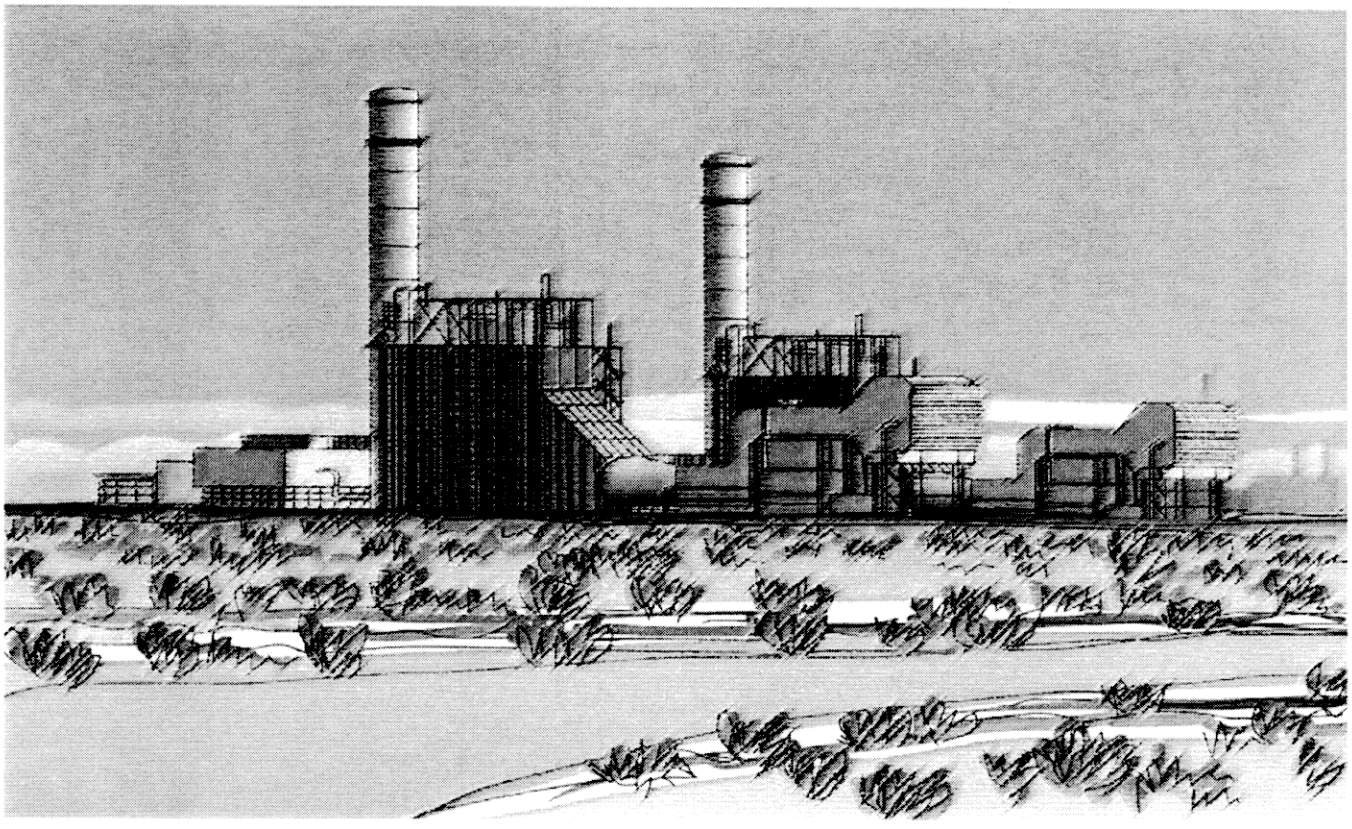
JANUARY 2002

UMATILLA GENERATING PROJECT

FINAL ENVIRONMENTAL IMPACT STATEMENT

DOE/EIS-0324



BONNEVILLE POWER ADMINISTRATION

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1) an updated Summary of the Proposed Action
2) additional information that has become available since the Draft EIS was released
3) responses to comments received
4) Appendix C – Phase II Report on Umatilla Generating Project Contribution to Regional Haze

Because the changes to the Draft EIS are relatively minor, BPA is just printing the changes to the Draft as a separate document. This abbreviated Final EIS document and the Draft EIS, constitute the Final EIS for the Umatilla Generating Project.

Environmental Process

In August 2001, we completed the Draft EIS for the Umatilla Generating Project and made it available for review and comment. In response to the comments we received, we made some changes that are included in this abbreviated Final EIS.

A decision on whether BPA would integrate electrical power from the proposed Umatilla Generating Project into the Federal transmission grid at BPA's McNary substation will be made and recorded in a Record of Decision. We plan to have the Record of Decision available about one month after publication of this Final EIS.

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If you need additional copies of the abbreviated Final EIS, or a copy of the Draft EIS, please call our toll-free document request line at 1-800-622-4520. Leave a message naming this project and the document(s) you desire, and your complete mailing address. Both documents are also available on our web site at: www.efw.bpa.gov.

Umatilla Generating Project Final Environmental Impact Statement
(DOE/EIS-0324)

Responsible Agency: U.S. Department of Energy (DOE), Bonneville Power Administration (BPA)
Title of Proposed Action: Umatilla Generating Project
States Involved: Umatilla County, Oregon

Abstract: Electrical consumers in the Pacific Northwest and Western states need increased power production to serve increasing demand and high-voltage transmission services to deliver that power.

The Umatilla Generating Company, L.P., a Delaware limited partnership, proposes to construct a gas-fired combined cycle electric power generation plant near Hermiston, Oregon. The plant would have a nominal generation capacity of 550 megawatts (MW). The Umatilla Generating Company, L.P. has requested that Bonneville Power Administration provide the necessary electrical connection at the McNary Substation. This final environmental impact statement describes additional information that has become available since publication of the draft environmental impact statement and responds to comments received during the public comment period, from August 15, 2001 to October 15, 2001. The environmental consequences of construction and operation of the Umatilla Generating Project and connection of the generating project to the regional electric power transmission grid (Proposed Action) in addition to the environmental consequences of the No Action Alternative are described in the draft environmental impact statement.

The proposed generating plant would occupy eight hectares (19 acres) of land zoned for industrial use. Up to five miles of new natural gas pipeline would be built to supply gas to the plant. Electric power would be conveyed to the McNary Substation by approximately 18 kilometers (11 miles) of reconductored electric power transmission line and approximately 0.8 kilometers (one-half mile) of new electric power transmission line. Approximately one-half kilometer (one-third mile) of new pipeline would be built to deliver raw water to the proposed power plant site. There are two wastewater disposal alternatives, one or both of which would be implemented. Under one alternative, approximately five kilometers (three miles) of new pipeline would be built to convey reclaimed water from the proposed power plant to an agricultural area for irrigation of cropland. Under the other alternative, all wastewater produced would be reconditioned and reused at the proposed power plant and no wastewater would be disposed of off-site.

For additional information please contact:
Inez Graetzer (KEC-4)
Project Environmental Lead
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621
Telephone: (503) 230-3786, or toll free 1-800-282-3713
Email: isgraetzer@bpa.gov

For more copies of this document, please call 1-800-622-4520 and ask for the document by name. The document is also available on the Internet at: www.efw.bpa.gov. For additional information on DOE NEPA activities, please contact Carol Borgstrom, Director, Office of NEPA Policy and Compliance, EH-42, U.S. Department of Energy, 1000 Independence Avenue S.W., Washington D.C. 20585. Telephone 1-800-472-2756.

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1.0 INTRODUCTION

The Umatilla Generating Company L.P., a Delaware limited partnership, proposes to construct a natural gas-fired combined cycle electric power generation plant near Hermiston, Oregon. The plant would have a nominal generation capacity of 550 megawatts (MW). Electric power from the proposed plant would enter the regional grid at the Bonneville Power Administration's McNary Substation.

The Umatilla Generating Project is only feasible if the Bonneville Power Administration (BPA) agrees to provide the necessary connection to the regional grid. Before agreeing, Bonneville Power Administration must fulfill its responsibilities under the National Environmental Policy Act (NEPA) by assessing the potential environmental consequences of providing the connection. This document is the final environmental impact statement, which will be followed by a record of decision to be issued based on the findings of the environmental impact statement.

1.1 Summary of National Environmental Policy Act Review

BPA published a Notice of Intent (NOI) to prepare an environmental impact statement on the Umatilla Generating Project in the Federal Register dated January 5, 2001. The NOI announced the commencement of a 45-day scoping period during which comments from the public would be accepted. It also invited members of the public to a scoping meeting held at Hermiston High School on January 30, 2001. To inform the general public of the scoping meeting, paid public announcements were placed in local papers (the Hermiston Herald, the Tri-City Herald and the East Oregonian) in editions published about one week before the meeting. Letters were sent to all land owners with property within several hundred feet of the proposed facilities. Also, letters were sent to local, state and federal agencies and Native American organizations that might have an interest in the proposed project.

After the meeting and at the conclusion of the comment period, BPA prepared a report documenting the results of scoping. The scoping report was mailed to all parties on the NOI mailing list and attendees at the public meeting.

A draft environmental impact statement (DEIS) was prepared to describe the environmental consequences of construction and operation of the Umatilla Generating Project and connection of the generating project to the regional electric power transmission grid (Proposed Action), in addition to the environmental consequences of the No Action Alternative. A notice of availability of the DEIS was published in the Federal Register on August 24, 2001. Copies of the DEIS were sent to all parties on the NOI mailing list and attendees at the public meetings who indicated they wanted to receive this document.

To provide opportunity for the public to comment, information directing parties to the appropriate communication channels for comment was provided in a letter sent out with the DEIS, on the internet at www.efw.bpa.gov, and in a public meeting held at the Hermiston High School on September 25, 2001. Five comment letters were received during the public comment period between August 15, 2001 and October 15, 2001. Two of the letters are included in this final environmental impact statement but not responded to because they are statements of no comment. The other three letters are addressed in this final environmental impact statement.

1.2 Summary of the Proposed Action

In the proposed action, BPA would provide a connection to the electric power transmission grid for the Umatilla Generating Project at the McNary Substation. The existing Westland-McNary transmission line would be upgraded to convey electric power from the plant to the McNary Substation.

The principal components of the proposed action are as follows:

- modifications to the McNary Substation to accommodate power from the Umatilla Generating Project

- a new 550-MW gas-fired combined-cycle electric power generation plant located on land zoned for industrial purposes near Hermiston, Oregon

- approximately 18 kilometers (11 miles) of reconductored electric power transmission line and approximately 0.8 kilometer (0.5 mile) of new electric power transmission line on new power poles

- up to eight kilometers (five miles) of new natural gas pipeline to deliver fuel to the proposed power plant site

- approximately one-half kilometer (one-third mile) of new pipeline to deliver raw water to the proposed power plant site

- Five to seven kilometers (three to five miles) of new reclaimed water pipeline and an approximately 20-acre reclaimed water storage pond located on privately owned agricultural lands, and a short reclaimed water pipeline between the proposed power plant and the Hermiston Generating Plant.

At McNary Substation, two alternative arrangements for connecting the new 230 kV circuit to the BPA system are being considered. The 230 kV alternative would be an interconnection into vacant Bay No. 18 in the 230 kV portion of the McNary Substation. This alternative would require a little less than 0.40 kilometer (0.25 mile) of new transmission line and up to four new towers. The second alternative, the 500 kV alternative, would be an interconnection into the 500 kV portion of the McNary

Substation, where the voltage would be increased from 230 kV to 500 kV. This alternative would require approximately 0.8 kilometer (0.5 mile) of new transmission line and up to seven new towers.

Electric power generated by the proposed power plant would be conveyed to the McNary Substation using the existing Westland-McNary transmission line. The existing 115 kilovolt (kV) transmission line would be upgraded to 230 kV. The new circuit would run from the proposed power plant to the McNary Substation.

The Umatilla Generating Project would be fueled by natural gas from the existing PG&E Gas Transmission Northwest (GTN) pipeline. The pipeline is located about eight kilometers (five miles) south of the proposed power plant site. Natural gas would be conveyed from the GTN mainline to the power plant site via one of three alternative pipeline routes proposed by the Umatilla Generating Company, L.P.

Water would be needed at the facility to generate steam and cool the steam process. Water would be supplied from the Port of Umatilla's regional raw water system. A recirculating cooling system employing mechanically induced draft evaporative cooling towers would be used to minimize water use. Water would be added to the cooling system to compensate for evaporative losses (make-up water) and blowdown. Blowdown is the water bled from the cooling system to limit the build up of salts. Process wastewater consisting primarily of blowdown would be disposed of either by application to cropland, or by reconditioning and reuse within the plant.

If water is disposed of by application to cropland, it would be conveyed to cropland in new and existing distribution pipelines and applied to crops at agronomic rates in accordance with the provision of a Wastewater Pollution Control Facility permit issued by the Oregon Department of Environmental Quality (DEQ). After the DEIS was published, discussions with DEQ led to some changes in the design of the cropland irrigation system. The area of cropland that would receive reclaimed water has been increased from about 800 acres to about 1,200 acres. In addition, an approximately 20-acre storage pond would be built on agricultural land to increase operational flexibility during the winter months.

If process wastewater is reconditioned and reused, it would be routed to a brine concentrator. After desalting, most of the wastewater would be returned to the recirculating cooling water system. Brine from the concentrator would be evaporated leaving behind a nonhazardous salt cake that would be disposed of in a licensed solid waste landfill.

The DEIS described the environmental consequences of the proposed action. An assessment of the effects of the proposed action on geology, soils and seismicity, hydrology and water quality, vegetation and wildlife, fish, air quality, noise, traffic, visual quality and aesthetics, cultural resources, land use, socioeconomics, public services and health and safety are included in the DEIS. Cumulative and unavoidable impacts are also addressed.

The FEIS presents additional information that has become available since publication of the DEIS and responds to comments received during the public comment period for the DEIS. The following sections provide this information.

2.0 ADDITIONAL INFORMATION THAT HAS BECOME AVAILABLE SINCE THE DRAFT EIS WAS RELEASED

This section presents new information that has become available since the DEIS. As project investigations continue, spatial references are refined and new resource specific information becomes available. For example, it is now estimated that the footprint of the plant would occupy approximately eight hectares (19 acres) based on more recent survey information (DEIS, p. 2-3). Because the plant would be contained within a 31-hectare (77-acre) parcel of land, which is zoned industrial and sparsely covered with non-native weedy vegetation (DEIS, p. 3.4-6), no additional impacts are expected.

This section includes additional information regarding BPA's study of cumulative impacts to air quality from the Umatilla Generating Project and other existing and proposed power projects in the vicinity. It also contains a discussion of modifications made to the wastewater disposal component of the proposed project since the DEIS was published. Where relevant, sections of the DEIS are referenced to facilitate comparison and review of changes.

2.1 Cumulative Impacts to Air Quality

As discussed in Section 3.6.3 of the DEIS, the regional cumulative effects of the Umatilla Generating Project and other projects were considered. For example, two new electric power generation plants have been approved and are currently under construction in the vicinity of the proposed power plant. One is east of Hermiston (Hermiston Power Partners) and the other is located at the Port of Morrow (Coyote Springs Unit 2). As of July 1, 2001, six additional electric power projects are proposed in the project region and are under regulatory review. BPA initiated a detailed modeling study of cumulative air quality and visibility impacts on the Columbia River Gorge and northwest Class I areas. This study was done in two phases.

BPA's Phase I Regional Air Quality Modeling Study[1] examined potential air quality impacts associated with over forty recently proposed projects in the Service Area. The study suggested the proposed projects including the Umatilla Generating Project would probably not significantly contribute to sulfur and nitrogen deposition in Class I areas, Class I PSD Increments, regional Class II PSD Increments, or regional concentrations in

[1] A *Modeling Protocol*, the *Phase I Results* of the Regional Air Quality Modeling Study and the *Phase II Results for Umatilla Generating* can be found at http://www.efw.bpa.gov/cgi-bin/PSA/NEPA/SUMMARIES/air2.

excess of the National Ambient Air Quality Standards. The model simulations did suggest the proliferation of proposed projects in the Service Area could potentially degrade visibility within Class I and Scenic Areas should all the projects become operational.

Based on the results of the Phase I Regional Air Quality Modeling Study, BPA performed a Phase II examination of potential cumulative regional haze impacts on a case-by-case basis for each new project before issuing a Record of Decision (ROD). Since it is unlikely all the proposed power plants will be built, the analysis investigated the cumulative impacts from a Baseline Source Group consisting of projects that have been issued a ROD, other recently permitted power projects not requesting access to BPA's transmission grid but within the Service Area, and the facility being considered for a ROD. For example, the Baseline Source Group considered in the Phase II study for the Umatilla Generating Project includes the two local projects mentioned at the beginning of this section.

BPA's Phase II modeling study for the Umatilla Generating Project assessed regional haze impacts at 16 Class I Areas (three National Parks, the Spokane Indian Reservation, and 12 Wilderness Areas), the Columbia River Gorge National Scenic Area, and the Mt. Baker Wilderness Area. Detailed descriptions of the Baseline Source Group, facility operating scenarios, and modeling methodology used in the analysis are provided in the Phase II report, which is attached as Appendix 1 of this FEIS.

Results of the Phase II modeling assessment for the Umatilla Generating Project show no significant cumulative impacts.

2.2 Wastewater Disposal Alternatives

In Section 3.3.2, p. 3.3-6, the DEIS describes the Umatilla Generating Company's proposal to dispose of process wastewater, consisting primarily of cooling system blowdown, from the proposed power plant by irrigation of cropland. Process wastewater would be applied to cropland in accordance with the terms of a Water Pollution Control Facility permit issued by DEQ to the Hermiston Generating Plant. This alternative is referred to subsequently as Alternative W1.

After release of the DEIS, and in response to comments received from DEQ, modifications were made to Alternative W1. The DEIS indicated (p.3.3-7) that reclaimed water would be applied to approximately 688 hectares (1,700 acres) of cropland. Under modified Alternative W1, the same volume of reclaimed water would be applied to about 769 hectares (1,900 acres). The proposed area for land application of the reclaimed water is all agricultural land. In addition, modified Alternative W1 would include an approximately eight-hectare (20-acre) water storage pond, which would be built on agricultural land near the application area. To prevent infiltration into groundwater, DEQ requires that the pond be lined. The pond provides increased operational flexibility during wet winters.

Although Alternative W1, as originally proposed, would not be expected to have any significant adverse effects on groundwater quality, the modified alternative would further reduce its impacts. Because the modifications to Alternative W1 would involve some additional piping and a storage pond, construction impacts would be slightly increased. With the application of the construction period mitigation measures described in the DEIS, construction impacts would still be minor. Although the precise location of the storage pond is yet to be determined it would be located on agricultural land with minimal value as wildlife habitat.

The Umatilla Generating Company is also considering a second alternative that would reuse process wastewater at the power plant site.

The reuse of process wastewater in the cooling towers is limited by the buildup of total dissolved solids in the water as it is used. The second alternative (Alternative W2) would route process wastewater to a brine concentrator and crystallizer system. If necessary, the wastewater would be further processed in a dewatering unit. The brine concentrator would lower the concentration of total dissolved solids in the process wastewater, and return the treated water to the recirculating cooling water system for further use. A small concentrated brine stream would be discharged from the concentrator to the crystallizer, where low-pressure steam from the power plant would be used to evaporate water from the brine and produce a salt cake suitable for haulage and disposal at a landfill. It is not expected that further dewatering of the salt cake from the crystallizer would be needed. If pilot studies indicate that additional dewatering of the salt cake would be desirable, a dewatering unit such as a filter press would be added to the system. Tests conducted with a similar system at the adjacent Hermiston Generating Plant, using the same source water, indicated that the salt cake is non-hazardous and could be disposed of at a conventional landfill, such as Waste Management's Columbia Ridge Landfill in Arlington, Oregon.

In section 3.4.2 of DEIS, p. 3.4-7, predicted salt deposition rates from cooling tower drift are low compared to rates known to affect crop yields. The zero discharge system would result in an increase in the total dissolved solids content of the water in the system and in the water droplets and vapor emitted from the cooling towers from approximately1,250 ppm to 1,850 ppm. The 48 percent increase in total dissolved solids would result in a 48 percent increase in predicted salt deposition rates. The maximum predicted salt deposition rate was 17.58 kg/km^2 (100.38 lb/mi^2) per month employing a crop irrigation system. The revised salt deposition rate for the Umatilla Generating Project if the zero discharge system is used would be 26.02 kg/km^2 (148.57 lb/mi^2) per month. Tomatoes and peppers show injury at chloride deposition levels of 400 kg/km^2 per month, while corn crops show a 10 percent reduction in yield at a salt deposition rate of 2,037 kg/km^2 per month. Alfalfa and cantaloupe plants show no reduction in yield at a salt deposition rate of 6,908 kg/km^2 per month. Thus, the expected salt deposition rate for the Umatilla Generating Project if the zero discharge system is employed would not exceed the non-injury thresholds for crops of tomatoes, peppers, corn, alfalfa, and cantaloupe grown in the vicinity of the project.

The rates of water use, wastewater generation, waste generation, and energy use at the proposed power plant will vary under Alternative W1 and Alternative W2. Alternative W1 and Alternative W2 would also result in differing construction impacts of the proposed power generation project. It is possible that both Alternative W1 and W2 would be constructed to provide operational flexibility.

Under Alternative W1 (DEIS, p. 3.3-4), the proposed power generation plant would have a peak average water demand of 0.16 m^3/a (5.76 cfs). Under Alternative W2, the proposed power plant would have a slightly lower water demand, approximately 0.15 m^3/s (5.12 cfs), because of the higher rate of water reuse in the cooling towers under Alternative W2. The proposed power plant would produce no process wastewater from the blowdown under Alternative W2. Alternative W2 would produce up to 60 tons per month of additional waste at the proposed power generation project. The waste would be non-hazardous solid or semi-solid salt cake.

Alternative W2 would consume more non-renewable energy supplies than Alternative W1 and lower the overall efficiency of the proposed power plant because operation of the brine concentrator and the crystallizer would require additional steam and electrical power from the proposed project. Consumption of one to two megawatts of power by Alternative W2 would reduce the net heat rate efficiency of the Umatilla Generating Project.

Alternative W2 would differ from Alternative W1 in that there would no longer be a need for an approximately one-half mile long wastewater pipeline connecting the proposed Umatilla Generating Project to the existing Hermiston Generating Plant's wastewater pipeline. Also, the related supporting water distribution facilities at Madison Farms that are a part of Alternative W1 would not be needed in Alternative W2. Construction impacts associated with Alternative W2 would be less than those associated with Alternative W1 because they would be confined to the proposed power plant site. The brine concentrator, crystallizer and filter press (if needed) of Alternative W2 would occupy about one-fifth of an acre at the eight-hectare (19-acre) site of the proposed power generating project. The tallest piece of equipment associated with Alternative W2 would be the brine concentrator, which would be 18 to 23 meters (60 to 75 feet) high. The tallest components of the proposed power plant under both Alternative W1 and Alternative W2 would be the exhaust stacks, which would be 66 meters (215 feet) high.

3.0 RESPONSES TO COMMENTS RECEIVED

UGPD-001 Heidi Williams, PE, Oregon Department of Environmental Quality

DEIS, Section 2.3.6, p. 2-8.

A meeting attended by representatives of the Umatilla Generating Company and Oregon Department of Environmental Quality was held on October 3, 2001 to discuss the acreage of land needed for disposal of process wastewater and the need for storage during the winter months. Based upon this meeting, the application for an amendment of the Hermiston Generating Plant's Water Pollution Control Facility permit is being revised to address DEQ's issues related to acreage and storage. Revisions to Alternative W1 involve a change in the location of land that would be irrigated with the process wastewater to provide increased winter storage capacity, and construction of an approximate eight-hectare (20-acre) pond that would hold some or all of the wintertime wastewater flows, during periods of abnormally high precipitation. Additionally, Umatilla Generating Company is filing a request to amend its Site Certificate issued by the Oregon Energy Facility Siting Council to include the option to dispose of process wastewater by reconditioning and reusing it in the plant's recirculating cooling water system. Under this arrangement, no process wastewater would be discharged by the plant and an amended Water Pollution Control Facility permit would not be required.

Based upon the information provided by Umatilla Generating Company, BPA concludes that groundwater resources will be protected either by disposal of process wastewater under a Water Pollution Control Facility permit issued by the DEQ or by process wastewater reconditioning and reuse within the proposed power plant.

DEIS, Section 3.3.2, p. 3.3.7.

Please see response to comment on Section 2.3.6, above. The revised Water Pollution Control Facility permit amendment application will address the storage issue identified by DEQ.

UGPD-002 Penelope Dunn Woods, Field Manager, Baker Resource Area, Bureau of Land Management

The BPA is conducting a Regional Air Quality Modeling Study to evaluate potential regional haze and deposition impacts associated with proposed power projects in the BPA Service Area. Impacts on 16 Class I Areas (including the Hell's Canyon Wilderness Area) are being evaluated in the Study. The results of the Study Phases I and II for the proposed power plant show no significant adverse impacts on the Hells Canyon Wilderness Area. Phase I Study results are documented at: http://www.efw.bpa.gov/cgi-bin/PSA/NEPA/SUMMARIES/air2. Phase II Study results for the proposed power

project are provided in Appendix C of this FEIS, and are also available at the previously noted website.

UGPD-003 Scott Madison

The comment provided by Mr. Madison directed attention to various attachments, but did not provide a substantive question or comment pertaining to the proposed action to which a response could be made.

Other Letters

Two additional letters were received from the Environmental Protection Agency and the United States Department of the Interior. Neither letter contained comments to which a response was required.

Appendix C

BPA Phase II Report:

PG&E National Energy Group Umatilla Generating Project
Contribution to Regional Haze

PG&E National Energy Group Umatilla Generating Project
Contribution to Regional Haze

This study examines the potential contribution of PG&E National Energy Group's Umatilla Generating Project to regional haze in Class I Areas within the BPA Service Area, the Columbia River Gorge National Scenic Area (CRGNSA), and the Mt. Baker Wilderness. Regional haze impacts are assessed following the techniques used in a Regional Air Quality Modeling Study[1] conducted by BPA. BPA's study examined potential air quality impacts associated with over forty recently proposed power projects in the Service Area. The Regional Air Quality Modeling Study suggests the proposed power projects including the Umatilla Generating Project would probably not significantly contribute to sulfur and nitrogen deposition in Class I areas, the Class I PSD Increments, regional Class II PSD Increments or regional concentrations in excess of the National Ambient Air Quality Standards. The model simulations did suggest the proliferation of proposed projects in the Service Area could potentially degrade visibility within Class I and Scenic Areas should all the projects become operational.

Based on the results of the Regional Air Quality Modeling Study, BPA is now examining potential cumulative regional haze impacts on a case-by-case basis for each new project before issuing a Record of Decision (ROD). Since it is unlikely all the proposed power plants will be built, the analysis investigates the cumulative impacts from a Baseline Source Group consisting of projects that have all ready been issued a ROD, other recently permitted power projects not requesting access to BPA's transmission grid but within the Service Area, and the facility being considered for a ROD. The remainder of this document describes the Baseline Source Group, provides an overview of the dispersion modeling approach, presents the results of a cumulative analysis for the Baseline Source Group, and discusses the potential contribution of the Umatilla Generating Project to regional haze.

Baseline Source Group. Peak emissions from the projects within the Baseline Source Group, including the Umatilla Generating Project are listed in Table 1. Emissions are shown both for the primary and secondary fuels. The location of these projects, Class I areas, CRGNSA, Mt. Baker Wilderness, and the study domain are displayed in Figure 1.

Operating Scenarios. The analysis assumes all plants in Table 1 are operating at peak load with their primary fuel for the entire simulation period. An oil-firing scenario was also considered, where sources permitted to fire with fuel oil were assumed to operate in this manner over the winter season. Note, peak load operating assumptions likely overestimate impacts, and with the exception of the Fredonia Facility, the projects are not allowed to fire with fuel oil for an entire winter season.[2]

In practice, virtually all proponents state that they intend to burn gas except in times of significant shortage. However, the recent surge in gas prices led to a widespread effort to re-permit a number of existing gas-fired boilers to allow the use of oil firing. This suggests power

[1] A *Modeling Protocol* and the *Phase I Results* of the Regional Air Quality Modeling Study can be found at http://www.efw.bpa.gov/cgi-bin/PSA/NEPA/SUMMARIES/air2.

[2] The Fredonia Facility near Mt. Vernon has requested fuel oil firing for all hours of the year as a secondary fuel. The Longview Energy Facility and the Chehalis Generating Facility have requested fuel oil firing for 1,650 and 720 hours per year, respectively.

plant operators may also be inclined to burn oil during periods of high prices. Thus, it is conceivable that the power plants that are permitted to burn oil would, in fact, burn oil as much as they are allowed, particularly as more power plants come on line.

The oil-burning scenario is a compromise solution to a potentially complex assessment. The present analysis likely overstates potential impacts attributable to the Chehalis Generating Facility and Longview Energy Facility because they cannot burn oil every day of the winter. The meteorology on the winter days producing the highest impacts may also not occur concurrently with the economic conditions likely to cause these power plants to burn oil. On the other hand, the impacts attributable to the Fredonia Facility (if they are allowed to burn oil every day) may be under predicted because the analysis limits their oil-fired emissions to winter months.

Modeling overview. The dispersion modeling techniques employed to evaluate potential regional haze impacts from the Umatilla Generating Project are described in the *Modeling Protocol*.[1] Features of the model simulations include the following:

- The CALPUFF modeling system was applied in the simulations. CALPUFF is the EPA's preferred model for long-range transport assessments. CALPUFF treats plumes as a series of puffs that move and disperse according to local conditions that vary in time and space. CALPUFF incorporates algorithms for wet and dry deposition processes, aerosol chemistry, and is accompanied by post-processors designed to assess regional haze.

- Wind fields are based on the University of Washington's simulations of Pacific Northwest Weather with the MM5 model from April 1, 1998 to March 15, 1999. The MM5 data set used in the simulations has a horizontal mesh size of 12 kilometers and over 30 vertical levels. The model simulations are based on weather conditions during a single year and actual impacts may vary from year to year due to large-scale annual variability.

- The 696-km by 672-km study area includes Washington and portions of Oregon, Idaho, and British Columbia. Meteorological, terrain, and land use data were provided to the model using a horizontal grid of 12 km. The terrain data are based on an average for each grid cell, thus the simulations do not fully resolve potential local impacts in complex terrain. A six-kilometer mesh size sampling grid was used with receptor locations within 16 Class I Areas (3 National Parks, the Spokane Indian Reservation and 12 Wilderness Areas), the CRGNSA, and the Mt. Baker Wilderness.

- The aerosol concentrations used to characterize background extinction coefficients in the study represent excellent visual conditions. Background visibility parameters are presented in Table 4 of the *Modeling Protocol*. These parameters represent visibility on the best five percent of the days in the Class I Areas and the best twenty percent of days in the CRGNSA and the Spokane Indian Reservation. Background ozone and ammonia concentration data were also based on generally conservative assumptions and are presented in the *Modeling Protocol*.

- Building downwash effects are not considered in the analysis and emissions were characterized using a single stack for each facility. Note the simulations only include emissions from the turbines or heat recovery steam generators, not from ancillary sources

(such as auxiliary boilers, gas heaters, and standby generators) associated with each project.

- The contribution of the Umatilla Generating Project to background extinction was assessed using the post-processing utilities included with the CALPUFF model system. Since portions of the aerosol chemistry are non-linear, the contribution of the Umatilla Generating Project considered the cumulative equilibrium conditions associated with the Baseline Source Group on an hour-by-hour and receptor-by-receptor basis. Post-processing utilities are applied to assess the contribution using simulations of both the Baseline Source Group with the Umatilla Generating Project and the Umatilla Generating Project in the absence of other sources.

Regional haze contribution from the Baseline Source Group with the Umatilla Generating Project. The CALPUFF modeling system was applied to simulate emissions from the Baseline Source Group using a year of Pacific Northwest weather characterized by MM5 numerical weather prediction model. The results of the simulations were post-processed and the 24-hour average extinction coefficient was used as a measure of regional haze. Increased extinction results in reduced visual range. For example extinction coefficients of 18.1 Mm^{-1} and 20 Mm^{-1} correspond to visual ranges of 216 km and 196 km, respectively. If the background extinction coefficient is 18.1 Mm^{-1}, then an increase in extinction of 1.9 Mm^{-1} caused by higher aerosol concentrations along the visual path length would decrease the visual range by about 10 percent. An annual average visual range of 216 km is representative of good (top five percent) visual conditions for most of the Class I areas considered in this analysis.

The predicted maximum contribution of the Baseline Source Group when fired by natural gas to regional haze within the study area is displayed in Figure 2. This figure was constructed from the highest 24-hour extinction coefficient at each receptor predicted for the Baseline Source Group during an annual simulation. Relatively higher 24-hour maximum extinction coefficients are predicted for the lowland areas of western Washington and in northern Oregon just south of the Columbia River. The meteorological conditions conducive to formation of secondary aerosols from the power projects include high relative humidity, light winds, and cooler temperatures that generally occur during fair weather in the spring, fall, and winter. During such conditions, plumes from the power projects are primarily confined to the lower elevations within the study domain.

Figure 3 shows the predicted maximum 24-hour extinction coefficients for the winter oil-fired case. This figure was constructed from the highest 24-hour extinction coefficient at each receptor predicted for the Baseline Source Group during a winter simulation. This scenario assumes sources within the Baseline Source Group permitted for oil firing would use this fuel for the entire winter period. Since the hours of fuel oil firing are restricted for most of the facilities, the predictions likely over predict impacts.[2] Due to relatively high SO2, PM10, and NOx emissions, the maximum extinction coefficients for the oil-fired case are potentially much higher than for the gas-fired case, especially in the airsheds influenced by the Fredonia Facility and the Chehalis Generation Facility. The Longview Energy Facility would use very low sulfur fuel oil (0.0015 percent by weight) as a secondary fuel and the potential impacts of the plant are reduced considerably during oil firing due to the use of this fuel.

The Federal Land Managers (FLMs) suggest the predicted change to the 24-hour average extinction coefficient as a visibility metric for assessing regional haze in Class I areas. According

to the FLMs, a five percent change in extinction can be used to indicate a "just perceptible" change to a landscape and a ten percent change in extinction coefficient from the "natural" background is considered a significant incremental impact.[3] As indicated above, the present analysis conservatively characterizes background visibility using seasonal aerosol concentration data on the days with the best visibility. Such good visual conditions are assumed for all days in the simulation and the analysis likely overestimates the joint probability of high source related impacts combined with low background aerosol concentrations.

Table 2 and Table 3 list the predicted number of days for each season with greater than five and ten percent change to background extinction, respectively. Assuming good background visual conditions, the Baseline Source Group with the Umatilla Generating Project would not significantly impact regional haze in any of the areas when these sources are fired by natural gas. For the winter oil-fired scenario, the Baseline Source Group could potentially result in a "just perceptible" change to the extinction coefficient on a few days for several of the areas examined in the study. The areas most affected are the Alpine Lakes Wilderness and Mt. Rainier National Park. In Mt. Rainier National Park the predicted change to background extinction for the winter oil-fired case exceeds the ten percent significance criterion on seven days.

Contribution of the Umatilla Generating Project. An analysis was conducted to examine the Umatilla Generating Project's contribution to the overall regional haze impacts predicted for the Baseline Source Group. Maximum 24-hour extinction coefficients predicted for the Umatilla Generating Project are displayed in Figure 4. This figure was constructed from the highest 24-hour extinction coefficient at each receptor predicted for the Umatilla Generating Project during an annual simulation. The higher 24-hour extinction coefficients are predicted relatively close to the proposed facility in the terrain south-southwest of Hermiston; extending eastward towards the Columbia River Gorge and Mt. Hood, and northeast into the Lower Columbia River Basin.

The relatively higher concentrations near the facility occur in slightly elevated terrain and are caused by the PM10 emitted directly from the turbines. With distance from the Umatilla Generating Project, secondary aerosols formed through conversion of the NOx and SO2 emitted from the facility become important components of the extinction. The worst-case meteorological episodes occur during the winter during outbreaks of cold air from the Lower Columbia River Basin. Note, this analysis did not consider whether meteorological conditions causing the greatest impacts actually coincide with good "natural" background visibility. Background aerosol concentrations will likely be higher and fog, low clouds, precipitation and other obscuring weather phenomena may reduce visual ranges so in some instances the impacts of the projects considered in this analysis would not be perceptible.

Table 4 summarizes potential changes to background extinction due to emissions from the Umatilla Generating Project to the Class I areas, CRGNSA, and the Mt. Baker Wilderness. The modeling suggests the proposed facility would potentially increase daily background extinction by up to 2.84 percent in the Mt. Hood Wilderness, but would contribute greater than 0.4 percent on only two days when the combined group's contribution is greater than five percent and no days when the group's contribution is greater than ten percent. The FLM's recommend 0.4 percent as a significance criterion for examining an individual source's contribution to

[3] USFS, NPS, USFWS, 2000. *Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report.* Obtained from http://www2.nature.nps.gov/ard/flagfree/FLAG--FINAL.pdf, December 2000.

cumulative impacts.[3,4] Based on this criterion, the Umatilla Generating Project would not significantly contribute to regional haze at any of the Class I areas within the BPA Service Area, the CRGNSA, or the Mt. Baker Wilderness when the facilities considered in this analysis are fired by natural gas.

Table 5 shows the Umatilla Generating Project contribution to predicted changes in extinction for the winter oil-fired scenario. This figure was constructed from the highest 24-hour extinction coefficient at each receptor predicted for the Umatilla Generating Project during a winter simulation. Based on the FLM significance criterion,[4] the Umatilla Generating Project would not significantly contribute to regional haze in Mt. Rainier National Park or any other of the areas considered in this analysis even when other facilities are using fuel oil.

[4] According to FLM recommendations for cumulative regional haze assessments, an individual project's contribution is considered "significant" when that contribution causes 24-hour extinction to increase by greater than 0.4 percent and for the same period the cumulative increase caused by all the sources being considered is greater than ten percent.

Table 1. Baseline Source Group Plus the Umatilla Generating Project Peak Emissions with Primary Fuel

Num	Project Name	Owner	MW	Peak Emissions (lb/hr)		
				SO2	NOx	PM10
1	Fredonia Facility	PSE	108	3.5	23.2	6.8
2	Rathdrum Power, LLC	Cogentrix	270	2.7	29.8	21.4
3	Frederickson Power	West Coast	249	10.2	19.7	16.9
4	Coyote Springs 2	Avista	280	1.1	30.0	4.5
5	Goldendale Energy Project	Calpine	248	1.0	14.9	11.8
6	Hermiston Power Project	Calpine	546	2.5	71.7	38.1
7	Chehalis Generation Facility	Tractebel	520	20.8	40.9	31.6
8	Longview Energy	Enron	290	1.4	25.0	19.9
9	Goldendale (The Cliffs)	GNA Energy	225	1.0	38.3	15.0
10	Big Hanaford Project	TransAlta	267	6.5	23.1	14.3
11	Umatilla Generating Project	PG&E	620	9.8	40.4	48.0
		Total	3623	61	357	228
Peak Emissions with Secondary Fuel						
1	Fredonia Facility (Oil-Fired)	PSE	104	51.2	23.2	12.2
7	Chehalis (Oil-Fired)	Tractebel	520	238.0	211.5	40.0
8	Longview Energy (Oil-Fired)	Enron	290	3.2	54.0	34.0

The Fredonia Facility has requested fuel oil firing for all hours of the year as a secondary fuel. The Longview Energy Facility and the Chehalis Generating Facility have requested fuel oil firing for 1,650 and 720 hours per year, respectively.

Table 2. Number of Days with Greater than Five Percent Change to Background Extinction Baseline Sources Plus the Umatilla Generating Project

Area	Natural Gas-Fired					Oil-Fired Winter
	Spring	Fall	Summer	Winter	Total	
Diamond Peak Wilderness	0	0	0	0	0	0
Three Sisters Wilderness	0	0	0	0	0	0
Mt. Jefferson Wilderness	0	0	0	0	0	0
Strawberry Mtn. Wilderness	0	0	0	0	0	0
Mt. Hood Wilderness	0	0	0	1	1	1
CRGNSA	0	0	0	1	1	2
Eagle Cap Wilderness	0	0	0	0	0	0
Hells Canyon Wilderness	0	0	0	0	0	0
Mt. Adams Wilderness	0	0	0	0	0	1
Goat Rocks Wilderness	0	0	0	0	0	2
Mt. Rainier National Park	1	0	0	0	1	19
Olympic National Park	0	0	0	0	0	0
Alpine Lakes Wilderness	0	0	0	0	0	5
Glacier Peak Wilderness	0	0	0	0	0	1
North Cascades National Park	0	0	0	0	0	1
Pasayten Wilderness	0	0	0	0	0	0
Mt. Baker Wilderness	0	0	0	0	0	1
Spokane Indian Reservation	0	0	0	0	0	1

Background extinction based on aerosol concentrations on days with the best visibility. For the CRGNSA and Spokane Indian Reservation based on top twenty percent, for all other areas based on the average of the top five percent.

The Oil-fired case assumes the Fredonia Facility, Chehalis Generating Facility, and Longview Energy Facility would all be using oil for all hours of a winter season.

Table 3. Number of Days with Greater than Ten Percent Change to Background Extinction Baseline Sources Plus the Umatilla Generating Project

Area	Natural Gas-Fired					Oil-Fired Winter
	Spring	Fall	Summer	Winter	Total	
Diamond Peak Wilderness	0	0	0	0	0	0
Three Sisters Wilderness	0	0	0	0	0	0
Mt. Jefferson Wilderness	0	0	0	0	0	0
Strawberry Mtn. Wilderness	0	0	0	0	0	0
Mt. Hood Wilderness	0	0	0	0	0	0
CRGNSA	0	0	0	0	0	0
Eagle Cap Wilderness	0	0	0	0	0	0
Hells Canyon Wilderness	0	0	0	0	0	0
Mt. Adams Wilderness	0	0	0	0	0	0
Goat Rocks Wilderness	0	0	0	0	0	0
Mt. Rainier National Park	0	0	0	0	0	7
Olympic National Park	0	0	0	0	0	0
Alpine Lakes Wilderness	0	0	0	0	0	0
Glacier Peak Wilderness	0	0	0	0	0	0
North Cascades National Park	0	0	0	0	0	0
Pasayten Wilderness	0	0	0	0	0	0
Mt. Baker Wilderness	0	0	0	0	0	0
Spokane Indian Reservation	0	0	0	0	0	0

Background extinction based on aerosol concentrations on days with the best visibility. For the CRGNSA and Spokane Indian Reservation based on top twenty percent, for all other areas based on the average of the top five percent.

The Oil-fired case assumes the Fredonia Facility, Chehalis Generating Facility, and Longview Energy Facility would all be using oil for all hours of a winter season.

Table 4. Contribution of the Umatilla Generating Project to Regional Haze in Class I Areas, Columbia River Gorge National Scenic Area, and Mt. Baker Wilderness – Firing by Primary Fuel

Area of Interest	Umatilla Generating Maximum Extinction (1/Mm)	Umatilla Generating Maximum Change to Background Extinction (%)	Number of Days When Umatilla Generating Contribution > 0.4%	
			And Cumulative Change to Extinction > 5.0%	And Cumulative Change to Extinction > 10.0%
Three Sisters Wilderness	0.11	0.86	0	0
Mt. Adams Wilderness	0.14	0.80	0	0
Alpine Lakes Wilderness	0.09	0.56	0	0
Diamond Peak Wilderness	0.07	0.35	0	0
Eagle Cap Wilderness	0.20	1.08	0	0
Glacier Peak Wilderness	0.07	0.39	0	0
Goat Rocks Wilderness	0.18	1.00	0	0
CRGNSA	0.54	2.41	1	0
Hells Canyon Wilderness	0.11	0.63	0	0
Mt. Hood Wilderness	0.57	2.84	1	0
Mt. Jefferson Wilderness	0.16	0.84	0	0
Mt. Baker Wilderness	0.06	0.25	0	0
North Cascades National Park	0.05	0.26	0	0
Olympic National Park	0.08	0.43	0	0
Pasayten Wilderness	0.05	0.29	0	0
Mt. Rainier National Park	0.13	0.83	0	0
Spokane Indian Reservation	0.18	0.57	0	0
Strawberry Mtn. Wilderness	0.16	1.07	0	0

Notes:

For the Umatilla Generating Project peak 24-hour gas-fired emissions were assumed for all days of the year. Cumulative predictions include emissions from the power projects listed in Table 1 fired by their primary fuel.

Predictions are from CALPUFF simulations of April 1, 1998 to March 15, 1999. Background extinction coefficients are based on aerosol concentrations during days with the top five percent best visibility for all areas except the CRGNSA and the Spokane Indian Reservation. The CRGNSA and Spokane Indian Reservation background extinction is based on the average for the top twenty percent at the Wishram monitoring site.

Table 5. Contribution of the Umatilla Generating Project to Regional Haze in Class I Areas, Columbia River Gorge National Scenic Area, and Mt. Baker Wilderness For Applicable Sources Firing by Secondary Fuel Oil During Winter

Area of Interest	Umatilla Generating Maximum Extinction (1/Mm)	Umatilla Generating Maximum Change to Background Extinction (%)	Number of Days When Umatilla Generating Contribution > 0.4%	
			And Cumulative Change to Extinction > 5.0%	And Cumulative Change to Extinction > 10.0%
Three Sisters Wilderness	0.04	0.31	0	0
Mt. Adams Wilderness	0.12	0.77	0	0
Alpine Lakes Wilderness	0.06	0.42	0	0
Diamond Peak Wilderness	0.01	0.08	0	0
Eagle Cap Wilderness	0.10	0.51	0	0
Glacier Peak Wilderness	0.05	0.27	0	0
Goat Rocks Wilderness	0.08	0.38	0	0
CRGNSA	0.54	2.41	1	0
Hells Canyon Wilderness	0.10	0.56	0	0
Mt. Hood Wilderness	0.57	2.84	1	0
Mt. Jefferson Wilderness	0.16	0.84	0	0
Mt. Baker Wilderness	0.04	0.20	0	0
North Cascades National Park	0.02	0.11	0	0
Olympic National Park	0.08	0.43	0	0
Pasayten Wilderness	0.05	0.29	0	0
Mt. Rainier National Park	0.06	0.46	0	0
Spokane Indian Reservation	0.18	0.57	0	0
Strawberry Mtn. Wilderness	0.16	1.07	0	0

Notes:

For the Umatilla Generating Project peak 24-hour gas-fired emissions were assumed for all days of the year. The Oil-fired case assumes the Fredonia Facility, Chehalis Generating Facility, and Longview Energy Facility would all be using oil for all hours of a winter season. Predictions for all other sources are based on the emission rates in Table 1 for their primary fuel.

Predictions are from CALPUFF simulations of April 1, 1998 to March 15, 1999. Background extinction coefficients are based on aerosol concentrations during days with the top five percent best visibility for all areas except the CRGNSA and the Spokane Indian Reservation. The CRGNSA and Spokane Indian Reservation background extinction is based on the average for the top twenty percent at the Wishram monitoring site.

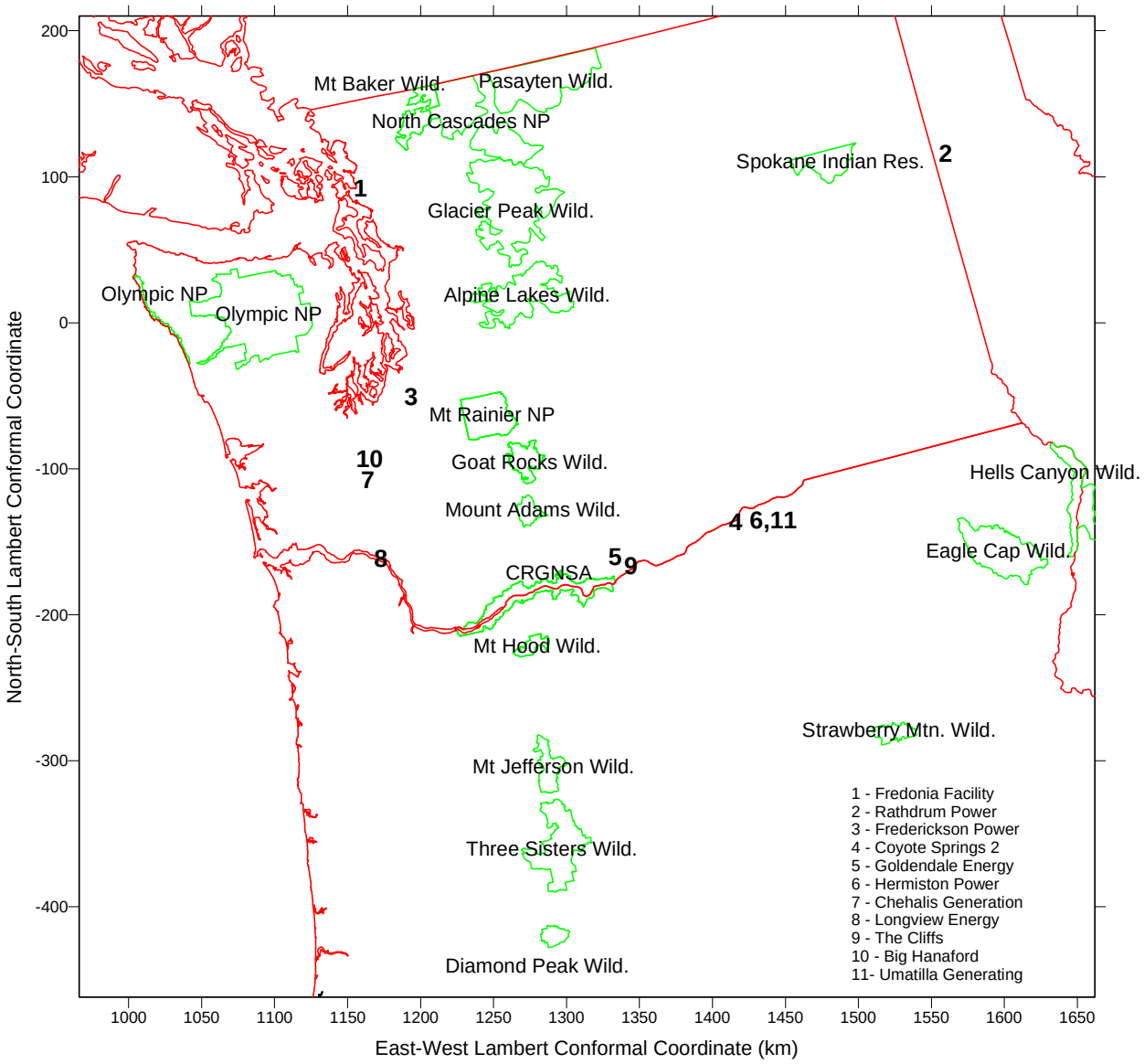

Figure 1. Baseline Sources with Umatilla Generating Project

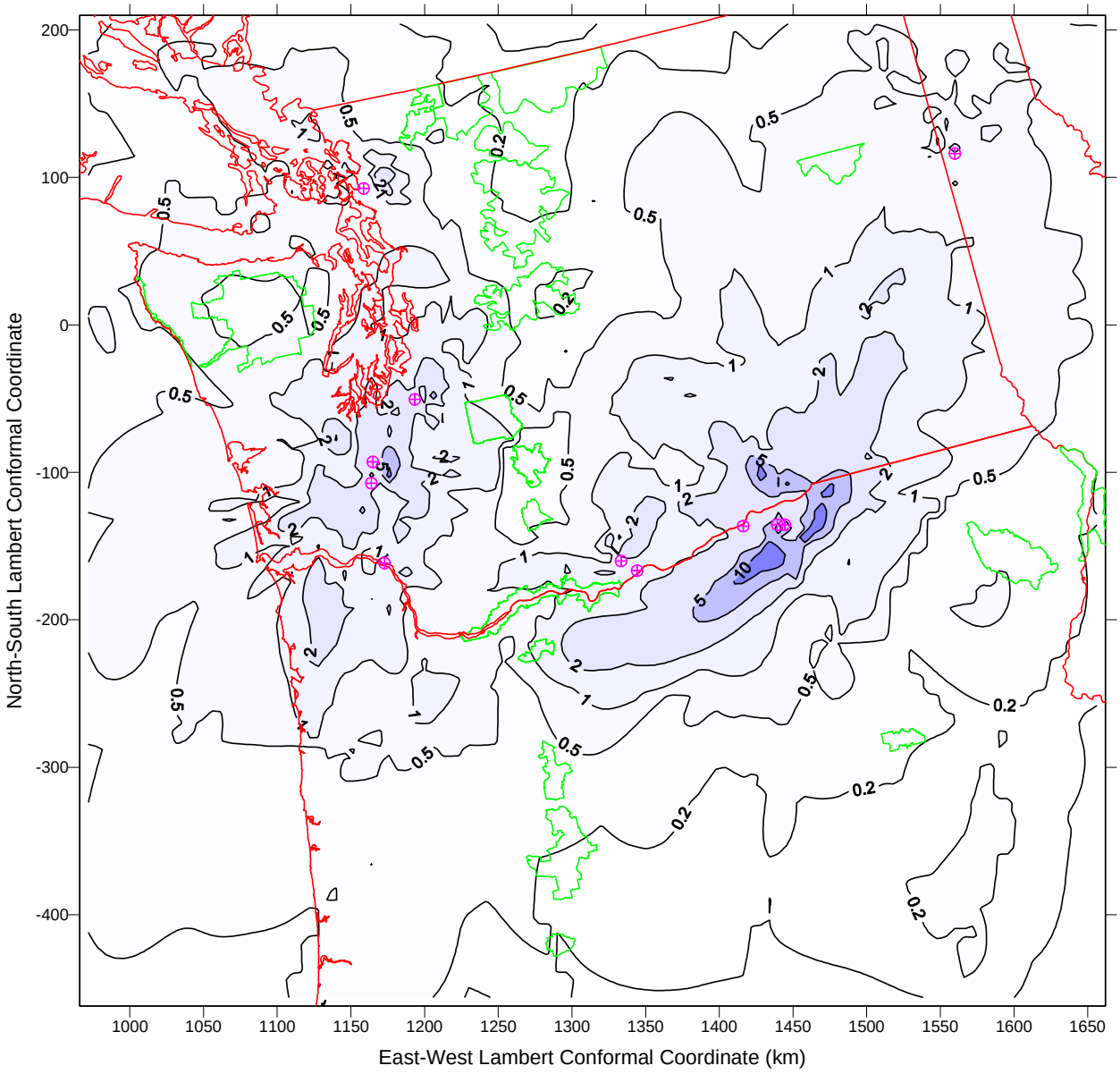

Figure 2. Maximum 24-hour Extinction Coefficient (1/Mm) at Each Receptor Based on an Annual Simulation of the Baseline Sources (Gas-fired) Plus the Umatilla Generating Project

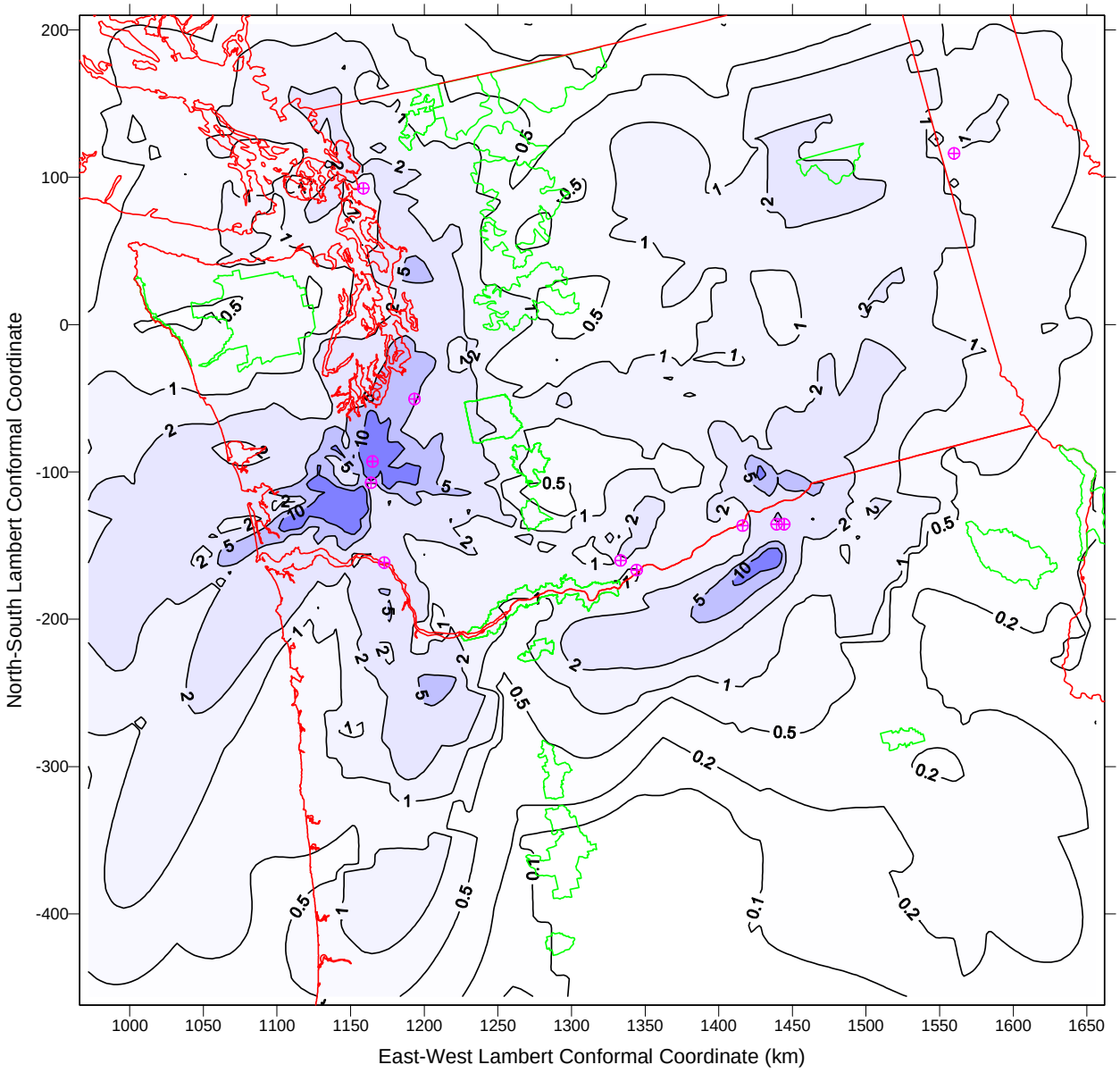

Figure 3. Maximum 24-hour Extinction Coefficient (1/Mm) at Each Receptor Based on a Winter Simulation of Baseline Sources (Oil-Fired)[5] Plus the Umatilla Generating Project

[5] The Oil-fired case assumes the Fredonia Facility, Chehalis Generating Facility, and Longview Energy Facility would all be using oil for all hours of a winter season. Predictions for all other sources are based on the emission rates in Table 1 for their primary fuel.

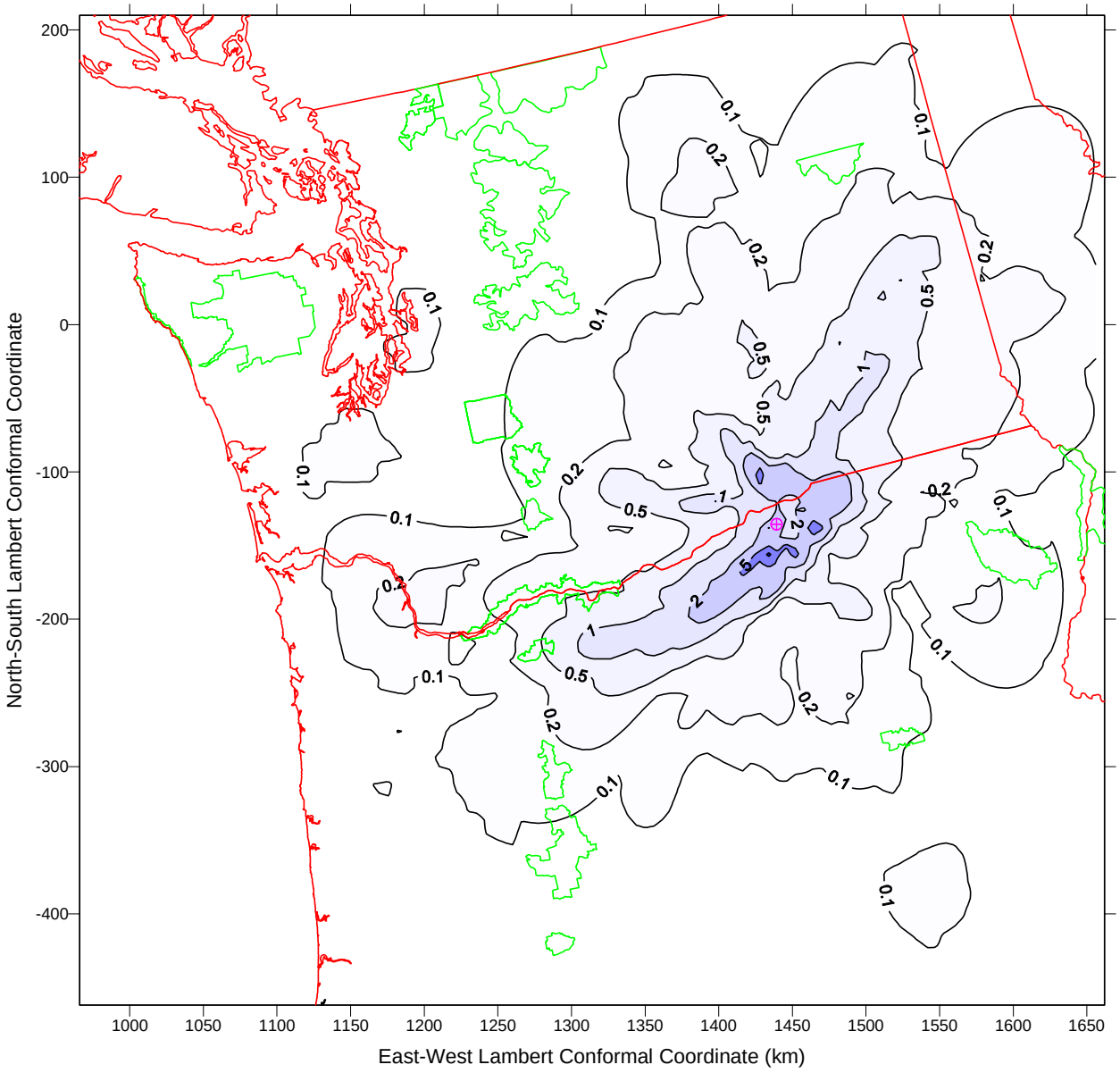

Figure 4. Maximum 24-hour Extinction Coefficient (1/Mm) at Each Receptor Based on an Annual Simulation of the Umatilla Generating Project Alone