonneville should consider damsites such as Mountain Sheep on the Snake, Glacier on the Flathead, etc., which are forbidden for development for one reason or another. It might be more economical and better for the overwhelming majority of the Pacific Northwest's citizens to repeal the laws and rulings by which special interests made these sites unavailable for development.

These reconsiderations should be placed before Congress as they become timely.

Part I.

2. Coal-Fired Generation

Pg. V-28 and V-29 consider environmental impacts of SOx and fly ash produced.

Line 48 on pg.V-28 sets up a paper tiger then subtly destroys it. The limestone slurry method of capturing SOx is a first generation type control which the electric power utilities have attacked so long that knowledgeable people are sick of it. No one is installing it, but are buying second generation designs of higher cost and complexity which do not produce the 500 tons/day of waste offered for condemnation on line 12 of page V-29. As stated above, list these pollution controls elsewhere, to be handled not by propaganda articles, but by experts knowledgeable of the latest technology. After all, we have one coal-fired plant operating, and another under construction. Why not describe them, rather than some paper tiger?

Part 1, pg. V-297 through V-320. This section "a. Determination of impacts of Environmental Levels of Residuals" tries to predict the effects of more coal-fired steam electric plants on the region's air quality. It results in a summary in Table V-80 on page V-320 where "aggravation of symptoms in susceptible" for humans is predicted, and "potential damage to susceptible species" for flora is predicted. Could not these conclusions have been omitted as self evident? Or described in terms of an acid rain, but lighter, than that falling on Scandinavia presently? Or simply described that weak infants, people with asthma and emphysema, and weak old people will have increased breathing problems? Or that certain plants will not do well because of SOx attack? The conclusions in Table V-80, in some cases, are worthy phrases usually expected of a very sharp lawyer. My congratulations on your ability to summarize unhealthy facts to a group of citizens so that pollutants are predicted but not promised in any real way they can understand or relate to their own health.

Part 2, page VIII-80 and VIII-81

Since a table of air pollutants emitted by Bonneville's direct service industrial customers would take no more than one page, why not list them? Isn't it because your conclusions would look optimistic in a narrow range? Every conclusion on pages VIII-80 and -81 is an optimistic white wash. BPA is defending their long-time customers from attack by environmentalists.

If you listed the emissions, then listed the County or area totals, these pages would be based on fact, not on conclusions which are drawn here in a very careful, defensive manner. Why not list the ambient air standards, then list the present pollutant levels?

In an earlier section, you counted every goose nest in the Columbia. Here you briefly describe the damage effects of air pollutants. Is this an assessment of the air quality impact on the standards or on the environment? Since it is on the environment, why not devote more space to the impacts of air pollution? To repeat, please describe the effect of the air pollution released by Bonneville's industrial customers on the people, animals, and plants around those industries.

The Martin-Marlette plant at The Dalles is described on page IV-173 as being in an urban environment, in an industrial zoned area. Isn't this a misrepresentation of The Dalles? Except for the railroad, and the aluminum plant, isn't every man, woman, and child in The Dalles agriculture oriented? Aren't the environs of The Dalles dominated by orchards? Aren't they organized and have a feud going with Martin-Marlette over air pollution?

Appendix A, page IV-116, line 9.

Environmental Effects of Federal Ownership of Thermal Power Plants

The engineering effects seem well described. The political and policy effects are completely omitted. What is the difference between federal (BPA) ownership of a coal-fired steam electric plant and private utility ownership? To begin with, many of the campaign issues of the recent election by Portland not to acquire its electric utility (PGE) by eminent domain should be described.

Among them are:

1. Public utilities pay no taxes to taxing districts such as schools. Payments in lieu of taxes are sometimes small or arbitrary, but always made unilaterally by the governmental body owning the utility.

2. Control over air and water pollution from private utilities is as complete as possible. Control over air and water pollution from municipal and state utilities is not as complete because of conflicts of interest within politicians governing both the utility and the regulatory agency.

For example, the last asphalt batch plant to be fitted with a baghouse or venturi scrubber in the four counties around Seattle belonged to a County Road District whose commissioner sat on the board of the regulatory agency.

Control over a federally owned and operated utility's air and water pollution by a state regulatory agency is not simple. The president has issued an order for units of the federal government to comply with local rules. Such compliance depends upon funding, the judgement of the utility's executive that such controls are feasible, etc. Case histories from TVA and other conflicts, i.e., DEQ vs Warm Springs Indians Forest Products, i.e., PSAFCA vs. Veterans Hospital Incinerator, should be given to show the difficulty of getting any federally owned or controlled source of pollution to clean up.

Appendix C, pgs. IV-143 to IV-161, this section is called "Impacts on Air Quality". It should be called "Impacts on Air Quality Standards." The whole thrust of the section is to prove that nearly all of Bonneville's industrial customers meet local and federal air pollutant emission rules and ambient air standards. The whole subject of receptor response to the pollutants released is delayed to later sections. Is Bonneville really so convinced that "Big Brother" knows best and is adequately intercepting all harmful pollutants by the standards? Or is the object of the section to prove that Bonneville's industrial customers are releasing no pollutants in harmful amounts? Therefore, Bonneville has never aided and encouraged harmful pollution by building transmission lines and selling power to these large industries?

Why is the history and description of dairy cattle problems with fluorides from aluminum plants so sparse on page IV-172 to IV-180? Where is the description of the problem of only high sulfur coke being available to make anodes? Where is the description of the law suits and complaints from orchard owners in The Dalles? Did none of this ever happen? Why is Bonneville so thorough with official government estimates of pollutants released, yet so brief in discussing possible, probable, and certain damage effects of aluminum plant air pollution on dairy cattle, certain crops, etc?

Alumex volume, Section 4, Air Quality Impacts, pgs IV-7 to IV-26

It is curious that BPA's air quality summary merely parrots the previous studies. There is little criticism of these studies or critique of the assumptions on which they were based. For instance the PGE-Boardman coal-fired-steam-electric plant's (sometimes referred to as the Carty plant) existence is acknowledged on pages III-9 and III-10, but the modeling for the addition of Alumex to the airshed may not have included PGE-Boardman's SOx emissions. This point should be discussed. PGE-Boardman will be releasing over 5,000 tons per year of SOx into the air shed. Should the wind blow from the WSW, there is nearly a straight line from PGE-Boardman, thru Alumex, and on to the pulp mill at Wallula (three large sources of SOx).

There is no description of the effects on livestock of excessive fluoride emissions; there is no comparison of ambient levels to anything but state or other standards. Since Environmental Statements are also written for lay persons, one would have expected some discussion of how such the ambient levels are predicted to be below the levels where effects are registered on cattle and crops. The area is so dominated by agriculture that this omission seems irresponsible. While the section describes the concentrations on Page IV-23, the effects of these or lower concentrations at the damage threshold are left unmentioned.

Case histories of pollution damage from such aluminum plants as Intelco near Ferndale, WA, and from Reynolds near Troutdale, OR, and from Martin-Marlette (Harvey) in The Dalles, OR, are not mentioned and no comparison is given between them and Alumex. Why? The brief description of damage in Appendix C, pages IV-172 thru IV-180, is both brief and non-specific to the Alumex site except in a very cursory manner. Yet in another part of the Role Environmental Statement, you are so thorough that you count every goose nest on the Columbia! The Alumex area is farm country. Their concerns over damage to their crops and animals deserve more thorough treatment than geese nesting on the Columbia.

Part I

IV. Future of Electric Power Development in the Oregon-Power Demand.

B. Conservation and other factors affecting future power demand

A. Supplemental Energy Systems

a. Wood

On Page IV-194, lines 1 to 7 describe a situation which is contradicted by experience in Oregon.

Line 3 "Unfortunately, most of these new burners are small, so a large industry would either use several of them or revert to the old-time wood furnaces. These . . . would revive a technology of 50 years ago."

1. SIZE. The Department of Environmental Quality has noted that a wood-fired paper products firm tends to install the largest wood-fired boiler available to meet its needs, rather than several smaller boilers.

a. Two large pulp mills in the Willamette Valley each installed a single wood-fired boiler in order to retire oil-fired boilers. Each was installed in 1975, has a steaming capacity of 150,000 lb/hr at 600 psig. Each has primary and secondary particulate emission controls.

b. A wood complex near Roseburg is installing a sixth wood-fired boiler with a rated capacity of 250,000 lb/hr of 600 psig steam. It will be the largest wood-fired boiler in Oregon and will assist the plant's other wood-fired boilers in generating over 40,000 kW.

c. A small wood products firm in Klamath Falls built a 28,500 lb/hr, 350 psig wood-fired boiler of modern design, then placed their Natural Gas/Residual Oil boiler on standby in 1975.

d. A Leveque firm did the same as (c), with a 24,000 lb/hr, 150 psig boiler.

2. TECHNOLOGY. While wood-fired boiler technology has not advanced as fast as coal-fired, neither has it stood still for 50 years. It is suggested that Bonneville contact the following firms who install or own the latest in wood-fired boilers:

- Wellons, Inc., Larry Wellons, Pres., Sherwood, OR, Phone (503) 625-5131.
- Bumstead-Woolford Co., Wayne Wagner, Portland, OR, Phone (503) 232-5171.
- Roseburg Lumber Co., James W. Pratt, Dillard, OR, Phone (503) 679-8741.
- Publishers Paper Co., Z. Rozyczki, Newberg, OR, Phone (503) 538-2151.

On Page IV-194, the burning of wood biomass is discussed. It does not include Meyerhauser's latest studies, summarized by:

Robert L. Jamison, Director, Energy Management Group, Meyerhauser Co., Tacoma, Washington.

In a presentation to the Pacific Northwest International Section of the Air Pollution Control Association at their March 18, 1977, Spring Specialty Meeting.

On page V-27, Figure V-3, the "Chimney or stack" should come last - with the "Stack Gas Cleaning Equipment" before it.

Part I

V. On page V-89 the adverse effects of 20,000 MW energy parks are listed. Mitigating factors could be listed here. Through much of its length, the Columbia River flows through sagebrush covered wasteland or deep canyons of lava. Many energy parks could be sited in these wastelands. The sites of Pabla Springs and Carty could be mentioned, besides Hanford on pages V-91-92, and West Roosevelt, V-92-93.

On page V-106, an air storage system is described. This system is presently in use on some of the Puget Sound ferries. It is very small, and is used only for starting; but it is in use. This could be mentioned to increase the credibility of this description.

On pg. V-223, the summary for biomass contains several statements which are misleading. Line 5 would be more exact if, instead of "such as sawdust and wood chips," it read, "such as bark and other wood wastes." Sawdust is used to make particleboard. Wood chips are pulped; they are rarely burned.

The next sentence implies that wood-fired boiler systems need development. Prototype systems are mentioned in line 8. This is a misconception. Wood products plants in Oregon very often generate power; others used to, but have been retired because of low cost Bonneville power.

Consult Oregon's Department of Energy or Department of Environmental Quality (P. Bosserman 229-6278) for lists of known wood-fired steam-electric plants in Oregon.

Part 1, pg. V-251, Table V-56:

CO₂ is not considered a pollutant in any other source, so it should not be added in here.

Part 2, The Role of BPA

X Unavoidable Adverse Impacts

A. Power Acquisition

Pg. II-4, effects of nuclear plants are discussed. Comment: Why are the effects of coal-fired-steam-electric air pollution left out? Neither the Centralia or Boardman plants have SO_x removal scrubbers. The document does not address the unavoidable adverse impact of about 5000 tons/yr of sulfur oxides from each of these plants and from future thermal plants.

XI-13 and XI-14. Under the air quality considerations of long term use, mention should be made of the trace materials found in coal. These are heavy metals, mercury, and radioactive materials. Now they are locked up in coal, buried in the earth. Thermal plants are burning thousands of tons of coal per day, spreading these trace materials over land and air. There they are breathed by man and animals. Plants take up these trace materials when they fall out. What are the effects? What are the materials released?

Appendix A, page II-83, line 7-8, "It usually takes days to bring a large thermal unit from cold standby to full load." PGE-boardman reports to DEQ that a cold start will take 11 hours.

Appendix A, page III-186, line 3, capitalize "Electric City".

Appendix A, page III-150, Table III-21, Isn't there a mistake in the particulate emission figure? The 55,000 tons/yr seems 10 times too high; 5,500 tons/yr or 550 tons/yr would be more believable. PGE-boardman is being designed to emit 478 tons/yr.

Only the major air pollutants are listed here. Are there over 10 tons/yr of chlorides, mercury, cadmium, zinc, lead, etc., etc.? What is the radioactive particulate emission to the air? How does it compare to Trojan?

Appendix C, pg. IV-149, line 5A: "This table shows that, collectively, BPA industrial customers are significant, but not the primary sources of particulate and SO_x in Multnomah County. . . . This judgement is misleading. In the following paragraph on pg. IV-152, more facts are explained to set Bonneville's industrial customers into proper perspective. However, here are the leading particulate and SO_x emitters in Multnomah County:

Rank	Particulate Tons/year	Source
1.	1,873	Reynolds Aluminum, Troutdale
2.	1,601	Motor Vehicles - Light Duty
3.	655	Cargill (grain terminal)
4.	277	Slashburning
5.	188	Motor Vehicles - Heavy Duty
6.	168	L. Greyfus (grain terminal)
7.	154	Publishers Paper, saw mill
8.	150	Agricultural tilling
9.	128	Gilmore Reduction (steel mill)
10.	103	Residential Space Heating, oil
745 sources	7,116	Multnomah County Total 8/3/77

Rank	SO _x Tons/year	Source
1.	1,666	Residential Space Heating, oil
2.	1,216	Gilmore Reduction, steel
3.	735	Panmelt
4.	664	Reynolds Aluminum, Troutdale
5.	462	Comm./Inst. Space Heating, oil
6.	399	Motor Vehicles - Light Duty
7.	345	Shell, oil terminal
8.	204	Motor Vehicles - Heavy Duty
9.	204	Chevron Asphalt
10.	200	Vessels, Sea Going
745 sources	5,313	Multnomah County Total 8/3/77

What is the primary source of particulate in Multnomah County if it isn't Reynolds? Is it the thousands of motor vehicles, an area source? At any rate, the summary judgements here and elsewhere in the other volumes had better watch their language in describing air pollutants from Bonneville's industrial customers, who rank first in particulate and third and fourth in sulfur oxides in Multnomah County. Aluminum plants are among the worst polluters in the Pacific Northwest; any summary which attempt to whitewash or mitigate this fact is doomed because it is so obvious that all aluminum plants are a major source of air pollution.

Mr. Francisco P. Hernandez, Jr.
1221 E. Lander
Pocatello, Idaho 83201

Mr. John E. Kiley
U.S. Department of Interior
Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

Dear Sir:

I have read the draft environment impact statement for the proposed ALUMAX, aluminum reduction plant, and offer the following comments

The statement appears to cover most of the important aspects and impact of the proposed ALUMAX plant. I especially was interested in the section on unavoidable social impacts. I strongly agree that the influx of an estimated 4,650 people would undoubtedly produce unavoidable strains on the community; in essence, I think the population of Umatilla County and the surrounding counties are prepared to meet the outcome of demands. I find it quite difficult to actually decide whether the ALUMAX plant is feasible or not for the environment and the community of Umatilla County, and Benton County for that matter. Certain issues in the EIS are quite vague. For example (II-28, Line 14-18):

At present, ALUMAX has not reached a decision related to a processing facility... this facility would be an expansion of an existing alumina unloading and storage facility on the Columbia River or the construction of a separate facility.

It seems to me that once construction is completed, and processing proceeds that expansion would inevitably be logical. I find that since this is only a draft statement, a little effort should be made to elaborate on the word "expansion." I think this statement raises a

couple more questions which concern me: Would the Bonneville Power Administration agree to power such an expansion? and, in terms of environmental safeguards: Would the widening of the Columbia River be in question?

It is obvious that all species of animals mentioned in this statement will be in one way or another affected. I take pride in saying I am concerned about all Wildlife survival, but I am mainly concerned about Homo-Sapiens. I guess what I am preparing to ask is: Is there any air control system that has the capacity to treat SO₂, CO, and CO₂? (P-7 #53) I understand these gases are considered dangerous to the environment, and are probably the most abundant pollutants in the atmosphere at present. In addition, it is unclear what is intended to be done about these gases. (P-9 #6)

While 165 acres used for ALUMAX may not threaten the extinction of the mentioned species who inhabit the area, it must be emphasized that the abundance of pollutants both in the atmosphere and in the water does decrease their chances for survival. ALUMAX will definitely release pollutants in the atmosphere, but how the wastewater will be treated remains unclear at this time.

Finally, there should be a more definitive statement concerning alternative control plans should the vaguely proposed system fail to meet environmental protection specifications.

In conclusion, even if the equipment meets the proposed specifications, there is the possibility that the ambient air standards will be exceeded. If this occurs, what is the proposed strategy?

If you could answer these questions, I would appreciate it. Thank you.

Sincerely yours,

Francisco P. Hernandez, Jr.
Francisco P. Hernandez, Jr.

-2-

Dear Sirs:

In reviewing the draft environmental impact statement on the Alumax Plant, I would like to look at its relevance to the guidelines issued by the CEQ and by the Department of the Interior along with general comments upon its contents.

As you are aware the CEQ relies upon seven guidelines which spell out what an environmental impact statement is to deal with. I have found this draft statement to meet in all aspects the requirements of the CEQ guidelines. The technical data provided gives a very accurate idea of the impact of the plant upon the area. All angles and areas of concern are covered and documented. The impact upon the environment is discussed and the effects laid upon the table. It is admitted that damage will occur, especially to ponds upon the site, (160 acres) because of fluoride buildup over a long period.

I was quite impressed with the handling of sociological and economic impacts upon the area. Again all facets of impact are studied and results indicated. The statement explains that their indeed will be problems with education, water, sewage, housing and recreation. Studies were conducted upon secondary employment, effects of increased population and economic stimulus resulting from the plant.

It was explained in the draft that the newest types of pollution control devices were to be utilized. Details such as historic findings, handling of threatened or endangered wildlife species and destruction of water fowl habitat was also covered and examined with adverse affected noted.

Lastly, the alternatives were listed and discussed. The main alternative deals with a change in location of the plant. It was found that the second area would receive much more damage environmentally than the Umatilla area. Again all facets of the second area were examined both of environmental concern and socio-economic impact of the plant upon the people and economy of the area. There were certain problems with the second area which were examined and considered, such as difficulty in obtaining power, and the comparison drawn between the Umatilla area and this second area demonstrated the advantage of the first or primary site.

The only question I have concerning the alternatives is that in Number 2, "Alumax Plant Located Outside Region", seems a bit vague. My question lies in what other areas are being or might be under consideration for location of the plant. Secondly, why is the Alumax plant to be built in the Umatilla area? It seems that the Umatilla area is the best, at least environmental damage is less there than in the Warrenton area, but were any other areas considered? No indication is given and so the question seems to have some relevance.

Lastly, and something which I feel is an important point to consider, is--why should the plant be built? In considering what affect a proposed action of man has upon the environment we must look at our reasons behind such an action. Is the action needed? Or are we just engaging in it because the American ideal of "bigger is better" and expansion of our economy means more plants and factories. It is my opinion that such uncontrolled growth is foolish. In some ways it compares to the uncontrolled growth of our cities expanding in every direction much to the detriment of the city itself.

In looking back over this EIS that remains the one big question in my mind--what is the need for such a plant. After all, its affects will be felt on such important areas as water which as the EIS pointed out is a problem because the existing system can't handle it. Also housing is a problem. The communities involved are going to experience growth, how will they handle this affect upon housing and the schools which was another problem listed. What plans are there to handle the influx of children?

Were the people of the area asked if they wanted the plant and all its impacts and affects? The question of why is the central point of this better with all the other problems--education, water, recreation, etc. being products of this central question? In format and information the EIS seems totally complete leaving little room for questions and compliments the researchers and compilers involved, but there are questions which I would like to see answered. My doubts are raised when such vital questions as how are they going to get more water and improve the educational system are not answered.

Respectfully,

Kevin Saderup
Kevin Saderup
32 Colonial Hall
ISU, Pocatello, Idaho
83209

KS/mdh

Idaho State University
Pocatello, Idaho
December 12, 1977

Bonneville Power Administration
Environmental Office - SJ
P.O. Box 3621
Portland, Oregon 97208

Dear Sir:

I would like to submit the following comments in response to the draft Environmental Impact Statement (EIS) on the Alumax primary aluminum reduction plant, to be located at the Port of Umatilla, Oregon.

The draft EIS appears to comply scrupulously with the requirements of the National Environmental Policy Act and all other applicable government standards and guidelines for a draft statement. The consideration of alternatives in the statement appear to adequately explain the advantages and disadvantages of the site at Warrenton and various means of providing power to the proposed facility at Umatilla. As a novice in reviewing these statements, however, I was surprised to see that there were only two locations under active consideration for the proposed Alumax Plant.

It is true that the Guemes Island, Port Washington, and Bellingham areas in the state of Washington have all been rejected for one reason or another. The Reedsport, Oregon, and Warrenton, Oregon sites have also been rejected. What inhibits the BPA or other groups and individuals from submitting other areas for consideration even if circumstances don't allow massive examination of their suitability?

The draft EIS contains several deficiencies. There is inadequate consideration given to emergency services (page III-54). What is meant by "localities" served by ambulance service? How much of the impact area and population is adequately covered or poorly covered? Is a rating system available? In Chapter IV there also needs to be a better analysis of the inter-relationship between existing employment patterns and the Alumax generated employment. Will Alumax create jobs that allow small farm families to keep their property and slow the changes toward larger more mechanized farms? Updated employment information was also lacking. Could information more recent than that from 1975 be provided in the tables on pages III-62 through III-67?

In considering the disadvantages of the proposed plant at Umatilla, I discern one problem that may not be readily apparent in the statement. The area's governments are not prepared to adequately manage the problems that will be caused by Alumax. There are sixteen school districts for Umatilla County's 48,000 people. Burdens and benefits aren't going to be shared equally. Local fire and police services are already strained in some areas. Com-

prehensive planning around the Alumax site was not completed in time for the draft EIS. Will it be done correctly by the time Alumax begins production?

Alumax has definite advantages. It is close to electrical generation facilities. There would be economies of scale. The plant is close to a port that can be easily expanded. The plant would meet environmental requirements set forth in Oregon's specific standards on aluminum plants. Added stability would be contributed to electrical use patterns. Landscaping of the plant will be required if it is built.

The decision of whether Alumax's plant is built belongs to the people of the affected area and the Bonneville Power Administration. In making this choice, I remind the decision-makers that the area will enjoy substantial growth and employment opportunities without Alumax. Many other large facilities are likely to be built. They will make substantial contributions to the economy of Umatilla and Morrow counties.

I have appreciated the opportunity to comment on this issue.

Respectfully,


Shaun M. Maxey
Idaho State University
Pocatello, Idaho

SM/mdh

Page 2

12 December 1977

Bonneville Power Administration
Environmental Office-SJ
P.O. Box 3621
Portland, Oregon 97208

Gentlemen:

In reviewing the Alumax Environmental Statement I found it difficult to justify to myself its simultaneous review with the Role Environmental Impact Statement for the Bonneville Power Administration. It was stated in the introduction of the Alumax EIS that the Role EIS was prompted by the writing of the statement concerning the proposed aluminum reduction plant. However, the review of the role of the BPA in the production and distribution of electric power in the Northwest may lead to significant changes in BPA policy and structure. Until the Role of the BPA has been decided, it would be unwise to consider service to new BPA customers. The concurrent review of the two environmental statements would seem to give the builders of the proposed plant an unfair advantage. Since the Role EIS has more far reaching effects, the public officials and private citizens who are interested enough to review EIS's and attend hearings are likely to spend most of their time with the Role of the BPA. Therefore, the Alumax EIS will not receive the scrutiny it deserves and may be approved with significant defects or disapproved without just cause. Also the changes which may occur in the BPA as a result of the hearings and comments received on the EIS may make the proposed plant impractical, particularly if the result is an increase in price or a decrease in the availability of BPA produced power. I would recommend that any decision on the Alumax proposal and EIS be postponed until the final EIS on the Role of the Bonneville Power Administration is approved.

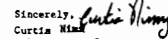
In the EIS itself (IV-101,102) an attempt is made to present the impact of the consumption of the aluminum. Aluminum is said to be "...in many cases, more economically efficient than alternatives (IV-101, line 31)". However, no figures or examples are given to support this contention. This omission is even more significant since later on in the same section the fact that aluminum is extremely electrical-energy intensive is mentioned. The economic efficiency

may only be an artifact of the low price of the electric power in the Northwest which is mainly hydroelectric power. If thermal generating plants are built to meet future electricity demand, by BPA or others, the price of electric power will rise and aluminum may no longer be economically efficient. Also the ability of aluminum to be substituted for wood, steel, copper is purported to be an advantage of producing more aluminum. A product which can be substituted for another also competes with that product. Since the copper industry is extremely depressed at present, it would not seem to be advised to make a questionable increase in a competing industry. Further, wood is a renewable resource while aluminum is only recyclable and not renewable and the production of aluminum is likely to require large amounts of other nonrenewable resources (coal, uranium) to be consumed in producing electricity in the future. One of the major issues confronting people today is how to slow the depletion of nonrenewable resources.

One of the major uses of aluminum is for beverage containers. This was not even mentioned in the EIS even though it is the most noticeable use of aluminum. The possibility of laws making all beverage containers returnable would decrease the need for aluminum by making aluminum cans uneconomical. Again the writers of the EIS have skirted a significant impact of the plant by not mentioning the aluminum industry's connection with the beverage container industry and not considering the competition of aluminum beverage containers with those made of glass.

Another major weakness of the EIS is the discussion of alternatives. All alternative except the alternate site at Warrenton were discounted as impractical with little discussion. Those alternative involved other sources of power which are not practical. The general impression gained from the discussion of the alternatives is that no other alternative exists but the present proposal. Since the proposed plant must rely on the continued supply of inexpensive electricity from the BPA which is not guaranteed past 1986, the economical operation of the plant is not likely and the closure of the plant in 1986 is a definite possibility. The best alternative is to not build the plant.

In conclusion the concurrent review of the Alumax and Role of the BPA EIS's is unfortunate because the Alumax proposal may be overshadowed by the greater importance of the Role EIS. The Alumax EIS is inadequate in that it fails to justify the proposed plant by showing that the advantages of the proposal outweigh the disadvantages and that proposal is the best alternative. Since the major reason for building the plant is the source of inexpensive power from the BPA and that power is not guaranteed past 1986, the plant is a marginal proposition at best and should not even be constructed.

Sincerely, 
Curtis Mink
139 S. Grant #203
Pocatello, Idaho 83201



DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 8070
PORTLAND, OREGON 97208

NPDPLE-ER

ORIGINAL FILE COPY	
No.	DEC 28 1977
Referred To	A
Action Taken	FILED
DATE	DEC 28 1977

Mr. Donald P. Rodel
Administrator
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Dear Mr. Rodel:

This is in reply to your letter dated 7 September 1977 requesting comments on the Draft Environmental Statements, "The Role of the Bonneville Power Administration in the Pacific Northwest Power Supply System" and "The Alumaax Statement."

The Role Statement is an impressive document that, in final form, will surely be used as a standard reference source in the Northwest for years to come. The Statement seems thoughtfully organized and generally quite readable. It is true that the complete work is voluminous but we recognize that the material needing to be covered to the level of detail demanded by the NEPA required the size involved. We felt the coverage was appropriately thorough and generally well balanced.

The Corps of Engineers' projects that are in the Federal Columbia River Power System were authorized as multipurpose projects of which hydropower is only one function. We, therefore, must take into consideration purposes other than power generation when scheduling the available water in the river system through our projects. Our projects are planned, constructed and operated in cooperation with the States and other Federal agencies to provide for maximum utilization of the resource. Further, Congress has directed that in those areas lying wholly or in part west of the ninety-eighth meridian, any such uses must not conflict with any beneficial consumptive use, present or future. Certainly one of the most common consumptive uses from the Columbia River system is irrigation. Accordingly, in our long-range planning studies we must assume that this policy will continue.

NPDPLE-ER

Mr. Donald P. Rodel

22 December 1977

Although many major acceptable hydropower sites have been developed, there still exists a number of undeveloped storage and hydropower sites. As the value of power increases we feel it is realistic to assume that additional projects will be constructed.

The subject of provisional drafting of our storage reservoirs needs additional discussion between us. At present, there is no definite agreement on this subject.

Our only comment on the Alumaax draft statement is that we believe the discussion of the alumina bulk facility on Page II-28 of the subject document should be expanded to discuss the navigation impacts that would occur if such a facility were constructed.

Inclosed are comments on specific sections on the Role Statement for your consideration.

Sincerely yours,

[Signature]
Executive Assistant

Incl
As Stated

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CORPS OF ENGINEERS, NORTH PACIFIC DIVISION COMMENTS, RPA DRAFT EIS
"THE ROLE OF THE BONNEVILLE POWER ADMINISTRATION IN THE PACIFIC
NORTHWEST POWER SUPPLY SYSTEM"

A. Part 1

- Chapter IV, Section A: The Pacific Northwest Utilities Conference Commission, West Group Area Load Forecast is discussed extensively in this section. However, a table showing the forecast (1977 to 1997, peak demand and average demand) is not included. Such a table would be useful.
- Page IV-64. We suggest that Table IV-6 be expanded to include the Northwest Energy Policy Project (NEPP) and Natural Resources Defense Council (NRDC) electrical energy forecasts for the Pacific Northwest Region. Also, a graph showing the different forecasts and growth rates over time would be useful for a quick comparison.
- Page V-10. Ben Franklin Project is not currently under study. If navigation to Wenatchee was authorized, a navigation lock would be required at the Rock Island Project.
- Page V-11, Line 14. Status of Strube project should be added. Pre-construction planning of the project by the Corps of Engineers is under way to confirm economic feasibility and determine optimum project development.
- Page V-12, Lines 36 & 73. We suggest that "The proposed . . . of a powerplant" be replaced with the following: "Feasibility studies reported on in 1968 proposed the installation of a powerplant."
- Page V-13. Replace first two paragraphs with the following: "More recent studies have been concerned only with provision of power facilities at Lucky Peak, with a five unit installation totalling 75 MW appearing to be engineeringly and environmentally acceptable and economically feasible."
- Page V-18, Lines 31-37. The Columbia River Treaty has not resolved all the regional flooding problems. The Corps' Columbia River and Tributaries Studies are inventorying new project sites to provide additional flood control storage and the potential for carryover storage to help power and irrigation during droughts.
- Page V-18. We suggest deleting the paragraph starting with Line 39. The passage appears to be inconsistent with the Corps' EIS study efforts. It is a misconception that the Corps will not sponsor new hydropower projects. We are now planning studies to review feasibility of hydropower and reservoir storage development and may seek Congressional authorization for construction.
- Page V-24, Lines 43-49. It appears that some words or additional discussion is missing because the paragraph discusses only added units at existing projects without reference to potential new reservoir storage and power dams.

B. Part 2

- Page VII-25, Lines 27 & 28. Suggest deleting the sentence starting with "Energy" since there are environmentally acceptable hydropower sites that are not feasible at the present time because of current power values.
- Page VII-36, Lines 29-31. Delete Lines 29-31 and replace with the following: "Electric system at the present, the remaining potential hydro sites will not supply all of the future needs. Accordingly, other forms of generation will be necessary to meet regional . . ."
- Page VII-39, Line 47. Suggest inserting "largely" following the word "depends." As presently written this sentence gives the impression that all future power development would be thermal. There are still hydro-power sites that can be developed.
- Page VIII-9. Figure VIII-4 would be more useful if it was updated, and possibly expanded by dashed or ghosting-in authorized future expansion, particularly at McNary Project.
- Page VIII-20, Lines 25-35. This paragraph should be revised as follows with respect to cultural resource impacts at Bonneville Project. "One known archeological site will be destroyed in the tailrace of the new powerhouse. A mitigation agreement for this site has been signed by the Corps of Engineers and the Advisory Council for Historical Preservation and mitigation activities are in progress at the site. A cultural resource investigation by Cole (1971) revealed no impact on significant cultural sites in the Bonneville Pool as a result of modification of the project for peaking operations."
- Page VIII-22, Lines 40-42. This passage is overstated. It is extremely unlikely that anyone would be swept downstream. The stranding of swimmers and fishermen is a more probable hazard.
- Page XI-22, Lines 33-37. The discussion in this sentence should be qualified to show that although hydropower and thermal power will be used primarily for peaking and baseload, respectively, there will still be some base loading at hydropower projects and some peak loading at thermal power projects.
- Page XI-22, Line 39. Suggest inserting "hourly and daily" ahead of the word "operation."
- Page XI-22, Line 43. Suggest deleting rest of sentence after the word "since" and add the following: "development of all remaining sites would not be adequate to meet the base load needs of the region."
- Page XII-25, Line 13. Suggest inserting this new sentence after "entity." "Such action would require additional legislative action to conform hydropower operation with the present multiple-purpose project authorization."

2

C. Appendix A

1. Page 11-41, Lines 7-13. We suggest inserting after the first sentence of this paragraph the following: "The Corps of Engineers utilizes similar programs in predicting future operation of the system, both on a weekly and seasonal basis using RPA load forecasts, and Cooperative River Forecast Center stream flow estimates. These studies evaluate power and non-power requirements and serve as input to RPA's weekly operating plan as well as confirmation of its implementability."

1/ RPA forecasts for the mainstream Columbia River and major tributaries are utilized for most operations planning studies.

2. Page 11-48, Lines 12-14. The referenced sentence contains incorrect information and should be deleted. The following comment provides the correct information.

3. Page 11-48. Suggest the following be added beginning on Line 21.

a. Simulated system studies showed that cyclic reservoir refill was decreased by the total provisional draft about 251 of the years, that is, in those years when runoff was in the lower quartile. Additional drafts of 2-5 feet would be sustained in August at least 50% of the time.

b. Although provisional draft in itself does not affect summer elevations substantially, the Federal reservoir parties are reluctant to consummate an agreement with RPA due to an uncommitted policy for shaping reservoir drafts under the Coordination Agreement. The combination of these two factors, it was felt, would provide for summer drafts far in excess of what is current operating practice and that which was defined for the public when the projects were first authorized.

4. Page 11-76. It appears that text material is missing following this page.

5. Page 11-80. Suggest that the last paragraph be deleted as it is redundant to similar discussions in same section.

6. Page III-2, Line 4. Mid-1980 minimum hydro generation is not expected to decrease significantly over 1975 conditions. However, the peak output and rate of change in generation are expected to increase. That is, existing practices of providing a minimum base hydro generation will be continued in the mid 1980's to insure minimum flows for multiple purpose uses and due to machine limitations at some of the projects. That is, some plants cannot physically reduce generation to zero output.

7. Page III-6, Lines 15-16. The last sentence should be revised to indicate that there are studies that reflect the impacts of Canadian diversion on Libby Project.

8. Page III-13, Line 51. We suggest changing "Service" to "service for short periods. . . ."

9. Page III-42, Line 39. Suggest changing "exceeded" to "exceeded or approached. . . ."

10. Page III-63. The problem with the analysis concluding on page III-63 is that it assumes a balanced load/resource condition and ignores the affect of load shaping permitted in accordance with provisions of the Coordination Contract. Inasmuch as there is no official RPA policy with regard to reservoir operations to accommodate these two conditions, the results presented (the impacts) are inconclusive.

11. Page III-67, Line 21. Suggest that to provide correct runoff value the figure "15" be changed to "13.4."

12. Page III-140, Lines 38-40. Our shipping records for the Lower Columbia River indicate that the primary reason for the increase in tonnage between 1960 to 1974 was the increase in shipping timber products consisting of logs and wood products.

13. Page III-187, Lines 16-32. The discussion on Lost Creek Lake Project on the Rogue River is not current. The project has been closed, filling of the reservoir is in process and both generating units tested and on the line. This discussion should be moved to Section A-4, Existing Federal Facilities.

14. Page III-187, Lines 39-44. The discussion of impacts on archaeological sites downstream and upstream of Bonneville Dam is incorrect. This paragraph should be revised to contain the same information provided for Part 2, Page VIII-20, Lines 25-35.

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Oregon Rare & Endangered Plant Species Task Force

536 Avenue Road - Lake Oswego, Oregon 97034 - 503/636-4633

October 5, 1977



Bonneville Power Administration
Environmental Office - SJ
P.O. Box 3621
Portland, Oregon 97208

Gentlemen:

Re: Alumas Environmental Statement

I have reviewed Section d, Endangered and Threatened Flora and Fauna, pp. III-8 and III-9 of the Alumas Environmental Statement, and have the following comments regarding the plant species listed:

Eriogonum chrysops is now considered to be endemic to Stearns Mt. by Dr. Reveal, who recently reworked the genus, and therefore would not be expected to occur on the site.

Allium pleianthum is being found from Forest, Wheeler County, to Jordan Valley, Multnomah County, but seems to prefer clay to sand, and the sites reported are well south of the Columbia River.

Arenaria franklinii var. *thompsonii* - yes, it may be on the site.

Chamaecrista - no, this species is endemic to the John Day Valley

Draba douglasii - yes, it could be on the site.

Eriogonum thymoides - yes, it could be on the site.

Lomatium hendersonii occurs in Oregon in the John Day Valley-Painted Hills area and therefore would not be expected to occur on the site.

Silene acaulis var. *scabra* - yes, it could be on the site.

I have researched our Rare and Endangered Plant Project files for species which may be on the Alumas site. Enclosed is a list of species collected in TSN R28E, the site township, which therefore are very likely to be found on the site and a list of other Columbia Basin species which occur in similar habitats and may be on the site.

The Alumas site should be searched for all of the species noted, but especially for *Astragalus douglasii* var. *douglasii*, which is known only from the type collection made in 1893 by Douglas of the "Group Road of the Oregon (Columbia)". As we have no other herbarium information for this species and its botanical participation in the Oregon Project has reported it, this plant is considered to be very rare if not extinct. If assistance with the fieldchecking is needed, I would recommend you contact Karl Urban, Professor of Botany at Blue Mt. Community College in Pendleton. He has been participating in the Oregon Project and is very knowledgeable about the rare and endangered plants in this area.

cc: Karl Urban, Blue Mt. Comm. Coll.
Duane Arnold, USFWS Reg. Off., Portland

Sincerely yours,
[Signature]
Chairman, Oregon Task Force

X-159

REPORT ON THE RARE, THREATENED AND ENDANGERED PLANTS WHICH MAY OCCUR ON THE ALUMAS PLANT SITE*

Compiled by Mrs. Jean L. Siddall
Director, Oregon Rare and Endangered Plant Project
October 1977

Species collected in R28E TSN which therefore are very likely to occur on the Alumas site:

Species	Sites reported in R28E TSN	General Range
<i>Allium robinsonii</i>	Columbia River near Umatilla	Columbia River, Vantage, Wn. to mouth of John Day R.
<i>Allium schoenoprasum</i>	Umatilla (only Oregon site known)	Along Columbia R., from Canada to Umatilla, Ore; now largely exterminated behind dams.
<i>Astragalus collinus</i> var. <i>laurentii</i>	3 mi. north of Hemiston	Known only from Morrow and Umatilla Cos., Oregon
<i>Astragalus howellii</i> var. <i>aberrans</i> (A. misellus)	1/4 mi. east of Umatilla Bridge	Pasco, Wn. to the John Day Valley, Oregon
<i>Astragalus succumbens</i>	Banks of Umatilla River 3 mi. above mouth; sandy hills near Umatilla	Umatilla and Gilliam Cos. to Klickitat and Grant Cos., Wn.
<i>Artemisia lindleyana</i>	Umatilla	Along Columbia River, from Vancouver east to Idaho.
<i>Camissonia pygmaea</i>	Umatilla	John Day Valley to Wn.

The following plants have been collected from the northern Gilliam, Morrow and Umatilla portions of the Columbia Basin physiographic province and therefore could also occur on the Alumas plant site:

Species	Range	Specific sites known
<i>Allium douglasii</i> var. <i>douglasii</i>	Columbia Basin to Blue Mts.	(Umatilla River Canyon, Pendleton Area.)
<i>Arenaria franklinii</i> var. <i>thompsonii</i>	Along Columbia River, Gilliam and Morrow Cos. (7 Umatilla)	(6 mi. east of Arlington)
<i>Astragalus arthurii</i>	Umatilla and Wallawa Co. to Astor Co., Wn. and Ida.	(sw. of Pendleton on rd. to Heppner)

* Species on the Provisional List of Rare, Threatened and Endangered Plants in Oregon, Jan. 1977
† Species listed as Threatened by the Smithsonian Institution; published in July 1, 1975 Fed. Reg.
‡ Species proposed for Endangered Status; published in the June 16, 1977 Federal Register.

L-49

X-200

Columbia Basin Species which could also occur on Alumax site - continued

Columbia Basin Species which occur in Oregon		
<i>Astragalus howellii</i> var. <i>howellii</i>	Dry plains, Columbia River east of the Cascades	(sw. of Pendleton; 5 mi. from Boardman)
E <i>Astragalus kentrophyta</i> var. <i>douglasii</i>	Known only from type collection -	"Great Bend of the Columbia River"
<i>Astragalus tweedyi</i>	Sagebrush plains along Columbia River, n.e. Oregon to Washington	(Arlington)
<i>Bolanderi oregonia</i>	Northern Oregon and southern Washington chiefly along the Columbia and Snake Rivers.	(Bingham Springs area; Columbia River Gorge)
E <i>Calliandra macrocalyx</i>	Local in Gilligan and Melther Cos.	(near Lonerack; near Cottonwood)
<i>Cryptantha leucophaea</i>	Along Columbia River, Wenatchee to the Dalles	(near Willows)
T <i>Dodecatheon poeticum</i>	Banks of Columbia River and lower Deschutes R. to Yakima Co, Wn.	(Arlington)
T <i>Draba Douglasii</i>	Sagebrush desert, s.e. Washington to s.e. Oregon.	
T <i>Eriogonum thymoides</i>	NE Oregon to Wn., Idaho.	(Baker and Union Cos. to Klickitat Co., Wn.)
T <i>Lomatium laevigatum</i>	Along the Columbia River, Wn-Ore	(Columbia R. at Grants; Meacham (Meacham; near Lonerack; Type loc. = Rock Cr., Morrow Co.)
E <i>Lomatium minus</i>	Basaltic "scablands" on open plateaus, e. Ore.	(near The Dalles; Squaw Cr., Umat. Co.; Lewiston, Idaho)
<i>Lomatium salmoniflorum</i>	N. Wasco Cos. Snake River, Wn. Oregon, and Ida.	
<i>Lupinus sericeus</i> var. <i>egglestonianus</i>	Presently known only from Sherman Co.	
T <i>Mimulus jungermannioides</i>	Columbia River and south along the Deschutes	(west of Rieth)
<i>Ribes corymbosum</i>	Umatilla Co. to se Wn. and Ida.	(Banks of Umatilla River near Pendleton - Type locality)
<i>Ribes litigium</i>	Extreme ne. Oregon to Wn.	(East of Ukiah)

T <i>Rorippa calycina</i> var. <i>columbica</i>	Known chiefly from se. Oregon, however Type Locality is Bingen, Elklickat Co., Wn.	
T <i>Silene scaposa</i> var. <i>scaposa</i>	NE Oregon, Gilliam and Wheeler Cos. to Blue Mts.	(near Ukiah)
<i>Tonella floribunda</i>	Snake River and tributaries	(Wallula Gap)
T <i>Trifolium pilosum</i> var. <i>alpinum</i>	Umatilla and Wallawa Cos. to Wn. and Ida.	(Ukiah; s. of Milton-Freewater; e. of WallaWalla)



DEPARTMENT OF BOTANY
(408) 254-2722

Mr. John F. Kiley
January 25, 1978
Page 2

the tunnel vision displayed in these BPA EIS's was intentional, serving to emphasize the paradox of an agency that was charged with promotion and sale of a resource which is in short supply and attempting to assess in a non-biased manner the consequences of the promotion of energy consumption.

My first intention was to review the deficiencies of these two documents as regards biological impacts. It soon became apparent that this would require preparing a document of approximately equal in volume to the largest volume of the AIAWES EIS. My next thought was to focus on the deficiencies as regards the impacts on terrestrial insects. Again, the task appeared to be monumental and right at the limit of my capabilities. I was not to be deterred, however. It was fully the obligation of the agency preparing the EIS to take into great detail reviewer. While I did not expect the EIS to make any role to take into great detail concerning each and every impact, I did expect to at least find an acknowledgment of significant impacts and references to more intensive treatments of these topics. However, as regards a site specific EIS such as the AIAWES EIS, this glossing over of impacts is unconscionable.

The AlumaX ES, thus glossing over the impact of the AlumaX on the terrestrial fauna other than birds, mammals, amphibians, and reptiles. The authority contend that air, birds, mammals, amphibians, and reptiles would affect vegetation immediately emissions of sulfur dioxide from the plant site. The authority contend that the Umetilla plant site "but not off the AlumaX property boundary." However, grasses around the plant site are expected to accumulate fluoride to concentrations above 40 ppm within 100 feet of the plant site. The authority contend that the plant site, within the plant boundary, they are "not expected to be affected by fluoride uptake." Granted, the plant site is not legally owned by the AlumaX, but the authority contend that the plant site is legally (option A-3,000 acres; option B-1,100 acres), but do not state the date in vegetation to expect anyone to believe that the plant site is not a "natural area" and not expected to be fluoride accumulative in biological systems outside the plant site boundary or that the smaller animals would not form part of the property? They are building a fence on the other side of the fence.

Not only does the Alumax ES contain a superficial or totally lacking coverage of biological impacts, it provides so little information that anyone attempting to identify impacts which were not discussed, for the most part, cannot obtain enough information from the document to know what might have been left out.

Having reviewed in their entirety both the Aluma EIS and the BPA Role EIS, it is evident that neither document provides "basic environmental information" for future BPA decisions such as service to Aluma (Aluma EIS, I-1, 1977). This is not surprising in light of the charge that Congress initially gave BPA administrators to "use the widest possible use of all electrical energy resources." Given the current shortage of energy resources in the U.S., the role certainly would appear to be outdated, and either BPA administrators must ignore the Congressional charge or they have to ignore the impacts of electric generation and energy utilization. The potential impacts of electric generation and energy utilization such as by the Aluma aluminum plant, especially those with biological impacts, were examined in an "unscientific, biased, and self-serving" manner, in other words biological problem, yet environmental pollution is essentially a biological problem, which in turn may have health, socio-economic, and other impacts. Perhaps,

For example, nowhere does the ES mention honeybees. Examination of the list of agricultural crops within five miles and within fifteen miles of the proposed aluminum plant reveals several crops that are reported to be dependent upon or benefited by insect pollination (see USDA, RRS Handbook No. 496, 1976). Given the agriculture profile of the area, one might expect to find an associated bee industry. I contacted Sharon Roberts, James Bach of the Oregon and Washington apiculture offices, respectively. Both reported that the area surrounding Umatilla supports a viable and sizable bee industry and that this area is one of the most productive in terms of honey

Mr. John F. Kiley
January 25, 1978
Page 3

yield and as a source of bees for pollination services. Exact data is difficult to obtain. Records generally are based on inspection of commercial apiaries which often omit hobbyists and small operations. Also, many of the beekeepers in the area practice migratory beekeeping. Migratory beekeeping is the moving of bee colonies either to follow honey flows or to rent as pollinators to crop growers.

There were approximately 4,000 bee colonies registered in Umatilla county and 5,000 colonies inspected in Walla Walla and Benton counties during 1976. Honeybees from these states produce an average honey yield of 40 to 50 pounds per colony, a rather low production which is a result of moving bees for pollination uses rather than for maximum honey production. However, an Oregon bee specialist estimated production in the Umatilla area to be closer to 75 pounds per colony. J. Bach noted that the largest Washington beekeeper is based in Richland and moves as many as 14,000 bees in and out of the area and often stockpiles 4,000 to 14,000 colonies near Richland. Thus, the number of colonies in the immediate vicinity of the Umatilla site may average around 9,000, but since this area is situated along the main corridor traveled by the migratory beekeepers, the numbers of bee colonies could exceed at any one time 20,000. Each hive and its resident colony are worth \$100 to \$150, so that \$1 million to \$3 million investment may be subject to impact. If honey yield for the area is assumed to be 75 pounds per colony for 9,000 hives (probably a conservative estimate) with a wholesale value of honey of 50¢ per pound, the product has a value of \$337,500. If a yield of 45 pounds per colony (the approximately average in both states) is applied to the number of colonies based in the area, the product has a value of \$450,000. Note that anything damaging to bees or to the plants that they forage would affect production and subsequent income.

Many of these bees are used primarily as migratory pollinators, and those that remain in the area and are utilized primarily as honey producers also contribute to the pollination needs of the areas in which they are located. Thus, pollination value should be considered. This has been estimated to be from 20 to 100 times that of the honey and wax produced. I did not have records of wax production, so I shall use only the value of the honey. Annually, as pollinators, these bees are worth from 50-74 million to \$45 million. These figures may seem high, but the projections are based on conversion factors formulated by two of the nation's experts on bee pollination--S. E. McGregor and F. Moeller.

Bees are bioaccumulators of fluorides and fluoride is toxic to bees. Numerous case histories attest to adverse impacts of aluminum smelters on beekeeping, and I know of several instances where beekeepers have been forced to abandon beeyards located several miles downwind from sources of airborne fluorides. My own work indicates that bees may accumulate fluorides at least as far as 15 to 20 km from a source emitting small amounts of fluoride--a 350 MW power plant equipped with emissions control devices. Also, I found that bees accumulate arsenic near copper smelters, which was not unexpected, but in one

Mr. John F. Kiley
January 25, 1978
Page 5

of the estimates of fluoride accumulation in vegetation of over 40 ppm near the plant. Dr. C. C. Gordon of this laboratory has prepared a comment on the BPA EIS documents, and in the process he recomputed the fluoride emissions based on the tonnage of ore and arrived at an estimated emissions rate ten times greater than that given in the Alumax ES--namely 2,643 pounds per day vs. 256.4 pounds per hour.

Thus, even when the site specific EIS is examined closely, it is evident that the aim of providing the base environmental information for future BPA decisions was not met. Considering the superficial treatment of biological impacts, the obvious question is whether either Alumax or Role EIS documents do any better at assessing other impacts.

As a final comment, the selection of the Umatilla site was justified on the basis of public and strong political preference. I should comment that based only on the beekeeping industry, the Warrenton area would be a better site, since there are few beehives in the area. However, I would not pretend to justify the selection of one site over another on the basis of such a limited criteria. Yet, the statement in the impact document is made that BPA found a number of sites to be acceptable and that the Umatilla site was elected to have the plant at Umatilla or strong feelings against siting the plant elsewhere and on statements by the Governor. The latter may be indicative of political favor, but why such a decision would be made primarily on public siting a plant on public polls and proclamations by the Governor negates the whole concept of an environmental impact assessment.

Sincerely,


Jerry J. Bromenshenk, Ph.D.
Entomologist/Ecologist

JJB/kb

Enclosure:

"Terrestrial Insects Sense Air Pollutants", Bromenshenk, J. J., et. al.,
Environmental Studies Laboratory, University of Montana, Missoula, MT 59801

Mr. John F. Kiley
January 25, 1978
Page 4

case also found elevated levels of arsenic at a site in the plume path of an aluminum smelter. Nowhere does the Alumax ES mention arsenic, so it is impossible to know if this might constitute a problem.

The Alumax ES would have the reader believe that cattle are the most sensitive animal to ingestion of fluoride, and if impacts on cattle are avoided thus so would other animal impacts. But the USDA ARS Agricultural Handbook No. 380 points out that bee poisonings from fluorides were reported near an aluminum plant where no case of fluoride poisoning to cattle was verified, and that of the domestic animals studied, honeybees are the most susceptible to arsenic toxicosis.

An ongoing suit in Montana alleges arsenic poisoning occurred in bees 45 miles from the only identifiable source. Thus, impacts may occur at areas other than those proximate to the source.

As I indicated in the enclosed pre-print, there are verified adverse impacts of industrial developments to a variety of terrestrial insects and insect-host plant relations. Insects are the most abundant form of animal life, including both beneficial and destructive forms, and are important components of ecosystems, food chains, soil cycles, etc.; thus, they should not and must not be arbitrarily dismissed from consideration of impacts. I have presented the case of honeybees just as one example of the magnitude of the potential for ecologic and economic damage. These impacts were NOT even mentioned let alone considered in the BPA EIS documents.

It is not the responsibility of the public to write the BPA EIS. It is the responsibility of the authors not only to present a comprehensive report but also to present the information available to them in an accurate manner. The authors contend that wildlife and domestic fauna have fluoride dietary tolerances above 40 ppm and as such no direct physiological effects are expected, and they reference Suttie. But, Suttie testified in the case of Paul Barcl vs. The Intalco Aluminum Corporation (1972) and in a case by Anderson and other plaintiffs vs. Intalco Aluminum Corporation and Mobil Oil Corporation (1972) that there is virtually no level of fluoride ingestion above which or below which one does not see an effect or change in animals (i.e., cattle). He also states that a trained observer could see discernible changes in animals, particularly in the dentition at levels considerably below 40 ppm. The 40 ppm figure is designed to prevent economic loss; it may not guarantee protection and certainly does not prevent physiological changes. The key is the word "tolerance," and as any physiologist knows, tolerance is affected by a complex interaction of factors and as such is not an absolute threshold. In other words, the dietary tolerance could be lower or higher depending on the condition of the animals, species of animal, other environmental stresses, length of exposure, etc.

Similarly, total fluoride was estimated at 46.8 tons per year maximum emission, which seemed unusually low compared to similar plants and in view



STATE OF
WASHINGTON
400 North Capitol Way, Olympia, Washington 98501
Dale Lee Ray
Governor

DEPARTMENT OF GAME

400 North Capitol Way, Olympia, Washington 98501 206/753-5700

January 30, 1978

Bonerville Power Administration
Environmental Office-SJ
PO Box 3621
Portland, OR 97208

DRAFT EIS: Alumax

Your document was reviewed by our staff as requested; comments follow.

For purposes of environmental review, we feel that the general presentation of your document defeats some of the purposes of an environmental impact statement. Some of the following points are indicative of problems that compound to create certain inadequacies:

- Data which have no background information or explanation in the text;
- Verbosity which tends to provide for more confusion than documentation;
- Selective placement of information in sections in such a manner as to obfuscate;
- Lack of comprehensive organization, which in some cases can lead to misinterpretation;
- Statements that refer to studies which may be inconclusive and;
- Apparent disregard, or lack of knowledge, of studies relevant to the proposal.

Due to the limitation of your document, we are concerned that important issues have been obscured or glossed over. As a result, we cannot readily state that this document adequately allows the reader to understand the proposal's entire implications. More specific points are contained in the following pages.

As we understand (I-2, I-3), BPA's energy contracts with industrial customers must provide full protection to future firm energy capabilities. On p. IV-95 it is stated that, "Supplying the Alumax loads with Federal generation would mean that power from the Federal System would be roughly 18.2% less reliable to BPA's other firm load customers under adverse water conditions and somewhat less (320 MW) available to BPA's other secondary energy customers under good water conditions". On p. VII-2 regarding long-term impacts, it is stated that, "Inasmuch as the Alumax load

U.S. ENVIRONMENTAL PROTECTION AGENCY



REPLY TO
ATTN: MS 623

FEB 17 1978

Mr. John E. Kiley, Environmental Manager
Bonneville Power Administration
Department of Energy
P. O. Box 3621
Portland, Oregon 97208

Dear Mr. Kiley:

We have completed our review of the Alumax Environmental Statement, which describes the environmental impacts of constructing and operating a new primary aluminum plant at Unstilla, Oregon, including the impacts of supplying it with electrical energy from the Federal Columbia River Power System (FCRPS). Our review revealed that a number of the concerns with the preliminary draft of this ES have not yet been adequately addressed.

In order to address these concerns the following information should be provided in the final statement:

1. The description of existing public water supplies (pp III-39 et. seq.) should be expanded to indicate whether each supply meets the Interim Primary Drinking Water Regulations promulgated under the Safe Drinking Water Act. Information on the current compliance status of Oregon water supplies is available from our Oregon Operations Office at (FTS) 423-3250.
2. Table III-7 and III-8 should be expanded to include information for southeastern Washington, which appears to be directly downwind from the proposed site and thus might be one of the principal impact areas.
3. Table IV-5 should state the efficiency of the dry scrubbers.
4. The discussion of fluoride emission impacts on wildlife needs some clarification and expansion. The FES should: (a) indicate whether any of the species bioaccumulate fluorides, (b) discuss impacts on rare and endangered species in the area such as the prairie falcon.
5. The Cold Springs Wildlife Refuge and Rock State Park are Class II areas under the PSD program, not Class I. The discussion at the top of page IV-26 should be corrected to reflect this.

Although the environmental impacts of the proposed aluminum plant may be rather "small," we question the logic of adding another large direct service industrial customer to BPA's clientele at this time. Given that it is extremely unlikely that BPA will be able to continue service to its existing DSI's, unless there are major changes to Federal law and the institutional structure, and that there are forecasted firm energy deficits over the next twenty years, it seems that the appropriate choice would be to defer major increases in connected DSI loads until these loads can be expected to be served without frequent interruptions.

Based upon these comments, we have rated this environmental statement LO-2 (LO-Lack of Objections; 2-Inadequate Information). The date of our comments and this rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, pursuant to Section 309 of the Clean Air Act, as amended.

We appreciate the opportunity to review this statement and would be glad to answer any questions which you may have about our concerns.

Sincerely,

Alexandra B. Smith
Alexandra B. Smith, Chief
Environmental Evaluation Branch

3

6. The discussion of wastewater treatment plants on page IV-27 should indicate whether the impacted plants will still be able to comply with the effluent quality conditions of their discharge permits, without modification.

7. The noise impact analysis should be expanded to discuss the noise impacts of the new substation and whether it will be able to comply with Oregon's noise regulations including the octave band standards.

8. The proposed Alumax plant will have significant impacts on water supply and wastewater treatment facilities. The statement should discuss the role that Alumax will play in mitigating these impacts. Will it help plan water supply expansions and treatment plant modifications and will it help finance the necessary construction?

9. The discussion of Alumax's impacts on the balance of payments appears to be overstated. It does not reflect the fact that one of the principal raw materials will be imported (alumina). The net impact should be much smaller than stated.

10. The ES does not discuss any mitigation measures for reducing the impacts of construction noise. We would suggest that the following practices be required:

- (a) the use and maintenance of properly operating mufflers and quieting devices
- (b) the use of the quietest available machinery and equipment
- (c) the use of electric equipment in preference to gas, diesel or pneumatic machinery
- (d) locating construction equipment as far from nearby noise sensitive properties as possible
- (e) shutting off idling equipment
- (f) limitation of construction hours to coincide with the normal workday period, e.g., 8:00 a.m. to 6:00 p.m.
- (g) scheduling the noisiest operations near the middle of the day and notifying nearby residents whenever extremely noisy work will be occurring
- (h) the use of permanent or portable acoustic barriers around point noise sources

2



United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
PORTLAND AREA OFFICE
POST OFFICE BOX 3168
PORTLAND, OREGON 97208

FEB 15 1978

Mr. John Kiley, Environmental Manager
Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

Dear Mr. Kiley:

This refers to the draft EIS and Planning Report, Role EIS and Alumax EIS (DES 77/21).

The future role of BPA will affect all Indian lands and communities in the service region. However, we find no direct or abnormal impacts that can be isolated or different from other communities in the Pacific Northwest.

We have a concern that the anadromous fishery in the Columbia River is maintained and enhanced allowing treaty Indian tribes to exercise their rights in harvesting the fishery. The following changes and insertions are suggested in Appendix A, Chapter III:

1. In the last paragraph, page III-72, insert the following statement between the first and second sentences:

"From the earliest known times, up to and beyond the time of the treaties, the Indian tribes were primarily a fishing, hunting and gathering people dependent almost entirely upon the natural animal and vegetative resources of the region for their subsistence and culture. They were heavily dependent upon such fish for their subsistence and for trade with other tribes and later with settlers."

2. In section (d) Indian Fishery, the second sentence should be changed and read as follows:

"Historically, Indians gathered at certain favored areas along the river, such as Celilo Falls, and harvested great numbers of salmon and steelhead for food, trading and ceremonial purposes."



L-48

increases the region's firm energy deficit. It reduces the power reliability to BPA's firm load customers under adverse water conditions. This situation would prevail until the region's firm energy deficit is negated. "It appears that Aluma's energy demands could be detrimental to BPA energy capacity, availability and reliability, and may result in adverse impacts to present user industries. To negate the region's long-term firm energy deficit, additional power generation facilities seem necessary. If firm power generation facilities have to be constructed as a result of Aluma's energy demands and the resultant energy deficit, it seems that by provisioning for not yet established industries, BPA is creating an "artificial" energy demand. If BPA meets generation requirements for the energy demands which it proposes, additional environmental impacts will occur, perhaps with great severity. Appendix A of the Role EIS as referred to, does not appear to discuss specifically the environmental impacts that are directly and indirectly attributable to the proposed Aluma's energy demands.

Additional discussion of environmental impacts that would result from peaking and/or installation of additional power generators could be helpful. We are particularly concerned that higher pool elevations for peaking purposes will disrupt valuable riparian habitat. Adverse impact to both existing terrestrial flora and aquatic flora would be reflected in an overall reduction in numbers and species of wildlife. And, though annual fluctuation in the pool may be averaged out, daily fluctuation, will in some cases double. Severe impacts to spawning activities are likely to result if the water level becomes too unstable. Again, such impact would be reflected in a reduction of species and numbers of fish presently existing. Installation of additional hydroelectric power generators, if necessary, could increase kills of anadromous fish.

On p. IV-96 we feel that paragraph 4 may be misleading. It is stated that, "Water must sometimes be released or moved through hydroelectric projects for reasons other than (generation)..." For instance, water may be required downstream to "flush out" portions of rivers with temporary water quality problems or to meet some particular navigation, recreation, or fish requirements". In 1977, the Washington Department of Game and Department of Fisheries were forced to negotiate for spill and flow, as well as truck fish upstream. Maintaining Columbia River fisheries became a very critical and costly operation. It is also stated that, "The Aluma's load would increase generation, thereby reducing spill." Is there connected with this statement an underlying meaning or forewarning that more and more trucking operations will be necessary as a result? Also, if significantly low flows occur, the flow downstream and dilution factors become critical, present sewage and industrial discharge may result in a higher incidence of water quality violations. In this regard, secondary impacts to aquatic life and recreation would result if there are significant increases in biological oxygen demand, carbon monoxide, odor, coliform, bacteria, ammonia, alkalinity, or thermal pollution.

On p. II-1 it is stated that "...the proposed plant already is planned to incorporate the most efficient up-to-date production and pollution control technology." On p. II-62 it is stated that, "While emissions could be reduced by further controls, such

reductions are not appropriate at this time in light of cost and energy use considerations." In one instance it appears that the best pollution control is to be used, but later we notice that more control is possible. Perhaps this dilemma could be resolved/dispelled by correlating quality and quantity of pollution control devices to pollution reduction potential. Since more pollution control appears to be possible, the matter may be deserving of further analysis.

On p. II-23 it appears that waste water from floor cleaning is connected to the plant sanitary sewer system via floor drains. It is noted that these outlets would not be used as process or process machinery drains. However, would there be other pollutants such as detergents, oils, grease, suspended solids or trace metals that might be mentioned? We are concerned about the possibility of cyanides from spent pot entering drainage or sewer systems, and perhaps, indirectly being discharged into the Columbia River. Toxicity levels of cyanides vary with temperatures, dissolved oxygen, and pH of receiving water. Extreme increases of toxicity can occur even within normal pH ranges. Cyanide concentrations between 0.05 mg/L and 0.01 mg/L have proved fatal to many sensitive fish species, and levels as low as 0.01 mg/L are known to have lasting effects on the swimming ability of salmonid fish. Water Quality Criteria - 1972 (EPA R-3-73-033) recommends that no free cyanide concentrations greater than 0.005 mg/L occur in receiving water.

We notice that 32,000 g-d of domestic sewage will be discharged to the Ikatilla treatment plant (p. II-23 and IV-27). On p. III-42 it is stated that, "The sewage treatment plant has reached or exceeded the design capacity". It is mentioned that an interceptor sewer from McNary was scheduled for completion in 1976. We have some difficulty understanding how this would relate to design capacity. More information about the McNary system could be helpful. Also, industrial pre-treatment might aid in reducing impacts to existing sewage facilities and help to maintain effluent standards.

As stated on p. IV-1, we concur that fluoride accumulations are long-term. However, discussion on p. VII-2, of plant induced long-term environmental impacts (pollutant loadings in local air, impacts on water quality, natural systems, etc.) indicates that, "If the plant ceased operation, these impacts, with the exception of those involving land use, would no longer exist." Is this not a contradiction? Perhaps some discussion of fluoride accumulation would be appropos of this section.

Also, on p. IV-4 it is surmised that "Air emissions of sulfur dioxide and fluorides would affect vegetation immediately surrounding the plant site but not off the Aluma's property boundary". Isopleths on pages IV-16, IV-17, IV-18, IV-19, IV-20, IV-21, and IV-22, and attachments H through M indicate a wide and varying range of emission rates that are not always confined to Aluma's property. If vegetation is affected, there is likely to be some indirect impacts on wildlife.

Regarding fluoride accumulations, it might be noted that high concentrations can affect mammalian skeletal structures with fluorosis. Fluoride concentrations as low as 1.5 mg/L have reduced fish egg hatchings, and concentrations in livestock drinking water of 40 mg/L and less resulted in teeth mottling and pitting, progress-

ing fluorosis, aversion to drinking water, and weight loss for cattle and sheep. (Water Quality Criteria 1972, EPA R-3-73-033) and Water Quality Criteria, McVee and Wolff).

In the section dealing with impacts to wildlife and domestic fauna on page IV-4, it is stated that, "Construction activities would have secondary effects upon resident wildlife inhabiting the surrounding plant site. Nesting would be disturbed... These impacts would be minor and temporary". Later (p. IV-27), in the water quality impacts section, we notice that the 9 ponds on the actual 165 acre plant site would be completely eliminated. If these ponds are completely eliminated, fish and wildlife would be eliminated as well. It may be helpful to the reader to include such impacts in the previous wildlife section.

On pages IV-27 and IV-28, we notice that the Oregon Department of Environmental Quality has included a special condition in the Aluma's Water Pollution Control Facilities Permit (Number 2287) stipulating that irrigation water must be protected from fallout of air contaminants. We were wondering what measures would be taken to accomplish this. Also on p. IV-28, we notice that sulfur dioxide reactions with surface water to form acids are not anticipated to "...cause any measurable pH change in the Columbia River since the aquatic buffering capacity is 37 times greater than required to neutralize all of the aluminum plant sulfur dioxide air emissions." We were wondering how this aquatic buffering capacity factor was obtained (studies, references, etc.). Is the Columbia River included as a whole, or would there be small sections or periods when buffering capacity would be low enough to become critical to aquatic life?

A possible impact to wildlife that might be included in your document involves transmission lines. Studies such as, The Impact of a Proposed 500 KV Transmission Line on Waterfowl and Other Birds, by Willard and Associates, indicate that there are measurable kill rates of birds where lines cross aquatic habitat. The McNary area is within a major flyway intensively used by ducks and geese. Waterfowl concentrations of up to 100,000 are present in the general vicinity. Increases in numbers of transmission lines may result in a higher rate of bird kills.

In several instances (pp. III-29, III-61, IV-48, IV-77 et al.) we notice that the primary recipient for economic benefits would be the Ikatilla area in Oregon. However, many of the adverse environmental and economic impacts would be sustained by Washington. A study done by the state Commerce Department at the request of the aluminum industry indicates that aluminum industries provide few jobs compared to other major energy consuming industries. The study predicts, among other things, that the aluminum industry would consume 33.9% of the electric energy, but provide only 2.4% of the state's jobs. This study, dated December 6, 1977, was reviewed by the aluminum industry, but has not to date been formally released for publication. However, some of the study's findings lead us to question the validity of assessing purported economic benefits in regard to environmental detriments as contained in the Aluma's document.

The issue of unilateral power demands on the Columbia River system is extremely complex. The Pacific Northwest Regional Commission hopes to establish a multi-state pact to govern the use of Columbia River resources. Presently, the Washington Department of Ecology is proposing a program for management of the surface waters of the John Day/McNary Pools. The establishment of an inter-state compact covering management of the Columbia/Snake system will be actively pursued. Of number one priority is water use for irrigation and municipal supply, and maintenance of in-stream flows to insure the continued viability of the Columbia River fish and wildlife resources. Because hydroelectric operations already predominate to determine flow rates in the river, further hydroelectric generation is 6th on the list of priorities. Further discussion regarding water resource priorities (irrigation, agriculture, fisheries, navigation, existing water rights, etc.) in relation to impacts from Aluma's power consumption could be helpful.

As we understand, the U.S. Army Corps of Engineers, under the Fish and Wildlife Coordination Act, presently and in the past has been responsible for mitigation and compensation, both monetary and real, for fish and wildlife losses that have resulted directly and indirectly from BPA proposals. Considering that BPA would be one of the foremost in economic and financial gains, could it not be asked that BPA itself provide mitigation and compensation for environmental damages? We realize that in the past BPA has conducted or participated in environmental studies. However, it must be understood that unless "replacement" lands or wildlife enhancement programs are not extensively provided for, no amount of studies will maintain the natural resources of the Pacific Northwest.

Thank you for the opportunity to review your document.

Sincerely,

THE DEPARTMENT OF GAME

Fred H. Maybee
Fred H. Maybee, Applied Ecologist
Environmental Management Division

FHM:bj
cc:Agencies
Regional Manager

3. In the fifth paragraph, page III-101, the following statement should be added after the last sentence:

"In February 1977, U.S. District Court Judge Belloni in his continuing jurisdiction in U.S. v. Oregon approved a five-year management and allocation agreement. This agreement regarding Upper Columbia River fish runs was reached by the parties to U.S. v. Oregon.

Maintenance of instream flow for fisheries and other instream uses are and will be seriously impacted by diversion of water for irrigation. This is also mentioned in Appendix A (Page III-143) which states "Increases in irrigated acreage will further reduce the flow in the rivers with a resultant drop in hydropower production". This also results in more energy being required to pump the water. Significant data which would assist in evaluation of the reduction in hydropower would be to provide projections of anticipated flow reductions due to increased diversion for irrigation. There is a need to establish instream flow levels which would be protected. We suggest that instream flows similar to those established by the Columbia Basin Fisheries Technical Committee should be considered.

In the future, there may be concern for future actions such as expansion of transmission lines and other facilities, development of pumped storage systems, geothermal development, et cetera, that may involve Indian trust lands. When such proposals are recommended in relation to specific projects, ample time should be available for comments.

In regard to the Almax Draft EIS, there are no Indian lands or communities that would receive a direct impact from the project if it were implemented.

We have a concern again for the impact that Almax operations may have on the Columbia River environment. The statement indicates that water (645,000 gallons per day) will be provided by the Port of Umatilla. We did not locate a description of the pumping facility. Is it already in existence or will it be constructed when needed? If in existence, can it function satisfactorily within the specifications established by the U.S. Fish and Wildlife for pumping facilities? If not, the pumping plan should be included in the draft document. An annual consumption of 645,000 gallons is very minor as far as the Columbia flow is concerned. However, once again the cumulative impact of many diversions is becoming significant, particularly during low flow periods.



AUDUBON SOCIETY OF PORTLAND

A Branch of National Audubon Society

PHONE 282-4855

5151 NORTHWEST CORNELL ROAD

PORTLAND, OREGON 97210

February, 1978

Bentonville Power Administration
Mr. Kiley
P.O. Box 3621
Portland, Oregon

Dear Mr. Kiley,

We are pleased to submit our review of the draft EIS.

Thank you very much.

Yours very truly,

Martha Gennet
Martha Gennet
Conservation Chairman



The Billings Area Bureau of Indian Affairs is concerned that the Montana Region is not adequately discussed. It seems evident that a significant contribution to Pacific Northwest energy will come from Montana. The impact of mining, processing, transportation and other related activities should be discussed as it affects both Indian and non-Indian lands and people in the Montana area.

Sam F. Adams
Assistant Area Director
(Economic Development)



AUDUBON SOCIETY OF PORTLAND

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5151 NORTHWEST CORNELL ROAD

PORTLAND, OREGON 97210

AUDUBON SOCIETY OF PORTLAND REVIEW OF DRAFT EIS "BENTONVILLE POWER ADMINISTRATION POWER SUPPLY SYSTEM (DES-77-21) AND DRAFT EIS THE ALMAX ENVIRONMENTAL STATEMENT (DES-77-22)"

The Audubon Society of Portland appreciates the opportunity to comment on the above documents. BPA is to be complimented on the wealth of excellent information in the documents. Obviously these were an enormous task.

We have additions we feel important and ask that they be added to the final impact statement. Also we suggest when making up the final impact statement, please cross reference the subject matter.

ALMAX (DES-77-22)

Fisheries and Wildlife

On pages III-11, Table III-2, we wish to point out this table comes from a series of somewhat outdated publications published by Oregon State University. Most of these species are not legally listed species under the Endangered Species Act or recognized as threatened or endangered by the Oregon Department of Fish and Wildlife. The reference to the Fox sparrow is erroneous unless the intent was for a particular subspecies of Fox sparrow. From the list of bird species, we are concerned about the outlook for the long-billed curlew in the Columbia Basin. It may occur on the site of the proposed Almax aluminum plants. The long-billed curlew is rapidly losing habitat piece by piece. Page IV-27 refers to wetlands. Of concern is the wetland loss piece. We also question the positive statement that there would not be air emissions impacts beyond the plant site boundary.

Executive orders 11990 "Protection of Wetlands" and 11988 "Flacodlain Management" dated May 21, 1977 were designed to prevent wetland destruction by Federal Agencies and should be addressed in the final EIS. We wonder why the plantsite need be located within a wetland.

Overview of BPA Direct Power Sales to Industrial Customers

On page 1-3, line 11, please insert the attached table which was obtained from the BPA Branch of Power Marketing in 1972, called DESCRIPTION OF BPA INDUSTRIAL CUSTOMERS. (1) This table is immensely helpful for public understanding of the energy demand of the aluminum industry (an updated version of the table would be preferred over the 1972 table if one is available).

On page I-8, lines 22 through 26, it is not clear how many people are directly employed in the aluminum plants served by BPA. Please insert the BPA table Employment and Expenditures of Bonneville Power Administration Industrial Customers in the Pacific Northwest 1961 to 1970 to clarify this point. We are attaching this document however if you have an updated document with the same information we would prefer that be inserted instead. (2)

In addition, please add the following to the text on page I-8, line 21, from BPA DIRECT INDUSTRIAL SALES (summary sheet), "during calendar year 1970, Northwest Industrial plants served directly by BPA employed over 13,700 people with total wages and salaries of over \$138 million. Total direct and indirect regional employment attributable to industries served directly by BPA is estimated to be approximately 43,000." (3)

The above statement would clarify how many people are directly employed in the aluminum industry served by BPA (of course we prefer updated figures for all three attachments (1), (2), (3), but if tables, and information is not available with these same facts addressed, then these are close enough to today's figures to make them valid).

In addition, if you plan to keep the statement on lines 21 through 28 of page I-8 in the final impact statement, please also add the indirect regional and national employment to all industries mentioned throughout both EIS documents. However, it would be preferable to simply say 13,700 people are directly employed in the aluminum plants currently served by BPA, and not extend employment to regional and national employment, because using the regional and national figures is confusing. Most all employment has regional and national scope.

We feel it is important in decision making, to make clear the immense amount of electric energy the aluminum industry requires. This is why we have asked for the above attachments (1), (2), and (3) to be included in the final EIS. From these attachments one learns that the aluminum industry served by BPA has a capacity of 3,138 megawatts of power, and employs a total of 13,700 people.

We also wish added on page I-8, line 29, the following:

"The aluminum industry served by BPA has a total capacity of 3,138 megawatts of electric power and total employment in these plants is 13,700. Bonneville Dam is a 518 megawatt dam, thus the aluminum industry employs 13,700 people and requires a electric energy in an amount which equals six Bonneville Dams."

On page II-3, line 12, please add "The 380 megawatts of power to be used in the proposed AlumaX plant will support the employment of roughly 700 people."

Also please add one more comparison on page II-3, in a paragraph at line 40 which gives the following information:

We recommend that AlumaX not be built because it involves the destruction of wetlands. The President's Executive Order 11990 and 11988 as mentioned above under Fisheries and Wildlife discourages the destruction of wetlands.

We recommend that BPA structure their rates to the aluminum industry in such a way that virtually all scrap aluminum is recycled. Perhaps the rates could remain the same as now with the threat to the industry that if they don't immediately set up the incentives necessary to assure that virtually all scrap aluminum will be recycled, BPA will increase their rates until this is assured.

THE MILS OF BPA IN THE PACIFIC NORTHWEST POWER SUPPLY SYSTEM Part 1 and 11 (DS-77-21)

History and Current Status of the Regional System

To help the public understand the growth of energy at the beginning of this report, please see that the following information is entered in the final EIS on page II-1, line 6 of Part 1:

In 1950 the total population in the area served by the Pacific Northwest Power Supply System was 4,475,000 people. By 1974, the population in this same area increased by one third to 5,761,000. BPA forecasts the population to be 6,940,000 in 1995.

In 1950 the above population required 20.8 billion kilowatt hours of electricity. By 1974 the population increased one third, but the electricity required increased four and a half times to 112.5 billion kilowatt hours of electricity. By 1995 BPA expects the population in the area served by the Pacific Northwest Power Supply System to double over the 1950 figure to 6,940,000 people, and the electrical energy required to serve them to increase fifteen times over that used in 1950. (all of these figures come from BPA's excellent chart on page IV-57 of Part 1).

This population increased one third from 1950 to 1974 while electrical energy consumption in the same area increased four and a half times. By 1995 BPA expects the population to be double the 1950 figures in the same area, but BPA expects electrical energy required to support those people to be fifteen times that required in 1950.

People need this information because they need to know how important it is to start making our economy more efficient, our living more efficient. People are beginning to drive cars that get twice the mileage of a few years ago, they will become more energy efficient with electrical energy.

"BPA sells 40% (please update) of their electrical energy to the aluminum industry. This is 20% of the total energy produced in the Pacific Northwest Power Supply System...and 13,700 people are directly employed in the aluminum industry served. The remaining 80% of electrical energy in the Pacific Northwest Power Supply System supports all other uses for the 6,761,000 people." (of course, please change all of the figures to the most recent available figures).

National Security

Page I-6, line 45 refers to national security. This is an extremely important use of aluminum, however only a small part of the aluminum produced goes into national security. The following is helpful in explaining where aluminum goes. Please add here on page I-6, line 46, the information from the attached Barron's magazine article of May 29, 1972 TORN IN ALUMINUM which states "for 72 domestic producers are counting on a surge in demand from their three biggest traditional markets -- construction which accounted for some 1.3 million tons in 1971; transportation, approximately 875,000 tons, and consumer goods and packaging, 784,000 tons. In the construction field, aluminum wires have come up with a replacement for the traditional two-by-four used in residential construction." In packaging, the greater use of all-aluminum cans will contribute to record volume. Last year, approximately 6.5 billion aluminum cans were turned out, a 75% climb over 1970. This year, it's estimated that more than 8.7 billion all-aluminum cans will roll off the production lines." (4)

The National Audubon Society magazine ALUMINUM article The High Cost of Aluminum Quoted Harry Cressman as follows: "Harry Cressman observed in the Closing Circle, for instance, that 'aluminum, which has increasingly displaced steel and lumber as a construction material, requires far its times more fuel energy than steel and about 150 times more fuel energy than lumber. Even taking into account that less aluminum, by weight, is needed for a given purpose than steel, the power discrepancy remains. For example, the energy required to produce steel for an aluminum beer can is 4.8 times that needed for a steel beer can."

Observation of Energy in the Aluminum Industry

In Draft EIS "The Role of the Bonneville Power Administration in the Pacific Northwest Power Supply System", Part 1, on page II-11, lines 47 through 50, we are pleased to see the statement, "It has also been demonstrated that it takes about 95% less energy per pound to make a product from scrap aluminum than it would to make the same item by the primary aluminum production process (Russell, 1974)."

Recommendation re AlumaX

Considering the immense amount of energy that aluminum consumes, we recommend that AlumaX not be built.

Fish and Wildlife

In regard to fisheries and wildlife, we have the following comments on Part 2 of DS-77-21. In general, many adverse environmental impacts are barely mentioned while beneficial impacts to other resources are addressed in detail. The ratio of increased power to increased degradation in our natural environment and the livability for us humans should be fully addressed in the final statement. What are the relative impacts of various types of industry?

We would like the same kind of analysis of adverse impacts as shown for benefits. While there was an excellent treatment of expected wildlife losses from hydropowering (Appendix A, page III-172-179) there is essentially little analysis of wildlife habitat to be lost to industrial and population growth attracted to more power.

The need for more research on effects of hydropowering on wildlife habitat is evident. We encourage you and the Corps of Engineers to pursue this, and the development of improved fish passage techniques past dams.

Part 2, Chapter VIII, pages 15-18 tends to indicate fisheries are not expected to be greatly affected by future development and this is not the case. Some salmon populations in the upper reaches of the Columbia system are close to extinction now. More hydropowering and turbines may jeopardize these fishes even further. We refer particularly to the prize chinook salmon of the upper Snake River which reach a very large size. Their future must be provided for. Please address these fish, a real endangered species even though not officially recognized. It appears, rather than hydropowering, incentives need to be built into the sale of electrical power which flatten out the curve and cut peak demand for power.

Radioactive Material in the Air and Water

Radionuclides in the air and water need to be discussed fully in the final impact statement.

In Appendix A page III-192 starting with line 29 please add a discussion of the Oregon Division of Health figures on radionuclides in milk of cows close to Trian which show an increase of radionuclides. Please also put in a table of the radionuclides prior to Trian and one of the most recent dates. And also explain to the public who monitors the air and water for radionuclides, and who funds the monitoring. How often is the monitoring done, and where are the results on file for public review.

Radionuclides are in the Columbia River in amounts higher than natural background radiation. Fields irrigated by the Columbia River have slightly more radionuclides than natural background radiation.

In the attached article from Science for December 23, 1960 on pages 1895 through 1897, is the article "Zinc -65 and

chromium-51 in foods and people. The abstract says, "Some radioisotopes introduced into the Columbia River via effluent water from reactors at Hanford, Washington are found in oysters irrigated with this water and in sea food harvested near the mouth of the river. Measurements of strontium-90 and chromium-51 in foods and in individuals consuming these foods are reported and compared with data on concentrations resulting from fallout." On page 1896 is the statement "In the measurement of radioisotopes in people at Hanford it was found that the strontium-90 in at least one individual could not be traced to farm produce from the Columbia River irrigation projects and was too high to be attributed to fallout. An examination of possible sources of this radioisotope revealed that oysters, which were a frequent part of the individual's diet, contained strontium-90." (5)

Page 22 of the U. S. Department of the Interior, Fish and Wildlife Service publication titled *FISH AND WILDLIFE IN RELATION TO THE BIOLOGICAL AND BIOCHEMICAL ASPECTS OF WILLAPA BAY ESTUARY WASHINGTON*, Portland, Oregon 1970 gives the information that "Radioactive contamination of the area's shellfish is an ever present threat. The radioisotopes enter the Columbia and Pacific Ocean from the cooling waters of the atomic reactors located at the Hanford Atomic Works, Hanford, Washington, about 390 miles from the Willapa Bay entrance. Of the radioisotopes entering the Columbia River and Pacific Ocean, phosphorus-32, zinc-65, and chromium-51 predominate. Zinc-65 can be found throughout the environment—water, flora, fauna, and sediment—of Willapa Bay—with oysters being the best biological indicators of this material, followed by razor clams which are found on the seafloor." (6)

We understand the Hanford reactors which dumped the above radioactive material into the Columbia River are no longer used for producing electricity, and that the radioactive material is leaching into the ocean and no longer increasing. Is the final impact statement please furnish charts which show the amounts of radioisotopes in the Columbia River in 1960, and charts of the recent amounts.

Please put in final impact statement who is doing the monitoring of the radioisotopes in the Columbia River, and the boys at the mouth of the Columbia River now, and why funds the studies. The University of Washington Department of Radiology was monitoring and so was the Geological Survey.

Please also address the fact that every nuclear power plant under normal operation releases minute amounts of radioactivity to the air and water. Appendix III-193 of Appendix A of EIS-77-21. Please explain these normal releases. Please also go into detail about abnormal releases since they are happening and can happen. Please tell what the maximum release of radioactivity to the air and water is projected to be. Please put the information in the equivalent of Hiroshima bomb radioactivity since the public understands that example.

Attached is a State Department of Energy chart from the *Oregonian*, July 21, 1977. This chart shows past and future costs of electricity and how they are expected to rise because of the continuing shift from cheap hydroelectric power to more expensive thermal power. Residential electricity in 1971 cost 13.30 (per 1,000 kWh) and in 1976, 1,000 kWh cost 19.20...and in 1995 that same amount of electricity is expected to cost \$87.80. This \$87.80 figure is not an unreasonable estimate, electricity already costs this much in New York. (8)

The National Association of Regulatory Commissioners is quoted in the *Oregonian*, December 16, 1977 as follows: "The NARUC report said that, as of last October, Portlanders were paying \$21.20 for 750 kilowatt-hours of electricity, while at the same time monthly costs in New York were \$71.87 for the same quantities." (9) Please insert the figures from the above Oregonian article and this one in the final EIS.

Problems in the nuclear industry in the state of New York are something we do not wish a repeat of here in the Pacific Northwest. The costs of these failures to the public are astounding. Two examples follow:

Consolidated Edison Electric Company had to sell its Indian Point #3 nuclear power reactor to the New York State Power Authority. Congressman Hamilton Fish, Jr. stated on the June 14, 1977 hearing on the Nuclear Energy Reappraisal Act of 1977, "Mr. Chairman, I might note that while my concern in this matter is one of broad public interest, my interest was stimulated by the fact that Indian Point #1, #2, #3 are located within the Congressional District which I have the honor to represent. While advocates indicate nuclear power both today and in the past is safe beyond question, Indian Point #1 operated for ten years within 30 miles of the heart of New York City with no Emergency Core Cooling Device, and is now shut down with ConEdison reportedly attempting to have EDA take it over to test ways of decommissioning reactors."

"Also, while nuclear proponents indicate nuclear power is the answer to cheap, economical electricity, I wonder if it is generally known that ConEdison had to see its Indian Point #3 reactor to the New York State Power Authority."

Another extremely costly problem the State of New York faces was thoroughly discussed at the June 14, 1977 Congressional hearing on DECOMMISSIONING AND DECONTAMINATION of nuclear facilities. This hearing was held before the Subcommittee on the Environment and the Atmosphere

Part 1, Appendix A, Page III-199, 4. Mitigation of of Atmospheric Releases by Plant Loading. states "Timing of plant shutdown to coincide with adverse meteorological conditions would minimize environmental impacts." Please put the maximum release and minimum release possible under the most adverse conditions, and the most ideal conditions.

Part 1, Appendix A, page III-188, line 41. Please acknowledge here, or in some other appropriate place, the concern over low level radiation. Studies which show reason for concern should be briefed, and studies which show there is no concern should be briefed. Like DDT, the public needs both sides to weigh.

Part 1, Appendix A, page III-192, line 52, please brief the studies at Richland, Washington by Dr. Raymond R. Wilding and Thomas R. Garland which found that plant roots can absorb plutonium from the soil, and when the plants decay, the plutonium may be converted into even more soluble forms. Please give the number of years that plutonium is radioactive. (7)

Part 2, XI-19, line 53 in regard to decommissioning, please explain in greater detail why parts of the plant that may buried on site must not be dug up, and why. Records must be kept of the site and control must be exercised over it's future development.

Part 2, XI-19, line 17. Please tell how long "Future generations will have to manage long-lived radioactive waste." What is the maximum time?

Part 2, XI-19, line 25, please explain what is the risk of radioactive exposure? Please also explain here why there is a limit on the liability of a company operating a nuclear plant in the case of an accident, and what that limit is (Price Anderson Insurance). Please also tell who stands behind the insurance...the public needs to know who pays the bill.

The above are tough subjects but the public needs to have all sides, both positive and negative in order to weigh what they want to do about the future development of energy.

ECONOMICS

The soundest action we can take is not to increase the availability of electric power through development of more large installations. The soundest action is to make the power we now have go farther by increasing efficiency of that which we already have.

of the Committee on Science and Technology, U. S. House of Representatives. The hearing record may be obtained from the above committee...the records number is (No.20). The record also may be obtained from the U. S. Government Printing Office under the number 97-393.

The June 15 hearing was on the West Valley, New York nuclear fuel reprocessing plant owned by Nuclear Fuel Services (a private company). This West Valley plant was the only reprocessing plant operating commercially in the U. S. It operated between 1966 and 1972 when it had to be closed down...this is why Trojan has no where to send it's highly radioactive spent nuclear fuel and must store it at the Trojan site.

Congressman Lundine said, "It should be noted that the land on which the site is located was acquired by the State of New York from productive farmers and homeowners who were forced to relocate. In exchange for this sacrifice, the State promised that the town would experience exponential economic growth as an important energy producing center of New York State. Quite the contrary, what has resulted is a failing enterprise that has instead threatened to destroy the economic base of this community." Congressman Lundine also pointed out the assessed value of the State-owned land which surrounds the Western New York Nuclear Fuel Services Center is \$597,000, from which no revenue is realized. The buildings owned by Nuclear Fuel Services are assessed at \$900,000.00."

Mr. Ralph W. Deuster, President of Nuclear Fuel Services, Inc. (the company that owns the above \$900,000 building) explained that in order to reopen the plant, costly repairs were projected. "It was projected that the earliest date for reprocessing would have been 1988 compared to a 1973 date when the project was conceived. The additional capital needs were in excess of \$600 million, compared with \$15 million in 1970." Mr. Deuster said further, "On September 22, 1976, after discussing these developments with customers who had contracted for reprocessing services, and determining their unwillingness to pay the additional costs, NPS announced its decision to withdraw from the reprocessing business. NPS' decision recognized that the millions already expended by NPS on the West Valley facilities could no longer be recovered and that NPS' role at West Valley would be reduced to maintaining the facilities until the expiration of the Lease". At the end of the Lease, all facilities of NPS on the West Valley site, and the nuclear waste thereon, revert to the New York State Power Authority.

This is an obvious tragedy for Nuclear Fuel Services and for the State of New York.

Now the State of New York is faced with the costs of decommissioning West Valley. Mr. George Brown, Chairman of the West Valley Decommissioning and Decontamination hearing said, "A fund of \$4 million was originally thought adequate to handle decommissioning costs, but current estimates for properly disposing of the wastes go as high as \$600 million. That is just for waste disposal at the West Valley plant" (see page 1 of the hearing record). The hearing record is attached (10)

Perhaps the two most important testimonies in the above hearing are those given by Mr. Monte Canfield, Jr., the Director of Energy and Minerals Division of the United States General Accounting Office, Washington, D. C. Mr. Canfield released a new General Accounting Office report called Cleaning Up the Remains of Nuclear Facilities--A Multibillion Dollar Problem (#MD-77-46). This report is found in the above hearing record starting on page 233.

The above Mr. Canfield also brought with him the General Accounting Office report EMD-77-27 called Issues Related to the Closing of The Nuclear Fuel Services, Incorporated, Reprocessing Plant at West Valley, New York. This report is not in the above hearing record. We are attaching this report. (11).

WHAT SHOULD WE DO FOR FUTURE ENERGY

1. First of all, we should assume zero energy growth. England and Germany require about half as much energy per capita as the U. S. In the Pacific NW, "Energy in the form of electricity is about 43 percent of total use in the region compared with 26 percent nationally". (source, EIS, Part I, IV-54, line 17. Obviously we can release an enormous amount of electric energy through conservation alone...getting greater efficiency out of existing energy.

We are energy rich in the Pacific Northwest because we have an immense amount of renewable energy in our hydroelectric system. "The total nameplate rating of all existing hydroelectric generation facilities in the Pacific Northwest as of June 1975 exceeded 21,000 megawatts". An additional 8,000 megawatts of hydroelectric resources under construction will bring the total nameplate rating to more than 29,000 megawatts (source, EIS, #DES-77-part I, page 11-17 line 36). In addition to this enormous hydroelectric source, the Pacific Northwest

has thermal electric energy in the amount of 3,600 megawatts, with 2,400 more megawatts under construction. (source, BPA EIS #DES-77-21, Part I, page 11-17, line 40)

We need to remind ourselves that in 1950 the entire Federal Columbia River Power System consisted of only two dams...Bonneville and Grand Coulee with a combined nameplate rating of 2,560 megawatts.

Between 1950 and 1970, twenty four more dams were completed, and another seven dams were under construction. Those dams that were added to the Federal Columbia River Power System between 1950 and 1970 are, Hungry Horse, Detroit, McNary, Big Cliff, Lookout Point, Albion Falls, Dexter, Chief Joseph, Chandler, The Dalles, Roza, Ice Harbor, Kials Creek, Minidoka, Boise Diversion, Black Canyon, Anderson Ranch, Palisades, Cougar, Green Peter, Foster, John Day, Lower Monumental and Little Goose.

Thus as of 1970 all of these dams were in place producing power. Please insert in the final environmental impact statement the attached table called, Table 2 Federal Columbia River Power System, General Specifications, Projects, Under Construction and Authorized Nameplate Rating of Installations as of June 30, 1970 from page 43 of the December 31, 1970 Annual Report, U. S. Department of Interior, Bonneville Power Administration. (12)

Obviously we have an immense amount of renewable energy. As noted above under ECONOMICS on page 8, paragraphs one and two we are financially better off to stay with our cheap hydroelectric system, and not develop any more thermal plants.

2. We would be wise to commence reverse forecasting. Each year predictions would be made of the amount of energy that could be saved that year by making our society more energy efficient.

BPA is complimented for having the Skidmore, Owens and Merrill study of energy made. This study is found in the BPA document (DES-77-21) Part I, beginning on page IV-130. As noted on page IV-131 line 12, "Up to 33 % of regional electrical energy use projected for 1995 can be saved. This would be a 53% reduction in growth in energy use between 1974 and the projected 1995 level."

of the Committee on Appropriations, House of Representatives, March 9, 1977, Part 5, U. S. Energy Research and Development Administration, U. S. Printing Office #86-101-0.

It might be interesting to know what ERDA was asking for in funds at this appropriation bill hearing. On page 4, Mr. Fri, ERDA Acting Administrator said, "We are requesting appropriations for the agency as a whole totaling \$7,753 million, of which about \$5.7 is for operating expenses, and \$2 billion is for plant and capital equipment. We receive revenues, primarily from uranium enrichment activities, at about \$1 billion. This estimate assumes passage of necessary legislation to revise our charges for enriching services. So total resources of about \$6.8 billion will be available to ERDA in fiscal year 1978." Some of the programs and the amount Mr. Fri was requesting for each are, \$88 million for Geothermal, \$311 million for Magnetic Fusion, \$122 million for Laser Fusion, \$656 million for The Liquid Metal Fast Breeder, \$148 million for other fission activities includes research and development of alternative reactor concepts such as water-cooled breeders and thermal reactors; \$611 million for the nuclear fuel cycle and safeguards program; \$390 million Supporting Research (re pollutants from energy); \$699 million for nuclear and high energy research; \$1,685 million for Uranium Enrichment activities; \$2,137 million for the national security budget, including "The increase of \$120 million requested in the 1978 budget will provide for increased operating costs of production facilities and supporting activities, the startup of the Purex reprocessing facilities at Richland; \$1 million for Conservation and \$305 million in budget authority for solar energy.

Thus of ERDA's \$8.8 billion budget, ERDA was requesting only \$305 million for solar energy. This \$305 million was to be divided among all of the energy sources that are considered solar...wind, solar heating and cooling, sea thermal, solar electric plants, photovoltaics, solar satellites, gasohol, biomass, agriculture and industrial process, and a few other areas. Of the \$305 million, only \$24 million was requested for wind by ERDA. \$87 million for solar heating and cooling, \$80 million for Biomass, and \$157 million for solar electric plants. Thus one can see solar has a low priority in ERDA's \$8.8 billion dollar budget. However, the program is far ahead of a few years ago. The first real funds for wind were appropriated in 1973

when \$200,000 was given the National Science Foundation. The first real solar budget was funded in 1975. In 1975, the solar budget was \$41.9 million...the 1976 solar budget grew to \$114 million and the 1977 solar budget was \$290 million.

Dr. Jerome Weingart, Environmental Quality Lab., Caltech, Pasadena, California stated in the attached paper, "If, over a three decade period, two-thirds of the residential units in the United States were provided with such solar equipment (solar heating and cooling and air conditioning), more energy would be saved each year than is currently produced by all of the electric power plants in the U. S." (13)

Dr. Jerome also said in the attached paper, "If just four percent of the housing units in Southern California were converted each year to solar water/space conditioning, and each solar unit provided 75% of the heat normally supplied by gas and electricity, this would offset the related energy demand due to mushrooming construction."

Perhaps Dr. Jerome is overly optimistic, however we are attaching three examples of operating solar heating systems that bear out what Dr. Jerome says. (14)

Henry Mathew built his solar heated home in Coos Bay in 1967. The Oregon Sunbook, written for the Oregon Department of Energy by Hal Brown says, "In 1974 the solar system handled 85% of the heating load and 88 percent in 1975. Savings for these years were estimated at \$200 and \$239 respectively. Preliminary indications show that in 1976's clear, dry winter Mathew's system handled 90-95% of the house's heating requirement. (15)

Solar pioneer, Harry Thomason built his first solar home 18 years ago. His Washington, D. C. home provides 75 to 90% of his heat. One can read about his solar system in the U. S. News and World Report, December 24, 1973 issue and in Readers Digest, May, 1974. Dr. Thomason taught Solar Energy at George Washington University in Washington, D.C. Dr. Thomason's solar heating system cost about \$2,500 in 1973. (16)

Getting the word to the public about solar is difficult, but the word is out. The public needs help, and funding of the future probably will include that help. One sixth of an

average U. S. family's energy bill is paid compulsorily through taxes used to subsidize the energy sector... (Source, page 19 of Soft Energy Paths, by Amory Lovins. Mr. Lovins cited the authors of the quote as, C. and J. Steinhardt, ENERGY, Sources, Use and Role in Human Affairs (North Scituate, Mass.: Auburn Press, 1974).

HOW DO WE MEASURE GROWTH AND REVERSE FORECASTING

1. There must be education, planning and implementation? Obviously this would take tremendous coordination.

A. Amory Lovins ideas are very helpful for education. His thoughts may be found in the above book Soft Energy Paths. Mr. Lovins material so interested Congress that much of the material in the December 9, 1976 hearing ALTERNATIVE LONG-RANGE ENERGY STRATEGIES is devoted to Mr. Lovins. This hearing is called Joint Hearing before the Select Committee on Small Business and the Committee on Interior and Insular Affairs, Interior Committee Serial No. (94-467) (92-137).

B. Education, planning and implementation would call for the participation of the utilities, BPA, State Governments and Citizen Groups

This concludes Audubon's statement? Obviously we don't wish to see Energy Parks developed, we want to take the excess out of our energy budget. Conservation is first of all and the attached Wall Street Journal article of February 9, 1978 indicates conservation is off the ground in industry. The article is called "Firms Spend Millions To Cut Use of Energy; Payoff is Often Rapid... Investments Should Bolster Dollar, Help Consumers". Quoting the Journal article, "Much of the capital equipment that companies are buying today isn't producing a thing—except money. These capital investments conserve energy. And energy conservation, say corporate money men who keep an eye on high fuel and electricity costs is about the most profitable use for capital these days. Companies have therefore begun to pour hundreds of millions of dollars into it." "We have a tremendous opportunity to invest capital for energy saving projects says J. Ernest Hitchens, Director of Corporate Planning for Dow Chemical Co. There are over \$200 million of good, highreturn investment opportunities in our Texas and Louisiana facilities alone." The article refers to Weyerhaeuser, "By 1980, Weyerhaeuser will have increased use of wood fuels by 50% from the 1975 level, replacing two million barrels of oil a year." (17)

Ending on a positive note, we enclose the New York Times article of April 21, 1977 which points out the Maine Audubon Society heated their building with solar energy during the severest winter in 177 years. They saved \$1,902 over using oil. Maine Audubon supplemented their solar system with wood, and from September to mid April the total cost was \$435. (18)

Thank you very much.
Prepared for Audubon Society of Portland by W. J. Steinhart

Audubon Society of Portland

Attachments

1. Description of BPA Industrial Customers 1972.
2. Employment and Expenditures of Bonneville Power Administration Industrial Customers in the Pacific Northwest 1961 to 1970.
3. BPA Direct Industrial Sales (Summary Sheet).
4. Harvard Magazine, May 89, 1972, "Turn in Aluminum".
5. Science, December 23, 1960, "Zinc -65 and Chromium -51 in Feeds and People".
6. U. S. Department of Interior, Fish and Wildlife Service, "Fish and Wildlife in Relation to the Biological and Biological Aspects of Willapa Bay-Kesteven Washington, Portland, Oregon (February 1970).
7. Seattle Globe, 4 Oct. 74, "Radioactive Plutonium Seen Collecting in Plants."
8. Oregonian, July 21, 1977, "Electricity Cost Projections".
9. Oregonian, December 16, 1977, "Electric Rate Said Low".
10. Hearings Before the Subcommittee on the Environment and the Atmosphere of the Committee on Science and Technology, U. S. House of Representatives, June 15, 16, 1977 (H-20).
11. Report to the Conservation, Energy, and Natural Resources Subcommittee, House Committee on Government Operations by the Comptroller General of the United States, "Issues Related to the Closing of the Nuclear Fuel Services, Incorporated, Reprocessing Plant at West Valley, New York." March 6, 1977 EEO-77-27.
12. Federal Columbia River Power System, General Specifications, Projects Existing, Under Construction and Authorized, Narrative Rating of Installations as of June 30, 1970.
13. ENR December 1971, paper by Dr. Jerome Weinstein, Environmental Quality Lab, Caltech, Pasadena, Calif 91109, "Everything You Wanted to Know About Solar Energy but were Afraid to Ask".
14. Oregonian, May 19, 1977, "Solar Energy Urged in NW".
15. The Oregon Sunbook, Oregon Department of Energy, pages 21-22, "Living With Solar Power".
16. U. S. News and World Report, page 62, "How Practical is Solar Power".
17. Wall Street Journal, February 9, 1978, "Firms Spend Millions to Cut Use of Energy; Payoff is Often Rapid; Investments Should Bolster Dollar, Help Consumers; A Decade Behind Europe".
18. The New York Times, April 21, 1977, "Maine Audubon Group Saves Money With a Solar Building."



United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, DC 20240

Reference: AE

U.S. Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208

FEB 17 1978

Gentlemen:

We are pleased to have this opportunity to review your draft Environmental Impact Statement "The Role of the Bonneville Power Administration in the Pacific Northwest Power Supply System" (DES 77-21). We offer the following comments for your consideration in preparing the final statement.

INTRODUCTION

The Columbia River and lower Snake River Watersheds contain an abundance and variety of fish and wildlife resources found in few other places in the United States. One of these resources by a large segment of the American public is correspondingly great. As indicated in your draft EIS, the Columbia River system even today remains the single greatest producer of anadromous fish in the United States. The U.S. Fish and Wildlife Service, under its various mandated responsibilities, has a very substantial concern for the continued welfare of this great natural resource heritage.

We acknowledge the need for a programmatic statement to describe in broader terms the BPA program and its environmental impacts, and the difficult nature of the task with respect to the complex regional power supply system. We are also concerned that the EIS follow Council on Environmental Quality guidelines in disclosing impacts sufficient for decisionmaking, including direct, indirect, and cumulative effects and mitigative alternatives. It is with these guidelines in mind that we have reviewed this document.

GENERAL COMMENTS

Nature of EIS

It is our view that the EIS leans heavily to descriptive power resource and socio-economic information, and that the discussion of actual environmental impacts consists of broad generalities and a lack of a

synthesized, careful analysis of potential impacts. Substituted instead are frequent disclaimers based on the perceived unavailability of scientific evidence and uncertainty of adverse impacts (Part 2, Chapter VIII, p. 18; Appendix A, Chapter III, pp. 158, 167, 169, 170, 171, 172, 173, 175; etc.).

There is, at the same time, a clear tendency for all beneficial impacts to be given full exposure and to be presented in optimistic terms (Part 2, Chapter VIII, p. 71, 73; Chapter IX, p. 2; Appendix A, Chapter III, 73; etc.). These factors give a distinct impression that the EIS is promoting or justifying the proposed operation of BPA.

For reasons that will be discussed, we believe that the draft EIS falls short of fully disclosing the environmental impacts and mitigative alternatives of BPA's program and thus has not adequately met the objectives of the National Environmental Policy Act.

General Fish and Wildlife Resource Impacts

We acknowledge the many benefits, some environmental, inherent in power supply system coordination in which BPA plays a substantial role. These benefits are displayed throughout the document, lending support for a continued similar role. Since the more efficient coordinated system attracts industry and thus promotes substantially greater development and urbanization (Part 2, Chapter VIII, p. 77), greater environmental degradation follows. These indirect but very significant environmental losses are not clearly outlined or analyzed in the EIS, and this represents a major shortcoming.

With respect to the use and potential expansion of interties to share electricity with distant areas of the U.S. (Part 2, Chapter IX, page 3; Appendix A, Chapter IV, pp. 8-21), it is our view that the potential net adverse environmental impacts of such operations are not adequately analyzed, preventing any reasonable determination of the tradeoffs associated with existing and contemplated interregional lines. We cannot determine from the information presented whether the economic benefits predicted will result at the greater expense of the Pacific Northwest environment, particularly Columbia River fish resources (see comments concerning hydro-peaking and turbine mortality).

BPA has direct project responsibilities through its construction, operation and maintenance of a high-voltage transmission system (Part II, Chapter VII, p. 41). While some environmental benefits result from this coordinated regional transmission grid, the Fish and Wildlife Service recognizes continuing and significant problems and the need for assuring maximum compatibility of the system with fish and wildlife resources. Appendix B, Chapter X, pp. 15-22 describes interagency coordination on transmission line projects, listing the Fish and Wildlife



Coordination Act as legislation pertinent to cooperation regarding siting and design of Federal transmission systems. Beyond that listing there is no discussion of how the Coordination Act is interpreted and used by BPA, except to note that our Service plans land use at National Wildlife Refuges and thus there is a need to obtain Secretarial approval for construction in those areas. Neither this limited role nor the review of impact statements under NEPA fulfills the intent of the Coordination Act, and we believe consultation regarding siting, construction, and right-of-way management as suggested by Table X-1, p. X-18, Appendix B, should be fully outlined.

It is probable that coal-fired thermal plants will constitute the primary source of new electrical generation in the near future. This being the case, the discussion of impacts associated with coal plants given in Part 2, Chapter XIII - 24 to 29 is inadequate to outline the major effects of these facilities on fish and wildlife and their habitats. Such problems as terrestrial and aquatic habitat use and degradation by sludge and ash disposal, particulate and gaseous emissions, and other contaminants should be considered. These contaminants may become incorporated into terrestrial food chains and cause long-term effects on the suitability of habitat for fish and wildlife resources (Goodyear and Fodor, 1977; Brungs, no date).

In many places in the draft EIS there are statements or implications of the need for further studies to identify impacts of the Columbia River power system on fish and wildlife resources. There is, as noted, also a tendency to play down uncertain impacts. We can appreciate that BPA is funding some studies to shed light on these information gaps, but feel the efforts are far from commensurate with the need for information on the potential resource losses that are likely to result from operation of the power system. The EIS should better describe BPA's recognition of their responsibility, their policy, and their plans for promoting and funding studies of environmental impacts, many of which may be the only mitigative measure available considering knowledge gaps in the decision-making framework. The portion of revenues which goes into these studies should be discussed.

Fish Resources

Part of BPA's mission is stated in Part 2 as "assuring a viable electric energy system in the Pacific Northwest while balancing economic, technical, and environmental considerations". We believe that to fully carry out this mission, BPA must improve consideration of fish resources in planning and funding programs, raising the resources to an equal if not higher priority than other uses of water when they participate in decisions regarding allocation of Columbia Basin water. We feel BPA should take a more active role in promoting comprehensive fisheries (and wildlife) planning, particularly in relation to hydropeaking operations of the power system. In this regard, we endorse the recommendation of the Columbia River Fisheries Council

3

Increases in water volume through the turbines will set up increases in shear forces which will kill a greater percentage per turbine than under present more moderate operations. In addition, portions of the discharge operations will cause increases in cavitation with resultant negative pressures which will kill fish. Increased discharges may also mean higher mortality rates from impacts with turbine blades. Juveniles do not have to undergo direct mortality from the turbine passage but may be so stressed as to later die or be picked up by predators. Generator efficiency will be reduced as large volumes of water are shunted through the turbines. Reduced generator efficiency levels will mean higher fish mortalities (Appendix A, III-114, lines 20-21).

The EIS mentions the reports of Collins, et al. (1975) and Raymond (1974) which suggest additional future serious consequences to anadromous fish runs resulting from juvenile mortality in turbines. The reader is left with no evaluation, however, of whether these estimates are believed et al. (1976) described in Appendix A, Chapter III, p. 153, is presented as the most comprehensive treatment of hydropeaking and juvenile survival but there appear to be concerns on the part of State fishery agencies regarding the values used to estimate mortalities at dams.

There is needed a more adequate discussion in the EIS of the problem of maintaining adequate flows for fish in the Columbia River under future operational criteria. BPA and other water management agencies were presented with a series of minimum flow recommendations for anadromous fish by the fishery agencies in December 1976, yet we find no recognition of these recommendations in the EIS.

An overall assessment of the fishery impacts sections of this EIS would be that too little is known from past studies or reported in the EIS to make a determination of whether or not very dire consequences to anadromous fish might ensue from power system development. Speculation by BPA that serious impacts of this degree are not anticipated is not justified by the evidence presented. We believe BPA has a major role to play in promoting and coordinating in-depth studies of fishery problems on a systematic, river-wide basis using the most advanced modeling or other techniques that will be necessary to effectively answer such questions.

Wildlife Resources

Hydropeaking will increasingly alter riparian vegetation and land contours along the Columbia River, thereby influencing wildlife associated with those habitats. In the past there has been considerably less consideration given these impacts in the study and planning processes of development agencies than in the fisheries realm. We know that hydropeaking has adversely affected and poses a serious future threat to important waterfowl habitat along the River. Although impacts are outlined reasonably well in Appendix A, our concern is that BPA accept and goals, to give greater consideration to wildlife protection and enhancement in water management decisions and through their support of needed studies.

5

(January 5, 1978 letter to Administrator, BPA) and some of those of Chaney and Perry (1976) for a more coordinated multiuse water management system. This proposal should be addressed in the Role EIS.

According to Part 2, Chapter VIII, p. 14, future power system operation on the Columbia River will create greater and more rapid variations in river flows and larger and faster daily changes in reservoir levels. This hydropeaking, through creation of extremely unnatural flow and water level regimes, will thus have increasingly serious adverse impacts on fish and wildlife resources. Physical changes in the river have created serious problems for many native fish species, as discussed in the draft EIS, but there have been marked changes in the structure of biological communities along the river which have not been adequately described. The changes in fish distribution, species composition, predation and competition, food chains, and other biological and ecological characteristics that have resulted and will result from modification of flow, temperature and other river characteristics through power system operation have not been adequately described.

Further, there is not sufficient justification for such statements as (1) "Resident fisheries are not expected to be greatly affected by future FCRPS development" (Part 2, Chapter VIII, page 18), or (2) "It is very likely that the net effect of hydropeaking on these (anadromous) populations will be unobservable" (Appendix A, Chapter III, p. 169). We know that resident populations have changed and are changing, and that anadromous species have and will continue to be subject to serious and perhaps new types of adverse impacts.

As an obvious example of peaking impact, the effects of change in just one physical parameter -- water velocity -- on fish microhabitat selection and maintenance, feeding, activity levels, intra- and interspecific relationships, and other factors can be substantial. The necessity for continual adjustments by individual fish and corresponding disruption of life pattern and increased activity levels can be expected to influence growth and survival of fish (Giger, 1974).

Considering the great body of individual studies and synthesized reviews of literature on the effects of flow modification on fish, the effort made in Appendix A, Chapter III, A.5 of this EIS to recognize, report, and much less to synthesize and analyze the information on potential impacts of Columbia River hydropeaking on resident and anadromous fish has been minimal. The application of scientific information in decision-making is called for by NEPA and by the Council on Environmental Quality, and the EIS does not adequately meet this requirement in the important subject area of hydropeaking operations of the power supply system.

Appendix A, Chapter III, A.5 also describes future power system operations which will result in a virtual end to spilling at dams and great increases in the quantity of water passed through turbines. The operations will force increased numbers of downstream migrant salmonids through the turbines where they will be subject to substantially greater direct and indirect mortality and other adverse effects than they would experience passing over spillways.

4

Recognition of this broader role by BPA necessarily includes greater acceptance of the provisions of the Fish and Wildlife Coordination Act, as stated earlier. The Act provides for early consultation with our Service to assure conservation of wildlife resources by preventing loss of and damage to such resources and providing for development and improvement of those resources. We believe BPA's role as a regional forecasting, coordinating, marketing, and transmission system construction entity for power generated at water-development projects is basis for exercising an expanded coordination role, particularly in the area of transmission systems and their environmental impacts.

The problem of bird strikes on transmission lines is of considerable concern to our Service. This concern applies to all such potential occurrences and not merely on or adjacent to our National Wildlife Refuges. The statement in Part 2, Chapter VIII, p. 36 that bird strikes on transmission lines are rare occurrences is erroneous. Mortalities of this type are well documented at a number of locations in the northwest, including even the BPA Ross line near Portland. Though the magnitude and significance of losses is not well understood, in areas of migratory bird concentrations and low-level feeding flights kills are common. Even BPA is finding broader and more detailed studies of transmission line impacts on birds following results of investigations near the St. Johns landfill at Portland, Oregon.

The recent position taken by Interior Secretary Andrus concerning Pacific Power and Light Company's proposed 500 kV line between Midpoint, Idaho and Medford, Oregon indicates the concern generated by proposals to route will result in substantial changes, and was a position supported by the Public Utilities Commission of Oregon following completion of on-site studies by Daniel E. Willard and Associates, contractors. The proposed BPA line crossing at our Umatilla National Wildlife Refuge is another example of our deep concern for waterfowl protection.

Wildlife Refuges

The general impacts of hydropeaking on Columbia River riparian vegetation and associated wildlife become an even greater concern at wildlife concentration points such as our wildlife refuges. It is conceivable that peaking effects could be of concern at the Minidoka, Deer Flats, Snake River Islands, Kootenai, McNary, Umatilla, Ridgefield, Columbian White-Tailed Deer, and Lewis and Clark Refuges. The information presented in the EIS concerning estimates of pool and tailwater fluctuations and impacts on riparian ecology (Appendix A, II, Part 2, Chapter VIII, B.1) is inadequate to assess impacts to riparian ecology in future years.

Problems at the refuges might include hazards to recreationists, adverse aesthetic effects of fluctuations as well as transmission lines, wind programs, interference with nesting and breeding activities of waterfowl and aquatic mammals, and others. These have not been adequately identified in the EIS, and BPA has not indicated their role in cooperative planning and funding of investigations necessary to identify impacts more adequately and develop mitigative measures.

6

The conflicts concerning placement of transmission lines on or near Refuge lands are a continuing drain on personnel of many agencies at many levels. The solution to protracted disagreements and investment of funds in preliminary studies of routes that are eventually abandoned would seem to lie to a considerable extent in improving the coordination among agencies during early planning stages of proposed routes. Contact points and a coordination framework for various activities should be developed, and this framework clearly outlined in the EIS.

Endangered Species

We cannot agree with the assessment in Part 2, Chapter VIII.B.1 that the Columbian White-tailed deer will not be adversely affected by hydropeaking operations and that the deer does not rely to a great extent on riparian vegetation. Studies by the Oregon Cooperative Wildlife Research Unit and Washington Department of Game have shown that the deer occurs primarily in the riparian zone, and that areas used for reproduction are well within fluctuation zones (Almsworth State Park and Fashion Reef (Prindle) Island). In addition, a specific geographical area that is likely to be impacted to some degree by peaking fluctuations has been proposed for publication in the Federal Register as critical habitat for this species.

The Larch Mountain salamander (*Plethodon larselli*) is located adjacent to the Columbia River in the Larch Mountain area, and should be reported as a species presently under a notice of status review in the Federal Register as a candidate for Endangered or threatened status. Hydropeaking is not expected to be detrimental to this species.

Alumax Draft EIS

The overall coverage of aluminum plant impacts on fish and wildlife does not appear to be complete. We question the implications in the statement that effects on fish and wildlife from fluoride will be minimal or non-existent. A memo of July 15, 1976 from the Fish and Wildlife Service to BPA outlined various concerns regarding potential plant impacts on fish and wildlife. Those comments were provided to assist in preparation of the draft statement, but have not been incorporated. We will repeat here some of the concerns expressed in July.

On Page III-B, 3rd Par., waterfowl use of the ponds around the plant is discussed. Only migration and resting use is described, however. These approximately 60 ponds are also used extensively as nesting habitat and therefore contribute significantly to waterfowl production. This additional use should be described.

The species list on Page III-9 of the statement is both erroneous and inadequate in that several species are included which are definitely not expected to be found within the proposed project area, and many species which are likely to occur have been omitted. The best information available concerning these species has been submitted to the office of BPA by Jean Siddall, Chairman of the Oregon Rare and Endangered Plant Species Task Force, in a letter of October 5, 1977. Information on the species

submitted by Mrs. Siddall has been acquired through field work by botanists, herbarium collections and botanical literature and represents the most up-to-date knowledge of these species currently available. We recommend that Mrs. Siddall's data be incorporated into the statement. All plants considered herein are candidate species for the Oregon State list of rare, threatened, and endangered plants, and some have been proposed for Federal listing as threatened and endangered.

Hunting should be included as a major recreational activity on Page III-55, 1st paragraph.

The potential hazardous effects on fish and wildlife from continual fluoride emissions at the plant are underrated. The statement is made on Page IV-4 that wildlife species have fluoride dietary tolerance levels above 40 ppm, and that therefore no effects from emissions are expected. However, we are quite concerned about the possible effects on wildlife, especially waterfowl. Since fluoride can be highly toxic to plant and animal life, continual ingestion of vegetation and aquatic organisms containing this chemical could adversely affect waterfowl. Table IV-3 indicates that waterfowl can tolerate 400 ppm of fluoride in their diet. However, the resulting long-term effects on such factors as reproductive capability, eggshell hardness, growth, and longevity are currently unquantified. This should be so stated in this section and in section II-1, Physical and Biological Impacts.

We further question the fluoride tolerance levels listed for various fauna on pages IV-4 to IV-6 in light of U.S. Environmental Protection Agency data. According to Water Quality Criteria 1972 (EPA), a maximum of only 2.0 ppm fluoride is recommended for livestock drinking water, and as little as 10-15 ppm kills cattle. When in the drinking water, fluoride concentrations much less than amounts projected for nearby vegetation are lethal to most wildlife. Losses to fish and wildlife as a result of using or living at contaminated ponds could be significant and should be evaluated in the statement.

The project area is within the breeding range of the peregrine falcon, a species classified as endangered by the Department of the Interior. This fact should be acknowledged in the statement narrative and precepts of the Endangered Species Act of 1973 (P.L. 93-205) should be met. Your attention is particularly directed to Section 7 of the Act, and possible adverse effects on endangered species by chemical emissions from the proposed project should be carefully evaluated.

We hope you will give serious consideration to the comments we have prepared in developing the final EIS and in carrying out your mission in BPA.

Sincerely yours,

J. I. Siddall
Deputy Associate Director

Retyped from Original Letter

REFERENCES

- Brungs, W.A. (date not given). Effects of residual chlorine on aquatic life: literature review. Prepublication. Environmental Protection Agency. Duluth, Minnesota.
- Chasey, E. and L.F. Perry, 1976. Columbia Basin salmon and steelhead analysis. Pacific Northwest Regional Commission. p. 1-74.
- Collins, G.B. and W.J. Ebel, G.E. Monan, H.L. Raymond and G.K. Tanonaka, 1975. The Snake River salmon and steelhead crisis, its relation to dams and national energy crisis. National Marine Fisheries Service, Seattle. p. 1-30.
- Giger, R.D., 1974. Streamflow requirements of Salmonids. Oregon Wildlife Comm., Fed. Aid Proj. AFS-62, Job Final Report, 117 p.
- Goodyear, C.P. and R.L. Fodor, 1977. Unpublished information. U.S. Fish and Wildlife Service. Ann Arbor, Michigan.

A Representative of Parkrose High School
John R. McMichael
2727 NE 131
Portland, OR 97230

I will refer to Chapter IV of the Alumax E.I.S., pages 16-22. They illustrated concentrations of sulfur dioxide, total particulate, and gaseous fluorides emission projections.

It seems that a certain amount of negligence has been exhibited in the preparation of the statement. Only a small amount of information was given concerning the impacts of the proposal on nearby Washington areas. Even though these effects might be negligible, this data should have been published.

The public should be made aware of what amounts of air pollutants are considered negligible. It should be left to the citizen to determine what data is to be thrown out as unimportant.

Finally, it would have been of great help if the E.I.S. had been written on a level that the average citizen could comprehend. After all, the document was published for his benefit.

Jan. 12, 1978

BOONEVILLE POWER ADMINISTRATION
P. O. BOX 3621
PORTLAND, OREGON 97208

Attn: Mr. G.

Gentlemen:

In response to my request for a copy of THE ALUMAX ENVIRONMENTAL STATEMENT, which you have sent (and I find a most comprehensive statement), and with your request for comments, I shall endeavor to comply.

During the sites discussed (Umatilla and Warrenton), the Umatilla site seems to be the best all around one, which I will approve.

It is noted that the shipment of bauxite to Umatilla facility has to be transported from a down-river facility. As this will be accomplished by covered hopper cars, the question noted that the hoppers will be returned empty to the "load site". As the Alumax site being inland the cost of the transportation of the bauxite and transportation to Umatilla will be added to the shipping costs. Being however that the Alumax site will be ideally suited to rail shipment of bauxite to other plants in the Pacific Coast and intermountain regions and beyond. Further the site will encourage other support/allied industries to locate nearby.

As to noise abatement - proper sound deflection methods such as landscape screening, sound suppressors are required. Also exhaust emission equipment may be designed/fabricated as required to remove certain chemical gases/emissions that might be reusable (as determined by chemical engineering research). Perhaps even the exhaust steam to run additional electrical generating equipment.

It is felt that the environment will be little altered with the new facility impact and the increased procedures adhered to. As the adjacent area becomes populated, the problems that arise will be dealt with by the residents as required. Alumax can only say that its property is sent in the best condition as planned with adjacent areas and own production requirements.

The Warrenton location - Noting that this site is located adjacent to Astoria and also will have excellent rail connections to Portland and the rail network. Perhaps the site should be relocated at Youngs Bay (former navy installation and now a ship repair center) just east of Astoria. If enough land is available. The location at this point would allow for an adjacent pier to be constructed which would allow direct off-loading of bauxite from ship into adjacent storage facilities.

Mr. George Elliott
Box 670
Pilot Rock, Ore. 97868
January 26, 1978

Bonneville Power Administration
Environmental Office SJ
P. O. Box 3621,
Portland, Oregon 97208

Dear Sirs:

This is my public comment, which you invited, on the Alumax Environmental Statement.

I am opposed to the building of any aluminum plant in the Northwest, and particularly at Umatilla, chiefly because of the stupendous amount of energy it would consume. A news article released January 18 states that aluminum plants consume 30% of all the electric power in the State of Washington but provide only 3% of the total jobs. What a disparity! And surely a newly built plant would be more highly automated than existing plants to provide an even lower jobs to kilowatts ratio.

The price alone, 3.02 mills, offered Alumax, even for interruptible power, is an insult to the common consumers who at this date are paying 27 mills, exclusive of F.U.D.'s. But this rate disparity is probably peanuts if just one more energy gulper such as this pushes the demand picture to another thermal plant that we could otherwise do without. We have barely scratched the surface of conservation and if we vigorously pursue that course it is likely we can stay away from any more of these billion dollar "luxuries". Just such building standards, microwave cooking, more efficient lighting, a real swing back to wood heating, and no more aluminum plants could very well enable us to make do with what we have for many years at somewhat reasonable rates. One study concluded that one dollar spent for conservation would equal six spent for new thermal plants. What is the sensible path to follow here?

Also, in this petroleum short land, locating a plant at Umatilla would necessitate barging upstream about 250 miles all the raw ore for processing. What a tremendous amount, and waste, of diesel fuel that would cause. If they must locate somewhere doesn't it make a lot more common sense to build on or close to ocean shipping facilities?

-2-

This is the only advantage that can see for Warrenton Astoria site. Also the shipment of Alumax products for overseas and/or shipment by vessel with out transshipment. As rail shipment would be point-to-point anyway.

Suggest that ALUMAX facility in Kitimat, B.C. be studied for suggestions for the Warrenton site.

It would appear that the Umatilla site area, if selected would require more financial support to expand the adjacent community facilities (state, federal, county moneys only). Also the area could be built to modern standards, a beginning from scratch so to speak. The consideration as to adequate present and future water sources and utilization of same must be determined.

Having not personally checked either site location, I must rely upon the ALUMAX statement. Thus the Umatilla site would be best for plant and also the recreational areas for plant employees and families that are abundant in close proximity also. Not to slight Warrenton site which also has similar recreation areas.

In conclusion the sites hinge on one of two things:
(1) adequate water supply
(2) materials handling facilities
(3) product distribution system
All other parts of related surveying on selected plant site and are also very important in final determination.

Once again will note that the ALUMAX report is a very fine one and worthy of study.

Will appreciate hearing of final outcome of ALUMAX report.

Sincerely Yours;

George R. Lowellyn, Jr.
P. O. Box 13
Silverdale, Wash., 98283

- 2 -

From a purely social viewpoint, such a heavy industry located at Umatilla would be highly disruptive to a primarily agriculturally oriented land. The crowding and certainly the crime increase would not fit in well to a rural type populace. Also, in spite of the most advanced technology to be incorporated in this plant, I can't help be concerned about emissions. Certainly existing plants haven't the best of records.

Now arises the question of need. While it may not be my place to second guess this factor, all the other Northwest plants were off capacity from 15 to 40% in 1977 with no apparent overall shortage. A national bottle and can deposit bill is a certainty and will save thousands of tons that we are now wasting.

Also, I think this large involvement of foreign capital (Mitsubishi) is a bit unsettling to many citizens. I believe most of us like to keep the profits at home.

All in all, at the bottom line, it looks like a big minus for a long time, so I emphatically vote "NO".

Thank you.

Sincerely,

George Elliott
Box 670
Pilot Rock, Ore. 97868

GE/ce

51

411 Main Street / Hermiston, Oregon 97838 / Telephone (503) 867-5823

OFFICIAL FILE COPY
FEB 13 1978
Action Taken:
ANS. ☐ NO REPLY
By Date

February 10, 1978

Mr. Ray Folern
Acting Administrator
Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Re: SJ

Dear Mr. Folern:

How can you possibly say "no" or even delay, when the need for their product is so great; also, while we wallow in high property taxes and need their assessed evaluation so badly.

Oregon's attitude continues to drive wealthy people and retired people to other states where property taxes are lower and where State income taxes are absent.

Washington continues to get the lion's share of the electricity and this does not seem to be easily understood by Oregonians.

Please stop delaying and live up to the contract between you and Alumax.

Very truly yours,

Norman H. Schroth
Norman H. Schroth

HBS:ot

Bonneville Power Admin.
Portland, Ore

Nov. 8, 1977

Gentlemen,

We ranchers between Umatilla, Ore and Kelix, Ore have planned to irrigate our wheatland with water from the Columbia River.

Now Umatilla R&A say they cannot handle our plans if ALUMAX comes in as they must provide a power plant for ALUMAX first. Why do you allow the power which belongs to all of us be given at low rates to the Japanese and Standard Oil?

We ranchers provide more job to the Hermiston area than three ALUMAX's. All Alumax will do is dirty up our clean air, take needed power and cause a burden upon the local communities.

We ranchers have voted no to ALUMAX and will fight on through the courts to prevent this monster from taking our power away.

John Orange
Sec. John Orange
Kelix, Oregon

CLACKAMAS DEVELOPMENT CO.
330 N. W. Fifth Avenue
Portland, Oregon 97209

December 9, 1977

Bonneville Power Administration
1008 N. E. Holladay
Portland, Oregon 97232

Re: Alumax Hearing
Kearlston, Oregon
November 22, 1977

Gentlemen:

The purpose of this letter is to approve of your environmental impact statement which was presented at a public hearing the evening of November 22, 1977. That portion of the hearing concerning the Alumax Plant to be located in Umatilla, Oregon is of specific interest to us, and we wish to voice our endorsement of those contemplated plans.

The industrial, agricultural, and commercial impact in the Boardman/Umatilla/Kearlston/Rainfield area will permit the area to develop into one of the most stable economic bases in the State of Oregon. Your concern and interest in Eastern Oregon is to be complimented.

Very truly yours,

CLACKAMAS DEVELOPMENT CO.

Louis Himi
Louis Himi, President



Advisory Council on
Historic Preservation
1322 K Street N.W.
Washington, D.C. 20005

OFFICIAL FILE COPY
NOV 11 1977
Action Taken:
ANS. ☐ NO REPLY
By Date

November 8, 1977

Mr. Donald Paul Hodel
Administrator
Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

Dear Mr. Hodel:

This is in response to your undated request for comments on the draft environmental statement (DES) for the proposed construction and operation of the Alumax-Pacific Corporation's primary aluminum reduction plant and associated transmission and substation facilities in Umatilla and Morrow counties, Oregon, and Benton and Franklin counties, Washington.

The Council has reviewed the DES and notes that while cultural resource studies to date indicate no properties included in or eligible for inclusion in the National Register of Historic Places will be affected by the proposed undertaking, the possibility exists for previously unknown cultural resources to be encountered during construction. However, we note that the Bonneville Power Administration recognizes its responsibilities pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320) should such cultural resources be encountered. Accordingly, we look forward to working with BPA in accordance with the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800) in the future, as appropriate.

Should you have questions or require additional assistance, please contact Brit Allan Storey of the Council staff at P. O. Box 25085, Denver, Colorado 80225, or at (303) 234-4946, an FTS number.

Sincerely yours,

James S. Wall
James S. Wall
Assistant Director, Office of
Review and Compliance, Deputy

The Council is an independent agency of the Executive Branch of the Federal Government charged by the Act of October 11, 1966 to advise the President and Congress in the field of Historic Preservation.

RETYPE FROM ORIGINAL LETTER

Hermiston Oregon
November 11, 1977

Dear Sirs,

Please send to me the information sheets.

I think B.P.A. has done a wonderful job all these years, and made so much progress and contributed so much to the whole Northwest during that time. You knew that when more "walking giants" appeared that more people had lights and that life was made easier for them. So, as with anyone who has been doing a good job, I think we should keep you as is.

As to ALUMAX I sure hope that it will never come into our area. I feel that our soft fruits will disappear, that the added growth of people will be an undesirable tax burden for us, increasing the inflated property values to where people on retirement income will be forced to sell their homes and leave the community because they cannot afford to live here. I will begrudge every bit of power they take away from the peoples of the Northwest if Alumax comes in. All the soft fruits will suffer and

don't try to tell me the wind doesn't come back our way--we smell

Georgia Pacific Wallula a lot.

Better get off my soapbox.

Thank you.

/s/ Mrs. Edward Hall
Rt 3 Box 3148
Hermiston Or.

Dean E. Holmes
P. O. Box 133
Hermiston, OR 97838

11-15-1977

Bonneville Power Administration
Portland, Oregon

Nov. 6, 1977

Sirs

I have received letters from my Hermiston city Councilmen friends asking me to write you expounding the virtues of giving our power to Alumax.

As a Christian Missionary in Africa, I must answer truthfully even though it may reduce the friends pocket books. I love Hermiston and miss it very much. And I feel that those who want to destroy its basic future by taking a power hungry plant into our area are thinking only of themselves.

Here are the facts. The power used by Alumax could handle our growth needs in Eastern Ore. for 50 years. Instead of 400 Alumax jobs that amount of power could produce 5600 jobs in other industries. The sudden increase of construction workers will cause a hardship on our schools, traffic, housing and may cause delays in the second power house at McNary Dam. The solid waste output of Alumax will overflow our present solid waste site in only two years of operation. The site now can handle our needs for 15 years.

As a EX City Councilman for many years and a resident for over 20 years, I know I speak for the majority of the local people and they want to save our northwest power.

I am sure the Hermiston Meeting on the 21st will be attacked as usual by the local Resiliators and the Hermiston Development Corp. But they always try to fill up the registration speaking slots with Woody Harret, Joe Burns, Tom Harper, Schroth, Don Gray, Charlie Maxwell, Dewey West, and so on. These men I am sorry to say do not represent anyone but the land promoters in our area. I am sorry I could not be there in person, but I am giving this letter to a missionary friend to bring back and mail to you from Hermiston.

who
Let those would profit by sorrow
of others, be held in bondage by
their own greed.

Thank you
Clarence G. Adams
Missionary, Lagos Africa

Bonneville Power Administration SJ
P. O. Box 3621
Portland, Oregon 97208

My statement on the future role of Bonneville Power Administration (BPA):

I have confidence in BPA in its operation policies and its forecasts in the field of electrical energy needs in the Pacific Northwest. The BPA forecasts and decisions are not biased, and this is important today with so many "experts" making predictions in disagreement with each other. The "Man on the Street" in the Pacific Northwest should have an independent agency like BPA.

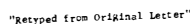
I do not favor BPA building power plants, but prefer it to continue its program of transmission line construction and the sale of wholesale power. I hope to see a continuation of the expansion of the investor owned facilities.

With an expanding population that is expected to increase, the Northwest should rely on BPA to set priorities for the use of federal hydro-electric energy.

I believe BPA should encourage further development of nuclear and coal-fired power facilities due to our declining hydro resources.

Statement by:

Dean Holmes,
Retired newspaper reporter
740 W. Ridgway,
P. O. Box 133,
Hermiston, Oregon 97838



November 23, 1977

Bonneville Power Administration- SJ
P.O. Box 3621
Portland, Oregon 97208

Gentlemen:

Regrettably, I was unable to appear in person at last night's "Alumax EIS Public Response Meeting" in Hermiston. However, I wish to be included with these Hermiston citizens now on record as favoring final approval of Alumax Pacific's plans to construct and operate an aluminum reduction plant in Umatilla County, Oregon.

As a resident and businessman in Hermiston for 30 years, I strongly believe that the plant in question, as well as its end product, will be in the best interests of the Pacific Northwest Region in general and this community in particular. I also believe that this area can and will cope with the socio-economic consequences of both the construction and operational phases of the proposed plant.

Respectfully yours,

W. M. Larham
Broker & REALTOR
M & B Investment Co., Inc. (Real Estate)
P.O. Box 62
Hermiston, Oregon 97838

WBL/dlc

11-28-77

Dear Mr. Hodel,

Dear Mr. Model,

We are writing this letter to state our opinion regarding the Alumax environmental impact statement. It seems clear that the residents in the Umatilla, Herrington area are overwhelmingly in favor of the construction of the proposed plant. Why then are their wishes not met? It seems that since the majority of the residents feel it would be beneficial for the area that our voices would be heard. It is unfortunate that a few people, who do not even live here are able to stand in the way of progress for the community. We wish to state that we think it is time this obstacle is removed, and to allow plans for construction to begin. We cannot stress this opinion too strongly. May the voices of the citizens and tax payers please be heard.

Sincerely,

Dolores M. Ritchey
Harren E. Ritchey



FIRST AND MAIN, HERMISTON, OREGON 97838

DATE: November 30, 1977

TO: Bonneville Power Administration

TO: Bonneville Power Administration

FROM: Doris S. Bounds, Chairman of the Board of Directors,
Inland Empire Bank, Hermiston, Oregon
~~Member, Hermiston Development Commission~~
President of Hermiston-Latilla for 70 years

SUBJECT: Proposed EPA contract for electric service to an
Alumax Plant near Umatilla, Oregon

I ask the following statement be included in the material to be considered for the final environmental statement on the above. I had planned to make an oral statement at the meeting November 22 at Hermiton, but was unable to be present because of weather conditions.

The EPA contract to the Alunox Aluminum Plant near Umatilla should be honored as early as possible for the following important reasons:

Aluminum is a necessary product in the nation and in the region.
The supply must be maintained.

The Alumax plant is engineered to be ultra-safe -- so this aspect of environmental concern is not a matter requiring attention.

The area chosen for this plant location will benefit very substantially from the operation of the Alumax plant, i.e., taxes, payroll, expansion of economic base, attracting skilled workers. Our area desperately needs the added diversification this plant will give to our economic balance and stability.

The delays, surveys, and court actions have been expensive and time consuming. No one has benefited. I urge quick, affirmative action!

Oregon deserves and should have an equitable share of Bonneville power. We certainly have the short end of the stick at present. Why should our needs for industrial development be ignored when plants with similar electric power requirements are welcomed and approved in other states? Why should this area be denied the benefits of our great natural asset which provides locally-generated power?

Home Owned .. Independent

Deposits increased up to \$20,000 -

MEMBER OF SYNERGY REPORT RESERVE CORPORATION

BPA

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If there is any question that this area cannot cope with the problems incident to caring for the influx of construction workers for the Aluma plant or fail to provide necessary housing, schools and services; or fail to absorb and serve Aluma permanent employees it has been proved historically that this area has coped and absorbed. We are a hospitable, vital, cooperative citizenry -- that has planned carefully and worked hard to develop our natural resources and potentials.

Through the years, community leaders have given their time and energy almost always without pay and donating their expenses. It would be a sorry situation, indeed, if the Alumax plan were to be denied us. It would bring so much to a wilderness interpretative community. Since the phasing-out of the Hatilla Army Depot, this industrial facility is a necessity in stabilizing the economy in this area. Aluminum must be produced and will use power. Why not here? Our community is ready. Alumax wants to locate here and we want it to locate here. Alumax's contract for power is to be honored without further delay.

Utahella is an old town -- six thousand (6,000) votes were cast there in Lincoln-Douglas presidential election. In early days, Utahella wintered and supplied the wagon trains that supplied the gold fields of eastern Oregon, Idaho and even Colorado. During the building of the railroad, there were approximately 3000 Chinese living there. With the building of the Utahella Ordnance Depot and the construction of McNary Dam and the Bonneville Power facilities, Utahella expanded its facilities and increased its services to accommodate temporary and permanent workers-- Utahella welcomed the new arrivals.

Hemiston (when I arrived here over seventy years ago there was no town) started with the Bureau of Reclamation's construction of the Cold Springs Reservoir and the Hemaston Irrigation District -- other irrigation districts followed. The rural valued, but always looked forward to capital-own roots. The area had exceptionally fine growing season, development of the Columbia River for transportation, water and power. Highway and railroad transportation were being realized.

For decades, community leaders trudged back and forth to Washington, D.C. at their own expense to beseech Congress, the Bureau of Reclamation and the Army Engineers to develop the great Columbia River resource.

In the interim, beginning in 1940, Hermiston's facilities and 800 citizens were really tested when the Unattila Army Depot (then the Unattila Ordnance Depot) was started with over 3000 construction workers and 1300 permanent employees. At one time, 11,000 ration cards were issued from the Hermiston office. At last, Hermiston had a steady payroll to help balance its economy. In depression years, Hermiston shared in this national catastrophe, but never gave up.

1-07

November 30, 1977

Hermiston NEVER lost its conviction that the development of the Columbia River was its greatest asset. Community leaders pursued every approach in Washington, D.C. to authorize harnessing this resource for the benefit of the area and nation at large. It required unrelenting effort to convince the well-populated East of the general benefits that would ensue.

Finally, in 1947, approval had been secured and construction of McNary Dam authorized for the generation of power and still-water navigation.

The Umatilla-Hermiston area again gathered its forces to provide the good life. The life that had attracted so many who came seasonally to work, but put down their roots instead — the necessary requirements of housing, schools, hospitals, services were supplied, but cultural, recreational and fraternal activities were generated.

The proof that this area can cope and absorb is obvious in that so many who came stayed. The steady growth of the area has attracted newcomers and greatly expanded our trade area.

From a ring-side seat for seventy years, there is no question but what we can welcome and provide for Aluma construction workers and permanent employees. We are experienced, we have surveyed and studied the possible impact. We have invested in the prospect of Aluma locating here. We feel we will benefit. If Aluma's contract for Bonneville Power is honored, it will be a good return for the decades of effort toward the development of the Columbia River.

We ask your approval at the earliest possible moment.

OREGON DIVISION

Izaak Walton League of America, Inc.

DEPENDER OF SOIL, WOODS, WATERS AND WILDLIFE

P. O. Box 58
Gladstone, Oregon 97027

December 6, 1977

Mr. Don Model, Administrator
Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

Dear Mr. Model:

The Oregon Division, Izaak Walton League of America, Inc. has reviewed "The Role of the Bonneville Power Administration in the Pacific Northwest Power Supply System Including Its Participation in the Hydro-Thermal Power Program, A Program Environmental Statement and Planning Report."

Our response to this important document is contained in enclosure (1). We request that a copy of the overall summary of public reply to this document be forwarded to us when it becomes available.

The Oregon Division invites comments and discussion of the issues presented in the enclosure from all recipients of this letter.

Sincerely,

James K. Belknap
President

Enclosure (1)

COMMENTS OF THE OREGON DIVISION, IZAAK WALTON LEAGUE OF AMERICA, INC. ON THE BPA ENVIRONMENTAL IMPACT STATEMENT AND PLANNING REPORT: "THE ROLE OF THE BONNEVILLE POWER ADMINISTRATION IN THE PACIFIC NORTHWEST POWER SUPPLY SYSTEM INCLUDING ITS PARTICIPATION IN THE HYDRO-THERMAL POWER PROGRAM"

1. General Comments on Method of Presentation

BPA alleges that it "urges everyone to participate in the review process." The scheduling of eleven public information workshops well distributed throughout the Pacific Northwest followed by public response meetings at the same locations appears to be a practical and effective beginning.

Unfortunately, the draft program environmental statement and planning report in five volumes and 3,100 pages is so intimidating that the average citizen is effectively discouraged from participating. In the five volumes major and critical points, with alternatives and short and long term consequences for each alternative, are indiscriminately mixed with a mass of detail. Far too much space is devoted to explaining the present situation and self-serving justification of what BPA conceives to be its role. The environmental impact portion does not adequately assess the long range implications of the public and private utility participation in the hydro-thermal regional power program.

BPA has not provided a true summary statement. Instead, its "summary" is a 54-page abridgement of the parent effort. It falls far short of concisely portraying the alternatives available to BPA for describing its role in the use and development of energy. It is intended only as a guide to the official statement and BPA has ruled that "all comments must refer specifically to the Role EIS itself and not to the summary".

What is needed to obtain effective public participation is a summary statement containing the essence of the critical energy choices and alternatives for the future with the advantages and disadvantages of each clearly, concisely, and objectively explained. The average citizen should be invited to comment on this summary with comments on the detailed five volumes of back-up information left to paid employees of special interest groups and a few citizens with sufficient time and interest. The back-up information contained in the five volumes, however, is generally useful as source material for research efforts.

2. Part I, BPA EIS, Chapter IV, Part B, Conservation and Other Factors Affecting Future Power Demand

The Oregon Division wishes to commend the overall excellence, thoroughness, and appropriateness of the Independent Skidmore, Owings and Merrill (SOM) report contained in Chapter IV, pages 131 through 204.

This study incorporates many of the League's long held concepts and recommendations for vitally needed conservation practices such as:

- Maximizing the efficient utilization and minimizing the waste of energy.
- Conservation in lieu of new energy generation sources.
- Uniform building codes requiring efficient insulation and lighting systems.
- Cogeneration of electricity with other energy use.
- Substituting recycled scrap for virgin raw materials. A national shift to recycling would have a significant impact on energy use.
- The reduction of unnecessary product packaging.

3. Part I, BPA EIS, Chapter VI Regional Electric Energy Alternatives and Their Potential Impacts

The Oregon Division concurs with the validity and importance of the issues concerning the regional power system that were discussed in this section. We agree with the following:

- There is a need to alter the institutional structure of the Pacific Northwest electric utility industry. Planning and decision making that rely largely on historical trends to forecast load growth must be modified.
- The concerns and recommendations expressed in the Natural Resources Defense Council (NRDC) alternative energy scenario are valid, particularly the following:
 - All reasonable alternatives including cleaner and less capital intensive techniques for the region's energy future must be fully explored before important options are foreclosed.
 - We must not rely solely on programs to construct more and more power plants. Current plans for such plants substantially overstate the effective demand.
 - The stakes in this choice of "energy futures" are extraordinarily high.
 - The large central power station scenario poses severe environmental consequences for the region. There would be increased air and water pollution from thermal power plants; increased fish mortality; decreased recreational safety and disruption of commerce on the Columbia River due to increased use of hydro

generators for peaking power; increased risks of a catastrophic accident and routine release of hazardous radioactive materials at nuclear power plants and their supporting facilities; and the disruption of thousands of acres of wildlife habitat and land use for agriculture, grazing, and recreational purposes, due to the construction of transmission lines and the surface mining of coal and uranium.

- (5) Many energy efficiency improvements are substantially less costly than the construction of a comparable amount of new thermal generation. Massive amounts of capital required for thermal generation present various economic problems.

4. Part 2, BPA EIS, The Role of BPA

An environmental impact statement is merely a wasteful paper exercise unless 1) the basic findings are the result of a thorough, accurate, and far-sighted assessment of the issues and 2) the basic findings provide the foundation for an action program for the future.

We endorse BPA's attempt to combine the EIS with a future "role" statement. But as was stated in our opening comments, the EIS material, the alternative role material, the back-up data, the past history and the attempts to justify BPA's past actions are presented in a manner that appears redundant and confusing. It is very difficult to separate the wheat from the chaff.

Our comments apply to the entire Part 2 but are directed in particular to Chapter VII, BPA's Mission and Its Proposal to Continue Working Toward Achieving the Mission, Part A, BPA's Role.

The original Bonneville Act of 1937 may have been appropriate for its time. Amendments and interpretations since that time have taken care of current needs and electrical energy needs but in our opinion the role that BPA has exercised in the past ten years has evidenced major deficiencies in planning for the long range future. We urge an overhaul in BPA's role along the following lines:

- Neither BPA nor the public and private utilities, or the utilities and BPA combined, should continue to make the major decisions concerning the amount, type, and location of new energy generating facilities and the location of high voltage transmission lines. Such matters are the responsibility of the people of the Pacific Northwest exercised through their elected representatives. Until recently, BPA and the private utilities have presented such major decisions, with the tacit consent of the state and local governments, as inevitable, realizing that growth and development cannot continue indefinitely using a finite base of natural resources and causing pollution and other environmental damage with each increment. We are also realizing that energy use is inextricably linked with growth and development. And we are aware of the poor track record

of BPA and the utilities in anticipating the long range future. For example, as recently as five years ago the utilities were belittling energy conservation and aggressively merchandising electric appliances. At the same time BPA was forecasting an electric load growth of 7 percent a year for the next 40 years.

- We urge the creation of a new regional planning and action entity consisting of the northwest governors supported by a highly qualified nonpolitical professional staff and by appropriate federal agencies. The purpose would be to coordinate policy for all forms of energy with policy for land use and growth and development. It would be responsible for merging such policies into harmony with long range quality of life goals for the Pacific Northwest. The existing Pacific Northwest River Basins Commission and the Northwest Regional Commission should be combined and revamped as a part of such a new entity.
- BPA should continue its lead role in integrating the region's generation and transmission systems, the one utility concept. (Also see our comments for Part 2, BPA EIS, Appendix B - Power Transmission.) It should continue to wholesale power from federal projects.
- BPA should be assigned a lead role in developing and promoting the region's energy conservation program (subject to policy direction from the new regional entity described above in item b.). Ample funds for this purpose should be allocated from power revenues.
- BPA should not be given the authority for constructing or operating new thermal generating plants utilizing nonrenewable fuels. Instead it should be authorized and directed to expand its existing role for one renewable resource, water power, into additional renewable resources that inevitably will be mandatory in the long range future. This role should include a major effort to keep abreast of energy research and testing efforts by ERDA and other organizations throughout the world and the publicizing of such information. Where supplemental efforts are needed to serve northwest energy needs, BPA should initiate its own research, testing, promotion, and perhaps initially, construction and operation. Financing should be from power revenues. These renewable energy systems should include but not be limited to:

- (1) Pump-lift hydro systems.
- (2) Geothermal systems (including the use of lower temperature deposits for space heating and similar purposes).
- (3) Systems to convert waste combustibles such as municipal trash, grass straw and unused residuals left from logging and manufacturing forest products into beneficial energy sources.

5. Part 2, BPA EIS, Appendix B -- BPA's Power Transmission

Unquestionably, having an agency such as BPA to coordinate and transmit the high voltage power generated by all the public and private utilities in the Pacific Northwest Power Pool is a very effective and efficient arrangement. It should be continued in some form.

The draft statement goes to great lengths to explain and justify the present system and proposed expansion thereof. It explains in some detail the efforts made to mitigate the adverse effects of the overhead transmission of high voltage power but it fails to fully assess the total economic, environmental, and social costs of such transmission, despite mitigation efforts. It fails to highlight such adverse effects and thus fails to place any sense of urgency on the critical need for developing innovative and far-reaching alternatives to the present system. It overemphasizes the merits of the status quo.

Of significance is the fact that rights of way for a total of about 15,500 miles of overhead transmission lines preempt the use of about 235,000 acres of land (20 percent owned by private utilities -- 80 percent by BPA). More of the same are planned for the future -- about 4 percent per year.

The annual productive value of high grade commercial forest land cleared per mile of transmission line is at least \$10,000 in stumpage and value of manufactured forest products. If we assume that 15 percent of the total transmission lines are through such forest land, the annual loss would be about \$35 million. There is a similar but lesser adverse economic effect on agricultural lands. In urban and suburban lands the economic costs probably are higher than for timber lands. The total identifiable economic costs are probably over \$75 million per year.

In addition, transmission line construction and maintenance results in soil erosion, destruction of fish and wildlife habitat, increased fire hazard, use of poisonous herbicides, line noise, radio and TV interference, and visual pollution, particularly in scenic areas. Since most of the power transmission needs are east to west and most of the mountain ranges run north and south, there are major conflicts involved in crossing national forests, national resource lands (BUE), national parks, wildlife refuges, wilderness, historic and cultural sites, recreation and scenic areas. These noncommercial values are rapidly becoming more and more valuable to the public. They are finite. In many instances they are irreplaceable. Some key mountain passes are already loaded to capacity with power transmission lines.

In our opinion, the environmental statement and planning report for Appendix B should be revised substantially with the alternatives for the future highlighted and the remainder relegated to back-up material. Our major recommendations are:

- The location and timing of high voltage transmission lines should be a decision of the people of the Northwest exercised through their elected representatives. The location and construction of transmission

- Solar and wind electrical systems with particular emphasis upon smaller scale medium technology reversible systems that could be installed by farmers and others to serve three functions: a) provide much of their own electrical energy needs during sunny or windy periods, b) feed energy into distribution lines when excess to their individual needs is generated, c) allow them to draw energy from the distribution systems when individual needs exceed the generation of their own systems. Many such systems are being developed and tested now. Some, such as pumping water, are already competitive with the costs of conventional electric power.

- Wave energy. The British Government is currently testing in the North Sea a full scale system of "floating ducks" designed to capture 80 percent of wave energy and convert it to electricity by use of an elaborate system of hydraulic pumps. The design was conceived and prepared at the University of Edinburgh. It is expected to be competitive with electricity generated from fossil fuels or uranium. The North Pacific location should prove equally favorable for wave energy development.

- Over the past forty years the installation of the federal hydro dam on the Columbia River system has had a major adverse effect upon anadromous fish runs. Population and industrial growth made possible by the cheap hydro power have caused additional adverse effects and at the same time created vastly increased demand for the diminishing fish runs for both food and recreation. A similar but less severe adverse effect and increased demand on diminishing resources has resulted in the case of waterfowl and other wildlife, archaeological, historical, cultural, and scenic values.

These lost fish and wildlife, cultural and recreational values should be fully restored or mitigated. BPA, representing the major beneficiary from the dam that caused the damage, should provide to appropriate federal, state, and local agencies from current power revenues the funds for the restoration or mitigation.

- The Izaak Walton League has no official position on the BPA "preference customers". However, plain logic and equity clearly indicate that the public agency which integrates the energy generation and transmission system and operates the Pacific Northwest Power Pool should charge the same rate for each class of electrical service. Yet, solely due to the BPA preference clause, the residential customer in Clark County, Washington, for example, pays less than one-half the rates for a residential customer in Multnomah County, Oregon. This is the roughest kind of discrimination. If there was ever a justification for such preferential treatment, it has ceased to exist.

lines should be part of the total decision involved in the location and construction of new generating facilities. BPA and the utilities should have substantial input but on an equal basis with representatives of forestry, agriculture, land use commissions, U. S. Forest Service, BLM, wildlife, wilderness, and recreation representatives.

b. BPA, in cooperation with the states and federal agencies, should aggressively promote the utility corridor approach. Gas lines, oil lines, coal slurry lines, etc., parallel to high voltage power lines. In addition, BPA should promote an effective extra high voltage interstate with the midwest and Rocky Mountains. These have the potential for the long term future, for advantages and efficiencies equal to the existing southwest interties.

c. BPA should fully and objectively assess the very high direct and indirect economic costs and the rapidly increasing social and environmental costs of its present system of overhead transmission and aggressively sponsor and promote a stepped-up research and development program aimed at perfecting a feasible system or systems for transmitting large blocks of high voltage power by underground pipeline. In addition to eliminating most of the economic, social, and environmental costs of overhead lines, undergrounding, using cryogenic or other unperfected technology, promises a substantial reduction in the electrical transmission losses suffered under the present system.

6. Part 2, BPA EIS, Appendix C, BPA Power Marketing

a. Chapter III, page 11, line 27

We favor the revision of rate structures from the traditional "proportional rate" to a pattern that encourages conservation. Such new structures would aim to reduce both the use of energy and of peaking capacity. Such a rate policy should be applied to all classes of power use including residential, commercial, farm and industrial.

b. Chapter III, page 129, line 17, "Alternative Policies Concerning Electric Energy Use and Conservation"

We support the proposals for energy conservation including education programs and incentive and mandatory practices. We note that perhaps as much as one-third of total regional power requirements as of 1995 could be saved through vigorous conservation efforts of the types suggested.

c. Chapter III, page 135, line 42, and Chapter IV, page 251, line 5 (Home Insulation)

We commend the proposed program for complete insulation of all electrically heated residences in the Pacific Northwest under a

program largely financed by BPA and administered by both public and private power distributors. We note the estimated saving of over 500 M/W average at a cost less than that of building equivalent new generation.

7. Part 2, BPA EIS, The Alumax Environmental Statement

In 1974 the Oregon Division, Izaak Walton League of America adopted a resolution opposing the construction of the proposed Alumax aluminum plant at Warrenton, Oregon for environmental reasons and because "there is a long term deficiency of electric power supplies in the Pacific Northwest, and the proposed plant would use more energy each year than a city of 200,000 and would export out of the United States at least half of the output."

The Alumax plant at Unatilla would overcome most of our environmental objections but, if it uses BPA power, none of our energy objections.

It appears extremely shortsighted and contradictory for a public agency (BPA) to deliver our overcommitted hydro power to a new industrial firm which will export at least half that power to Japan in the form of aluminum ingots. In any event, since the Alumax contract would expire in 1986 and the plant could not be completed before 1980, the availability of cheap power for only five years should make the investment unattractive.

The only option that should be considered is for Alumax to build its own power generation capacity, or contract with a private utility to build it, and charge the company the full present day costs. We see no justification whatever for subsidizing Alumax.

Alumax impact statement, Roseville Power Administration, Open Forum:

After hearing some of the testimony presented at the Alumax impact hearing, I get the feeling, most who testified in favor of Alumax were too blinded by Alumax talk of a \$400 million plant to see far beyond the end of their noses. I will grant a few may make a quick buck if Alumax builds. But with the final costs of increased welfare, unemployment, electrical rates, streets, sewers, water, crime, etc.; will it be gain or loss.

In this nation we have no problem of production, the problem is distribution, it is the human factor that is in short supply. Some want to take everything with no consideration at all for the needs and rights of others. For years this nation has had false prosperity gained by produce and consume. This has led to gross waste, unemployment and indebtedness. We are living on and wasting, what we hope to be able to pay for sometime in the future and what the future generations will need for survival.

This greed and waste is now beginning to create shortages. We are now producing more of most everything than we have any true need for and to build more plants and increase production is gross waste and will lead to greater unemployment. The bigger and more modern a plant is the more each of it's employees will produce, creating more profit for the company and greater unemployment for the nation.

The fact Alumax wants to build a plant which is an energy hog, here in the northwest, knowing the northwest is facing an energy shortage, to me is proof beyond question Alumax has no true interest in the area nor it's people. Alumax's sole purpose is profit. It will cooperate and promise in order to get in position to profit, but once in position it will exploit, for exploitation is the sole purpose of large corporations. It will pay as little taxes as possible, hire as few employees as possible and pay

them as little as possible, spend as little on environmental protection, etc;

If we are to overcome unemployment and avoid disastrous shortages in the future, we will have to get away from bigness and return to smaller plants, farms, etc; so that more people are involved in ownership and management and it is less practical and/or profitable to replace employees with machines. We need more people more involved in some of the facts of life, so that they better understand the final results of their acts and what their part should be. As a general rule man should reap what he sows and live with or by it.

Bigness makes too much room for passing the buck, allowing some to waste and/or profit while others pay the bill. Also the area the individual is involved with and familiar with is so small and distant compared to the whole, the individual does not understand the whole or know how he affects it. Alumax hopes to profit from cheap power and low employment, and as cheap power is about a thing of the past and we already have too little employment, in the long run we all pay for Alumax's profit with higher energy bills, increased unemployment, taxes, crime, air pollution, inflation, etc; Alumax may make a profit for a few, but it will be a gross loss for the whole in the long run.

Thank You

Earl F. May

Rt. 3 Box 3915

Hermiston, Oregon 97838

Retyped from Original Letter

Olympia, Washington
Dec. 11, 1977

To: BPA

Re: BPA "Role" E.I.S. and Alumax E.I.S., to be entered as testimony on the E.I.S. hearing records.

In reference to Part II of the "role" E.I.S., the role of the B.P.A. should be that of the major supplier and transmitter of electricity regionwide, using environmentally sound renewable energy resources, coupled with conservation. The B.P.A. should not be involved with nuclear power generation in any manner, nor should it buy or transmit nuclear power. My objection to B.P.A. involvement in nuclear power is twofold: first, the problems of nuclear wastes are too great, and secondly, I oppose a government agency giving financial support to private businesses operating nuclear power plants, by guaranteeing purchase of power.

First priority in supplying power to industries should be given to those based on regional resources--agricultural and forest based industries such as food processing and pulp mills. Second priority should be given to industries which have high employment and low-energy use. Primary aluminum manufacture and related energy intensive industries should be phased out, with the possible exception of one or two relatively efficient plants.

In reference to Part I, the main method of generating power should remain hydro. BPA should also become involved in massive research and development of renewable energy including: solar, geothermal, wind, waste burning, biomass conversion energy from the sea, and magnetohydrodynamics. Emphasis, particularly in solar energy, should be placed on decentralized power, with direct solar heating and cooling of residences and industrial plants.

In reference to Appendix "B", BPA should devote extensive research and development to alternative transmission systems. Present transmission systems take too much forest land out of production, are too hazardous, and result in too great a loss of power. Construction of further high voltage transmission lines should wait until better transmission systems are available.

Energy conservation should become the cornerstone of BPA's role. BPA should only promote the generation of as much power as can be supplied by hydro power and other renewable sources. Further "demands" should be met with constructive means of conservation. BPA's responsibility is conservation, not meeting excessive energy demands.

In reference to the Alumax E.I.S., sale of power to Alumax should be denied. We as citizens of the Northwest shouldn't be forced to suffer from the environmental and economic effects of nuclear power involved in the generation of power for Alumax, just for the benefit of private corporations. We are satisfied with the environmental and economic costs of hydro power, and want nothing more. "Growth" for its own sake is destructive of the qualities which we value in the Northwest. Our family has lived in the Northwest for several generations, and we intend to remain here. We don't want our region despoiled for a greedy few.

Sincerely, Russell A. Pfeiffer-Royt
Rt. 14, Box 556
Olympia, Wash. 98502

of large central thermal power plants are diffuse, indirect and frequently delayed, they far outweigh the local advantages. Nothing is said about the high interest and capital intensive back-up power plant which may well usurp investment capital from alternative needs which might afford a more balanced industrial productivity. This subject could be explored in detail but time does not allow this. This is an example of unobjective except to the extent that it is designed to persuade to a specific point of view, writing. As such this section discredits the EIS making it appear possible that this section was written not by BPA but by Alumax. Time does not allow a complete listing of this sort of persuasive rhetoric which has no place in a document represented as "objective". I suggest this section needs drastic and extensive rewriting. Self-serving arguments should be identified and a balanced presentation should be accomplished. Alternatively, the document should be discarded and written by better informed authorities. The electrochemical industry lobby is very apparent as is its generous advertising budget. A government agency should be the last source of "selected" information. I am deeply disappointed by BPA's apparent insensitivity on this point, particularly when I find little in the definition of the word "propaganda" which would exclude parts of the Alumax document. I am unimpressed by the fact that the Department of Interior had some measure of approval of this draft statement. Perhaps it is time to have training programs for government officials on "The ethics of persuasion in a democratic society". I note (page I-1) that, The court ruled...BPA must prepare an EIS assessing the primary, or direct impact of the proposed plant as well as the socioeconomic impact of the proposed impact of the proposed plant on the local eastern Oregon community....". BPA may be acting according to the court ruling in the Alumax EIS but this is not a restrictive order, only the minimum court requirement. Objective analysis dictates the broader consideration of economic and environmental impact.

I can not identify an appropriate section of the EIS to relate the next point to. I refer to the matter of interruptible power and its benefits in terms of reliable distribution. Again the matter of comparison comes up in the following way. It is not possible to my knowledge to ascertain the history of actual interruption in interruptible power. This information is required if the reader is to evaluate the extent to which said power is in fact "interrupted" and if the reader is to judge the extent to which this provides more reliability in the delivery of power. If interruptible

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BOONVILLE EIS DRAFT STATEMENT TESTIMONY.

R. G. Wolfe

Eugene, Oregon, November 10, 1977

Let me preface my specific remarks with some rather general observations. I find this draft statement a vast improvement over the statement of several years ago. As a preliminary draft reviewer I was greatly encouraged by the obvious educational process going on in the BPA offices. As one humbled by the complexity of our energy problems I hope that this educational process will continue within and outside of BPA.

I feel that the draft statement is far too long. This is such a general point that I can not make specific recommendations. I suggest the use of a criterion question, "Does a particular section or item significantly implement decision making?" I think everyone will agree that the fundamental purpose is objective decision making.

A second rather general deficiency in my opinion, is the rather rare identification of interrelated aspects of the problem and the consequent deficiency in making comparisons of alternative courses of action. This is very difficult to do, but is the essence of good decision making. Let me give a probably oversimplified example. Transmission corridor capacity is determined, or rather the capacity need is determined by peak demand for electricity. There are alternative methods of handling the peaking problem, for example heat storage by the consumer. The required transmission capacity and energy storage are therefore related matters and there are countless other related factors which are not apparent in this document. How can objective decisions be made without such information? It is possible to interpret the apparent deficiency in this aspect as an expression of similar planning deficiency within BPA. For that reason I am tempted to suggest that "systems analysis" management techniques are necessary in the operation of BPA as well as in the writing of this document. I am not qualified to judge the extent to which "systems analysis management" is currently practiced in BPA, I only observe its apparent small influence in the draft statement.

Let me illustrate the deficiency of comparative treatment with a consideration of the economic impact section (Chapter IV B) of the Alumax Environmental Statement. This section extolls the virtues and benefits of this industry at the local level. The reader unschooled in promotional advertising might assume that there are no consequences of meeting increased electricity demand with the required additional costly thermal power. While the effects

-1-

power has so greatly benefitted the Northwest let the record speak for itself with quantitative fact rather than broad generalization. The need for this data is too obvious to require further justification. Arguments and positions can and should be backed by facts in any writing supposed to be objective. This is a glaring example, unless the information has escaped me. To be more specific the data provided should indicate the time and duration as well as the load relief. Appropriate statistical representation of duration and load relief information should be provided to allow quantitative comparison with reliability data. It is highly desirable to compare this sort of load management with alternatives such as energy storage by the ultimate user, interruptible power to water heaters and air-conditioning facilities.

At some appropriate location the EIS should be updated to consider the recently released report of Task Force B FIMCO and the suggestion that smaller more flexible power plants be constructed. This should be related to the proposed increased use of the Columbia river flow to meet peaking needs.

The draft EIS should include, in the same form, the TRC research analysis of the Natural Resources Defense Council "Alternative Scenario". It is my understanding that TRC found no technical deficiencies although they did opine that the extent to which energy conservation might be implemented might be optimistic. Since the FIMCO scenario is optimistic about meeting electricity demand through conservation without planning new central power plants, it is worthy of serious consideration. Bearing in mind that natural conservation makes the acceptance of alternatives to time-proven procedures difficult, this TRC analysis should be appropriately weighted. To the extent that conservation measures are more cost effective than the alternative, namely, large thermal power plant construction, the choice is obvious. This is particularly true when the environmental impact of each alternative is considered.

Finally, I am sure that many additional specific observations might be made before the deadline for submitting written comment on the draft EIS. Unfortunately, most of the public is unable to respond in the relatively short time available. I hope that BPA can consider an extension in the deadline for submission of written comment. Also, although I am associated with the Eugene Future Power Committee, these remarks are solely my personal responsibility.

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L-61

THE TIMBER CO., INC.

General Contractor

P. O. Box A 1850 N. First

Hermiston, Oregon 97838

November 22, 1977

Bonneville Power Administration
Alumax Environmental Impact Hearing
November 22, 1977

Gentlemen:

Enough is enough! The country needs private industry to create jobs. We need jobs in this area of this type.

We have way too many lowpay agriculture oriented jobs now, which the people cannot make up their minds to work or stay on welfare.

Alumax is needed and we would welcome them here.

The bureaucrats, environmentalists and federal judges have all been throwing up road blocks for years, for enumerable selfish reasons, this should not be a political football.

This industry's product is needed by the whole country. The jobs are needed by the whole country. A little common sense would be a welcome change to clarify this situation.

The tax base generated would help every town and person in this area.

As you surmise, we are 100% for Alumax to locate in this area and have utter disdain for those selfish interests who continue to try to stifle any progress.

Yours very truly,

THE TIMBER CO., INC.

Walter J. Earing

WJE:mjh

HOUSE ADDRESS
JACK DUFF
ST. L. BOX 82
ALUMAX, OREGON 97801
COUNTY
UMATILLA COUNTY
DISTRICT 97



COURTESY
HOUSE
JOINT INTERIM COMMITTEE ON
WATER MANAGEMENT
OPERATIONS

HOUSE OF REPRESENTATIVES
SALEM, OREGON
97310

November 21, 1977

To Whom It May Concern:

I am writing in support of the Alumax proposal to build a plant in Umatilla County. The Alumax Pacific Corporation has gone far in it's offer to help with the impact which the construction of such a facility would have on the surrounding area, especially the towns of Umatilla, McNary and Hermiston.

The impact on the County as a whole would be considerable in several areas. Since Umatilla County is primarily Agricultural, diversification is needed to level out the wide swings in income due to weather and prices. The benefits to be derived from the new assessed value to the County taxing districts, the increase in employment and income, the growth in both residential and commercial areas would all add much to the progress of Eastern Oregon.

I am in favor of bringing in clean industry to our County. I would encourage all efforts to get the problems of impact and environment resolved as quickly as possible in order for the Alumax Corporation to proceed with it's plans.

Sincerely,

Representative Jack Duff
JD/rtd

November 22, 1977

Public Response Meeting
Bonneville Power Administration

Re: Alumax Aluminum Plant
Environmental Impact Statement

November 21, 1977

Gentlemen:

Sanitary Disposal, Inc. presently serves this area for the collection and disposal of solid waste. As President of this Company, I, Merle Jewett, would like to submit the following information with reference to the proposed impact the Alumax Plant will have on our company.

We have recently purchased some new, modern equipment which will increase the life of our landfill 30% to 50% making the anticipated life at least 15 years. We have ample space, adequate equipment and the personnel to handle the collection and disposal of solid waste for our franchised area.

We are aware of the future development and the inflated population that will be created during the construction of the Alumax Plant as well as permanent employees and additional population which will be generated by Alumax and other new businesses and industries. We are confident we are capable of meeting this challenge.

Very truly yours,

Merle P. Jewett
President
Sanitary Disposal, Inc.

MPJ/bbh

To whom it may concern:

Alumax is more than welcome in our area and I can see no end to the benefits it would bring to our area. The site situated is ideal with the railroad, water and roads in close proximity. The same amount of power will be used, no matter where it is located so I'd like to share the power and receive all of the benefits and advantages which comes with a company of this stature.

Sincerely yours,

Kenneth Cole
1050 N. 1st, Suite 115
Hermiston, Ore. 97838

November 21, 1977

November 22, 1977

Mr. Howarth and People of Umatilla County:

I am very much in favor of the proposed Alumax Plant. The benefits for the community far outweigh the negative aspects of this production facility. I say let us use the power where it is produced. Let us have the payroll instead of Washington State and let us not be swayed by some small minority group, from somewhere else. This plant is a great opportunity for this community. Again let me say that I support it 100 percent.

Thank you:

Gary Hughes
Gary Hughes

Our area would welcome the Alumax plant and I feel the benefits would far outweigh all the problems that have been dreamed up. It is an ideal site with good roads on all sides, the railway and waterway. After all is said, it would use no more power here than if situated in Astoria, Seattle or any other place.

I am in favor. Alumax, we want you to locate here.

Sincerely yours,

John F. Felt
Box 678
Felt, Ore. 97826



Moore & Ripley Drug Inc.

121 MAIN STREET

P. O. BOX 147

PHONE 567-5555

HERMISTON, OREGON 97838

Bonneville Power Administration Environmental Hearing
Alumax Environmental Impact
November 22, 1977

Bonneville Power Administration

Mr. Chairman:

I am Irvine Howard, mayor of Echo, Oregon. I reaffirm my support for the Alumax plant to be built here in Western Umatilla County. We need the jobs; we need the increase in evaluation the plant will bring to the tax base, and we need the diversity this will bring to our economic base.

In my judgment, the study identifies no unusual growth problems that are not manageable, and I urge the speedy o.k. of this plant.

Irvine J. Howard

Irvine J. Howard
Mayor, City of Echo

November 21, 1977

Bonneville Power Administration
Mr. Don Model
Alumax Hearing
Hermiston, Oregon 97838

Dear Mr. Model:

I would like to take some time to reaffirm the position taken two years ago at a similar hearing at this location. As a resident and businessman in the city of Hermiston, I still support the proposed Alumax aluminum reduction plant near Umatilla. This area's communities and business facilities have been improved during this time and the addition of this Alumax facility would further expand our economic base. This would add to the employment and development of Northeastern Oregon.

The block of power in question, I feel should be released to Alumax to be utilized in an area which has provided the resources for its development. This area of Oregon has not received its share of hydroelectric energy for industrial development. Alumax's development would help equalize this energy export.

Sincerely,

Bernard W. Carper
Bernard W. Carper

REMARKS OF S. R. LINDSTROM
MEMBER, BOARD OF DIRECTORS
PACIFIC NORTHWEST WATERWAYS ASSOCIATION
OPR/ALUMAX HEARING, NOVEMBER 22, 1977

Good Evening and thank you. I am Steve Lindstrom, Manager of the Port of Umatilla. But, since you have heard from the Port Commission President, I am speaking as a member of the Board of Directors of the Pacific Northwest Waterways Association. The PNWA was incorporated as a non-profit organization in 1934 and for more than four decades has sought to achieve significant objectives related to the comprehensive planning and development of the water and water-related land resources in the Pacific Northwest: Oregon, Washington, Idaho and Western Montana. Some of the PNWA goals have been attained, others have not. Obviously, the matter before this hearing is a situation yet to be resolved.

Resolving the specific matter of the siting of Alumax or resolving the larger, more nebulous matter of the power picture in the future of the Northwest will not occur easily or instantaneously. But I can assure you it will not occur in a singular or limited scope.

Specifically: Extreme curtailment, even total limiting of the region's many aluminum smelters, or the prevention of the building of new aluminum smelters, cannot be construed as in the national interest or that of the region. These smelters produce some 30 percent of the nation's total aluminum supply. Not only is continued growth and expansion of the aluminum industry vital to national objectives of improved transportation services and energy-saving device utilization, but aluminum contributes to the well-being of the region as well. Aluminum is in itself an energy bank and conserves valuable energy resources through its application in hundreds of vital and beneficial uses. We cannot believe that casting aside the needs of the aluminum industry for the sake of some supposed up-front energy savings and replacing it with labor intensive industry is in the best interest of either the nation or the Northwest.

We oppose this idea for many reasons. For example, the region's labor force is unwilling to accept the lower wages and threatened automation that invariably accompany labor-intensive industries. This, versus the income derived from the relative sophistication of the electro-mechanical process industry of the region. Many other major employers such as Boeing PACCAR, and Freightliner depend upon aluminum for their products. Other reasons abound.

We would suggest that a healthy and vital aluminum industry is a most beneficial force in the Pacific Northwest today and promises to continue to be so in the future and by that belief, we strongly urge the immediate approval, construction, and start-up of Alumax at the McNary Industrial Park.

Thank you for your kind attention.

"It would appear that Alumax Pacific has conscientiously sought to obey all relevant laws and regulations. Their end product is legal and beneficial. Therefore, I believe that personal opinions as to the desirability of a specific, legitimate enterprise are irrelevant. In that context, which I believe transcends all others, it is my firm belief and recommendation that Alumax Pacific should be permitted to invest their capital and talent to create the industrial plant which they propose." End of Quote.

As an epilogue I will say that should I find the existence of the plant personally intolerable, I am blessed with the freedom of choice to move away. Further, if those of us who are not at risk in new ventures continue to obstruct those who are, we cannot expect the fruits of free enterprise, already hampered in many ways, to be available to our descendants in the same measure we take for granted. The fate of one aluminum plant in Umatilla County, Oregon will not alone deflect the course of democratic capitalism, but as one of many such decisions pending across the United States its long-term importance reaches far beyond this community. And if we are to permit only those activities which are free of risk to our persons, the environment and our personal economy, then we must be prepared to accept ever-decreasing material returns.

In the firm belief that Alumax' purpose is legitimate and its product beneficial and with confidence in the community's ability to cope with the consequences, I repeat my positive recommendation of July 1975.


Charles R. Morris

Charles R. Morris
725 East Highland Avenue
P.O. Box 121
Hermiston, Oregon 97838 567-8652

Statement made at the Alumax KIS Public Response Meeting, Hermiston, Oregon,
November 22, 1977.

I am Charles R. Morris, Hermiston citizen and resident by choice and REALTOR by profession. I make this statement as an individual citizen.

There are many facets to the current issue, and many different consequences will flow from the final decision, be it positive or negative. Some we can reasonably foresee. Some will undoubtedly surprise us. The more tangible benefits, the adverse impacts as well as the community capabilities and shortfalls have been, or no doubt will be, thoroughly covered. Therefore, my purpose in speaking is to voice a deep philosophical concern as I did before the Environmental Quality Commission in this same place in July 1975. I quote those earlier remarks:

"What I believe and have to say goes beyond, but does include, aluminum reduction plant in Western Umatilla County. The overriding issues are the viability of free enterprise and free choice within the law.

"Our way of life, our relative freedom from want, and, in fact, our personal freedoms are founded and sustained on an economic and social system of private capital investment and reasonable freedom of choice as to the object, time and place of that investment. As a society we have increasingly constrained that freedom of choice by laws and regulations at all levels of government and by vocal displays of philosophical dissent. In particular, of late, we have, through attitude and law, severely altered the relative values of economic productivity and the condition of the environment in which we exist. Yet, we cannot realistically achieve our environmental goals without the financial resources available only through economic productivity.

"When an enterprise persists in the face of and in full compliance with those external socio-political constraints to exercise freedom of choice in capital investment, they should be permitted to make that choice. Serving complied with the statutory and regulatory demands of society, such an enterprise should not be thwarted by those who do not share the economic risk.

November 22, 1977

Public Hearing
Hermiston Power Administration

Re: Chapter III, Section 9, Part B
Environmental Impact Statement
Alumax Aluminum Plant

Gentlemen:

Concern has been expressed regarding the social impact the construction and operation the Alumax Aluminum Plant would have on the communities in the West end of Umatilla County, and Southern Morrow County.

As a resident of Hermiston all of my life and active in civic affairs all of my adult life, I feel qualified to present some history of our development.

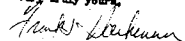
The population of Hermiston was 850 people when the construction began for the Umatilla Army Depot. At the peak, there were over 8000 workers on the project. We managed to take care of this influx without the aid of any Governmental Agency.

Shortly after World War II, we were advised McNary Dam was to be built. The influx of workers during this construction was 3500. After our experience with the Army Depot, the McNary Dam construction posed no problem.

Since the completion of these two major projects, the PNWA has continued to grow and upgrade its facilities. The development of Hinkle Railroad Yards, Harlotta, Leach-Watson, Johns Harville, Simplot as well as the numerous agricultural businesses continued to grow and then is planned for the construction of Alumax.

All this activity has been taken in stride by the communities involved. I am confident we are able to accept the challenge of the social impact Alumax will have on our communities and welcome the opportunity.

Very truly yours,


Frank J. Barkenrider
President
Hermiston City Council

FJB/bbb

HEARING ON THE ALUMAX ENVIRONMENTAL IMPACT STATEMENT

Hermiston, Oregon
November 22, 1977

My name is A.K. Felt. I am the administrator of the Umatilla Hospital and I am speaking for the Good Shepherd Hospital in Hermiston and the Umatilla Hospital.

We take an affirmative attitude regarding the Alumax proposal for the following reasons:

1. Collectively we have the bed capacity needed to serve a substantially enlarged patient clientele. During the last two years, we have had an average daily non-newborn census of 53% of our 69 beds leaving 32 beds available. During the same period the nursery's have been only 15% occupied by newborns.
2. Our hospitals offer an extensive selection of inpatient and out-patient services and with the added demand of a larger population, our services can be even more comprehensive.
3. Greater utilization of any bed or service has the effect of lowering our cost per service unit and has a curbing effect on the rising cost of health care.
4. Both Hospitals maintain Emergency Rooms with Good Shepherd offering 24 hour physician coverage.

5. The Governing bodies and administrations of both hospitals are assuming an aggressive posture in the effort to attract additional physicians to our communities. This is evidenced by the professional building under construction in Hermiston and the ongoing plans for such a building in Umatilla.

We feel an affirmative decision regarding the Alumax proposal will improve the quality of care offered by the hospitals and medical community in Western Umatilla County.

Thank you

A.K. Felt
L. B. Mahoney adm.
Good Shepherd Hospital

city of
hermiston

305 EAST MAIN STREET / HERMISTON, OREGON 97838

STATEMENT OF SUPPORT FOR SITING ALUMAX PACIFIC AT THE PORT OF UMATILLA

Bonneville Power Administration Environmental Hearing
Alumax Environmental Impact
November 22, 1977

Bonneville Power Administration
Gentlemen:

Hermiston has the ability to provide city services and housing adequate to meet the needs of a rapidly expanding population pressure. New construction of single and multi-family housing has been provided in both existing and well laid out new subdivisions to accommodate a growth of 55% since 1970.

A new water source has been developed, and the new sewerage treatment facilities are in Phase II construction design status.

A progressive attitude has been demonstrated within this community in the continued support for the Alumax proposal in spite of the aggravating delays. Some of these delays were of local origin. This is in line with the intent stated in this city's comprehensive plan that a balanced, expanding economy is needed and wanted to provide for the economic well-being of its citizens and an ability to fund adequate city services.

I believe that the proposed wage scale and the added tax base to be provided by Alumax is complimentary to and an essential part of accomplishing this planning goal.

Thank you.

L. P. Gray
L. P. Gray
Mayor

city of
hermiston

305 EAST MAIN STREET / HERMISTON, OREGON 97838

Bonneville Power Administration Environmental Hearing
Alumax Environmental Impact
November 22, 1977

Bonneville Power Administration

Gentlemen:

I am Raymond R. Schroth, member of the city council of the City of Hermiston.

Mayor Gray has asked that I read his letter of testimony at this hearing inasmuch as he is out of the city today.

(read letter)

On behalf of the members of the Hermiston City Council, I would like also to express their endorsement in the location of the Alumax aluminum plant in this area. The capital investment and the new jobs that will be created for the people in this area have been long awaited.

Through the excellent work of our city planning commission the present growth the city has experienced has been well managed. With the development tools at hand and the experience gained during the past few years, the City of Hermiston has been placed in a most favorable position to accommodate any future growth that may come.

The Alumax Pacific officers have on many occasions expressed their corporate willingness and desire to assist the various local governments in accommodating whatever impact may occur in their plant location here. I would like to congratulate them in their corporate responsibilities and their desire to be a good neighbor to one and all of us.

The much needed diversification to stabilize the economy should be paramount for the well-being of the citizens in this area. Alumax would accomplish this much needed goal.

Thank you.

Raymond R. Schroth
Raymond R. Schroth
City Councilman

TO: BONNEVILLE POWER ADMINISTRATION, ENVIRONMENTAL IMPACT HEARING
HERMISTON, OREGON NOVEMBER 22, 1977

MY NAME IS CLIFFORD MORGAN. I AM VICE PRESIDENT OF THE NORTHEAST OREGON BUILDERS ASSOCIATION. THE NORTHEAST OREGON BUILDERS ASSOCIATION IS AN ORGANIZATION OF BUILDERS AND ASSOCIATED INDUSTRIES, PRIMARILY INVOLVED IN THE CONSTRUCTION OF HOMES, BOTH SINGLE FAMILY AND MULTI-FAMILY. WE ARE ASSOCIATED WITH THE NATIONAL ASSOCIATION OF HOME BUILDERS AND THE OREGON STATE HOMEBUILDERS ASSOCIATION.

I HAVE STUDIED THOSE PORTIONS OF SECTIONS III & IV OF THE IMPACT STATEMENT AS THEY APPLY TO THE PROJECTED HOUSING NEEDS IN SO FAR AS THEY WILL BE AFFECTED BY THE ALUMAX PLANT, BOTH DURING CONSTRUCTION OF THE PLANT AND THE PERMANENT OPERATION OF THE PLANT.

THE ENVIRONMENTAL IMPACT STATEMENT BASICALLY DEALS IN PERCENTAGES. BUT, IF YOU CHANGE THESE FIGURES FROM PERCENTAGES INTO DOLLARS, IT WILL GIVE YOU A DIFFERENT PERSPECTIVE OF THE EFFECT ALUMAX WILL HAVE ON THE ECONOMY THROUGH JUST THE HOUSING INDUSTRY. I HAVE MADE SOME CALCULATIONS BASED ON SINGLE FAMILY DWELLINGS. THESE FIGURES DO NOT INCLUDE MULTI-FAMILY DWELLINGS, MOBILE HOMES, OR THE DEVELOPMENT OF LAND FOR MOBILE HOMES OR MULTI-FAMILY DWELLINGS.

TABLE IV-17, PAGE LV-53 "NEW DWELLING UNITS NEEDED FOR ALUMAX RELATED GROWTH" SHOWS A PROJECTION OF 1380 DWELLING UNITS WILL BE NEEDED DURING THE FIRST FIVE YEARS OF PLANT CONSTRUCTION AND OPERATION. USING NATIONAL AVERAGES AS COMPILED BY THE NATIONAL ASSOCIATION OF HOMEBUILDERS, 58% OF THESE DWELLING UNITS, OR 800, WILL BE SINGLE FAMILY DWELLINGS.

IT TAKES 14 DIFFERENT TRADES TO BUILD A HOME. THESE 14 DIFFERENT TRADES WILL EMPLOY APPROXIMATELY 30 PEOPLE TO BUILD THAT HOUSE. THIS MEANS WE ARE CREATING

BONNEVILLE POWER ADMINISTRATION

NOVEMBER 22, 1977

PAGE 2

24,000 JOBS IN THE PRIVATE SECTOR OF OUR ECONOMY.

NOW IF WE TAKE THOSE 800 HOMES AND MULTIPLY THEM BY \$42,500, WHILE IN THE AVERAGE PRICE OF NEW HOMES IN THE UNITED STATES TODAY, YOU COME UP WITH A GROSS SALES FIGURE OF \$34,000,000. APPROXIMATELY 60% OF THE COST OF BUILDING A HOME IS IN LABOR. THIS GIVES US \$20,400,000 PAID OUT IN LABOR. ALLOWING A TAX WITHHOLDING RATE OF 25%, WE STILL HAVE \$15,300,000 TO BE PUT IN OUR LOCAL ECONOMY BY THE LABOR FORCE INVOLVED IN THE ACTUAL HOME CONSTRUCTION ALONE.

NOW TO THIS WE ADD WHAT THE CONTRACTORS WOULD PUT IN. \$34,000,000 IN GROSS SALES LESS THE \$20,400,000 FOR LABOR LEAVES \$13,600,000 TO BE DIVIDED UP INTO THE PURCHASING OF MATERIALS AND PROFITS INVOLVED IN BUILDING THOSE HOMES. ASSUMING A 15% PROFIT RATIO BY A CONTRACTOR, WE COME UP WITH \$5,100,000 IN PROFITS. ASSUMING A 25% TAX RATE AND A 10% RETAINED EARNINGS, WE HAVE ANOTHER \$3,442,500 TO INVEST INTO FUTURE DEVELOPMENT AND BUILDING, WHICH AGAIN PLACES IT INTO THE MAIN STREAM OF OUR LOCAL ECONOMY.

NOW WE STILL HAVE \$8,500,000 IN MATERIALS TO BE SUPPLIED. NOW THIS HAS TO BE DIVIDED UP INTO PURCHASING MORE MATERIALS TO REPLACE THOSE USED, WAGES, TAXES, ETC. A BIG SHARE OF THIS \$8,500,000 LEAVES THE AREA, BUT A LOT OF IT STAYS AND IS PLACED INTO OUR LOCAL ECONOMY THROUGH THESE WAGES, PROPERTY, TAXES, ETC.

THE BUILDERS OF THE AFFECTED AREA WILL BE ABLE TO HANDLE THE HOUSING NECESSARY BECAUSE THE NEED FOR HOUSING WILL ARISE OVER A PERIOD OF TIME. WE HAVE THE LAND NEEDED FOR DEVELOPMENT ALREADY, AND WE WILL BE ABLE TO GEAR UP OUR BUILDING SCHEDULES AS THE NEED ARISES.

IN CLOSING, I WOULD LIKE TO SAY THAT NOT ONLY WOULD THE BUILDERS OF THE AREA WELCOME ALUMAX AND THE RELATED GROWTH, BUT WE CAN HANDLE IT AND WE WANT IT. THANK YOU.



SCHOOL DISTRICT NO. 8R

OFFICE OF THE SUPERINTENDENT
541 N. E. THIRD STREET
HERMISTON, OREGON 97101
PHONE 867-0574

November 22, 1977

Bonneville Power Administration

Subject: Proposed Alumax Development

This is to reaffirm our position so far as the proposed Alumax development on a site within our school district.

It is the position of the school district board that it is ready to cooperatively work with Alumax in the proposed plant development so far as it applies to the educational environment.

We have been most pleased with the extremely cooperative efforts of Alumax officials working with educational concerns and especially in their willingness to work toward an acceptable plan dealing with the impact during the construction stage.

It is obvious that once on the tax rolls, the proposed Alumax plant would have a highly favorable impact on the tax rate of those residing within the Hermiston school district.

So, simply stated, the Hermiston school district continues its stance of full cooperation with the Alumax-Pacific Corporation.

Barbara L. Scott
Superintendent of Schools

Revised: District President

Blue Mountain Community College

2411 N.W. Corbett P.O. Box 100 Pendleton, Oregon 97601 Area 503 276-1265

November 22, 1977

TO: BONNEVILLE POWER ADMINISTRATION
FROM: RONALD L. DANIELS, PRESIDENT
RE: DRAFT ENVIRONMENTAL STATEMENT - ALUMAX ALUMINUM PLANT

My name is Ronald L. Daniels. I am President of Blue Mountain Community College, located in Pendleton, Oregon. I have been authorized by the college Board of Directors to present testimony regarding the impact on Blue Mountain Community College if the proposed Alumax Plant were to be located at the proposed Umatilla site or any other part of the college district.

Obviously, the college board cannot speak for the total college community as that encompasses a multitude of people with varying opinions regarding the Alumax Plant. My testimony, therefore, will speak only to the anticipated impact on the college and will avoid the political implications regarding the environmental statements and other issues. I am sure those issues will be adequately covered in other testimony, studies, and reports.

The most obvious impact would be on the existing valuation of the college district. Depending on what figures one accepts, the assessed valuation of the Alumax Plant would increase the assessed valuation of the college district by somewhere between \$380 million and \$500 million dollars. This would be an increase of between 30% to 40% and should result in a substantial reduction in the college's tax levy rate per \$1,000 of True Cash Value. As an example, the current levy is \$1.88 for \$1,000 TCV. This amount would be reduced to approximately \$1.13 with the addition of the Alumax Plant.

The estimated permanent work force of 500 people would result in a substantial increase in the population of the college district. This increased population would undoubtedly result in an increased enrollment at the college. This would have the effect of increasing enrollments in those programs that are currently underenrolled. The increased enrollment would make those programs much more cost effective.

On the other hand, the increased enrollments could result in overenrollments in programs that are now filled to capacity. This has the potential for requiring additional facility space to meet enrollments in those areas and could also result in the need for adding instructors.

The increased population would also permit the college to offer

ALUMAX ALUMINUM PLANT
PAGE 1

some programs that are not currently available due to the relatively small population served by the college. The expanded programs would be of benefit to the total college community.

The location of the plant in this area would also result in increased job opportunities and would provide a new source for placement of Blue Mountain Community College students and graduates.

The items I have mentioned here are those that we feel would directly impact the college. There may be other issues that would affect the college indirectly or in some minor way, but those issues do not seem to be significant enough to raise at this time.



Inland Empire Real Estate Co.

WESTVIEW PLAZA, SUITE D
1130 W. HARTLEY HERMISTON, OREGON 97038
(503) 967-7223

November 22, 1977

Alumax Hearing
Bonneville Power Administration
Environmental Impact Statement
Hermiston, Oregon

Gentlemen,

Our firm has completed a market analysis aimed at pin-pointing housing needs in the Greater Hermiston Area, including the Cities of Echo, Stanfield and Umatilla. This study was conducted in the first quarter of 1977 in order to help ascertain the makeup of housing units that will be required to meet the area needs as well as the type of housing and the price range the majority of families could afford in acquiring adequate shelter.

Our analysis indicates that there are an adequate number of lots to meet the housing requirements for this area over the next three to five years.

This analysis indicates that our current growth pattern is occurring at 15% plus a year and will apparently continue to do so through about 1985. However, should Alumax start construction within the next year this growth figure could double.

If, in fact this does happen, our study indicates two things of a beneficial nature should occur:

1. Our current facilities and building sites would be used at more efficient capacities within three years instead of five. Allowing costs to be less per family as well as give apl time to provide for additional growth as needed.
2. Costs should be lower to the ultimate consumer because of volume savings that suppliers and builders would be able to incur because of savings that could occur by building larger numbers of homes within a shorter time frame.

It has been apparent to our firm that local governments have done a commendable job in providing for a solid basis for growth to occur in this area without incurring large costs and inconveniences to the taxpayer.

Page 1 of 2

Alumax Hearing, Hermiston, Oregon, November 22, 1977

The data we used to compile this report, that led to the conclusions contained herein, came from the following sources:

1. U.S. Dept. of Housing & Urban Development Family Income Study - Umatilla County 1976
2. U.S. Dept. of Housing & Urban Development Situation Report - Umatilla County as of September 1, 1976
3. Oregon State Department of Employment Wage Survey - Hermiston Area (1977)
4. Oregon State Department of Employment Projected Job Market - Umatilla Co. (1977)
5. Portland General Electric Community Requirements Report - Carty Project (1976)
6. Oregon State Housing Division Reports - Hermiston Area (1977 - 1976)
7. Impact Study of Future Irrigation Development by Robert F. Vining, A.I.P. U.S. Army Corp of Engineers
8. Personal observation of housing currently in the market place and the needs of the people in our area.

Sincerely,

Robert E. Ketrenos
Robert E. Ketrenos
Realtor

ROBERT E. KETRENOS, REALTOR

Real Estate Development, Exchange and Development
200 EAST HUNSBURY AVENUE
P.O. BOX 100 HERMISTON, OREGON 97038
PHONE 503 967-5000

November 22, 1977

Gentlemen:

I would like to make the following comments for the record on the construction of an Aluminum Plant in Umatilla County. I feel that Aluminum is a vital commodity that is in short supply when we need it most. With the advent of the energy crunch it has been shown that most conservation efforts depend on Aluminum to help achieve them. Examples are Aluminum storm windows, insulated siding, foil backed insulation, weight reduction in automobiles and aircraft. The list could continue on and on. The energy expended to produce the basic Aluminum is returned many times over by its use in the above mentioned applications over a short period of time.

As to the impact of additional people coming to our community, I feel that a majority of these people are already here, working at other projects that are soon to be completed. We have experienced a growth rate over the last 2 to 3 years that is considerably larger than what will be expected from the construction and operation of the Alumax plant. We have been able to handle this growth and I feel we shall be able to handle any new growth created by the construction of this new and much needed facility.

Very truly yours,

Robert E. Ketrenos
Robert E. Ketrenos, C.C.I.M., Realtor

REK/jlg

Page 2 of 2



WILLIAM V. (BILL) JAMISON, Agent
Auto - Life - Health - Home and Business

9455 South Highway 395, Hermiston, Oregon 97338
Phone: Off: 503-587-5257 Res: 503-687-5050

Aluminum is a vital product in our world today and we need their products. Did you ever stop to think what the discovery of aluminum has done for our economy? It has put millions of people to work, lightened the weight of the auto for a more economical machine, its in your home in door's and windows, and you use something made out of aluminum every day.

I only wish time permitted to share with you what aluminum has done for our national defense. I think if you atop to ponder on the subject you will come up with many of the things that I am thinking of.

You say the aluminum plant will use alot of electricity. I don't think anyone will deny that, but on the other hand if we produce the electricity for the plant in Oregon - why in the heck should we be selling 80% of it to Washington? Why don't we sell it to the plant in Umatilla County where it really is going to do us some good.

I only hope that we in Umatilla County and the people making decisions for us in Salem can see and understand that today can be a very important one for us.

Thank you,

Bill Jamison

Denny Evans letter - continued

Thank you for giving me time to voice my opinions.

In conclusion, there are 3 elements competing for the river water: the power companies, the agribusiness people and the salmon. In dry years like this year it leaves them all wanting. Some business people and corporations want to deny the salmon the water. I would rather my kids see a salmon than a beer can.

Denny Evans
Hermiston, OR

Retyped from Original Letter

I don't represent any group but I am just a concerned citizen. I'll start flat out. (All-you). I'm very much opposed to the alumax plant coming in to the Northwest for 3 reasons.

1st. There were reports of aluminum plant layoffs at the Balles and Trousdale because of power shortages last spring and summer.

Two. There have been many news releases about our electrical rates going up if Alumax comes in and that there will be no chance of the rates coming down in the future. And,

Three. Regardless of the findings of the environmental impact statement in my opinion, there will be a detrimental effect on our ecology.

Concerning the layoffs in other plants: how can we justify building a new plant when other plants are not operating to capacity. We're having second thoughts about nuclear wastes so we shouldn't count on nuclear plants for our future power needs. We should cut back on using our natural resources which are not renewable such as bauxite and use more renewable natural resources such as wood products. We don't need so many aluminum products such as airplanes and expensive machinery made out of alloys but instead we need more peaceful products like houses and agriculture bi-products.

Our electrical rates are going up every year and it seems like the utilities apply for rate hikes more often than that. If the manufacturers had to pay the same rate as the private community, it would not be so burdensome to the private consumer. But we should take every step to halt our inflation. Our economy is already programmed for the well-to-do yet there are many people who belong in the low income group or fixed income category. The economic benefit which this aluminum plant would bring to this community would not benefit the overall regional economy. The Alumax plant would invite other plants and other impacts unbefitting to humanity.

I have lived 4 miles South of Pendleton at the base of McKay Dam for 17 years and when we first moved out there we could hear the ducks flying above for 1 to two hours in the evening at dusk in the fall. I didn't count them but I would guess there were lots of ducks flying from the water to the fields. By the way there were only 17 houses when we first moved out there. To continue my story there were many pheasants and quail also in the adjoining fields.

Since then there have been about 50 houses built and the house cats have done away with the pheasants and quail population. The last two years I have heard ducks fly over for maybe 15 to twenty minutes and I keep waiting for the rest but they never come.

When they say the alumax plant will have no effect on the fish, birds and plants the experts have to be kidding. How can any unintelligent or intelligent person have any trust in the credibility of our officials when their statements are so contradictory to common sense.

COMMENTS BY JAMES A. HOWARTH AT BPA - PUBLIC RESPONSE MEETING - HERMISTON, OR
November 22, 1977

As VICE PRESIDENT AND PROJECT MANAGER OF ALUMAX PACIFIC CORPORATION, I HAVE BEEN PERSONALLY INVOLVED AND AM ACQUAINTED WITH THE ALL-OUT EFFORT MOUNTED BY THE COMPANY, TO ESTABLISH AN ALUMINUM REDUCTION PLANT AT THE PORT OF UMATILLA.

MY COMMENTS ARE REFERENCED TO CHAPTER 1 B2 AND 3, AND CHAPTER 4 B8 OF THE ALUMAX ENVIRONMENTAL STATEMENT.

ALUMAX PACIFIC CORPORATION BEGAN ITS ATTEMPT TO BUILD AN ALUMINUM REDUCTION PLANT IN OREGON IN LATE 1970 AND HAS SPENT MORE THAN \$14 MILLION ON THIS PROJECT.

INITIALLY, THE GOVERNMENTAL AND PUBLIC CONCERN INVOLVED ENVIRONMENTAL CONSIDERATIONS. THIS CHARACTERIZED THE PERIOD OF 1970 - 1974 WHEN GREAT STRIDES FORWARD WERE MADE IN ENVIRONMENTAL PROTECTION LEGISLATION AND THE DEVELOPMENT OF ENVIRONMENTAL CONTROL SYSTEMS TO MEET NEW REQUIREMENTS.

BY JULY, 1975, ALUMAX HAD OBTAINED ALL REQUIRED ENVIRONMENTAL PERMITS FROM THE OREGON DEQ, AND THE FEDERAL EPA. ALUMAX HAD ALSO OBTAINED THE APPROVAL OF THE UMATILLA COUNTY PLANNING COMMISSION. THESE PERMITS HAVE BEEN KEPT IN FORCE. INCIDENTALLY, IN ORDER THAT EVERYONE IN OREGON MIGHT KNOW WHAT ALUMAX HAS PROPOSED, WE LAID OUT OUR PLANS IN DETAIL IN COMPREHENSIVE STATEWIDE NEWSPAPER ADVERTISING OVER SEVERAL MONTHS.

ALUMAX ALSO HAD CH2M HILL DO A COMPREHENSIVE SOCIO-ECONOMIC IMPACT STUDY WHICH WAS MADE AVAILABLE EXTENSIVELY THROUGHOUT THE AREA

HOWEVER, IN APRIL, 1975, THE LAWSUIT HAD BEEN FILED IN FEDERAL COURT BY THE PORT COMMISSION OF ASTORIA AND SEVERAL CLATSOP COUNTY CITIZENS BARING BONNEVILLE POWER ADMINISTRATION'S DELIVERY OF POWER TO ALUMAX'S PROPOSED UMATILLA PLANT. THE FEDERAL COURT IN SEPTEMBER, 1975, RULED THE CONTRACT ENFORCEABLE BUT ONLY AFTER BPA PREPARED, CIRCULATED, AND FILED THE ENVIRONMENTAL IMPACT STATEMENT; THE DRAFT TO WHICH WE ARE RESPONDING TODAY. THIS EFFECTIVELY STOPPED ALUMAX'S PROJECT UNTIL THE COURT'S ORDER HAS BEEN MET. BPA PROJECTED A TWO YEAR COMPLETION DATE FOR THE EIS IN THE FALL OF 1977, NOW, WE UNDERSTAND, THE FINAL EIS WILL BE COMPLETED IN DECEMBER, 1978.

DURING THIS PERIOD, ALUMAX HAS BEEN AND WILL BE PAYING SUBSTANTIAL SUMS TO RETAIN ITS RIGHT TO THE PROPOSED PLANT SITE AND HAS INCURRED ENORMOUS ESCALATION IN THE COST OF THE PROPOSED PLANT NOW ESTIMATED AT \$400 MILLION AND HAS BEEN FORCED TO DO ALTERNATIVE PLANNING FOR ITS PRIMARY ALUMINUM NEEDS FOR 1979 AND 1980. EVEN IF THE IMPACT STATEMENT IS FILED WITH THE CEQ IN DECEMBER, 1978, ADDITIONAL TIME WILL BE REQUIRED TO OBTAIN COURT APPROVAL, HOPEFULLY THERE WILL NOT BE OTHER DELAYS.

COMPOUNDING THIS SERIES OF DELAYS, IS ANOTHER GREAT PROBLEM, THE GREAT DROUGHT AND POWER SHORTAGE OF 1977. THIS HAS TRIGGERED POWERFUL REGIONAL POLITICAL FORCES WHICH ARE NOW AT WORK TO DEAL WITH THE IMPENDING POWER SHORTAGE OF THE 1980'S. ALUMAX PACIFIC'S POWER CONTRACT WITH BPA WILL EXPIRE IN 1986. SOME WAY MUST BE FOUND TO EXTEND THIS CONTRACT ON A REASONABLE COST BASIS IN ORDER TO CONTINUE TO MAKE OUR PROJECT VIABLE. THEREFORE, GREAT UNCERTAINTIES HAVE BEEN PLACED NOT ONLY ON ALUMAX BUT ALSO ON RESIDENTS OF UMATILLA AND

HERMISTON WHO ARE ATTEMPTING TO DEAL WITH CURRENT MUNICIPAL NEEDS FOR SCHOOLS AND OTHER SERVICES WITHOUT THE BENEFIT OF ALUMAX'S TAX BASE.

ALUMAX PACIFIC HAS EXPRESSED A WILLINGNESS TO AND IS WORKING WITH MUNICIPAL LEADERS IN THE LOCAL AREA IN AN EFFORT TO FIND PRACTICAL SOLUTIONS TO MUNICIPAL PROBLEMS. WE SUBMIT THAT THIS IS A DIFFICULT AND FRUSTRATING TASK FOR ALL PARTIES UNDER THE EXISTING CIRCUMSTANCES. ONCE THE BARRIERS ARE REMOVED, WE CAN ALL DO A BETTER JOB OF PLANNING.

OBVIOUSLY, THERE IS NO EASY SHORT TERM ANSWER TO THE POWER PROBLEMS. ONE LONG TERM SOLUTION IS TO SUPPORT THE PENDING FEDERAL LEGISLATION DEVELOPED BY THE PACIFIC NORTHWEST UTILITIES CONFERENCES COMMITTEE --- THE PACIFIC NORTHWEST ELECTRIC POWER SUPPLY AND CONSERVATION ACT. WE SUPPORT THE VIEW THAT THE PNUCC LEGISLATION IS THE ONLY SPECIFIC REGIONAL PROPOSAL CONTAINED IN THE ROLE ENVIRONMENTAL IMPACT STATEMENT WHICH ADEQUATELY ADDRESSES THE URGENT NEEDS FOR CONSERVATION, THE NECESSARY EFFICIENT MANAGEMENT OF THE REGION'S GENERATOR RESOURCES, AND THE PLANNING MECHANISM THAT ASSURES AVAILABILITY OF ELECTRIC ENERGY FOR THE REGIONAL REQUIREMENT AT THE LOWEST POSSIBLE COST. WE FURTHER URGE THE VOTERS OF THE REGION TO LET THE OREGON CONGRESSIONAL DELEGATION KNOW OF THEIR SUPPORT FOR THE PNUCC LEGISLATION.

Jama A. Howarth

hermiston development corporation 398 EAST MAIN STREET /HERMISTON, OREGON

Bonneville Power Administration Environmental Hearing
Alumax Environmental Impact
November 22, 1977

Bonneville Power Administration

Gentlemen:

My name is Joe Burns. I am president of the Hermiston Development Corporation, Hermiston, Oregon.

The Bonneville Power Administration Impact statement indicates that this area will be able to meet the impact brought about by the Alumax plant. We are convinced that in the final analysis this multi-million dollar installation by Alumax will be a great plus for all of Umatilla County.

Industrial users of energy from the Bonneville Power Administration take collectively about 33% of the total Bonneville energy sales. Of this amount, 87% goes to the State of Washington and 13% to Oregon. We feel we are entitled to a more equitable share of the industrial power. This power use in Oregon would help but still not put us in a position of equity. If Alumax does not use this power, it would only take 60 days of normal growth and the same amount of energy would be sold somewhere else, probably 80% into the State of Washington.

Alumax has a valid energy contract with Bonneville and has had for 10 years. We think it is time the contract be honored. We would like to note that it is significant that the type of power used by Alumax is about 75% interruptible power and only 25% firm power. A great deal of Bonneville Power Administration surplus interruptible power is presently sold and delivered to California and other areas outside the Bonneville system.

We can see no reason for further delay, and we respectfully urge Bonneville to expedite at long last the go ahead on this important project.

Thank you.

Joseph E. Burns
Joseph E. Burns
President

Bonneville Power Administration Public Hearing
November 22, 1977
Hermiston, Oregon

Subject: Alumax environmental Impact Statement

I moved to Hermiston in 1964 and have watched our community grow during the past 13 years.

Several years ago, a citizens' committee was formed to explore the possibility of building a new public library. I serve as chairman of the Building Committee and our financial research revealed the area needs a broader tax base to provide for these types of projects.

I am also a member of the Hermiston Planning Commission and have watched the city government tackle numerous problems during the past several years. Our community is noted for dealing expeditiously with problems and the people of the community show remarkable public spirit.

We need tax generating industry and a balance between labor-heavy industry and ^{high tech} Alumax-type industry. Since the Environmental Impact Statement revealed no serious threats to Umatilla County, I heartily endorse ^{the project} Alumax.

Submitted by,

Margaret E. Davis
Margaret E. Davis

REMARKS OF L. M. O'DOURKE,
PORT OF UMATILLA PRESIDENT
BPA/ALUMAX HEARING, NOVEMBER 22, 1977

The Port of Umatilla believes that the site it has offered the Alumax Pacific Corporation is the best site available in Eastern Oregon. We continue to support that siting and offer our continued assistance to that end.

We recognize that the siting will create impacts upon the local communities. It is our belief that the solutions to the problems created by those impacts can be arrived at by the communities involved working in close partnership with Alumax Pacific. Public issues such as power, land use, environmental concerns and other issues central to the question of the plant siting have been addressed throughout the Impact Statement.

Other communities all over America, like ours, are wrestling with the same kinds of problems and the same kinds of decisions: To build and to grow—not to build and not to grow. The citizens of the West End of Umatilla County have the opportunity of a lifetime: The opportunity to build and grow in an orderly fashion and to be innovative to meet the problems of that growth.

The communities of the West End have a golden opportunity to commit the leadership, the energy and the local resources in order to exemplify the very best these communities have to solve common problems. The Port of Umatilla urges that we all, collectively, assume that responsibility. Let's get on with it.

Thank you for the opportunity to comment this evening.



UMATILLA COUNTY
BOARD OF COMMISSIONERS

F.K. "Woody" Starrett
Barbara Lynch
Ford Robertson

P.O. Box 1477
Pendleton, Oregon 97601
Ph: 503/276-7111

November 22, 1977

J. Dean Fouquet
Administrative Assistant

THIS IS A REAFFIRMATION OF UMATILLA COUNTY'S SUPPORT FOR THE SITING OF THE ALUMAX PLANT AT THE PORT OF UMATILLA.

The Board of Commissioners is pleased to again testify of our decision to support the Alumax siting as proposed.

Many reasons, a bit of philosophy, and a considerable amount of review has gone into the County arriving at this decision.

The addition to the tax base, adding balance to our economy and the desire for orderly growth were areas of positive approval.

The roller coaster of agricultural production and price make our economy very fragile. Jobs without a supportive tax base force a heavy tax load on the existing taxpayer. A stacking of dependent businesses exacerbate the 'ups and downs' of our economy.

Alumax could add a new dimension to diversification of industry in Umatilla County. It brings a tax base ten times higher per employee than any existing industry. This industry (Alumax) has its productivity and sales outside of the economic factors of agriculture.

In philosophy, we see aluminum once produced like money in the bank that keeps paying dividends. It is "energy conservation" to the transportation industry. It saves energy in homes and businesses. The fabrication of the material to other uses is less energy consuming than other metals. The product can be salvaged decade after decade and reprocessed at a fraction of the initial cost. The "long run" energy picture is not the initial energy picture.

Briefly, other considerations - the proposal meets State and Federal guidelines for dispersal. Aluminum is a strategic material that needs to be manufactured in the U.S.A. Our area has a "hand-in-glove" relationship between energy production and energy use. The energy produced by the Columbia River system should be shared by those that share the responsibility. Oregon needs its fair share of industry and energy.

In summary, Umatilla County needs the partnership between agriculture and industry. Our Nation needs the product to protect our way of life. In our opinion, Alumax is a perfect match with the site, the energy, the distribution, and the people.

I thank you for your time and consideration.

Sincerely,
F.K. Starrett
F. K. Starrett, Chairman
Board of Commissioners

11/22/77
ew

PACIFIC POWER & LIGHT COMPANY
November 22, 1977

As manager of Pacific Power and Light Company in Hermiston I am here to testify as to the electrical energy supply for the region and for the proposed Alumax plant. Pacific along with the majority of the electric utilities in the Pacific Northwest, has before both the Federal House and Senate a regional electric power plan called the Pacific Northwest Energy Power Supply and Conservation Act. This plan will more equitably distribute electrical energy costs throughout the region and set up a method of planning new generating plants to meet future regional energy needs for all classes of electric customers. This would include residential, commercial and industrial customers such as this proposed Alumax plant. This plan would assure all customers their required energy on time and at equitable cost.

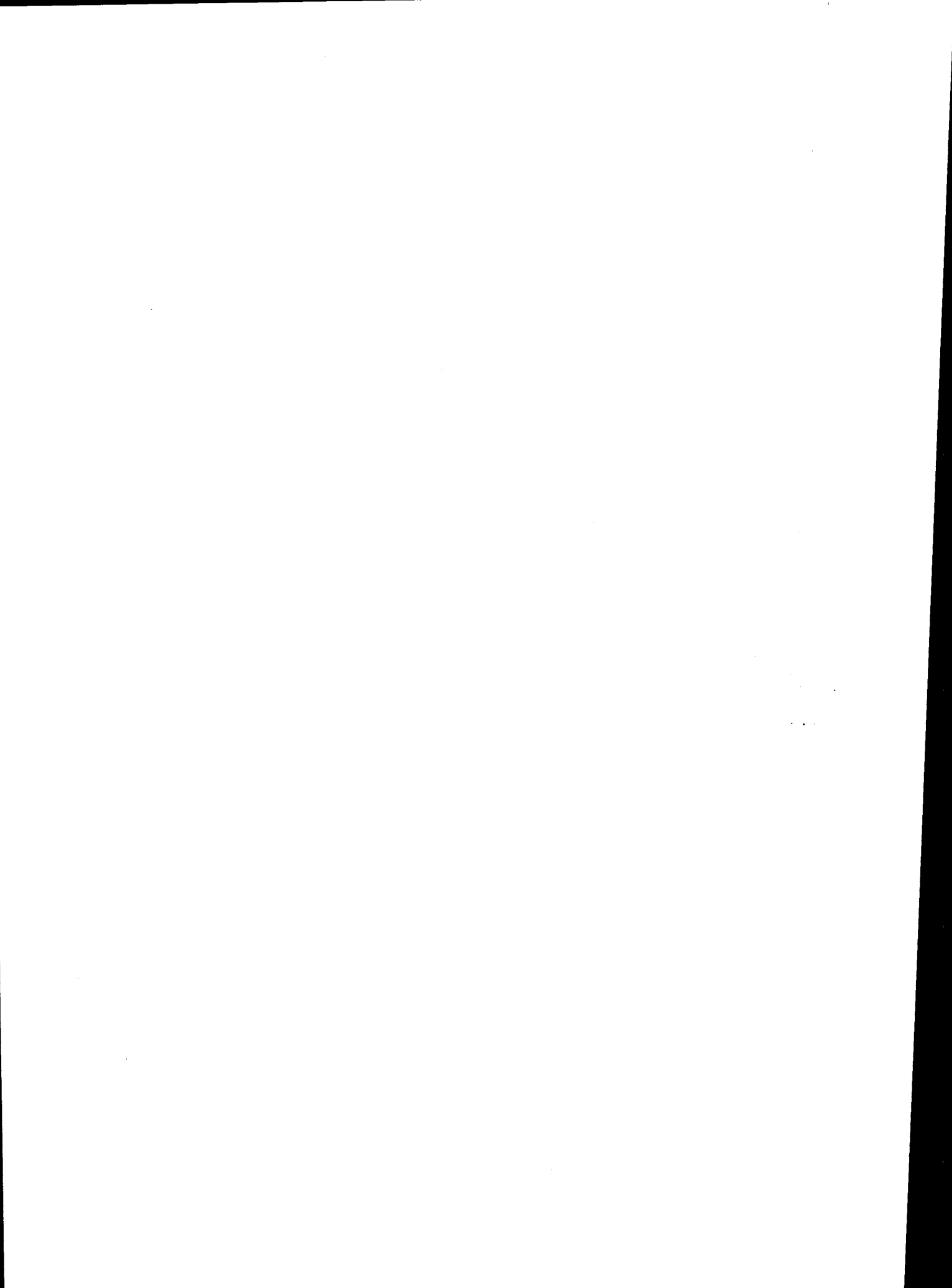
In spite of how one might feel about high energy consuming facilities such as this proposed plant, we do need aluminum for the good of this country. Ironically, aluminum provides a way of conserving energy through its use in replacing steel in such things as automobiles, trucks and other transportation equipment which ends up in saving energy. Aluminum's properties make it unique for irrigation pipe and transmission line conductor which supplies the electricity to run the irrigation pumps.

As manager here in Hermiston I live here and have an interest in the economy of the community. I have been active in community affairs and see the proposed plant as an opportunity to diversify the areas economy which is currently almost entirely dependent on the agri-industry.

It would provide a needed stability and a major economic boost to the community.

Roy E. Stephens

LIST OF PREPARERS



List of Preparers

Alumax Environmental Statement

Fucile, Stephen

B.S. 1968 - Geography

M.S. 1975 - Geography and Environmental Studies

Environmental Specialist, BPA, Division of Power Management. Major responsibilities involve environmental analysis and input into BPA's marketing programs. Four years experience with BPA. Previously employed with City of Chicago.

Moorman, Geoff

B.A. 1968 - Economics

Economist, BPA's Conservation Section. Ten years experience with the agency in various positions.

Peterson, Norman S.

B.S. 1950 - Business Administration

Member, BPA's support staff on evaluations of resource and load forecasting functions for nine years. 15 years previous experience with Bureau of Mines conducting economic studies of mineral supply and demand.

Seiffert, Randy D.

B.S. 1971 - Chemical Engineering

Environmental Specialist - Air quality in BPA's Division of Power Management. Responsible for evaluating environmental impacts of BPA's power marketing programs. Prior to joining BPA in 1976, was with the Environmental Protection Agency, Office of Air Quality Planning and Standards.

Taves, John

B.A. 1968 - Psychology

M.S. 1971 - Social Psychology

Ph.D. 1975 - Sociology

Public Utility Specialist, BPA Branch of Rates. Four years' experience evaluating the social impacts of BPA policies and programs.

Volpe, Helen Ann

B.S.M.E. 1970

M.S. 1974 - Operations Research and Industrial Engineering

P.E. 1976 - Mechanical Engineering

System engineer, BPA Division of Engineering and Construction. Background in industrial engineering. Four years - BPA experience.

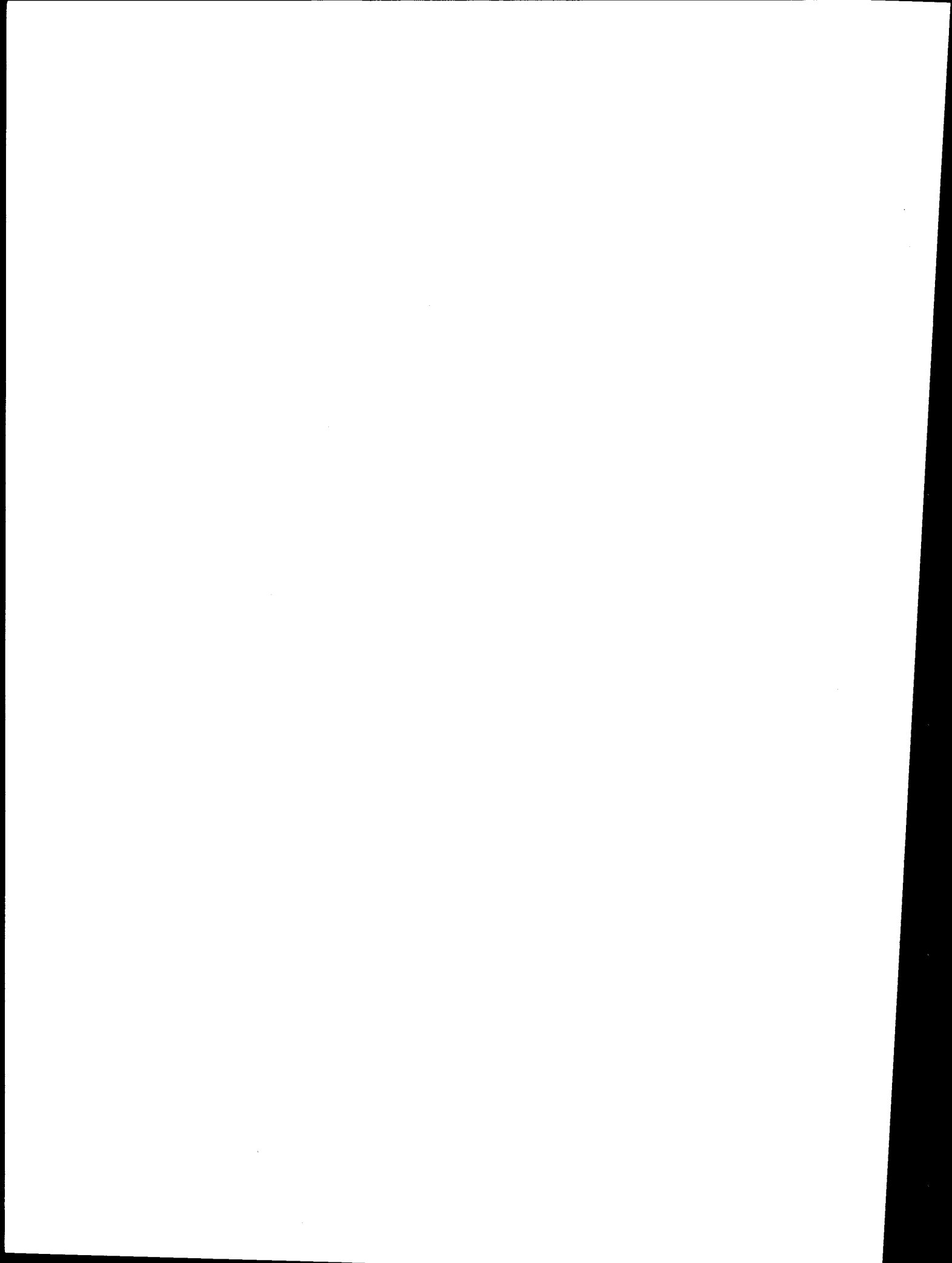
Willis, Lynda D.

B.S. 1973 - Environmental Sciences/Urban Planning

M.S. 1973 - Mechanical Engineering
Air Pollution Control

Six years' experience in the area of industrial pollution control, energy consumption, and evaluations of environmental and power marketing policies related to BPA's Direct Service Industries. Alumax project manager.

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



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

Federal Agencies

Advisory Council on Historic Preservation
Columbia River Fisheries Council
Federal Aviation Administration
 Northwest Region
Federal Regional Council, Region 10
General Accounting Office
Pacific NW River Basin Commission
U.S. Army Corps of Engineers
U.S. Department of Agriculture
 Forest Service, Region 1
 Forest Service, Region 4
 Forest Service, Region 6
 Rural Electrification Administration
 Soil Conservation Service
U.S. Department of Energy
 Federal Energy Regulatory Commission
 Western Area Power Administration
U.S. Department of Housing and Urban Development
U.S. Department of the Army
 Environmental Resources
U.S. Department of the Interior
 Bureau of Indian Affairs
 Bureau of Land Management
 Bureau of Outdoor Recreation
 Fish & Wildlife Service
 Geological Survey
 National Park Service
 Office of Environment Project Review
 Water & Power Resources Service
U.S. Environmental Protection Agency

State Agencies

Idaho

Division of Budget, Policy Planning, and Coordination
Idaho State Historical Society
Idaho State University Museum
Laboratory of Anthropology, University of Idaho

Montana

Department of Natural Resource & Conservation
Montana Department of Community Affairs
Montana Historical Society
Office of Budget & Program Planning
Statewide Arch. Survey, University of Montana

Oregon

Museum of Natural History
Oregon Department of Economic Development
Oregon Department of Energy
Oregon Department of Environmental Quality
Oregon Department of Fish & Game
Oregon Department of Justice
Oregon Intergovernmental Relations Division
Oregon State Historic Preservation Office
Oregon State University, Water Resources Research
Public Utility Commission of Oregon

Washington

Office of Community Development
Office of Ecology
University of Washington, Inst. for Environmental Studies
University of Washington, Washington Energy Research Center
Washington Archeological Research Center
Washington Department of Ecology
Washington Office of Archeological & Historical Preservation
Washington Office of Program Planning and Fiscal Management
Washington State Department of Fish & Game
Washington State House Energy & Utilities Commission

Local Agencies

Idaho

Bingham County
Bonner County Courthouse
Bonneville County
Boundary County Board of Commissioners
Cassia County Courthouse
Clearwater County Courthouse
Clearwater Economic Development Assn.
East Central Idaho Planning & Development Assn.
Elmore County Courthouse
Gem County Courthouse
Ida-Ore Regional Planning & Development Assn.
Idaho Public Utilities Commission
Kootenai County Courthouse
Latah County Courthouse
Lincoln County Department of Planning
Minidoka County Planning Commission
Nez Perce County Courthouse
Panhandle Area Council
Shoshone County Courthouse
Southeast Idaho Council of Governments
Teton County Courthouse

Montana

Anaconda-Deer Lodge County Planning Board
Butte-Silver Bow Planning Board
Flathead County Areawide Planning Organization
Granite County City Commissioners
Lake County Planning Board
Mineral County Planning Office
Missoula Planning Office
Powell County Courthouse
Ravalli County Planning Board
Sanders County Planning Board

Oregon

Blue Mountain Community College
Blue Mountain Intergovernmental Council
Central Oregon Intergovernmental Council
City of Echo, Office of the Mayor
City of Hermiston, Office of the Mayor
City of Portland
City of Umatilla
City of Umatilla, Office of the Mayor
Clackamas County Courthouse
Clatsop County Courthouse
Clatsop-Tillamook Intergovernmental Council
Columbia County Courthouse
Coos County Courthouse
Coos-Curry Council of Governments
Crook County Planning Department
Curry County Courthouse
Deschutes County Courthouse
Douglas County Courthouse
East Central Oregon Assn. of Counties
Emerald People's Utility District
Gilliam County Courthouse
Grant-Lincoln-Adams County Conference of Governments
Hermiston City Council
Hermiston Public Schools
Hood River County Courthouse
Klamath County Courthouse
Lane Council of Governments
Lane County Courthouse
Lincoln County Board of Commissioners
Linn County Board of Commissioners
Marion County Courthouse
Mid-Columbia Economic Development District
Morrow County Courthouse
Multnomah County Courthouse
Polk County Courthouse
Port of Astoria
Port of Umatilla
Sherman County Courthouse
Tillamook County Board of Commissioners

Umatilla County Board of Commissioners
Umatilla County Courthouse
Umatilla Public Schools
Umpqua Regional Council of Governments
Union County Courthouse
Wasco County Courthouse
Washington County Courthouse
Wheeler County Board of Commissioners
Yamhill County Courthouse

Washington

Adams County Courthouse
Asotin County Planning Commission
Benton County Courthouse
Benton County Public Utility District #1
Benton-Franklin Governmental Conference
Chelan County Courthouse
Chelan County Regional Planning Council
City Planning Commission, Eastsound, WA
City Planning Commission, Ellensburg, WA
City of Seattle
Clallam County Courthouse
Clallam County Governmental Conference
Clark County Courthouse
Columbia County Board of Commissioners
Cowlitz County Courthouse
Cowlitz County, Department of Commercial Development
Cowlitz-Wahkiakum Governmental Conference
Douglas County Courthouse
Douglas County Regional Planning Commission
Ferry County Courthouse
Franklin County Planner
Garfield County Courthouse
Grant County Courthouse
Grays Harbor County Planning Department
Grays Harbor Regional Planning Commission
Jefferson County Courthouse
Jefferson-Port Townsend Regional Council
King County Courthouse
Kitsap County Courthouse
Kitsap County Courthouse, Department of Community Dev. & Planning
Kittitas County Board of Commissioners
Kittitas County Conference of Governments
Klickitat Regional Council
Lewis County Courthouse
Lewis Regional Planning Commission
Lincoln County Courthouse
Mason County Courthouse
Mason Regional Planning Council
Okanogan Cities & County Regional Planning Commission
Okanogan County Board of Commissioners
PUD #1 of Franklin County
Pacific County Courthouse
Pacific County Regional Planning Council

Pend Oreille County Courthouse
Pierce County Planning Department
Puget Sound Council of Governments
Regional Planning Council of Clark County
San Juan County Courthouse
San Juan County Planning Department
Skagit County Courthouse
Skagit Regional Planning Council
Skamania County Board of Commissioners
Skamania Regional Planning Council
Snohomish County Planning Department
Spokane County Board of Commissioners
Spokane Regional Planning Conference
Stevens County Courthouse
Thurston County
Thurston Regional Planning Council
TRICO Economic Development District
Wahkiakum County Courthouse
Walla Walla County Commission
Walla Walla Regional Planning Commission
Washington Public Power Supply System
Whatcom County Council of Governments
Whatcom County Courthouse
Whitman County Board of Commissioners
Whitman County Regional Planning Council
Yakima County
Yakima County Conference of Governments

Wyoming

Board of Commissioners, Lincoln County

Interest Groups

California

Natural Resource Defense Council

Colorado

The Wilderness Society

Idaho

Clearwater Conservation Forum
Clearwater Economic Development Assn.
Energy and Mass Environment
Idaho Citizens Coalition
Idaho Conservation League
Idaho Environmental Council
Idaho State University Outdoor Program
Idaho Wildlife Federation
Kootenai Environmental Alliance
Kootenai Tribal Council of Idaho

League of Women Voters of Idaho
Lost Rivers-Lemhi Range Wilderness Council
Pacific Northwest Conservation Council
Sawtelle Chapter of Outdoors Unlimited
Soil Conservation Society of America
Wilderness Society
Wildlife Resources, Inc.
Wildlife Society, Idaho Chapter

Montana

Northwest Citizens for Wilderness

Oregon

1000 Friends of Oregon
Central Cascades Conservation Council
Clatsop Environmental Council
Columbia River Fisherman's Protective Union
Concerned Citizens for Clatsop County
Confederated Tribes of Umatilla Reservation
Consumer Power League
Energy Conservation Coalition
Eugene Future Power Committee
Greenpeace Foundation
Healthy Environment Action League
Industrial Customer of BPA
Izaak Walton League of America, Inc.
League of Women Voters of Oregon
League of Women Voters, Central Lane Cty
Mid-Columbia Concerned Citizens
NW Coalition for Alternatives for Pesticides
National Audubon Society
National Wildlife Federation
Nature Conservancy
New American Movement
Northwest Environmental Defense Center
Oregon Common Cause
Oregon Environmental Council
Oregon League of Environmental Voters
Oregon Rare & Endangered Plant Species
Oregon Shore Conservation Coalition
Oregon State University Environmental Center
Oregon Student Public Interest Research
Oregon Wildlife Federation
Sierra Club
Trojan Decommissioning Alliance
University of Oregon, Survival Center
Western Environmental Trade Assn., Inc.
Western Forestry and Conservation Assn.
Wilderness Society

Washington

Audubon Society
Citizens Against Toxic Herbicides
Confederated Tribes of Colville Reservation
Ecotope Group
Environmental Affairs Commission
Environmental Law Committees of Young Lawyers
Federation of Western Outdoor Clubs
Forelaws on Board
Friends of the Earth
Huxley College of Environmental Studies
Huxley Environmental Reference Bureau
Inland Empire Big Game Council
Institute for Environmental Studies
League of Women Voters
North Cascades Conservation Council
Northwest Fund for Environment
Olympic Conservation Council
Pacific NW Waterways Association
Pierce County Action
Public Power Council
Puget Sound Chapter of Oceanic Society
Recreational Equipment Incorporated
Richland Ecology Commission
Sierra Club, Northwest Chapter
Soil Conservation Society of America
Stop Toxic Overspray of Pesticides
Washington Environmental Council
Washington Forest Protection Association
Washington State Sportsmen's Council, Inc.

Washington D.C.

Environmental Defense Fund

Other

Associated Press
East Oregonian
KINK Radio
KOHU - Hermiston
The Hermiston Herald
The Oregon Journal
The Oregonian
The Pendleton East Oregonian
The Seattle Post-Intelligencer
The Seattle Times
The Tri-City Herald

Individuals

Bruce M. Bolme
Peter B. Bosserman
Jerry J. Bromenshenk
Kenneth Colach
Margaret E. Davis
Walter L. Eiring
George Elliott
Denny Evans
Clarence Graham
Edward Hall
Francisco Hernandez
Dean Holmes
Gary Hughes
Bill Jamison
Bill Kitto
Ester Life
George R. Llewellyn
Gary Matson
Shaun M. Maxey
Earl F. May
John R. McMichael
Samuel Moment
Virginia Newell
Curtis Nimz
Charles R. Norris
Andrea Paroni
Russell A. Pheiffer-Hoyt
W. E. Ritchey
Harmon H. Rulifson
George B. Ruthhard
Kevin Saderup
Chris Talkington
Dick Van Tassell
Natalie Walsh
R. G. Wolfe

Businesses

Alumax, Inc.
Aluminum Company of America
Anaconda Company, Aluminum Division Mgr.
CH2M Hill
Carborundum Company
Clackamas Development Co.
Crown Zellerbach
Georgia-Pacific Corporation
Hanna Nickel Smelting Co.
Hermiston Development Corporation
Inland Empire Bank
Inland Empire Real Estate Company
Intalco Aluminum Corporation
International Bauxite Association

Kaiser Aluminum & Chemical Corp.
Keane, Harper, Pearlman, & Copeland
M & B Investment Co., Inc.
Martin Marietta Aluminum Co.
Moore & Ripley Drug, Inc.
Robert E. Ketrenos, Realtor
NE Oregon Builders Association
Oregon Metallurgical
Pacific Carbide & Alloys Co.
Pacific Northwest Generating Company
Pacific Power & Light Co. Library
Pacific Power & Light Co., Hermiston
Pennwalt
Portland General Electric Company
Preston, Thorgrimson, Ellis, Holman, and Fletcher
Sanitary Disposal, Inc.
Schroth Real Estate Agency
Seattle City Light
Stauffer Chemical Co.
Umatilla Hospital
Union Carbide

Libraries

Idaho

Boise State University Library
College of Idaho, Terteling Library
College of Southern Idaho Library
David O. McKay Learning Resources Center
Idaho State Library
Idaho State University Library
University of Idaho Library

Montana

University of Montana Library

Oregon

Blue Mountain Community College Library
Clatsop Community College Library
Eastern Oregon State College, Walter M. Pierce Library
Harvey W. Scott Memorial Library
Hermiston Public Library
Lewis & Clark College, Aubrey R. Watzek Library
Library Association of Portland, Multnomah County Library
Oregon College Of Education Library
Oregon State Library
Oregon State University, Wm. Kerr Library
Oregon Supreme Court Library
Portland State University, Branford Price Millar Library
Reed College, E. V. Hauser Memorial Library
Southern Oregon State College Library

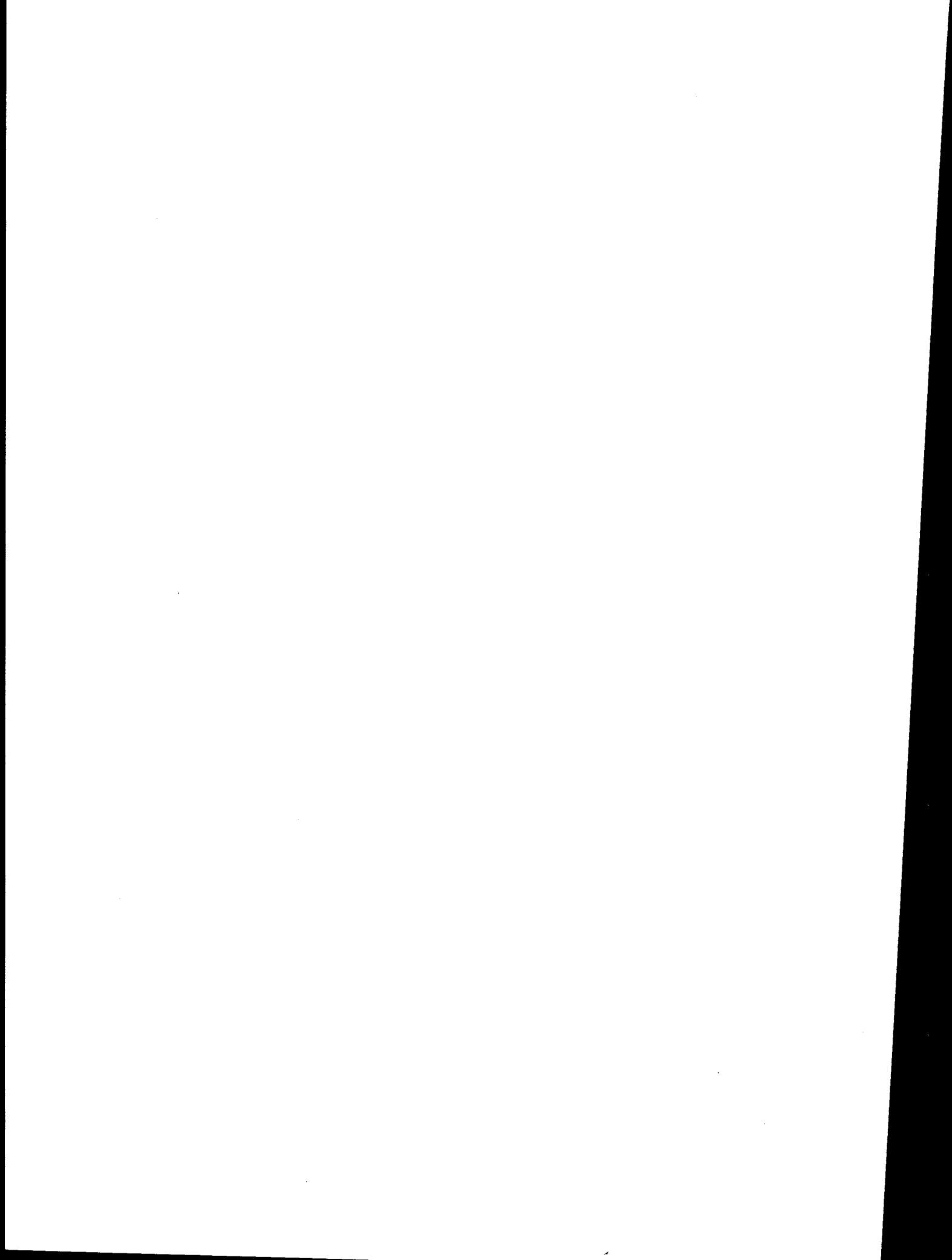
Tillamook County Public Library
Umatilla County Library
University of Oregon Law Library
University of Oregon Library
Willamette University Library

Washington

Central Washington State College Library
Columbia Basin College, Instructional Resource Center
Eastern Washington State College, John F. Kennedy Memorial Library
Everett Community College, Library Media Center
Everett Public Library
Evergreen State College, Daniel J. Evans Library
Fort Vancouver Regional Library
Governmental Research Assistance Library, Seattle Public Library
North Olympia Library System
Port Angeles Public Library
Richland Public Library
Spokane Public Library, Comstock Building Library
University of Puget Sound, E. S. Collins Memorial Library
University of Washington Libraries
University of Washington, School of Law Library
Walla Walla Community College Library
Walla Walla Public Library
Washington State University Library
Western Washington State College, Mable Zoe Wilson Library
Whitman College, Penrose Memorial Library

ATTACHMENTS

A thru I

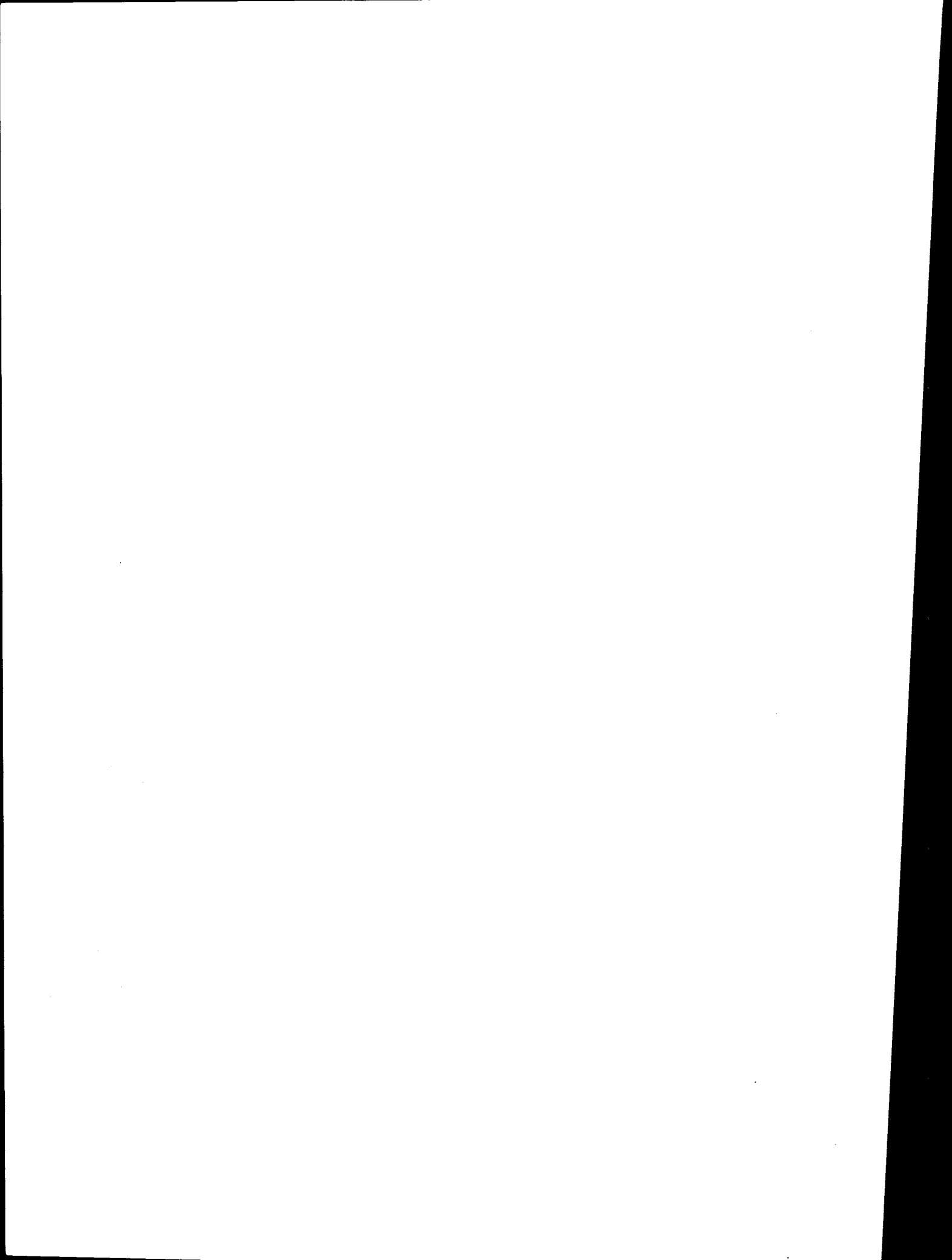


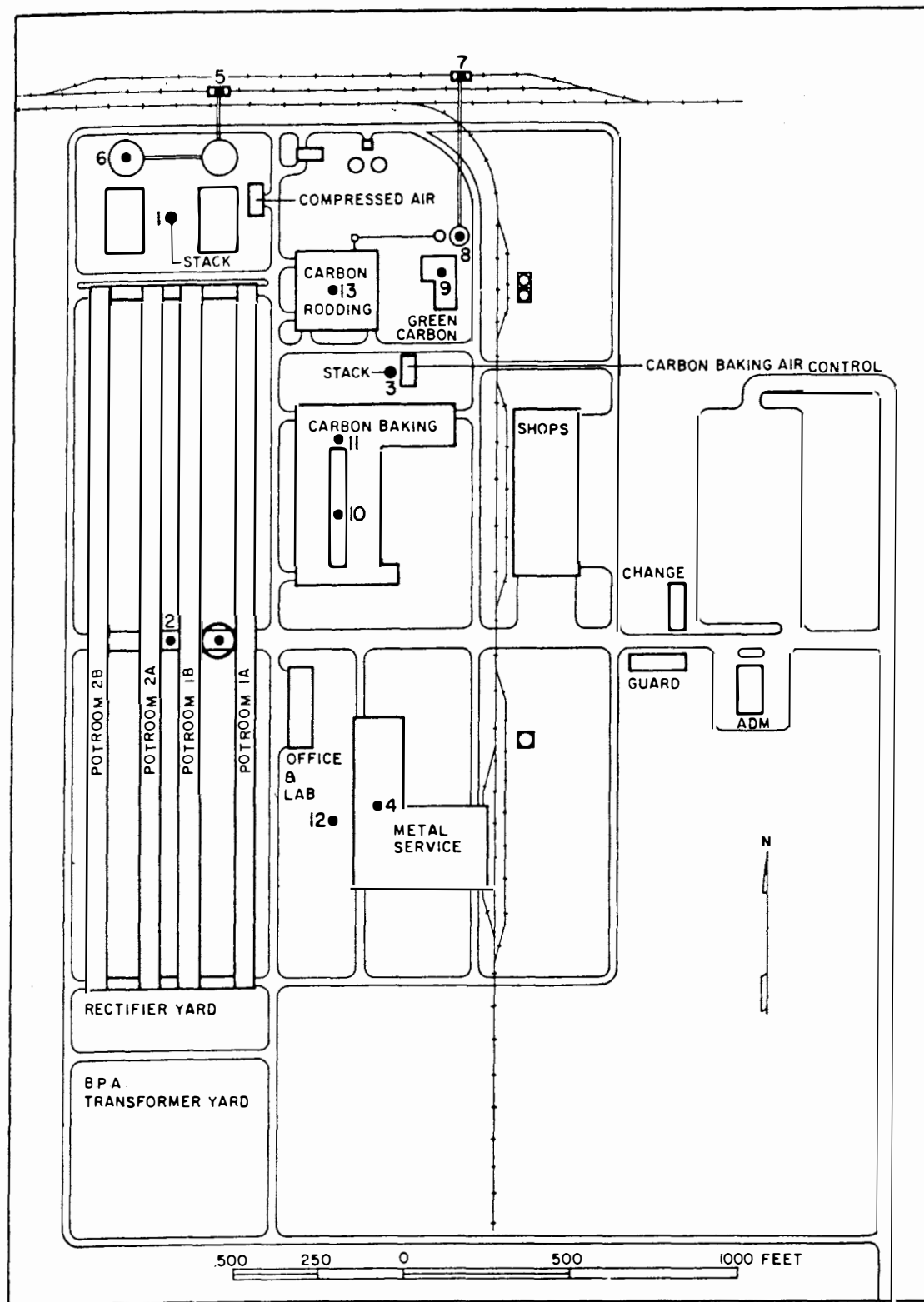
Attachment A

Seasonal and Annual Median Mixing Depths in Meters

Time-of-Day Category	Wind Speed (m/sec)					
	0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.7	10.7
(a) Winter						
Night	125	125	375	375	500	625
Morning	125	188	375	438	500	625
Afternoon	125	250	375	500	500	625
Evening	125	188	375	438	500	625
(b) Spring						
Night	125	125	125	375	500	750
Morning	563	938	938	1063	1125	1250
Afternoon	1000	1750	1750	1750	1750	1750
Evening	563	938	938	1063	1125	1250
(c) Summer						
Night	125	125	125	375	500	750
Morning	1313	1313	1313	1438	1500	1625
Afternoon	2500	2500	2500	2500	2500	2500
Evening	1313	1313	1313	1438	1500	1625
(d) Fall						
Night	125	125	125	375	500	750
Morning	375	688	688	813	875	1000
Afternoon	625	1250	1250	1250	1250	1250
Evening	375	688	688	813	875	1000
(e) Annual						
Night	125	125	190	375	500	720
Morning	593	783	830	938	1000	1110
Afternoon	1060	1440	1470	1500	1500	1500
Evening	593	783	830	938	1000	1110

Source: Cramer, 1975.





Chapter IV—Attachment B

PLANT LAYOUT SHOWING THE LOCATIONS OF THE EMISSION POINTS USED IN THE CONCENTRATION CALCULATIONS. THE SYMBOL SHOWS THE ORIGIN OF THE REFERENCE COORDINATE GRID SYSTEM.

Source: Cramer, Bowers, 1975a, P. 9.

Attachment B

Information on Planned Air Pollution Control Devices

(Source: Alumax Pacific Corp., 1975)

General information pertaining to all baghouses:

- Type: Pulse jet baghouse dust collector. Intermittent high-pressure compressed-air blasts through individual venturis on clean-air side of bags set up shock waves that flex the filter bags and dislodge the dust cake built up on the outside of the bags. Material drops into the hopper for conveyor removal.
- Filter Media: Sixteen-ounce Dacron bags, 84 in. high x 5-7/8 in. diameter; 10.7 square feet of filter area per bag.
- Casing: Welded construction.
- Size: Alumina -- 7:1 air-to-cloth ratio (for nuisance dust collectors).
Coke -- 4.5:1 air-to-cloth ratio (for nuisance dust collectors).
- Emission: 0.02 grains/scf for nuisance dust collectors.

Specific Control Devices:

Control Device
Code Number

(See Table IV-5)

14-1 ALUMINA UNLOADING FROM RAIL

A baghouse dust collector is connected by ductwork to the rail unloading hopper and the enclosed rail unloading building.

- Flow rate: 20,000 scfm
- Temperature: Ambient
- Effluent: Fine alumina particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 619 tons
- Disposal : Recycle

14-2 ALUMINA STORAGE AREA

A baghouse dust collector installed on top of the alumina storage silos handles all vent air from the belt conveyor discharge, and from all fluidized conveyors feeding

alumina to and reclaiming alumina from the silos. Suitable remote-controlled ductwork closure dampers will be provided to vent the dust-laden air to the dust collectors.

- Flow rate: 10,000 scfm
- Temperature: Ambient
- Effluent: Fine alumina particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 527 tons
- Disposal: Recycle

15-1 COKE RAIL UNLOADING AND STORAGE

A baghouse dust collector will be connected by ductwork to the coke rail unloading hopper, the enclosed rail unloading building, and the coke silos.

- Flow rate: 20,000 scfm
- Temperature: Ambient
- Effluent: Fine petroleum coke particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 177 tons
- Disposal: Recycle

15-2 COKE STORAGE AND RECLAIM AT GREEN ANODE PLANT

A baghouse dust collector will be placed on top of the coke and spent anode silos adjacent to the green anode plant and connected to the silo delivery conveyor, silo reclaim conveyors, and silos.

- Flow rate: 5,000 scfm
- Temperature: Ambient
- Effluent: Fine petroleum coke particulate
- Efficiency: 99 percent minimum
- Estimated amount of collected per year: 265 tons
- Disposal: Recycle

31-1 GREEN ANODE PLANT COKE GRINDING SYSTEM

A baghouse dust collector in the green anode plant will vent an air-swept coke grinding mill.

- Flow rate: 2,500 scfm
- Temperature: 130 F
- Effluent: Fine petroleum coke particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 133 tons
- Disposal: Recycle

31-2 & 31-3 GREEN ANODE PLANT

Two baghouse dust collectors will be connected by ductwork to the green anode plant processing equipment and conveyors.

- Flow rate: 10,000 scfm each
- Temperature: Ambient
- Effluent: Fine petroleum coke particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 1,062 tons
- Disposal: Recycle

31-4

GREEN ANODE PLANT -- PACKING MATERIAL FROM BAKING

A baghouse dust collector will be used to vent return packing material (coke) from the carbon baking furnace. Transport is by an airveyor conveyor system in which fine coke is conveyed through a pipeline by air pressure from the baking furnace facility to the green anode facility.

- Flow rate: 1,500 scfm
- Temperature: Ambient
- Effluent: Fine petroleum coke particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 13 tons
- Disposal: Recycle

31-5

GREEN ANODE PLANT -- PITCH FUME CONTROL

A Johns-Manville HEAF filter will be used for collection of pitch fumes from the liquid pitch storage area (including car unloading to storage tanks) and from the mixing and forming areas in the green anode plant. This is a recent development designed specifically for asphalt plants with efficiencies in the range of 95 percent to 99 percent (determined by photometer measurements).

The system consists of a glass fiber filter assembled in a roll which is indexed to present fresh filter media to the influent gas stream. Its specific application is for sticky or liquid aerosols, including submicron liquid and solid particulates. Air velocity across the filter cloth is approximately 500 fpm.

- Flow rate: 30,000 scfm
- Temperature: Approximately 100 F
- Effluent: Vapors from coal tar pitch
- Efficiency: Approximately 95 percent
- Estimated amount collected per year: 150 tons
- Disposal: County landfill

33-1

CARBON BAKING MULTIPURPOSE CRANES

A baghouse dust collector will be mounted on each of two multipurpose cranes used in the baking furnace. The cranes suck coke packing material from refractory lined pits. The fine material collected by the dust collectors is discharged to an airveyor system which returns the material to the green carbon plant. The dust collectors

are also used to collect the nuisance dust during the discharging operation. The baghouse dust collectors exhaust to the baking furnace building and will exit the building through a continuous ridge-mounted gravity ventilator.

- Flow rate: 3,000 scfm each
- Temperature: Approximately 200 F
- Effluent: Fine petroleum coke
- Efficiency: Approximately 99 percent
- Estimated amount collected per year: 137 tons
- Disposal: Recycle

33-2

CARBON BAKING -- ANODE CLEANING

A baghouse dust collector is used to vent the baked anode cleaning machine. The cleaning machine removes packing material from anode blocks by blast cleaning. Sized coke is used as the cleaning agent.

- Flow rate: 9,000 scfm
- Temperature: Ambient
- Effluent: Fine coke particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 279 tons
- Disposal: Recycle

33-3

CARBON BAKING -- BAKING FURNACE EXHAUST

Dry scrubbing units will be used to treat the baking furnace exhaust. Each consists of a Kaiser Aluminum-designed dry contact reactor, using as-received alumina as the collecting medium, and a baghouse dust collector similar in construction to the standard unit specified in the introduction to this section except that the air-to-cloth ratio will be approximately 4.4 to 1 at normal flow conditions. Bag material will be suitable to withstand the operating temperature, which will normally be in the 200 to 250 F range. Provisions will be made to cool the gases automatically by internal water spray or ambient air bleed, or both, to maintain a stable temperature. The furnace exhaust, containing particulate and gaseous pollutants, will pass through the collection system, depositing the tars and fluorides on the dry contact media. Particulates are removed by the baghouse filters. The dust cake is then dropped into the discharge system for reuse in the process. Exhaust ducts from each filter will be manifolded together and connected to a 100-foot stack.

This collection technique is similar to that used for dry scrubbing (primary collection) of aluminum electrolytic cell off-gases, but it has not as yet been commercially applied to baking furnace effluent control as intended

for Umatilla plant. Pilot testing of this collection system has been conducted by Kaiser Aluminum.

Following are the anticipated characteristics of the dry collection system based upon the pilot work done to date:

- Flow rate: 137,000 scfm
- Temperature: 225 F
- Effluent: Particulate -- coke, fluorides, alumina, and hydrocarbons
Gas -- HF and products of combustion from firing furnaces with residual oil (0.5 percent or less sulfur)
- Outlet Concentration: Total Particulate -- less than 0.005 gr/scf
Fluorides -- 0.000188 gr/scf
- Estimated amount collected per year: 297 tons
- Disposal: Recycle

34-1

CARBON RODDING -- CLEANING MACHINES

A baghouse dust collector will be connected by ductwork to the anode rod, cathode collector bar, spent anode cleaning machine, and cast iron tumbling mills. Steel shot is employed in all cleaning operations.

- Flow rate: 5,000 scfm from each operation only when operating; 20,000 scfm maximum
- Temperature: Ambient
- Effluent: Fine iron oxide particulate from all four dust sources, and fine carbon and trace quantities of fluoride particulate from spent anode cleaning machine
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 650 tons
- Disposal: County landfill

34-2

CARBON RODDING -- SPENT ANODE CRUSHING

A baghouse dust collector will service the spent anode primary crushing area in the carbon rodding facility, including the feed to the crusher and the crusher discharge to the conveyor for transport of crushed carbon to the green anode plant.

- Flow rate: 10,000 scfm
- Temperature: Ambient
- Effluent: Fine coke particulate and traces of other materials, such as iron oxide and silica
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 217 tons
- Disposal: Recycle

POTLINES -- BATH RECLAIM SYSTEM

A baghouse dust collector will service the enclosed bath reclaim area and will incorporate crushing, screening, and conveying of bath materials reclaimed from the reduction cells and crucibles. Operation is intermittent, amounting to approximately one shift per week.

- Flow rate: 4,000 scfm
- Temperature: Ambient
- Effluent: Fine alumina and cryolite particulate
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 14 tons
- Disposal: Recycle
- References: Flow Diagram No. 2

POTLINES AIR CONTROL -- PRIMARY SYSTEM

The primary air control systems for each of the four potrooms will consist of a horizontal duct running the full length of the building and connected to the exhaust gas offtake duct from each reduction cell and to a battery of dry scrubbing units, each with its individual fan and shutoff dampers.

The exhaust from the dry scrubbing units will be ducted to a common 150-foot stack. The dry contact reactors to be employed have been developed by Kaiser Aluminum and Chemical Corporation. The design is based on extensive pilot-scale testing on a full-scale operating reduction cell at their test facility in California, and on the results of full-scale experimental operation on a potroom since May 1972 at Kaiser Aluminum's reduction plant in Ravenswood, West Virginia.

Similar systems are in various stages of design and construction for other Kaiser Aluminum facilities in Tacoma and Spokane, Washington, and in Chalmette, Louisiana.

The following are the anticipated characteristics of the primary system:

- Flow rate: 1,470,000 scfm total
- Cloth Area: 5 to 5.5:1 air-to-cloth ratio
- Temperature: Approximately 175 F exiting baghouses
- Effluent: Particulate -- alumina, fluorides, and carbon
Gas -- HF, SO₂, CO, CO₂
- Outlet Concentration: Particulate -- 0.00257 gr/scf
Particulate & gaseous
fluoride -- 0.000342 gr/scf -
No treatment of SO₂, CO, &
CO₂

- Estimated amount collected per year: 7,400 tons
- Disposal: Recycle

43-2

AIR CONTROL -- REACTED ALUMINA DAY BINS

Two elevated alumina day bins, one for each potline, will be situated in alternate courtyards adjacent to the center passageway. Each bin will be fed by conveyor from the potline primary air control system and will, in turn, feed alumina containers in each potroom. One baghouse dust collector will be situated above each day bin.

- Flow rate: 3,000 scfm each
- Temperature: Ambient
- Effluent: Fine alumina and fluoride particulate (fluoride component represents approximately 0.7 percent of total)
- Efficiency: 99 percent minimum
- Estimated amount collected per year: 447 tons
- Disposal: Recycle

43-3

POTLINE AIR CONTROL -- SECONDARY SYSTEM

In addition to the primary collection system, a wet scrubber secondary air control system will be installed to treat the potroom building air.

Approximately 8,000,000 cubic feet per minute will be evacuated from the potrooms by 80 scrubber units handling 100,000 cfm each.

A fluoride and particulate removal efficiency by these scrubbers of 75 percent is expected, based on experience at the INTALCO reduction facilities in Washington.

Alumax intends to install approximately eighty 100,000 cfm cocurrent wet scrubbers using a recirculating water spray mist at a rate of approximately 1,000 gpm. Each scrubber will be approximately 12 feet in diameter, complete with a 6-foot inlet section with a 30-hp vane-type fan.

Each unit will contain an expanded section incorporating a mist-minimizing series of baffles in which the air velocity will be reduced to approximately 400 fpm. To maximize the fluoride removal and to design the plant for zero discharge of industrial water, Alumax intends to use a closed recycle scrubber liquor system. The following operating characteristics are anticipated for the scrubbers at this time:

- Flow rate: 8,000,000 scfm total (excluding water vapor)

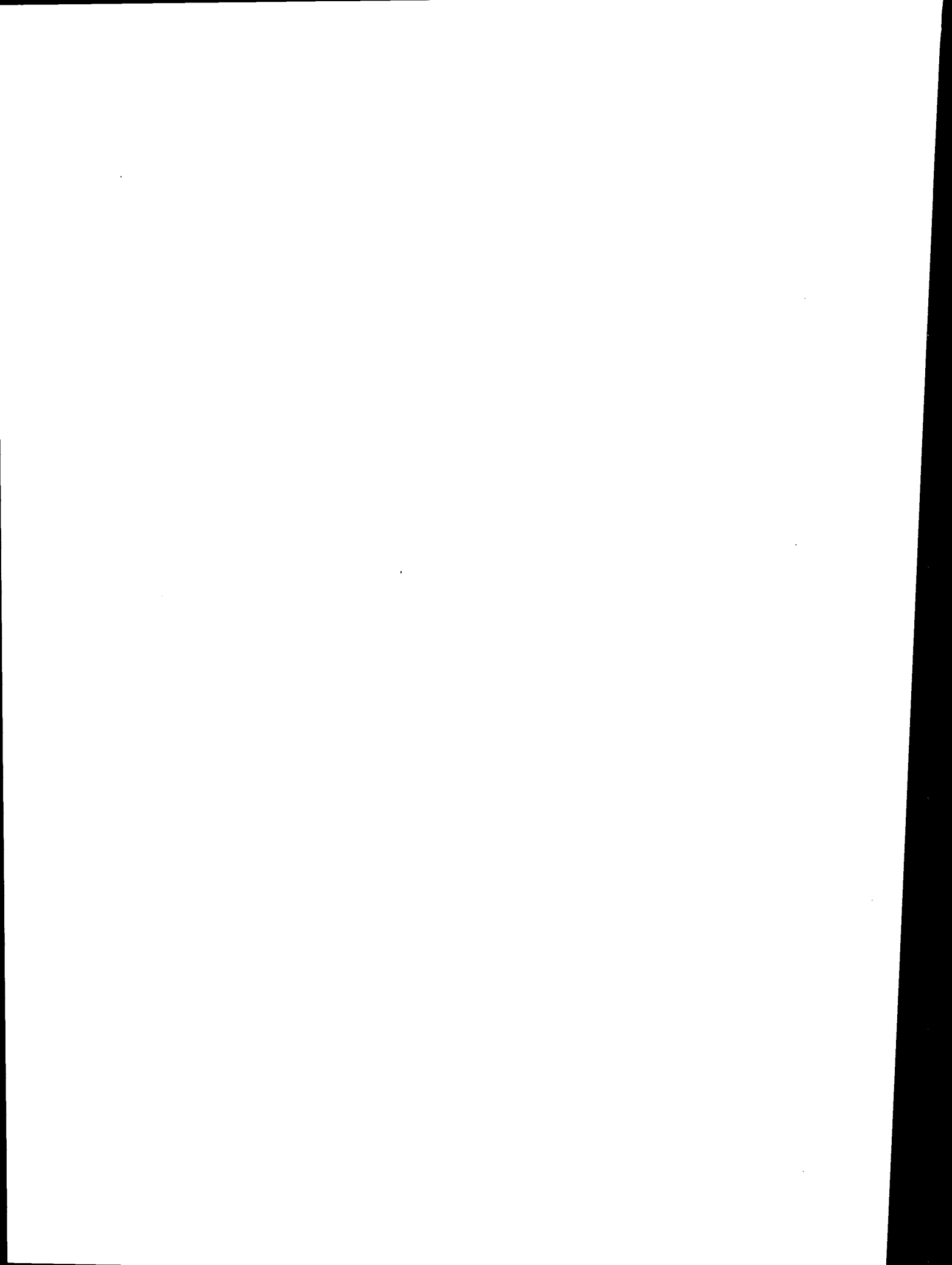
- Temperature: Ambient plus 5 degrees F
- Effluent: Particulate -- alumina and fluorides
Gases -- HF, SO₂, CO, CO₂, Air
- Efficiency: 75 percent minimum for particulates and
fluorides
SO₂, CO, CO₂ -- None claimed
- Estimated amount collected per year: 250 tons
- Disposal: Water treatment plant

44-1

METAL SERVICE -- DROSS TREATMENT

A baghouse dust collector will be used for venting dust-laden air from the dross cooling system housed adjacent to the metal service building. The process involves removing aluminum content from furnace skimmings (dross) by a shaking and cooling technique.

- Flow rate: 18,000 scfm
- Temperature: Approximately 150 F
- Effluent: Fine particulate aluminum oxide
- Efficiency: Approximately 99 percent
- Estimated amount collected per year: 510 tons
- Disposal: Outside sales



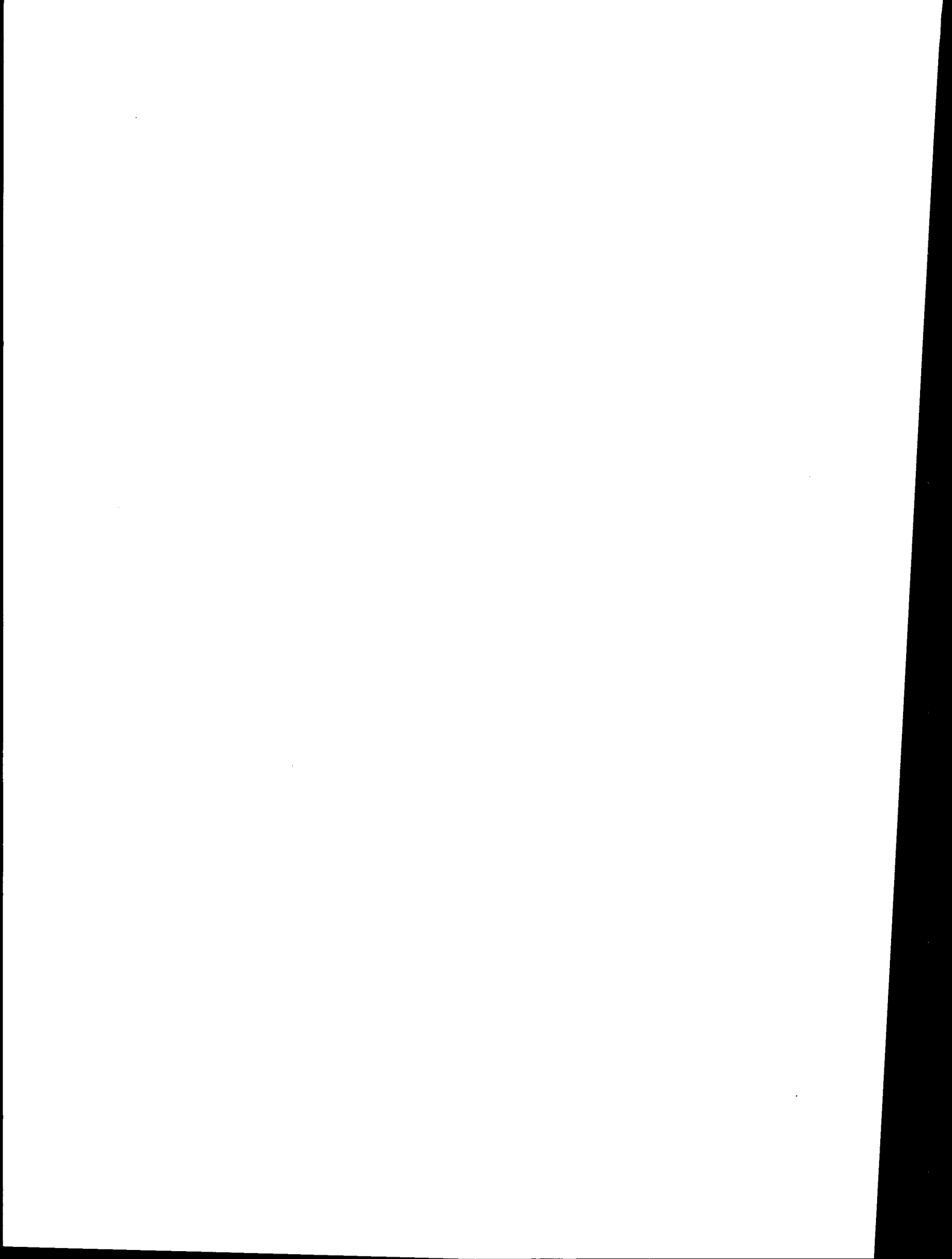
Attachment C

Thermal Emissions Data

Parameter	Heat Source					All Sources
	Primary Scrubber System	Secondary Scrubber System	Carbon Baking Plant	Metal Services Building	Cooling Towers	
Discharge Height (ft)	150	75	100	70	40	
Discharge Temperature (°F)	175	Ambient +5	225	600	90	
Discharge Velocity (ft/min)	3450	400	3450	1700	3000	
Number of Discharge Points	1	80	1	5 <u>1</u> /	4	
Total Discharge Volume (acfm)	1.5×10^6	8.0×10^6	1.4×10^5	1.5×10^4	1.3×10^6	
Total Heat Discharged:						
Gram-calories/sec	5.03×10^6	2.70×10^6	1.25×10^6	3.06×10^5	2.10×10^6	1.14×10^7
BTU/sec	1.99×10^4	1.07×10^4	4.98×10^3	1.21×10^3	8.33×10^3	4.51×10^4
Percent of total	44.1	23.7	11.0	2.7	18.5	100.0
Average Stabilization Height (ft)	624	75	272	155	118	

1/ Only 3 discharge points are operating at any one time.

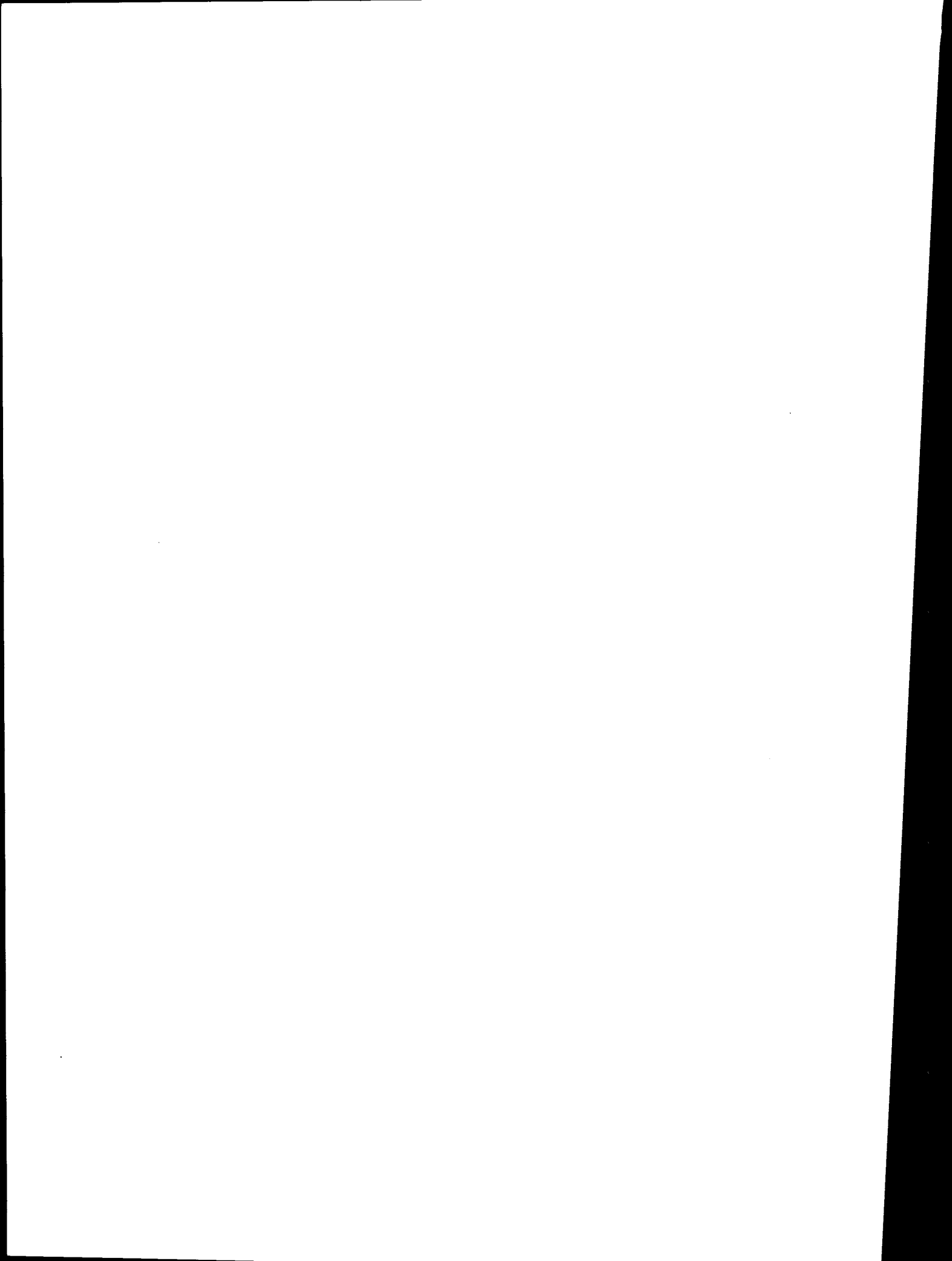
Source: Cramer and Bowers, (1975b).

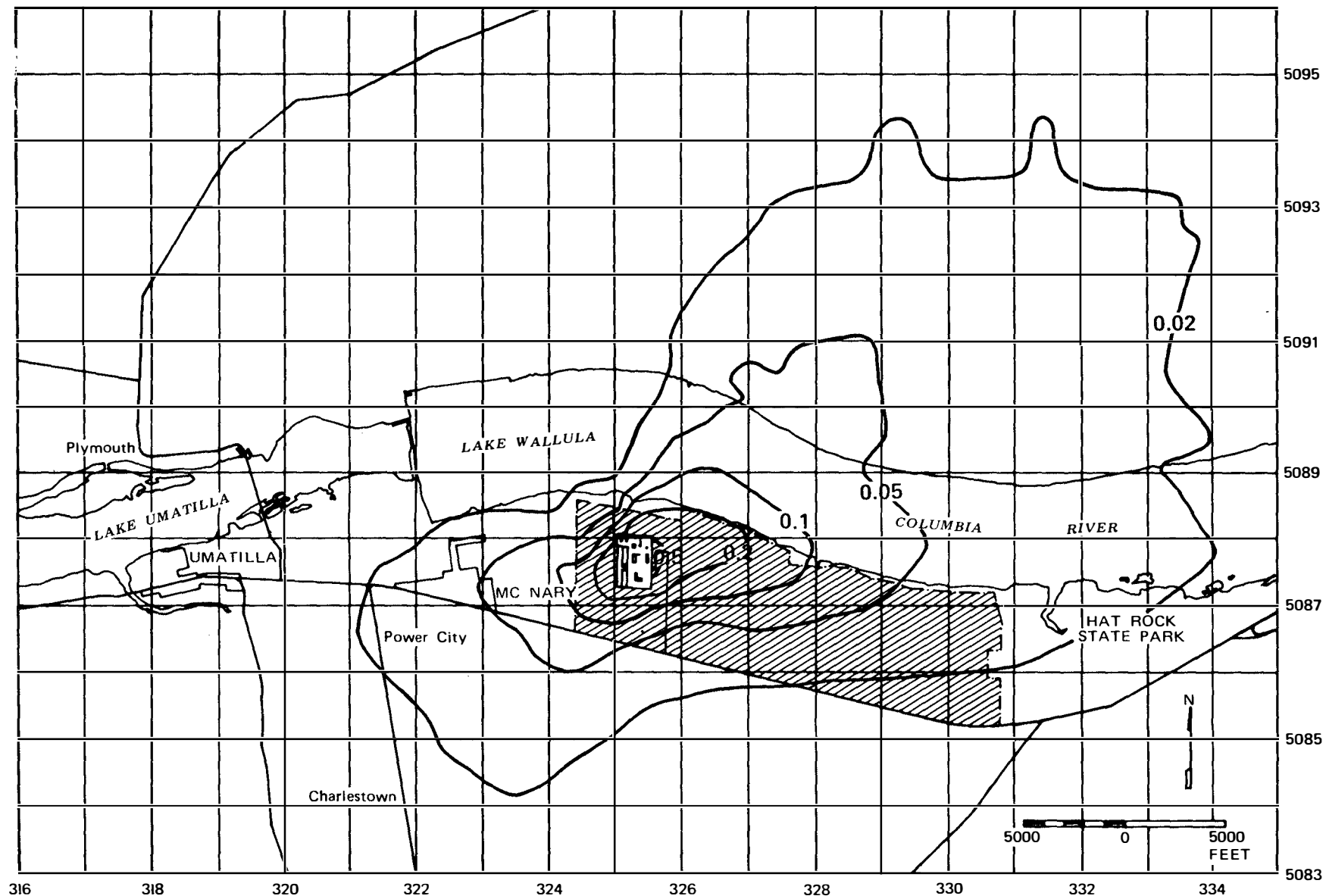




Chapter IV—Attachment D

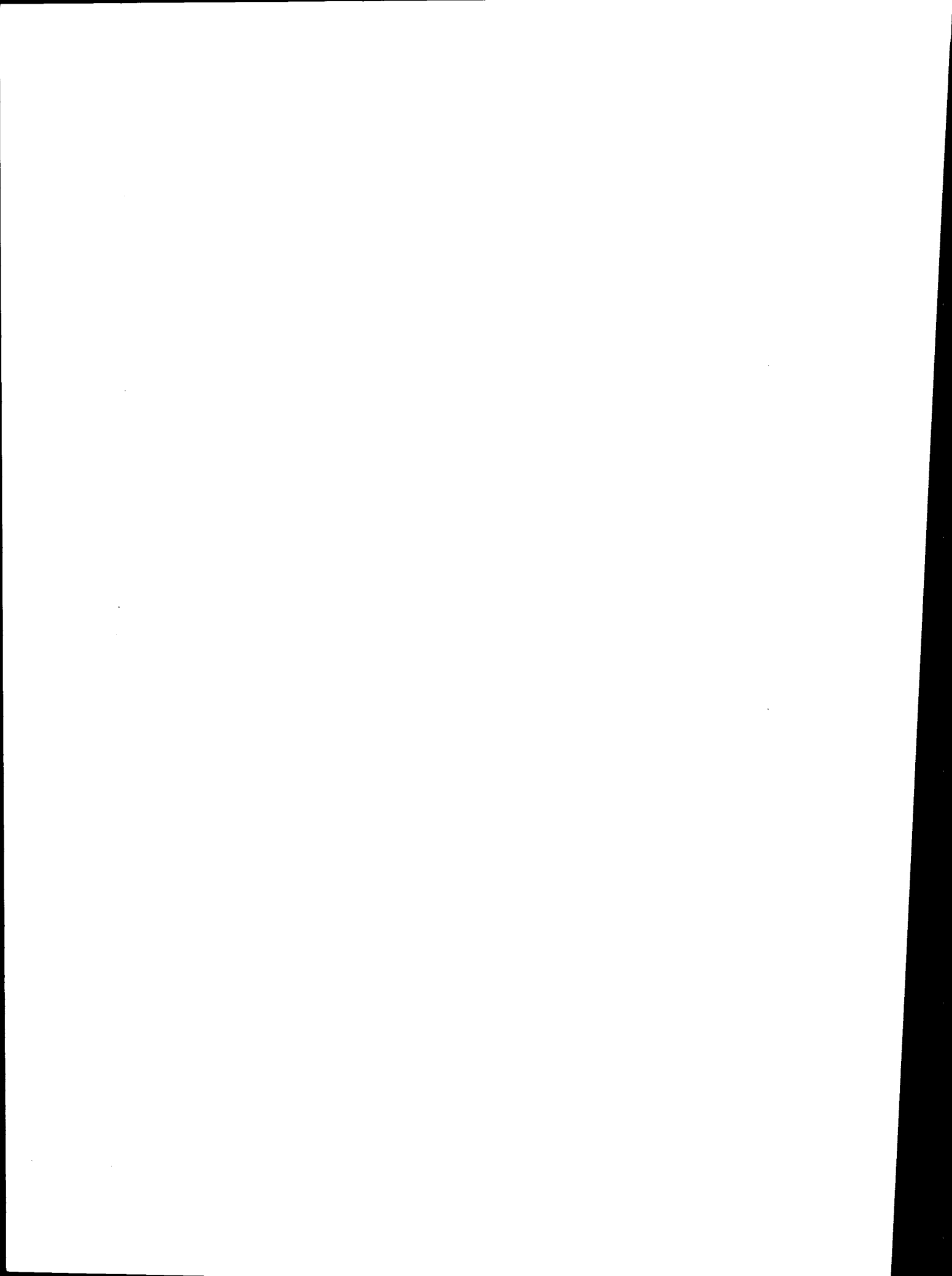
CALCULATED ISOPLETHS OF ANNUAL AVERAGE GROUND-LEVEL PARTICULATE FLUORIDE
CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR MAXIMUM OREGON DEQ EMISSION RATES.

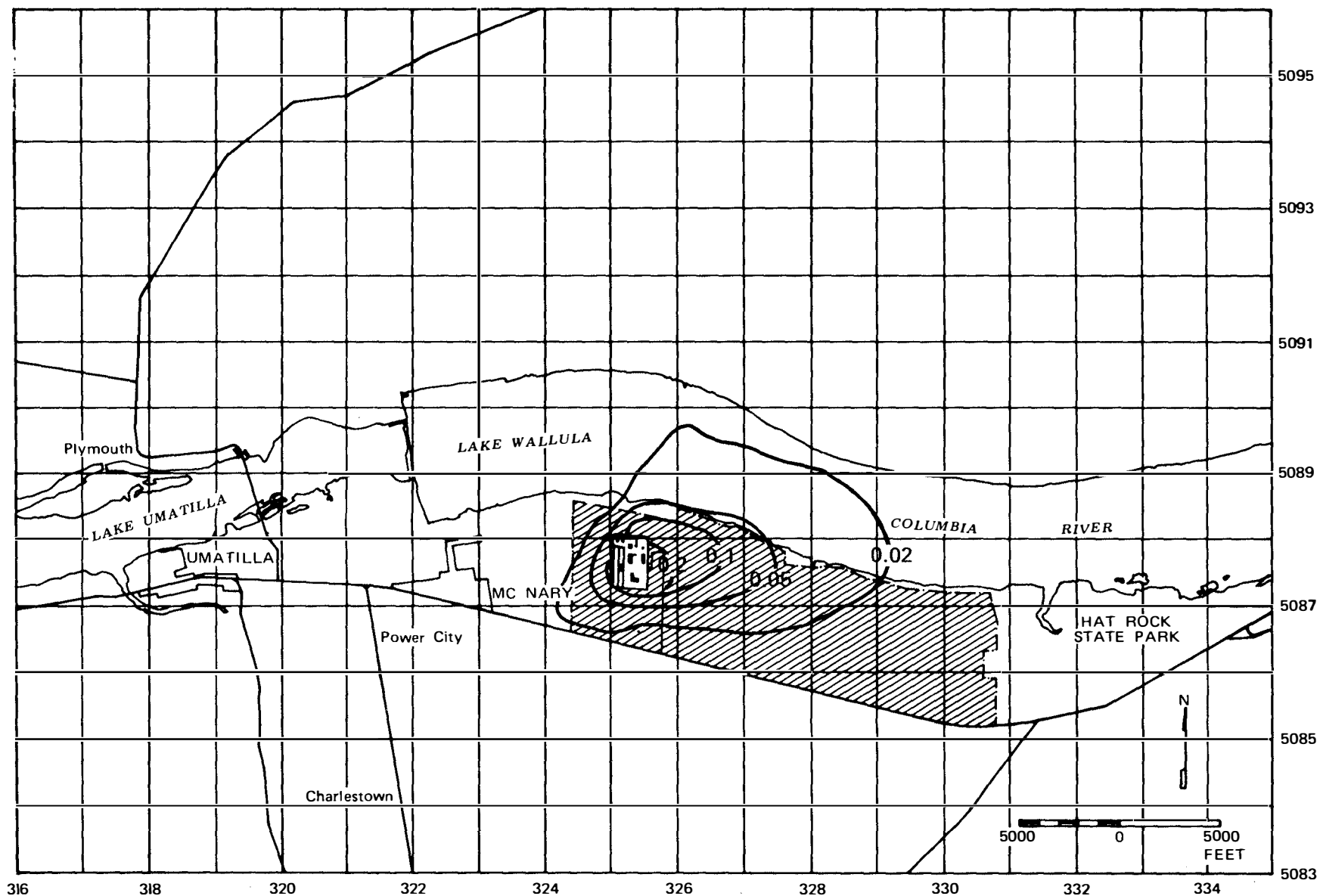




Chapter IV—Attachment E

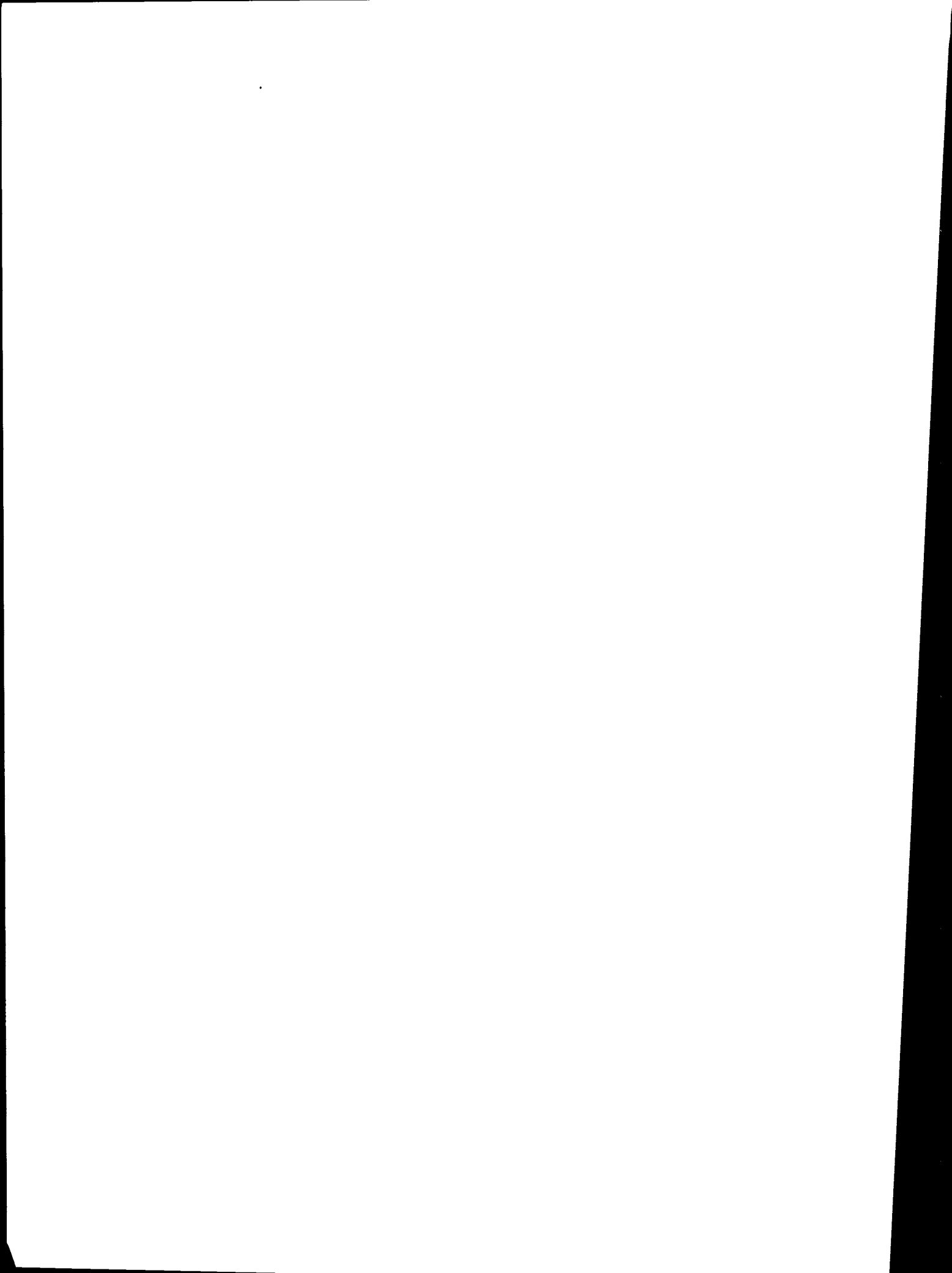
CALCULATED ISOPLETHS OF SEPTEMBER MONTHLY AVERAGE GROUND-LEVEL PARTICULATE FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

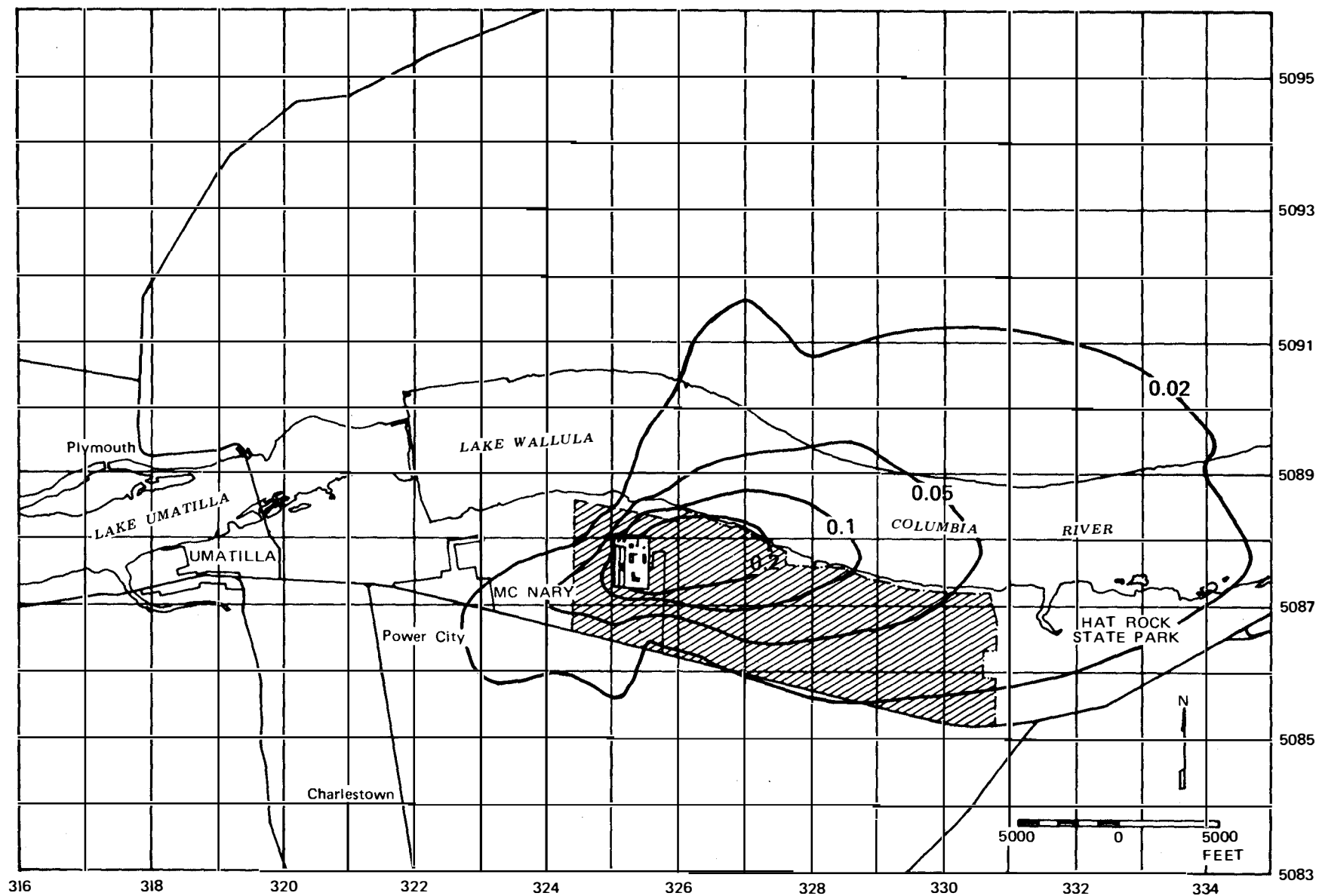




Chapter IV—Attachment F

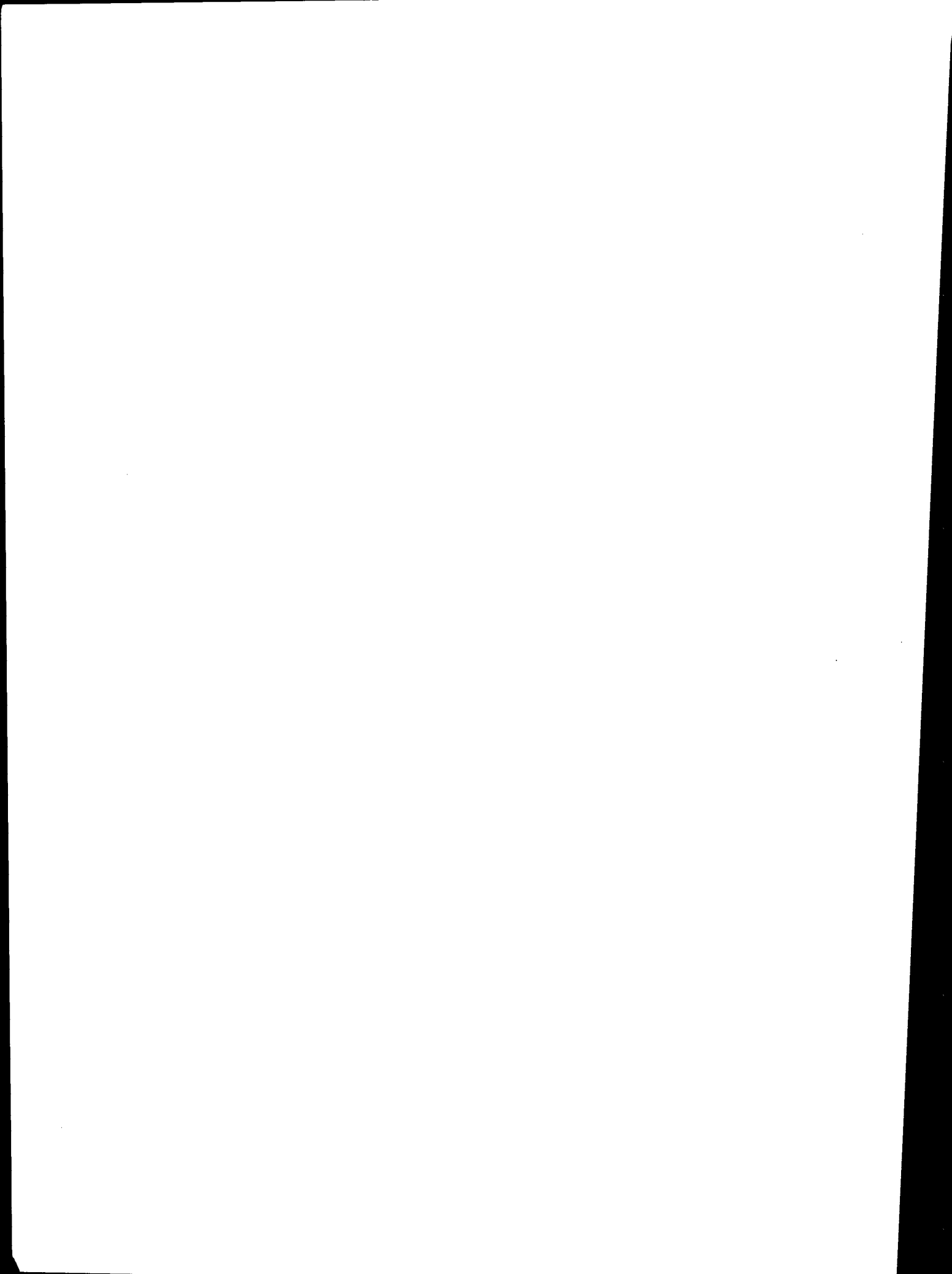
CALCULATED ISOPLETHS OF JUNE MONTHLY AVERAGE GROUND-LEVEL GASEOUS FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.



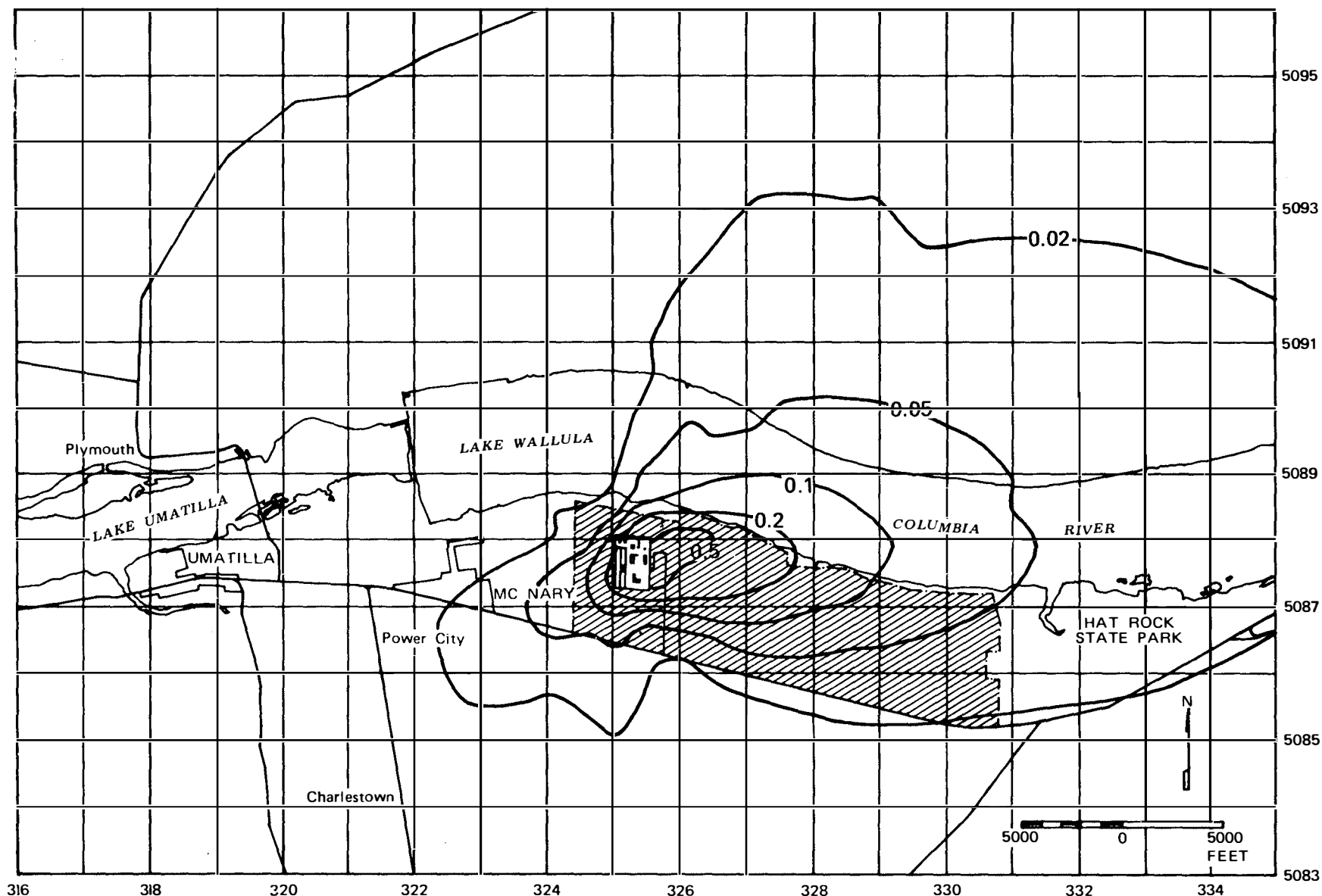


Chapter IV—Attachment G

CALCULATED ISOPLETHS OF JUNE MONTHLY AVERAGE GROUND-LEVEL PARTICULATE FLUORIDE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

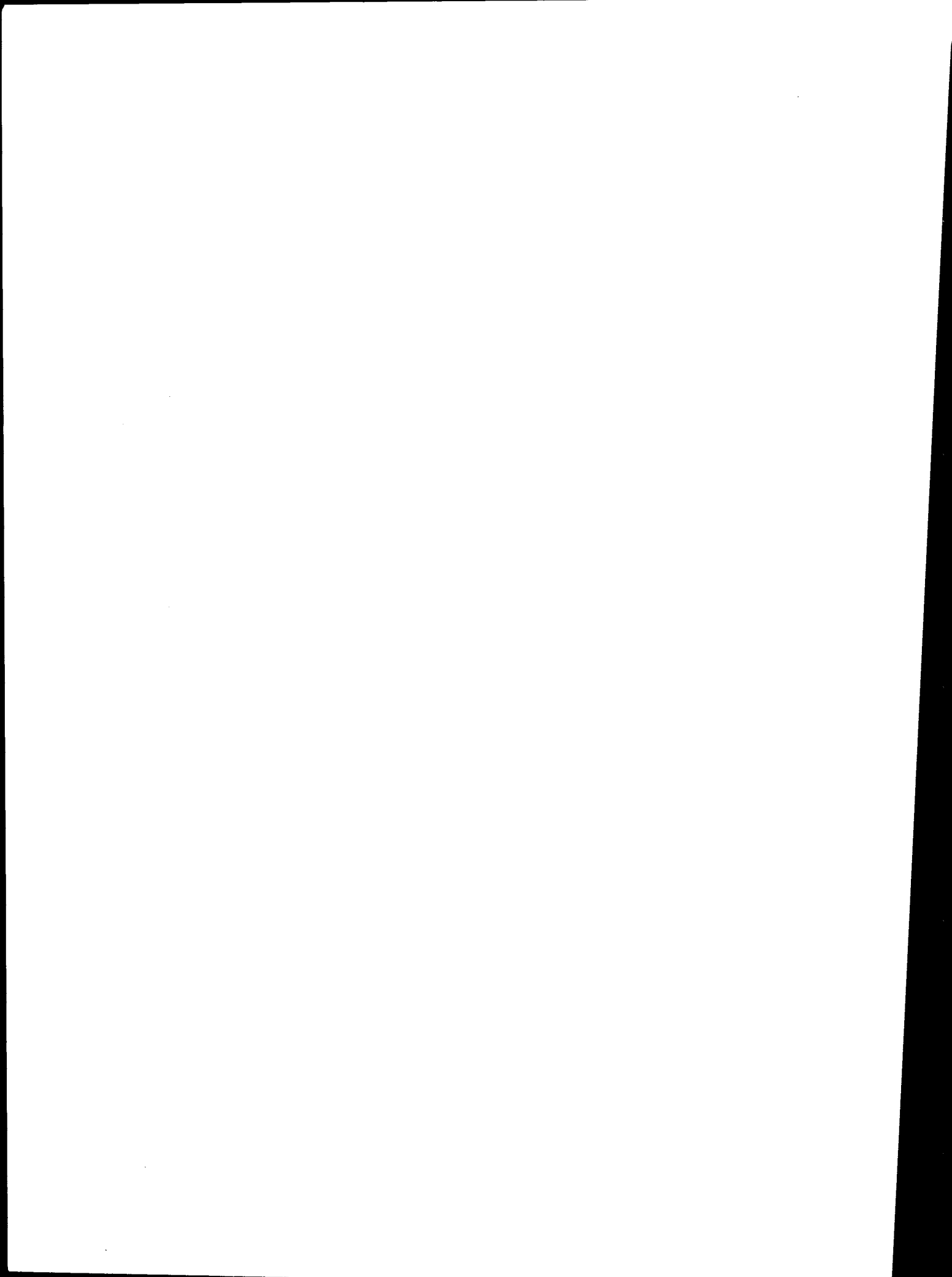


I-H

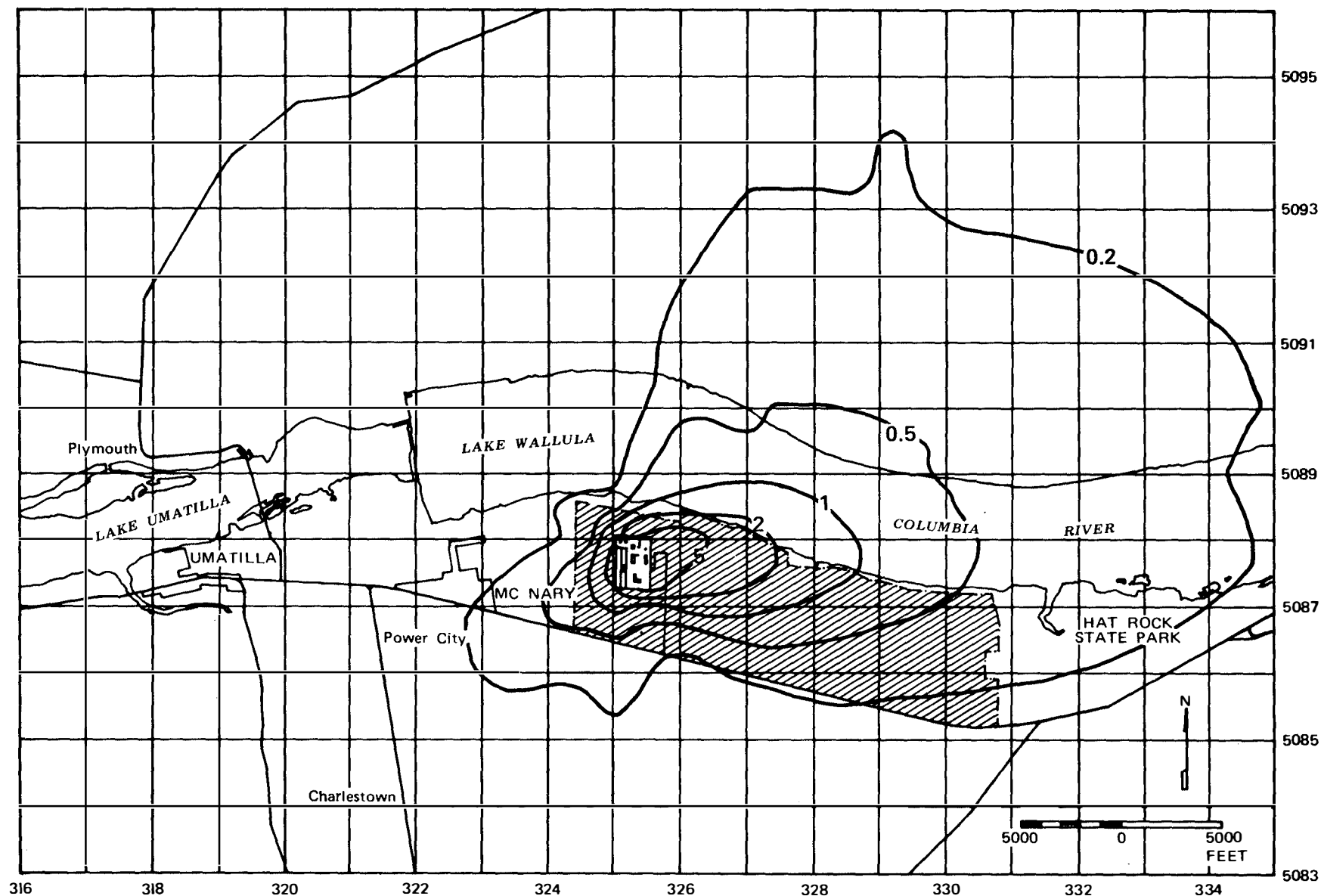


Chapter IV-Attachment H

CALCULATED ISOPLETHS OF JUNE MONTHLY AVERAGE GROUND-LEVEL TOTAL FLUORIDE CONCENTRATION
IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.



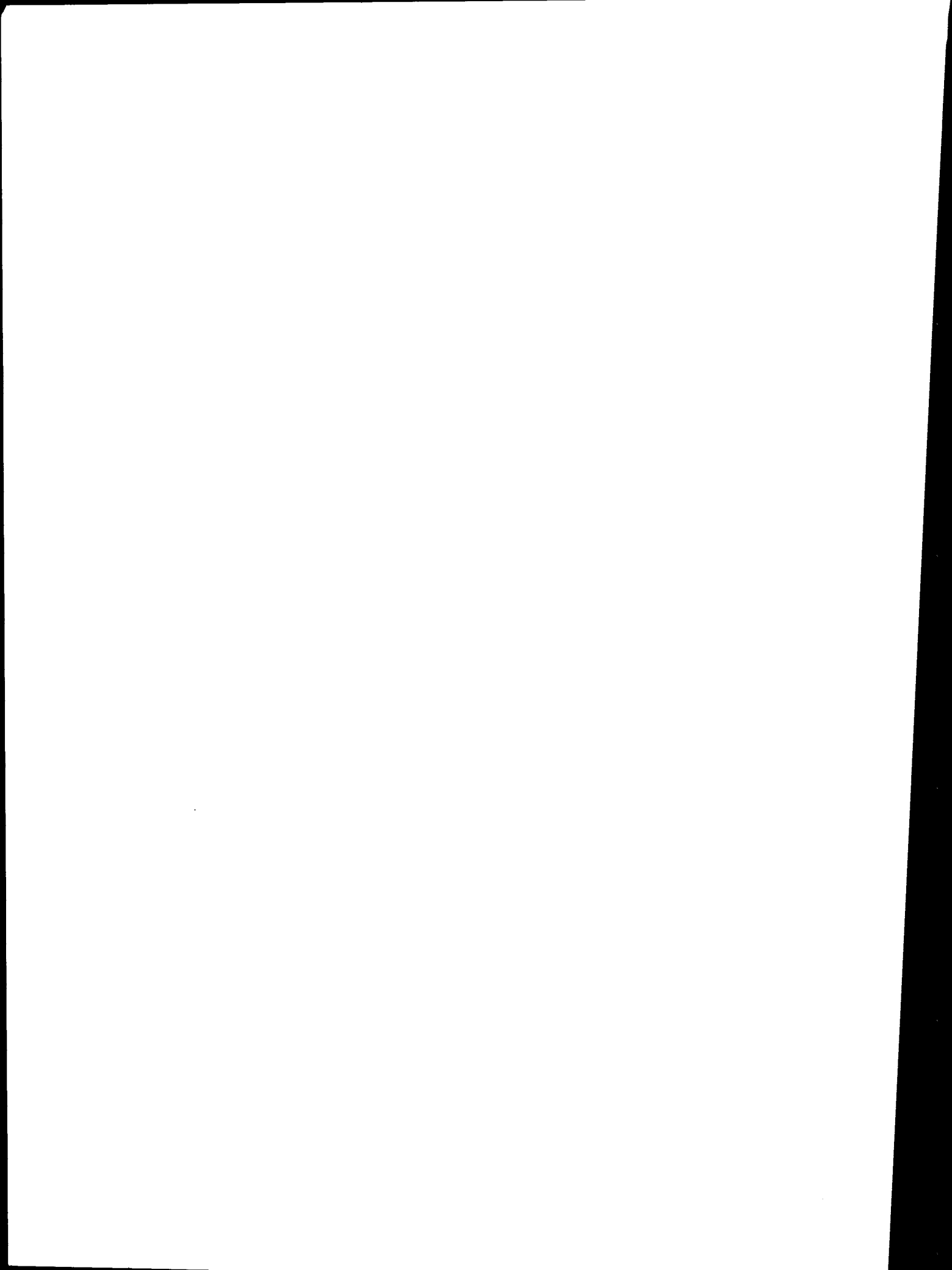
1-1



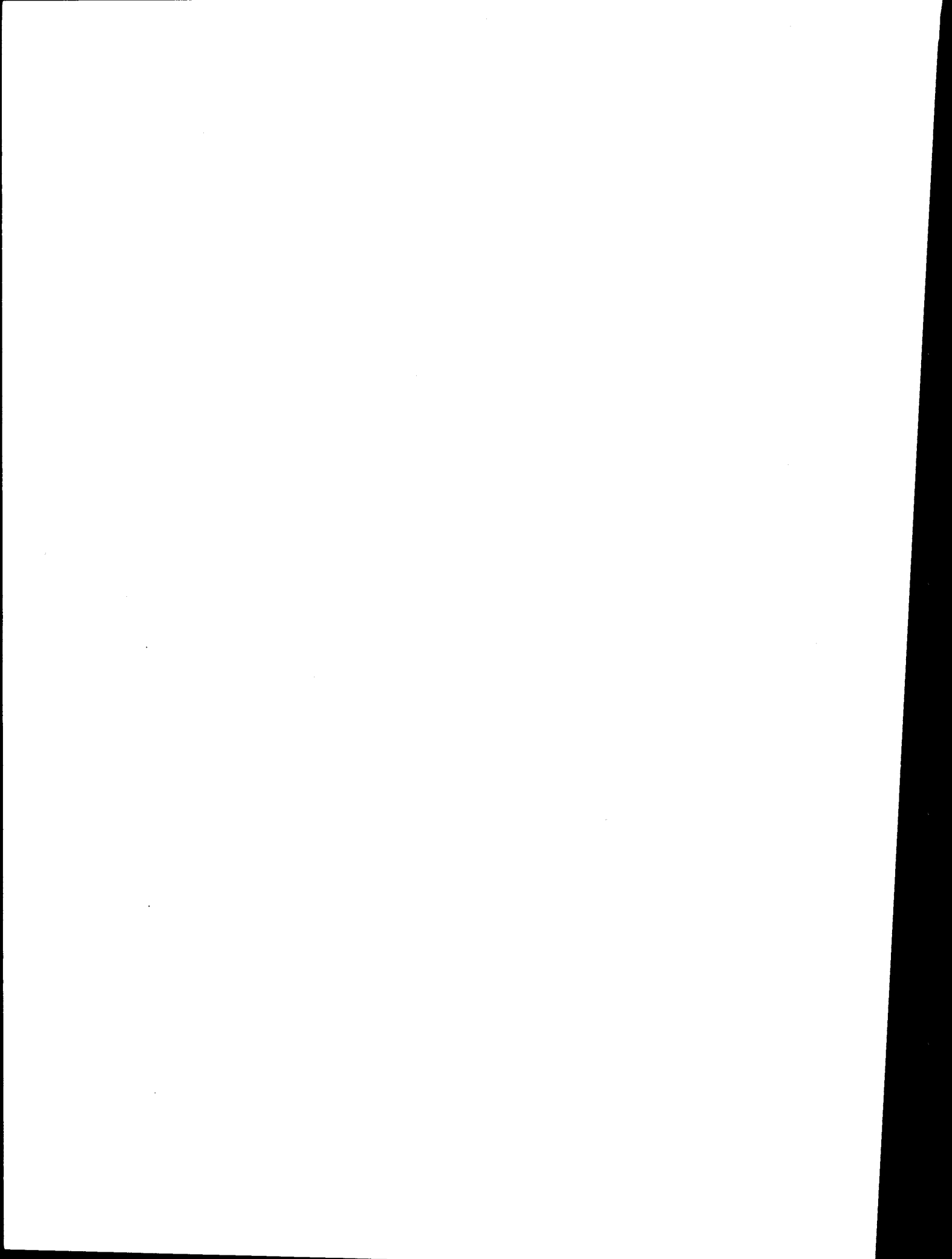
Chapter IV—Attachment I

CALCULATED ISOPLETHS OF JUNE MONTHLY AVERAGE GROUND-LEVEL TOTAL PARTICULATE CONCENTRATION IN MICROGRAMS PER CUBIC METER FOR THE OREGON DEQ MAXIMUM EMISSION RATES.

Source: Cramer, Bowers, 1975d, P. 19.



GLOSSARY



ALUMAX EIS GLOSSARY

advance energy:	1. Electric energy delivered at BPA's option at times when government-controlled reservoirs are on storage control, to the industrial customers in lieu of restricting Industrial Firm Power. This arrangement improves the availability of service and results in greater sales revenue to BPA. The current contract provisions limit such deliveries to two million megawatthours, and the energy is subject to return if Bonneville determines that firm commitments can not be met because of advance energy deliveries. 2. Any electric energy delivered prior to the date that specified amounts from specified thermal generating plants become available.	annual storage:	See "storage reservoir."
aggregate:	Crushed rock or gravel screened to sizes for use in road surfaces, concrete, or bituminous mixes.	anthracite:	A high-rank coal with high fixed carbon, high percentages of volatile matter and moisture.
alluvial:	Pertaining to the sediments, usually mineral or inorganic, deposited by running water.	anticlinal:	Of or relating to a geological anticline, which is an arch of stratified rock in which the layers bend downward in opposite directions from the crest.
alternating current (a.c.):	An electric current that reverses its direction of flow at regular intervals and has alternately positive and negative values.	aquifer:	An underground bed or stratum of earth, gravel, or porous stone that contains water. A geological rock formation, bed, or zone that may be referred to as a water-bearing bed.
ambient:	The natural conditions (or environment) at a given place and time.	authorized increase:	Nonfirm energy which BPA determines is available either to serve that portion of BPA industrial customers' existing industrial plant capacity for which Industrial Firm Power is not available, or to serve increased loads resulting from technological changes other than plant expansion, including improvement in operation of plant equipment, modification of such equipment, installation of additional auxiliary equipment, or installation of emission control equipment.
ambient air quality:	The prevailing quality of the surrounding air in a given area in terms of the type and amounts of various air pollutants present.	backfilling:	A reclamation technique which returns the rock and soil of the overburden to mined cuts or pits. This leaves the land in a configuration similar to the original form.
ambient noise level:	The background noise level within a given area for a certain period of time during the 24-hour day.	baghouse:	A fabric filter used to separate particulates from an airstream.
ampere (A):	The unit of measurement of electric current. It is proportional to the quantity of electrons flowing through a conductor past a given point in one second. It is analagous to cubic feet of water flowing per second. It is the unit current produced in a circuit by one volt applied across a resistance of one ohm.	basalt:	A hard, heavy, dark volcanic rock, sometimes found in the form of columns.
anadromous:	Species of fish (such as salmon) that are hatched in fresh water, mature in salt water, and return to fresh water to spawn.	baseload:	The minimum load in a power system over a given period of time.
andesite:	Dark grayish rock consisting essentially of oligoclase or feldspar.	bench:	A terrace along the bank of a body of water, often marking a former shoreline.
		biochemical oxygen demand (BOD):	The amount of oxygen required to decompose a given amount of organic compounds to simple, stable substances within a specified time at a specified temperature. BOD is an index of the degree of organic pollution in water.

bioconversion:	The conversion of organic wastes into methane (natural gas) through the action of microorganisms.	carbon monoxide (CO):	A colorless, odorless, highly toxic gas that is a normal byproduct of incomplete fossil-fuel combustion. CO is one of the major air pollutants.
biosphere:	That portion of the solid and liquid earth and its atmosphere where living organisms can be and are sustained; "organic nature" in general.	carrying capacity:	The maximum population size of a given species in an area or concentration of pollutants in a stream, beyond which any increase would cause degradation of the resource.
biota:	Living organisms; the plant and animal life of a region.	circuit breaker:	Generally, any switching device that is capable of interrupting an electrical circuit under overload or short-circuit conditions as well as under normal load conditions.
bituminous:	An intermediate-rank coal with low to high fixed carbon, intermediate to high heat content, a high percentage of volatile matter, and a low percentage of moisture.	clearance requirements:	Distances required between conductors of various voltages and the ground; also, the distance required between the line and trees, buildings, and other objects on, above, or immediately adjacent to the right-of-way.
British thermal unit (Btu):	The standard unit for measuring quantity of heat energy in the English system. It is the amount of heat energy necessary to raise the temperature of one pound of water one degree Fahrenheit (3412 Btu's are equal to one kilowatthour).	coke:	The solid combustible residue left after the destructive distillation of coal, crude petroleum, or some other material.
bunchgrasses:	Any of various grasses that grow in tufts.	community:	All of the plants and animals in an area with defined boundaries; a complex association usually containing both animals and plants.
bundle:	The use of more than one conductor per phase in transmission systems. The phase conductors are grouped together and separated several inches by a spacer. This grouping is called a bundle.	conductor:	The wire cable strung between transmission towers through which the electric current flows.
bus:	Generally, a conductor or group of conductors that serves as a common connection for two or more circuits. In substations, specifically a conductor, often rigid, which interconnects equipment of the same voltage.	conservation:	Improving the efficiency of energy use; using less energy to produce the same product.
capability:	The maximum load that a machine, station, or system can carry under specified conditions for a given time interval, without exceeding approved limits of temperature and stress.	contract demand contracts:	Power sales contracts stipulating a specific number of kilowatts that the customer agrees to purchase. BPA may exceed the contract demand at the customer's request and serve additional amounts as an authorized increase under the rate schedule.
capacity:	Maximum power output, expressed in kilowatts or megawatts. Equivalent terms: peak capability, peak generation, firm peakload, carrying capability. In transmission, the maximum load a transmission line is capable of carrying.	cooperative:	Private, non-profit corporations, operating within State laws, but essentially self-regulating. Each cooperative is a preference customer of BPA and is controlled by a board of directors, elected from its membership. It is a private business and not a unit or subdivision of government.
capacity factor:	The ratio of the average load on a generating resource to its capacity rating during a specified period of time, expressed in percent.		

corona:	A partial electrical discharge which occurs when the dielectric strength of insulation is exceeded. Transmission line corona varies with atmospheric conditions, being more intense during wet weather. In all cases, it causes a power loss. On a transmission line, corona appears when the dielectric strength of air adjacent to the conductor is exceeded due to the applied potential ionizing the air. It can be seen as bluish tufts or streamers surrounding the conductor, and generally, a hissing sound can be heard.	cubic feet per second (cfs):	A measure of discharge; a measure of the rate at which water passes a given point.
corridor:	A strip of land forming a passageway for transportation or utility facilities. Single purpose corridor: A corridor developed for one primary use such as pipelines or transmission lines. Single purpose corridors are sited to accommodate one utility and boundaries are set accordingly. They offer few opportunities for joint access. Joint use corridor: A corridor occupied by more than one type of utility or transportation system (i.e., pipelines, transmission lines, communication lines, highways, railroads, etc.). Many joint use corridors develop as a result of new and different utilities or transportation systems being constructed alongside an existing corridor.	curtailment:	Temporary, mandatory load reduction reflecting emergency conditions, following after all possible conservation action and load management techniques, and prompted by problems of meeting baseload, rather than peaking deficiencies.
		cyclonic:	In meteorology, characterized by a storm with heavy rainfall and winds rotating about a moving center of low atmospheric pressure.
		deadend towers:	Heavily-designed towers for use where the transmission line loads the tower primarily in tension (pull) rather than compression (downward push); for example, in turning large angles along a line, or in bringing a line into a substation.
		decibel (dB):	A unit which measures the relative intensity of sound; one decibel being approximately the least change detectable by the average human ear.
		deciduous forest:	Forests composed of trees which shed their leaves at maturity or at certain seasons.
critical period:	An application of historical lowest streamflows to current storage capacity to determine the maximum firm load-carrying capability of the present system under "worst-case" conditions; the interval during which all reservoirs are drafted from maximum to minimum elevation without failing to meet a given firm load requirement.	demand:	1. In an economic context, the quantity of a product that will be purchased at a given price at a particular point in time. 2. In a public utility context, the rate at which electric energy is delivered to or by a system, expressed in kilowatts or megawatts, kilovoltamperes, or over any designated period.
cross-elasticity of demand:	The tendency for an increase (or decrease) in the price of any given product to result in an increase (or decrease) in the demand for a substitute product. For example, an increase in the price of gas may lead to an increase in the demand for electricity, without any change in the price of electricity.	demand limit contracts:	Power sales contract in which BPA agrees to serve a customer's requirements up to a specified demand limit. BPA may exceed the demand limit as in the Contract Demand Contracts.
crustacean:	A member of a class of invertebrates, including shrimps, crabs, barnacles, and lobsters, that often live in the water and respire through gills; they have a hard outer shell and jointed appendages and bodies.	dependable capacity:	The load-carrying ability of a station or system under adverse conditions for the time interval and period specified when related to the characteristics of the load to be supplied.
		depletion allowance:	A charge against income for the pro rata cost of extracted depletable natural resources such as coal, gas, or oil.

4

direct current (d.c.): A unidirectional current having a magnitude that does not vary, or that varies only slightly.

dissolved oxygen: The oxygen dissolved in water, necessary for the life of fish and other aquatic organisms.

dissolved solids: The total amount of dissolved material, organic and inorganic, contained in water or wastes. Excessive dissolved solids can make water unsuitable for industrial uses, unpalatable for drinking, and even cathartic.

distillation: Heating a liquid mixture in order to drive off gases or vapors which are then separated according to boiling point and condensed into liquid products.

disturbance: Any occurrence that adversely affects normal power flow in a system, such as a lightning surge on a line, or a short circuit.

double circuit: The placing of two separate electrical circuits (consisting of three phases each) on the same row of towers. In tower design, any tower capable of supporting two circuits.

draft: Release of water from a reservoir, usually measured in feet of reservoir elevation.

easement: The right or privilege obtained by BPA through negotiated contract or condemnation to construct, maintain, and operate transmission facilities within a right-of-way.

ecological climax: The final, stable community in an ecological succession which is able to reproduce itself indefinitely under existing conditions.

ecological stress: The result or consequent state of a physical or chemical, or social stimulus on an organism or system; perturbations likely to cause observable changes in ecosystems; usually departures from normal or optimum.

ecological succession: The replacement of one assemblage of plants and animals by another.

ecosystem: A community and its living and nonliving environment considered collectively, the fundamental unit in ecology.

effluent: A discharge or emission of a liquid or gas, usually waste material.

elasticity of demand: The degree to which the quantity of a product demanded responds to changes in price, income, or other factors.

electric field: The space surrounding an electrical charge in which electrical forces may act.

electrode: Generally, a conducting element through which an electric current enters or leaves a different medium.

electrolysis: Chemical changes produced by passage of an electric current through an easily ionized liquid.

electrolyte: Any substance which in solution dissociates into ions and is thus made capable of conducting an electric current.

electromagnetic interference (EMI): The disruption of radiated or conducted electric signals frequency spectrum from 10 Hz to 100 MHz caused by an electromagnetic disturbance. On transmission systems this can be caused by corona discharges or by induction from the electromagnetic field.

electromagnetic radiation: A form of energy characterized by transversely oscillating electric and magnetic fields propagating through space. Visible light is part of the spectrum of electromagnetic radiation.

electrostatic precipitator: A device that collects particulates by placing an electrical charge on them and attracting them into a collecting electrode.

emission: A discharge of pollutants into the atmosphere, usually as a result of burning or the operation of internal combustion engines.

emissions: Material that is released into the air either by a distinct source (primary emission) or as the result of a photochemical reaction or chain of reactions.

endangered
species:

Any species which, as determined by the Fish and Wildlife Service, is in danger of extinction throughout all or a significant portion of its range other than a species of the class Insecta determined to constitute a pest whose protection would present an overwhelming and overriding risk to man.

energize:

To apply voltage to electrical equipment.

energy:

The ability to do work; the average power production over a stated interval of time; expressed in kilowatt-hours, megawatthours, average kilowatts, or average megawatts. Equivalent terms: energy capability, average generation, firm energy load carrying capability.

energy capability:

The net average output ability of a generating plant or plants during a specified period, in no case less than a day. Energy capability may be limited by available water supply, plant characteristics, maintenance, or fuel supply.

entrain:

To carry along or over, especially mechanically (as fine drops of liquid in vapors during distillation or evaporation).

estuary:

Shallow coastal water, usually associated with the mouth of a river, including adjoining bays, lagoons, shallow sounds, and marshes where tidal effects are evident and fresh water and sea water mix.

exchange
arrangement:

An agreement providing for an exchange of power and energy, or of services, rather than a direct sale or charge.

extra-high
voltage (EHV):

Descriptive of transmission lines with voltage levels higher than 230-kV but lower than ultra high voltage (UHV) levels (800-kV).

facility loca-
tion supplement:

A supplementary environmental impact statement issued subsequent to a specific facility planning supplement. It expands upon the facility planning supplement to include alternative locations for the proposed new facility and environmental impacts associated with each alternative location. This

facility plan-
ning supplement:

supplement is prepared after public and agency review of the final planning supplement has been completed and reconnaissance studies have been made.

A supplementary environmental impact statement which identifies the need for a specific new transmission facility proposed as part of the annual construction program and which outlines in preliminary form the probable environmental impact of constructing the facility in accordance with a general proposed system plan and alternative plans.

firm power:

Power intended to be available at all times during the period covered by a commitment, even under adverse conditions, except for reason of certain uncontrollable forces or service provisions. Equivalent terms: prime power, continuous power, assured power. Component terms: firm energy; firm capacity, dependable capacity.

firm power
transfer:

The reservation of capacity in a utility's transmission system for the transfer of another utility's power and energy.

forced outage:

An outage that results from emergency conditions directly associated with a component requiring that component be taken out of service immediately or as soon as switching operations can be performed.

forced outage
reserves:

An amount of peak generating capability planned to be available to serve peak loads during forced outages of generating units.

formula wheeling:

A BPA transmission rate schedule which provides for the firm transmission of electric power and energy for another entity using unspecified portions of the Federal Transmission System.

fossil fuels:

Coal, oil, natural gas, and other fuels originating from fossilized geologic deposits and depending on oxidation for release of energy.

groundwater:

Water which is underground in an aquifer.

habitat:

The natural abode of a plant or animal, including all biotic, climatic, and soil conditions, or other environmental influences affecting life.

hardness:	The concentration in water of mineral salts which interfere with the lathering and cleansing properties of soap.	impoundment:	A body of water formed by confining and storing the water.
head:	Essentially, the vertical height of the water in the reservoir above the turbine; that is, the difference between the elevation of the forebay of the reservoir and the tailrace at the foot of the dam.	induced current:	A current produced in a conducting object resulting from its exposure to a magnetic and/or electric field.
headwater payments:	Payments for power benefits received at downstream plants from coordinated operation of upstream storage.	inductor:	A device designed to introduce a specific inductance into a circuit. Generally it is a coil of wire wound around a core of air, iron, or other substance.
headwater storage payments:	Payments to owners of headwater storage projects for benefits received at downstream projects from coordinated storage operations.	industrial firm power:	Power intended to have assured availability to the industrial customer on a contract demand basis.
heat engine:	An engine for changing heat into mechanical energy, such as a steam engine or gas motor.	infiltration rate:	The rate at which a fluid flows into a substance through pores and small openings. It connotes flow into a substance in contradistinction to the word percolation, which connotes flow through a porous substance. The downward entry of water into the soil.
heat exchanger:	A device that transfers heat from one fluid to another without allowing them to mix.	in lieu energy:	Energy delivered by the owner of an upstream reservoir to the owner of a downstream project in an amount equivalent to the energy that could have been produced at the downstream project if water (above the energy content curve) had been released from the upstream reservoir as requested by the owner of the downstream project.
heat pump:	A device that moves, concentrates, or removes heat by alternately vaporizing and liquefying a fluid through the use of a compressor.	insolation:	The radiation from the sun received by a surface, especially the earth's surface.
hertz (Hz):	A unit of frequency equal to one cycle per second.	insufficiency:	The lack of sufficient Federal capacity or energy resources to serve BPA's firm load capacity and/or energy commitments.
horizon:	A natural soil layer.	insulator:	A low conductive support for a conductor, typically of glass or porcelain. It prevents the normal flow of current from the conductor to earth or another conductor.
hydrocarbons:	Any of a vast family of compounds containing carbon and hydrogen in various combinations, found especially in fossil fuels. Hydrocarbons in the atmosphere resulting from incomplete combustion are a major source of air pollution.	interchange energy:	Energy transferred between systems either to supply all or a part of a system's deficiency.
hydrologic cycle:	The continual exchange of moisture between the earth and the atmosphere, consisting of evaporation, condensation, precipitation (rain or snow), stream runoff, absorption into the soil, and evaporation in repeating cycles.	interconnected system:	A system consisting of two or more individual power systems normally operating with connecting tie-lines.
hydromet station:	A radio station which reports hydrological and meteorological data to a monitoring center for weather and streamflow forecasting purposes.		
hydropower:	A term used to identify a type of generating station, or power, or energy output in which the prime mover is driven by water power.		

interruptible loads (interruptible power):	Loads (power) that, by contract, can be interrupted in the event of a capacity deficiency on the supplying system. The interruptible loads are usually heavy industrial segments on the BPA system.	load factoring service:	A service which a utility provides by delivering energy either in advance of or after the time an equal amount of energy is received by the utility.
investor-owned utility:	A utility which is organized under State laws as a corporation for the purpose of earning a profit for its stockholders.	load growth reserves:	A supply of electric power and energy held in reserve for the unanticipated load growth of a utility having limited resources. If such reserves are available when requested, BPA would sell them to qualified utilities under Schedule EC-7 (Reserve Power Rate).
ionization:	A process by which electrons are detached from atoms or molecules, thus originating ions and free electrons. It occurs as a result of high-energy radiations, or by collisions.	load leveling:	Describes the more extensive use of storage to eliminate most or all conventional intermediate cycling equipment.
irradiation:	Exposure to radiation, as in a nuclear reactor.	megawatt (MW):	The electrical unit of power which equals one million watts or one thousand kilowatts.
isotope:	Each form of an element having the same atomic number (that is, the same number of protons in its nucleus), but having different numbers of neutrons in the nucleus and consequently different atomic weights. For example, three isotopes occurring in natural uranium have atomic weights of 234, 235, and 238. Isotopes usually have very nearly the same chemical properties, but somewhat different physical properties.	megawatthour (MWh):	A basic unit of electrical energy which equals one megawatt of power applied for one hour.
kilowatt (kW):	The electrical unit of power which equals 1,000 watts.	microclimate:	The fine climatic structure of the air space which extends from the surface of the earth to a height where the effects of the immediate character of the underlying surface no longer can be distinguished from the general local climate.
kilowatthour (kWh):	A basic unit of electrical energy which equals one kilowatt of power applied for one hour.	microwave station:	A radio station which relays microwave signals as an active or passive repeater.
leaching:	The process by which soluble materials in the soil are washed into a lower layer or are dissolved and carried away by water.	mitigate:	In environmental usage, the reduction or control of adverse environmental impact through various measures which seek to make the impact less severe, less obvious, more acceptable, etc.
lee:	The side sheltered from the wind.	modified firm power:	Power sold on a firm basis except that in the event of loss of generation or transmission facilities, or occurrence of uncontrollable forces which make it impossible to serve total loads, delivery of modified firm power is restricted to the extent necessary to prevent or minimize restriction of firm power. The extent of the restriction in delivery of modified firm may be limited regarding amount and duration.
liquefied natural gas (LNG):	A clean flammable liquid existing under very cold conditions; that is, almost pure methane.		
load:	The amount of electric power delivered to a given point on a system.		
load factor:	The ratio of the average load to the peak load during a specified period of time, expressed in percent.		

nameplate rating:	The full-load continuous rating of a generator under specified conditions as designated by the manufacturer. It is usually indicated on a nameplate attached mechanically to the individual machine or device.	nuclear reactor:	A device in which a fission chain reaction can be initiated, maintained, and controlled. Its essential component is a core with fissionable fuel.
net-billing:	1. Offsetting payments due one party against payments due the other party under various contacts between those parties. 2. The method used by BPA to acquire preference customers' entitlement to the Trojan, WPPSS 1, 2, and 3 nuclear plants. This acquisition is accomplished by net-billing the preference customers' costs in those nuclear plants against power sales revenues due BPA from the preference customers.	off-peak:	A period of relatively low system demand for electrical energy as specified by the supplier, such as in the middle of the night.
nitric oxide (NO):	A gas formed in great part from atmospheric nitrogen and oxygen when combustion takes place under high temperature and high pressure. NO is not in itself a pollutant; however, in the ambient air, it converts to nitrogen dioxide, a major contributor to photochemical smog. NO is often a minor byproduct of open burning.	once-through cooling:	A method of rejecting waste heat from a thermal powerplant in which water from a natural body of water is circulated through the condenser, absorbing the heat of vaporization.
nitrogen gas supersaturation:	A condition of water in which the concentration of dissolved nitrogen exceeds the saturation level of the water. Excess nitrogen can evolve bubbles of nitrogen in the circulatory systems of fish.	outage:	In a power system, the state of a component (such as a generating unit, transmission line, etc.) when it is not available to perform its function due to some event directly associated with the component.
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.	ozone (O ₃):	A pungent, colorless, toxic gas. Ozone is associated with the corona discharge of high-voltage transmission lines.
noise:	Any unwanted extraneous electrical quantity or sound which modifies the transmission, indication, or recording of desired data.	particulates:	Finely divided solid or liquid particles in the air or in an emission. Particulates include dust, smoke, fumes, mist, spray, and fog.
nonfirm energy:	Energy which is subject to interruption or curtailment by the supplier and hence, does not have the guaranteed, continuous, availability feature of firm power.	peaking:	Operation of generating facilities to meet maximum instantaneous electrical demands.
nonfirm power:	Electric power available during surplus periods, which can be interrupted by the supplying party for any reason. One class of nonfirm power currently available from BPA is called Authorized Increase.	peaking capability:	The maximum peakload that can be supplied by a generating unit, station, or system in a stated time period. It may be the maximum instantaneous load or the maximum average load over a designated interval of time.
		peaking capacity:	Generating equipment normally operated only during the hours of highest daily, weekly, or seasonal loads. Some generating equipment may be operated at certain times as peaking capacity and at other times to serve loads on round-the-clock basis.
		peak/energy exchange:	Exchange of peaking capacity for offpeak energy return between two or more electrical energy producing systems.
		peakload:	The maximum electrical load consumed or produced in a stated period of time. It may be the maximum instantaneous load (or the maximum average load) within a designated interval of the stated period of time.

peakload diversity:	The difference between coincident and noncoincident demands of two or more individual loads.	requirement contracts:	Power sales contracts between BPA and each of the preference customers providing for BPA service of the customers' firm electric power and energy requirements, which usually increase each year as the load grows in size.
peakload plant:	A powerplant which is normally operated to provide power during maximum load period.	reserve capacity:	Extra generating capacity available to meet unanticipated demands for power or to generate power in the event of loss of generation resulting from scheduled or unscheduled outages of regularly used generating capacity. Reserve capacity provided to meet the latter is also known as forced outage reserve.
plasma:	A hot, ionized gas composed of nearly equal numbers of electrons and positive ions.	reserves:	Resources which are known in location, quantity, and quality and which are economically recoverable under currently available technologies.
pollutant:	A residue (usually of human activity) which has an undesirable effect upon the environment (particularly of concern when in excess of the natural capacity of the environment to render it innocuous).	residuals:	Any release or infringement on the environment.
power:	The time rate of transferring or transforming energy, for electricity, expressed in watts. Power, in contrast to energy, always designated a definite quantity at a given time.	salmonid:	Fish belonging to the family salmonidae, including salmon, trout, char, and allied freshwater and anadromous fishes.
precipitate:	To cause a slightly soluble substance to become insoluble and separate out from a solution.	scrubber:	Equipment used to remove pollutants, such as sulfur dioxides or particulate matter, from stack gas emissions.
preference:	The preferential use of Federal resources by public bodies and cooperatives, as accorded to such entities in the Bonneville Project Act.	secondary energy:	Electric energy surplus to the needs of a supplier, the delivery of which may be interrupted for any reason by the supplier.
provisional energy:	See "advance energy."	secondary power:	Power not having the assured availability of firm power; power that is available from a system intermittently and that is used to serve markets that can accommodate such power. Equivalent terms: nonfirm power, surplus power, secondary energy.
PUD:	Public Utility District (in Washington) or Peoples' Utility District (in Oregon). These are separate units of government established by voters of the proposed district. The PUD's hold "preference customer" status in buying BPA power.	self-financing:	The method by which BPA now finances its operation and construction program through all revenues received and through revenue bonds to be acquired through the Treasury.
pumped storage:	An arrangement whereby a reservoir is filled with water by pumping during off-peak periods when low-cost steam energy is available or when water is being spilled at other hydroplants. This method of operating a hydroplant stores water which can be used at a more appropriate time or saves water which would otherwise be lost; an arrangement whereby additional electric power may be generated during peakload periods by hydraulic means using water pumped into a storage reservoir during off-peak periods.	single circuit:	The placing of one single electrical circuit (consisting of three phases) along a row of towers. In tower design, any tower capable of supporting only one circuit.
reliability:	Generally, the ability of an item to perform a required function under stated conditions for a stated period of time. In a power system, the ability of the system to continue operation while some lines or generators are out of service.	slag:	A molten or solidified ash; a mineral substance formed by chemical action and fusion at furnace operating temperatures.

slurry:	A mixture of a liquid and a solid.	surface runoff:	That part of the precipitation which travels over the soil surface to the nearest stream channel.
soil structure:	The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles.	surplus energy:	Electric energy generated at Federal hydroelectric plants in the Pacific Northwest which cannot be conserved. This energy would otherwise be wasted because of the lack of market for it in the Pacific Northwest at any established rate. When the nonfirm energy needs of the Pacific Northwest entities are satisfied, surplus energy then becomes available for marketing outside the Pacific Northwest.
spillway:	The channel or passageway around or over the dam through which excess water is spilled around the turbines.	surplus power:	Power that is in excess of the needs of the producing system. For the region, surplus power would be exported to serve markets in adjacent areas. Sometimes used as an interchangeable term with secondary power.
stack:	A vertical passage through which products of combustion are conducted to the atmosphere.	suspended solids:	Solids suspended in wastewater. The amount of suspended solids is a measure of the polluting effect of the wastewater.
stack gas (flue gas):	Gases, usually carbon dioxide, water vapor, nitrogen and accompanying particulates which result from combustion processes.	switchover:	Conversion of an energy-using system from one form of energy to another, e.g., from natural gas to electricity for heating purposes.
stoichiometric:	Pertaining to weight relations in chemical reactions. A stoichiometric mixture is one in which all constituents will be consumed in a chemical reaction.	synergistic:	Referring to the joint action of various agents that, when acting together, have an effect which is different or of a greater magnitude than any one agent would have in isolation from the others.
storage reservoir:	A reservoir in which storage is held over from the annual high-water season to the following low-water season. Storage reservoirs which refill at the end of each annual high-water season are "annual storage" reservoirs. Those which can not refill all usable power storage by the end of each annual high-water season are "cyclic storage" reservoirs.	system reserve capacity:	The difference between the available dependable capacity of the system including net firm power purchases, and the actual or anticipated peak load for a specified period.
storage service:	A service which a utility provides by receiving energy reducing the generation and water discharge at one of its reservoirs and thereby storing energy in the form of water in that reservoir. At a later time the stored water may be released and the stored energy returned.	thermal efficiency:	The ratio of the electric power produced by a powerplant to the amount of heat produced by the fuel; a measure of the efficiency with which the plant converts thermal to electrical energy.
substation:	An electric power station which serves as a control-and-transfer point on an electrical transmission system. Substations route and control electrical power flow, transform a voltage to a higher or lower voltage, and serve as delivery points to individual customers.	thermal electric:	The production of electricity from steam-powered turbines. The heat input required can be from a number of sources such as coal, oil, gas, and nuclear fission.
sulfur dioxide:	One of several forms of sulfur in the air; an air pollutant generated principally from combustion of fuels that contain sulfur.	thermal generation:	Generation of electricity by applying heat to a fluid or gas to drive a turbine generator.
sulfur oxides:	Compounds of sulfur combined with oxygen that have a significant influence on air pollution.		

thermal pollution:	The warming of the environment, especially streams and other bodies of water, by waste heat from power plants and factories. Drastic thermal pollution endangers many species of aquatic life.	ultra-high voltage (UHV):	Descriptive of transmission lines with voltage levels above the 800-kV class.
threatened species:	Those species, as determined by the Fish and Wildlife Service, which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.	upland game:	Hunttable animals living on land forms other than near rivers, streams, lakes, swamps, or seas.
tower configuration:	Delta - term given to a transmission line in which the two outside phases are in the same horizontal plane. The center phase is supported at a higher level. Double circuit - a tower usually with three crossarms each supporting two phases (two or more conductors). All three phases of one circuit are located on one side of the tower. Horizontal configuration - single circuit tower designed with all insulators attached in a horizontal plane.	volatile:	Readily vaporizable at a relatively low temperature.
trajectory:	The overall combination of the technological alternatives chosen for each activity in resource development.	volatilization:	The evaporation or changing of a substance from liquid to vapor.
transformer:	A device for converting energy from one voltage level to another in an alternating-current system.	volt:	The unit of electromotive force or electric pressure analogous to water pressure in pounds per square inch. It is the electromotive force which, if steadily applied to a circuit having a resistance of one ohm, will produce a current of one ampere.
transmission grid:	An interconnected system of electric transmission lines and associated equipment for the movement or transfer of electric energy in bulk between points of supply and points of demand.	voltage gradient:	Synonymous with electric field strength. The rate at which voltage increases or decreases through a dielectric such as air; often expressed in terms of kilovolts per meter.
trust agency agreement:	An agreement under which BPA, as agent for the utilities, acquires non-Federal electric power and energy resources for those utilities, using their funds. BPA, at the utilities' expense, also provides certain utility services in return for a share of the acquired non-Federal power and energy.	watershed:	The area from which water drains to a single point. In a natural basin, the area contributing flow to a given place on a stream.
turbidity:	A discoloration of water due to the presence of suspended particles, organic matter, or other pollutants.	wheeling:	The use of the transmission facilities of one system to transmit power of and for another system. As applied to BPA, the transmission of large blocks of electric power over the BPA system from non-Federal hydro and/or thermal generating plants to points of use by utilities owning or purchasing the output of such plants.
		wheel-turning loads:	The auxiliary loads such as lighting or heating which may be served by a local utility for a BPA direct service industrial customer with a BPA power sales contract for its electroprocess needs.
		zooplankton:	Animal constituents of plankton passively floating in water, such as the small crustaceans.

